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CHEMICAL SAFETY

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Contents

Chemical safety

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

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

The challenge for the whole society is to reap the benefits from chemicals, while at the same time avoiding their harmful effects to the society, to any individual, and to the environment. In order to reach this goal, the hazards have to be identified, quantitated, and the choice of chemicals and their use patterns must be adapted to the minimization of risks. The risks of chemicals depend on the chemical itself, and on the level and pattern of exposure. International organizations depending on world-wide collaborative expertise are best equipped to assess the inherent hazards of chemicals where a very important aspect is independence of stakeholders – very large amounts of money are implicated in risk assessment activities. On the other hand, the assessment of exposure (what chemicals are produced/imported/used; what are the use patterns and production processes, possibilities for exposure and understanding of the exposed people and management of the hazards involved, what are the exposure levels, how are the chemicals disposed of) can only be done at local level. Furthermore, information without action is useless – it is a heavy responsibility on governments to regulate chemicals in their countries appropriately. What is crucial is that legislation and guidelines themselves mean little without means and willingness to enforce them. A prerequisite for the enforcement is sufficient education and training, appropriate for the individuals concerned: factory floor level, individual sprayer of the pesticide, factory and farm management, environmental and occupational health personnel, and government responsible officials. Although much work remains to be done, history of work-related diseases (e.g., silicosis, asbestosis, byssinosis, isocyanate asthma, aromatic amine-induced bladder cancer, nickel-induced lung and nasal cancer, chromate-induced cement excema) indisputably demonstrates that chemically induced ill health can be avoided, provided that the causes are identified, and proper chemical management is instituted and maintained.

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

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Chemical regulatory framework in Korea

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Currently, 38,000 chemicals are known to be present and in use at workplaces in Korea, and 300 new chemicals are being imported each year. Based on results of the Work Environment Status National Survey in 2004, 59,199 companies, or 80.1% of 73,884 manufacturing companies employing more than five workers, either manufacture or use chemicals. A stratified probability sample survey among manufacturing companies with less than five workers also found that 73.4% of companies either manufacture or use chemicals (1).

Chemicals are essential in manufacturing various products at workplaces, but their use and lack of understanding about the hazards and risks involved lead to increases in occupational disease, fire, explosion, and environmental hazards. Therefore, to prevent workers and people from the suffering induced by accidents and diseases, seven Korean Ministries have twelve different Acts for the management and regulation of chemicals in Korea (Table 1). Out of these twelve laws, the Industrial Safety and Health Act of the Ministry of Labour, which focuses on the safe use of chemicals in the workplace with the aim of protecting workers' health, is the key chemical regulatory system in Korea. Therefore, this article concentrates on the chemical regulatory system set up in the Industrial Safety and Health Act from the industrial health perspective.

In Korea, the Ministry of Labour is the supervisory authority for all companies manufacturing and handling chemicals where workers may be exposed to chemicals. Surveillance is conducted by applying the Industrial Safety and Health Act. In 2003, how-

Table 1. Acts regulating chemicals in Korea, and the purpose of each Act

Target substances	Chemicals regulated	Jurisdiction	Related Acts	Purpose of the Act
Substances hazardous to health	698	Ministry of Labour	Industrial Safety and Health Act	Workers' safety and health
Toxic chemicals	512	Ministry of the Environment	Toxic Chemical Control Act	Public health and environment protection
Agrochemicals, fertilizer, feed	314	Ministry of Agriculture and Forestry	Agrochemicals Control Act, Fertilizers Control Act, Control of Livestock and Fish Feeds Act	Quality improvement and appropriate management of agrochemicals, fertilizer and feed
Medical supplies, narcotics	2,600	Ministry of Health and Welfare	Pharmaceutical Affairs Act, Narcotics Control Act	Appropriate management of pharmaceuticals and cosmetics
Food additives	461	Ministry of Health and Welfare	Food Sanitation Act	Management of food additives
Dangerous articles, explosives	64	Ministry of Government Administration and Home Affairs	Fire Service Act, Control of Firearms, Swords, Explosives, etc. Act	Fire prevention, control, management of explosive chemicals
High-pressure gas	51	Ministry of Commerce, Industry and Energy	High Pressure Gas Safety Control Act	Safety control of high-pressure gas
Radioactive agents	Isotope	Ministry of Science and Technology	Atomic Energy Act	Management of radioactive agents

ever, 87 workers were diagnosed as having occupational diseases caused by chemical exposure, and 23 workers died after suffering from occupational disease caused by chemicals (1).

Although the amount of chemicals in circulation is rising along with increased technology and sophistication, and along with the larger size of domestic industries, the continuously increasing number of occupational disease cases caused by chemicals shows that our reaction to these increases is lagging behind. In response both to the new information about the health risk of chemicals and to the concern expressed by academia, labour, and industry, the chemical regulatory system under the Industrial Safety and Health Act was completely restructured in 2003. The aim was to achieve a more systematic approach and to meet the particular needs of Korea (2).

Based on the results of hazard risk assessment done through Good Laboratory Practice (GLP) standards, chemicals will be identified as either specially controlled or generally controlled substances. Those substances identified as specially controlled substances will then be classified into five different categories based on the seriousness of the health hazard and risk they pose: banned substances; substances requiring a permit; regulated substances; substances requiring monitoring of the work environment; and substances requiring an occupational exposure limit for regulatory purposes. For the chemicals identified as generally controlled substances, only MSDS and warning label obligations are imposed. With regard to new chemicals, hazard risk evaluation is conducted first; then, if needed, a detailed assessment is made to determine the hazard and risk level for the purpose of classification into general or specially controlled substances.

In consequence of the revised regulatory system and the chemical classification now applied in Korea, the number of banned substances rose from 9 to 66, the number of substances requiring a permit from 8 to 13, the number of regulated substances from 109 to 168, and the number of substances requiring monitoring of the work environment rose from 116 to 189 (see Figures 1 & 2). The Work Environment Status National Survey and hazard risk assessment were recently included in the revised system, the aim being to achieve a systematic mechanism for updating the regulation of chemicals.

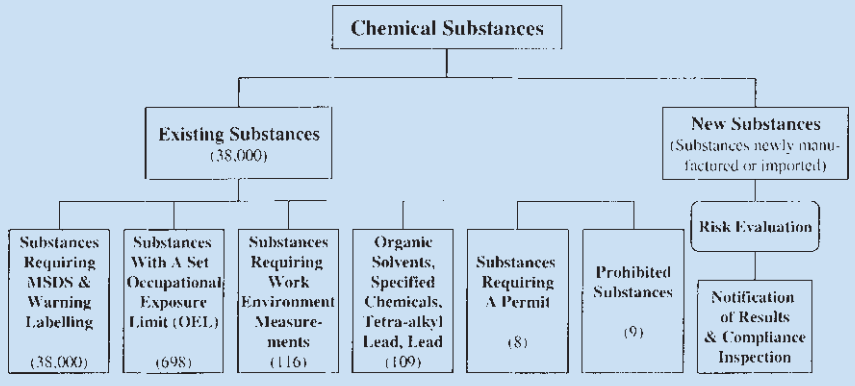

Figure 1. Chemical regulatory system used in Korea until June 2003

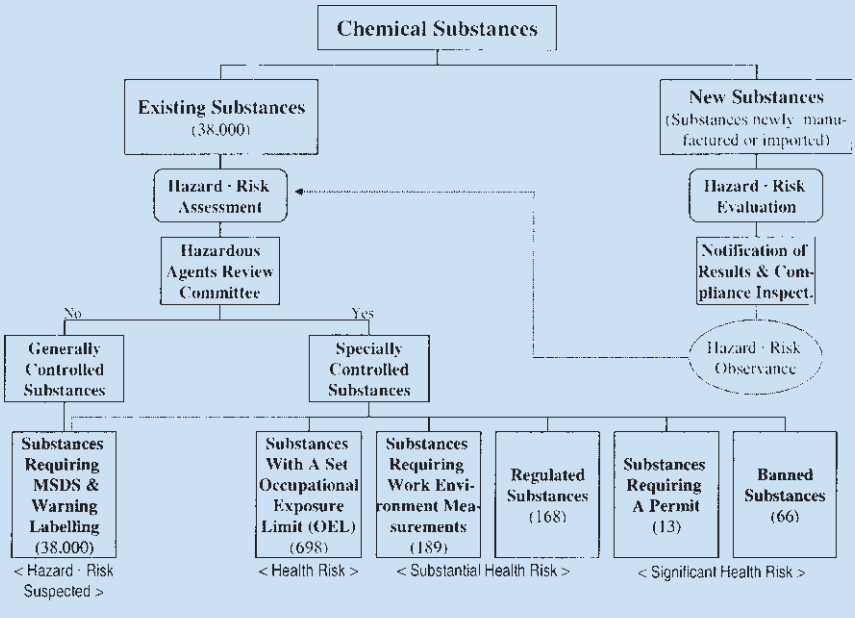

Figure 2. Revised chemical regulatory system in Korea as of July 2003

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Pesticide use, acute symptoms, and nicotine absorption among tobacco farmers in Malaysia

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Shunichi Araki (middle) and Rusli Nordin (left) on a tobacco-growing farm in Kelantan, Malaysia (1996).

Background

In 1996, the first author (SA), formerly Professor and Chairman at the Department of Public Health of the University of Tokyo, was sent by the Japan Society for the Promotion of Science (JSPS) to Malaysia in order to develop scientific cooperation between Japan and Malaysia. This led to an international collaborative study on pesticide poisoning among Malaysian tobacco-growing farmers conducted with Dr. Rusli Nordin, formerly Associate Professor at the Department of Community Medicine of the University of Science of Malaysia (USM) (1). This report is based on original data from our studies (1–5).

Pesticide use, safety behaviours, and acute symptoms

We studied pesticide use, safety behaviours, and the occurrence of acute symptoms among 395 male and 101 female tobacco-growing farmers in Kelantan, Malaysia. We also investigated 15 safety behaviours associated with pesticide use and 25 organ symptoms reported shortly after spraying pesticides, i.e. 7 central nervous system, 7 digestive, 5 respiratory, 2 eye, and 4 skin symptoms.

The results of stepwise multiple linear regression analysis (Table 1) indicated that not smoking while spraying (377 males, 95%), spraying equipment in good condition (356 males, 90%), and changing clothes immediately after spraying (295 males, 75%) significantly prevented the occurrence of acute symptoms immediately following the spraying of pesticide among the male farmers. By contrast, among the female farmers, only wearing a hat while spraying (87 females, 86%) significantly prevented total symptoms.

In addition, among the male farmers, not smoking significantly prevented the occurrence of respiratory symptoms; spraying pesticides with equipment that was in good condition significantly prevented central nervous system, digestive, eye and skin symptoms; changing clothes prevented respiratory symptoms; washing the hands and face immediately after spraying prevented digestive symptoms; and wearing facemask and gloves while spraying prevented skin symptoms. By contrast, among the female farmers, wearing a hat significantly prevented skin symptoms; the number of pesticides used increased the occurrence of central nervous system symptoms; wearing a facemask and not smoking while spraying prevented digestive and eye symptoms, respectively; and changing clothes after spraying prevented skin symptoms.

Smoking while spraying increased the absorption of pesticides through inhalation of the airborne particles and through oral ingestion of the particles attached to cigarettes. It also exacerbated underlying respiratory diseases, such as bronchitis and asthma by conducting irritating smoke and pesticide aerosols to the respiratory airways. The

pesticides inhaled caused respiratory symptoms and then systemic symptoms after absorption. We made special efforts to curb Malaysian farmers from smoking while spraying in order to prevent pesticides from having these effects.

Leakage of pesticides during pesticide spray is a serious problem among agricultural workers in developing countries. Socioeconomic factors have been cited as the main reason for poor maintenance of pesticide spraying equipment. Defective spraying equipment leaked pesticides that caused local symptoms in the skin, eyes and digestive organs through contact and oral ingestion, as well as central nervous system symptoms through absorption. We advised the National Tobacco Board of Malaysia to provide the tobacco farmers with a regularly subsidized spraying equipment maintenance programme so that the spraying equipment used would be in good condition, since the farmers were found to be using defective spraying devices because of the high cost of repairing and maintaining the equipment.

If there was a delay in changing clothes immediately after pesticide spraying, the body was in longer contact with pesticides, thus increasing the risk of inhalation exposure and absorption through the skin. The quality of clothing worn is an important factor in determining the extent of pesticide absorption, since poor quality material can allow a greater penetration of pesticides and hence absorption through the skin. Therefore, the risk of prolonged bodily contact with pesticides through a delay in changing clothes should be fully explained to farmers.

Many women in tropical countries tend to perceive the head cover worn for religious reasons as providing protection against the adverse effects of pesticides. Most of these head covers are made of thin cotton which pesticides can easily penetrate during spraying. Religious and health authorities are advised to develop a health education programme about the importance of female tobacco-growing farmers wearing a hat as personal protective equipment.

Absorption of nicotine and green tobacco sickness

Tobacco farmers are at risk of green tobacco sickness (GTS), which is caused by dermal absorption of nicotine from wet tobacco leaves. Seventy-seven male tobacco-growing farmers who were registered by the National Tobacco Board were examined in Kelantan, Malaysia. Thirty-eight control subjects were healthy male Board officers, who did not handle wet tobacco leaves. There were no significant differences in age, height, or weight between them. None of the subjects consumed alcohol.

To assess dermal absorption of nicotine from tobacco leaves in relation to GTS, urinary cotinine concentrations were measured for the male tobacco farmers and for the control subjects. Their urinary concentrations

Table 1. Effects of safety behaviours during pesticide use, and effects of demographic, occupational and present illness variables (independent variables), on the numbers of total and organ symptoms (dependent variables) among 395 male and 101 female tobacco-growing farmers: Stepwise multiple linear regression analysis (3)

Dependent variables[a]	Males		Females	
	R[b]	Independent variables selected [c]	R[b]	Independent variables selected [c]
Total symptoms	0.25	Not smoking (-0.16)** Spraying equipment in good condition (-0.15)** Changing clothes (-0.10)*	0.17	Wearing a hat (-0.17)*
Central nervous system symptoms	0.14	Spraying equipment in good condition (-0.14)**	0.24	Number of pesticides (0.24)*
Digestive symptoms	0.23	Washing the hands/face (-0.17)** Spraying equipment in good condition (-0.15)**	0.28	Wearing a facemask (-0.26)*
Respiratory symptoms	0.32	Not smoking (-0.12)* Changing clothes (-0.11)*		
Eye symptoms	0.22	Spraying equipment in good condition (-0.15)**	0.20	Not smoking (-0.20)*
Skin symptoms	0.23	Wearing a facemask (-0.18)** Wearing gloves (-0.14)** Spraying equipment in good condition (-0.12)*	0.31	Wearing a hat (-0.23)* Changing clothes (-0.22)*

[a] Number of symptoms
[b] Multiple regression coefficient
[c] The total number of independent variables tested was 21 for males and 17 for females; figures in parentheses denote standardized partial regression coefficients
* P<0.05, ** P<0.01

Table 2. Differences in urinary cotinine (ng/ml/m²) between 77 tobacco farmers and 38 controls by smoking status (4)

Smoking status (cigarettes/d)	Tobacco farmers median (range), n	Controls median (range), n
0	17.7* (0[a]–289.9), 16	0[a], (0[a]–32.4), 12
1–10	948.3 (75.4–3778.5, 29	684.3 (23.3–2858), 11
>10	1119.2 (78.9–4725), 32	1194.5 (368.1–2724.2), 15

*: p<0.05 (Mann-Whitney test)
[a]: Below the detection limit

were adjusted for the body surface area, i.e. 1.65 m². In a comparison of non-smokers, the cotinine concentrations of 16 farmers were significantly higher than those of 12 controls (Table 2); six farmers with a urinary cotinine concentration of 50 ng/ml/m² or above showed eye symptoms, i.e. runny eyes (5 farmers) or blurred vision (4 farmers) more frequently than the ten farmers with a concentration below that level (2 farmers and 1 farmer, respectively) (p<0.05, Fisher's exact test). Farmers who did not wear protective equipment (40 farmers for rubber gloves; 37 farmers for boots) had subjective symptoms more frequently than the remaining farmers who wore the equipment (37 and 40 farmers, respectively; p<0.05); some of these symptoms were seen more frequently among organophosphate (Tamaron) users than among non-users. As tobacco farmers evidence a risk of nicotine poisoning from tobacco leaves, it is necessary to assess GTS together with the effect of pesticides when studying tobacco workers.

Previous studies showed that using gloves and wearing boots or rubberized nylon rain-suits effectively reduced nicotine absorption. In the present study, the farmers who did not wear boots or rubber gloves during their work and those who worked in wet conditions (47 farmers) manifested subjective symptoms such as nervousness, dizziness, pallor, skin rash, numbness, or muscle weakness more frequently. By contrast, eye symptoms were not prevented by the use of protective equipment or by improvement of the working conditions. Therefore, more effective protective measures should be taken to prevent nicotine absorption. Use of protective equipment or improvement of the working conditions had no significant effect on the urinary cotinine concentrations. This is probably because the urinary cotinine levels were influenced by exposure on the previous day.

No significant differences were found in the frequency of complaints between farmers who used dithiocarbamate or pyrethroid and those who did not. Therefore, it did not appear that these pesticides caused the symptoms observed.

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ILO World Day for Safety and Health at Work 2005

Advocacy to raise awareness about safe and unsafe practices and the need to move occupational safety and health up the political agenda is a key tool in the ILO's response to the changing face of occupational safety and health. World Day for Safety and Health at Work is a major component of the ILO's efforts to raise the profile of occupational safety and health by motivating both leaders and workers to highlight the importance of a preventative safety and health culture on 28th April and to work on a making a safe and healthy workplaces a reality during the rest of the year.

The main emphasis this year is on prevention within the over-arching theme of creating and maintaining a preventative safety and health culture. The old adage has for years held that an ounce of prevention is worth a pound of treatment, and the ILO is working with governments, employers and workers to put this profound recognition into practice. It requires a great deal of foresight and commitment to achieve this. One must anticipate where the hazards are, assess the risks and act before the accident happens or the illness has been contracted. The benefits, however, are manifestly worth it.

This year's themes therefore are:

1. Prevention (main emphasis)
2. Preventive safety and health culture (overarching theme)
3. Construction safety (subtheme)
4. Younger and older workers (subtheme)

A **preventive safety and health culture** is one in which the right to a safe and healthy work environment is respected at all levels. It is one where governments, employers and workers actively participate in securing a safe and healthy work environment through a system of defined rights, responsibilities and duties, and where the principle of **prevention** is accorded the highest priority. Building and maintaining a preventive safety and health culture requires making use of all available means to increase general awareness, knowledge and understanding of the concepts of hazards and risks and how they may be prevented or controlled.

Construction safety is a significant area because while this sector generates much employment, it is also where more than its fair share of accidents, particularly fatal accidents, take place. The work is dangerous because it may often include working at heights (on scaffolding, gangways, ladders, roofs), excavation work (explosives, earth-moving machines), and using lifting materials (cranes, hoists).

These dangers can largely be avoided by good planning and co-ordination, for example, making sure there are sufficient skilled workers and the appropriate tools and equipment at the right place at the right time. Preventive measures include signaling, developing and implementing safety procedures, personal protective equipment (where other means of protection are not available), training, first aid, and also cover welfare facilities, such as drinking water and sanitary facilities.

Youth at work tends to suffer disproportionately from workplace accidents and diseases. Faced with high demands and little control (i.e. being highly stressed), yet wanting to please and/or wanting peer approval (wanting to be "cool"), means that young people may tend to disregard safety measures. Often they are simply not aware of those safety measures and do not yet have the experience to recognize or avoid potential danger.

Older people at work face different risks. While in most occupations they tend to have fewer accidents, they need longer to recover than younger people from injury or work-related illness. Any diseases which build up over time will manifest themselves after a certain age. What older workers may lose in strength, balance and flexibility for physical work is often made up for by higher accuracy than younger workers. So accommodation is called for to profit from the valuable skills and competencies older workers have. Preventing discrimination against older workers is also vital.

ILO offices around the world and constituents are organizing a variety of events on or around 28th April 2005. In previous years, events have ranged from speeches held by leaders from government, employers' organizations and trade unions to street theatre and worker coffee meetings focusing on occupational safety and health. There were also podium discussions between eminent specialists in the field and launches of new technical and legal material related to occupational safety and health. For more information see the website: **www.ilo.org/safework/safeday**.

If you would like to do something to celebrate World Day for Safety and Health at Work, please contact your local ILO office and feel free to use the products, such as posters, the report and fact sheets that will be available for downloading on the website in time for April 28th.

Poisoning caused by newly introduced chemicals and preventive measures

Yasuhiro Takeuchi, Japan

Owing to rapid computer development, we live in what is called the computerized era. It is also called the era of chemicalization, because very many chemicals are produced and used everywhere, both in daily life and in industry. The number of main chemicals used in industry now exceeds 50,000. In addition, more than 500 new chemicals are introduced in industry every year. Moreover, the world's annual consumption of petroleum is more than 3 billions tons. In consequence, many workers the world over are exposed to a wide range of chemicals, and many workers are injured. Generally speaking, substantial amounts of chemicals are produced in large companies and supplied to all sorts of workplaces, including small workplaces where the workers are not well protected.

Industry has a need for ever more sophisticated skills and new materials in order to be competitive enough. Thus many new chemicals are introduced in the production of new, competitive goods such as new medicines, new dyestuffs, new agricultural chemicals, new clothes and others.

In Japan from 1979 to 2003, the cumulative number of new chemicals reached more than 12,000. By law, the mutagenicity of new chemicals must be tested, to screen for carcinogenicity and reproductive toxicity, before they can be marketed in Japan. About 4% of the new chemicals are strongly mutagenic and 9% are weakly mutagenic (Figure 1) (1). However, in addition to mutagenecity, chemicals have various other toxicities, and may cause health disorders.

Specific fluorochlorocarbons and 1,1,1-trichloroethane were prohibited in 1996 because of their ozone-layer depleting potentials. In a Korean electronics factory where 2-bromopropane was used as an alternative solvent, menopause was found in 16 exposed female workers in 1995. Additionally, oligospermia or aspermia was detected in male workers. After about two years, ovary function had recovered in only two female workers, one of whom gave birth to a child while the other recovered menstruation. Many animal experiments have confirmed the severe reproductive toxicity of 2-bromopropane in both female and male animals.

In place of 2-bromopropane, 1-bromopropane started to be used in industry although not enough information was available on its toxicity. Figure 2 shows paralysis of the legs in a rat exposed to 1-bromopropane. Severe neurotoxicity of 1-bromopropane to both the central nervous system and the peripheral nerves was found (2). In Japan, manufacturers and suppliers of 1-bromopropane proceeded with care. Fortunately, no reports of serious poisoning involving 1-bromopropane have surfaced in Japan.

However, the first serious case of 1-bropmopropane poisoning was reported in the USA in 1999 (3). In his work, the 19-year-old male patient used 1-bromopropane to clean metal parts. He noticed paresthesia in January 1998. The symptoms gradually worsened, with weakness occurring in proximal portions of both lower extremities and the right hand. He was admitted to the hospital about 2 months after he had started using 1-bromopropane on the job. At admission, he could not stand up by himself, and both swallowing and urination were difficult. On the basis of the clinical findings and MRI examination, he was diagnosed as having encephalomyeloradiculopathy. The author of the report (3) diagnosed the patient as a case of 1-bromopropane poisoning because the patient's symptoms and signs were similar to the findings of the animal experiments. Since that case, at least three other severe cases of 1-bromopropane poisoning have occurred in the USA (4).

The factory we investigated in China produced about 6,000 tons of 1-bromopropane, and exported 1-bromopropane to the USA, Germany, France and other countries in 2003. Neurological impairment was found among the workers exposed to 1-bromopropane (5).

On October 5, 2004, at the American Neurological Association held in Salt Lake City, USA, Dr. J.J. Majersik and colleagues reported six cases of poisoning with 1-bromopropane. Six cases were exposed to 1-bromopropane while using spray adhesives to glue foam cushions. All of the patients complained of subacute onset of lower extremity pain or paresthesia, and five out of the six patients reported difficulty in walking. Eighteen months later, the two most severely affected patients had regained minimal function but still required assistance to walk. Three patients continued to experience chronic neuropathic pain. One patient

had subtle cognitive changes. Air samples taken at the workplaces one day after gluing operations had ceased revealed the mean concentration of 1-bromopropane to be 130 ppm (range 91–176). It was thought that the patients had been exposed to higher concentrations of 1-bromopropane while gluing.

This is a rare chemical in that animal experiments predicted the potential risk of 1-bromopropane. It is important in the future that the potential risk of newly introduced chemicals is predicted, in order to prevent poisoning. Generally speaking, when new chemicals are introduced in industry, it is impossible to know where, by whom and for what purpose they will be used; poisoning may thus occur at workplaces where it is not expected. Industrial chemicals are not tested for safety and health as stringently as medicines and foods, because they are not produced for human intake. Moreover, it is very difficult to prevent poisoning in the case of new chemicals introduced at small workplaces, because small workplaces are not well equipped with preventive measures and they lack adequate information on toxicity. The toxicity of new chemicals should be checked for safety and health before marketing. New chemicals should be taken into use with care in order to prevent them from poisoning workers.

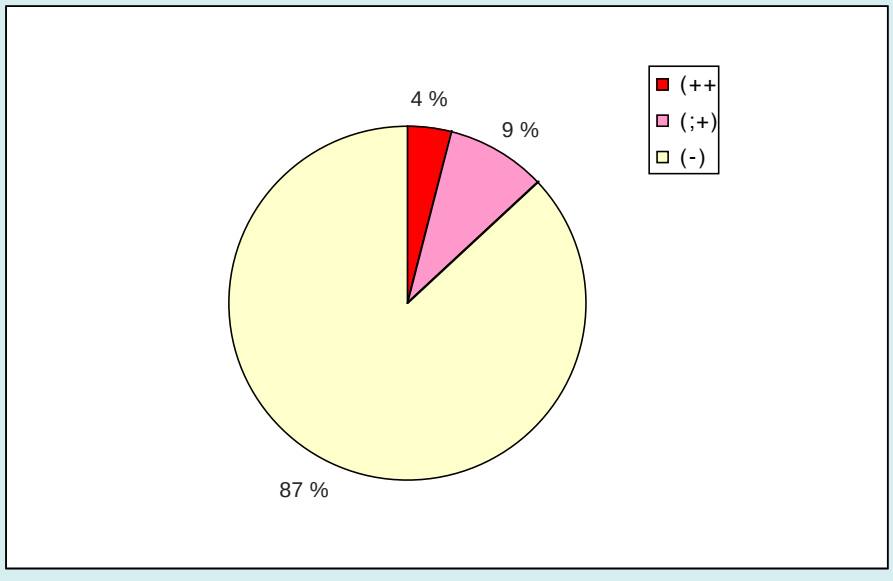

Figure 1. Mutagenicity of tested new chemicals (11,271) (1979–2000)

Figure 2. Paralysis in a rat exposed to 1-bromopropane

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Health and safety of farmers in the Philippine Cordilleras:

Pesticide exposure

Dulce P. Estrella-Gust, Teresita S. Cucueco, Marissa San Jose, Teresa S. Andres, The Philippines

Introduction

This paper reports on the health and safety of farmers and farm workers and, in particular, on their exposure to a large variety of pesticides and other farm hazards. It is primarily based on a study conducted by the Occupational Safety and Health Center (OSHC) in two selected areas: Buguias and Bauko of the Cordillera Administrative Region, located in the north of Luzon Island in the Philippines.

The study focused on determining the correlation between pesticide exposure and the morbidity of farmers in vegetable farming. The study also examined some socio-demographic factors surrounding pesticide use, and other health and safety concerns.

Agriculture is a major source of revenue for the majority of people in the rural areas in the Philippines. Agriculture and related rural activities account for about 30 per cent of employment among the Philippine labour force of 32 million workers (1).

The Benguet region in the northern part of Luzon accounts for a large share of the country's total supply of vegetables, including broccoli, cabbage, lettuce, potatoes and different varieties of pechay. As early as 1960, farmers have been trying to control several pests, such as the diamond back moth, through extensive use of pesticides.

The harmful effects of pesticides did not go unnoticed by farmers, researchers and by regulatory organizations. Signs of acute and chronic exposures have been reported from time to time by farmers and/or by health personnel. Complaints of headaches, blurring of vision, stomachaches and diarrhea were observed; the latter also involving numbness and tingling of the fingers and hands, arms and lower extremities.

Photo by Rey Soriano, OSHC

Since the 1980s Philippine stakeholders have been making a strong case for banning or at least severely restricting the use of pesticides belonging to the highly toxic group as per WHO classification and the recent Stockholm Convention on "persistent organic pollutants (POPs)". A ban has been decreed for: Aldrin in 1989, Dieldrin in 1989 and Endrin in 1983. The Philippines ratified the Stockholm Convention in 2004 (2).

The banning of toxic pesticides has been only partially effective, and farmers' access to adequate preventive and curative health service remains inadequate. As a result, the use of pesticides and corresponding health problems have to a large extent persisted to this day.

The OSHC study

In 2001, the Occupational Safety and Health Center, an agency for preventive occupational safety and health attached to the Department of Labor and Employment, embarked on a preliminary study on the health effects of pesticides and other safety hazards as experienced by farmers in selected sites in the Cordillera Region, Buguias in Benguet Province and Bauko in the neighbouring Mountain Province. The OSHC team comprised physicians, industrial hygienists, and safety practitioners.

Material and methods

Study population

Selection criteria for the participating farmers included active farming and pesticide use in the care of their crops at some time during their work life. The participants selected included 75

farm workers: 32 from Buguias and 43 from Bauco. They were informed that a study and a medical mission were to be conducted in Buguias' multipurpose hall. The 75 participants were selected from those who were seeking medical assistance. Two groups of farmers served as participants: Group A included 55 farmers who had used pesticides up to two weeks prior to the interview and Group B included 20 farmers who had not used pesticides for almost a year or more but had been involved in other farming activities.

Health complaints were elicited through a questionnaire and a clinical examination. The farmers' level of exposure to organophosphates was determined through measurements of the red blood cell acetylcholinesterase (RBC AChE) content, including determination of the level of enzyme inhibition.

Photo by Rey Soriano, OSHC

Mixing chemical cocktails

Medical and laboratory examinations: Exposure measurements

Both physical examinations and laboratory tests identified organophosphates and carbamates as the pesticides most commonly used by the participants. In order to assess or document exposure to these classes of pesticides, the study made use of determination of the red blood cell acetylcholinesterase (AChE) content, as it reflects not only the level of exposure but also the intensity of biological effects (3). The colorimetric method or Ellman method using acetylthiocholine as substrate was used to determine red blood cell cholinesterase.

Results

Socio-demographic profile

Most of the participants belonged to the 35–55-year-old age group with a mean age of 40.8 ± 14.5 years. Both Group A and Group B had workers younger than 20 years old. The youngest was a 7-year-old boy in Group B, while the oldest was a 78-year-old man.

All of the participants did the following farm activities: planting, land preparation, fertilizer storage and application, watering, harvesting. They spent an average of 9 hours a day in the field for 6 days a week.

Pesticides were applied and empty containers were discarded by at least 80 per cent of those in Group A and 90 per cent of those in Group B. Pesticide mixing was reported by only 50 per cent of those in Group B. Pesticide mixing, or 'cocktailing', involves the combination of two or more pesticides for the purpose of producing a more potent product; it is based on farmers' perception and experience, not on manufacturers' recommendations. The mixture usually contains at least one organophosphate or one carbamate. Pesticide application was a major agricultural activity among almost all participants.

Forty one per cent of the farmers usually stored used or unused pesticides inside their homes, while 31.7% kept the pesticides on the farm outside the home, in small huts serving as a warehouse, resting place, or dining area; 27 per cent left them anywhere in the garden. Empty pesticide containers were usually (54.0%) thrown anywhere in the farm or in the water streams where people wash their clothes, face, hands, legs and feet after farming.

Carrying heavy loads

There were 56 participants who reported carrying heavy loads. The mean estimated weight of the participants' load was 40.06 ± 20.3 kg. The estimated minimum load of both subgroups was 10 kg, while the maximum load was 100 kg among Group A and 50 kg among Group B.

During harvest time, the farmers sell their produce to middlemen who go to the gardens to buy their harvests. The gardens are located on mountain slopes, which means that the gardeners have to carry their produce long distances from their garden to the transport vehicle waiting for them on the main road. Few gardeners in Buguias and Bauko handle vegetables and harvests by using pulleys or other mechanical devices.

Training in the use of pesticides was perfunctory at best. Most of the information and training had been provided by technicians or sales representatives of private pharmaceutical companies selling the pesticides, some also by the Fertilizers and Pesticide Authority of the Department of Agriculture.

Types and brands of pesticides used by respondents

The farmers at these sites regularly use a cocktail of two or more pesticides, which they apply by knapsack spraying.

Of the five most common type of pesticides used, two were organophosphates (OP), one was a pyrethroid, another an organochlorine (OC). The most commonly used was a thiocarbamate, a herbicide which does not inhibit the enzyme acetylcholinesterase. Among the pesticides used, two have been restricted (mevinphos and methamidophos) and one organochlo-

rine pesticide, Endrin, has been banned in the Philippines since 1983.

Personal protective equipment (PPE)

Out of 53 exposed respondents who handled pesticides, 33 (or 62%) used some kind of improvised personal protective equipment (PPE) while 38 per cent did not. The head and face protection used consisted of caps, hats, handkerchiefs, bonnets/mask, disposable gas masks, face towels and sunglasses. The garments usually worn to protect the body are jackets and long-sleeved shirts; gloves are worn to protect the hands, while boots and slippers cover the feet. Jackets are usually worn not as protection against pesticides but as protection against cold weather. Boots and other feet protection were always worn (84%), followed by jackets or some body covering (76.5%); a head covering was the third most common type of PPE always worn.

After spraying pesticides, more than half of the Group A participants practised the following: full shower (84%), change of clothes immediately after spraying (80%), and washing exposed body parts such as the face, hands and mouth (65%). Many, however, used the same PPEs without prior cleaning, and many washed themselves and their clothes in streams that were often used for dumping empty pesticide containers.

Health complaints/symptoms

The symptoms experienced by both participant groups were similar to those identified in some local and international studies. More than half of the Group A participants showed symptoms related to the neurobehavioural system, the cardiorespiratory system or the muscular system. More than half experienced fatigue, headache, muscle cramps, coughing/sneezing, chest discomfort and loss of appetite.

In Group B, most had neurobehavioural complaints; headache was the most frequent symptom, followed by dizziness and fatigue. Chest discomfort was also experienced by more than half of the unexposed participants, and more than a third of the group also had muscular, gastrointestinal and skin complaints.

Chi square test of significance was done to compare the symptoms between Groups A and B. Farmers who have finished spraying pesticides with inadequate personal protection may react immediately to these chemicals and thus experience the symptoms of coughing and sneezing. No significant differences for other symptoms were found among the two groups.

Photo by Rey Soriano, OSHC

Spraying pesticides on grown lettuce

Physical examinations

Of the 75 farmers examined, 19 (35%) were found to have elevated blood pressure. Other findings were pale conjunctivae (4 cases), chicken pox (1 case), lymphadenopathy (1 case), and an enlarged thyroid gland (2 cases). The neurological tests were within normal limits among all those examined. The findings were not all related to pesticide poisoning; some findings pertained to other illnesses among the farmers. Anaemia attributed to iron deficiency was noted among three women. Goiter or an enlarged thyroid gland is endemic in the Mountain Province and Benguet, owing to the iodine deficient diet.

Laboratory examinations

The level of RBC acetylcholinesterase (AChE) was determined for all participants. RBC AChE is the enzyme found in the red blood cells, which hydrolyse excess acetylcholine in the nerve synapses, thereby limiting the action of acetylcholine at multiple sites in the body. The mean level of RBC AChE among Group A participants was 1160 $\pm$ 133.18, with a minimum level of 949 U/L and maximum of 1804 U/L. The most recent exposure to pesticides was from one day to less than two weeks prior to this study.

On the basis of an acetylcholinesterase reference value of 3,500 U/L, 98 per cent of Group A participants had depressed RBC AChE levels indicative of moderate poisoning; only one participant has a level that was not indicative of any toxicity. Among Group B participants, 10 per cent had RBC AChE depression indicative of mild poisoning while 90 per cent had values indicative of moderate poisoning. At this point, the use of intra-individual determinations or pre- and post-determinations of RBC AChE levels was necessary. The reference value obtained was from Filipino subjects; it should be noted, however, that inter-individual variations in RBC AChE levels can range from 10 to15 per cent among healthy individuals (4).

Other laboratory tests showed abnormalities in a few cases, but these were not sufficient to fit the profile of any specific disease nor could they be directly attributed to be caused by pesticide exposure. Only one farmer had an abnormal liver function, as indicated by an abnormal SGOT/SGPT result.

Key informant interviews

Interviews with key informants and focused group discussions with municipal health officers, extension offices and representatives of grassroots organizations provided a rich source of information on pesticide use and misuse.

Municipal health officer of Benguet

Pesticide use was rampant among the vegetable growers in the area and was regarded as the cause of frequent problems, such as cough and colds. Older farmers were experiencing organic joint pains and neuritis. The officer mentioned that there were few health practitioners taking care of the needs of the population in Benguet. Often she caters to more than one municipality at a time. She occasionally sees cases of pesticide poisoning, but these are often suicidal in nature.

A Barangay captain

Years back, the chemical suppliers had distributed PPEs to the farmers, but this practice had now been stopped. Distributors no longer provided PPEs, and the farmers could not afford to buy appropriate PPEs. Most of the farmers had been given some training in Integrated Pest Management, but application of this training was impaired by chemicals that are readily accessible and easy to use. Due to aggressive pesticide marketing campaigns, farmers were spending up to half of their profits on pesticides.

Elementary school pupils in Bauko

Schoolchildren reported that they had started working in the vegetable gardens when they were 6–9 years old. They usually worked in the gardens during the weekends, but some still worked in the gardens during weekdays. Their work consisted of tilling the soil, land preparation, planting, watering, harvesting, and application of both fertilizer and pesticides. They were familiar with both garden pests and pesticides. Some of them were sometimes involved in chemical preparation and mixing, and even in spraying pesticides. Leftover pesticides were often stored or burned anywhere in the farm. During harvest time, children had to help and were sometimes carrying loads weighing 30 kg or more.

The symptoms experienced by the children were skin and nasal irritation, headaches and abdominal pain after the use of chemicals. Many exhibited signs of poor nutrition as well as skin rashes.

Multi-agency meeting of representatives from Buguias and Bauko

In 1998 the Department of Health (DOH) stopped its earlier practice of carrying out regular urine tests of farmers. The communities were deeply concerned about the indiscriminate and extensive use of pesticides and the resulting ill effects. They were also deeply concerned about the inadequacy of surveillance and the lack of health services and medicines.

Discussion

Numerous studies have been conducted on the general adverse effects of pesticides and on the health consequences to farmers. The results of this study revealed that farmers have used and misused pesticides, which have exposed them to numerous health problems.

It is noteworthy that Group B participants, i.e. farmers who had not used pesticides for one year, reported a frequency and nature of symptoms similar to those who had used pesticides during the past two weeks. The complaints of Group B participants can be attributed to secondary exposure to pesticides while carrying out other farm activities.

The likelihood of secondary exposure among the Group B participants is in fact demonstrated by their RBC AChE levels. The mean RBC AChE levels among both groups were similar; most participants of both groups showed a 60 per cent to 90 per cent depression of RBC AChE.

Photo by Rey Soriano, OSHC

Dr. Dulce P. Estrella-Gust interviewing schoolchildren involved in vegetable farming in the Cordillera Region.

With a 60–90 per cent depression of RBC AChE, one can expect that symptoms of moderate poisoning would occur and that most of those examined would manifest signs of acute toxicity. However, this was not the case in the present study. Although the participants reported that they experienced some symptoms secondary to increased pesticide exposure, none had acute complaints of moderate poisoning requiring immediate medical care. The possibility of tolerance may account for this phenomenon. However, since all participants had RBC AChE levels that were much lower than normal, future studies should assess individual baseline pre-exposure versus post-exposure levels in order to clearly assess levels of RBC AChE in this population and the resulting depressed levels after occupational exposure to pesticides.

The study revealed that individual farmers had decided to stop using pesticides because of observed health complaints. It is worth noting that those who had recently stopped working with pesticides were all single and generally had a lower level of educational achievement than those continuing to use pesticides. A majority of those who had stopped working with pesticides at least one year prior to the study had a higher educational attainment and had better knowledge on the hazards of pesticide use.

The symptoms experienced by the study participants were similar to those observed in studies among Indonesian farmers who are also using pesticide cocktails. The same applies to the vegetable farmers in Benguet Province.

Interestingly, symptoms were not only experienced by adult subjects but also by the 9 to 18 year-old youths helping out on the farms. While some participants had started working on the farm at ages as young as 7 years, the average age when starting work was 15 years.

Conclusion and recommendations

The study has confirmed the assumptions that significant use and misuse of pesticides in vegetable farming have exposed farmers and farm workers to numerous health problems. There is reason to believe that the conditions of pesticide use and misuse in Buguias and Bauko may be typical of other ar-

eas with a high concentration of vegetable farming in the Philippines.

The Philippines ratified the Stockholm Convention on Persistent Organic Pollutants (POPs) in 2004, but has so far failed to enforce the Convention. A recently concluded plan on POPs provides for inter-agency action including nationwide information campaigns, capability building and risk assessments.

The time is ripe, and conditions seem favourable for concerted initiatives to implement the existing Plan of Action to contain, if not eliminate, the use and misuse of toxic fertilizers. There is no alternative other than taking immediate and decisive action through close cooperation among all stakeholders: vegetable farmers and workers, their associations and cooperatives; producers, importers and distributors of pesticides; local and national governments; as well as academia and specialized agencies such as the OSHC.

1. There is a need for local and national implementers to build their capability for preventive and curative interventions, particularly on the diagnosis and treatment of pesticide poisoning. Health services should focus on work-related exposure to pesticides as well as exposure to other work-related hazards in farming. The role of the private sector, in particular the producers, importers and distributors of pesticides, should be emphasized through their corporate social responsibility programmes.

2. *Information campaign*

Especially at local levels, there is an urgent need both to develop and/or strengthen a massive information campaign on the correct, appropriate and safe use of pesticides and to strengthen the enforcement of banned and toxic pesticides.

3. *Capability building on prevention of exposure to toxic pesticides*

Immediate action must also be taken to train farmers on the proper disposal of pesticide containers. With improper disposal, these toxic containers may be re-used by unsuspecting persons, they pollute farmsteads, waste disposal sites, ground water and rivers, etc.

Attention should be paid to the rational use of pesticides. The Integrated Pest Management approach should be widely propagated to decrease the use of pesticides, lessen farmers' exposure and to protect the environment.

Training and information activities concerning pesticides safety for pesticide workers, distributors, and users should be established and strengthened.

Mechanism must be put into place, that ensure farmers' and agricultural workers' easy access to appropriate and effective pesticides that have no universal health effects.

4. *Enforcement*

Inter-agency enforcement efforts must be strengthened, based on comprehensive legislation and administrative guidelines on pest management.

Concerted action should focus on implementation of the existing plan of action regarding the wider application, in the national setting, of the Stockholm Convention. There are vast opportunities for public participation in the regulatory process, as well as a pooling of available manpower resources from all government agencies. Private sector participation as well as the participation of NGOs and academia are essential.

5. *Research*

Drawing on earlier studies and existing proposals on the health and safety effects of exposure to farm hazards put forward by the OSHC, further research should focus on vulnerable population groups, including child farmers, young workers, women and older workers in the Cordillera Region.

6. *Networking for social protection*

Preventive programmes can be put in place in the Buguias and Bauko areas through existing cooperatives, health authorities, and local government units. This could be achieved through safety training and education campaigns as well as medical surveillance.

Medical surveillance may be coordinated with the local government health units as well as private hospitals in the area. Training on the different levels of preventing the different health effects is recommended. A referral system for the more complicated cases should be established.

7. *Safety and health*

The most appropriate safety measures that will ensure the safety and health of agricultural workers are: safety measures on the proper use and storage of hand tools, construction of appropriate garden trails, and proper continued development of safer pesticides for both agricultural and public health use.

While the problems are well known and documented, there is now a growing concern among the affected workers and population, the authorities and civil society. Consumers in urban areas, e.g. in Metro Manila, have also become alerted to the possible health implications of vegetables grown with indiscriminate use of pesticides. This trend is increasing the economic risks of current practices of vegetable farming.

The future rewards of positive action will be considerable in terms of public and occupational health. In addition, economic returns and the future development of vegetable farming are very much at stake.

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The REACH proposal in the European Union – Towards better safety with chemicals

Marita Luotamo, Jack de Bruijn

Introduction

The European Commission published a 'Strategy for future chemicals policy (COM(2001) 88 final), the so-called 'White paper' in 2001, which was based on a review of the existing EU system for regulating the safe use of chemicals. This strategy was supported by both the European Parliament and the Council of Ministers, and led to the Commission's REACH proposal (Registration, Evaluation, Authorisation and Restrictions of Chemicals), which was published on 29 October 2003. At present this REACH proposal is under discussion in the European Parliament and Council of Ministers, and will be discussed in several committees before its final adoption with possible changes.

The main goals of the proposed REACH regulation are:

- to protect human health and the environment
- to maintain and enhance the competitiveness of the EU chemical industry
- to prevent fragmentation of the internal market
- to increase transparency
- to integrate the regulation through international efforts
- to promote non-animal testing
- to achieve conformity with EU international obligations under the WTO.

The proposed REACH regulation will replace the present EU chemicals legislation on 'existing chemicals' (Council Reg. 793/93/EEC), 'new chemicals' (Dir. 67/548/EEC and its many amendments). Also the present directives concerning the Classification and labelling of dangerous substances (Dir. 67/548/EEC) as well as Restricting the marketing and use of certain dangerous chemicals (Dir. 76/769/EEC) will be part of the REACH package. 'Existing chemicals' refers to chemicals which were on the European market before 21 September 1981 (100 in total, 106 representing today ± 99% of the total volume of all substances on the European market). 'New chemicals', in other words, chemicals produced after that date, represent altogether about 3,000 chemicals.

The general lack of knowledge about the use and exposure of substances as well as the lack of knowledge about the toxicological and ecotoxicological properties of the substances has been one of the main driving forces in the development of the REACH regulation proposal. In addition, it has been widely recognised that the current process by which authorities in the Member States need to demonstrate the risks of a substance before risk reduction measures can be taken places the burden on the wrong party and is too slow and inefficient.

Placing the 'burden of proof' to manufacturers, importers and downstream users

The proposed future REACH regulation is based on the principle that it is up to the manufacturers, importers, and downstream users to ensure that they manufacture, place on the market, import or use substances in such a way that they do not adversely affect human health or the environment. For substances manufactured or imported in volumes above 1 tonne per year, the industry has to submit a registration dossier in which they provide information about the manufacturing process and the uses of the substances, as well as information on the hazardous properties (including proper classification and labelling). For hazardous substances manufactured or imported in volumes above 10 tonnes per year, the registration dossier also needs to contain a chemical safety report (CSR).

All chemicals need to be registered

All the substances manufactured or imported to the EU in volumes over one tonne or more per year must be registered to the European Chemicals Agency, which will be founded in Helsinki. Failure to registrate means that the substance cannot be manufactured or imported in the EU. For substances which are already on the market today, different deadlines for registration are set. These deadlines depend on the tonnage level, and the information requirements are ranked in relation to physicochemical, toxicological and ecotoxicological data. The information requirements at 1 tonne/year or more include the physicochemical properties of the substance, and basically, *in vitro* testing concerning skin irritation and corrosivity, eye irritation and mutagenicity, and if necessary, skin

sensitization using *in vivo* testing. For the environment, short-term testing in aquatic conditions is required, and if the testing results indicate the need to further investigate the effects on aquatic organisms, long-term testing may be necessary. Further information will be required with the different tonnage levels (10 tonnes or more, 100 tonnes or more, and 1,000 tonnes or more). The greatest information requirements are for substances produced or imported in volumes over 1,000 tonnes or more. In order to assure that no unnecessary tests with animals are carried out, the manufacturers or importers need to provide testing plans for the tests; these will be required for volumes above 100 tonnes. Alternative approaches, such as QSARs, read-across from information on related substances, or *in vitro* tests may also be used obligatory.

Data sharing and avoidance of unnecessary animal testing

An important general principle of the REACH regulation proposal is to protect animal welfare and to avoid unnecessary animal testing with vertebrates. To facilitate the availability of the information concerning the registered substances, the Agency is required to create and maintain the 'Substance Information Exchange Forum' (SIEF) via Internet, where the manufacturers and importers can check to see whether the information they need for registering their substance is already available with other potential registrants. Manufacturers and importers are also encouraged to create consortiums in order to avoid double testing and to share their costs.

Evaluation of the registration dossiers

It is the responsibility of the Member State Competent Authorities (MS CA) to evaluate whether the proposed testing is reasonable and relevant. In addition, they may decide to check certain dossiers to see whether the information provided in the dossier for that substance meets the registration requirements. The authorities can also influence the contents of the testing, as well as the time schedule of the requirements. The Member States may also decide to look at all dossiers of a substance at once, in case any risk to human health or the environment is suspected.

The Agency makes decisions on the testing proposals of the industries or on the need for further information, after having followed a written procedure based on the proposals of the Authorities of the Member States. In case of disagreement, the Agency will send its opinion to the Commission, which will then prepare the final decision.

Transparency

Transparency concerning all the data and information on the chemical substances is strongly highlighted in the REACH proposal at all levels. The Agency is responsible for preparing the non-confidential information concerning the registration, evaluation and authorization of the chemicals available, either directly on its Internet site, or on the basis of written requests.

Authorization of chemicals – a new element

A new element of the REACH proposal is the introduction of the authorization requirement for substances of very high concern. These substances are defined in the proposal as substances with severe hazardous properties, such as 'CMR' substances (Carcinogenic, Mutagenic, Reproductive toxic), PBT or vPvB substances ((very) Persistent, (very) Bioaccumulating and Toxic) or other substances having serious and irreversible effects on human health or the environment. Parties that use or make available these substances of very high concern are required to apply for authorization of each use in accordance with the deadlines set by the Commission. The applicant must demonstrate that the risk from using the substance is adequately controlled, or that the socio-economic benefits outweigh the risks. The Agency will use its Risk Assessment and Socio-Economic Committees to develop an opinion on these authorization requests. Based on these opinions the Commission will take the final decision on whether the authorizations will be granted or refused.

Information in the Supply Chain

The current duties and responsibilities of manufacturers and importers regarding the development and dissemination of the Safety Data Sheets (SDS) will remain, but they will be slightly extended. The SDS will still be the main instrument for conveying the relevant information from manufacturer(s), importer(s) or down stream user(s) down to the supply chain. The contents of the SDS will be the same as today. However, a new procedure is that, whenever a Chemical Safety Report is available, the corresponding exposure scenarios will need to be annexed to the SDS.

All the actors in the supply chain are responsible for communicating information on individual substances and their compounds to the immediate downstream user or distributor. Any actor in the supply chain must also communicate information such as new data on hazardous properties, or any questions about the risk reduction measures regarding use, to the supply chain. Whenever a downstream user uses a substance in conditions other than those described in the exposure scenario provided by the supplier, the user is obliged to send the Agency information on the user's identity and of a brief description of substance usage.

Chemical Safety Report

A Chemical Safety Report (CSR) is required for all hazardous substances produced or imported in volumes above 10 tonnes per year. The CSR shall consist of all the relevant information concerning the substance included in the technical dossier. The CSR shall take into account all information available from assessments carried out under other international and national programmes, particularly the risk assessments carried out under the present EU regulation on existing substances, or hazard assessments carried out under the OECD programme on existing chemicals.

The main difference between the contents of the CSR compared to the present requirements for risk assessment reports on existing chemicals is the following: the corresponding risk

management measures that the manufacturer or importer takes, or recommends to be taken by the customer, must be described in the CSR.

The following steps need to be included in the chemical safety assessment performed by the manufacturer or importer of the chemical:

- Assessment of human health hazards
- Assessment of physicochemical properties hazardous to human health
- Assessment of environmental hazards
- Assessment of PBT and vPvB

If the substance or the compound meets the criteria of being classified as dangerous, or is assessed to be a PBT or vPvB substance, the safety assessment should also consider:

- Exposure assessment
- Risk characterization.

In the exposure assessment, the manufacturer and importer should clearly define the exposure scenario(s) and the risk management measures they recommend to be taken by their customers, regarding the identified use(s) of the substance.

Restrictions of use

The present list of chemicals included in the directive on restrictions for marketing and use of certain dangerous chemicals (Directive 76/769/EEC) will be entirely taken into Annex XVI of REACH. In addition, for substances mentioned in the 'Stockholm Convention' and the so-called POP substances (Persistent Organic Pollutants) included in the UNECE Protocol, the details of the restrictions from these conventions will be included in REACH (Annex XVII).

The Member State Competent Authorities or the Commission may start a procedure to restrict or prohibit the use of other substances if a risk to human health or the environment is identified. In that case they need to provide the Agency with a dossier which contains both a Chemical Safety Report on the substance, as well as a proposal for Community – wide restrictions and a justification explaining why these are necessary. The Risk Assessment and Socio-Economic Committees of the Agency will formulate an opinion on the proposed restrictions. Based on these opinions, the Commission will then decide on amendments to the list of restrictions (Annex XVI).

European Chemicals Agency – to be situated in Helsinki

A European Chemicals Agency will be established to manage the technical, scientific and administrative aspects of the REACH system, and to ensure consistency of the decision making at the community level.

The Agency manages the registration process and ensures that a harmonized approach will be taken to the evaluation. It provides criteria to guide the Member States' selection of substances for evaluation, and resolves disputes about requests for further information on the substances, based on the evaluation. It provides expert opinions and recommendations to the Commission regarding the authorization and restriction procedures, and it is responsible for confidentiality. It also handles requests for exemptions from the registration requirements for research and development concerning products and processes. It facilitates the sharing of animal test data at the pre-registration stage by putting registrants of certain substances in touch with each other.

The main body within the Agency will be its secretariat, which will provide technical, scientific and administrative support to the Committees and the Enforcement Forum, and will ensure the coordination between them. The Agency shall provide the Member States and the institutions of the Community the best possible scientific and technical advice on questions concerning chemicals.

Next steps

Within the Council, the Heads of State gave the Competitiveness Council the responsibility for REACH. An ad hoc working group of representatives of the Competitiveness and Environment Ministries is helping to develop a Council Common position. The Italian, Irish and Dutch presidencies have put considerable effort into this working group by carefully going through the REACH proposal. This process will be continued under the Luxembourg presidency and may be finalised by the end of 2005 under the UK presidency. Meanwhile, the European Parliament has also started its discussions on REACH. Most likely the Environment Committee, the Industry Committee and the Internal Market and Consumer Affairs Committee will all be giving an opinion on REACH. It is expected that the first reading in Parliament will be ready in the second half of 2005.

Meanwhile the Commission is working on the so-called interim strategy for the implementation of REACH. In line with this strategy, the Commission services are preparing technical guidance documents and tools (including the IT system) for the industry and authorities so that they will be prepared when REACH comes into force (see **http://ecb.jrc.it/REACH/** for more details on these preparations).

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Focus on Small-scale Enterprises

Suvi Lehtinen

The International Commission on Occupational Health, ICOH, has 35 Scientific Committees. The Scientific Committee on Small-scale Enterprises and the Informal Sector is one of the most active Committees. It organized an International Symposium on Occupational Health in Small Enterprises and the Informal Sector on 12–15 November 2004 in Nagoya, Japan. The meeting gathered together some 150 participants from 15 different countries, mainly from Asia, but also from the Middle East, Europe, North America, and Africa. Professor Toru Itani and Professor Norihide Tachi were the main organizers of the Symposium. They are to be credited for the most successful symposium on small-scale enterprises. The following are just a few of the many reports presented.

Professor Wai-On Phoon, Chair of the Scientific Committee, introduced the topic by describing the progress made by the Committee activities, and pointing out the challenges that lie ahead. Dr. Kazutaka Kogi, Vice-Chair of the Committee, described the participatory approach in providing good practices to small enterprises and the informal sector. During the years he has collected a lot of evidence from South-East Asian countries about the feasibility of the ILO WISE method for improving the working and living conditions of the workers in small enterprises.

The Symposium provided a good overview of the present status of small enterprises throughout the world. Most of the 10 keynotes, 34 oral presentations and 40 poster contributions stressed the role of small enterprises as the main form of employment. The economy of most of the countries in the world relies on the productivity of small enterprises. The number of small enterprises in most countries is 80–98% of all enterprises. Throughout the world, small and medium-sized enterprises (SME) are handicapped by limited resources and poor awareness of health and safety matters, but once they have initiated improvements in their conditions of work, they are willing to continue.

Professor Toru Itani described the collaborative projects carried out in small enterprises in the Philippines, Thailand and Japan. He reported that the small enterprises participating in the projects were eager to plan and implement improvements in their working conditions. They need, however, the support of external experts. Further evidence and materials on the effectiveness of WISE activities should be produced in order to inform also those managers and workers who have not yet participated in the activity.

Mr. Peter Hasle of Denmark reported on the studies on working conditions in small enterprises and concluded that more research would be needed on the real differences between small and large enterprises. Even though there are a lot of tools and methods for SMEs, surprisingly little attention is paid to the special features of SMEs, he said.

Ms. Theresa Holizki of the Workers' Compensation Board of British Colombia, Canada, reported that, on the basis of their data, the life span of one half of the small enterprises is less than 4 years. It has been clearly shown that if the life span of a small enterprise is less than one year, the accident rate is three times that of enterprises that continue their activities after four years.

In addition to the oral and poster communications, a special workshop was held on further development of health and safety in small enterprises. Dr. Tsuyoshi Kawakami and Professor Norihide Tachi organized the workshop in a professional, effective and pleasant way. The workshop consisted of several tasks: first, each participant gave points to the three best improvements (photos taken) in small enterprises. Then each participant proposed the three most important future devel-

opment ideas for small enterprises. These were collected on post-it papers onto a board and grouped according to their contents. Dr. Kawakami went over the proposals and summarized four groups of developments deemed important for small enterprises. These were: 1) need for a well-functioning government policy, 2) training and information activities, 3) extension of occupational health services, including basic occupational health services, and 4) need for research and networks of experts.

The individual proposals, new ideas and innovations written down on the post-it papers offered a basis for group discussion. The 50 participants of the Workshop were divided into six groups. Each group discussed the three most important achievements and three future development targets of occupational health and safety in small enterprises. All the groups did an excellent job, and reported their results in turn. Two ideas came up in almost all group reports. First, ways to extend the participatory approach should be found and, secondly, it should be kept in mind that some risks cannot be assessed by the workers themselves, such as exposure to dibromochlorpropane. Occupational health and safety experts are sorely needed to assess risks of this sort.

Some general conclusions can be drawn from the Symposium:

1. The problems of small enterprises and the informal sector are very similar in all parts of the world: high risks, lack of resources and low level of awareness, as well as the need for external advice and support for improving health and safety at work.
2. The participatory principles developed by the experts of ILO and a number of Japanese experts (the School of Professor Kogi) have already demonstrated their feasibility, effectiveness and impact in SMEs.
3. The SMEs and the informal sector are less likely to benefit from inspection strategies; they need services that help them to initiate and support their own activities for achieving better safety and health.
4. Whatever methods are used, they should be based on the participatory approach, adapted to the local conditions, be low-cost, and integrated so that the workplace can be developed as a whole to ensure the workers' health, safety and well-being, and the productivity of the enterprise.

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Dr. Kawakami of the ILO, Prof. Tachi and Prof. Itani planning the Workshop.

The brief introductions and individual tasks kept Workshop participants interested and busy.

Photos by Suvi Lehtinen

The Fourth International Congress on **Women, Work and Health**

The IV International Congress on Women, Work and Health (WWH 2005) is to be held 27–30 November 2005 in New Delhi, India. The Congress will highlight important issues of occupational safety, health and environment for women working in the formal and the informal sectors.

This Congress is being co-organized by the Nehru Memorial Museum and Library, Teen Murti House, Stree Shakti – The Parallel Force and Manána – Reflections on Indian Civilisation. The National Institute for Working Life, Sweden is also a co-organizer of this Congress.

The first international pre-Congress workshop was held at the same location in New Delhi on 27–28 February 2004. This workshop, held primarily to give shape to the Congress themes, had participation by the Society for Working Life, the nodal agency and members of the WWH 2005 Organizing Committee, International Scientific Committee, as well as national experts. The second international meeting took place on 6 December 2004, also at the same location in New Delhi; it was jointly organized by Manána and the Center for Social Research.

Regional workshops were organized in Dehradun, Kolkata, Chennai, Jaipur and Mumbai to complement the scientific programme of the Congress and to give researchers, practitioners and experts the opportunity to voice region-specific concerns. The focus was to strengthen issues on gender mainstreaming at work and at home through information, to adapt to the changing world of work, as well as to introduce innovative ways in the scientific practices of health and development. The target groups were researchers, social scientists, physicians, work environment experts, trade union members, government representatives and associates of WWH 2005.

The Congress seeks to consolidate vision on the above issues, in a region where such issues have thus far been overlooked. The Congress shall further the outstanding work of the three previous Congresses, held in Barcelona (1996), Rio de Janeiro (1999) and Stockholm (2002), by enhancing the global perspective on the following issues with a special focus on the Indian situation:

1. Gender mainstreaming at work and at home
2. The changing world of work
3. Scientific practice of health and development

We invite you to participate in this Congress, and thereby to contribute to ensuring a greater representation of issues, which although of major concern to women all over the world, also have a region-specific perspective.

More information is available on our Website: **www.swl-delhi.org/wwh**. You can also write to the Secretariat, E-mail: wwh@swl-delhi.org.

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Congresses

The 18th Triennial Asian Conference of Occupational & Environmental Health

Wellington, New Zealand
11–13 May 2005

Theme
Emerging Industries in the Asia Pacific Region and the Challenges for Occupational Health.

Organizers
Australian and New Zealand Society of Occupational Medicine (ANZSOM) and Faculty of Occupational Medicine Royal Australasian College of Physicians (RACP).

Programme
The Scientific Programme will include morning plenary sessions and afternoon Symposia on:

- Occupational Respiratory Disease
- Aviation Medicine
- Ergonomics
- Occupational Nursing
- Hygiene
- Rehabilitation and
- Safety Management.

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OH education and training for everyone everywhere

Strasbourg, France
15–16 September 2005

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First Pacific Conference on Sustainable Development for Small Island Developing Nations

General themes

- Capacity building for sustainable development
- The role of occupational and environmental health in sustainable development

Annual Conference of the Papua New Guinea Occupational Health and Safety Association (SEFTI)

General themes

- The role of occupational health and safety in sustainable development
- Occupational health and safety for all

Madang, Papua New Guinea
18–20 October 2005

Organizers
The Papua New Guinea Occupational Health and Safety Organisation Inc (SEFTI), The International Commission on Occupational Health, The University of Southern Queensland

Information
http://www.usq.edu.au/seftiicohconf/default.htm

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The 13th International Congress on Occupational Health Services

Utsunomiya, JAPAN
1–3 December 2005

Main Theme
Evidence-Based Occupational Health

Organizer
ICOH Scientific Committee on "Health Service Research and Evaluation in Occupational Health"

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http://www.dokkyomed.ac.jp/dep-m/pub/ohs2005.html

28th ICOH International Congress on Occupational Health

Milan, Italy
11–16 June 2006

"Renewing a century of commitment to healthy, safe and productive working life"

The scientific program will include: Plenary lectures, symposia, workshops, debates, educational courses and poster sessions.

Preliminary list of topics to be discussed during the Congress sessions:

- Chemical factors
- Air-borne particles and respiratory system effects
- System health effects
- Physical factors
- Industries and occupations
- Occupational health services
- Prevention and education

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