

African Newsletter on Occupational Health and Safety

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INFECTIOUS DISEASES



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Infectious diseases

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Infectious diseases

“People in Africa suffer from a vast range of preventable and curable infectious diseases. HIV/AIDS, tuberculosis and malaria alone are estimated to kill about three million people every year in the Region. Africa’s children bear the brunt of ill-health caused by common childhood illnesses such as measles, pneumonia, diarrhea, malaria and malnutrition. The result is hardship, impoverishment, countless lives lost and reduced productivity. The diversion of scarce resources into tackling these diseases spins the countries on an inescapable cycle of poverty and ill-health.”⁽¹⁾

The challenge, including human and financial resources, is how smart we can operate within the constraints and with the resources available in the African Region. Smallpox has been eradicated and polio will be eradicated very soon. There are proven interventions for tackling malaria, tuberculosis and many diseases in the region. We have to scale-up these interventions while looking for new ways to address the problems.

Risk factors for many diseases are rooted in the environment we live, work, play and recreate in. Many of the answers should be sought from these settings such as domestic, work, schools, market places- and the communities within those settings. The International *Conference on Community Health in Africa* held in Addis Ababa, Ethiopia in November 2006 highlighted the need to work with, and through communities in identifying issues, finding solutions and implement those solutions in addressing health concerns. The WHO African Region is implementing and sharing the recommendations of this consultative conference. Presently, we are looking at how best we can scale up interventions to address the health challenges facing the Region.

The workplace is another setting where, in addition to occupationally related conditions, infectious diseases contribute to absenteeism, low productivity and disability and death. Appropriate interventions for communicable disease management can be applied with success in the workplace. Although the workplace is rapidly changing as a result of global trends, people can still be found as a cohort at work as in schools. The programme of occupational health in the region has been established very recently. Significant efforts have already been made to sensitize the Ministers of Health on the contribution that the world of work can make to the health of workers and their families, of the general population, and in the economy and sustainable development of the country. Many countries in the Region are developing programmes and plans to address challenges in the world of work. Workers suffer from many of the infectious diseases that afflict the general population. They form a community wherein the Directly Observed



Treatment Short-course (DOTS) and Anti retroviral therapy (ARV) can be extended successfully. Thus the inroads into addressing infectious diseases can be made in the world of work.

Even though the challenge from infectious diseases seems to be insurmountable, it only needs the region to think of in an ingenious ways of applying some of the interventions proven to be effective. It is hoped that the exercise of scaling up interventions will further assist the region to accelerate in applying the proven interventions. I am confident that with various segments in the communities getting involved, the health service can be augmented in its effort of addressing various health challenges including infectious diseases. The world of work is critical in developing policies, programmes and plans in health, safety and welfare for people at work.

Dr Luis Gomes Sambo
Regional Director
WHO African Region

1. *The Health of the People – The African Regional Health Report 2006. Regional Office for Africa.*

The ILO Programme on HIV/AIDS and the World of Work (ILO/AIDS): Its role and contribution to the global response to HIV/AIDS

S. Kisting, B. Alli
ILO

*“AIDS has a profound impact on workers and their families, enterprises and national economies. It is a workplace issue and a development challenge.”
Juan Somavia, ILO Director-General*

Background

About 40 million people in the world are living with HIV; 36 million are working-age adults (1). The HIV/AIDS epidemic constitutes a colossal human tragedy. The loss of human capital, skills and experience undermines enterprise productivity and increases the mismatch between labour supply and employment opportunities. The world of work also has a key role to play in the wider struggle to limit the spread and mitigate the impact of the epidemic, and is a vital component of national responses to HIV and AIDS. The workplace offers entry points for contact with the most affected age group, 15–49 -year olds, and with some particularly vulnerable populations (e.g. young adults and mobile workers). It is a recognized source of authoritative messages; it has a tradition of training and education; it has mechanisms in place for employee assistance, health and safety; and it integrates non-discrimination in policies and agreements. Workplace programmes provide contact not only with workers, but also their families and communities, as well as other key stakeholders. In this way, they contribute to the achievement of universal access to prevention, treatment, care and support.



ILO Photo Gallery

The role of the ILO

The ILO, as the United Nations (UN) agency with special responsibility for the world of work, has the primary objective of promoting decent work and productive employment for all, based on principles of social justice and equity. In response to the HIV/AIDS epidemic, the ILO has established itself as a significant contributor to international efforts by creating the ILO Programme on HIV/AIDS and the World of Work (ILO/AIDS), formally established in November 2000, and by mainstreaming HIV responses throughout the Office.

In October 2001, the ILO became the eighth co-sponsor of the Joint United Nations Programme on HIV/AIDS (UN-

AIDS). Co-sponsorship makes the most of the comparative advantage of each agency, as well as ensuring coordination and collaboration within the UN response. The ILO's contribution includes its tripartite structure, making it possible to mobilize and support efforts of governments, employers and workers against HIV/AIDS; its central presence at the workplace; setting standards to protect the rights of workers and improve their working conditions; occupational safety and health; and drawing on its global network of field offices and experience in technical cooperation.

The ILO Programme on HIV/AIDS and the World of Work

The objectives of the ILO/AIDS Programme are to raise awareness of the economic and social impact of AIDS in the world of work; to help the ILO's tripartite constituents (governments, employers and workers) support national efforts to prevent the transmission of HIV and reduce the impact of AIDS; and to counter discrimination and stigma related to HIV status. The Programme's approach may be summarized as follows:

- Mainstreaming HIV/AIDS in the Decent Work Country Programmes (DWCPs) and integrating the issue

ILO/AIDS areas of focus

Technical cooperation

- implementing HIV/AIDS workplace projects with the social partners in all regions of the world

Research and policy analysis

- socio-economic consequences of HIV/AIDS, especially labour and employment impact
- data collection and projections
- analysis of responses

Advisory services

- integrating workplace issues in national AIDS plans
- revising labour laws to address HIV/AIDS
- developing policies on HIV/AIDS at national, sectoral and workplace levels

Education and training

- supporting the implementation of the Code of Practice
- strengthening the capacity of governments and the social partners to respond to HIV/AIDS in the workplace
- production of tools and resource materials

Information and advocacy

- examples of good practice in workplace action
- examples of national laws and policies
- data and research findings

in existing world of work structures and programmes, such as occupational health services, occupational safety and health committees, business development services and vocational training

- Mobilizing the commitment, networks and resources of its constituents, and supporting their capacity to take effective and sustainable action
- Helping put in place comprehensive workplace programmes, as well as an enabling legal-policy environment, with an emphasis on the defence of rights and prohibition of discrimination
- Outreach into the informal economy and initiatives to promote employment opportunities for those infected and affected with HIV.

The ILO Code of Practice on HIV/AIDS and the World of Work

The first major initiative of the ILO/AIDS Programme was the elaboration, in 2001, of a Code of Practice on HIV/AIDS and the world of work, complemented by a training manual to assist in its implementation. By defining the practical and ethical requirements for addressing HIV/AIDS in the work environment, the Code provides a framework for action through an effective set

of guidelines for governments, employers, workers and other stakeholders to help them develop concrete responses to HIV/AIDS at the enterprise, community and national levels. The Code of Practice highlights the rights of workers, the responsibilities of employers, and the duties of governments. This rights-based approach is covered in the ten key principles of the Code which relate to non-discrimination; confidentiality; testing; access to benefits, prevention, care, and support; as well as gender equality.

The Code also makes reference to infection control in the workplace, prescribing the application of Universal Precautions, setting out the need for training, and highlighting procedures, tests and treatments in the event of occupational exposure (2).

Synopsis of programme activities

Technical cooperation serves as the basis for strengthening the capacity of the ILO's tripartite constituents to develop workplace policies and programmes and contribute to national efforts to fight HIV/AIDS. Currently the ILO is implementing over 65 projects in 50 countries in Africa, Asia, Eastern Europe, Latin America and the Caribbean. The projects cover numerous sectors, such as transport, agriculture, the informal economy/cooperatives, and promote core workplace responses, such as prevention, with an emphasis on behaviour change communication (BCC); care, with an emphasis on reasonable accommodation; and treatment through a combination of delivery at the workplace and systems of referral to public services, underpinned by 'know your status' campaigns..

ILO/AIDS has helped many governments to revise labour laws to address HIV/AIDS and assisted with the development of policies on HIV/AIDS at national, sectoral and workplace levels. It has developed guidelines on HIV/AIDS for labour lawyers, magistrates and judges and a handbook for factory/labour inspectors which are being used for training and advisory services.

The programme has also developed models to cushion the impact of HIV/AIDS on social security schemes; highlighting social health insurance as an effective social protection mechanism, as well as conducting a research study on health care financing mechanisms in an HIV/AIDS endemic country.

In the areas of public information and advocacy, the programme draws on the

experience of its projects as well as research findings and policy analysis. It publishes (including on its website) examples of good practice in workplace action, issue papers and fact sheets, as well as technical and policy guidance in the form of guidelines. Every two years since 2004, the programme has published global estimates to measure the impact of HIV/AIDS on the world of work and provide information to key actors and policy-makers concerned with HIV/AIDS.

Partnerships

The Programme has established partnerships and formal working relationships with major international actors in the area of HIV/AIDS. Of particular importance are the international organizations representing the ILO's social partners, the International Organization of Employers (IOE) and the International Trade Union Confederation (ITUC), as well as the sector-specific global union federations. The collaboration within the UNAIDS family includes joint activities with individual agencies as well as global cooperation, and UNAIDS and other UN agencies execute projects on behalf of and in partnership with the ILO.

The ILO has partnered WHO on two guidelines: The guidelines for workplace TB Control Activities (3); and the Joint ILO/WHO guidelines on health services and HIV/AIDS (4). The primary goal is to engage the workplace, and harness the contribution of employers and workers, to promote the prevention and control of both diseases. Both guidelines highlight key principles that include recognition of the disease as a workplace issue, the need for a healthy work environment, non-discrimination, information and education, and access to treatment, care and support. They have been used extensively to develop workplace policies and programmes on HIV/AIDS and TB at national, enterprise and sectoral levels, with the full participation of workers, employers and their organizations. Technical cooperation partners currently include Sweden (SIDA), Italy, the US Department of Labor, Germany (GTZ,) and the Organization of Petroleum Exporting Countries (OPEC). The programme has also established partnerships with the Global Fund to Fight AIDS, Tuberculosis and Malaria, the United Nations Global Compact, the Global Business Coalition on AIDS, the World Economic Forum, as well as a range of partnerships at national level with governments, business coalitions and NGOs.

The way forward

ILO/AIDS is actively contributing towards the achievement of the goal of universal access to HIV/AIDS prevention, treatment, care and support by mobilizing the massive potential of the world of work and the workplace partners to take action on AIDS. The ILO response is becoming more focused and more coordinated through the integration of HIV/AIDS in Decent Work Country Programmes. The ILO is identifying the many areas where its comparative advantage provides entry points for HIV/AIDS. These include combating stigma and discrimination, providing income generation and employment opportunities for people living with HIV, extending social protection through measures, such as decentralized health insurance and cash transfers, adapting occupational health services to HIV service provision, promoting public-private partnerships, addressing child labour where it is being exacerbated by HIV/AIDS, including HIV in skills development programmes, and providing education for behaviour change. The ILO is actively working with fellow UN agencies towards a greater workplace contribution to the Prevention of Mother to Child Transmission (PMTCT), and to TB prevention and control. These activities will continue to form the main focus of the ILO/AIDS Programme at the sectoral, national and regional levels in the next biennium and beyond.

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Protecting health workers from occupational exposure to HIV, hepatitis, and other bloodborne pathogens: from research to practice

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Introduction

Needlestick injuries and occupational exposures to the human immunodeficiency virus (HIV) and other bloodborne viruses are a common hazard faced by health workers. Despite low-cost, effective means of prevention, the occupational health of health care workers has not been prioritized. This article will discuss the nature of the risk to health care workers related to bloodborne pathogens, methods to control hazards, and address issues and barriers to prevention. It will furthermore describe the goals and successes of the WHO project Protecting health workers – preventing needlestick injuries, along with resources from WHO and other international agencies for health worker protection.

For these and millions of other health workers worldwide, needlestick injuries and other exposures to blood are all too common.

Needlestick Injuries (NSIs): nature and prevalence of the problem

It is estimated that worldwide, 12 billion injections are given annually and many of these injections are unsafe – for the patient if the needle is not sterile or the worker from exposure to a contaminated needle after its use (1).

Approximately 3 million health care workers (HCWs) experience needlestick injuries exposing them to bloodborne viruses each year. This results in an estimated 16,000 hepatitis C, 66,000 hep-

atitis B, and 200 to 5000 human immunodeficiency virus (HIV) infections annually (2). While more than 90% of these infections occur in low-income countries, most of the programmes for exposure control and data regarding occupational transmission come from high income countries. Regardless of the setting, most of the exposures and infections are preventable.

Who is at risk of transmission?

All health workers who use sharps in the course of their work: nurses, doctors, and laboratory technicians are at risk of a needlestick injury or other occupational exposure to bloodborne pathogens. Cleaners and waste handlers are also at risk if they are required to handle sharps as part of their job such as cleaning instruments or removing needles for disposal or when waste is not disposed into a puncture resistant container. Globally, nurses report the greatest number of needlestick injuries followed by laboratory workers and physicians (2,3).

According to the WHO, the global burden of disease from sharps injuries to health care workers includes 40% of all hepatitis infections and 4.4 % of all HIV infections among health workers (2).

The risk of health care worker infection following a needlestick injury from an infected source patient depends on the virus. The Hepatitis B virus is about 10 times more transmissible than hepatitis C virus, which in turn is more easily transmitted than HIV.

Determinants of transmission of infection

The risks of transmission of infection from an infected patient to the HCW following a NSI are (4,5):

- Hepatitis B 3–10% (up to 30%)
- Hepatitis C 0.8–3%
- HIV 0.3% (mucous membrane exposure risk is 0.1%)

Factors that can increase the risk of transmission of HIV include a deep wound, visible blood on the device, a hollow-bore blood-filled needle, use of the device to access an artery or vein, and high-viral-load status of the patient (6,7). Taken together, these factors can increase the risk of transmission of HIV from a contaminated sharp to 5%.

The most common injuries occur from syringes with needles used for injections. Two of the most common causes of the injuries are recapping needles and the lack of use of sharps containers (safety boxes) at the site of the injection (2,3,7,8,9,10).

The highest risk exposures come from blood filled devices, such as those used to access an artery or vein, for example, phlebotomy needles and needles used for inserting intravenous access lines (5,7,8). Among the documented cases of occupational transmission of HIV by the U.S.CDC, 90% of the cases resulted

from a needlestick injury from a hollow-bore blood-filled needle.

Factors that contribute to needlestick injuries (2,4):

- Overuse of injections and unnecessary sharps
- Lack of supplies: disposable syringes, safer needle devices, and sharps-disposal containers
- Lack of access to and failure to use sharps containers immediately after injection
- Inadequate or short staffing
- Recapping of needles after use
- Lack of engineering controls such as safer needle devices
- Passing instruments from hand to hand in the operating suite
- Lack of awareness of hazard and lack of training.

While it is the HIV epidemic that has stimulated attention and occupational health regulations to protect health workers from exposure to bloodborne pathogens, hepatitis is much more prevalent and more infectious than HIV. Although hepatitis B is preventable with immunization and HIV transmission is significantly reduced with post-exposure prophylaxis no immunization exists for hepatitis C so that prevention of exposure is even more important.

Preventing and controlling occupational exposures

Analysing the root cause of the injury or exposure is necessary to target specific measures for prevention. The most effective way to prevent the transmission of blood-borne infections is to prevent the needlestick injury and as a result prevent exposure to blood. Primary prevention of NSIs is achieved through the elimination of unnecessary injections and elimination of unnecessary needles. The implementation of education programmes, Universal Precautions, elimination of needle recapping, and use of sharps containers for safe disposal have reduced NSIs by 80%, with additional reductions possible through the use of safer needle devices (9,11,12).

Control measures to prevent NSIs are described in the following table according to the traditional hierarchy of controls with the most effective control measures at the top of the table.

Universal or Standard Precautions

Universal Precautions (UP) are a set of measures taken to prevent exposure to blood. The definition of Universal Precautions means that all patients regardless of their known serological status

Table 1. Hierarchy of controls applied to risk of bloodborne pathogen exposure reprinted from Joint ILO/WHO guidelines on health services and HIV/AIDS (13)

Method of control	Efficacy of control measure
Elimination of hazard - complete removal of a hazard from the work area. Elimination is the method preferred in controlling hazards and should be selected whenever possible. Examples include: removing sharps and needles and eliminating all unnecessary injections. Jet injectors may substitute for syringes and needles. Other examples include the elimination of unnecessary sharps like towel clips, and using needleless IV systems.	IV needleless systems were shown to be 78.7 per cent effective in reducing IV-line related needle-stick injuries over one year in a Canadian study.
Engineering controls - controls that isolate or remove a hazard from a workplace. Examples include sharps disposal containers (also known as safety boxes) and needles that retract, sheathe or blunt immediately after use (also known as safer needle devices or sharps with engineered injury-prevention features).	Sharps containers reduced injuries by two-thirds. A review of seven studies of safer needle devices demonstrated a reduction in injuries from 23-100 per cent with an average of 71 per cent.
Administrative controls - policies aimed to limit exposure to the hazard such as Universal Precautions. Examples include allocation of resources demonstrating a commitment to health-worker safety, a needle-stick injury prevention committee, an exposure control plan, removing all unsafe devices, and consistent training on the use of safe devices.	Poor safety climate and reduced staffing was associated with a 50 per cent increase in needle-stick injuries and near misses.
Work practice controls - reduce exposure to occupational hazards through the behaviour of workers. Examples include no needle recapping, placing sharps containers at eye level and at arms reach, emptying sharps containers before they are full, and establishing means for the safe handling and disposal of sharps devices before beginning a procedure.	Elimination of recapping resulted in a two-thirds reduction in needle-stick injuries
Personal protective equipment (PPE) - barriers and filters between the worker and the hazard. Examples include eye goggles, gloves, masks and gowns. PPE will prevent exposures to blood splashes but will not prevent needle-stick injuries.	Double gloving in the surgical setting reduced puncture of the inner glove

should be considered to be infected with a bloodborne pathogen and treated as if infected. A new term, Standard Precautions, which includes precautions for airborne as well as bloodborne infection transmission, has come into practice in the past few years, superseding Universal Precautions (14,15,16).

These administrative controls have been widely promoted in high-income countries to protect health care workers (HCWs) from occupational exposure to blood and the consequent risk of infection with bloodborne pathogens. In low-income countries, the situation is very different: UPs are often practised partially, if at all, thereby exposing the HCWs to unnecessary risk. When health workers who do not practise UP, they often minimize the risk of needlestick injury when they do not know that the patient is infected. Where Universal Precautions are not in place, patients infected with bloodborne viruses are more often labelled (even at the bedside with a loss of their confidentiality) and workers single out those patients in order to be “more careful” instead of treating all blood carefully because it is potentially infectious (16,17,18).

Reporting and stigma

The underreporting of needlestick injuries is a serious problem. 40–80% of all injuries go unreported (2–3).

This is a problem for three major reasons:

- The injured health worker does not receive appropriate care and follow-up.
- There is no opportunity to evaluate the circumstances of the injury to consider changes in policy, practices or products that could prevent similar exposures in the future. No injury data are available to be used for the purpose of prevention.
- There is no documented record of the injury in the case of later infection.

Common reasons are given as to why workers do not report their injuries:

- “Not a serious exposure”
- Uncertainty of confidentiality
- Did not know who to report to
- No access to post-exposure prophylaxis (PEP) or perceived lack
- Fear of discipline and job loss
- Fear of being tested and of results
- No relief from duty.

In the absence of access to post-exposure prophylaxis, there is little perceived benefit to reporting occupational exposures, especially when reporting can result in punishment, blame, job loss, and being forced to be tested for



Photo by M. Crozet

HIV with no guarantee of confidentiality. When on-site evaluation and treatment is not available, workers who are sent to the infectious disease clinic across town for follow-up may not be able to receive antiretroviral medication, if needed, on a timely basis.

In addition to fear of punishment and fear of testing, health workers commonly minimize the risk of the exposure: “I didn’t think it was a significant exposure OR the patient did not have (documented) HIV or hepatitis”. Supervisory personnel sometimes reinforce this when they should urge immediate evaluation and follow-up of the exposure and provide release time from their duties to report on a timely basis.

Barriers to reporting should be identified and eliminated in order to ensure appropriate care and treatment of health workers to prevent infection as a result of exposure.

Periodic anonymous surveys have been used to ascertain the rate of reporting prior to and after implementing programme changes to control exposures. In this way, an increase in the proportion of injuries being reported in response to improvements in the exposure control and post-exposure programmes will not be misinterpreted as an increase in the number of injuries to workers.

Health workers in many countries in the world have not been educated in occupational bloodborne hazards and lack knowledge about the risk and nature of occupational risk (10, 16,18,19). The lack of knowledge about HIV/AIDS is evidenced by the fact that many nurses surveyed believed that HIV could be

transmitted from patients by sharing of tubs and toilet seats. This inaccurate information contributes to stigmatization of patients with HIV and fear of caring for them. Accurate information about the risk of HIV transmission from occupational exposure to needlesticks and the greater risk of hepatitis transmission to workers is necessary and should include information about the most effective measures to control exposure and infection. In a World Bank guidance note written for protecting health workers in Asia from bloodborne pathogen exposure and infection the authors state: “Healthcare worker fear of contamination by HIV, hepatitis, or opportunistic infections, such as tuberculosis has a direct impact on the provision of care and treatment to patients, their families and the community” (3).

Raising awareness among health workers of their true risk of infection, reducing exaggerated fears of HIV transmission, increasing knowledge of the impact of unsafe injections on patients and workers, and implementing exposure control programmes that demonstrate a commitment on the part of hospital management and ministries of health to health worker safety will improve both patient and worker safety. In this way the definition of a safe injection according to the WHO Safe Injection Global Network:

“A safe injection does not harm the recipient, does not expose the provider to any avoidable risks and does not result in waste that is dangerous for the community” can be realized.

WHO project: Protecting healthcare workers – preventing needlestick injuries

The WHO project: Protecting healthcare workers – preventing needlestick injuries was developed in 2003 by the WHO occupational health programme in collaboration with the International Council of Nurses (ICN) utilizing and modifying tools from the SIGN tool box (http://www.who.int/injection_safety/toolbox/en/) which were then piloted in three countries: South Africa, Tanzania and Vietnam, to address the occupational health of health workers (20). Funded by the U.S. National Institute for Occupational Safety and Health (NIOSH), the goals of the project are to raise awareness of the problem of occupational exposure to bloodborne pathogens among health workers and decision-makers in national ministries, as well as in hospitals, to build a commitment among management and involvement of workers for occupational health of health workers and to build capacity building for the implementation of policy, exposure control programmes, surveillance systems of sharps injuries, post-exposure follow-up and prophylaxis, and immunization of health workers against the hepatitis B virus.

Key elements of the project are listed below. The details, tools, and resources to assist countries and hospitals to implement these elements can be found in English and in Spanish on the WHO website at: http://www.who.int/occupational_health/activities/pni-toolkit/en/index.html.

Key elements

1. A national planning meeting is held. Management commitment and worker involvement are essential. The creation of a needlestick prevention committee or health and safety committee with representatives of front-line workers and responsible managers is key to the success and sustainability of the programme at the institutional level.
2. An initial assessment is conducted and includes interviews with workers and supervisors, surveys and observations of policy, products (adequacy of supplies of products), and policy. The written policy is reviewed to determine the existence or need for policy regarding prevention and post-exposure prophylaxis. Practices to be observed include: giving injections, drawing blood samples, and insertion of intravenous lines to note

whether practitioners recap needles. The availability, placement, and use of sharps containers (safety boxes) should be assessed.

3. Set up or modify, as needed, a surveillance system for exposures to blood
4. Establish a written exposure control programme, including post-exposure follow-up and prophylaxis
5. Provide information, education, and communicate to all staff about the hazards, the exposure control programme and how they can participate in prevention
6. Ensure adequate supplies and access to: sharps containers, Post Exposure Prophylaxis (PEP), and the hepatitis B vaccine
7. Provide supportive supervision and monitoring of practices
8. Feedback to needlestick prevention committee and other stakeholders.

In Vietnam, the project established a partnership between professionals in infection control, occupational and environmental health, and nursing at the national and at the hospital levels creating a needlestick prevention committee for local implementation and monitoring of results. The results demonstrated an increase in knowledge and awareness of health workers about the hazards, changes in products (enhanced personal protective equipment and sharps containers) and practices (hand hygiene and elimination of recapping). Working conditions for health workers and waste management programmes were improved. The likelihood of sustaining these changes is increased through the ongoing monthly work of the on-site needlestick prevention committees (10, 20). As a result, the Ministry of Health drafted new regulations on safe injections and preventing needlestick injuries.

The project is now extending to Egypt and Venezuela as pilots for those regions, scaling up the results and incorporating occupational health principles and components into other injection safety and infection prevention and control programmes throughout southern Africa, and in Vietnam and Tanzania, expanding the topics to include all occupational hazards to health workers.

Since the initiation of this project and growing recognition of the need to support and protect health workers in order to provide quality health care, WHO has developed two additional projects, the Global Health Workforce Alliance and the HIV Treat, train, and retain programme both with components regarding working conditions that include at-

tention to occupational health of health workers. (see <http://www.who.int/workforcealliance/en/>; <http://www.who.int/mediacentre/news/releases/2006/pr37/en/index.html>)

Hepatitis B Immunization Campaign

The WHO Occupational Health Programme is planning a global campaign to immunize health workers against the hepatitis B virus. Hepatitis B is the most common, most easily transmitted, and most easily prevented of the bloodborne viruses to which health workers are exposed. The 2003 WHO burden of disease report on sharps injuries revealed the high burden of hepatitis attributable to occupational exposure and the low rate of immunization among health workers. As a result, the WHO Global Plan of Action on Workers' Health that will be on the agenda of the World Health Assembly in May 2007 includes a campaign to immunize all health workers. WHO will develop guidelines for immunizing health workers similar to those guidelines for the successful campaign to immunize children under 5 years against hepatitis B, the 10th leading cause of death worldwide (21).

Summary

Health care workers are essential to the provision of quality health care services and should be protected from occupational hazards. In addition, the health workforce is entitled to the same rights as all workers – to a safe and healthful workplace. Unsafe working conditions contribute to global shortages of health care workers. The 2006 World Health Report calls on countries to protect and support health care workers. The WHO Global Plan of Action on Workers' Health which will go before the World Health Assembly in May 2007 includes a strong component on health workers and calls upon national health ministries to establish a programme of health worker health and safety.

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Introduction

Human immunodeficiency virus (HIV) and hepatitis B virus (HBV) infections pose great health problems worldwide, particularly in developing countries (1,2). Although they share similar modes of transmission and risk factors, they are very distinct viruses. Provision of medical care to HIV-positive patients is becoming a major activity for many health care workers in Nigeria. HBV infection is also a recognized occupational hazard among health care personnel, especially those who regularly come in contact with blood, blood products and other body fluids of patients (3,4).

Needle-stick injuries among health care workers are the commonest form of exposure to HIV or HBV infections (5,6). Few data are available on the occurrence of needle-stick injuries in Nigeria (6,7). Splash injuries contribute to some extent, especially when they occur on mucous membranes or non-intact skin (8).

In Nigeria and other developing countries, supplies of hygienic and protective equipment are often lacking (9). Possible exposure to HIV or HBV is therefore likely to be common here.

Practice of universal precautions

Universal precautions are infection control guidelines designed to protect workers from exposure to diseases spread by blood and certain body fluids. The guidelines stress that all patients be assumed to be infectious for blood-borne diseases, such as HIV and HBV (10). The universal precautions, when applied, have been found to reduce the risk of contracting these infections at the place of work.

Reducing occupational risks to HIV and hepatitis B virus among health care workers in Nigeria

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NIGERIA

The level of knowledge and compliance with universal precautions among Nigerian health care workers is low (11–13). The low level of training and unequal training opportunities among various cadres of health care workers have been identified as contributory factors. This situation is worsened by the non-availability or poor supplies of protective materials and equipment (9).

Safe injections

It is estimated that 5% of new HIV infections and 32% of HBV infections worldwide are caused by unsafe injections (14). Nearly 95% of injections are administered for therapeutic purposes. Immunization injections account for less than 5%. In Nigeria, there has been considerable improvement in the area of immunization services since the introduction of disposable syringes (13,14). However, poor injection safety practices and inadequate sharp waste disposal methods still pose an unavoidable risk of transmission of these deadly diseases to health care providers (7,15).

Hepatitis B vaccination

The risk of contracting HBV infection is particularly high among health care workers in Nigeria, which is a holoendemic area. In addition to universal precautions and safe injection practices, hepatitis B vaccination virtually eliminates this risk. There is a low level of acceptance and administration of hepatitis B vaccination, as well as non-existent post-exposure prophylaxis among health care workers in Nigeria (4,16). Poor perception of the risk of contracting the infection and non-availability of vaccine are contributory factors. In one study (16), only 53.8% of health care

workers actually took the required three doses of hepatitis B vaccine. Most striking, however, was the high rate of acceptance among non-clinical hospital workers and very low rates among the clinical doctors, nurses and laboratory workers who actually are at the greatest risk.

Post-exposure prophylaxis for HIV

Post-exposure prophylaxis for HIV exposure is virtually non-existent; it is only available in a few centres. Nigerian health care workers thus remain at great risk of exposure to HIV in the course of service provision.

Present situation

The Federal Ministry of Health in Nigeria has phased out the use of sterilizable injection equipment. A National Injection Safety and Health Care Waste Management Policy has been developed and is being implemented. Safety disposal boxes are now found in many health facilities, although in inadequate quantities (see photos).

A serious sensitization campaign is being mounted to make health care workers adopt the practice of universal precautions. Training is also being made more uniform and mandatory.

Hepatitis B vaccination has only recently been included within the National Program on Immunization (NPI),



Photo by John Snow Inc.

Presence of sharps in containers other than safety boxes. This was earlier a common situation.



The present situation is that the injection boxes are now available in most hospitals.

making it available to children, but vaccination has not yet been offered to health care workers en masse. Post-exposure prophylaxis to prevent HIV infection after needle-stick injury is now available in tertiary health institutions in the country.

The way forward

Continuous sensitization and training on injection safety and the adoption of universal precaution are necessary. Compulsory and full immunization of all health care workers with hepatitis B vaccine is advocated. Provision of post-exposure prophylaxis for HIV and HBV in all health facilities in the country is desirable.

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The world of work is changing. There are a considerable number of influences that impact on individuals as they strive to meet the challenges in an ever-changing world. There are many influences that effect people engaged in work. People are social beings and may be exposed to different types of problems. The source of these problems may be in the community at large, the social environment (or the extended family) within the family or may lie within the individual. Rarely will these problems exist in isolation. It is necessary to consider not only the problem on the surface, but the underlying roots of the problem. The factors influencing people engaged in work are shown as Figure 1.

Safety and health at work, as a discipline, has traditionally grouped workplace hazards into four categories: Physical hazards such as noise, pressure, radiation and light; Biological hazards are health effects caused by bacteria, viruses, funguses, animals or human waste or blood products; Chemical hazards which are caused by chemical products or compounds and Ergonomic hazards which result from the relationship between the worker and the design of the work station or equipment. The fifth category of hazards which has always been present but is usually inadequately addressed is the category of Psychosocial hazards. Examples of psychosocial hazards include stress, violence (both physical and psychological violence), the abuse of alcohol and drugs, HIV/AIDS (although a biological hazard it is treated as a psychosocial hazard as a source of discrimination and stigmatization), tobacco, lack of adequate sleep, cyber addiction, lack of adequate nutrition, gambling, lack of adequate exercise and economic stressors.

The combined effects of these psychosocial issues have considerable negative

Addressing psychosocial issues in Africa: The ILO's SOLVE Programme

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ILO

ramifications for workers, employers, the worker's family and society.

- For the worker, these problems can result in isolation, stigmatization, injury, illness and even death.
- For the organization or enterprise, these factors can result in increased absenteeism and accidents, reduced productivity, increased recruitment, training and insurance costs and decreased profits and therefore a lack of competitiveness.
- The family invariably suffers the full brunt of the loss of income, reduced welfare, missed opportunities for children, psychological trauma, lack of self-respect, and injuries, to the extent that the family may break up altogether.
- For society, the impact may be seen in terms of increased social costs, decreased consumer spending, increased crime and adverse economic development.

Here is an example of the impact of the interrelation of psychosocial problems. Benjamin is 16 and lives in a village along the coast of Africa. His grandfather and his father both earned a living from fishing. Traditionally, Benjamin's father would go to sea for a few days and come back to the village with a catch. The women would meet the boat and prepare the fish for either consumption in the village or to be sold at the market to buyers. It is a hard life at sea and five years ago the boat that Benjamin's father worked on was lost in a storm with everyone on board.

Benjamin gets a job on a village boat, but things have changed. The boat goes to sea for several days and the boat pulls into a large fishing port and the catch is sold. The crew may spend a day or two in the port mending nets before going back out to sea and therefore Benjamin may be away from home for several weeks at a time. Benjamin learned from

an AIDS worker that unprotected sex is dangerous and should be avoided at all costs. Fishing is rigorous, hard work. Benjamin wants to please the boat owner and the captain, so he works extra hard. In the evening his muscles and back are sore from pulling nets or lines or from other duties on the boat. Older fishermen on the boat tell Benjamin that alcohol will help him relax in the evening and will let him sleep despite his sore muscles. At sixteen Benjamin starts to consume significant amounts of alcohol to deal with the stressors of working life.

In reaching port, after unloading the catch and receiving a small share of the revenue from the catch, Benjamin goes into the port town with others from the boat and starts to drink. The alcohol starts to reduce inhibitions and arguments may turn violent or Benjamin may turn to one of the many sex workers in the port and, having put aside what he learned from the AIDS worker, engage in unprotected sexual activity. A significant portion of the local population is HIV positive.

Benjamin's story is not an isolated case. Many young men and women use

alcohol or drugs to deal with stress or pain and subsequently their level of inhibition decreases and their risk of having unprotected sex increases.

As depicted in Figure 2 workers facing the five categories of hazards carry a certain amount of risk. Young workers and workers facing new assignments or new jobs may be especially at risk for psychosocial problems as they have high expectations of themselves, perceived high professional demands, perceived low or limited control over these demands and limited or no social support. According to Professor Robert Karesek, this is a situation known as "high strain" and leads to the most severe psychological effects. The individual will be at a high risk for occupational accidents and diseases and may, in turn, start to use addictive behaviours or substances as a means of relieving stress.

Each of the above-mentioned psychosocial problems may be a causal factor for the others and may be an end result or find its roots among them. For example, if a worker has an inadequate knowledge of HIV-AIDS, he or she may fear being infected by casual contact. This

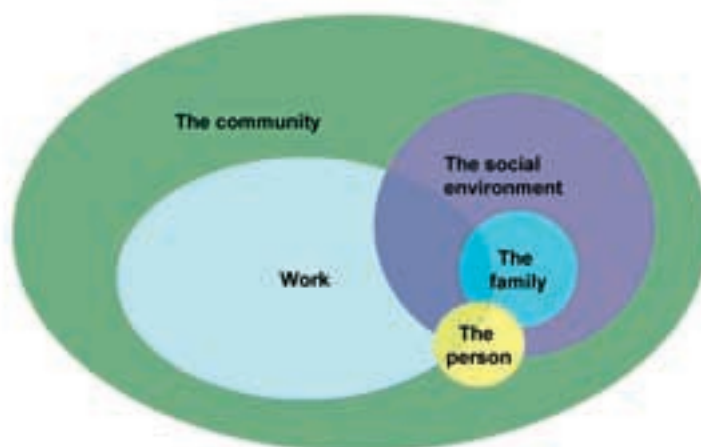


Figure 1. Factors influencing people at work

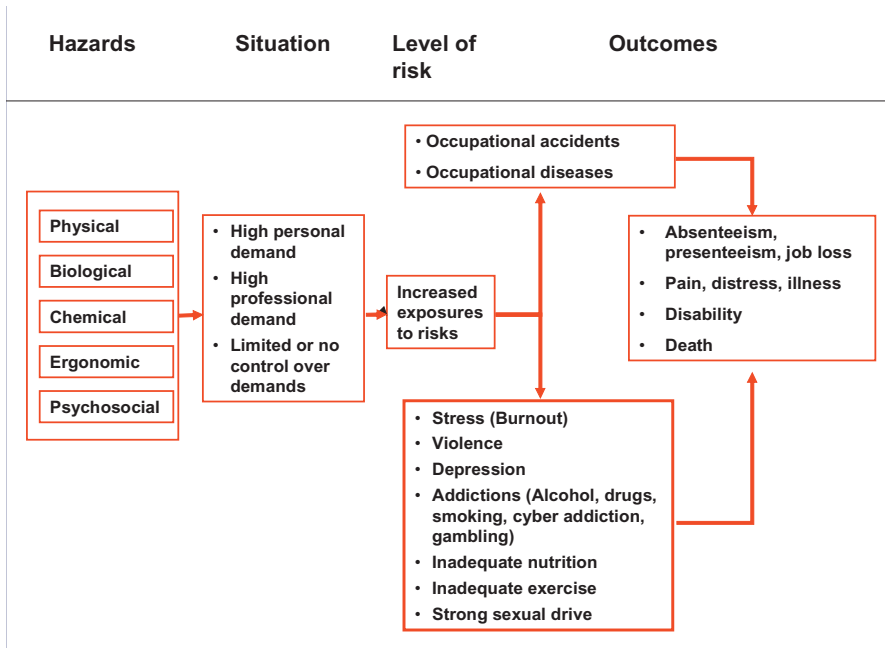


Figure 2. Stressors, hazards and risks influencing health outcomes

fear may lead to stress, lead to psychological or physical violence (such as bullying or mobbing), drive a worker towards abusing drugs, alcohol or tobacco. It may also lead to stigmatization and discrimination against the HIV-positive individual and subsequently trigger aggression or actual violent behaviour. Figure 3 depicts this vicious cycle.

In June 2006, the International Labour Conference adopted the Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187). This ILO Convention calls for the establishment of a framework within which occupational safety and health can be promoted. This Convention stresses the importance of the continuous promotion of a preventive safety and health culture, in which the right to a safe and health working environment is respected at all levels. Therefore the world of work should be considered as part of a larger community which can be a venue to promote a culture of prevention.

The establishment of a preventive safety and health culture requires a level of knowledge and skills where the social partners can actively discuss, develop, implement and evaluate effective measures. Training, education and the provision of up-to-date information are means of action to develop this knowledge and these skills.

The ILO Programme, Addressing Psychosocial Issues at Work, known by its acronym SOLVE (Figure 4) was developed in 2001 to address the problems of multiple causalities and multiple negative outcomes resulting from psycho-

social issues. The traditional approach in dealing with psychosocial problems has been reactive and isolated, focusing on just one of the problems and treating its symptoms. But the problems are increasing and because they are inter-linked treating just one can be ineffectual. Therefore a major paradigm shift with SOLVE is towards an integrated, proactive and prevention-oriented approach.

The goal of the SOLVE Programme is to develop national capacity to integrate the psychosocial issues of stress, violence and HIV/AIDS, and economic stressors; the addiction problems of alcohol and drugs, gambling, cyber addic-

tion and tobacco; as well as the well-being problems of adequate sleep and adequate nutrition and adequate exercise into a comprehensive organizational policy and develop action based on the policy through a number of different educational programmes. This policy should incorporate issues such as prevention, non-discrimination, confidentiality, social support, worker involvement, the provision of training and information and the provision of treatment and rehabilitation. The policy should call for an occupational safety and health management system to assure smooth development, implementation and evaluation. For workers and supervisors, SOLVE provides for action through education and training, translating policy into action at the shop-floor level.

SOLVE consists of seven different courses.

- ILO-trained Course Directors manage a two-hour briefing programme for managing directors (CEOs)
- The four-day SOLVE Policy Course is a 32-hour interactive programme for operational managers designed to provide the elements necessary for participants to design a comprehensive corporate policy including psychosocial factors. This course is highly interactive, using case study analysis, simulation exercises and policy development activities to reach its objectives. It may be conducted in consecutive four days or over a longer period of time, dividing the course into smaller units.
- The two-day SOLVE for Peer Counsellor Training Course provides enterprises or organizations with an informal safety net for psychosocial



Figure 3. The vicious circle of psychosocial problems



SOLVE Peer Counsellor Training in Senegal

problems before they become acute and require professional intervention. Participants are trained in active listening, assessment of problems and referral to specialist sources when needed

- SOLVE for Workers is one-hour orientation package designed to give all workers an understanding of the interrelationships among the psychosocial issues and the importance of the home-work-family balance. SOLVE for Workers uses exercises, group discussion and individual action planning to achieve its objective
- Twenty-two topic specific two-hour MicroSOLVE (micro-educational courses) are provided to companies or organizations that have been through the SOLVE Policy-Level Course for them to implement as part of their continuing education programme.
- The Course Directors' Workshop is provided exclusively by ILO SOLVE Master Trainers.

There is also multiple evaluation mechanisms in place.

In Africa, ILO SOLVE Course Directors from 23 countries have been trained. SOLVE courses have been held in 14 countries. Policy-Level SOLVE Courses have been held in Botswana, Burkina Faso, Cameroon, the Ivory Coast, Kenya, Mauritius, Lesotho, Namibia, Senegal, South Africa, Swaziland, Tanzania, Togo and Zambia. Participants have included government officials, factory inspectors, employers and workers, university professors, medical doctors, health workers and officials from a number of different United National

agencies. There have been Course Directors' Courses in a number of places, including Dakar (Senegal), Cape Town and Pretoria (South Africa), Douala (Cameroon), Arusha (Tanzania), Cotonou (Benin), and Port Louis, Mauritius. Some of these courses have included participants from other countries, thus creating capacity to implement SOLVE both nationally and regionally.

Five African universities are engaged in teaching SOLVE in schools of medicine, public health or social work. There are four sites being considered as SOLVE Centres of Excellence. It is also interesting to note that in Senegal, the Faculty of Medicine of the Cheikh Anta Diop University and the Social Security Fund of Senegal have developed a joint effort for the delivery of SOLVE.

The ILO SOLVE programme has shown to be an effective tool in addressing the difficult and often unique problems of psychosocial issues at work. It strives to be solution oriented and clearly focuses on prevention through social dialogue. It is designed to adapt to local cultures through educational methods such as simulation and role play. Worldwide, the SOLVE Policy Course has been taught to over 1,250 people in over 25 countries.

For further information about SOLVE

HIV/AIDS is a serious problem in Lesotho and directly impacts on many workers and their families. Dealing with HIV/AIDS as one of the psychosocial issues within the context of SOLVE allows employers and workers to better understand some of the causal factors of why certain behaviours take place.

Within the scope of factory inspection, SOLVE is a unique tool that can help employers and workers understand the impact of HIV/AIDS at work and motivate them towards prevention.

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Occupational health and safety problems among workers in wood processing enterprises of Libreville, Gabon

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Introduction

Gabon is a central African country bordering on the Atlantic Ocean at the Equator. Gabonese state forests cover 220,000 sq km (Gabon's total area: 267,667 sq km). Timber, the second resource after oil, is a key for the Gabonese's economy. Exotic varieties of cut wood are available; e.g. Okoume (*Aucoumea klaineana*), a soft wood. Gabonese forestry and wood processing have largely ignored the changes that have occurred in occupational health and safety. The times are changing worldwide. Is this the case in our country?

Woodworkers, who represent 31% of the active population, are part of the workforce, employed in tough, menial, poorly paid jobs (1). Health, the level of working capacity and efficiency, professional reliability and the safety of wood processing employees are influenced by the working conditions, by ergonomic, psychological, and social factors, as well as by lifestyle (1,2,3). Physical factors and unfavourable microclimate also have an impact on the workers during their work. All these factors influence the safety of procedures, trauma from accidents, and can provoke subsequent serious psychological, moral, and economic consequences (3).

Whilst it is not possible to obtain accurate statistics, because of under-reporting, nevertheless attention has been focused on hardwood dusts which can cause nasal cancer. Softwood does not appear to have the same inherent risks although it, too, can adversely affect health when large quantities are involved (4).

The aim of the study was to estimate exposures and perceived health risks

(occupational, lifestyle and psychosocial factors) of 790 workers from two Okoume processing enterprises. Both enterprises manufactured veneers in Okoume for national and international markets.

Carrying out the study

A descriptive study was carried out in Libreville (Gabon), between November 2005 and November 2006, in two Okoume processing enterprises (Enterprise A: N=303; Enterprise B: N=487). Data on 790 randomly selected workers were collected during, before and after working hours, using an individually interviewer-administered standard questionnaire prepared by the service of Occu-

pational Medicine (Faculty of Medicine, University of Health Sciences, Libreville, Gabon). Temporary workers were also included in our study. All workers signed an individual consent before inclusion. We itemized 20 workplaces and 21 risk factors. Microsoft Excel was used for the statistics.

Managers, staff representatives and medical personnel were interviewed concerning particular issues relevant to the survey. In addition, secondary data obtained from medical records were examined.

The heads of the enterprises chose five participants for each workshop; we added five employee volunteers, also randomly selected. Before starting at the workshop or any observations, we de-



Photo by P. Comlan

clared that the information collected would be confidential. People were all willing to participate. Workers were informed in advance, but the checklist was not shown and workplace interviews took place at the end of the workshop.

Results of the interviews

790 workers (temporary staff 82.3%) participated out of 855 available (response rate 92.4%). The mean age was 36 years (range 23–57 years) and the sex ratio 2.76%. In the group, 70.8% of the respondents could read and write and 92.4% of them were single. Workers had been employed for a mean of 5 years (range 0–8 years). The workers' lifestyle was not healthy: among them were smokers (21.5%); alcohol consumers (72.2%); physically inactive (41.8%); those with a poor nutrition regime (75%) and everyday stressful situations (36.7%).

Stackers were the largest occupational group among the 20 workplaces listed in Table 1 (31.4%).

All workers were highly exposed to at least one hazard (Table 2). In addition to the usual wood processing risks, such as wood dust, noise and heat, workers reported exposure to night shift (94.7%), sharp metals and objects (82.5%), heavy lifting and pulling movements (79.6%), flying and falling objects (66.2%), awkward positions (58.9%), slips and trips (43.9%), meeting production quotas (36.7%) and stress (20.9%). Workers were also exposed to precariousness, improper amenities, poor health, safety and hygiene conditions and inadequate medical services (67.9%).

Enterprise A had carried out noise monitoring at the different posts. The noise exposure limit of 85dB (A) was exceeded at the boiler (94dB (A)), the saw (95dB (A)), the anvil roll (96dB (A)), the debarker (104dB (A)), and the drum chipper (110dB (A)). None of the enterprises followed a monitoring programme for dust.

There was no accident book in either enterprise. Enterprise A kept account of absence but didn't analyse or glean any information on how accidents involving woodwork happen. During the study period, 57.1% of accidents led to more than three days' sick leave, representing 5.7% of the total sickness absence days. Enterprise B could not provide us with any information on absence.

In both enterprises, we noted a need for improvement concerning regular preventive maintenance of the machines.

Use of personal protective equipment was poor and inappropriate for all the

Table 1. Breakdown by occupational groups of the 790 workers interviewed

Workplace	Workers (N)	%	Workplace	Workers (N)	%
Anvil roll	27	3.4	Management	36	4.6
Boiler	36	4.6	Mechanics	30	3.8
Centring	9	1.1	Medical	06	0.8
Control	18	2.3	Peeling station	62	7.8
Cleaning	10	1.3	Gantry crane	09	1.1
Cutting saw	18	2.3	Saw	45	5.7
Debarker	11	1.4	Shift supervisor	54	6.8
Fork-lift truckers	27	3.4	Stacking	248	31.4
Drum chipper	12	1.5	Welding, sharpening	18	2.3
Dryer	18	2.3	Wood packaging	96	12.2

Table 2. Percentages of different exposures and duration of exposures among 790 workers

Exposures	Exposed	Never	Sometimes	Always	≥ 2 hrs / day	< 2 hrs /day
Wood dust	100	0	11	88.6	93.5	6.5
Excessive noise	94.7	5.3	73.5	21.1	98.8	1.2
Heat	94.1	5.3	15.3	79.4	-	-

Table 3. Use of protective equipment (%) among 790 wood workers

Protective Equipment	Needs (%)	Effective use (specific %)
Gloves/mittens	95.4	27.9
Overalls	95.4	92.8
Security shoes/boots	95.4	92.8
Goggles/spectacles	80.8	12.5
Protective face shields	14.3	20.3
Nose/mouth masks	92.3	35.7
Earplugs, ear muffs	93.9	4.7
Helmets	46.5	14.4

Table 4. Clinically based and self-reported occupational health complaints of the 790 wood workers

Health complaints	Self-reported (%)	Clinical registries (%)
Backache	62	64.3
Eye problems	48.1	51.2
Nose irritation	46.1	47.2
Other respiratory problems: chest and throat	39.2	35.7
Stress symptoms	29.1	14.3
Skin irritation	15.2	10.7
Skin burn	10.4	7.1
Noise-induced hearing loss	6.3	6
Tuberculosis	4.4	6

workplaces. All workers apart from management and medical staff acknowledged receiving a pair of security shoes/boots and two overalls every year (92.8%). Table 3 shows that less than 50% of the required protective equipment was provided.

Clinically based and self-reported occupational health complaints stated during the interviews are listed in Table 4. Half of the workers declared at least one health complaint. Skin burn, red eyes, headache and chest/throat pains

were reported by more than 70% of the workers. From the clinical registries, we found that the four first health problems were backaches (64.3%), ophthalmic problems (51.2%), nasal irritations (47.2%), and chest and throat problems (35.7%).

Temporary employees at the two enterprises mentioned the problem of obtaining a permanent and secured job, as posts were allocated to them by interim for a period of two years at the most.

Results for the workshops

The focus was on 'prevention', 'healthy workplaces', 'raising awareness', 'monitoring and surveillance' and 'further research.' Participants understood that healthy and permanent workplaces were indispensable. They expressed the need for information and education on wood-work-related exposures and on legislation in the sector. They also asked that study findings would be distributed to raise awareness among them. All managers understood that registering accidents would enable analysis and identification of the following aspects: machine guards and operating procedure.

Providing treatment for affected persons, screening of workers, immunization and first aid boxes were emphasized because of the high cost of living in our country.

Discussion

In Gabon, scarce data on occupational exposure to wood processing risk factors are found in the medical literature. Occupational health, safety and hygiene are still not perceived as a priority (5). Owners or managers do not provide sufficient maintenance and funds to buy protective equipment. Not much attention is given to the safety of processing machines, equipments, and tools as well as their link to health requirements. Employers, contrary to legal stipulations, do not guarantee safe and healthy working conditions for the employees, nor an adequate regime for their rest and nutrition. Employees were provided with only part of the protective equipment without any instruction in how to use it.

All employees acknowledged that exposure dust and noise were due to a lack of control at the source. In addition to wood dust, each employee reported at least one other type of occupational hazard.

Workers and employers were aware of numerous occupational and environmental health hazards, but the absence of a clear policy for the wood sector and the temporary nature of most wood-

workers' employment do not encourage investment in occupational health and safety. Managers in the sector used worn-out measures not complying with the work safety and health standards. Therefore, the employees were not willing to apply them.

Our observations support those of previous studies, conducted in Italy and Tanzania, noting that the majority of wood processing employees worked under extremely hazardous conditions without appropriate protective equipment (2, 6). Boy also underlined that in Italy, the woodworking trade ranks as one of the most hazardous occupations in general industry. Rotating devices, cutting or shearing blades, in-running nip points, and meshing gears are potential sources of workplace injuries, while crushed hands, severed fingers, amputations, and blindness are typical accidents in woodworking (2).

The clinical registries revealed six types of occupational health complaints: musculoskeletal (backache), ophthalmic, respiratory, pulmonary, dermatological and hearing problems. In China, Zhi et al. reported that 83% of the small-scale industries surveyed in county towns had at least one type of occupational hazard, and noise-induced hearing loss was one of the seven types of occupational diseases cited (7).

In our study, backaches represented 64.3% of all medical consultations. As Mazloun et al. reported in Iran (8), we also found that musculoskeletal disorders of the back, i.e., low back pain, were among the leading causes of occupational injury and disability. Prevention of musculoskeletal disorders requires an integrated approach, including improved work station design, a thermally comfortable environment, a well-scheduled work-rest regime and realistic production goals.

During the workshop study, the workers did not perceive health as their immediate problem. Temporary workers were more concerned with acquiring permanent workplaces. They depend on interim jobs which are often non-compliant with the law.

Conclusions

In Gabon, there is an urgent need for comprehensive national legislation dealing with the issues of health and safety in the wood sector. Wood processing workers are not covered by appropriate national occupational health and safety standards. This sector is neglected as a result of difficulties encountered in dealing with its multiple problems. Wood enterprises are particularly numerous

and informal in our country. Managers take no account of the risks linked with wood processing. Their knowledge on the subject is relatively imprecise and the various exposure levels are not measured or monitored. The lack of a prevention policy for the wood sector and occupational risks constitute an acute actual public health problem.

Proposals for future development

Registration and research, being the main source of information on work accidents and occupational diseases should be improved. A network should be created to develop new criteria for collecting and analysing data on workplace risk factors. Workers' safety representatives should have rights to access information on health and safety issues. Compulsory medical examinations at the workplace should be required by law.

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Occupational health and safety concerns of smallholder tobacco farmers

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Photo by J.K. Kibwage

Introduction

Tobacco is a cash crop that is grown widely in developing countries of the world, where wealthy multinational companies exist as growers, traders and manufacturers at the expense of the smallholder farmer. In Kenya, tobacco growing was first introduced in 1969. Most of the tobacco production takes place in the South Nyanza region, mainly in Suba, Kuria, Homa Bay and Migori districts (1–5).

Despite the global policies aimed at reducing the production and use of tobacco, the Kenyan Government's poverty-reduction policies seem to encourage more tobacco production in this region (Figure 1). This is evidenced by the current plans of the British American Tobacco Company Limited (BAT Ltd) to expand its activities to other districts in the Nyanza region, i.e. in Bondo and Siaya in the central Nyanza region (6). The emergence of Stancom Company Limited and Alliance One Company Limited also indicates continued tobacco production activities in the region.

The number of farmers contracted by the tobacco companies in Kenya increased by 67% in the period of 1972 to 1991, and by 36% between 1991 and 2000. In addition, the land under tobacco grew rapidly at the expense of food crops, because farmers have shifted to tobacco production (6). Due to time and land constraints, traditional crops such as cassava, millet and sweet potatoes – important in periods of drought and famine – are scarce in the region. Livestock activities have also decreased drastically (7).

The type of tobacco grown in this re-



gion is fire-cured. The curing process required a lot of wood fuel. Consequently, many indigenous trees are felled. Soil erosion is also rampant in these areas and so farmers are given eucalyptus ssp seedlings to plant. Scientific research has shown that this type of tree requires much water and nutrients; the result is loss of soil fertility. This has even led to further reduction in food crop production, which in turn has meant increased poverty levels in the area.

Furthermore, documented reports indicate that since the introduction of tobacco in the region, the health status of the local population has deteriorated drastically. For instance, it was alleged by tobacco farmers and other stakeholders in a workshop held in Migori town, Migori district, that about 60% of the medical consultations in Kuria district can be attributed to tobacco production and home-based processing of the harvested tobacco (8). The workshop participants observed that children and women are the most vulnerable to tobacco-related health risks since they spend most of their time working with tobacco. However, to our knowledge, no research of a considerable depth has

been done in this area to promote enforcement of the Framework Convention on Tobacco Control (FCTC). This study provides first-hand information from farmers and relevant stakeholders that may be used as a basis for planning the control of tobacco production and its related health issues.

What was done?

The study was carried out in 2006 in South Nyanza region, which encompasses Kuria, Migori, Homa Bay and Suba districts (Figure 1).

The area is located in south-western Kenya, along Lake Victoria region, and covers an area of about 7,778 sq. km (5,714 sq. km. land area and 2,064 sq. km water), which is 48% of the land area of Nyanza Province (9).

Data were collected through participatory rural appraisals (PRAs) where in every district, 40 tobacco farmers (15 adult males, 15 adult females and 10 youths) participated in four (4) focused group discussions. This gave a total participation of 160 former and current tobacco farmers. Key informants were also interviewed in several tobacco collection centres and major processing areas. In order to gain in-depth understanding of tobacco-related issues, stakeholders from the Ministry of Agriculture, farmers' associations, the Social Needs Network NGO, the Community Livelihoods Development Forum (COL-IDEF)-NGO, the Nyanza Eastern Western Tobacco Farmers Association (NEWTFA) and the Kenya Anti-Tobacco Growers Association (KATOGA) were interviewed and their views were documented. Secondary data were gathered from relevant literature sources.



Since tobacco-related health issues could not be empirically determined in the surveys and the participatory rural appraisals, a qualitative analysis technique was employed and the information obtained was documented.

Results and Discussion

Since the introduction of tobacco in the southern Nyanza region of Kenya, the health status of people in the tobacco farming areas has deteriorated drastically. For example, the participants claimed that 60% of medical consultations in Kuria district can be attributed to tobacco-production. Dizziness during dry spells when spraying tobacco is complaint often reported by the tobacco farmers. The hazard posed by tobacco cultivation places tobacco farmers at risk of injury and illness. Children and adults who handle tobacco frequently suffer from Green Tobacco Sickness (GTS), which is caused by dermal absorption from contact with wet tobacco leaves (10).

The infant mortality rose, as did incidents of unexplained miscarriages among pregnant women. Tobacco was labelled as a silent killer because tobacco farmers are the greatest smokers themselves. The participants listed some cases of tobacco-related, locally known deaths, skin disorders and incidents of eye damage. Tobacco companies have not established any local health facility for the tobacco farmers they contract. Tobacco farmers also lack medical insurance for tobacco farming-related ailments or occupational accidents.

During the curing season (April-June), most of the region is smoky. This was reported to be the period when people are exposed to pollutants that lead to the

ailments commonly known as chronic obstructive pulmonary disease (COPD). Generally, the farmers lack protective devices for use during the production and preliminary processing of tobacco leaves. The protective devices are necessary during the application of pesticides and herbicides. The common protective clothing which should be provid-

ed to every farmer are gum boots, nose masks, overall coats and gloves, but these are rarely provided.

The pesticides include aldicarb, a highly toxic insecticide, which is suspected of causing genetic damage in humans and of having a negative effect on the nervous system and is commonly used. With symptoms encompassing nausea, muscle twitching, and convulsions, aldicarb is a common cause of pesticide poisoning (10). Dichloropropene is another pesticide in use. It contains a highly toxic soil fumigant that causes respiratory problems in humans, as well as skin and eye irritations.

During the harvesting and curing period, there were serious shortages of storage facilities. Most farmers used their own houses to store the leaves, a practice which is very hazardous to their health. Tobacco produces a choking smell which makes children and women more vulnerable to tobacco-related health concerns, especially while asleep (see photo on page 49).

Environmental degradation is also caused by the tobacco plant, which leaches nutrients from the soil as well as pollution from pesticides and ferti-



Figure 1
 The location of the South Nyanza Region (Study area) in Kenya
 (The borders are not exact.)

lizers applied to the tobacco fields (11). The study established that farms where tobacco had been grown cannot be used to grow other crops due to high chemical levels in the soil. The growing of tobacco along riverbanks and the general use of fertilizers and pesticides had caused the death of some valuable fish species in local streams and rivers. The fish, *Synodontis* (cat fish) that used to be common in River Migori in Migori district and the surrounding ponds had disappeared because of the poisonous chemicals used in spraying tobacco. Other aquatic life had also been lost since the introduction of tobacco in the region.

Some farmers attributed the emergence of *Striga* weed (kayongo in the Luo language) in the region to tobacco farming, but establishment of that claim would require scientific investigation. Moreover, the tobacco nurseries are situated near water masses. During rainy seasons, some of the chemicals used in nurseries are washed downstream; this has serious implications for the animals, aquatic life and people using the water. Poor disposal of wastes (expired fertilizers, chemicals, uncollected tobacco) by the tobacco companies was also reported.

Conclusion and Recommendations

The findings of this study verify the impacts of tobacco production on the health of smallholder tobacco farmers in South Nyanza and on the local environment. The drive to achieve the high quality standards required, imposes great stress on the environment and risks to the farmers' health. Tobacco-related health issues arise due to exposure to chemicals when spraying, smoking or curing, prolonged skin contact with the tobacco during weeding and harvesting. Though tobacco plays very important socio-economic roles for the concerned farmers, the following recommendations are necessary to assist the farmers improve the fertility of their soil and promote their health.

- There is a dire need to control the chemicals that flow to the rivers as a result of tobacco farming, because pesticides in the water pose a great threat to both human beings and animals using the water. The rule should be that only environmentally friendly chemicals approved by the Kenya National Environment Management Authority (NEMA) are supplied to farmers.
- Because the cost of producing tobacco



Photo by J.K. Kibwage

Most farmers used their own houses to store the leaves, a practice which is very hazardous to their health.

co is very high and the companies understand the full cost of production, if possible, farmers should diversify to other sources of livelihood and should ensure that tobacco farming does not compromise the cultivation of sufficient food for subsistence. In particular, maize and other crops, such as fruits and flowers, should be considered.

- Smallholder farmers should be supported and provided with protective gears right from planting to curing of tobacco to minimize the chances of health-related problems.
- Alternative credit facilities should be arranged to ensure the farmers' independence from the tobacco companies.

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WHO Framework Convention on Tobacco Control
See more information on Internet:
<http://www.who.int/tobacco/framework>

There are 168 signatories (countries) to the WHO FCTC and 149 parties to the WHO FCTC.

Survey of pesticide formulation plants in Tanzania: Occupational and environmental health perspectives

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Introduction

Pesticide formulation is a process which comprises the mixing of biologically active compounds with solid or liquid inert materials to a predetermined concentration, and the addition of other formulants as necessary. Active ingredients are mixed with solvents, adjuvants (boosters) and fillers as necessary to achieve the desired formulation. Almost all formulation plants operating in Tanzania import both active and inert ingredients from overseas. The inert ingredients are imported in the form of technical materials. The main purpose of the formulation process is to attain products with optimum biological efficacy that are convenient to use or apply safely and economically (1).

The formulation process may generate air emissions and effluents, as well as solid wastes. Owing to the toxicity of the materials used in the formulation process, special attention must be paid both to the environment and to workers' health protection (2). The principal pollutants in formulation plants are particulate matter and volatile organic compounds. These are emitted from reactor vents, the filtering system and the mixing operation. Most liquid effluents result from spills, the cleaning of equipments and process waste water (3). The effluents may contain toxic organics including pesticide residues. Occupational exposure to pesticides in manufacturing plants occur in processes such as mixing, loading, packaging and storage (4).

Formulation plants should prepare and implement emergency plans that take into account neighbouring land users and the potential consequences of an emergency or accidental release of the harmful substance. Measures to avoid the release of chemical substances into the environment should be incorporated in the design, operation, maintenance

and management of the plant (5). Areas that produce dusts, for example, can be equipped with efficient exhaust device and automatically operated dust filters. During the formulation process, especially as concerns dusts or powders, special care must be taken to separate all metal particles by means of a magnet separator, which may ultimately become a source of ignition. Some operations like filling may be automated to reduce chances of direct contact (5).

Other important requirements for pesticide formulation plants are, e.g. wastewater treatment plants, personal protective equipment (PPE), fire-fighting equipment, competent staff, standard safety features, a medical facility for workers, an appropriate ventilation system, formulation equipment, and prop-

er and reasonable site location.

According to national legislation, all pesticide formulation plants or manufacturing plants in Tanzania must be licensed and the products formulated must be registered. This is stipulated in the Plant Protection Act, 1997. Surveillance and control of formulation plants are conducted by pesticide inspectors nominated by the Minister of Agriculture, Food Security and Cooperatives (5).

The purpose of this paper is to describe the capacity of Tanzania regarding pesticide production under local conditions, and its occupational safety conditions. The preliminary data acquired will be utilized as baseline information for the formulation of operational guidelines for local formulation plants in Tanzania.



Mixing and filling facility in a formulation plant

Photo by J. Akhabuhaya

The survey

The survey of formulation plants was conducted in May 2006 by direct inspection and interview using a special checklist (PRC 10). The major questions included in the checklist were, e.g. the plant name, address and location, the products formulated or repacked, the inert ingredients used in the formulation process, the availability of standard safety precautions including first aid, fire-fighting equipment, a disposal facility and hygiene facilities. Also determined were the plant production capacity, staff competency, smell and noise risk, and the plant proprietors. The questionnaires were administered by the investigators as a walkthrough site survey. The data were analysed using Microsoft Excel and Access 2003.

Results

The total number of firms visited was 12. By geographical distribution, they were located in Arusha (n=1), Moshi (n=2), Tanga (n=2), Dar es Salaam (n=5), Morogoro (n=1) and Iringa (n=1). Nine of the firms were formulating pesticides and the rest (n=3) were both formulating and repacking pesticides. All of the firms were within the regulatory control of the Tropical Pesticides Research Institute (TPRI), but only three are officially licensed by TPRI; these have updated their license for 2006 (Table 1).

The formulations produced were mainly emulsifiable concentrates (29.2%), wettable powders (16.7%) and dusts (12.5%). The formulations produced and repacked consisted of various active ingredients including pyrethrins (16.7%), cypermethrin (8.3%), d-allethrin (8.3%), and copper oxychloride (8.3%). The production capacities of the plants ranged from 1 to 4000 metric tons (MT) per year, but one-third of the companies produced 1–10 MT per year. Fifty per cent of the formulations produced were solids and the rest were liquids and aerosols. The chemical groups which seemed to dominate among the formulated products were pyrethroids, which accounted for 45%. Based on target pests, the majority of formulated products were insecticides (54.2%) (Table 2).

Regarding the occupational safety features, the firms had first-aid kits and necessary antidotes (n=11), hygiene facilities (n=12), adequate PPE (n=7), a disposal facility (n=5), fire-fighting equipment (n=12) and moderate ventilation (n=11).

As to the availability of quality con-

Table 1. List of formulation plants in Tanzania

Firm	Region	Products formulated or repacked	Active ingredients
Company 1	Arusha	Olyset mosquito nets	Permethrin 2%
Company 2	Moshi	Mosfly coils	D-allethrin 0.2%
Company 3	Moshi	Tankopper	Copper oxychloride 50% WP
		Gugucide	Atrazine
Company 4	Tanga	Farasi Insecticide	Pyrethrins
Company 5	Tanga	Flyex Solution	Pyrethrins
Company 6	Iringa	Pyrethrin	Pyrethrins
Company 7	Morogoro	Rococide	Bromodiolone
Company 8	Dar es Salaam	Farmbase 80 WP	Mancozeb
		Linkonil	Chlorothalonil
Company 9	Dar es Salaam	Milthane Super	Mancozeb
		TixFix	Amitraz
		2,4-D Amine	2,4-D
Company 10	Dar es Salaam	X Pel	Pyrethrins
		No Bite	Diethyl toluamide
Company 11	Dar es Salaam	Sapa Endosulfan 4D	Endosulfan
		Sapa Carbaryl	Carbaryl
Company 12	Dar es Salaam	Akher Powder	Carbaryl + cyhalothrin
		Drop On	
		Paranex	Alpha cypermethrin
		Rat cide	Bromodiolone
		Ecoflece	Cypermethrin
		Royalcop	Copper oxychloride
		Farmbase 2,4-D	2,4-D

Table 2. Types and quantities of products formulated or repacked in Tanzania

Parameter	N	%
Plant annual production		
No Production	5	21
0–10 MT*	7	30
11–20 MT	2	9
Over 40 MT	3	13
Unknown	7	30
Type of formulation produced		
Emulsifiable concentrate	7	30
Wettable powders	4	17
Dusts	3	13
Solution	2	9
Poison Bait	2	9
Aerosol	2	9
Granules	2	9
Coil	1	5
Suspension concentrate	1	5
Formulation state		
Solid	12	50
Liquid	10	42
Granules	2	9
Chemical groups produced		
Pyrethrins	11	46
Others	7	30
Carbamates	3	13
Inorganics	2	8
Organochlorines	1	4
Types of products produced by target pests		
Insecticides	13	55
Fungicides	4	17
Herbicides	2	8
Rodenticides	2	8
Nematicides	2	8
Acaricides	1	4

*MT = metric tons

trol laboratories, only four out of the twelve firms visited had such a facility. Out of these four firms, two can test only physical parameters and the remaining two can conduct both physical and chemical tests.

The pollution from noise and smell were assessed. The survey indicated that two formulation plants had high noise levels while four plants had a strong smell of pesticide within and surrounding the premises. Contamination of the floor by pesticide spills was noted in four plants.

Regarding the academic competency of the staff, the survey found that about half of the firms had semi-trained staff, particularly those carrying out routine activities such as labelling, mixing, packing, etc.

The inert ingredients used in the formulation process included cassava binder, coffee husks, dye, fish meal, isopropyl alcohol, maize flour, odourless kerosene, perfumes, piperonyl butoxide, potassium nitrate, sodium benzoate, starch binder, wheat and wood dust.

The products formulated included olyset mosquito nets (permethrin 2%), Mosfly coils (d-allethrin 0.2%), Tankopper (copper oxychloride), Gugucide (atrazine), Fylex solution (pyrethrin), Farasi Insecticide (pyrethrins), Rococide (bromodiolone), Akheri Powder (carbaryl + cyhalothrin), Drop on (cypermethrin), Paranex (alpha cypermethrin), Raticide (bromodiolone), Sapa Carbaryl (carbaryl 5% D), Sapa Endosulfan (endosulfan 4D), X Pel (Pyrethrins), No Bite (diethyl toluamide) and pyrethrins (Table 1).

The products that were repacked included Linkonil (chlorothalonil), Farmzeb 80 WP (mancozeb), Ecvoflece (cypermethrin), Royalcop (copper oxychloride), Farmbase 2,4-D Amine (2,4D), Milthane Super (mancozeb), Tixfix (amitraz) and 2,4-D Amine (2,4-D). The active ingredients repacked in the plants visited were lambda cyhalothrin (n=1), copper oxychloride (n=1), 2,4-D (n=2), mancozeb (n=2), amitraz (n=1) and chlorothalonil (n=1).

Discussion

The firms operating in Tanzania are unequally distributed in the country. The study indicates that half of them are located in Dar es Salaam and Tanga. This could be because of the easy availability and transport of raw materials by sea, taking into account that Dar es Salaam and Tanga are very important ports on the eastern coast of the country, opening onto the Indian Ocean. Also the firms

seem to concentrate in hot regions, i.e. Dar es Salaam, Tanga and Moshi. This is due to the fact that these hot areas have good conditions for mosquito breeding and hence the demand for anti-mosquito products is quite high. This is somehow consistent to the finding of this study, which indicated that 43% of all products formulated locally are for mosquito control.

The disposal facility is one of the features lacking in some of the firms. Taking into account that industrial effluents from these areas may have a high concentration of toxic chemicals, and that some town sewage systems are not properly designed, there is the likelihood of human and environmental contamination, either directly or indirectly. The untreated industrial effluents may pass into the groundwater, which is used by the residents in rural areas through the domestic wells that have been constructed.

Some of the firms lack standard PPE. One cause could be that plant owners fail to procure PPE for economic reasons or due to negligence. Another reason could be that the plants are located in hot climatic areas and the workers probably feel uncomfortable wearing them. However, despite these limitations, working without appropriate PPE can lead to high occupational exposure and hence health hazards among the staff.

Another important facility which is lacking is the quality control laboratories. The study found that some plants

have no such facilities. The laboratories are very important, not only for the quality control of finished products but also for research and development in the formulation process. Failure to conduct quality assurance of the finished products indicates that substandard products may be distributed on the market. This may also lead to the distribution of products with high impurities, which in turn may cause health hazards to the users.

Strong smells released by some of the plants reflect a high potential for occupational exposure through inhalation. The situation becomes more serious if workers are not adequately protected, which is the case in some of the plants visited. Apart from occupational exposure, the toxic fumes are also affecting the inhabitants around the plants.

The spills noted in some formulation plants are also a matter of concern, especially to workers engaged in production and packaging. The pesticide spills, if not properly handled, can easily pollute water bodies which collect washings from the formulation plants. The situation is more hazardous for plants that lack treatment facilities.

Almost all of the plants visited are located in industrial areas, but some are in places which are highly populated. These locations may be extremely dangerous in case of any accidental leakage or spills. Such problems occurred in India when there was a leakage of methyl isocyanate, a chemical used in the manufacturing process of a Union Carbide plant that was located in a high-



Evaporation basin – disposal facility: this is one of the techniques for safe disposal of plant effluents.



Photo by J. Akhabuhaya

One of the plants dealing with manufacturing, formulation and repacking of pesticides

ly populated area. This major accident caused between 2,500 and 5,000 fatalities and over 200,000 people were injured (6). The victims suffered from lung damage, eye injuries, suppression of the immune system, chromosome damage, spontaneous abortions, stillbirths, etc. (6).

Some of the plants visited used natural products, pyrethrum, to formulate mosquito control products. These were noted in Mafinga (Iringa) as well as in Tanga and Dar es Salaam. Since the synthetic products are believed to be more hazardous, the efforts to formulate natural products is highly recommended. Since Integrated Pest Management (IPM) have devised several technologies or cocktails for pest control using natural products (nonsynthetics), it is high time for the local plants to engage in research and development in the formulation of these products. This will contribute to the reduction of health risks arising from synthetic pesticides.

The majority of products formulated were insecticides (54%), and these are the most used pesticide products in Tanzania (7). These agents are more involved in poisoning incidents in Tanzania than other agents, such as herbicides, fungicides, etc.

Studies in other areas indicate that workers working in formulation plants have been exposed to pesticides and have suffered a variety of injuries resulting from pesticides exposure. Studies have revealed workers experiencing face numbness and sneezing from exposure to deltamethrin and fenvalerate (8), dizziness, malaise and fatigue from chlorpyrifos exposure (9), tremors, weight loss, and poor coordination and muscle weakness from exposure to chlordane (10)

and problems in brain circulatory system (11). In another study (12), 11% of 102 workers were hospitalized for illness related to pesticides exposure. The highest hospitalization rates occurred among workers at production and packaging units.

Recommendations

- i) The survey indicates that Tanzania already has a total of twelve formulation plants. Although all plants are within the sphere of regulatory control, there is a need to design guidelines for the operation of these plants in Tanzania. The guidelines should be used to license the firms.
- ii) In order to reduce risk, the plants should not be located in highly populated areas. They must be constructed in industrial areas far away from highly populated areas.
- iii) The national authority should start to implement monitoring, sampling and analysis of finished products prior to distribution to the end users. These activities should come into effect immediately.
- iv) All plants must have quality control laboratories.
- v) Tanzania – through the national authority – should develop emission standards for our local formulation plants.
- vi) The pesticide industry and researchers should design PPE that are convenient for workers in hot climatic conditions.
- vii) All firms must have sound disposal facilities for their industrial effluents.

Conclusion

The study revealed that a number of pesticide products are locally formulated and distributed in Tanzania. It further revealed poor working conditions for some formulation plants, a situation which can endanger workers involved in the production process. Although this potential occupational hazard was noted for the formulation plants surveyed, it is believed to be indicative of common practice at other pesticide distribution points. There is thus an urgent need for regular assessment of workers' health in formulation plants.

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Initiatives in occupational health and safety of health care workers in Ghana

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Introduction

Health care work comprises workplace tasks and work environments associated with varying degrees of risk of occupational injuries and ill-health. These may arise from biological, physical, chemical, psychosocial and ergonomic hazards. In Ghana, poor occupational health provisions have been cited as contributory factors to the brain drain that has plagued the health sector over the past three decades (1). This paper summarizes the findings of three studies conducted in health institutions in Ghana between 1999 and 2004, and follow-up actions effected so far.

The objectives of these studies were, respectively to assess the physical conditions under which staff work within the Ghana Health Service, to unearth the health and safety conditions among various categories of health workers at different levels of health care delivery, and to evaluate the occurrence of musculoskeletal conditions among female nurses working at two public health institutions.

Physical working conditions of staff of the Ghana Health Service (GHS) (Study 1)

The first study entailed assessment of some physical hazards in two hospitals, three health centres and two administrative offices (headquarters of the GHS and offices of a rural health centre), all located in the Greater Accra region of Ghana. The physical parameters studied were lighting, heat/cold, humidity and risk factors for exposure to radiation from visual display units. Lighting intensities were determined using a luxmeter, temperature (measured with a centigrade thermometer) was determined and used as a proxy for heat, while humidity was determined with the aid of a hygrometer. Lighting was determined under natural conditions and with artificial lighting, while temperature and humidity were determined under natural conditions and with air conditioning, respectively.

Lighting

The generally accepted range of illumina-

tion at work surfaces such as desk level suitable for office and laboratory work is 300–600Lux. The results of lighting assessments illustrate the importance of factors, such as use of windows, direction of windows as well as colour schemes in determining illumination levels.

Table 1 shows the lighting results of the institutions surveyed. The lighting levels in the offices of two directors at the GHS headquarters illustrate the importance of factors such as the colour of walls and curtains in determining illumination levels. The offices are of the same size. The major difference between the two offices is that the office of Director 1 has white walls and ceilings as well as light-coloured curtains, while in contrast, the office of Director 2 has walls lined with dark brown wooden paneling and brownish coloured curtains. Under natural lighting, the illumination in the office of Director 1 was 1031 Lux, compared with 20 Lux in the office of Director 2. Under artificial lighting, (with the curtains drawn), it was 957 Lux in the office of Director 1 compared with 207 Lux in that of Director 2.

The rural health centre had the best lighting results, with six out of eight rooms having an illumination level above 300 Lux. These scenarios show that with proper orientation of buildings, good arrangement and sizing of windows and the use of light-coloured ceilings, walls and curtains, a humble rural facility can outperform urban institutions, which are often better endowed than the former.

Temperature and humidity

In the tropics, temperatures of 23–26°C are considered as the optimal range within which most people are likely to work comfortably. The temperatures recorded in this survey were mostly in the range of 28–30°C, with a few rooms registering either 26°C or above 30°C under natural conditions.

The comfort range for humidity varies widely among persons, but relative humidity (RH) in the region of 85% RH is considered comfortable for the aver-

age person living in the tropics. Under natural conditions, relative humidity measured indoors was in the range of 74–100% RH and 71–95%RH when air conditioners were on. The air conditioners generally reduced the RH by 1–2%. The combined effect of the moderate reduction in humidity and cooling makes the environment more comfortable to work in.

Radiation risk

No instructions have been laid down concerning safe emission levels in offices. It is known that exposure to radiation emissions is a risk to human health and that a personal computer can emit radiation both from the front as well as from the back and sides. It is generally advised, therefore, that users should sit at least 28 inches from the screen and other occupants of the room should sit 48 or more inches from the sides and back of the equipment.

The rule of thumb for space planning allows for 5–11 m² for secretaries and office clerks, while allowing for 18 m² for one to two persons of managerial rank. The working space available to persons whose offices were surveyed ranged from 5.9 to 18.8m² per person. Due to arrangements of furniture and other items in some of the smaller offices, some staff members using visual display units (VDUs), are seated closer to equipment than is recommended. While the distance between the screen and its user was within accepted limits for most users, several were seated very close to the sides and back of the VDUs. Over-

Table 1. Adequacy of illumination of rooms surveyed

Institution	Rooms with adequate illumination as the proportion of the number of rooms surveyed	
	Natural Light	Artificial Light
Headquarters	6/19	3/19
Hospital 1	0/12	2/12
Hospital 2	1/9	2/9
Polyclinic 1	4/13	3/13
Polyclinic 2	3/12	2/12
Rural health centre	6/8	6/8
Offices of rural district office (DHMT)	0/3	0/3
	73% inadequate	76% inadequate

crowding or inadequate work space was therefore a major risk factor for workers (particularly secretarial staff) in some offices.

Perceptions of health care staff (Study 2)

The second study was an exploratory cross-sectional one that involved 189 subjects working in seven government institutions in the Greater Accra and Eastern Regions. The institutions comprised a teaching hospital, two regional and district hospitals, as well as two health centres. The respondent consisted of nursing professionals, medical officers, pharmacists, laboratory staff, orderlies, environmental health officers, administration staff, workers at the maintenance department, and catering staff.

Perceptions of various professional groups of health workers on hazards in their work environment, as well as measures taken to prevent and mitigate effects of hazards in workplaces, were sought via interviews.

The three commonest hazards in health care work (with variations among professional groups) were biological factors, handling of patients/poor work postures, and psychological stress. This was the trend among doctors and nurses. Laboratory staff considered their two most significant risks to be similar, while the third most important exposure among them was to chemicals. Pharmacists and technicians considered themselves to be most at risk of exposure to chemicals/harmful drugs followed by the risk mentioned by the doctors and nurses.

Among all categories of personnel, occupational health services were characterized by:

- Absence of measures to monitor the various hazards on a routine basis
- Absence of organized occupational health and safety arrangements. This included the lack of a systematic programme of medical surveillance for all categories of staff. Thus, while over 77% of respondents have undergone pre-employment medical examination, periodic and special medical examinations are not widely practised; exit medicals are non-existent. Similarly, there is no ongoing programme for handling work-related ill-health.
- Incident reporting is low; the procedure for reporting and investigation of workplace accidents and diseases is unclear.
- The use of personal protective clothing, as well as caution at the personal level are the main measures adopted to mitigate the effects of hazards.

- Means of handling and disposal of waste may pose significant risks for health staff, the general public and for the environment.

- On the whole, occupational health and safety is poorly understood by both management and employees, with as many as 32%–59% of respondents expressing the view that occupational health and safety (OHS) provisions are grossly inadequate.

Assessing the experienced musculoskeletal problems (Study 3)

This was a cross-sectional exploratory study assessing the experience of musculoskeletal problems among 127 nurses in one sub-district of Accra from the perspective of nurses, compared to that of a group of 96 teachers working in the same sub-district.

The method consisted of interviews of nurses using a structured questionnaire enquiring about perceived workplace hazards, experience of musculoskeletal problems and measures to prevent musculoskeletal problems.

Nurses are at greater risk of musculoskeletal problems than teachers of the same age and sex. The major risk factors identified are lifting of patients, poor working postures, stress, slips and falls. 78% of nurses have a risk factor of obesity compared to teachers (65.2%). The parts of the body most affected by injury are: the lower back, neck and upper back. The main measures in place for prevention of musculoskeletal problems are personal caution, training in patient transfer and lifting techniques. One or more of these measures were applied by 23–25% of the nurses participating in the study.

Conclusions

The conclusions drawn from the findings of the above surveys were the following:

- Many health workers, both in clinical practice and in administration, work under uncomfortable or hazardous physical conditions.
- Some of the discomfort may be eased by simple measures. For instance, illumination can be improved by measures such as repositioning of windows and provision of lighter colours for walls, ceilings and curtains. Improved seating arrangements, etc. may reduce exposure to radiation from VDUs.
- Musculoskeletal problems are a substantial cause of the burden of ill-health among health workers, especially among nurses.
- In addition to the actual process of rendering care, handling of health care

waste also poses health and injury risks to health care professionals. Measures to address occupational health should therefore also focus on control of infectious and other risks arising from waste management.

- While measures in place for prevention/control are grossly inadequate, health care workers are in general not abreast of occupational health and safety measures.

Current interventions

Measures that have been initiated to address some of the issues identified over the past few years include:

- the development of an OSH policy for staff of the Ghana Health Service
- the development of an HIV/AIDS policy for the health sector
- institutionalization of a health surveillance system for staff of the Ghana Health Service
- the development of a curriculum for in-service training in OSH for health staff and
- the development of a health care waste management policy.

Implementation arrangements for the policies and training are underway. These interventions have the potential to contribute positively to the national health policy, which aims at promoting healthy lifestyles and healthy environments, while ensuring partnerships and inter-sectoral collaboration. They also fall in line with the stipulations of the Ghanaian Labour Act, 2003 Act 651 (2), which enjoins the employer to provide a safe and healthy working environment for employees.

For success to be achieved in this endeavour, however, there is a need for the commitment of resources at all levels of the health system. Useful lessons can be learnt from sister countries on the continent who have made major strides in occupational health and safety of health care workers, such as South Africa (3).

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