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Occupational hygiene and practical solutions

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Contents

Participatory occupational hygiene; a path to practical solutions

The formality of addressing a participatory application in our profession requires an understanding that occupational hygiene is defined as both a science and an art. Our devotion is to the prevention, recognition, evaluation, and control of hazards or stressors in the workplace, that may cause illness, injury, or significant discomfort. In many of the industrialized countries we are fortunate to have both the opportunity and resources to delve into our daily activities with the luxury of the scientific and technological tools and aspects of our profession. To construct a path to practical solutions within the Industrially Developing Countries (IDCs) we need to recognize the artistic aspects of application that lie within the cultural understanding of the workers we have a responsibility to protect.

The concept of participatory occupational hygiene is presented as somewhat analogous to the successful and accepted practice, performed under our common occupational health umbrella, known as participatory ergonomics. Participation at work is a technique of giving employees an opportunity to control the aspects of their workplace that are associated with exposures resulting in work-related illness and disease. The assumption is that workers know their workplace better than anyone else does and that this knowledge allows them to develop a more comprehensive approach to their work. With the majority of the working population of IDCs involved in the agricultural trades and small-scale enterprises, practical solutions need to have the adaptability to go beyond the factory environment and into rural villages. This requires a programmatic approach that is low cost and easy to understand. The introduction of the International Labour Organisation (ILO) Toolkit, with the assistance of the International Occupational Hygiene Association, may be an important step to the implementation of such an approach. Utilizing the ILO Toolkit with the assistance

of trained professionals, workers can participate in the gathering and analysing of necessary occupational hygiene information, then in identifying and implementing practical solutions.

An occupational hygiene programme should utilize intervention techniques that focus on a method of achieving prevention. For an intervention to be effective and for practical solutions to be achieved, the intervention must actively involve the worker, must reduce exposures to the stressors, and must affect the organizational culture. There are often cultural differences in how work is performed between countries, and participatory occupational hygiene can assist in developing an approach that takes this into account. Addressing the social, psychological, and cultural needs of IDCs has been, and continues to be, an important aspect of achieving prevention. Within IDCs, the participatory approach has been successfully applied by maximizing the role of the employee within the diversity of the local population. This approach has been applied within developing countries in Asia for assessing the needs of small enterprises and agriculture by building on local practices within the limitations of locally available resources. Field study interventions, use of practical assessment methods, and voluntary efforts within a participatory framework are all part of the collaborative research and training approach that has been successful within Asian-Pacific IDCs.

Technological advancements have brought an increase in chemical exposures and related occupational diseases. Participatory occupational hygiene offers a technique that can be an essential aspect for a multidisciplinary approach to address these changes in the workplace and reduce occupational diseases. Many of the technological advancements have created industrial problems where an occupational hygienist, ergonomist, and occupational health physician can work together with workers to develop understanding and create solutions. The implementation of this method can be extended by a greater level of participation within a given community or village. Information learned and practical solutions created need to be shared with other IDCs within an established participatory occupational hygiene protocol, which can be associated with the ILO Toolkit. This protocol would also assist in the development of accuracy in reporting occupational health statistics. A collaborative, multidisciplinary approach is necessary in order to strengthen the occupational health and safety foundation and assist IDCs in initiating preventive programmes. This approach must aim at reducing work-related exposures for employees in large industry, small businesses, and agricultural professions. Utilizing local talent in training, developing, and implementing participatory occupational hygiene programmes and practical solutions within IDCs will aid in ensuring costs are minimized and cultural, ethical, and psychosocial aspects are addressed.

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Low-cost improvements and good practices

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Introduction

The benefits arising from the Work Improvement in Small Enterprises (WISE) programme in the Philippines answered a lot of questions and opened up a number of options in implementing low-cost workplace reforms. WISE is a unique approach to improving productivity and working conditions in small enterprises. It entails the implementation of an action-oriented training programme that links better working conditions to higher productivity.

WISE has been proven effective in generating simple and low-cost improvements linking productivity and product quality to better and safer workplace conditions. Small enterprise owners/managers are encouraged to consider improvements more favourably if they are inexpensive. Good operating practices can often be implemented at little cost, and therefore lead to a high return on investment.

The intention has been that the results of the assessment activities conducted on several practical WISE improvements should become springboards for promoting improvements. The in-depth evaluation of the impact and practical effects of implemented improvements offers a lot of potential for promoting better working conditions and higher productivity.

The information from the assessment activities can be used by entrepreneurs and workers to enable them to clearly understand the relevance and impact of practical and low-cost improvements, and to understand constraints and technical difficulties involved in furthering existing improvements and implementing new ones.

The value of practical workplace solutions

The numerous low-cost improvements implemented in the WISE activities seem to have been fairly practical and workable. Most of these improvements have been sources of immediate positive changes in the workplace, giving the shop floor the needed reform in terms of comfort for the workers and high-quality performance. But how long the improvements can remain in place is another question. Workers abandoning workplace reforms and reverting to old practices oftentimes have valid reasons for doing so.

One of the reasons is simple – some changes cannot be sustained because they do not improve working conditions as a whole. In fact, some of the changes have led to increased heart rate and muscular activity – and at times to excessive trunk bending – in the case of the workers concerned; and this has in turn led to poor productivity.

However, such adverse results should not in any way be a reason for ignoring the potential of the changes; rather, it should be the driving force for activities aimed at improvement. Simple modifications and additional improvements may be needed to bring out the real impact and full potential of these changes. The benefits become more relevant once the changes achieve their true worth.

This paper presents only three improvements from among those assessed. The details of the improvements – including the situations before and after improvement, and explanations of experiments conducted to assess the physical conditions of workers vis-à-vis productivity – are discussed. Recommendations are provided for each improvement.

It makes good sense to promote good examples in improving working conditions and increasing productivity. It is a matter of gaining optimal impact and benefits from the changes. The workplace is always a venue for continuous improvement.

Before the improvement the roll of material was on the floor.

The metal frame at table height to hold the roll of material is a big help for the worker.

Data gathered

Experiment	Running Time (min.)	Heart Rate	EMG-%MVC Biceps	Trunk Degree
Previous	5	102.2	11.0	23.6
Improved	5	95.0	14.4	24.7

Improving good practices

Improvement 1: Use of metal frame at table height to hold roll of material

Previous method: The roll of material, 2 meters in width and weighing 30 kilograms, used in making bags, was placed on the floor. A worker doing the cutting operation would pull the edge of the material, place it on the table, put on the clips/locks to fix the cloth on the table, and then cut the material to get the specified length. To cut again, the worker had to pull from the roll. Sometimes, a portion of the material was caught under the weight of the entire roll, and when this happened, the worker had to lift the roll before he could pull and set the material on the table.

Improved method: The cutting process is done in the same manner except that in the case of the new method, the roll of material is already placed at table height using a metal frame.

Experiment

A male worker was asked to perform the cutting operation using the two methods for five minutes each. Part of the experiment in simulating the previous method was to free several meters of the material from the roll for easier pulling before starting to set the material on the table.

Observations

Using the metal frame to hold the roll of material is a big help to the subject. Average heart rate is 7% lower in the case of the improved method. The muscular activity, however, is slightly higher. This could mean that the pulling force needed using the improved method is greater than the force applied in the previous method.

Recommendations

- Shorten the pulling distance from the roll of material to the point of operation. This can be done by using a table that is less wide, so that the worker can get closer to the roll of material and can minimize stretching and forward-bending movements.
- Install a turning or rolling device on one side of the metal frame to free several meters of material from the roll before setting and cutting. The device should be able to minimize pulling effort.
- Elevate the height of the metal frame so that the material can roll more freely once pulling is started. If possible, always set up a less heavy roll of material on the metal frame.

Improvement 2: Use of fixture for auto headrests in fixing covers

Previous method: Before the construction of the fixture, a worker would place one headrest between his knees and fix the cover by inserting the headrest into the cover. This was not an easy task, because for the cover barely fits over the headrest and the worker had to do two things at the same time – fix the cover while holding the headrest in place.

Improved method: A fixture that could hold 4 headrests was constructed to make the operation of fixing the cover on the headrest faster and less strenuous. With this method, the worker can now concentrate on fixing the cover, because the headrest is already stable. Working on 4 headrests continuously is also time-saving. During peak periods, two persons can even work together using the fixture.

Experiment

A male worker was requested to simulate the two methods mentioned above by working on 4 headrests for each method. For the improved method, the subject first set 4 headrests on the fixture before starting to fix the covers.

Observations

All indications point to the positive impact of the improvement. Operation time has been reduced on the average by more than 60% and with less physical exertion as shown by the indicators – the average heart rate and trunk bending of the subject are down by almost 18%, while the effort of the trap muscles has decreased by more than 50%. The results of the experiment prove that this is a worthwhile improvement. Adding more cycles to the experiment would generate more valuable results.

Recommendations

- Use the fixture at all times. Make the fixture a portable workstation by installing castors.
- Make the height of the fixture higher and adjustable to minimize forward bending of workers using the device.

Improvement 3: Use of funnel in noodle packing

Previous method: Before the improvement, the process of packing "odong" (a local term used in the region for a specific type of noodles) would involve weighing cut noodles using a scale to get the desired weight (in approximate terms). Then, using a small carton guide, the noodles would be inserted into a small plastic bag.

Improved method: Now the step of weighing the cut noodles has been eliminated. The worker just picks up noodles from the work table and inserts them through the hole of the funnel, which is already half-inserted in a small plastic bag. What goes through the funnel is the approximate weight of noodles for packing.

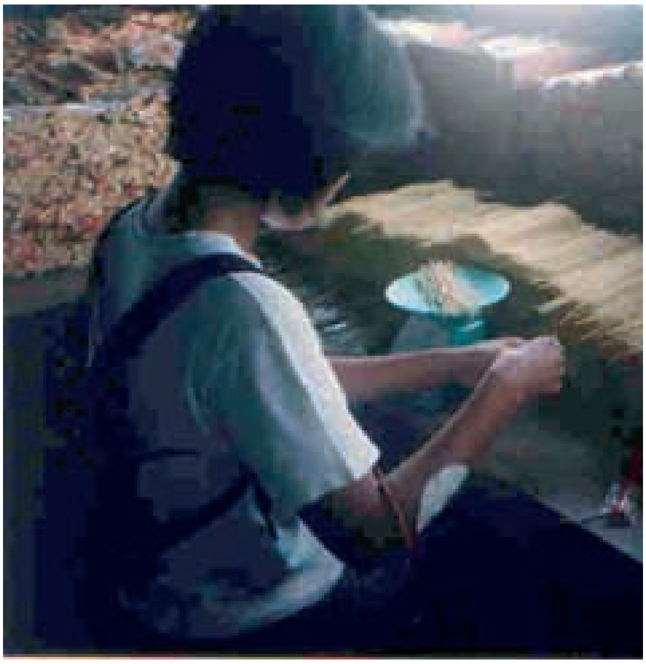
Experiment

One of the female workers was requested to be the subject in this simple experiment. She was asked to prepare 10 small plastic bags of "odong" noodles using each method. The tasks were performed with the subject in a sitting position.

A fixture was constructed to speed up and facilitate the fixing of the cover of the headrest (picture on the right).The worker can now concentrate on fixing the cover. This was a worthwhile improvement.

Data gathered

Experiment	Running Time (min.)	Heart Rate	EMG-%MVC Trap	Trunk Degree
Previous	6'23"	149.3	27.9	21.9
Improved	2'10"	122.5	12.4	18.0



Before the improvement, the packing of noodles involved weighing the cut noodles with a scale.

The use of a funnel in noodle packing, and elimination of the weighing shortened the operation time by over 75%.

Data gathered

Experiment	Running Time (min.)	Heart Rate	EMG-%MVC Extensor	Trunk Degree
Previous	2’49”	105.8	5.6	7.5
Improved	0’39”	119.4	19.1	7.5

Observations

The figure of more than a 75% reduction in operation time is remarkable. This is essentially the result of eliminating the weighing step. But it seems that the trade-off here is the resulting increase in heart rate and muscular activity in the extensor muscles of the subject. With the use of funnel and elimination of the weighing step, the arms of the subject are elevated, with the elbows bent most of the time, except while the noodles are being picked up and while they are being deposited in the small plastic bags. In the old process, there is a series of short movements. With the application of the improvement, packing the noodles has become monotonous and involves working with bent elbows most of the time.

Recommendations

- A worker can pack “odong” noodles using the funnel in alternate sitting and standing positions.
- Modify the height of work table, so the worker can maintain elbow level while picking up noodles and holding the small plastic bag.

References

1. Thurman JE, Louzine AE, Kogi K. Higher Productivity and a Better Place to Work. International Labour Office, Geneva.
2. Ergonomic Checkpoints. International Labour Office, Geneva.

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Occupational hygiene and protective measures in Vietnam

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Introduction

Good occupational health practice requires a multidisciplinary approach, based on two fundamental components, namely occupational hygiene and occupational medicine. In preventive terms, the practice of occupational hygiene includes the following steps: the recognition, evaluation and control of occupational hazards. The associated field of occupational health covers prevention, diagnosis, and treatment and rehabilitation for workers with ill health as a result of an occupational hazard.

As described above, occupational hygiene can be defined as a scientific and technical discipline focused on research and practice in the recognition, evaluation and control of environmental hazards and stress that affect workers. These factors cause diseases and illnesses, impairing health and reducing the work capacity of the workers.

Identification of occupational hazards

The occupational hazards at work are identified in a preliminary survey. This is the first, fundamental step in analysing occupational hygiene. Occupational hazards often abound in the work environment, but the key problem is to decide what hazard should be identified first. Some occupational hazards can be easily identified, while others – such as newly introduced chemicals – are hidden. It is very important that the preliminary study be conducted by experienced occupational hygienists. In order to identify occupational hazards, it is necessary to gather all the information at the work site. The preliminary survey is initiated by negotiations with the management, the technical director and the safety and medical staff of

Photo by NILP

Taking air pollution samples at a workplace.

the factory. The survey should concentrate on the organizational structure, products and productivity, pollutants, occupational safety and health management, first-aid, fire prevention, and data on work-related accidents and diseases, and suitable facilities for workers. Negotiating with the relevant units of the workplace is the next step. The technical process (continuation, interruption, coverage, and automation), the detailed work schedules, the consumption and toxic properties of the chemicals used, the raw materials, semi-finished and finished products, and the number, sex and age of the workers are all recorded. The last step is to conduct visits to the workplaces in order to collect information about the premises, the machinery, safety measures and ventilation. Environmental factors are measured both qualitatively and quantitatively.

In the 1970s, occupational hygiene surveys were small. They were conducted separately in various industries, e.g. mechanical manufacturers, coal mines, textile mills and chemical plants. Environmental factors were mostly physical, and they were easily identified, such as temperature, humidity, thermal radiation, noise, and illumination. They could be measured by simple equipment (thermometer, Asman thermometer, noise measurer and luxmeter). The measured values were in compliance to Russian, German and Polish standards.

In the 1980s, occupational hygiene surveys were conducted within the framework of research projects carried out in industries, such as shipyards, coal mines, foundries, civil engineering work, metallurgy, and foodstuff manufacture. During this period, a series of national standards (TCVN) were created and taken into use; environmental and personal control measures were developed; data on Vietnamese anthropology were collected; and methods of collecting and analysing air samples were applied.

From the 1990s onwards, occupational hygiene surveys have been more comprehensive, focusing on chemical agents, physical and psychological factors and ergonomics. Attention has been paid to occupational hazards arising from industrial waste-air, noise, and especially from technology transfer and foreign investments, and effects on female workers. The equipment used for collecting, analysing and evaluating the samples are of Western origin. The evaluation of the hazardous factors is linked to biological monitoring and medical examinations (e.g. biochemical, hematological, cardiographic, lung function, and audiometrical tests).

Evaluation of occupational hazards

The evaluation of occupational hazards aims at determining the presence of hazardous agents, and defines their characteristics and the magnitude of the exposure. The levels of hazardous agents in the work environment should be quantified and qualified by different techniques. Only after having a clear picture of the exposure and how it relates to occupational health standards, can the proper assessment of the actual hazards be accomplished.

The best estimate can be obtained by collecting adequate data on hazardous agents in the work environment and their subsequent statistical analysis. Correct evaluation of the hazards should be based on accurate measurement of the environmental agents and reliable treatment of the obtained data.

One important tool in determining the absorption of chemical agents is the biological monitoring of workers. Data from medical examinations, including tests for the early detection of health impairment contribute to the evaluation of the occupational hazards. The close cooperation between occupational hygienists and the medical staff is very important at this point.

The above-mentioned principles have been applied in the evaluation of occupational hazards in Vietnam.

The physical hazards of, for instance, poor microclimate, WBGT, noise, and vibration have been measured with modern equipment. A hot work environment is a common problem at workplaces, and the noise level is often higher than the threshold limit values (TLV).

Toxic gases were collected and analysed by high-precision equipment such as Gastec pump kits, Niken Gas portable monitor, gas chromatograph (GC-90), polarography (VA464), and atomic absorption photography (Perkin Elmer 3100).

Dust pollution is a serious threat to the workers, as it can damage their respiratory organ. The dust concentrations in some casting workshops exceeded the TLV five-fold and contained high levels of silicon dioxide (silica) and inspirable dust. As a result, large numbers of workers suffer from silicosis. Also, toxic levels of heavy metals, e.g. manganese in welding fumes, or exposure to lead in battery factories, are a serious health hazard.

Photo by NILP

Analysis and evaluation of hazardous environmental agents.

Pesticides, herbicides and other chemicals used in agriculture are the most common hazardous agents to peasants. These substances have been found in high concentrations, explaining a vast number of cases of chemical poisoning in agricultural areas.

Control of occupational health hazards

The measures for controlling of occupational health hazards can be grouped into two main categories: environmental control and personal control.

Environmental control measures include changes in work processes and the work environment. The aim is to control hazards by eliminating or reducing them to levels that are not harmful to health, as well as protecting the workers from them.

Appropriate design and layout. Appropriate design of the machinery, workplaces and production processes helps to reduce the hazards. It is important to isolate of the pollution sources from the workplaces, as well as to design and install effective ventilation systems. The use of natural and artificial illumination should be taken into account already in the design and construction of the plants.

Elimination and reduction of occupational health hazards at their source. Harmful materials should be replaced by less harmful ones. For example, asbestos could be replaced by coconut fibers in fibrocement roofing products. Changes to the work process or equipment is another way, for example, reducing the speed of mulling machines from 20 rpm to 18 rpm. This would lower the noise level from 105 dBA to 100 dBA. Proper maintenance of the machinery also cuts down hazards at their source.

Isolation. This measure is used widely in the production lines of, for instance, chemical factories; closed conveyor belts have been installed in coal preparation lines. A wall is a simple way to separate pollutant areas from the work sites. A closed cabin in a cement mill, or a separate heat source in steel casting work can reduce the noise level by 20–30 dB(A). Cutting down the distance or exposure time can also prevent workers from high risk levels.

Ventilation. Ventilation is generally installed in production lines that have a heating source such as metallurgy, steel laminating, building materials, and shoe manufacture. Good ventilation ensures the workers comfort and dilutes the air contaminants. Vent stacks may prevent chemicals from re-entering the breathing zone of the workers. Local exhaust ventilation is used widely at workplaces. It consists of two types: mounted and mobile. Mounted exhaust ventilation can be relevant for a wood-scrapping machine, grinding machine, welding machine or sources that emit organic solvents, such as paint production lines or shoe making lines. Mobile exhaust ventilation is applied in e.g.

Photo by NILP

The collection system for toxic substances, installed in a pesticide-manufacturing plant.

textile mills. Ventilation can also be ventilation arranged in closed tanks, or with hoods for laboratory work.

Wet methods are efficient for controlling inspired dusts in coal dumps, rock drilling, and explosion sites in mines, etc. A water curtain cyclone, and a water-spraying fan are also suitable for this purpose.

Sanitation must be ensured at workplaces; proper waste disposal, storage and labeling of materials, and good house-keeping are supportive methods for keeping the work environment safe.

Personal control measures

Work practices are taught to all workers. The aim is to train workers to master their work habits and safety habits while working. The principles include: reducing of exposure time to chemicals during working time, getting rid of contaminants such as casting pieces, plastic scraps; preventing chemical reactions that emit toxic substances or entail a risk of accidents (nitric acid and wood, strong acid and arsenic); be careful with activities in a closed chamber; handle chemicals with care; keep free from direct contact with corrosive materials.

Personal protective equipment (PPE) are used commonly in almost all industries. In Vietnam, workers are provided with suitable PPE. PPE can help to protect workers in hazardous environments. PPE can enhance the efficiency of environmental control measures. Since the 1980s, the National Institute for Labour Protection has investigated and successfully produced a great number of PPEs, such as protective helmets, welding screens, eye protectors, earplugs, mufflers, anti-acid and anti-base boots, cold-proof and heat-proof garments, filtering facepieces, dust-filtering half-masks, and gas-filtering masks.

Limiting exposure time to health hazards is another control measure that is based on training, job rotation, and decisions on the part of the management.

Personal hygiene is necessary in order to prevent the workers from conveying transmissible hazards to their homes. This means that they have to take a shower and put on clean clothes before leaving the workplace.

Conclusion

Occupational hygienists have had an important role in Vietnam because of their practical activities during the past decades. These activities aim at preventing occupational hazards and protecting the workers' health – important goals in the development of the society. Sustainable development demands comprehensive protection of the people.

References

1. Ten years of activities of the National Institute for Labour Protection (1981–1991). 20th founding anniversary. Hanoi, 1991.
2. NILP. Scientific report. National workshop on OSH in transfer of technology and foreign investment in Vietnam. Hanoi, 1995.
3. Special issues on science and technology for labour protection. Hanoi, 1995.
4. Report of the result of the scientific and technological research on OSH and work environment. 2001;1–4, 2002;1–2.
5. The 2nd, 3rd, 4th National Scientific Conferences on Occupational Health. Hanoi, 1995, 1998, 2001.
6. NIIH – Japan. Industrial Health. 1996;34:1–11, 279–86. 1998;36:61–5.

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Healthy workplace indicators in Thailand

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Abstract

This article is a result of the first phase of the research consisting of two phases. This first phase was a qualitative one, consisting of literature review, the establishment of draft health promotion indicators for the workplace, and the soliciting of opinions from experts, after which the necessary changes were made. The Ottawa Charter addresses five major health promotion activities: formulating a 'healthy public' policy; creating a supportive environment; strengthening community activities; developing personal skills; and reorienting health services. With regard to the external (outside the workplace) environment as well as the internal (inside the workplace) environment, our first phase yielded workplace health promotion indicators in six groups containing 46 indicators as follows:

Group 1: Workplace health promotion policy, consisting of 6 indicators
Group 2: Workplace health environment, consisting of 9 indicators
Group 3: Physical environment, consisting of 8 indicators
Group 4: Lifestyle and health skill of the employees, consisting of 12 indicators
Group 5: Health services, consisting of 9 indicators
Group 6: External environmental impact, consisting of 2 indicators.

Photo by Workmen Compensation Fund

Introduction

Comprehensive health services comprise health promotion, disease prevention, treatment, and rehabilitation. Basically, health promotion and disease prevention aim at primary prevention, i.e., preventing human from getting diseases. The Ottawa Charter on Health Promotion, a result of the First International Conference on Health Promotion, defines health promotion as "the process of enabling people to increase control over, and to improve, their health" (1). Health promotion may be achieved via several strategies such as creating partnership, implementing the process through various 'setting approaches', and so forth. Setting approaches include schools, hospitals, cities, and workplaces.

Work is a key process and workplace is a critical site for efforts towards health promotion and sustainable development (2). Work and the workplace may be hazardous and dangerous for workers. But if workers appreciate health promotion and healthy behaviour, they are likely not only to benefit directly but also to influence their families in the same direction.

Since workplace health promotion in Thailand is relatively new (3), the availability of healthy workplace indicators would definitely clarify the direction of health promotion activities and boost them as well. The objective of this first phase of research was to propose a set of healthy workplace indicators, suitable for Thailand's context, to be used by workplaces in the country as both the means and the goal of workplace health promotion. However, these proposed indicators will have to be tested further in the second phase of this project if they are actually put to use.

Methodology

The authors extensively reviewed articles and publications on health promotion (4–13), workplace health promotion activities and their measurement/evaluation, and then synthesized the first draft of healthy workplace indicators. After proposing this draft to a group of 24 experts in health promotion, occupational medicine/health, as well as other stakeholders, we solicited their comments and opinions, and then made appropriate changes. The results presented here represent the second draft.

Results

The Ottawa Charter addresses five major health promotion actions: formulating a 'healthy public' policy; creating a supportive environment; strengthening community activities; developing personal skills; and reorienting health services. Many publications and articles have also addressed these points with regard to a healthy workplace. Concerning the external (outside the workplace) environment as well as the internal (inside the workplace) environment (4), our first phase yielded workplace health promotion indicators in six groups containing 46 indicators:

1. Policy regarding workplace health promotion

- Having a policy that addresses the importance of health promotion, prepared as written documents and available to all employees
- Having personnel with knowledge and understanding in the area of health to take responsibility for workplace health promotion directly (as their primary job or with enough time to do this job)
- Having a safety, health and environment committee
- Having health promotion plans: annual plans, short-term plans (shorter than 3 years), and long-term plans (longer than 3 years)
- Having rules and regulations for occupational health and safety
- Evaluating health promotion activities and improving them accordingly.

2. Workplace health environment

- Ensuring that employees participate in decision-making, planning, implementing, and evaluating health issues
- Ensuring that the time established for each task is appropriate and adequate
- Giving employees an opportunity to perform various tasks
- Making sure that employees have enough break time
- Having good relations among employees on every level
- Ensuring that shift work is properly managed and has the least possible effect on employees' health

Photo by Workmen Compensation Fund

Members of the Workmen Compensation Medical Committee visiting a factory for traditional man-made textiles.

- Supporting and preparing employees for their retirement
- Ensuring that employees obtain health information from both health personnel and their self-study in the workplace
- Ensuring that employees participate in the improvement of their working environment so as to make it healthier.

3. Physical environment

- Ensuring that the workplace cafeteria has nutritionally balanced and safe food for employees
- Making sure that lighting is appropriate for work
- Having appropriate workplace ventilation
- Having appropriate control measures for dust and toxic gas in the workplace
- Having appropriate control measures for noise in the workplace
- Having equipment to help in handling and moving materials to reduce employees' physical load
- Having enough and clean toilet facilities for every employee
- Having proper waste management, including provisions concerning hazardous waste.

4. Lifestyle and health skill of employees

- Providing education and training in occupational health and safety for every employee
- Providing education and training in health promotion for every employee
- Providing a nutritional programme for employees
- Providing an anti-smoking programme for employees
- Providing an alcohol-free and drug-free workplace programme
- Providing an exercise programme for employees
- Providing a stress management programme for employees
- Providing a reproductive health programme for employees covering such areas as family planning, sexually-transmitted diseases and AIDS prevention
- Providing an accident reduction programme in the workplace
- Providing an accident reduction programme outside the workplace
- Ensuring that the workplace has activities aimed at strengthening the relationship with employees' families
- Ensuring that the workplace has activities aimed at strengthening the relationship with the surrounding community.

5. *Health services*

- Having appropriate health and medical records
- Having a good system for recording occupational diseases and injuries
- Having medicine and materials for first aid
- Performing preplacement examination according to risk factors
- Having a regular periodic physical examination according to risk factors
- Ensuring that employees are properly notified of the results of health tests
- Having a return-to-work physical examination in case of long-term sick leave
- Conducting and recording the results of occupational health and safety activities
- Reducing the extent of sick leaves resulting from illness of employee in the past year.

6. *Environmental impact*

- Preventing pollution of environment outside the workplace
- Ensuring that the workplace has a role in supporting and promoting a healthy lifestyle in the community.
- Each indicator was accompanied by scoring criteria (not presented) in order to make it more objective and comprehensible.

Conclusion

This first phase of research yielded a set of six groups containing 46 indicators for a healthy workplace. Each indicator was accompanied by scoring criteria to make it more objective and comprehensible. The second phase will consist of a trial and feasibility assessment of these indicators, before they are released to the public.

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References

1. Health Promotion Glossary, WHO Geneva, 1998 (Division of Health Promotion, Education and Communication).
2. National Center for Chronic Disease Prevention and Health Promotion. Taking Health Messages to North Carolina Workplaces Effectively Reaches Women. Chronic disease notes & reports. Winter 1999, 12(1). http://www.cdc.gov/nccdphp/cdwin99.pdf (12-24-2001)
3. Jantawimon P. Health promotion in the workplaces. Health System Research Institute, Bangkok, 1999.
4. WHO (Western Pacific Region). Regional guidelines for the development of healthy workplaces. http://www.wpro.who.int (10-12-2001)
5. National Quality Institute. Canadian Healthy Workplace Criteria. http://www.nqi.ca/english/criteria_dowload.html#hw (10-12-2001)
6. Griffiths JH. A practical guide to health promotion in the workplace. Guidelines for alliance-building and networking. With companies with the assistance of A Midha. European health promotion Series No. 5, WHO/Europe. Cardiff, Wales, 1995:11–3, 17–9, 21–43.
7. World Health Organization. Health Promotion for Working Populations. Report of a WHO Expert Committee. WHO Technical Report Series 765. Geneva, Switzerland, 1988:31–45.
8. Rotem A, Fay J. How Can I be a Better Self? Manager – Assessment for Managers of Health Care. WHO offset Publication No. 97. Geneva, 1987:36–7.
9. Abelin T, Brzezinski ZJ, Carstairs VDL. Measurement in health promotion and protection. WHO Regional Publications, European Series No. 22. Copenhagen, 1987:22–3, 89–102, 103–8, 151–70, 233–325, 365–83, 584–601.
10. Nutbeam D. Evaluating health promotion – Progress, problems and solutions; In: O'Byrne D, Kickbusch I. (Editors) Review and evaluation of health promotion. Proceeding of the Fourth International Conference on Health Promotion; 1997 Jul 21–25; Jakarta, Indonesia, 1997:3–43.
11. WHO Regional Office for the Western Pacific: Regional Guidelines for the Development of Healthy Workplaces, Oct 1999.
12. Legger LS, Health promotion indicators. Coming of out of the maze with a purpose, Health Promotion International, 1999;14(3):193–5.
13. WHO Background Information about Health Promotion. http://www.who.int/hpr/Background/index.html

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Control banding

– Practical tools for controlling exposure to chemicals

Heather Jackson, IOHA

Growth in the use of chemicals in small and medium-sized businesses (SMEs) and in emerging economies, where access to people with the experience to assess and control exposure to chemicals is limited, has led to the development of a new approach to the control of chemicals. Called Control Banding, the approach uses information that is readily available to users from the suppliers of chemicals, taking the users through a series of simple steps, allowing them to choose practical control solutions that should reduce exposures to levels which present no danger to health. (1)


COSHH ESSENTIALS

Hazard groups A-E (chemicals causing harm when breathed in)

least hazardous substances — more hazardous substances — Special cases

Hazard group S (chemicals causing harm in contact with skin and eyes)

Figure 1. COSHH Essentials Chemical Hazard Groups

Much of the recent work on Control Banding derives from the COSHH Essentials package developed by the UK Health and Safety Executive (UK HSE). Designed to assist SMEs in complying with the UK chemical safety regulations – the Control of Substances Hazardous to Health (COSHH), the scheme uses the R phrases that in Europe must be assigned to potentially harmful chemicals by the manufacturer of the chemical. R phrases describe the most important harmful effects of a chemical and have been adopted in many non European countries also. These phrases have been grouped by experienced toxicologists into hazard groups (Figure 1). The user finds the R phrases for the chemical using the label or Material Safety Data Sheet supplied by the chemical supplier and looks for the R phrases in the list of hazard groups. The hazard group for the chemical is thus selected using toxicological expertise without the need for an expert on site.

Once a chemical has been assigned to a particular hazard group it is necessary to consider the exposure potential in the workplace being assessed. The combination of the hazard classification of the chemical and assessment of the exposure potential will allow understanding of the level of risk thus leading the person carrying out the assessment to an appropriate control method. Occupational hygienists with experience of assessing workplace exposure to chemicals agreed parameters that could be used to give reasonable indications of exposure potential. One of these is quantity being used – and 3 categories, small, medium and large are defined. The likelihood of the chemical becoming airborne has been addressed by defining solids according to levels of dustiness and liquids according to volatility. A simple graph that uses the boiling point of the chemical and the process operating temperature assigns the chemical a high, medium or low volatility rating (Figure 2).

The user now has enough information to identify the control approach required to adequately reduce exposures to the chemical. Occupational hygienists agreed on 3 broad control approaches: General Ventilation; Engineering Control; Containment. However, it is recognized that in some cases specialist advice will be needed and this is control option 4. The user takes the hazard group, quantity and level of dustiness/volatility and matches them to a control approach using a simple table. The controls are described in control guidance sheets, which comprise both general information and, for commonly performed tasks, more specific advice (Figure 3).

Figure 2. Selecting volatility/dustiness of a chemical

Figure 3. Example of Control Guidance Sheet

While there will always be circumstances where specialist advice should be sought and where the controls selected will not be as protective as would be ideal, this approach allows businesses without ready access to specialist advice to effectively reduce the exposures of their employees to the chemicals used. Where the control recommendation is for the business to seek specialist advice the information already gathered doing the assessment will in some instances help the employer to know what sort of assistance to look for.

A recent development of COSHH Essentials by UK HSE has been to adapt it for the Internet. Electronic COSHH Essentials is free for anyone to use by logging onto **www.coshh-essentials.org**. It is an interactive package that takes the paper-based version even further. By inserting the required information into the fields provided, the package itself consults the tables and assigns the hazard ratings and suggested control options.

Several countries are developing tools based on the control banding technique, and the International Labour Office (ILO), World Health Organization (WHO), International Occupational Hygiene Association (IOHA), and the United Kingdom Health and Safety Executive (UK HSE) are working together to develop a control banding toolkit which will have international application. To further the work on this, a workshop on control banding was held in London, England 4–5 November 2002. This workshop was organized by the British Occupational Hygiene Society, British Institute of Occupational Hygienists and the UK HSE, supported by IOHA, WHO and ILO. Further information can be obtained from the Secretariat: **conferences@bohs.org** or telephone +44-(0)1332 298101, or from the IOHA website **www.ioha.com**.

References

1. Oldershaw PJ. Control Banding – A practical approach to judging control methods for chemicals. Journal of Preventive Medicine 2001;9(4):52–8.
2. UK Health and Safety Executive. COSHH Essentials – Easy steps to control chemicals.

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Latest developments in occupational health legislation in China:

An overview of setting of occupational exposure limits

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Introduction

Occupational exposure limits (OELs), which serve occupational professionals as benchmarks of occupational hygiene in workplaces worldwide, are well established in many countries. In China, an OEL is a mandatory limit used for industrial practice to control potential health effects of hazardous agents at the workplace. It is believed that nearly all workers may be repeatedly exposed to such limited hazards during their entire working life without suffering either acute or chronic adverse effects.

The central government began to promulgate documents concerning the adoption and implementation of OELs for chemical substances, dusts, and physical agents in the workplace in the mid-1950s. The first official document, entitled ***Provisional Hygienic Standards for the Design of Industrial Premises*** (Standard 101-56), was promulgated in 1956. It contains a MAC list of 53 chemical agents and dusts. This was followed by gradual development in the 1960s and 1970s. During that period, a formal document, ***Hygienic Standards for the Design of Industrial Premises*** (GBJ 1-62), was first issued in 1962. It contains a MAC list for 92 chemical substances and dusts. The expanded version of ***Hygienic Standards for the Design of Industrial Premises*** (TJ 36-79) was jointly promulgated by the Ministry of Health and some other relevant ministries of the People's Republic of China in 1979. Document TJ 36-79 comprised a list containing 120 MACs, and it is regarded as an important contribution to the OELs, since it was the most comprehensive document to appear before the 1980s, when China started her full-scale drive for economic reform and policy of openness (1).

However, the history of systemic setting of OELs began only after the establishment in 1981 of the National Technological Committee of Health Standards Setting (NTCHSS), under the Chinese Academy of Preventive Medicine, the Ministry of Health, P.R. China. The Subcommittee of Occupational Health Standards Setting, affiliated to the NTCHSS, is responsible for seeking advice of experts on the setting and improvement of OELs, for providing advisory consultation, and for education and training. This new framework is recognized as a milestone in the development of occupational health standards, as well as in setting other health standards China (2). Since then, more sophisticated approaches in scientific research aimed at setting OELs have been rapidly developed, and the pace of the setting process has accelerated enormously. As a result, two volumes of ***Compilations of National Occupational Standards*** containing 123 newly developed OELs in total were published in 1992 and 1997, respectively (3, 4) (Table 1).

Philosophy and protocol in the setting of OELs

The philosophical principles

The setting of OELs for airborne contaminants is based on the premise that, although all chemical substances are toxic at some concentration when experienced for a period of time, a concentration (e.g. dose) does exist for all substances at which no injurious effect should result, no matter how often the exposure is repeated. However, this philosophy differs from that applied to some physical agents such as ionizing radiation, and to most chemical carcinogens, since it is possible that there may be no threshold or no dose at which zero risk would be expected (5). Therefore, in the case of almost all chemicals, except for ionizing radiation, allergens, and carcinogens, it is possible, using proper principles, criteria and applicable procedures, to set OELs based on the perceived dose-response relationship.

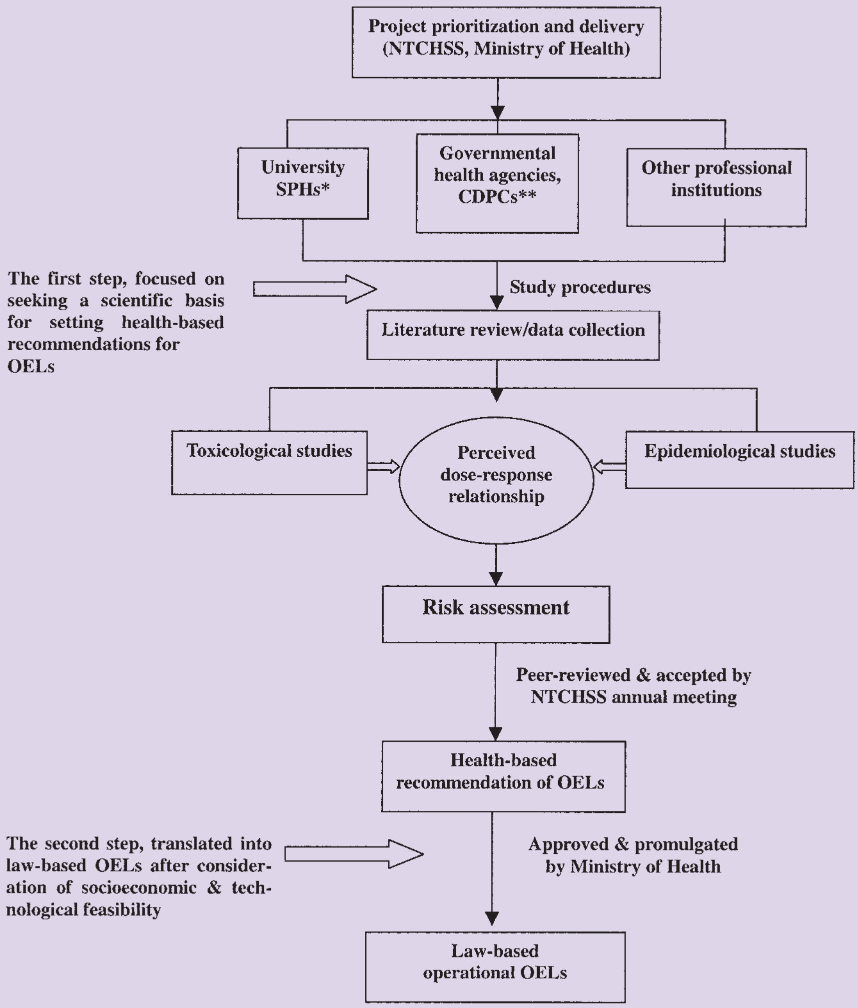
In China, the scientific procedure followed in setting health standards emphasizes the principles of: 1) regarding health as the basic criterion; 2) prioritizing epidemiological studies of human populations for those chemicals that have been used in production; 3) making full use of information sources and integrating them with data studied; this includes animal experimental data for new chemicals, or for chemicals newly-revealed, identified or recognized toxicity; 3) considering socioeconomic and technological feasibility; and 4) amending existing standards on the basis of new evidence and the questions which it may raise.

The criteria used to develop the OELs may include morphological, functional and biochemical changes, and miscellaneous factors (nuisance, cosmetic irritation, etc). For the sake of setting a safer OEL, more sensitive and specific indicators should be the predominant goals in China. Of these, changes in ChE activity in the case of organophospate pesticides, sensory irritation in that of irritants, neurobehavioural alteration in that of neurotoxic substances, and other biomarkers of relevance are highly appropriate if the aim of the study is to be achieved. In the case of OELs mainly based on human data, most are derived from effects observed in workers exposed to particular substances for many years. Consequently, most of the existing OELs have been based on the results of workplace monitoring, with qualitative and quantitative observations of human response. However, OELs for new chemicals have been based primarily on the results of animal studies and literature data, as well as being derived from international standards with consideration for national conditions and priorities.

The schematic procedures

Under the NTCHSS, the procedure for setting OELs has been structured in accordance with WHO's "Two-step" policy aimed at generating: 1) a *health-based recommendation for OELs;* this is mainly contributed by scientists; and 2) the *operational OELs;* these are established after both socioeconomic and technological feasibility have been considered through cooperation involving policy makers, industries, and occupational health and safety practitioners. The two-step strategy keeps researchers and policy makers in a state of logical equilibrium between "*How safe is safe*", and "*How safe can we afford to be*"; and it takes users straightforward from hazard and exposure considerations to benchmark standards and law-based guidelines for good practice in occupational hygiene (Figure 1).

To summarize the above, systems for developing health-based OELs and finally generating law-based operational OELs have fairly generic features that are common to all international standard setting bodies; these features include the basic criteria used, the core data sets, the rationales frequently considered from a scientific viewpoint and on the basis of socioeconomic feasibility, and the logical processes established. It is recognized that numerous values of OELs do differ from country to country. However, with the rapid develop-



* Schools of Public Health
** Centres for Disease Prevention and Control

Figure 1. Schematic procedures in setting OELs

Table 1. Adopted national occupational health standards

(1979–1997)	TJ 36-79	Comp Vol. 1	Comp Vol. 2	Others	Total
Chemical agents	111	25	51	3	190
Physical agents	9	14	17	1	41
Dusts		6	1		7
OH Guidelines		5			5
Subtotal	120	50	69	4	243

ment of economic globalization, there is a widespread perception of the needs involved in a commitment to international harmonization. As has been pointed out, "***full harmonization*** may not even be a good solution for improving the work environment for all workers; and the ***intermediate harmonization*** and ***rudimentary harmonization*** would appear to be more 'incremental', and so to provide more promising routes towards achieving the goal of reducing differences among countries" (6). In reviewing the current status of OEL setting and implementation in China, it is believed that we are entering the stage of ***intermediate harmonization*** both in theoretical and practical aspects; this stage is characterized by the use of common criteria and methods and a primary database available in the international literature, but with local OELs based on national considerations and priorities (7).

Table 2. Summary of the updated OELs for chemicals and bioaerosols (As of 2002-04-08)

Agents	Number of items	Number of OEL values
Chemicals	329	340
Dusts	47	70
Bioaerosols	1	1
Total	377	411

*Table 3. Relationships among PC-TWA, deviation limit and PC-STEL**

PC-TWA (mg/m^3)	Excursion limit (mg/m^3)	Proposed PC-STEL*
≤1	3	≤3
~10	2.5	~25
~100	2.0	~200
≥100	1.5	≥150

Latest legislative approach to occupational health

The relevant newly developed documents

To keep pace with the implementation of a new law, ***Occupational Diseases Prevention and Control Act of the People's Republic of China***, which came into force on 1 May 2002 (8), two important documents regarding occupational health standards (OHSs), GBZ 1-2002 and GBZ 2-2002, are being issued by the Ministry of Health, P.R. China. The ***Health Standards for the Design of Industrial Premises (GBZ 1-2002)*** focuses on: 1) workplace selection and design; 2) ergonomic layout of workstations; 3) guidelines for sanitary facilities and emergency needs; and 4) health-based climate conditions for workplaces (9). The ***Occupational Exposure Limits for Hazardous Agents in the Workplace (GBZ 2-2002)*** contains numerous lists containing re-notified and newly developed OELs for chemical agents, dusts, physical agents and biological agents, and some other occupational health standards (10) (Table 2).

The definition of OELs in China

Three categories of OELs for chemical substances have been adopted in China: 1) Permissible Concentration-Time-Weighted Average, PC-TWA, which is defined as an average concentration for a conventional 8-hour workday; 2) Maximum Allowable Concentration, MAC, defined as the ceiling level of chemical substances that should not be exceeded in any representative sampling; and 3) Permissible Concentration-Short Term Exposure Limit, PC-STEL, defined as an average of a 15-minute TWA exposure which should not be exceeded at any time during a workday, even if the 8-hour TWA is within the limit of the PC-TWA.

To control the magnitude of deviation, the average of 15-min PC-TWA, i.e., PC-STEL, is recommended as a supplementary limit to the PC-TWA. For a number of chemical substances, the PC-STEL was set either on the basis of the toxicological and epidemiological study, or was derived from the existing international standards. However, for those hazardous substances for which there was a lack of sufficient toxicological and epidemiological data to directly generate a corresponding PC-STEL, calculated values (PC-STELs*) were recommended in accordance with the proposed Deviation Limit for chemical substances with various levels of adopted PC-TWA (Table 3).

Amending standards

The amendment of a standard may be prompted either by newly developed knowledge of toxicology or by industrial practice. It is recognized that under-estimation might lead to a greater risk of exposure. For example, the OEL for benzene has been set at 40mg/m^3 (12 ppm) as the MAC since the 1950s in China. This is about 24 times higher than the TLV-TWA and 4.8 times higher than the TLV-STEL recommended by ACGIH (11). A cohort study of 74,828 benzene-exposed and 35,805 unexposed workers (1972–1987) in 12 cities in China showed that the RR for the combination of acute nonlymphocytic leukemia and related myelodysplastic syndromes was 3.2 (95% CI 1.0–10.1) among workers historically exposed to benzene at average levels of less than 10 ppm (30 mg/m^3). It showed a rising tendency for the RRs with increasing levels of exposure (12). On the basis of the study, a recommendation that the adopted benzene OELs should be lowered from 40 mg/m^3 (12 ppm) to 10 mg/m^3 (3 ppm) as PC-STEL, and 6 mg/m^3 (6 ppm) as PC-TWA was submitted to the NTCHSS, and accepted after the results of the study were defended at the annual meeting of the

NTCHSS held in Beijing in 2001 (13).

By contrast, over-estimation of the risk related to exposure might be misleading and could cause an additional constraint hindering the enforcement of OELs. For example, an over-stringent MAC value of 0.01mg/m^3 was set for mercury vapour at workplaces in China from the 1950s until the early 1990s. An extensive epidemiological study was initiated in the early 1990s, and the results showed that the incident rate of mild chronic effects was less than 2% among workers who had been exposed to mercury vapour at concentrations ranging from 0.02 to 0.03 mg/m^3 for more than 30 years. Therefore, a recommendation to elevate the Hg MAC from 0.01 mg/m^3 to 0.02 mg/m^3 was accepted by the NTCHSS in 1993 (14). Accordingly, a number of OELs have been adjusted and/or re-notified since the recent promulgation of the new law, and these have bridged the gap between our OELs and those adopted in other countries in a way conducive to *intermediate harmonization* (15).

Conclusions

Over the past 50 years, great efforts have been devoted to the setting, implementation and improvement of occupational health standards in China. The occupational exposure limits or guidelines for occupational hazards have become the most valuable tools for achieving good industrial hygiene practice through monitoring, evaluation and workplace controls of hazards. The adoption and implementation of the new law, the *Occupational Diseases Prevention and Control Act*, has substantially promoted the legislative impact and mandatory enforcement of occupational health standards. There is no doubt that the National Technological Committee of Health Standards Setting (NTCHSS) will be further considering how OELs/OHSs can be gradually developed to provide a more complete system for both physically demanding work and certain types of mental work involving greater risk exposures. Such developments will effectively contribute to the control of hazardous agents, in particular chemical substances, in the workplace.

References

1. Liang YX, Gang BQ and Gu XQ. The Development of Occupational Exposure Limits for Chemical Substances in China. Regul Toxicol Pharmacol 1995;22:162–71.
2. Gang BQ. Occupational Health Standards Setting in China: An Overview of 50-Years' Experience. Chin J Ind Hyg Occup Dis, 2000;18:9–11.
3. Standards Division, Chinese Academy of Preventive Medicine. *The Compilation of National Occupational Standards (Vol. 1)*. Beijing: China Standard Publishing House, 1992.
4. Standards Division, Chinese Academy of Preventive Medicine. *The Compilation of National Occupational Standards (Vol. 2)*. Beijing: China Standard Publishing House, 1997.
5. Paustenbach DJ. Occupational Exposure Limits. In: ILO: Encyclopedia of Occupational Health and Safety (4th ed). P. 32.27–30.34, Geneva, 1998.
6. Vincent JH. International Occupational Exposure Standards: A Review and Commentary. AIHA Journal 1998;59:729–41.
7. Liang YX, Wu WA. Occupational Health Standards: A Review of the Domestic Development and Advances in International Dynamics. Chin J Ind Hyg Occup Dis 2002;1:68–70.
8. *Occupational Diseases Control and Prevention Act of the People's Republic of China,* adopted by the Standing Committee of National People's Congress, P.R. China, *on* 27 Oct. 2001, and brought into effect on 1 May 2002.
9. Ministry of Health. *Health Standards for the Design of Industrial Premises (GBZ 1-2002),* Issued on 2002-04-08, Beijing.
10. Ministry of Health. The *Occupational Exposure Limits for Hazardous Agents in the Workplace (GBZ 2-2002),* Issued on 2002-04-08, Beijing.
11. ACGIH. Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. Cincinnati, OH, USA, 2002.
12. Hayes RB, Yin SN, Dosemeci M, Li GL, Wacholder S, Travis LB, Li CY, Rothman N, Hoover R, Linet MS. Benzene and the Dose-Related Incidence of Hematological Neoplasms in China. J Natl Cancer Inst 1997;14:1065–70.
13. Li GL, Chang P, Gao Y, Yin SN. Scientific Evidence for Amending the Health Standard of Benzene at Workplaces. A Study Review Submitted to the Annual Meeting of the National Technological Committee of Occupational Health Standards Setting, Beijing, 2002.
14. Fu WZ, Jiang JK, Xu SZ. Dose-Effect Relationship of Occupational Exposure to Mercury Vapor. In: Liang YX, Lu CH eds. Advances in Health Standards Setting, 1993;5:26–30, Shanghai, China: Shanghai Medical University Press.
15. Liang YX, Wu WA. Occupational Health Standards: A Review of the Domestic Development and Advances in International Dynamics. Chin J Ind Hyg Occup Dis 2002; 2:158–60.

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Asbestos Symposium for the Asian Countries

Suvi Lehtinen

Photo by Suvi Lehtinen

Asbestos is a widespread problem throughout the world. Many countries have banned the use of asbestos because of the evidence of its adverse and severe health effects. During the past few years, the Finnish Institute of Occupational Health (FIOH) has arranged three expert meetings on asbestos hazards. The first was organized in January 1997 in Helsinki; it dealt with asbestos, asbestosis, and cancer. The next one was arranged as a regional symposium for the Central and Eastern European Countries in December 1997 in Hungary. The third expert meeting was held in February 2000 again in Helsinki, and the purpose of the meeting was to monitor the recent advances in radiology and the screening of lung cancer.

The University of Occupational and Environmental Health organized a symposium that monitored the asbestos situation in nine Asian countries. The Symposium took place on 26–27 September 2002.

Asian Asbestos Symposium

The idea of organizing an Asbestos Symposium to survey asbestos exposure in the Asian countries was put forward some years ago. The issue was discussed at the University of Occupational and Environmental Health (UOEH), Kitakyushu, Japan, in connection with an exchange visit of researchers. In 1998 Professor Matti Huuskonen of the FIOH led the first discussions concerning the organization of an asbestos symposium. The model of the Symposium for Central and Eastern European Countries was used, and Professor Toshiteru Okubo, President of the UOEH, and Professor Ken Takahashi assumed the responsibility for organizing the meeting. It was co-sponsored by the Finnish Institute of Occupational Health. The planning and operational work was done at the University of Occupational and Environmental Health.

The regional symposium was supported by both the International Labour Office, ILO, represented by Dr. Takanobu Teramoto and the World Health Organization, WHO. Dr. Hisashi Ogawa assisted in the preparations of the symposium. The message of the WHO Regional Director, Dr. Shigeru Omi was conveyed to the participants of the Symposium by Dr. Hideki Igisu, Director of the Institute of Industrial and Ecological Sciences at UOEH.

Introductory keynotes and country reports

The Symposium started with five keynote lectures that introduced the asbestos problems on the global scale. Dr. Antti Karjalainen of FIOH reported on the epidemiological and clinical aspects of asbestos-related diseases. Professor Jorma Rantanen of FIOH discussed in his presentation the distribution of the asbestos problem in the society. Dr. Anders Englund of the Swedish Work Environment Authority described an

Photo by Suvi Lehtinen

The participants actively took part in the discussions after the presentations.

example of how to solve the asbestos hazard in the construction industry. Professor Kenji Morinaga of the Osaka Medical Center for Cancer and Cardiovascular Diseases reported on the prevention, screening and surveillance of asbestos-related diseases, and Dr. Antti Tossavainen of FIOH presented recent international activities in the prevention of asbestos hazards.

Nine country reports were presented describing the status of asbestos exposure, health outcomes, as well as recommendations for actions at the country level. The countries that gave their reports were Indonesia, Japan, Korea, Malaysia, P.R. China, Singapore, Thailand, The Philippines, and Vietnam. In addition, two specific reports were given, one on asbestos management in a disaster environment in East Timor 1999–2001, and another on laws and regulations on asbestos in Japan.

The conclusion in many of the country reports was that additional information needs to be collected and compiled to get an overall picture of the exposure and health outcomes. Many of the countries reported that the import and use of asbestos has been going on for several decades, and that it is even increasing in some countries. There is an urgent need to monitor exposure to asbestos in these countries, and to inform the decision-makers of the volume of exposure and the well-documented adverse effects. Decisions need to be taken on how to reduce exposure to asbestos if we hope to see a decline in the numbers of mesotheliomas and lung cancers in the future.

Lively discussion

All the presentations aroused a lot of discussion, questions and comments. The main goal of the Symposium, exchange of information among the participants, was well met. The informal discussions during the breaks extended the possibilities of the country representatives to create contacts with experts working in similar fields in other countries. This is a basis for an active network.

Proceedings

In order to ensure that the data and information presented during the Symposium will also be made available to those who did not have an opportunity to attend the meeting, the Proceedings of the Symposium will be published. Those interested in receiving a copy are advised to contact Professor Ken Takahashi, University of Occupational and Environmental Health, e-mail: **ktaka@med.uoeh-u.ac.jp**. The price of the Proceedings will be announced later.

Practical arrangements

The Department of Epidemiology of UOEH, and its entire staff, was responsible for the practical arrangements of the Meeting. The participants enjoyed ample hospitality during the meeting days. Everything was taken care of, and the implementation of the meeting offered a good forum for experts to interact, to exchange information, to learn from each other, and to take back home models from other countries. Usually nothing can be applied directly, all procedures need to be adapted to local conditions. This is a challenge for all of us.

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Photo by Suvi Lehtinen

The whole staff of the Department of Epidemiology at UOEH was actively involved in the preparements of the Symposium. Its success was evident.

Occupational mortality in Japan compared to the Nordic countries

Mitsuo Fujioka, Japan

Work-related diseases and statistics on workers' health

In the"Declaration on Occupational Health For All"(WHO, 1994, it is written as follows: "The Constitution of the WHO, the Alma Ata Declaration on Primary Health Care, the WHO Global Strategy on Health for All, plus the ILO Conventions on Occupational Safety and Health and on Occupational Health Services stipulate among other issues the fundamental right of each worker to the highest attainable standard of health."

Statistics for occupational injuries that include occupational accidents and occupational diseases are the most basic and important data for observation of workers' health conditions. However, these statistics do not necessarily include new types of disease, such as those which are work- or stress-related. Nor do they always cover workers in informal situations such as work in the home. Multi-factorial work-related diseases differ from classical occupational diseases that exclusively affect working people exposed to specific hazards. The ILO and WHO Joint Committee (1989) identified three major categories among work-related diseases as frequently being more common than occupational ones, i.e. chronic nonspecific respiratory disease, cardiovascular diseases, and musculo-skeletal disorders (1). At the "Meeting of Experts on Labour Statistics: Occupational Injuries" in the ILO (1998), methods of measuring and classifying occupational diseases were discussed. In addition, "many participants also emphasized the importance of statistics in all areas of occupational health, including occupational diseases, dangerous occurrences and the effects of stress and repetitive movement on the health of workers and their families", although these issues were not included in the final statement.

Among these work-related diseases, cardiovascular diseases in particular have been attracting increasing public awareness because of their relationship to overwork or emotional stress. The 'World Labour Report' (ILO, 1993) mentioned an increase in claims for stress-related occupational injury compensation in the United States, as well as an increase in "Karoshi" in Japan, i.e. death from overwork. In Japan much research has been done into cardiovascular/cerebrovascular diseases in relation to overwork and stress disorders.

Only very few such cases of death caused by diseases of circulatory system from overwork have been indicated in Japan's own statistics on occupational injuries. This is because the statistics themselves are closely related to compensation schemes for occupational injuries and most of the deaths resulting from overwork are not recognized as occupational injuries.

Table 1 shows the number of death cases caused by diseases of circulatory system among the male population as a whole and for working males between 20 and 64 years of age, the number of claims filed and the number of cases where compensation was awarded for the same diseases (all ages, both sexes) in 1985, 1990 and1995 in Japan. According to this table, the total number of deaths among males as a whole was 34,575, while for working males the figure was 20,842. The number of claims filed was 579, of which 92 received compensation, and among these only 33 deaths were officially recognized as being caused by diseases attributable to overwork.

So in order to observe workers' health conditions accurately in Japan, statistics on occupational mortality are necessary. These statistics cover the whole population and all kinds of diseases and accidents, and because they have no connection with any compensation scheme for occupational injuries they are truly independent. Mortality statistics by occupation or social class have long been used in European countries for analyzing health inequalities. This is especially true of the Nordic countries, where the data has been tabulated according to detailed occupational groups, thus making it useful for analyzing mortality in relation to socio-economic factors (2).

In Japan, surveys on mortality by occupation are carried out every five years, and the statistics have been published under the heading 'Special Report of Vital Statistics: Occupational and Industrial Aspects' by the former Ministry of Health and Welfare (now known as the Ministry of Health, Labour and Welfare). However, these statistics have limitations when it comes to making comparisons with the Nordic countries for the following reasons: firstly, the occupations and industries investigated are defined as they were at the time of the deaths; secondly, only

Table 1. Number of deaths, claims filed and cases of compensation awarded for diseases of the circulatory system (Japan, 1985–1995)

	1985	1990	1995
Death cases aged 20–64 (males, whole population)	34,211	34,575	30,775
Death cases aged 20–64 (males, total in work)	21,487	20,842	18,324
Claims filed for compensation of occupational injuries	441	597	558
Cases of compensation awarded	39	92	140
Cases of death from overwork acknowledged	–	33	76

Source: Special Report of Vital Statistics, Occupational and Industrial Aspects (former Ministry of Health and Welfare), Data for claims filed and cases of compensation awarded (former Ministry of Labour).

major groups of occupational- and industrial- classification are investigated for the compilation of the data.

For a more realistic comparison between the Nordic countries and Japan, Mori, Yoshinaga, Kaneko and Fujioka worked together to publish re-tabulated data crossing the occupational mortality statistics according to occupation and industry using micro-data from 1975 to 1990 (3). Moreover, for further comparison between Finland and Japan, Fujioka was able to acquire detailed data on mortality according to sex, age and occupation for Finland (1981–1990) thanks to the helpful co-operation of Statistics Finland. This paper will highlight features of workers' health in Japan based on the Finnish data, as well as other materials related to death from overwork.

Comparison of SMR on occupational mortality between the Nordic countries and Japan

Concerning occupational mortality, it should be noted that there has already been a significant project for international comparison of occupational mortality caused by cardiovascular diseases conducted by Kunst, Groenhof, Mackenbach, as well as the "EU Working Group on Socioeconomic Inequalities in Health" covering both the United States and 11 European countries, including the Nordic countries (4). The results confirmed common tendencies toward a low level of mortality for white-collar workers and a high level for manual workers. However, the data for Japanese workers was not included.

In the afore-mentioned research on occupational mortality by Mori, Fujioka and others, occupational group categorizations were first adjusted to facilitate comparison. Then the number of deaths by sex, age and occupational category across industry was calculated using micro-data in Japan, while the standardized mortality ratio (SMR) was used for a comparison between the four main Nordic countries (Denmark, Finland, Norway and Sweden) and Japan. The results were published by the Japan Institute of Statistics at Hosei University (3), as well as by the ILO Bureau of Statistics in Geneva (5). Please refer to these materials for the method of harmonizing occupational group and the detailed data.

Table 2. Standardized Mortality Ratio (SMR) according to occupation in Japan compared to the Nordic countries (Males, 20–64 years of age)

Occupation	All death causes				Diseases of circulatory system			
	Japan (1980)	Japan (1990)	Nordic 4 countries (1971–80)	Finland (1981–90)	Japan (1980)	Japan (1990)	Nordic 4 countries (1971–80)	Finland (1981–90)
Whole male population	132	144			135	144		
All economically active males			100	100			100	100
All male workers	106	100			109	100		
Technical workers (estimates for Japan)	257	179	80	73	264	174	95	76
Professional workers (Japan)	54	47	85	72	50	44	94	72
Administrative workers	60	72	91	75	57	62	91	75
Clerical workers	97	103	100	88	91	109	106	97
Sales workers	105	92	105	86	114	95	106	92
Farmers and agricultural workers	129	127	90	94	133	132	91	95
Workers in transportation	116	121	109	109	97	117	112	132
Manual workers in manufacturing	67	63	102	102	69	64	105	108
Construction workers	93	91	105	114	91	97	101	104
Service workers	125	136	125	124	132	130	114	112
Unemployed	445	424			433	401		

Source: Mitsuo Fujioka et al., Comparison of occupational mortality between the Nordic countries and Japan, with analysis by age group in Japan, using micro-data and the SPA method. Bulletin of Labour Statistics 2002;1, ILO.

SMR = total of deaths by age group ÷ total of (population by age group x death rate by age group of standard population)

Table 2 is the result of comparison of SMR for male workers in the Nordic countries and Japan according to all death causes and diseases of the circulatory system (including sudden death) using a part of the above-mentioned data. For Finland, the data for 1981–1990 was available. With regard to the four Nordic countries as a whole, however, data for the period 1971–1980 was used owing to a lack of more recent statistics.

In this table, when comparing the SMR level with figures for all death causes, we found a relatively low level of SMR among "technical workers", "professional workers", "administrative workers", and conversely a relatively high level among "workers in transportation", "construction workers" and "service workers". Similar tendencies were observed in Finland (1981–1990), and here the SMR differentials were more apparent than among the four Nordic countries as a whole, especially the lower level observed among "clerical workers" in Finland.

On the other hand, in Japan a relatively low level of SMR among both "professional workers" and "administrative workers", and a relatively high level among "workers in transportation" and "service workers" was in evidence. Nevertheless, we noticed a high level for "technical workers" among white-collar workers and "farmers and agricultural workers", and these tendencies were quite different from the Nordic countries.

When we compare the SMR caused by diseases of the circulatory system, almost identical tendencies are shown in this table. In the four Nordic countries, the occupational categories indicating a relatively high level of SMR for all death causes were "workers in transportation", and "service workers". Besides this, however, for diseases of the circulatory system, we found that both "clerical workers"(106) and "sales workers"(106) had a slightly elevated level of SMR. Nevertheless, the SMR levels of these two occupational categories were not at a relatively high level in Finland (1981–1990). In Japan (1990), as with all death causes, a relatively high level of SMR could be observed among "technical workers", "farmers and agricultural workers", "workers in transportation", "service workers" and "unemployed". For "clerical workers" a very slight increase in level was indicated.

It should be emphasized that a high level of SMR among "technical workers" is a significant feature of workers' health in Japan. However, we have to note that the category of "technical workers" in Japan does not correspond to "technical workers" in the Nordic countries in the strict sense of the word. This category was made up of "technical and professional workers" in all industries other than the service industry because only major classifications were used for occupational categorization in the Japanese statistics. The term "professional workers" in Japan also included "technical and professional workers" in the service industry.

Comparison of death rate ratio by age group in Finland and Japan

Although the SMR is regularly used for comparison of occupational mortality, the leveling out of age-specific death rates to arrive at the SMR might cause information losses because deaths among the elderly (being greater in number) are reflected more strongly than deaths among the young and middle-aged. Therefore it is necessary to use the age-specific death rate for more detailed analysis. Here we will compare the following death rate ratios for the standard population (this being "all male workers" in Japan, and "all economically active males" in Finland) by the age groups 20–34, 35–44, 45–54 and 55–64 years.

Death rate ratio by age group = Death rate by age group ÷ Death rate by age group of standard population x 100

As detailed data is available for Finland, the death rate ratios by age group in Japan are only compared to the ones for Finland. However, there were no remarkable differences in the mortality tendencies of SMR between Finland and the other Nordic countries, and so this comparison could be useful for analyzing the mortality features by age group in Japan.

When comparing death rate ratio by age group in Finland and Japan in Table 3, the characteristics of Japan during the survey period can be observed as follows:

Relatively high levels of death rate ratio caused by diseases of circulatory system among "workers in transportation" in age group 20–44, and "service workers" in age group 20–54 (in Japan also 55–64) were evident in both countries. For "farmers and agricultural workers", the figures in this table indicate higher ratio levels among all age groups in Japan, and they were also relatively high in Finland in age group 20–44.

Regarding "technical workers", i.e., technical and professional workers" in all industries other than the service industry in Japan, the ratio-levels for all age groups were quite high, whereas in Finland they were at a lower level. Also in Japan we found a relatively high level of death rate ratio among "clerical workers" in age group 20–34 (134), and a slightly higher one in age groups 35–44 (110) and 45–54 years (109), although the SMR level of this occupational group was almost at the average level of 103. The rate ratios of these three age groups were 121, 101, 94 in 1985 and 103, 92, 94 in 1980 respectively. We could thus discern a gradually rising tendency for the rate ratios. In addition, the SMR level for administrative workers was at a lower level both in Finland (75) and Japan (67). However, in the case of Japan, the death rate ratio of this category indicated quite a high level of 169 in age group 20–34 on the one hand, and quite low levels of 77 in age group 35–44 and 61 in age group 45–54 on the other. When comparing this data with the corresponding 1985 values of 119, 74, 70, we were able to confirm the same tendency of a high level of rate ratio in the younger age group and a low level for the middle to older age groups. The ratio for age group 20–34 had risen in 1990. We may assume that this relatively high death rate among the young hardly had any effect on the overall SMR because incidences of death in age group 20–34 of this category had been few anyway: 17 in 1980, 14 in 1985 and 17 in 1990.

We conclude that characteristic for occupational mortality in Japan is the fact that the relatively higher levels of mortality caused by diseases of circulatory systems are not only observed among "workers in transportation" and "service workers", but also among "farmers and agricultural workers", as well as among white collar workers such as "technical workers", young- and middle-aged "clerical workers", and younger-aged "administrative workers". We have to take note of these tendencies as they are at variance with the tendencies of occupational mortality in European countries.

Overwork and diseases of the circulatory system in Japan

In the Japanese occupational mortality statistics, there is no information on death factors or causes, only information about the occupational or industrial category of the deceased person. As we are not able to use any official statistics concerning overwork and deaths caused by diseases of circulatory systems, we will try to examine the background of the aforementioned features of mortality among Japanese workers using some other data and materials.

In Table 4, we found figures based on the contents of consultations held between 1988 and 1999 by a "Karoshi Hotline" set up by lawyers and researchers. During this period, there were 3,501 cases of consultation on compensation for occupational injury regarding overwork and diseases, and 2,336 cases among them were on the subject of *karoshi*, i.e. death from overwork. Male workers accounted for 92% of the 3,501 cases, and the age distribution was 9% for those under 30, 15% for those aged 30–39, 25% for age group 40–49, 24% for age group 50–59 and 5% for those aged 60 years and over. The age groups of the remaining 21% could not be determined. This data clearly indicates that death from overwork is a problem not only affecting middle-aged men but even those much younger.

In Table 4, the figures highlight the fact that the occupational categories of victims included many white-collar workers such as Directors, Managers, Office workers, Technical workers, and Government employees, whose deaths had been caused by diseases of the circulatory system. Although these results only indicate information gleaned from "Karoshi Hotline" consultations, they should be taken seriously because of their similarity to the features we found when comparing mortality statistics by occupation.

It is generally considered that long working hours among Japanese workers are closely related to death from overwork. According to data compiled by Mizunoya comparing "annual working hours including paid work and unpaid overtime work", Japanese male workers put in an average of 2,540 hours in 1985, 2,490 hours in 1990 and 2,330 hours in 1995. The corresponding figures for Denmark were 1,860, 1,800, and 1,800 respectively. The differentials of real annual working hours between the two countries were 680 hours in 1985, 690 hours in 1990 and 530 hours in 1995. The reasons for the long working hours in Japan are as follows: firstly, long overtime hours; secondly, a shortage of days off each week; and thirdly, short annual leaves. In Japan, average paid overtime per year in 1990 was 208.8 hours and unpaid overtime 300 hours, altogether 508.8 hours, and in 1995 the corresponding figures were 154.8 hours paid, 290 unpaid, altogether 444.8 hours according to Mizunoya's estimation. The average number of days off each week was 1.6 days in 1990, 1.8 days in 1995, and the rates of diffusion of the 2-full-days-a-week-off system among workers were 39% in 1990 and 58% in 1995. Average annual leave was only 8.2 days in 1990 and 9.5 days in 1995, compared to between 5 and 8 weeks in the Nordic countries (6). Seen against the background of these long working hours, it is easy to understand why there is ill health among workers because of overwork or stress.

Dr. Uehata, who is a famous Japanese researcher on death from overwork, defined *karoshi* as "a permanent disability or death brought on by worsening high blood pressure or arteriosclerosis resulting in diseases of blood vessels in the brain such as cerebral hemorrhage, subarachnoidal hemorrhage and cerebral infarction, and acute heart failure and myocardial infarction induced by conditions such as ischemic heart diseases (IHD)". In his research on *karoshi*, the process from overwork to the onset of diseases of circulatory system is explained as follows:

Long working hours with a paucity of holidays and uninterrupted overwork such as (1) heavy physical work, (2) overtime work, night and shift work against the circadian rhythm, or (3) emotional stress (caused by heavy norms, excessive business trips, change of workplace, troubles with customers, etc.) often results in unhealthy life styles, i.e. few or irregular sleeping hours, bad dietary habits, alcohol and tobacco abuse, lack of exercise and so on. As a result of overwork and an unhealthy lifestyle, physical fatigue and emotional stress gradually accumulate, and these factors make it difficult for workers to keep their normal health conditions. Finally, health disorders such as high blood pressure, damage in arterial walls, and an increase in cardiac activity, etc., will tend to appear, and sudden death from overwork may occur when workers exert themselves beyond their physical limits (7).

Some examples of *karoshi* in Japan, i.e., death from overwork, have been outlined in Table 5. These case records including white-collar workers were obtained from judicial precedents on compensation of occupational injuries relating to *karoshi*.

Although it is considered that similar situations in workers' health and problems related to overtime work have been prevalent in Japan for a long time, we have no official statistics to enable us to observe the true state of affairs other than the following two sets of statistics that only partly reflect the status quo.

The first official indications came from statistics on "Death within a 7-day course among middle-aged people" released in 1989. This was a small ad hoc sample survey; one of a series entitled "Survey of Socio-Economic Aspects on Vital Events" conducted by the former Ministry of Health and Welfare. From this we were able to find out that the percentage distribution of sudden

Table 3. Comparison of age-specific death ratio in Japan and Finland (male, diseases of the circulatory system)

	Japan (1990)				Finland (1981–1990)			
Occupation / **Age-group**	**20–34**	**35–44**	**45–54**	**55–64**	**25–34**	**35–44**	**45–54**	**55–64**
Whole male population	124	129	136	158				
All economically active males					100	100	100	100
All male workers	100	100	100	100				
Technical workers (estimated for Japan)	145	125	165	218	75	62	79	87
Professional workers (ditto)	33	41	45	54	59	57	70	86
Administrative workers	169	77	61	69	66	49	75	88
Clerical workers	132	110	109	91	58	94	101	100
Sales workers	75	78	90	110	83	89	100	104
Farmers and agricultural workers	308	217	165	138	119	110	96	104
Workers in transportation	108	135	108	101	113	116	105	105
Manual workers in manufacturing	92	68	58	61	90	107	101	99
Construction workers	100	96	109	78	142	129	110	95
Service workers	130	161	180	192	136	136	120	106
Unemployed	295	1042	1052	407				

Source: The Japan Statistics Research Institute, Mortality by Industry and Occupation (in Japanese) (Statistical Material; no 64), Japan, Hosei University, 2000. Statistics Finland, Tables for Population (1980) and Deaths (1981–1990) by occupation in Finland (unpublished), Helsinki, 2002.

Table 4. Contents of consultations with Karoshi Hotline (Japan, 1988–1999)

Occupation	Cases	%
Total	3501	100%
Directors	140	4%
Managers	838	24%
Construction and manufacturing workers	749	21%
Sales, office workers	774	22%
Drivers	300	9%
Technical workers	307	9%
Government employees	263	8%
Name of disease		
Total	3501	100%
Cerebral hemorrhage	479	14%
Subarachnoidal hemorrhage	740	21%
Cerebral thrombus, infarction	214	6%
Heart myocardial infarction	358	10%
Heart failure	527	15%
Suicide	330	9%
Others	1105	32%

Source: National Defense Counsel for Victims of KAROSHI, "KAROSHI HOTLINE" National Network, http://www.bekkoame.ne.jp/i/karoshi/

death within a week among male workers in age group 30–64 years was 13.5%. The percentage distribution of deaths caused by diseases of the circulatory system was 85.6% among the sudden death victims, and 61.1% among those in healthy condition a week before death. The age component of sudden death cases was 7.6% for age group 30–39, 20.4% for age group 40–49, 43.0% for age group 50–59 and 29.0% for age group 60–64 years. When observing the occupational categories of these cases, we noted that 10.4% were "farmers and agricultural workers", 28.0% were "manufacturing workers and workers in transportation", 15.8% were "sales and service workers", and 25.0% were "clerical, technical and administrative workers".

The second official indications came from the "Survey on Workers' Health Conditions" (published every five years by the former Ministry of Labour, now the Ministry of Health, Labour and Welfare) showing the normal situation of Japanese workers. According to these statistics, in 1997 ill health was being experienced by 25.9% of administrative workers, 20.7% of professional and technical workers, 17.0% of clerical workers, 21.2% of sales workers, 14.4% of service workers, 12.8% of workers in transportation. Moreover, the proportion of workers experiencing such unhealthy conditions was 26.9% among those working 10 hours or more per day, 23.1% among those working 9–10 hours, but only 17.1% among those working a more normal 7–8 hours per day.

These figures highlight the special characteristic of workers' health conditions in Japan that not only workers in transportation, manual workers and service workers but also some white-collar workers have a hard time maintaining a good standard of health. It should be emphasized that an official survey on health in relation to overwork and stress is a matter of great urgency in Japan.

Table 5. Cases of death from overwork (Japan, male workers)

Properties of victim	Working conditions	Lifestyle	Diseases and death cause
Male, 33 years of age. Electrical engineering technician. Heavy responsibility.	Normally overtime work; a week before death, average of 3 hours per day. 2 months before death: increase in holiday work and night work. A week before death: heavy responsibility and emotional stress on account of delivery times and coping with trouble as project leader.	Commuting: 1.5 hours. Sleep: 5 hours. Holidays: driving, listening to music etc. Drinking: a little. 1 or 2 days per week. Smoking: nothing.	Hypertension for long periods (170 for upper and 120 for lower value) Abandoned medical supervision and treat ment for distension of heart and hypertension. Intracerebral bleeding (died in 1990).
Male, 43 years of age. Technician in mechanical engineering. Highly strung person with heavy responsibilities.	Overtime working: normally an average of 4 hours per day, a maximum of 100 hours or more per month Normally 1 or 2 bouts of night duty per month, and day duty on a holiday once every 2 months.	Sleep: average 5–6 hours. Days off: 7–8 days per month. Drinking: 2 bottles of beer/day. Smoking: 20 cigs. per day. Diet: lack of breakfast and dinner eaten at midnight.	2 days before death: rising blood pressure and cerebrum rupture of aneurysm. Subarachnoidal hemorrhage (died in 1994).
Male, 31years of age. Manager of local office in electronic equipment manufacturing.	Normally: a great many business trips, by car even for long distances, and strong mental strain. Much holiday work. Accumulation of physical fatigue. Before death: continuous working for 2 weeks without days off. Accumulating mental stress due to coping with complaints from customers.	Lack of rest due to excessive holiday work. Sleep: Slept 3 times at home a week before death due to business trips.	No fundamental diseases. Asymmetry pulse based on acute myocardial infarction. Acute cardiac failure (died in 1985).
Male, 46 yeas of age. Truck driver.	Normally: heavy physical work such as loading, driving and unloading while delivering commodities to ten and a few more stores every working day. Early morning work. Working days: 25–27days per month. Overtime work: regularly over 3 hours per day. Immediately preceding death: new route for driving without rest time; Unloading work in cold conditions (winter).	Lack of rest due to only 3–5 days off per month and early morning work. Sleep: average 6 hours. Drinking: 1 bottle of beer and 2 glasses of whiskey per day. Smoking: 20 cigs. per day.	Accumulation of physical fatigue. Hyper-excitation of sub-sympathetic nerve. Fatal asymmetry pulse. Acute cardiac failure (died in 1991).

Sources: 1, Tokyo high court, 1998, (Ne) no.1785; Osaka district court, 1999, (Gyou-U) no. 85; Kyoto district court, 1993, (Gyou-U) no. 3; Osaka district court, 1998, (Gyou-U) no. 17

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References

1. Joint ILO/WHO Committee on Occupational Health. Epidemiology of Work-related Diseases and Accidents, 1989. (WHO Technical Reports Series 777).
2. The Central Statistical Office of the Nordic Countries. Occupational Mortality in the Nordic Countries 1971–1980. Copenhagen, 1988.
3. The Japan Statistics Research Institute in Hosei University. Shokugyo Sangyo betsu Shibou Toukei (in Japanese, Mortality by Industry and Occupation). Japan: Hosei University, 2000. (Statistical Material; no 64).
4. Kunst AE et al. Mortality by Occupational Class among Men 30–64 Years in 11 European Countries, EU Working group on Socioeconomic Inequalities in Health. Social Science and Medicine 1998;46:11. Kunst AE et al. Occupational Class and Ischemic Heart Disease Mortality in the United States and 11 European Countries. American Journal of Public Health 1999;89:1.
5. Fujioka M, Mori H, Yoshinaga K, Kaneko J. Comparison of occupational mortality between the Nordic countries and Japan, with analysis by age group in Japan, using micro-data and the SPA method. Bulletin of Labour Statistics 2002;1, International Labour Office.
6. Mizunoya T. Roudou Jikan Seikatsu Jikan no Kokusaihikaku (in Japanese, International Comparison of Working and Living Hours), (Iwai H, Fukushima T, Fujioka M, ed., Gendai no Roudou/Seikatsu to Toukei, (in Japanese, "Fluctuation of Population/Employment Structure and Mobility of Labour Force", Modern Labour/Life and Statistics, Hokkaido: Hokkaido University Press, 2000.)
7. Uehata T. A Medical Study of Karoshi. National Defense Counsel for Victims of Karoshi, Karoshi: When the "Corporate Warrior" Dies. Tokyo: Mado-Sya, 1990:98–102.

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