

African Newsletter **on Occupational Health and Safety**

Volume 15, number 2, August 2005



**Occupational health and safety
programmes and management**

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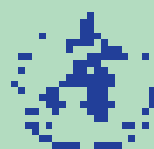
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Occupational health and safety programmes and occupational safety and health management

Efficient management systems and programmes on occupational safety and health are primarily responsible for protecting workers from work-related hazards and the elimination of work-related injuries, ill health, diseases, incidents and fatalities and their associated costs. This task has customarily been carried out with legislation and regulations. However, in the recent past, several systems management models for occupational safety and health (OSH) management systems (MS) have been developed especially to improve OSH performance and auditing. The need for OSH-MS has basically been driven by the quest for a global approach to OSH management in a global economy and by business realizing the need to integrate OSH into other business systems.

Traditionally, OSH management mainly focussed on compliance with legislation and was reactive rather than proactive, thereby focusing more on effects and outcomes such as illnesses and injuries. These matters are not neglected in a systems management approach and the inspection of working conditions and the environment is part of the management system and has progressively developed to embrace performance. In addition, workplace inspection has gone beyond the traditional domain to include areas previously not covered by legislation such as work-related psychological problems and stress, ergonomics, moral harassment and violence at work. In Africa today, inspectors are faced with challenges from new technologies in workplaces in addition to the traditional workplace hazards both in the formal and the vast informal economy that is generally unregulated and sparsely covered by inspection services. This has further been compounded by the scarcity of support and operational resources, facilities and the reduction of skilled and experienced inspectors, mainly due to the implementation of struc-



tural adjustment programmes that has been experienced in many countries over the past decade. For inspections to make the desired impacts in reducing workplace hazards, inspectorates have to come up with new and innovative inspection approaches, including broadening their skills and seeking synergies with new and old strategic partners, such as health ministries which are responsible for primary health care programmes.

These primary health care programmes are available in virtually all countries in both rural and urban areas and are valuable vehicles for providing basic occupational health services for the underserved workers in all sectors. The ILO Convention No. 161 on Occupational Health Services and the World Health Organization (WHO) Global Strategy on Occupational Health call for the organization of occupational health services for all. In meeting this goal and challenge, the Joint ILO/WHO Committee on Occupational Health, in collaboration with the Finnish Institute of Occupational Health and the International Commission on Occupational Health (ICOH), is in the process of developing a guideline for the provision of Basic Occupational Health Services (BOHS). The integrated application of these guidelines, including the training of new and existing inspectors and health care providers, will produce an invaluable improvement in the quality of life and lead to decent work for all. It is critical, therefore, that every effort is made to support this initiative, bring the guideline into effect and ensure its successful application, especially in developing countries where coverage is estimated to be below 10%.

At the international level, the ILO Occupational Safety and Health Convention 1981 No. 155 provides a point of reference for the establishment of both national and enterprise-based

OSH systems. At the national level, the Convention outlines the principles that should govern OSH systems, which in this case include policy setting, regulations and regulations control, promotion and support; education and training, situation analysis, etc. Such MS should have support at the highest level and be implemented under the direction of a national tripartite organ. There is also the need to tie the MS to the prevailing national development programmes in order to enhance their sustainability and access to resources.

Furthermore, the ILO Global Strategy on Occupational Safety and Health adopted during the 91st Session of the International Labour Conference in 2003 also calls for the promotion of a preventive safety culture and the need for national tripartite commitment and action. The Strategy emphasizes the need to develop a national framework for OSH management systems that is adequately supported by national laws and regulations that promote the development of voluntary arrangements to strengthen compliance leading to continual improvement in OSH performance and the achievement of lasting improvement in safety and health at work.

At the enterprise level, OSH-MS should be integrated and interwoven into other management systems to ensure that it is part and parcel of the business process. In order for it to be successfully applied and implemented, full commitment must be ensured at all levels, adequate resources must be allocated and a continuous review process that is in line with other business goals must be established. The establishment of strong and active bipartite organs such as occupational safety and health committees with full responsibility for overseeing the successful implementation of OSH-MS is critical at the enterprise level. The peer-reviewed ILO-OSH 2001 Guidelines on Occupational Safety and Health Management Systems have progressively provided the necessary technical support in setting up OSH management systems. The guidelines have been adopted by several countries such as Argentina, Ireland and Israel.

There is also a need to come up with specific OSH programmes at both the national and enterprise levels to address specific sectors or hazardous substances and materials. Such programmes should not, however, stand on their own but be integrated as part of the wider OSH management systems whether at national or enterprise levels. The Global Programme for the Elimination of Silicosis from the world by 2030 that was launched by the ILO/WHO Joint Committee on Occupational Health in 1995 and is already being implemented in some countries, is a good example of a tailored programme with impacts not only at the national level, but also at the regional level as it can address some critical long-term issues of migrant labour engaged in hazardous sectors, such as mining and construction, especially where regional blocks have free migration of labour.



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Management systems approach and national programmes on occupational safety and health (OSH)

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A management systems approach

One of the main pillars for the Global Strategy on Occupational Safety and Health (OSH) adopted by the International Labour Conference in 2003 (full text available at http://www.ilo.org/public/english/protection/safework/globstrat_e.pdf) is the application of a management systems approach to OSH at the national level. A model for such an approach at the enterprise level has been described in the ILO Guidelines on occupational safety and health management systems. As suggested in the Global Strategy on OSH, the application of this management systems approach at the national level, as proposed below, builds on this concept and related methodology. This approach at the national level is the core element of the new instruments on promotional framework for OSH which is briefly discussed at the end of this paper.

At the enterprise level

The systems approach to the management of OSH at the enterprise level provided in the ILO Guidelines on occupational safety and health management systems (ILO-OSH 2001) is based on the concept of continual improvement of performance through the application of the PDCA cycle (“plan-do-check-act”). The Guidelines include five sections, namely Policy, Organizing, Planning and implementation, Evaluation, and Action for improvement.

- “Policy” is the basis of the OSH management system and sets the direction for the organization to follow.
- “Organizing” provides guidance on management structures and the allocation of responsibility and accountability for delivering the policy.
- “Planning and implementation” gives guidance on initial review, system planning, development and implementation, OSH objectives and risk

control.

- “Evaluation” describes how to monitor and measure performance and carry out audits and reviews, identifying areas for improvement.
- “Action for improvement” addresses arrangements for taking preventive and corrective action and for continual improvement of performance through various measures.

These Guidelines have been successfully applied at enterprise level in many countries. In the following section, an attempt is made to describe a model for a management systems approach to OSH at the national level.

At the national level

Based on the above, the main steps in developing such a management approach at the national level include the following:

- Firstly, national policy on OSH should be formulated in consultation

Table 1. Comparison of the main elements of a management systems approach to OSH at the enterprise and national levels

Enterprise level	National level
<i>Setting OSH policy within the enterprise</i>	<i>Setting national policy on OSH</i>
<i>Establishing organization and responsibilities within the enterprise</i>	<i>Establishing and progressively developing a national system for OSH</i>
<i>Planning and implementing the elements of an OSH management system</i>	<i>Formulating and implementing national programmes on OSH</i>
<i>Evaluating and reviewing performance within the enterprise</i>	<i>Reviewing national programmes on OSH</i>
<i>Taking action for continual improvement</i>	<i>Formulating new national programmes on OSH for continual improvement</i>

with representative organizations of employers and workers, as laid down in the Occupational Safety and Health Convention, 1981 (No. 155). Other concerned parties may also be consulted as appropriate.

- Secondly, a national system for OSH should be developed which contains the infrastructure to implement the policy and national programmes on OSH.
- Thirdly, a national programme on OSH should be developed, based on the analysis of the OSH situation, which preferably should be summarized as a national profile on OSH, and implemented over a specific period of time.
- Finally, at its conclusion, such a programme should be reviewed, and be replaced by a new national programme on OSH.

Table 1 compares the main elements of a systems approach at the enterprise and national levels.

National systems for OSH

National systems for OSH are infrastructures which provide the main framework for the implementation of national programmes on OSH. In turn, one of the main aims of national programmes on OSH should be to strengthen national systems for OSH.

For the competent authority, it is not enough just to establish OSH legislation and to make arrangements for its enforcement. While tripartite collaboration, inspection and enforcement are still vital components of any national system for OSH, there is a need to develop other elements of the system covering specific functions – either within or in collaboration with key players such as labour inspectorates. For example, most employers, particularly those of small enterprises, need various supports just to comply with the legislation, such as providing OSH training to workers handling hazardous substances, conducting technical inspection of dangerous machines and carrying out medical surveillance. Further support and services are required to promote good practice covering many other aspects of OSH, which are outside the legal sphere. Although national systems for OSH can vary from one country to another, they should have many elements in common. These could include:

- a) laws, regulations, collective agreements or any other relevant instrument on occupational safety and health
- b) authority or body, or authorities or bodies responsible for OSH, design-

nated in accordance with national law and practice

- c) mechanisms for ensuring compliance with national laws and regulations, including systems of inspection
- d) arrangements to promote, at the level of the undertaking, cooperation between management, workers and their representatives as an essential element of workplace-related prevention measures
- e) information and advisory services on OSH
- f) the provision of occupational safety and health training
- g) occupational health services in accordance with national law and practice
- h) research on OSH
- i) the mechanism for the collection and analysis of data on occupational accidents and diseases, taking into account relevant ILO instruments
- j) provisions for collaboration with relevant insurance schemes covering occupational accidents and diseases, and
- k) support mechanisms for a progressive improvement of occupational safety and health conditions in micro-, small- and medium-sized enterprises.

Placing OSH high on national political agendas

A major challenge in the Global Strategy on OSH is the call to place OSH high on national political agendas. There is general agreement that the protection of workers is of great importance and that OSH is a priority issue, but it is a fact that OSH has not been given sufficient attention in practice in many countries. The Global Strategy refers to the adoption of national programmes on OSH as a means to solve this problem by stating that “the endorsement and launching of a national programme on OSH by the highest government authority, for example, by the Head of State, government or parliament, would have a significant impact on strengthening national OSH capacities and mobilization of national and international resources”. Several national programmes on OSH launched in recent years by member States have, in fact, been signed or endorsed by parliament, deputy prime ministers or other high authorities in national governments.

National programmes on OSH

A key element in making a management systems approach operational at the national level is the formulation and de-

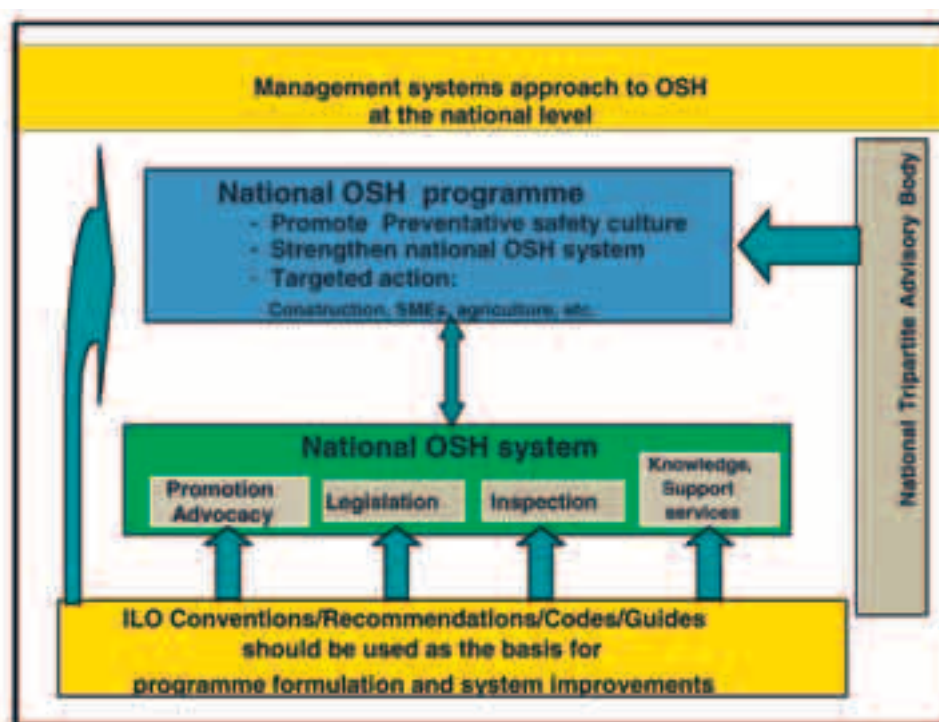
velopment of national programmes on OSH. These programmes are strategic programmes with predetermined time frame (e.g. lasting five years) that focus on specific national priorities for OSH, based on analyses of the situations in the countries concerned. These should preferably be summarized as national profiles on OSH. Each programme should be developed and implemented following tripartite consultation between government, employers and workers, and endorsed by the highest government authorities. While such programmes need clear objectives, targets and indicators, overall they should also aim to strengthen the national system for OSH to ensure sustainability of improvements and to build and maintain a national preventive safety and health culture.

National programmes on OSH should be developed taking into account ILO instruments on OSH. For each Member, the instruments to take into account include, in the first instance, ratified ILO Conventions. In terms of a progressive improvement of national systems for OSH, the target should be the effective implementation of the relevant up-to-date Conventions and Recommendations, as well as of other instruments, such as codes of practice and guidelines adopted in this area. Furthermore, member States should also take into account future OSH instruments that may be developed.

A conceptual diagram of the strategy for strengthening national systems for OSH through national programmes on OSH is shown in Figure 1.

In order to ensure a coherent and effective use of scarce resources and to coordinate efforts better, the development of a national programme on OSH should include a number of logical steps:

- national tripartite agreement to establish a national programme on OSH
- establishment of coordination mechanisms for the elaboration and implementation of the programme
- preparation of a national profile on OSH
- analysis and identification of strong and weak points in the national systems for OSH, using the national profile on OSH
- identification of priorities for national action to improve OSH
- development of action plans in a national programme on OSH, including indicators of success
- launch of the national programme on OSH with the endorsement of the highest national authorities (to ensure OSH is placed high on national agendas)



Source: ILO.

Figure 1. The management systems approach to OSH at the national level

- establishment of sustainable mechanisms for review, updating of data and continual improvements in effectiveness, and
- eventual designation of new priorities for action through the establishment of a new national programme on OSH based on an updated national profile on OSH.

National profiles on OSH

Once the government, employers and workers reach a consensus to formulate a national programme on OSH, the first technical step is to carry out a review of the national OSH situation. In order to carry out this review systematically, the preparation of a national profile on OSH is suggested. A national profile on OSH summarizes the existing OSH situation, including national data on occupational accidents and diseases, high-risk industries and occupations, and the description of national systems and capacity for OSH. National profiles on OSH also facilitate a systematic review of the improvements in national systems for OSH and programmes.

A national profile on OSH should:

- be prepared at the country level through a process that involves all the national competent and other designated authorities concerned with the various aspects of OSH, and more importantly the most representative organizations of employers and

workers

- include basic data on all the parameters that may affect the sound management of OSH, at both the national and enterprise levels, including available legislative framework, enforcement and implementation mechanisms and infrastructures, workforce distribution, human and financial resources devoted to OSH, OSH initiatives at the enterprise level and level of protection
- provide practical information on ongoing activities at the country level (e.g. activities related to the implementation of international agreements, ongoing and planned technical assistance projects)
- enable a country to identify gaps in and needs for further development of existing legal, institutional, administrative and technical infrastructure related to the sound management of OSH, taking into account relevant ILO Conventions, Recommendations and codes of practice
- provide a means for improved coordination among all parties interested in OSH. The process of preparing the profile itself may serve as a starting point for improved coordination and should facilitate communications and an improved understanding of the potential problems and activities being undertaken within the country.

ILO technical cooperation and assistance for national programmes on OSH

The Global Strategy also highlighted the importance of providing technical advisory and financial support to, in particular, developing countries and countries in transition for the timely strengthening of their national OSH capacities and programmes. Priority should be given to countries where the assistance is most needed and where the commitment for sustained action is obvious. The launch of national programmes on OSH was mentioned as one example of demonstrating national commitment. Properly formulated national programmes on OSH have clear priorities for action based on tripartite consultation and a review of the national OSH situation. Thus, technical cooperation activities to support the implementation of national programmes on OSH have ensured success in view of their relevance and sustainability. While the launch of national programmes on OSH is a good criterion for providing technical and financial support, many developing countries require technical support in formulating a national programme on OSH. Thus, the formulation of a national programme on OSH could be an area for ILO technical cooperation if there is a tripartite commitment to OSH in the country.

Promotional Framework for OSH

The International Labour Conference, held in June 2005, had the first discussion on the elaboration of new instrument on promotional framework for OSH based on the guidance provided by the Global Strategy on OSH. After an extensive debate, the Conference Committee selected a Convention accompanied by a Recommendation as the form of the instrument. Proposed Convention is a new type of Convention with the focus of promoting OSH as suggested by the Global Strategy on OSH with the objectives of placing OSH high at national agenda and promoting preventive safety and health culture and systems approach at the national level. The design concept of the new Convention includes 1) promotional, 2) easy to ratify, 3) non-prescriptive, 4) avoid duplication with provisions of existing OSH instruments, 5) promote application of existing OSH instruments, 6) target continual improvement of national OSH system and performance. The report of the Conference Committee is available at <http://www.ilo.org/public/english/standards/realm/ilc/ilc93/pdf/pr-18.pdf>. In June 2006, the International Labour Conference will have the second discussion to adopt a new Convention and a Recommendation on promotional framework on OSH. Active participation of all ILO constituents is essential in elaborating effective and practical promotional framework for OSH.

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Challenges in development of labour inspection systems

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The Kenyan labour inspection system has two separate inspection branches: namely, the industrial relations branch which deals with working hours, wages, terms and conditions of work; and the occupational health and safety branch which deals with the health, safety and welfare at workplaces. The topic of this article is the systems as they relate to occupational health and safety.

The department responsible for occupational health and safety inspection is the Directorate of Occupational Health and Safety Services within the Ministry of Labour and Human Resources Development. It has five divisions: i) field services and the specialized divisions for ii) occupational hygiene, iii) safety, iv) occupational health, and v) information & training. Occupational health and safety undertake different types of inspections, as needed: e.g. on request due to a complaint or accident, or a routine inspection. Routine inspections follow an annual work plan and set targets. The inspections normally seek to identify contraventions against the provisions of the Factories and Other Places of Work Act, Chapter 514, laws of Kenya.

Challenges faced by the inspection system

The Factories and Other Places of Work Act makes the employers responsible for ensuring that the work environment is safe and without risks to employees' health. In the traditional approach, which has been practised for a long time, the occupier of the factory primarily waits for the government inspector to

inspect and point out the contraventions against the law, sometimes requiring that the occupier is taken to court before any tangible improvements are made. If no inspector shows up, the workplace safety improvements implemented by the employer are usually very basic, if any. This reactive approach has proved ineffective over time – hence the need for change, for the following reasons.

- 1) The industrial activity has expanded over time, but the number of inspectors needed to conduct regularly inspections of every site has remained low. This situation has been worsened by the structural adjustment reforms that require lean government service. Under a situation of this kind, it may take years before an enterprise is inspected.
- 2) The officers rely primarily on government-provided transport when exercising their duty. Due to financial constraints, governments have not been able to provide the necessary adequate transport. Even if there were an increase in the number of officers, a significant rise in inspections would not take place unless adequate transport facilities were made available.
- 3) It is recognized that the clients require appropriately trained officers who are competent in identifying hazards and offering practicable solutions. However, training opportunities have thinned out, particularly from the nineties onwards, as there was over-reliance on donor assistance, which is very little nowadays. This situation makes it even more difficult for the government to offer



quality inspection service.

- 4) Many clients are increasingly challenging the inspectors to support their opinions with scientific data. The officers in the field lack the necessary equipment to deal with this challenge. There is a need for a system that does not rely on the government to provide the measurements. The system used for the examination and testing of plants by persons approved and supervised by the government has worked successfully since the Factories Act came into effect in September 1951. A similar arrangement should also work for hygiene measurements.
- 5) The demand for all economic activities to be covered by the occupational health and safety legislation will certainly create a greater burden in terms of an increased workload that the traditional system cannot handle.
- 6) The general low rating of the Ministry of Labour when it comes to funding makes it difficult to deal effectively with the above issues, as all are dependent on funds. Therefore, it is necessary to introduce inspection systems, which are proactive and complement the government efforts in prevention of accidents and diseases at workplaces.

To work towards overcoming these challenges, and improving the quality of conditions in the work environment, Kenya has recently introduced the fol-

lowing measures.

- The revitalization and operationalization of safety and health committees at workplaces so that the employers and workers are collectively involved in health and safety matters at the workplace without waiting for government intervention. It is now mandatory for such committees to meet at least once every three months, and for them also to conduct regular inspections of their respective workplaces. This strategy aims at enhancing self-regulation of the enterprise.
- As part of the change process, training of the health and safety committee members by approved training institutions is mandatory. To ensure that quality training is offered to the member of the committee, the institutions – before approval – must prove competence in occupational health and safety training. In their training, the institutions follow the course contents and guidelines provided by the Director of Occupational Health and Safety Services.
- Introduction of health and safety advisers who will help employers by auditing and offering advice on the most effective means of complying with legal provisions – hence allocating a major advisory role to the Occupational Health and Safety Department. The Department will concentrate more on its core functions of enforcement and developing technical guidelines for the use of the advisers, employers and workers. The advisers are approved by the Director of Occupational Health and Safety Services, and only those with OSH qualifications, five years of occupational health and safety experience, as well as a degree or higher national diploma in a science discipline in engineering are considered. The Department uses the adviser's audit report for enforcement. In order to achieve a standardized way of auditing, the Department has developed a code of practice for health and safety auditing. This code is useful to the safety committee members as well.
- Mandatory formulation of safety policies and appointment of competent persons responsible for safety matters by organizations will introduce objectivity in management of the company safety function.

- The compilation of medical examination rules that provide for the appointment of designated health practitioners will strengthen and improve the health surveillance of workers throughout the country.
- Equipping the information centre, which serves as a national reference point for occupational health and safety, will improve information dissemination and exchange in a manner that positively impacts on the performance of inspections.

Issues arising

1. Employers' resistance to the introduction of new systems, owing to perceived costs. Such employers do not seem to appreciate the benefits of health and safety.
2. Conflict with investment promotion priorities of the Ministries of Trade and Industry. It is felt that health and safety matters make investment costly.
3. Poor planning and management of inspection services. Implementation of the strategic plans already in place as a government policy and the introduction of performance contracts are expected to bring about the desired improvement. There is a need, however, to train the officers in planning and management.
4. For the smooth succession process and continuity in the quality of work performance, a balance should be established between the well-trained aging workforce and the young. Local universities have been requested to start a postgraduate diploma in the field – if affordable – for interested persons to benefit locally.
5. Application of a solutions-oriented approach by the law enforcers and the health and safety advisers is client-friendly and motivating. Appropriate training is, however, necessary for its success.
6. There is a need to create a future workforce that is sensitive to the issues of health and safety through the introduction of basic occupational health and safety in the school curricula.

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Basic Occupational Health Services

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Of the total 3 billion workers in the world over 85% work and live without having access to occupational health services (OHS). In many countries on all continents occupational health services may cover only 5 % of the workforce. Statistics on coverage is also very unreliable and subject to variations in the definitions and measurement methods. For example, often coverage is reported as the intended coverage of services as stipulated by legislation although the implementation in the real life may have remained minimal. The real coverage is also affected strongly by the content of services. The service provided in the form of health examinations only is substantially different of the service which comprises all the preventive, promotion, curative and rehabilitation elements which are possible to implement through occupational health services. Many experts share the view that even the 15% coverage of the workforce of the world may be an over-estimate.

During the past 20 years the development of occupational health services in terms of coverage and real implementation has been at best modest. In fact, the global trend is declining rather than improving, due to several factors associated with globalization. Outsourcing, downsizing, fragmentation of companies, minimizing the social costs of companies tend to reduce the coverage. In addition, growing numbers of the self-employed and the informal sector workers, growing turnover, short-term employment contracts and partial unemployment all affect possibilities to provide occupational health services for workers.

The declining trends are seen in spite of the fact that several authoritative bodies, including the ILO, WHO and numerous professional organizations and

the organizations of workers have, already for several decades, emphasized the need for services. The ILO Convention No. 161 on Occupational Health Services and the WHO Global Strategy on Occupational Health for All call for the organization of services to all working people of the world. We are still far from this goal, and it is not likely that the coverage will essentially expand without concerted efforts. The Convention No. 161 has been ratified so far by 19 Countries, i.e. about 10% out of 200 Member States of the ILO. A number of other countries have reported they use the Convention and related Recommendation as a guideline for the development of occupational health services.

Very recently a new interest to develop occupational health services has appeared likely as a consequence of the identification of negative social impact of globalization particularly in the developing countries and countries in transition. The task to develop the services for all working people is huge and takes several decades to be totally met. The most important underserved sectors or sectors without services at all are particularly found in developing countries, but gaps in the coverage are also seen in the industrially developed countries particularly in agriculture, informal sector, small-scale enterprises and medium-sized enterprises. In addition, migrant workers are in many countries without services as they are likely to work in the sectors, where services are not available. The access to services does not match with the real needs, i.e. the rates of injuries and diseases and the exposures of workers to various risk factors. In several meetings of the occupational health administrators and experts the reasons for the slow development of the coverage of OHS have been discussed. Good examples of the reasons were re-

cently listed by the Inter-Country Workshop on Primary Health Care and Basic Occupational Health Services of the WHO Eastern Mediterranean Region which convened in Sharm-El-Sheik, Egypt in July 2005:

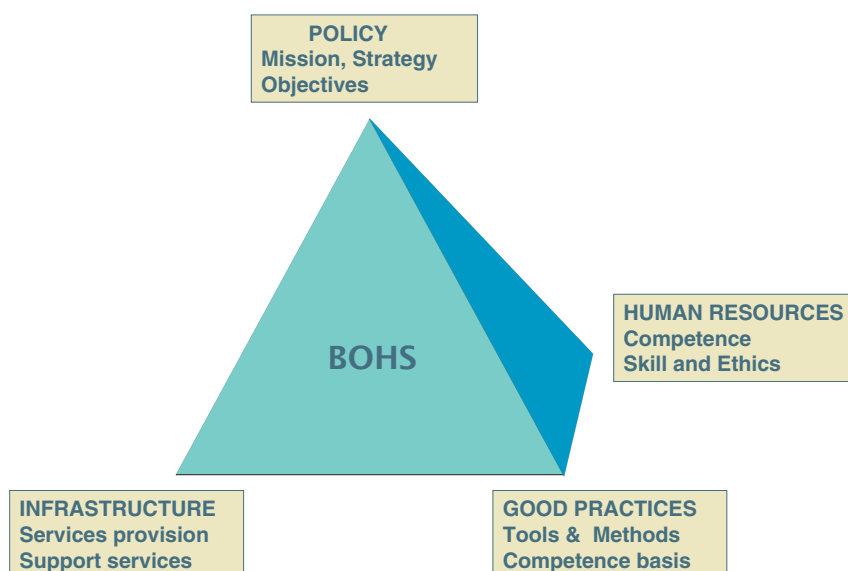
- Low awareness of decision-makers of importance and benefits of OHS
- Financial constrains
- Shortage of trained experts needed for OHS
- Poor understanding of the concept of OHS
- Ambiguity of the roles of various ministries and lack of collaboration
- Low priority given to occupational health in national health policies
- Low priority given by the International Organizations, WHO and ILO to Occupational Health in their policies and programmes.

So the recognized reasons are primarily political and in policy prioritization rather than technical. There is, however, also a recognized need to develop new strategies and technologies to adapt occupational health paradigms and practices to the changed structures of economies and to the new trends in the employment and demographic changes of workforce.

Background and generation of the BOHS concept

In order to meet the global needs to develop occupational health services in the world the 13th Joint ILO/WHO Committee on Occupational Health on 9–12 December 2003 decided to develop a new concept, Basic Occupational Health Services, BOHS. The development work was agreed to be done in collaboration among the WHO, ILO, and the International Commission on Occupational Health, ICOH.

The concept of BOHS is based on the



do not have any OHS at all, this is a reasonable starting point. This is the service utilizing field OHS workers (if possible, a nurse and safety agent), who have a short training in OHS and who work for a primary health care unit or respective grassroots level facility. The content of service focuses on most important and severe health hazards and on their prevention and control.

Stage II: Basic Occupational Health Services (BOHS)

This is the infrastructure-based service working as close as possible to the workplaces and communities. The service provision model may vary depending on local circumstances and needs. The personnel comprises a physician and a nurse with training in occupational health. They may work on full-time or on part-time basis depending on needs and local circumstances.

Stage III: International Standard Service

This level is the minimum objective for each country as stipulated by the ILO Convention No. 161. The service infrastructure has several optional forms and the content is primarily preventive, although also curative services may be appropriately provided. The service staff should be led by a specially trained expert (usually a specialist occupational health physician) and the team should preferably be multidisciplinary.

Stage IV: Comprehensive Occupational Health Services (COHS)

This level is usually found in the big companies of industrialized countries or it may be provided by large OHS centres. The staff works as a multidisciplinary team often including several specialists like specialist physician, occupational health nurse, occupational hygienist, ergonomist, psychologist, safety engineer, etc. The content of services is comprehensive covering all relevant aspects of occupational health.

The Stages I and II are primarily designed for the smallest and micro-enterprises, the self-employed and the informal sector which have no possibilities to start immediately from the International Standard level three.

The content and activities of BOHS

It is important to note that although the BOHS are intended to support meeting the basic needs of health and safety at work, the content of services still is designed to comprise all the three elements, protection, prevention and promotion. Also curative activities are included where needed and to the extent which does not compromise the preven-

public health theory and particularly on the concept of primary health care as defined by the Alma Ata Declaration. The BOHS apply primary health care principles and aim on their part at the implementation of the WHO Global Strategy on Occupational Health for All. The BOHS are simultaneously a step in the practical implementation of the ILO Convention No. 161 on Occupational Health Services and the Convention No. 155 on Occupational Safety and Health. The BOHS also serve as a response to the priority area set for the ILO/WHO/ICOH collaboration in the 13th Joint ILO/WHO Committee on Occupational Health in 2003.

The definition of BOHS can be spelled in line with the above principles as the following:

The Basic Occupational Health Services are an essential service for protection of people's health at work, for promotion of health, well-being and work ability, as well as for prevention of ill-health and accidents. The BOHS provide services by using scientifically sound and socially acceptable occupational health methods through primary health care approach.

The WHO has continued in collaboration with ILO and ICOH to develop the paradigm of BOHS. The most important conclusion is that the sustainable occupational health service is not developed as a time-limited project, but it needs a set of several prerequisites covering legislation, government policy, development of appropriate infrastructure and content which are feasible in conditions where BOHS need to be implemented.

The overall paradigm of BOHS is presented in Figure 1, emphasizing the role of four important elements: policy, infrastructure, appropriate content in the form of good practices, and the availability of human resources, well-trained experts, their competence, skill and ethical principles.

The objective of Basic Occupational Health Services is to help increase the global coverage of services and guide to appropriate content of services so that the occupational health needs of workers and workplaces in very varying conditions prevailing in different parts of the world are met. The ultimate objective of the BOHS is to ensure provision of services for all workplaces in the world (in both industrialized and developing countries) which so far have not had such services available or the services have not met their occupational health needs.

Stepwise development of infrastructures

A sustainable occupational health service requires an infrastructure. Every country should analyse its prevailing situation in OHS. On the basis of such an analysis, a national policy and strategy including an action programme need to be drawn up. To consider the wide variation in the stage of development of the occupational health services in different countries a stepwise strategy is recommended. Depending on the degree of development achieved by the country, following steps may be considered:

Stage I: Starting level

To the workers and workplaces, which



Figure 2. The BOHS activities described as a continuous process for improvement of the work environment and workers' health.

tive approach. The BOHS activities are described as a process starting from identification of occupational safety and health needs, going to surveillance of the work environment and workers' health, risk assessment, initiation of necessary preventive and control actions which have been recognized through risk assessment and proceeding to assistance in implementation of preventive and control actions and finally evaluation of the impact of actions (the BOHS process cycle, see Figure 2 above).

Evaluation may lead to redesign of activities according to the principle of continuous improvement of services.

Following steps in the BOHS activity process deserve to be briefly mentioned here:

- Orientation and planning to the workplace by collecting information on the typical hazards and problems of the economic sector in concern, available data on hygienic measurements, actions undertaken in the past, records of injuries and diseases
- Surveillance of the work environment for identification of workplace hazards and for planning their prevention and control
- Surveillance of worker's health to detect the occupationally determined diseases and to assess
 - their consequences
 - Assessment of health and safety risks and their judgement for prioritizations
 - Information and education on risks to the employers and workers and advice on the need for preventive and control actions
 - Participation in actions and campaigns for prevention of accidents and major hazards
 - Maintaining and training preparedness for first aid and participation in the organization for emergency preparedness
 - Diagnosis of occupational and work-related diseases when appropriate and their referral to an assigned clinic
 - General health care, curative and rehabilitation services when appropriate
 - Record keeping on activities, such as hygienic measurements and outcomes such as occupational diseases and injuries
 - Evaluation of effects and impact of BOHS's own activity by using the recorded data as a data source.
- Primary health services model integrating BOHS into the primary health care unit's activities
- Big company model operating from inside the company by staff employed by the company itself
- Social security institution as a service provider
- Group service organized jointly by several small or medium-sized enterprises on non-profit basis
- Private health centres providing exclusively occupational health services or BOHS as a part of other health services
- Private physician who has special competence in occupational health
- Local or regional outpatient clinic of hospitals as BOHS providers.

The structure, size, nature of activity and geographical distribution of workplaces vary widely. It is a lesson from many countries that one model alone is not sufficient for ensuring full coverage of services for all workplaces and all working people. Therefore, a flexible use of several models fitting best to the local circumstances is recommended. Each service provision option should, however, be integrated into the overall national OHS system.

Service provision models

In general, numerous models for the provision of occupational health services are available:

Human resources and support services for BOHS

An experience-based estimate speaks for a minimum need of one physician and two nurses per 5000 workers with a great variation depending on the branch of industry and size of workplaces, as well as on their geographical distribution. The public authorities are responsible for ensuring that such a resource is available and its competence is regularly updated in every country. A core team should comprise at least a physician and a nurse, who both need to have training in occupational health. They should be supported by a kind of safety agent trained in safety and accident prevention. The front-line services also need to be supported by intermediate level services to ensure, for example, hygiene services and the diagnostic services for occupational diseases. The Institute of Occupational Health serves usually best this purpose.

Financing

According to the ILO Convention No. 161 on Occupational Health Services, the financial responsibility for the provision of occupational health services rests on the employer. As the ability of the small enterprises and the self-employed, and particularly the informal sector enterprises and workers, to buy external services is poor or non-existent, often the only possible provider and financier of services is the public sector, i.e. the primary health care units, public polyclinics or social security organizations. As the employer is responsible to ensure safety and health at work, whatever is the financial arrangement, it is a strong principle of the ILO Convention No. 161 that the worker should not be put to pay for costs of services, which are established for correction and prevention of hazards at work.

Actors in organization and development of BOHS

Occupational health services are a collaborative activity of OHS experts, employers and workers of the workplace. In addition to these three partners numerous other actors are needed at the national level for various activities concerning OHS. A part of them ensure prerequisites for organization and functions of the services, another part participate in the service delivery. Among the most important actors are the following:

- Government's special agencies in occupational safety and health and in the health sector

- Provincial and local municipal authorities
- Social partners, employers' organizations and trade unions
- Branch organizations and chambers of commerce
- Associations of agricultural producers and small enterprises
- Associations of occupational health professionals
- Safety representatives of local workplaces and communities
- Ministry of Agriculture and Ministry of Industry
- Universities and other educational settings.

To ensure good coordination and full participation of all the relevant partners, a National Committee for Occupational Health Services or for Occupational Safety and Health may be organized.

Summary

The global need for the development of occupational health services particularly for the working people and workplaces, which at present do not have access to services, is massive and urgent. The traditional instruments and totally voluntary activities have not provided such services in the past and the current trend in the coverage is declining rather than increasing.

The Joint ILO/WHO Committee on Occupational Health in collaboration with the International Commission on Occupational Health, ICOH, has developed a model for Basic Occupational Health Services, BOHS, which is intended to help the countries to meet the needs to expand the coverage of services and to provide a reasonable content, which fits to the local and workplace level OHS activities. Numerous practical tools for the implementation of BOHS and training of BOHS providers are still needed to get the objectives of the BOHS initiative implemented. Nevertheless, the BOHS initiative is one of the few actions to meet the objectives of the ILO Convention No. 161 and the WHO Global Strategy on Occupational Health for All at the practical level.

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Problems in teaching occupational health and safety in university degree courses

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Background

The disease burden in developing countries, especially in Tanzania, is largely preventable. The determinants of these diseases are mainly environmental. It is clear that given the magnitude and diversity of the current and future environmental health issues in Tanzania, the need for competent environmental health professionals with a broad, sound scientific background is extremely important.

The present curriculum was first developed in 1980 but owing to constraints, it could not be implemented until 1995 when the Institute of Public Health (now the School of Public Health and Social Sciences) was asked by the Ministry of Health and Muhimbili University College of Health Sciences to refine the curriculum for the degree of Bachelor of Science in Environmental Health Science (BSc. EHS). The curriculum was developed and approved by the Senate of the University of Dar es Salaam in 2000. The first intake of 18 students was enrolled during the academic year 2001/2002. Six main modules were earmarked, namely Public Health, Food Safety, Pollution Control, Human Settlements, Risk Management and Contextual Studies. Occupational health and safety is included in the Risk Management module. The course is taught in six semesters.

Occupational health

The ability of any community to provide health care and other social services for its members depends on its resources. The development of these resources depends, in turn, on the productivity of the workforce. It is essential that workers –whether farmers, factory workers or office workers – are healthy. Thus

health care for workers – occupational health – is one of the most direct contributions that health services can make to the community's productivity, and therefore to its welfare.

Component of occupational health and safety taught in the degree course

The occupational health and safety component has the following broad objectives:

- To orientate students in the principles of occupational health and safety
- To equip students with knowledge and skills for preventing occupational hazards
- To enable students to understand the impact of work activities on people's health, safety and welfare, and to

enable them to apply control mechanisms and strategies.

What has been taught in the past three years?

The training has followed the University of Dar es Salaam Prospectus (UDSM, 2004). It has involved 140 hours for theory and 70 hours for laboratory and field work. The course contents are shown below.

Definitions and occupational services provided in Tanzania:

- classification of occupational hazards
- preventive/control measures of occupational hazards
- occupational health services in Tanzania
- advice on medical checkups and first



Students studying for the Bachelor's degree near the entrance to Mount Kilimanjaro climbers.

Photo by L.M.B. Rongo

aid facilities – e.g. pre-employment medical examination, periodic checkups

- industrial and other workplace visits.

Impact on human health and safety:

- role of other organizations on occupational health and safety
- relative rights and responsibilities of employees and employers
- occupational hazards protection
- impacts on human health and safety arising from work activities
- identification of hazards, and assessment of risks
- identification of unsafe work practices/procedures in variety of workplaces
- health and safety inspections
- evaluation of health and safety management systems in regulated workplaces
- role of occupational health entrance agencies.

Output

In December 2004, we marked the first graduation from this course; eighteen students were awarded the degree of Bachelor of Science in Environmental Health Sciences. This was a good outcome, something to be proud of despite all the difficulties encountered during training. They all finished their six-month internship in April 2005. Personal communication with one of the students revealed that they were all doing fine as interns, but further training on Master of Science courses is necessary to make them more effective. We are requesting all interested institutions outside Tanzania to consider sponsoring some of these graduates for the Master of Science degree course in Occupational Health and Safety. After qualifying, these post-graduates will become future course lecturers. They will also become resourceful to the Ministry of Health.

In December 2005, the second intake of 23 students will be awarded the degree of Bachelor of Science in Environmental Health Sciences, earned in accordance with the University of Dar es Salaam Prospectus (1).

What problems were encountered in running the course?

The problems faced were both organizational and managerial. The following partial list includes only some of the problems that are easy to spot.

Part-time lecturers

The major constraint faced by the col-



This photo is showing breeding ponds for malisa and helisoma snails (see the corner). These snails are used as biological control for *Biomphalaria glabrata*, the bilharzias snail.

Photo by L.M.B. Rongo

lege was to identify suitable lecturers in occupational health and safety. It has been reported in the past that such experts are not available in Tanzania (2). The college identified only one suitable lecturer, but he was not always available because he had other office obligations. The second constraint was the money need to pay part-time teachers. If such a lecturer were available all of the time, he would cost the college about 3,220 euros per semester lasting 18 weeks. This is an area where we need an expert in occupational health to chip in.

Practical

The time meant for practical work in laboratory and in industries was 70 hours. The students had limited practical sessions on occupational health and safety. This was the case because most of equipment used to assess work exposures in workplaces was not available. Again because of globalization and the liberation of trade, very few industries were willing to be inspected by students. Only those industries known to the trainer could allow visitors such as the students. In addition, few Tanzanian authors have published occupational health and safety studies that could be taken as examples and references (3–6). We appeal to international organizations to assist by donating exposure assessment equipment and reagents. We are also looking for supporters to start an occupational health and safety laboratory and workshops.

Field training

Students visited areas of interest in order to merge theory and practice. In

December 2004, they visited the Kilimanjaro Agricultural Development Project (Lower Moshi Irrigation Scheme), Tanganyika Planting Company Ltd in Moshi, the Tropical Pesticide Research Institute and the Tanzania Atomic Energy Commission in Arusha. They studied biological bilharzias snail control by using malisa and helisoma snail killers at Tanganyika Planting Company Moshi, proper disposal of radioactive substances in the Tanzania Atomic Energy Commission, and pesticide residues in food in the Tropical Pesticide Research Institute.

Problems with transport

Transport for the course was not well organized. We had to use public transport when there was no alternative. This is another area where we are requesting assistance or collaboration. At least one 40-seater bus, that would be shared by students of all study years, is required. The photo on next page shows that, without a transport vehicle, it is impossible to visit these areas.

Occupational health and safety books

This course was first taught intensively in Tanzania with the intake of 2001/2002. The occupational health books found in our medical library are very old. We would need experts in the field of occupational health and safety to point out modern occupational health and safety books; possibly these might be donated to the newly established course. We are also lacking journals on occupational medicine/health and safety.



Borders of rice pad irrigation in the Lower Moshi Irrigation Project.

Future plans and request for assistance from international institutions

We are looking for collaborators, from institutions both inside and outside Tanzania, to support the course. We will accept support of any kind, even if it is in terms of supporting a module or a topic. This article deals with the Risk Management module, where topics in the sphere of occupational health and safety, occupational hygiene and risk management are covered.

In addition to the above ambition, in future we are planning to:

1. use volunteers in the field of occupational health and safety to teach the course
2. provide short courses in occupational health and safety for the existing lecturers who teach the course, from the Muhimbili University College of Health Sciences
3. train existing laboratory technicians to assist students in their practical work
4. employ an industrial liaison officer to improve relationship between the college and existing industries, both those in Dar es Salaam and those up country. This will increase places for students to their practical work.
5. request a transport vehicle from institution willing to support the course. At least 45,000 euros is required for a 40-seater bus.
6. request books on occupational health and safety from international organizations, e.g. WHO, ILO, OSHA,

NIOSH, the UNDP and the World Bank. Support in terms of books or journals from individual institutions or individual persons are also welcome.

Conclusion

Muhimbili University College of Health Sciences is the first institution in Tanzania to conduct a course that has a strong component on occupational health and safety. We are appealing to all institutions with experience in teaching this component to provide assistance.

Acknowledgement

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Management perspective of workplace health and safety practices in Kenya

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KENYA

The concepts of health and safety were introduced in Kenya as early as 1951 with the commencement of health and safety legislation. The Factories and Other Places of Work Act was enacted to promote the health, safety and welfare of persons employed in factories and other workplaces.

Later, occupational safety and health rules derived from the sections of the principle Act, and covering various activities, were developed to serve as further guidelines and standards for promoting safety and health in factories and other workplaces. Among the rules that have been developed since then include the First Aid Rules (1977), the Protection of Eye Rules (1977), the Woodworking Machinery Rules (1959), the Docks Rules (1962), the Cellulose Solution Rules (1964), the Electric Power Rules (1979), the Building Operations and Works of Engineering Construction Rules (1984), the Safety and Health Committees Rules (2004), the Medical Examination Rules (2005), and the Noise Prevention and Control Rules (2005).

All these rules were made to enable the employer and employees, or any other stakeholder, to apply the standards set in order to control the hazards that may exist in the workplace. In so doing, the work environment would be safe for workers and the employer, resulting in a reduction in the cost of production and having the overall effect of enhancing workplace productivity.

In order to facilitate a follow-up of workplaces for the purpose of inspec-

tion and monitoring, the Occupational Safety and Health Services Department maintains a record of all workplaces that have been visited and inspected. In any case all workplaces in Kenya, which by definition may be factories or other places of work, are required by law to be registered. Approximately forty percent of the workplaces are registered at present. The majority of these workplaces are registered after an Occupational Health and Safety Officer visit their premises to conduct an inspection. The scenario is that the occupiers do not, in most cases, find it necessary to register before they are persuaded to do so through the enforcement of the law. On the contrary, the process of registration presents the Department with the opportunity to offer advice to the management on measures to be taken, if any, to improve safety and health before the workplace is finally registered. However, through the intervention of the employers' organization and sufficient publicity and education provided to the management on safety and health requirements, the occupiers have been responding positively.

It is a legal requirement in Kenya to have all building plans approved by the Local Authority, and those buildings intended to be used as factories or any other workplace need to be approved by the Directorate of Occupational Safety and Health Services before construction commences. The occupiers during this process are advised with regard to areas that require to be improved in order to meet the safety and health standards

set by law. When the plans for factories or workplaces are presented to the Local Authority, arrangements are put in place to direct owners of factories and other workplaces to have their plans approved by the Occupational Health and Safety Department before the Local Authority finalizes the approval. This requirement has increased the number of plans presented to the Department for scrutiny and approval.

The Safety and Health Act requires that some plants and equipment are to be examined and tested periodically. Among them are hoists and lifts, chains, ropes and lifting tackle, cranes and other lifting machines, steam boilers and steam receivers, air receivers, and cylinders for compressed, liquefied and dissolved gases. These plants and equipment are examined and tested by competent persons authorized and approved by the Director of Occupational Health and Safety Department; their names are gazetted every year. This information is made available to the owners of the plants and equipment so that they can invite these authorized persons to carry out inspections of their plants. This arrangement has improved the safety status of those plants and equipments and has been received positively by the management, because insurance firms also require inspection of the same plants.

Most occupational accidents are never reported although the law requires the owners of the workplaces to report them. Many of the occupiers only report for the purposes of workmen's compensation; otherwise many occupational ac-



The law requires workers to be provided with personal protective appliances, including overalls, helmets, safety shoes, and goggles if they are exposed to conditions that may be injurious to their health.

idents remain unreported.

In 2004, a legal notice was published requiring occupiers to establish safety and health committees in workplaces. This was intended to enhance self-regulation and participation of workers in the management of occupational safety and health, because it was based on tripartite arrangement where the workers and management are represented equally in the committee. In response to the said legal notice the management in some of firms has vigorously started training their workers on safety and health, which has tremendously increased the level of awareness of safety and health in the workplaces.

The Act requires that employees undergo a medical examination before, during and after employment, with the cost being met by the employer. Some firms have been complying with this requirement, but the majority are unwilling unless legally compelled. In April 2005, Medical Examination Rules were published, requiring employers to ensure that all persons employed in certain specified occupations under the rules undergo both pre-employment and periodic examination by the designated health practitioners approved by the Director of Occupational Safety and Health. It is hoped that the number of workers examined will increase and that the number of firms requesting examination for their workers will rise, since it is now mandatory to have employees examined annually.

All workers are expected to be protected from any hazard in the workplace. This may be achieved through the institution of engineering measures. In absence of this provision, the law requires workers to be provided with personal protective appliances, including overalls, helmets, safety shoes, and goggles if they are exposed to conditions that may be injurious to their health. In most cases the management has been providing these devices mostly to permanent workers, excluding casual workers with the excuse that the casual workers disappear with them and never come back. However, it is clearly spelt out to them that all the workers should be protected from hazardous conditions without discrimination.

There have been cases of workers being locked in workplaces by the management, but this should not be done. The actual situation is that while workers are inside the workplace, the emergency exit doors should be unlocked so that workers can easily open them from inside in case of danger. In some cases the management feel insecure and lock the door from outside, exposing workers to unsafe situations in case of fire, injury or illness requiring workers to move out of the workplace. This procedure is seriously discouraged, and it is an offence under the law.

In conclusion, it is true that some employers are not willing to comply with the safety and health standards that have been set. This is an attitude that begs

for change if we are to develop a safety culture in all workplaces.

The integration and participation of workers and management in the safety and health committees is expected to accelerate the understanding and acceptance of safety and health practices in the workplaces. This situation will encourage the sharing of ideas and experiences by both workers and management.

Some members of the management hold the opinion that any expenditure incurred in the promotion of safety and health constitutes a loss for the organization. It is important to note that this is not true, because a healthy worker in a safe workplace is a productive worker who is an asset to the organization.

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Occupational health and safety in garages

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Background

Garage work is not a new occupation in Eritrea. It was introduced during the Italian colonization. Garage work can be divided into three categories, based on the type of machinery or equipment used and the number of workers employed. For instance, some garages are well-equipped establishments with 100 or more employees while other garages are very small, involved mainly in selling fuel and making minor repairs and employing one or two workers. There are also garages run by family workers only. Aside from these establishments, there are garages in the informal sector.

Garage work is an important source of job creation in Eritrea. Apart from creating jobs directly, garages have a number of unique advantages, providing potential for improving skills and devising new technology. At present in Eritrea, various trials developing new technological innovations are in progress. Most of these innovations come from people working in different types of garages. There are several central reasons why this happens mostly in garages: The relationship between workers and managers is closer, owners often work on the shop floor, and they are able to adopt innovative, informal and flexible approaches to solve problems. This sort of work relationship fosters good co-operation among workers and employers, creates a conducive work environment for understanding technological problems, and promotes informal and flexible approaches to problem-solving.

Introduction

A survey was conducted in order to assess working conditions at garages, paying special attention to workers' occupational safety and health (OS&H). OS&H standards in the garages were paid particular attention because garages account for a high and growing share of urban employment, they have inadequate safety and health guidelines, and there are easily applicable and practical solutions that can help a large number of people at relatively low cost. The purpose of this survey was to identify safety and health hazards in garages, to recommend appropriate engineering and administrative control measures, and to identify the correct personal protective equipment (PPE).

Methodology

The methodology applied during the survey was field observation, and involved interviewing technical persons and garage workers on the basis of a prepared questionnaire or checklist. The questionnaire was divided into five occupational hazard categories: 1) fire and explosion; 2) chemical agents; 3) mechanical hazards; 4) physical or electrical hazards; and 5) ergonomic hazards. The use of personal protective equipment was also determined.

Study findings

The survey indicated that many activities and much equipment pose a wide range of risks and hazards. Risks and hazards were identified in: 1) car mechanical and electric repair work (engine overhauling; automobile electrici-

ty repairs and battery charging, mechanical repairs of vehicles and motorcycles and rare suspension repairs); 2) body repair activities (body repair work, metal painting and surface treatments); and 3) maintenance services (car washing and greasing, wheel alignment and other services, such as seat repairs) (1).

When performing the above activities, garage workers used a variety of tools and equipment, including cranes, jacks, hydraulic platforms, portable electric drills and lamps, small machine tools, hand tools, a compressed-air system, welding equipment, an inspection pit, a painting booth and organic and inorganic (chemicals) solvents.

The survey found that in large and well-organized establishments, work areas and working personnel are clearly separated. Risks are easier to control and fewer workers were exposed to occupational injuries and illnesses. By contrast, when all types of garage work were carried out in a single room, more workers were exposed to all of the hazards because under these circumstances it was difficult to introduce preventive measures.

Identified fire and explosion risk

Fire and explosion – not only conflagration but, more often, small incidents involving grave personal injuries – are ever-present hazards. Many injuries were caused by the accidental ignition of petrol-soaked clothing or gasoline vapours. The high volatility and high flammability of these petroleum fuel products, in particular, and products with a low boiling point (such as motor

gasoline and kerosene) create dangerous situations. Some of the workers interviewed said that the risk of fire and explosion occurred in garages during high-pressure gas welding. Both oxygen and fuel gas (acetylene) are supplied to the torch from the cylinders in which they are stored under high pressure.

Preventive measures for fire and explosion

Various methods or techniques are recommended to prevent fire and explosion in garages. The first and most important method is to introduce a high standard of ventilation and cleanliness, as these keep the petroleum vapour concentration in the workplace air at a level 20% below the explosive limit (2).

It is also necessary to control spillage of petroleum products. To eliminate sources of ignition, electrical installation and equipment should be flame-proof. Rags and waste should be placed in metal rubbish bins with self-closing covers. Great care is necessary whenever welding or cutting is carried out. No work should be done on tanks or other receptacles until they have been thoroughly purged of all inflammable vapours.

Workers should receive the necessary training in safe working methods and in the procedures to follow in case of fire. Last but not least, appropriate fire extinguishers should be ready to hand and fire exits are vital, as they help save human life and property during fire and explosion.

Occupational safety hazards identified

An occupational safety hazard was defined as any substance (raw material), machinery or equipment that could cause simple or serious injury leading to absence from work lasting at least 24 hours. The results of the technical inspectors' observations, and the replies to the question: "Have you ever suffered any occupational injury caused by work or related to your work, and did you have any registered occupational injury in the past 6 months?", are described below.

According to the observations and responses, no occupational injuries had been registered. However, workers working in engine overhauling, battery charging, welding (arc and gas welding) and mechanical repairs, (hazards related to equipment and tools, lifting machinery and tackle, electrical equipment, compressed air and the inspection pit) suffered from different occupational in-

juries.

The occupational injuries were found to be unevenly distributed over different sections in the garage work. More incidences of injuries were reported in mechanical repair, battery charging, welding, and painting sections.

The types of accidents were: acid burns to the hands and feet, severe dehydration, overexertion, amputation, injection, cutting, abrasion, broken hand or foot and eye injury. On the basis of the workers' interviews and the field observations, the most common occupational injuries, with a high frequency, were abrasions, broken bones, fractures, cuts, acid burns, and eye injuries caused by flying objects.

The incidence of occupational injuries was more common among young workers between 21 and 35 years of age. Young workers with less work experience are more prone to accidents in garage work than older people with more work experience. Therefore, employers should pay serious attention to newly-recruited young workers right from the very beginning of their employment.

Occupational health hazards identified

An occupational health hazard was defined as a pathological condition, whether caused by physical, chemical or biological agents, which arises as a consequence of the work performed by the employee or the surroundings in which he/she works. This shall be considered an occupational illness (3).

The occupational health hazards identified in garages during the study included the organic solvents and inorganic chemicals used in cleaning or washing different engine parts, the recharging of batteries, the lead used in welding, the lead filler and molten lead used for filling cracks and dents. Outbreaks of sensitization dermatitis have been reported from the use of zinc chromate primers in preparing metal parts, especially in those rubbed down wet.

Workers engaged in painting activities were exposed to another health risk. In such activities, vehicle bodies damaged in car accidents are repaired, coated and painted. Various metal surface treatment processes are used: phosphating (coating with phosphate compounds), etching, electrolytic polishing, priming, plastic coating, electroplating, galvanizing, painting, and varnishing. This process involved working with a number of organic and inorganic chemicals that are a potential risk to workers' health and safety. Depending on the de-

gree and type of hazards, employers are obliged to introduce engineering and administrative controls as the first choice, and to provide appropriate PPE as a last resort, in order to protect workers from occupational health hazards.

Conclusion and discussion

The survey confirmed that garage workers are exposed to different occupational safety and health hazards. These exposures have different causes. They resulted in different occupational injuries and illnesses. However, further periodic medical surveillance of the diseases prevalent in garages is needed in order to verify that the illnesses were caused by occupational health hazards (4).

Most of the workers interviewed (39 out of 45) reported that improvements to their work environment are necessary in order to reduce the incidences of injury and illness. It was found, however, that most small-scale garage owners (garages with less than five workers) in particular do not invest money to improve their workplaces or the work environment. On the other hand, well-established and equipped garages were found to invest money to introduce engineering and administrative solutions as the primary means of preventing occupational accidents and diseases, and as the last resort, personal protective equipment (PPE) were provided for workers at no charge. The study indicated, however, that there was a lack of knowledge concerning the engineering controls introduced and selection of the proper PPE.

The respondents were able to mention some of the safety-related occupational health hazards, but they did not consider these hazards to be dangerous to their health or capable of causing a disease. Unsafe situations were evidently easier for workers and employers to identify than unhealthy situations (5). The survey found that most of the workers did not use the PPE provided by the employer, for different reasons. For instance, the PPE was uncomfortable (it might cause other accidents), it was not the correct type, it was not replaced on time, or the workers felt it was easy to work without the PPE. This is due to the lack of knowledge on occupational safety and health and PPE.

As far as employers' knowledge of occupational safety and health was concerned, the results obtained indicated that only a few garages (9 out of 31) had set up occupational safety and health programmes. When asked "Why do you provide PPE for your workers?", the



Photo by M. Lintunen

The management should ensure that workers receive proper training, are aware of the hazards and know how to avoid them.

answers indicated that the aim was to prevent workers from occupational safety and health hazards. Another reason mentioned was that the employers had been instructed to do so by government inspectors. This result shows that the level of the employer's awareness about occupational safety and health was not very high.

To overcome these discrepancies, the management should:

1. have sufficient knowledge of the hazards, correct methods of application and precautions needed with regard to each particular equipment and chemical or ingredient used. All essential information should be provided by the manufacturers or suppliers of equipment and chemicals.
2. ensure that workers receive proper training, are aware of the hazards and know how to avoid them.
3. provide proper protective equipment for each particular operation. In the painting process, for instance, there should be spray booths of the correct size and with adequate exhaust ventilation, as well as personal protective equipment such as gloves and the correct respirators for the materials involved.
4. supervise that there are adequate hygiene and correct procedures in the shop. This includes the cleaning of equipment and the hands and the provision of adequate washing facilities

complete with soap and hot water.

5. have medical supervision for replacement and regular examination of workers.
 6. use less hazardous substances in place of more hazardous substances.
- In order to minimize the occurrences of occupational injuries and illnesses, workers in turn should:
1. know what is being used and how to use it properly and safely.
 2. use safety equipment whenever it is needed.
 3. ensure good housekeeping.
 4. carry out their work on the basis of the training and instructions given by the employer.
 5. notify the management of any observation that could lead to injury or illness.

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Occupational stress among Algerian teachers

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ALGERIA

Introduction

There has been an enormous increase in research into occupational stress over the last decade. Numerous studies (1, 2) have implicated stress in the etiology of a number of physical and psychiatric ailments (coronary heart disease, skin diseases, ulcers, etc.). In addition, occupational stress can hinder effectiveness at work and can lead to low performance, job dissatisfaction, poor motivation, absenteeism, and turnover (3).

Teachers, regardless of what level they teach, are exposed to high levels of stress (4–6). In some extreme cases, they may suffer from burnout as well (7). The fact that teachers are exposed to high levels of stress seems to be an international phenomenon (8).

The aim of this study was to answer the following questions:

- What are the sources of occupational stress to which Algerian teachers are exposed?
- What symptoms of occupational ill-health have teachers developed after they became teachers?
- How do teachers control the effects of occupational stress?
- Are the differences between variable alternatives significant?

Method

Subjects

A sample of 126 teachers was randomly chosen from Biskra governorate (Algeria) primary schools to answer the study questionnaires. Some characteristics of the teachers in the sample are shown in Table 1 (below).

Data collection

An occupational stress questionnaire

was developed. It comprised three major areas: sources of stress; symptoms of ill-health; and coping with stress strategies. The first area (Sources of stress) contained nine dimensions (9 items about teaching, 8 items about the teaching environment, 5 items about administration, 7 items about the curriculum, 4 items about work colleagues, 4 items about parents, 5 items about pupils, 4 items about supervision, and 4 items about society as a whole). The other two areas (symptoms of poor health and strategies for coping with stress) each contained eight.

The questionnaire was designed as a Likert scale, with five alternative responses. The alternatives were marked as follows: 4 = very high experience of stress; 3 = high experience of stress; 2 = moderate experience of stress; 1 = weak experience of stress; 0 = very weak experience of stress.

A test-retest method was used to ensure reliability. The reliability coefficient was 0.78. With regard to validity, the content validity was adopted. For this purpose, the questionnaire was ad-

ministered to seven teachers, two from Constantine University (Algeria) and five teachers at a primary school. The questionnaire was rewritten on the basis of these teachers' proposed suggestions and comments.

Procedures

To speed up and ease administration of the questionnaire to teachers who were distributed over various schools in the Biskra governorate, two teachers (a man to deal with male teachers and a woman to deal with female teachers) were chosen to help the researcher. Within two weeks, questionnaires were distributed and collected; the return rate was 91%.

Results and Discussion

With regard to stress, Table 2 indicates that the teachers' major sources of stress were society, parents, teaching, the teaching environment, pupils, supervision, the curriculum, colleagues, and administration. Table 2 also shows that teachers suffered from many health problems. More than seven out of ten teachers (74%) reported headaches.

Table 1. Some characteristics of the teachers in the sample.

Variable	Number of teachers	%
Age (years)		
29–39	114	90
> 39	12	10
Gender		
Male	68	44
Female	58	46
Work experience (years)		
1–9	61	48
10–19	56	44
20 and above	09	34
Training		
Trained teachers	51	40
Non-trained teachers	75	60

Table 2. Sources of stress, symptoms of poor health and strategies for coping with stress.

Sources of stress		Symptoms of poor health.			Strategies for coping with stress		
Source	Mean	Symptom	Number of teachers	%		Number of teachers	%
Society	2.87	Headache	92	74	Watching TV	78	62
Parents	2.60	Sensual problems	42	34	Talking with friends	74	59
Teaching	2.29	Arthritis	36	29	Praying and <i>Du'a</i>	67	54
Teaching environment	2.04	Respiratory problems	34	27	Relaxation	47	38
Pupils	1.79	Ulcers	27	22	Reading	47	38
Supervision	1.42	Hypertension	06	05	Forgetting work	42	34
Curriculum	1.37	Heart problems	06	05	Playing sports	31	25
Colleagues	1.28	Diabetes	02	02	Traveling	28	23
Administration	1.08						

Table 3. Differences between the alternative responses.

Variable	Alternatives	Statistical test	Significance
Age (years)	29–39	t-test = 3.80	0.01
	39		
Sex	Male	t-test = 2.21	0.05
	Female		
Work experience (years)	01–09	F-test = 6.25	Not significant
	10–19		
	20 and above		
Training	Trained teachers	t-test = 1.56	Not significant
	Non-trained teachers		

Other health problems (sensual problems, arthritis, respiratory problems, ulcers, hypertension, heart problems, diabetes) were also reported by many teachers but not by the majority. As to strategies for coping with stress (see Table 2 above), 62% of teachers said they watch TV programmes, 59% talk with their friends, and 54% pray and make *Du'a* to cope with occupational stress. As to demographic variables (Table 3), the differences were significant only for age and gender.

The above results show clearly that teaching work needs to be ergonomically designed. Since its emergence in the 1940s, ergonomics has focused mainly on industrial work. Other types of work, such as service work and academic work, have been left unstudied. The main reason may be the belief that ergonomics has nothing to offer to academic work. In the light of this and other studies, it is evident that ergonomics is needed in academic work, taking into account the fact that there are differences between industrial and academic work. For this reason, it would be desirable to develop and apply a new kind of ergonomics, i.e. educational ergonomics.

Educational ergonomics refers to the application of theories, models, laws and methods of ergonomics to educational settings. In the paper to be presented at the Fourth International Cyberspace

Conference on Ergonomics later this year (9), I will show that the major areas of educational ergonomics are: teaching (teaching methods, teaching aids, increasing learners' motivation); academic curricula (design, development, enrichment, evaluation); assessment of academic performance (developing evaluation tools, assessing evaluation tools, academic achievement tests, exams); development of individuals (students, teachers, administrators); the design of context design (study place, the design of classrooms and amphitheatres, computer stations, the physical environment); and the legislative framework (laws and regulations).

It is expected that if educational ergonomics were to be widely taught and applied in practice, much occupational stress among teachers would be eliminated. This is an area calling for much research, and researchers are urged to investigate these issues.

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Agrochemicals (Acaricides) in veterinary practice in Nigeria

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NIGERIA

Introduction

The growing demand for enhanced animal production through the effective control of external parasites such as ticks, fleas, mites and lice in animals has led to the increasing sales, distribution and use of agrochemicals (acaricides) in sprays, dips and injection form in Nigeria. For veterinary use, these agrochemicals are available in varying types of preparations, including topical powders and solution, shampoo bath and injectable liquid.

However, in veterinary practice an important occupational hazard or disease problem associated with agrochemicals is the risk of exposure to chemicals (acaricides) used to control external parasites and other insects (pest) of animals. Both animals and humans are exposed through contact by skin penetration, inhalation and ingestion, either due to misuse or through unhygienic practices.

This article highlights the health implication of agrochemicals (acaricides) sold, distributed and used in veterinary practice in Nigeria. Another aim is to highlight the attitude and practices of the animal healthcare workers in relation to safety management of chemicals (acaricides) in veterinary practice.

Materials and methods

This study is based on visits made to some randomly selected agro-veterinary (pet) shops and veterinary clinics in Jos, Plateau State and Warri, Delta State, Nigeria. The study involved a personal interview and observations on the safety management practices of the animal healthcare workers using agrochemicals (acaricides) in order to control external parasites of animals and poultry.

Results and Discussion

This study focused on two important issues (Table 1, 2 and Photo 1), showing firstly the availability of chemicals (acaricides) in various preparations (topical powders, liquid/solutions, shampoo and injectable forms) in Jos, Plateau and Warri, Delta State, Nigeria. The result showed that more topical powders and liquids/solutions are sold or distributed in pet shops and veterinary clinics in Warri, Delta State than Jos, Plateau State (Table 1). This difference may be due to the proximity of Warri, Delta State to the port of entry of most agrochemicals.

However, the result showed that only few acaricides are used for cattle or other species in Warri, Delta State (which is located in the southern part of Nigeria).

The use of chemicals (acaricides) in cattle in this part of the country was limited because of the low population of cattle when compared to Jos, Plateau State (in the northern part of Nigeria), where there is more cattle. The use of acaricides in cats in the two areas studied (Warri and Jos) was also observed to be very low (only two types) out of the many that were available (Table 2). Their limited use may be due to the small number of cats taken for veterinary medical care and to the knowledge that cats have very tender skin, which makes them prone to the risk of chemicals (acaricide) toxicity, thus preventing their use in cats.

The second factor (Figure 1) is the



Photo 1. Animal healthcare workers applying chemical acaricide without adequate protective wears (e.g. hand gloves, boots, eyes, nose, mouth or face mask).

Table 1. Classification of chemicals (acaricides) on sales/distribution in Jos, Plateau and Warri, Delta State, Nigeria

Acaricide Type	Vet Clinic		Pet Shop		Examples
	Warri	Jos	Warri	Jos	
Topical Powders	9	2	8	3	asuntol, pyrethrin, malathion, carbamate, Johnson dog powder (chlorpyrifos), ectopel
Topical Solutions	9	7	9	7	diazinol, diazintol, decis, amitrax, steladon, triatix, dichlorvos, zerokeet (herbal drug)
Shampoo	5	1	4	2	primose, ectochin, Johnson dog shampoo
Injectable	8	7	8	6	kepromece, intercheme, vermic, ivocip, vermac, alfamec, ivomec, intermectin, ivodad, dectomax.

high risk that animals and the animal healthcare workers are exposed to the chemicals (acaricides). The survey showed that those involved in the sale, distribution and application of chemicals (acaricides) in pet shops and veterinary clinics are themselves exposed to the chemicals.

Most of the workers also have little or no proper knowledge or training concerning the agrochemicals they sell or handle, let alone that they would give advice to their customers or the end users. The knowledge and skills acquired by some of the trained animal healthcare workers, in terms of safety management, is inefficiently utilized in practice. About 95% of the workers do not use or encourage the use of protective devices when handling chemical acaricides (Figure 1).

Agrochemicals are increasingly sold, distributed and used in pet shops and veterinary clinics without adequate consultation or supervision from trained professionals. A workshop/seminar or training programme to refresh or educate agro-veterinary (pet) shops and animal healthcare/veterinary workers on the safety management of agrochemicals may be necessary in order to minimize exposure. Emphasis on safety management must include registration and licensing of sales/distribution premises and veterinary clinics, in order to authorize the sale and use of chemicals.

Health implication of agrochemicals (Acaricides)

Agrochemicals are toxic to both animals and humans. Exposure to a single dose, or repeated exposure, can cause acute toxicity leading to death, as almost all

agrochemicals are capable of destroying the cells of tissues and organs, including the nervous system of not only insect (pest) but animals and humans. They can destroy the lungs, causing pleurisy, allergic reaction and cancer (1, 2).

The rinsing off of agrochemical spray, dips, and tick bath (wash) through rain-water (splashes) means chemicals may pass into crops and animal (grazing) farmland, and into sources of drinking water, leading to chronic illness, especially when such chemical toxins get ingested by animals and humans. Acute side effects or toxicity can occur through exposure by skin penetration and ingestion during treatment or contamination.

For example, a dairy farmer in Nasarawa State lost about 30 cows a few minutes after his workers used a chemical (acaricide) solution to spray a herd against infestation with ticks. Correspondingly, in Jos, Plateau State a poultry farmer lost about 100 chickens when an animal health practitioner used a topical acaricide powder to dust the birds. A few days ago a dog breeder, also in Jos, lost his precious Alsatian bitch after he locked up the dog overnight in a room previously sprayed with an acaricide solution (Dichlorvos), which had been bought from a pet shop.

There are many more cases of poisoning which either go undetected or unreported. There is a need therefore to monitor, register and document all agrochemical sales/distribution (premises) and their safety management in veterinary practice in Nigeria.

Safety management of agrochemicals (Acaricides)

Regulation of chemicals and safety management are said to be paramount in order to control the potential danger chemicals pose (1). Risk prevention is one of the most effective means of combating the problems associated with agrochemicals. The law should mandate the sale, distribution and use of agrochemicals under strict safety regulations, through prompt supervision from a functional regulatory body, which should have representation from the national legislation, the Ministry of Agriculture, the National Agency for Food and Drug Administration and Control (NAFDAC), the Nigeria Police, and non-governmental organizations (NGOs).

Strategies that will ensure safety regulation of all agrochemicals, such as awareness campaign, education, training workshop and seminars on the use of protective devices and hygiene measures, should be encouraged and adopted in our day-to-day handling and application of agrochemicals. While violators of safety handling and application of agrochemicals in agriculture and veterinary practice should be made to face the penalties.

Conclusion

The continuous exposure of animals and human to agrochemicals can be detrimental to health. Most pet shop dealers dealing with agrochemicals as well as animal healthcare/veterinary workers do not enforce safety management precautions when handling chemical (acaricides). Before handling or using any agrochemical (acaricide) the worker or applicator should ensure that the animals

Table 2. Number of acaricide type used for treatment of animals in Jos, Plateau State and Warri, Delta State, Nigeria

Animal Species	Warri – Delta	Jos – Plateau
Cattle	4	7
Sheep/goat	7	7
Pigs	9	7
Dogs	9	4
Cats	2	2
Chickens	9	7

they treat, including their owners, are adequately protected to avoid exposure. The use of protective gear such as leather hand gloves, overall coat (or apron), leather footwear (or both), head and face mask (to protect the mouth, nose and eyes), as well as the use of delivery devices such as knapsack sprayer (machine) – must be observed at all time. All chemicals should also be regarded, labeled and handled with care.

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