

SECTORAL ACTIVITIES PROGRAMME

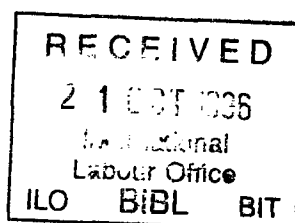
Working Papers

INDUSTRIAL ACTIVITIES BRANCH

Occupational Safety and Health in the Food and Drink Industries

by

Shizue Tomoda



39536

Working papers are preliminary documents intended to stimulate discussion and critical comments.

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FOREWORD

Through its Sectoral Activities Programme, the ILO assists governments and employers' and workers' organizations to strengthen their capability to deal equitably and effectively with labour and social problems specific to different sectors, industries and occupational categories. Over thirty industries or sectors receive specific attention through subprogrammes dealing with manufacturing, basic industries and transport; maritime industries; the service sector, including salaried employees and professional workers; and hotels, catering and tourism.

A major means of action is the holding of meetings of tripartite (governments, employers, workers) Industrial Committees, each of which is composed of selected countries that are representative of the sector with which that committee deals. Some of these are standing committees; others are convened on an ad hoc basis. In addition, bipartite meetings (governments, workers) and meetings of experts are held to consider labour and social problems of specific occupational categories.

In support of the meetings programme, the Sectoral Activities Department acts also as a centre for the collection, analysis and dissemination of technical information. Studies are carried out on issues of concern to particular industries and sectors. Such studies also support a wide range of operational activities in the form of technical co-operation and advisory services.

This publication is the outcome of research done under the Sectoral Activities Programme. It was prepared within the context of the wishes expressed by the Food and Drink Industries Committee of the ILO. In conclusions No.18 concerning occupational safety, health and working environment in the food and drink industries adopted by its First Session, the Committee urged the ILO to "promote research, particularly in the field of epidemiology, on the relation between working environment in the food and drink industries and health or disease, on ergonomics, particularly in view of new technologies, on safety in machine designs and on toxicology, particularly in view of the many chemical substances being used in the food and drink industries." Furthermore, in Resolution No. 30 concerning occupational safety and health in the food and drink industries adopted by its Second Session, the Committee requested the Director-General of the ILO to "prepare a study on possible occupational diseases due to repetitive strain injuries in the food and drink industries." It is hoped that the study will provide useful information on some of these subjects for member States and employers' and workers' organizations concerned.

August 1993

G. Stoikov
Chief,
Industrial Activities Branch

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INTRODUCTION

The food and drink industries are not commonly perceived as constituting a serious safety and health problem in the same way as, for example, the mining or construction industries. And yet, statistics from various countries, which are reproduced in this report, go some way to validating the claim made by some of the participants at the recent Second Session of the ILO Food and Drink Industries Committee that the sector has one of the worst records in the manufacturing sector in the field of safety and health. The evidence gathered in this report shows that the food and drink industries do indeed occupy an unenviably high position in league tables of the incidence of occupational accidents and diseases, although the number of working days lost would tend to suggest that the injuries and illnesses suffered in the sector may not be as serious as in some other manufacturing industries. There are also grounds for believing that some aspects of safety and health in the sector are getting worse.

Despite the generalized economic recession in recent years, the food and drink industries have continued to expand in response to the growing worldwide demand for processed food and drinks. In this context of expansion and intensified competition, the sector has experienced rationalization, restructuring and a high level of mechanization, in both the industrialized and developing countries. As a result, although output and the overall worldwide employment level in the sector have continued to expand, employment in individual enterprises, particularly in the highly capital-intensive drinks industry, has suffered. Moreover, mechanization has often had the effect of increasing the tempo of work and the resulting stress levels of the workers, as well as increasing the number of monotonous and repetitive tasks, with a consequent rise in the incidence of musculo-skeletal disorders. Increased mechanization has also been accompanied by higher noise levels, which has led to more workers suffering from hearing impediments. Other common safety and health problems in the sector arise out of the use of sharp cutting tools, the prevalence of dust in the air, contact with infected animals and the increased use of hazardous chemicals.

Governments, employers and workers in the sector are naturally attempting to respond to the above problems as best they can. In many countries, safety and health codes have been adopted for the sector, as a complement to the more general safety and health legislation. Particular efforts are being made in a number of countries in the essential area of the collection and dissemination of information and research, including the establishment of data banks on the use of hazardous substances. In general, at both the national and international levels, it has been found that safety and health is a particularly auspicious field for joint and tripartite cooperation. The workers in the industries are undoubtedly in a good position to identify safety and health problems, as well as to suggest solutions. It is vital for them to be able to contribute their knowledge and competence to improving the record of the industries in this respect. Such cooperation is the basis of the approach adopted by the ILO to safety and health in its recent instruments on the subject, and in some countries a highly developed and effective system of safety and health committees, safety delegates and safety and health representatives has been established. It is the intention of this working paper to contribute to the efforts made in the food and drink industries throughout the world to come to grips with their safety and health problems. It is hoped that the information provided on the problems encountered and the preventive measures adopted in some ILO member States

will be of use to officials, managers and workers in countries which are experiencing similar problems and seeking appropriate solutions.

Chapter 1 provides general background information on the food and drink industries and the impact of technological progress in the sector. Chapter 2 goes on to identify the general hazards encountered in the sector and to place them in context through a comparison with other industries. Chapters 3 and 4 contain a more detailed description of the injuries and diseases suffered by workers in the sector and concentrate on the most common approaches adopted for their prevention. The specific safety and health problems encountered by women workers in the sector are then examined in Chapter 5, before the description which is given in the final Chapter of the legal texts and policies which have been adopted at the national and international levels. Chapter 6 concludes by emphasizing the importance of adopting a tripartite approach to the solution of safety and health problems.

CHAPTER 1

Recent trends and characteristics of the food and drink industries

1.1. Background

The food and drink processing industries are in many ways the manufacturing sector which is most fundamentally linked to human existence. Various food processing activities go back to the prehistoric era, when our ancestors began to adopt processes such as drying excess meat and fruits for future consumption. Because of their importance in terms of food security and nutrition, the food and drink processing industries can be found in every society, although at different stages of development.

The food industry includes a wide range of subsectors, such as the slaughter, preparation and preservation of meat; the manufacture of dairy products; canning and preserving fruits and vegetables; canning, preserving and processing fish and seafood; the manufacture of vegetable and animal oils and fats; grain milling; the manufacture of bakery products; the manufacture and refining of sugar; the production of cocoa, chocolate and sugar confectionery; and the manufacture of animal feeds. The drink industry covers the distillation and blending of spirits and the production of wine, malt liquors, soft drinks, fruit juices, etc.

The enterprises in the sector reflect the heterogeneity of its activities. At one end of the spectrum, the large multinationals which operate in a number of countries utilize the most modern technologies available and produce a wide range of products. At the other extreme are the tiny informal establishments which produce a single product using primitive processing tools.

Although the trend in the sector is towards the concentration of enterprises through mergers and acquisitions in order to achieve economies of scale, a competitive price does not guarantee commercial success even if the product is of competitive quality. One of the keys to success in today's market is to establish brand names. Small and medium-sized enterprises often have well-established brand names, which gives them a strong position in competition with larger enterprises, even though the latter may enjoy cost advantages. In order to survive and even expand their activities in a world where competition has intensified, enterprises devote much effort to reducing labour costs through rationalization and restructuring and to developing a higher added value for their products through research and innovation, utilizing all possible modern technology.

In terms of output, the food and drink industries have become one of the most important sectors in the manufacturing sector in many countries. The total turnover of Europe's food market today is estimated at \$700 billion.¹ In 1991 in the United States, 47 food processing enterprises were among the 500 largest companies in terms of sales. The combined sales of these 47 companies was \$195.5 billion, which gave them third place after the combined sales of oil refining companies (\$412.2 billion) and motor vehicles and parts (\$273.5 billion) among the 500 companies selected. Although the combined sales of the

drinks producers included among the 500 largest companies was much lower than that of the food processing companies, the average volume of sales per establishment in the drinks sector is much greater than in the food sector.²

While most industries have been affected by recession in recent years, the food and drink industries have tended to expand due to the steady growth in demand throughout the world, as well as the higher demand for more processed and pre-cooked food induced by current life-style trends. In the United Kingdom, for example, the food, drink and tobacco industries combined recorded 2.2 per cent growth in 1991, at a time when most other sectors showed negative growth.³ In the United States, the food and agribusiness sector (which includes the production, harvesting and trading of agricultural commodities, as well as the processing and manufacturing of food products) is expected to grow by 11 per cent in 1992 and 13 per cent in 1993.⁴

The growth of the food and drink industries has not been confined to the industrialized countries. In the tropical African region, for example, the total added value of the food and drink manufacturing industries increased from \$4,267 million in 1980 to \$5,346 million in 1987. In North Africa and West Asia, the total added value increased from \$6,670 million to \$8,672 million over the same period. Similarly, in the Indian subcontinent it grew from \$3,700 million to \$5,272 million (in constant 1980 dollars).⁵

1.2. The impact of technological development on working conditions in the sector

The impressive expansion of the food and drink industries, particularly in industrialized countries, has been made possible by the introduction of new technology designed to achieve higher productivity and to produce goods of higher value. The outstanding example is the use of computer-operated machines for processing and packaging, and the application of biotechnology in the processing of food and drink products.

Microelectronic applications have been introduced not only in the processing and packaging of products, but also in management information systems, quality control procedures and office work. Where they have been adopted they have substantially changed the nature of the tasks performed by the workers.

Computerization is more pronounced in the drinks than in the food industry. By way of illustration, new computer controlled machines can detect and eject dirty bottles in fast moving lines. Although the filling methods are basically the same as before, the speed has increased considerably. Canning lines in modern plants can now run at 2,000 cans per minute.⁶ Once bottles are filled, labelled and placed in cartons, robotized machines stack and wrap them ready for shipment.

The food industry has traditionally been more labour-intensive than the drinks industry, although it has also been increasingly affected by the wave of mechanization. Sophisticated tools and machinery, such as cutters, choppers, slicers, grinders, mixers, evaporators, freezers, dryers, extractors and presses are now widely used to process all kinds of primary products into a variety of food products. Tasks which were traditionally performed with varying degrees of manual input are being rapidly replaced by robotized

operations. The new machinery, when properly used, can be very efficient at increasing productivity, although it can also have the effect of increasing the risk of accidents at the workplace, particularly for those who are inadequately trained in the proper use of the new techniques.

Despite technological advances, certain tasks still need to be performed manually. The outstanding example is the processing of meat and poultry. Workers who process carcasses which are hung from or placed on a conveyor belt have to perform their routine tasks at the speed of the conveyor. Although the tasks may seem simple and easy, they can become stressful when the workers have to adjust to the speed of the machine, rather than the machine adjusting to human actions. The fact that these workers use sharp and dangerous tools means that the incidence of accidents in this sector is one of the highest in the industry.⁷ In other parts of the food and drink industries in which workers' operations are regulated by computer-operated machines, an increasing number of cases of mental and physical stress are being reported.

The application of biotechnological techniques to control, for example, the freshness and nutritional value of products and to accelerate processing steps is another illustration of a new technology which has had a significant impact on the industry. These techniques are used to increase food production and the variety of food and drink products. According to industry sources, worldwide sales of biotechnology-derived products, excluding fermented foods and drinks, amounted to approximately ECU7.5 billion in 1985, and sales are expected to increase to ECU41 billion by the year 2000.⁸

The brewing industry is the most important branch of the drinks industry. In the EEC countries in 1986⁹ it employed a workforce of some 57,000. The rapid changes in this branch in recent years are partly a result of advances in biotechnology. For example, the new technologies have made it possible to shorten considerably the malting process. A few decades ago, steeping required 60 to 84 hours and germination 8 to 20 days; today steeping takes only 2 days and germination 4 days.¹⁰

In the bread industry, the processes of analysis and extrusion have been integrated into the manufacturing process. Further progress is anticipated in fermentation technology, the development of freezing techniques and new preservation methods¹¹ which will give products a higher added value and a longer shelf life.

Advances in biotechnology are making the cocoa, oils and sugar industries less dependent on imports of raw or semi-processed food products from developing countries. With the use of enzymes, sugar can now be produced from corn, potatoes and other crops which are common in North America and Europe, as well as from cane and beets.¹²

Another modern technique is irradiation, particularly of primary products, to eradicate microbial contamination which might otherwise accelerate the deterioration of foodstuffs. It also prevents potatoes from sprouting and keeps them fresh for a long period of time. However, little information is currently available regarding the effects of this technique on workers or consumers.

Little information is available on the effects of the more widespread application of biotechnology on workers' health. However, an increasing number of allergies, such as eczema and other types of skin disorders caused by contact with enzymes, are now being reported.

The use of chemical substances at various processing stages and of additives in both food and drink products has also increased greatly. Additives are used, for example, to create a variety of artificial colours, flavours, fragrances and tastes to meet the varied demands of consumers, and to gain a longer shelf life. Some additives have been banned in certain countries because sufficient data are now available to show that they are carcinogenic. Others are believed to present no threat to the health of consumers. However, further study is needed of the effects of the increased use of these substances on safety and health at the workplace.

Finally, mention should be made of how new technology affects some other aspects of working conditions in modern plants. Forklifts, for example, have released many workers from physically demanding tasks such as loading, unloading and transporting heavy materials. Many other machines have also greatly alleviated the physical strain of ordinary work. However, these machines are often the cause of accidents.

The greater degree of mechanization has also been responsible for an increase in the prevalence of flexible types of employment, such as the more widespread use of shift work.¹³ The increase in shift work is not unique to the food and drink industries; it is a common phenomenon in large plants in many industries, where a heavy investment has been made to mechanize the plant in order to achieve higher productivity.¹⁴ Production lines are kept running around the clock, except when undergoing maintenance work. One of the concerns of workers about this form of employment is that shift work is increasingly being organized on a seasonal basis to cover peak work loads in certain branches of the industries and that an increasing proportion of workers on shift work therefore have little job security and are paid hourly wages with little or no fringe benefits. Moreover, the fatigue that can easily be accumulated during the night shift is often associated with an increased risk of accidents.¹⁵

1. G. de Jonquières and W. Dawkins: "An appetite for acquisitions", Financial Times, January 27, 1992.
2. Fortune: April 20, 1992, p. 160.
3. Financial Times: December, 1991.
4. Fortune: July 13, 1992, p. 40.
5. UNIDO: Industry and Development, Global Report 1989/90 (Vienna, Oct. 1989), p. 71.
6. International Union of Food and Allied Workers' Association (IUF): IUF Brewery and Soft Drinks Workers Conference, Documentation and Minute, Eastbourne. 19 - 22. 11. 1990 (Geneva, 1990), p. 6.
7. In the United States the meat-packing industry recorded the highest accident rate in 1988 and second highest rate in 1989, after the ship-building and repairing industry, among all the industries. See Bureau of Labor Statistics (BLS), U.S. Department of Labor (USDL): Occupational Injuries and Illnesses in the United States by Industry, 1988 and 1989 (Wash. D.C., 1990 and 1991).
8. Commission of the European Communities (EC): Bulletin of the European Communities, Supplement 3/91 (Brussels, 1991), p. 41.
9. EC: Panorama of E.C. Industry - 1989 (Brussels, 1989), p. 17-57.
10. Abby Ghobadian: The effects of new technological change on shift work in the brewing industry (Aldershot, Gower, 1986), p. 36.
11. EC (1989): op. cit., p. 17-37.
12. C. Oman and R. Rama: "The food industry", Ch. 6 of New forms of investment in developing country industries: Mining, petrochemicals, automobiles, textiles, food (Paris, OECD Development Centre, 1989), p. 244.
13. National Economic Development Office (NEDO): Changing working patterns: How companies achieve flexibility to meet new needs (London, 1986). See also Ghobadian, op. cit., in which the author confirmed that the intensity of shift work was a function of a firm's size.
14. Ghobadian, op. cit.
15. Federal Institute for Occupational Safety and Health (FIOSH): Sicherheitsingenieur: Practical Research (Dortmund, 1990). p. 47.

CHAPTER 2

Occupational hazards in the food and drink industries

2.1. Hazards characteristic of the sector

The food and drink industries cover a highly diversified range of activities. Although some concerns and hazards are common to the whole sector, others are more specific to certain branches of the industries. Despite their heterogeneity, one of the common factors shared by all branches of the food and drink industries is that they are required to follow strict health and hygiene standards, since their products can affect the health of consumers. At the initial stage of food processing, raw materials must be thoroughly washed, while workers have to observe personal hygiene rules, such as the washing of hands. As a result of these rules workers keep their hands constantly in water, which may gradually affect the nerves of their hands and arms. The constant use of water in the workplace also means that the floor is likely to be wet, with a consequent increase in the risk of falling and slipping.

Another common feature of the industries is that they are engaged in the processing and transformation of raw materials, such as meat, poultry and seafood, which spoil easily unless processed quickly at a low temperature. In these branches, workers often have to perform their tasks in a refrigerated room, often standing for long hours. The fact that the same task is performed repeatedly at low temperatures also increases the risk of strains, particularly of the elbow and wrist. In some cases, workers have to enter freezing rooms when handling raw materials, such as carcasses. The rapidly expanding demand for frozen and chilled food also has the effect of requiring many workers to work long hours at low temperatures. These workers are liable to suffer from respiratory disorders, frostbite and rheumatic disorders.

Other workers have to operate in a high temperature environment. Many products are now given a higher added value through processes involving heat, such as roasting, drying, boiling and baking. Workers in high temperature environments are exposed to the risk of burns.

Another characteristic of the sector, particularly in the food industry, is that workers often use sharp and dangerous hand tools to process various raw materials. In the meat processing branch, particularly sharp and heavy butcher's knives are used to cut and trim meat, which can be greasy and unstable on the cutting board. The floors of meat processing plants can also be dangerously slippery as a result of the animal fats which have been dropped.

An additional feature of the industries is that work can be highly seasonal when the raw materials are of seasonal nature. Because raw materials such as fruit and vegetables are highly perishable, they have to be processed within a short period of time. The workload is often heavy immediately after the harvest, while the workers often risk being laid off during slack periods. Because of the seasonality of the work and the pressure on the workers at peak periods, the consequent overexertion can give rise to stress and muscular disorders.

A further characteristic is that workers in certain branches run a high risk of inhaling a heavy concentration of dust particles, which is likely to result in respiratory disorders and allergies. Processes such as the grinding and mixing of grain, beans, nuts and herbs emit considerable levels of dust into the air. Anyone working in this atmosphere for long hours is liable to inhale dust particles to such an extent that allergic symptoms begin to appear.

Finally, particularly in the drinks industry, workers are exposed to a high risk of injury from glass bottles, which can fall and break while being washed or burst while being filled. Glass bottles are also a source of high noise levels which can be hazardous to workers' hearing. Glass bottles are now gradually being replaced by aluminium cans and plastic bottles, which are lighter and easier to handle and present no danger of injury to workers. However, the manufacturing of plastic bottles, which often takes place in the bottling plant itself, is a process which produces high noise levels and in which particularly hazardous chemical substances are used.

2.2. Occupational accidents and diseases in the sector compared with other industries

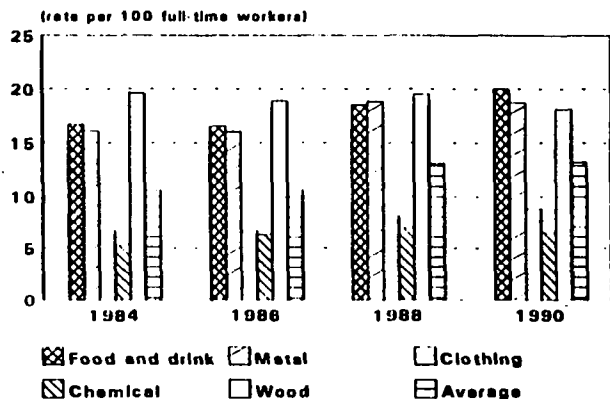
Figure 1 shows the incidence of workplace accidents in a number of industries in four industrialized countries. The data, although not comparable internationally since each country has its own method of collecting information, nevertheless indicate the relative incidence of accidents in the four sectors and show how this incidence has changed in recent years.

The Figure shows that the incidence of accidents in the food and drink industries is following a slight downward trend in Japan, but is rising in Spain, the United Kingdom and the United States. In all these countries, the incidence of accidents in the food and drink industries is much higher than the average for the manufacturing sector as a whole. In three of the countries, the incidence rate of accidents in the food and drink industries is the second highest among the industries shown. The information provided in the Figure supports the contention that more workplace accidents occur in the food and drink industries than in many other manufacturing industries.

This conclusion is also supported by Figure 2, which compares the occupational safety and health records of various industries in the United States in terms of total workdays lost due to accidents. According to the Figure, the number of workdays lost in the food and drink industries was much higher than the average for the manufacturing industries as a whole in both 1988 and 1989. It was, in fact, the second highest in both years, preceded by the lumber and woodwork industries and followed by the metal products industries. However, the fact that the lumber and woodwork industries in the United States had a greater number of workdays lost than the food and drink industries in both 1988 and 1989, although Figure 1 showed a lower incidence rate of accidents for the lumber and woodwork industries in 1990, suggests that the injuries that occur in the food and drink industries are generally less serious than those in the lumber and woodwork industries. This is also borne out by the figures provided in Table 1, which shows the severity of occupational accidents in selected manufacturing industries in Japan in 1989. Despite the fact that the food and drink industries generally report a high rate of occupational accidents, the injuries which occurred in that sector in Japan in 1989 were not any more serious than those reported in other industries. The paper, metal and chemical industries reported a higher proportion of cases which

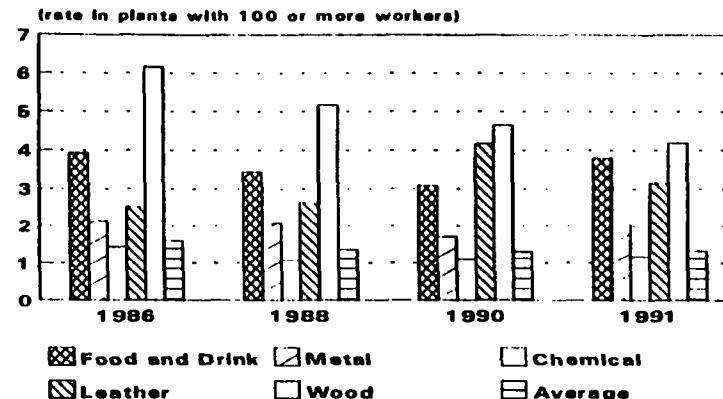
Figure 1: Occupational accidents by sector in four industrialized countries

United States



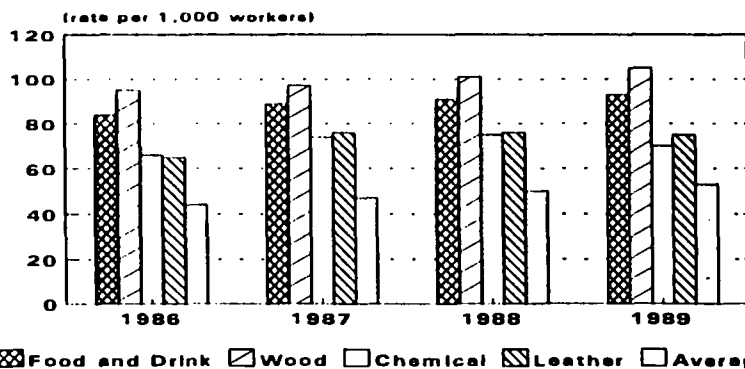
Source: Bureau of Labor Statistics, USDL: *Monthly Labor Review*, Vol. 115, No.3 (Wash., D.C., March 1992). The figures also include occupational diseases.

Japan



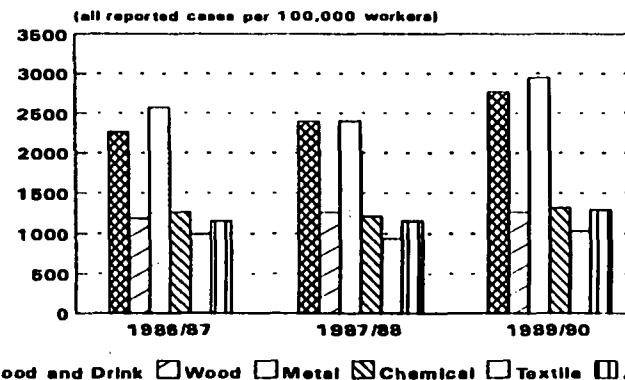
Source: Min of Labour: *General Guidebook on Industrial Safety* (Tokyo, 1986-92 editions)
Rate = No. of Accidents/No. of hours worked x 1,000,000

Spain



Data were provided by the Govt. of Spain for ILO's Second Session of the Food and Drink Industries Committee, Dec. 1991.

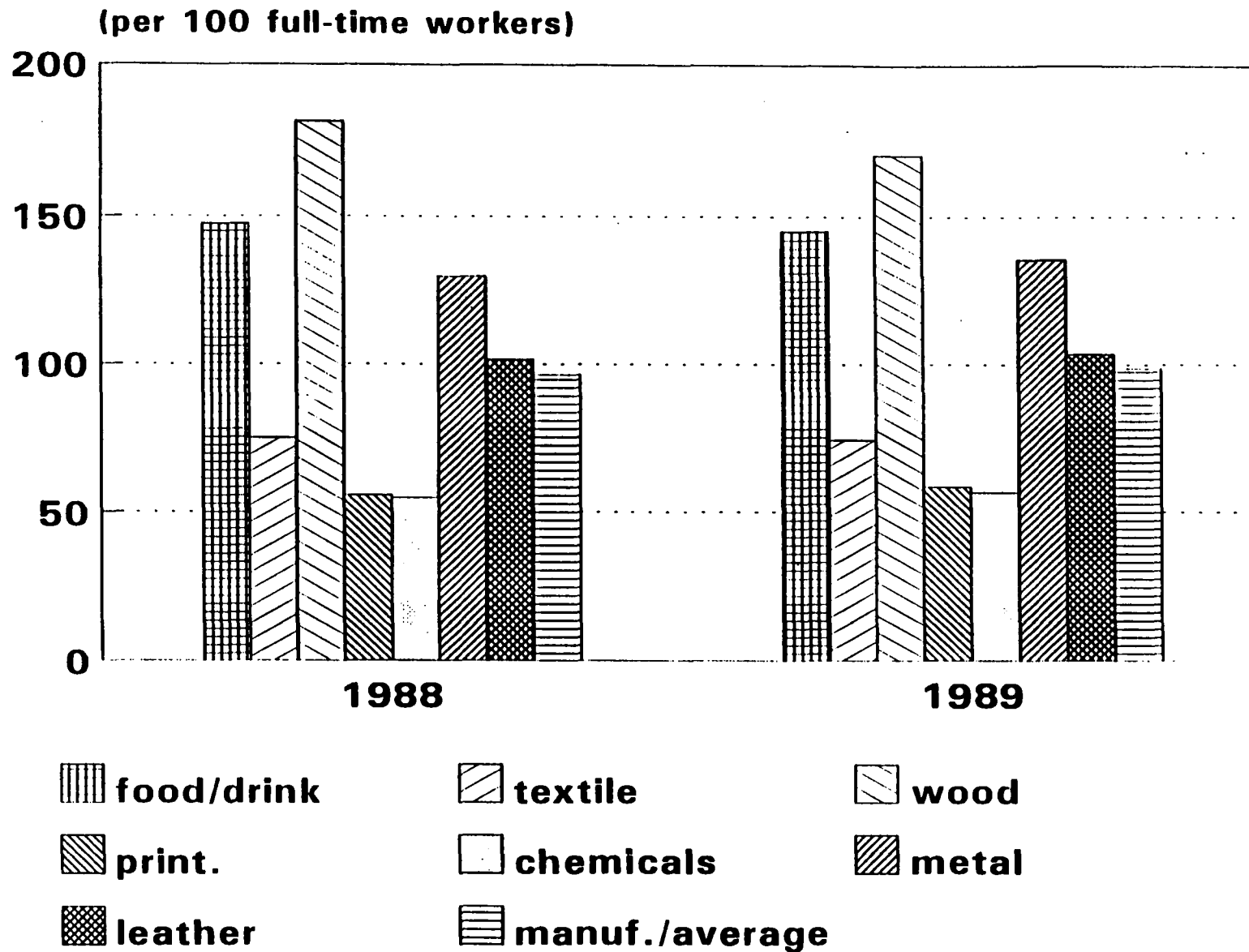
United Kingdom



Data provided by the Govt. for the Second Session of the Food and Drink Industries Committee. Rates based on cases reported between 1 April and 31 March.

(NB: The graphs are intended to show trends only - the figures are not comparable between countries.)

FIGURE 2: Lost workdays due to occupational injury by industry in the United States



Source: Bureau of Labor Statistics, USDL: Occupational injuries and illnesses in the United States by industry, 1989 (Wash. D.C., April 1991).

No. of work days lost = No. of days away from work + No. of days of restricted work

Table 1: Severity of occupational accidents in selected manufacturing industries in Japan, 1989
(as per cent of total accidents)

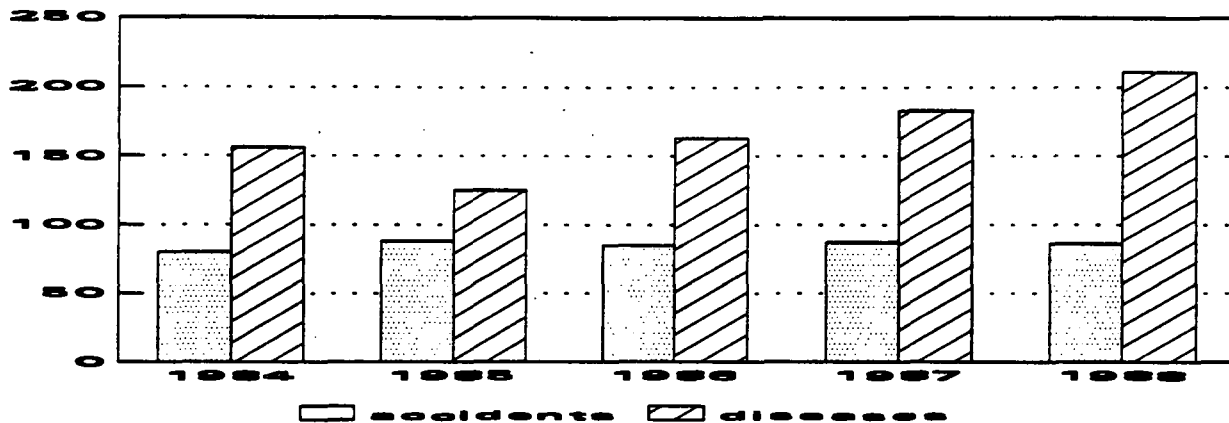
Severity	Manuf. Average	Food & Drink	Textile	Clothing	Lumber & Wood	Paper Prod.	Printing & Publish.	Chemical	Metal Prod.
Death or permanent total disablement	0.6	0.2	0.9	0.8	0.4	0.1	0.2	1.1	0.5
Partial permanent disablement	7.2	6.6	5.1	2.6	5.2	11.3	10.0	6.5	10.8
More than one work-month lost	39.4	37.5	39.8	39.2	40.4	36.8	39.7	43.5	41.3
More than four days but less than one work-month lost	52.3	55.2	53.7	56.2	53.4	51.5	49.6	48.9	46.9
Others	0.5	0.5	0.5	1.2	0.6	0.3	0.5	0.0	0.5

Source: Chuo Rodo Saigai Boshi Kyokai: Anzen Eisei Nenkan (Tokyo, 1990)

FIGURE 3A: Occupational accidents and diseases in the food and drink industries in selected countries

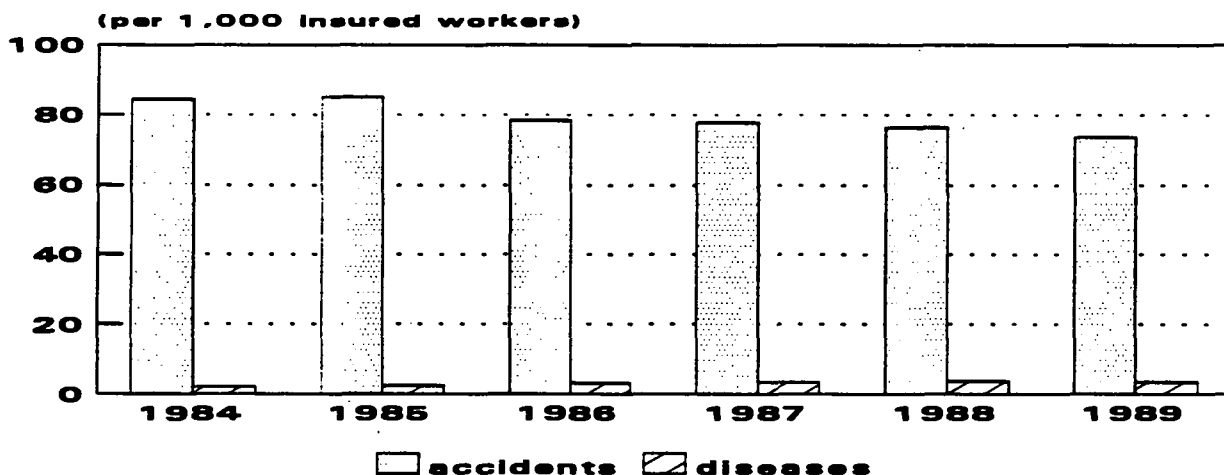
(NB: The graphs are intended to show trends only - The figures are not comparable between countries.)

Austria



Tobacco workers are also included.
 Accident rate is per 1,000 insured workers.
 Diseases are the total number of cases reported.

Germany



Data on the former Fed. Rep. of Germany.
 Changes were introduced in 1986 in the system of notification of occupational accidents/diseases.

Sweden

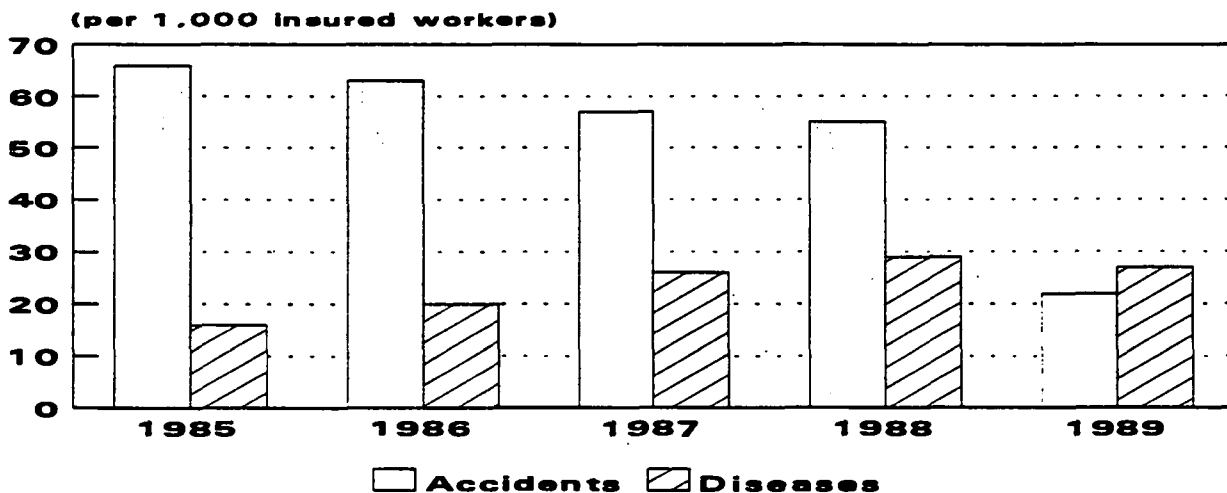
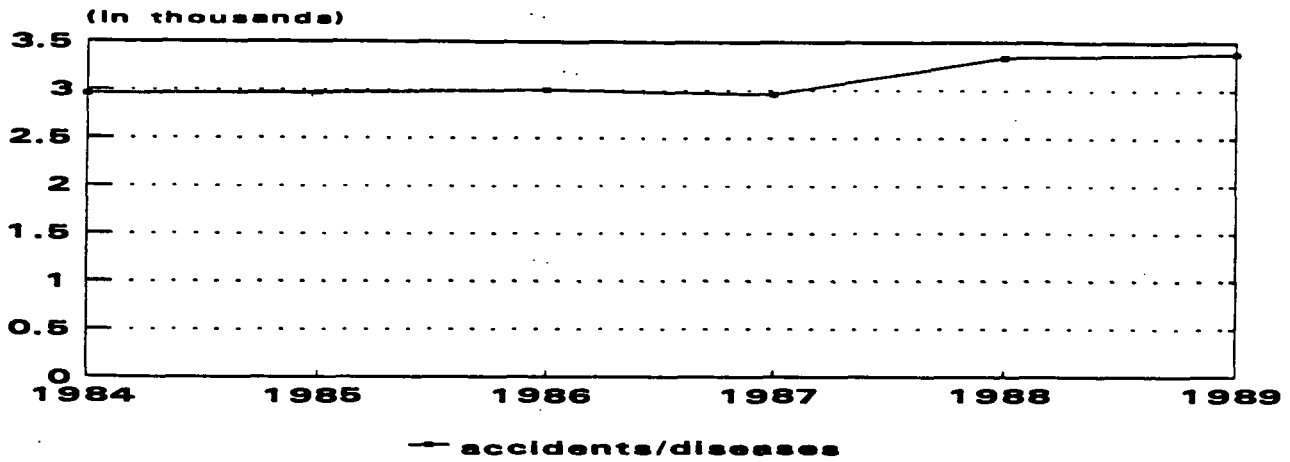


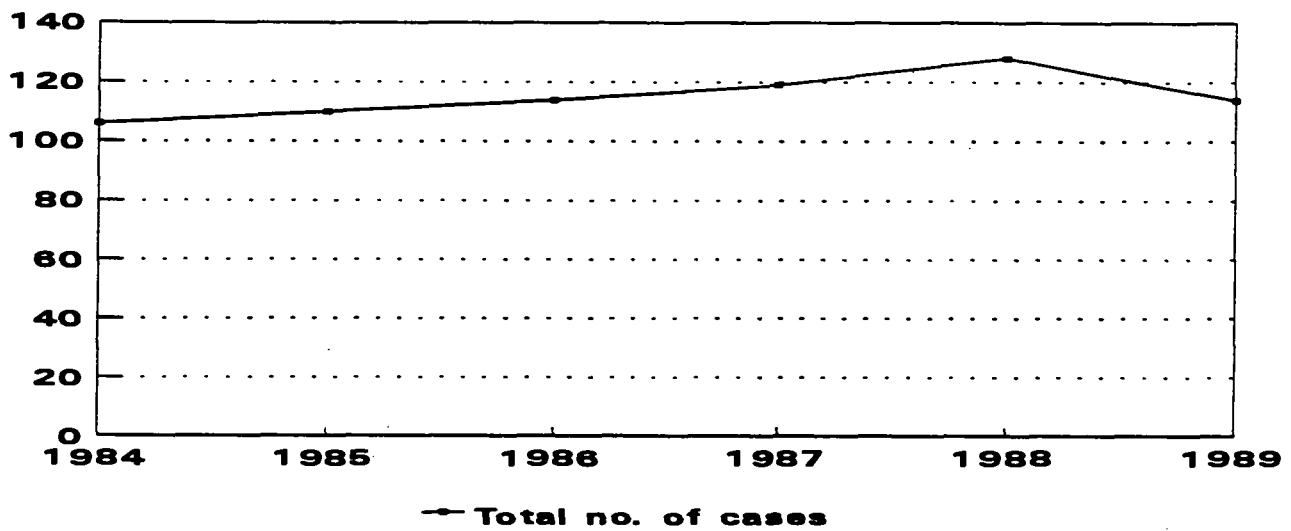
FIGURE 3B: Occupational accidents and diseases in the food and drink industries in selected countries

(NB: The graphs are intended to show trends only - The figures are not comparable between countries.)

British Columbia, Canada



Cyprus



Hungary

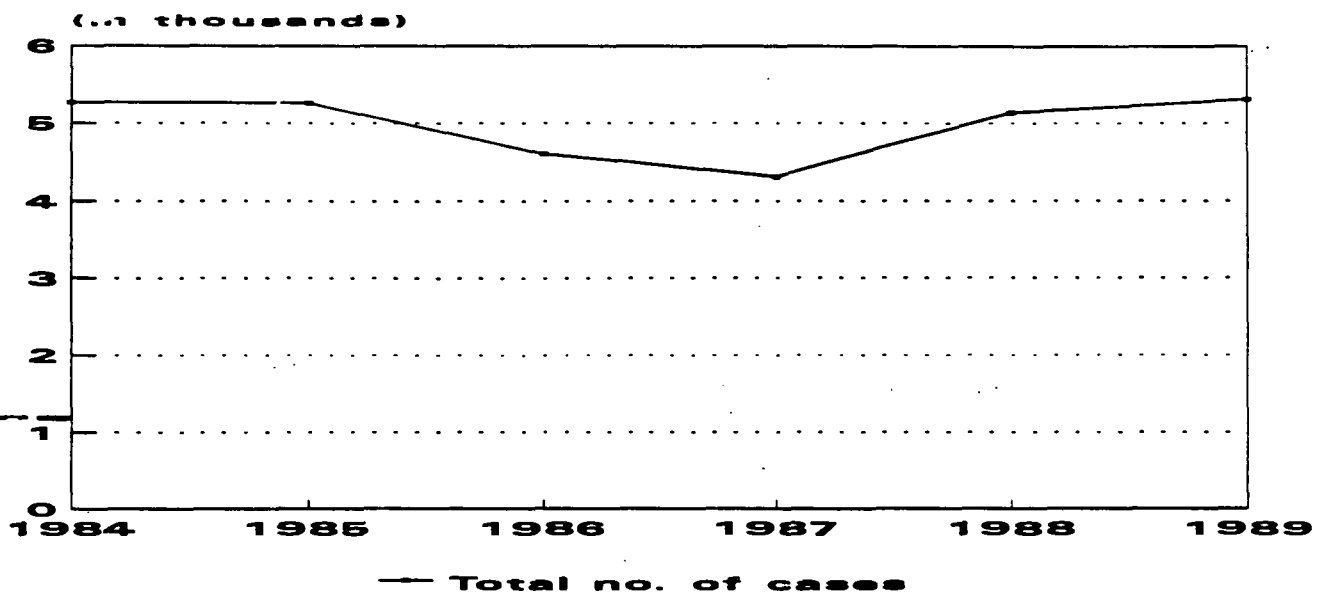
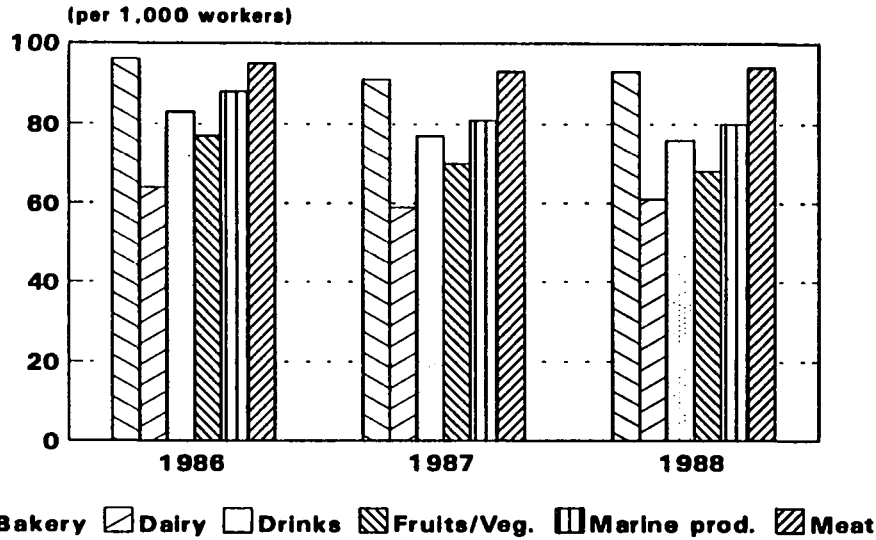


FIGURE 4: Occupational accidents by branch of the food and drink industries in selected countries

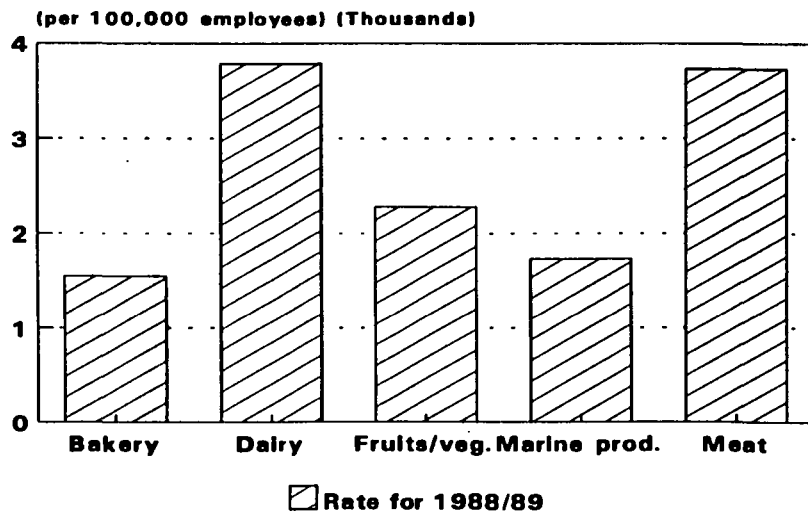
(N.B: The charts are intended to show trends only - the figures are not comparable between countries.)

France



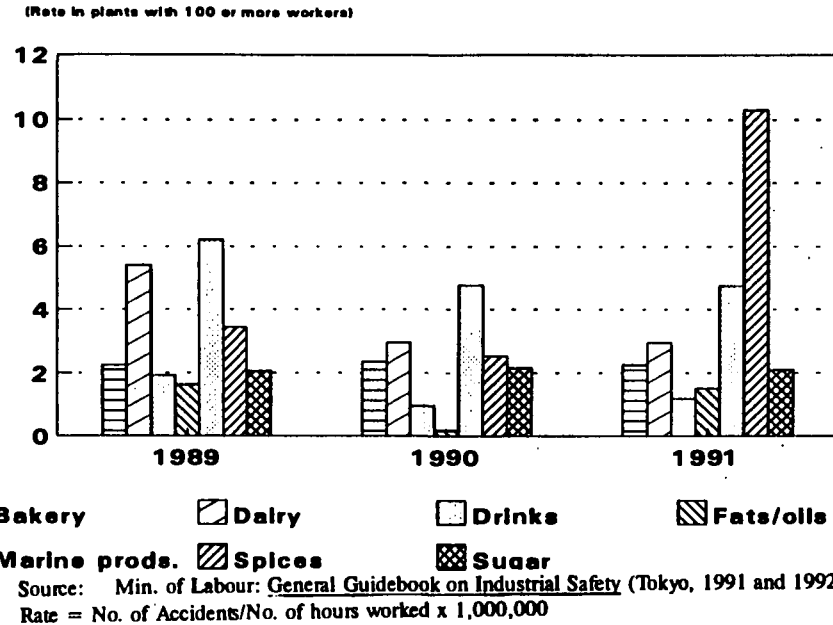
Source: Caisse Nationale de l'Assurance Maladie des Travailleurs Salariés: Statistiques Nationales d'Accidents du Travail, 1986-88.

United Kingdom

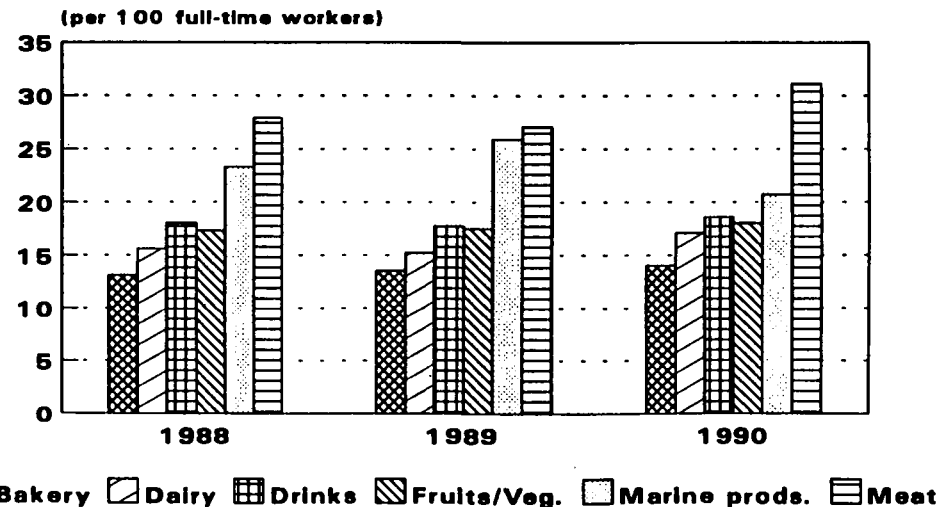


Data provided by the Government for the Second Food and Drink Industries Committee, 1991.

Japan



United States



resulted in partial permanent disability than the food and drink industries. Indeed, the proportion of accidents resulting in permanent partial disability in the food and drink industries was lower than the average for the manufacturing sector as a whole. The food and drink industries also reported a relatively low rate of fatal accidents compared with other sectors. The Table also shows that about 55 per cent of those injured in the food and drink industries suffered injuries which kept them from work for less than one month.

Figure 1 confirms that the incidence of accidents in the food and drink industries is high in comparison with the rest of the manufacturing sector. However, Figure 2 and Table 1 indicate that the accidents which occur frequently in the sector are probably not as serious as those reported in other industries. Nevertheless, the high frequency rate of accidents in the sector pushes the total number of workdays lost above the number for other industries.

Figures 3A and 3B show that the incidence of occupational accidents and diseases in the food and drink industries increased between 1984 and 1989 in some countries and declined in others. However, when accidents and diseases are examined separately, as in the cases of Austria, the former Federal Republic of Germany and Sweden, occupational diseases appear to be on the rise. In some countries, the number of reported cases of occupational accidents and diseases increased despite the fact that the level of employment has declined in the sector over recent years.¹

Figure 4 shows accident rates in various branches of the food and drink industries in France, Japan, the United Kingdom and the United States, although the data are not comparable between the countries. In France, the meat processing and bakery branches had the highest accident rates of the sector. In Japan, although the accident rate for the spice branch was unusually high for 1991, the accident rate was generally high in the marine products processing branch. In the United Kingdom, the highest accident rate in 1988/89 was reported by the fats and oil branch. Finally, in the United States the accident rate for the meat processing branch is steadily much higher than for the rest of the sector.

From these data, it is clear that the meat processing branch has a generally very high accident rate. Accidents also occur frequently in the marine products processing branch, in which the activities are similar to those in the meat processing branch. Other branches which have relatively high accident rates include the drink, dairy, spice and fruit and vegetable processing branches.

1. See, for example, Austria, Canada and the Federal Republic of Germany in Table 4 in ILO: General Report, Food and Drink Industries Committee, Second Session (Geneva, 1991), p. 81.

CHAPTER 3

Prevention of occupational accidents and injuries in the food and drink industries

Before embarking upon a more detailed examination of occupational accidents and diseases which are commonly encountered in the sector and their prevention, it is necessary to briefly emphasize two basic principles of safety and health. The first is that research and the collection and dissemination of information to all those concerned, including officials, researchers, employers and workers and their representatives are the cornerstone of prevention. This working paper is intended to contribute to the information dissemination process in the sector. The second is the importance of joint and tripartite approaches to safety and health issues. These are covered in Chapter 6.

3.1. Common occupational injuries in the sector

Table 2 lists the three or four most common injuries reported in order of frequency in selected countries. It supports the data provided in Figure 4 by showing that injuries associated with sharp hand tools are those which occur most frequently. In other words, the meat, marine products, and fruit and vegetable processing branches, where the work involves the use of sharp knives, report very high accident rates. Other injuries which occur frequently include musculo-skeletal injuries and bruises. Fractures, burns and eye injuries are also reported fairly frequently.

Table 3 shows the most common causes of workplace injuries in the food and drink industries in selected countries. The handling of tools, the operation of machines, overexertion, collisions with moving or stationary objects and falls or slips in the workplace are the major causes of injuries in the sector. Other causes of injuries which are frequently reported include the handling of chemical substances or hot materials and parts of the body being trapped in machines.

It is difficult to assess whether there are any differences in the common causes of injuries between industrialized and developing countries, since information from the latter is very limited.

However, the information contained in Tables 2, 3 and 4 confirms that a large majority of workplace injuries reported in the food and drink industries in many countries are traditional types of injuries. Most such injuries could be prevented by providing workers with better training in the safe handling of tools, as well as by supplying them with improved personal protective equipment. Improvements in the working environment, such as laying non-slip floor covering, are another effective means of minimizing industrial accidents. All those measures are dealt with in greater detail below.

Many accidents could also be prevented by the stricter observance of safety codes. It is therefore important for there to be an effective exchange of information so that enterprises in which appropriate safety and health measures have not yet been thoroughly implemented can learn from the experience gained elsewhere in order to improve their accident records.

Table 2: Most common occupational industries reported in the food and drink industries in selected countries

Country	Year	Order of occurrence			
		1	2	3	Other
Benin (1)	88	traumatic wounds	bruises	eye injuries	fractures
Canada (1)	89	back strain	cuts, lacerations	bruises	fractures
Denmark (1)	89	cuts, lacerations	sprains	fractures	back injuries, burns
Hungary (1)	89	cuts, stabs, lacerations	bruises	sprains and strains	burns (from heat and chemicals)
Japan (2)	89	cuts, lacerations	bruises	sprains and strains	burns (from heat)
Switzerland (1)	88	stabs, cuts	bruises	sprains and strains	-
United States (3)	88	sprains and strains	cuts, lacerations	bruises	fractures and burns (from heat and chemicals)

Sources: (1) Data provided by Governments for the Second Session of the Food and Drink Industries Committee
 (2) Chuo Rodo Saigai Boshi Kyokai: Anzen Eisei Nenkan (Tokyo, 1990)
 (3) Data provided by the U.S. Department of Labor, Bureau of Statistics

Table 3: Most common causes of occupational injuries in the food and drink industries in selected countries

Country	Year	Order of occurrence of injuries			
		1	2	3	Other
Australia	86/87	handling chemicals and other materials	handling equipment	working environment	machinery, lifting equipment
Austria	89	collisions	slips, trips and falls	collisions with non-motor vehicles	falling from a height, traffic accid. to/from work
Benin	89	handling tools/equipment	accidents involving vehicles	handling hot materials & chemical substances	parts of body trapped
Canada (1)	89	handling tools	overexertion (lifting, carrying)	collisions	falls
Cyprus	89	handling materials, substances	working environment	machinery	means of transport, other equipment
Finland	89	treading on objects	strain from sudden movements	falls, slips	falls from height, hit by falling objects
Hungary	89	handling tools	collision with objects/persons	fall (same level)	parts of body trapped, hit by falling objects
Japan (2)	89	parts of body trapped	handling materials/tools	falls (same level & from height)	hit by flying/falling objects, collisions with moving/stationary objects

Philippines	89	handling objects/tools, collapse of structures, equipment, etc	collisions, stepping on sharp objects	falls	trapped parts of body, overexertion
Sweden	89	handling tools	collisions with moving objects (vehicles, machines)	overexertion	falls, collisions with stationary objects
Switzerland	88	handling tools	loading/unloading (over-exertion)	collisions with moving or stationary objects	handling machinery
Turkey	89	machinery	falls	contact with hot materials/chemical substances	radiation, accidents involving motor vehicles
United Kingdom	88/89	slips, trips, falls (same level)	collisions with moving machinery	falls from height	collisions with stationary objects, contact with harmful substances
United States (3)	88	overexertion (handling boxes, barrels, containers)	working surface (falls)	hand tools	accidents involving machines, vehicles

Source: Data provided by respective Governments for the Second Session of the Food and Drink Industries Committee, except for (2) and (3).

- (1) Data for British Columbia.
- (2) Chuo Rodo Saigai Boshi Kyokai: Anzen Eisei Nenkan (Tokyo, 1990).
- (3) Data provided by the U.S. Department of Labor, Bureau of Statistics.

Table 4: Parts of the body most commonly injured in the food and drink industries in Canada and the United States

Country	Year	Order of occurrence of injuries			
		1	2	3	Other parts
Canada (1)	89	hands & fingers	lower spine	knees, legs & ankles	elbow, lower arms and wrists, feet, toes
U.S. (2)	88	back	upper extremities, excluding fingers	lower extremities	fingers, trunk (except back)

Sources:

- (1) Data for Saskatchewan provided by the Government of Canada for the Second Session of the Food and Drinks Industries Committee.
- (2) Data provided by the U.S. Dept. of Labor, Bureau of Statistics.

In the others a regular review of safety measures would be useful to see if they are still appropriate in view of new developments in work methods and to ensure that they are strictly observed.

There has long been a belief in some quarters that the adoption of various safety and health measures at the workplace is prohibitively expensive, particularly in small and medium-sized establishments. However, workplace accidents necessarily result not only in injuries to workers but also in lost workdays and lower industrial output. By way of illustration, it is widely held that the costs of industrial accidents in the construction and building sector represent between 7 and 10 per cent of labour costs.¹ Although similar figures are not available for the food and drink industries, in view of the high accident rate in the sector, the cost of accidents in total labour costs is bound to be high compared with other manufacturing sectors. Moreover, preventive measures are not always expensive.

3.2. Machine guarding

From the information provided in Table 3, it is clear that the workplace accidents which occur frequently in the food and drink industries include a large number of cases in which parts of the body are caught or jammed in unprotected machines, as well as collisions with unguarded machines. These accidents often occur soon after new machines have been introduced and when workers have not yet fully adapted to their new work environment. The nature of the work carried out in the sector involves the use of bandsaws, slicers, choppers and mincers with sharp blades. Even mixers and other machines without sharp blades can be dangerous unless workers are adequately trained in their operation and maintenance.

Although it is clearly essential that only trained workers operate machines and that they follow the instructions provided, proper machine guarding is also important for the reduction of machine-related accidents. Well-designed machines are deactivated when guards are removed. However, the machines used in the sector often have dangerous moving parts to which it is difficult to fit adequate guards. The cutting edges of blades are often exposed, which can cause serious injuries. Nevertheless, there are measures which can be taken to reduce the danger, such as the use of feeding devices to protect fingers when operating slicers and grinders.²

Chains or V belts in the motor drives of most food processing machinery also have the potential to cause serious injury.³ Although motor drives on recent machinery are usually well-guarded, accidents to operators from unguarded machines can often be avoided by fairly simple preventive measures, such as ensuring that clothes, hair and accessories are not worn in such a way that they may get caught in the moving parts.

There is also the risk that operators may become overconfident following long periods of the safe operation of machinery using the appropriate safety guards and devices and that they may forget that the machines can still be dangerous if handling instructions are not properly followed. For example, when a machine is not functioning properly, the operator may be tempted to try and see what the problem is, for example by placing a hand into a

machine which is still running. The risk of injury in such cases is high. Because many workers still suffer injuries in this manner, it is necessary for constant reminders to be made simple but essential rules such as switching the power off before touching even the smallest moving part of any machine. In addition, operators need to be encouraged to call in properly qualified mechanics to deal with technical problems rather than trying to deal with them themselves.

For reasons of hygiene and because food processing often creates a high level of fat and grease, processing machinery is usually cleaned daily. Modern machines can usually be taken apart easily, including their guards, so that they can be thoroughly cleaned. However, cleaning is normally done at the end of the day when workers are tired and are tempted to take short cuts. Since the careless handling of sharp blades, even if they are not moving, can be dangerous, it is all the more necessary that safety instructions are followed strictly. The proper methods for cleaning the various types of machinery have to be covered in the training received by operators. The basic rules are simple: before cleaning, electrical power must be switched off; care has to be taken when using water, since leaks onto electrical equipment can cause electric shocks; cleaners should wear the recommended personal protective equipment, such as gloves, goggles and aprons; when cleaning is completed it is very important to ensure that the machinery has been correctly reassembled with the appropriate guards in order to prevent accidents.⁴

3.3. Workplace safety

A number of measures related to workplace layout and design can be effective in minimizing accidents. One such measure is to ensure that machines are firmly fixed on an even surface and that there is adequate space around them for workers to perform their tasks safely. The provision of adequate work space for workers who handle sharp hand tools is particularly important in order to prevent injuries to those working around them.

An effective means of preventing falls and slips, which are also common in the food and drink industries, is to ensure that the floor around machines and work stations is kept clean and free of grease. In addition to supplying workers with safety shoes with slip-resistant soles, it is also important to place rubberized cushioned floor mats at work stations, as well as to install non-skid floor materials on staircases and ramps, which should also be equipped with guard-rails.

In large modern plants, the lifting and transporting of materials and finished goods is usually carried out using powered vehicles such as forklifts. However, accidents may occur because loads are stacked up high and block the operator's view. In a large plant, where many workers need to move about to perform their tasks, traffic routes and rules for vehicles and pedestrians have to be established and clearly marked. Clearly, such rules have to be strictly observed by everyone concerned in order to prevent traffic accidents inside the plant.

Large plants are normally partitioned into many sections using interior walls with doors through which the workers pass. Some doors are designed in such a way that they can be opened in either direction, while others open in only one direction. In either case, workers are often hit by doors opened from the other side. If they are carrying dangerous

substances, seemingly minor incidents may result in serious accidents. It is therefore recommended that doors should be either translucent or made partially of glass so that it is possible to see through them clearly.

The accident statistics cited in Chapter 3 indicate that accidents also take the form of collision with stationary objects at the workplace. These can include protrusions or objects hanging from the ceiling, or indeed low portions of ceilings. The best solution is to eliminate such obstacles. Where this is not possible, obstacles should be clearly marked or cornered off.

3.4. Ergonomics

Sprains and strains in various parts of the body are very common in the food and drink industries. Indeed, they account for one-half of the injuries and illnesses in the soft drinks industry in the United States.⁵ In the same country, cumulative trauma disorders (CTDs), which are also referred to as repetitive strain disorders (RSDs), account for a large percentage of workers' compensation costs, particularly in the meat-packing industry.⁶ Overexertion from lifting, pulling and pushing heavy objects is the normal cause of these injuries. They can be reduced considerably by the mechanization of strenuous tasks. However, if mechanization is not feasible, a safe posture for lifting, pulling and pushing heavy objects should be established, as well as weight limits for such tasks.

As well as overexertion in the handling of heavy objects, workers often have to perform tasks in awkward and stressful postures, which may result in sprains and strains, particularly to the wrists and the elbows. Working in uncomfortable positions also leads to greater fatigue, which increases the risk of accidents. The tools and machines which they use may also be too heavy for the tasks performed. Ergonomics has therefore come to play an important role in the workplace and consists of designing the optimum equipment and work stations for the workers to perform their tasks efficiently with as little fatigue and discomfort as possible. When ergonomically sound equipment is designed, the shape of the body is taken fully into consideration. This may involve, by way of illustration, designing the handle of a dangerous tool in such a way that the positions of the fingers are firmly fixed and the user can gain a better grip on the tool. The handles of such tools are attached at an angle which enables the user to employ them using the least stressful posture. It is considered that "the optimum work surface height for simple, light manual tasks is about 8 cm below the worker's elbow or the best work surface height for heavier jobs is where the worker's wrist bends."⁷ In order to fit these specifications, the height and size of worktables, or the chairs used by workers, has to be adjustable to take into account the height of the worker and the nature of the task. Adequate leg room is also needed in order to be able to adopt the most comfortable postures, both for workers who are standing and those who are sitting. In general, there is little room for doubt that better designed tools, equipment and workstations result in greater efficiency and a safer working environment.

3.5. Fire and explosions

Industrial plants always face the risk of explosions and fires, which may result in loss of life and injury as well as serious damage to plant facilities. The food and drink industries are not by any means free of such accidents, particularly due to the widespread use of gas

cooking equipment, boilers, autoclaves and ovens.

Boilers are used both to generate power and also at various stages of processes such as drying and heating. Their use is spreading widely in developing countries. Although it is clearly essential for boilers to be designed and installed safely, failure to maintain them properly and replace worn out parts and materials is often the greatest source of danger. Although boiler accidents occur in industrialized countries, their incidence in developing countries is much higher. This is mainly due to the fact that in the latter most boilers are imported and spare parts and materials may not be readily available. Moreover, safety regulations respecting installation, maintenance and inspection may not be well developed. The problem is compounded by the fact that boiler manufactures are in many cases not regulated by any particular standards when producing boilers for export.⁸

In this context, there is an evident need for boiler operators to be adequately trained and to undergo frequent retraining in order to prevent accidents. Poor maintenance can result in failure of the automatic regulating systems and safety devices. Poor operation can lead to a low water level or high pressure in the boiler, which may have the effect of thinning the boiler shell or give rise to a deterioration of the metal. Boilers therefore need to be inspected regularly in accordance with the maintenance check list and need to be operated strictly according to the manual provided by the manufacturer.⁹ The operation and maintenance of autoclaves is in many ways similar to that of boilers, in the sense that the water and pressure inside has to be kept at the prescribed levels, while components such as valves and rubber door gaskets require regular checking.

The edible fats and vegetable oils branch is the segment of the food industry which is normally most at risk from explosions and fires. By way of illustration, in December 1991, an explosion in a palm oil plant in Osaka, Japan, killed eight workers. Palm oil is extracted from coconuts using normalhexane, a highly inflammable organic solvent. At the time of the explosion, workers were repairing the extractor when the solvent caught fire.¹⁰ At plants where highly inflammable and hazardous substances are used at any stage of production, the handling and storage of such materials has to be strictly controlled and the relevant rules, such as the strict prohibition of smoking, have to be rigidly enforced. An important preventive measure against fires is the regular cleaning of machine components such as filters and ducts as well as cleaning around machines to prevent the accumulation of grease.

It is also vital that, should a fire break out, workers are able to reach the emergency exits without any difficulty. A fire in a poultry processing plant in North Carolina, United States, in September 1991 killed 25 workers and injured 50 others by smoke inhalation. The fire resulted in so many deaths and injuries due to the fact that the fire exit doors had been locked because the employer was alleged to have wanted to prevent the theft of meat by his employees.¹¹ This tragedy served to show the high price that may have to be paid if safety and health at the workplace is neglected.

3.6. Ventilation

The safety regulations in many countries cover the ventilation of the workplace. Effective ventilation is important for a number of reasons: it can be instrumental in reducing

the risk of explosion in the event of, for example, gas leaks; it can avoid the inhalation of hazardous substances by workers who are handling them; and, in many food and drink processing plants, it plays a vital role in clearing the air of dust produced by the processing of various foodstuffs. A number of studies show that those who work in the type of dusty environment which is found in a number of branches of the food industries risk respiratory disorders unless adequate ventilation is installed.

The degree of ventilation which is required depends on the type of activity being carried out, the number of workers in the space and the physical demands made on the workers. In general, it is recommended that 30 m³ of fresh air per hour be made available to workers who are seated, 50 m³ to workers who are standing and 65 m³ to workers performing heavy physical work.¹² The importance of ventilation in the prevention of occupational illnesses is discussed further in the next Chapter.

3.7. Good housekeeping

Keeping the workplace tidy and orderly is a simple yet fundamental principle for ensuring the safety and health of the workers. Tools, especially dangerous hand tools, must not be left lying around, or hidden beneath other objects. Once used, they need to be cleaned and returned to their proper positions. Passageways and staircases should be cleared of obstacles. Even if boxes and crates are stacked in the appropriate area, the piles have to be stable, with the heaviest items at the bottom. If stacks are unstable, they should be tied with a rope to prevent them from falling.

The floors and passageways need to be kept as grease-free and dry as possible in order to prevent any falls and slips. Should they become wet or slippery during the course of work, they need to be cleaned and mopped as frequently as necessary.

Solvents, acids, alkalis, chemical substances used as cleaning agents and other caustic materials are used frequently in the food and drink industries.¹³ It is essential that suppliers' labels are not removed, defaced, modified or altered. In order to avoid any risk of misunderstanding, the substances should never be transferred to other containers, nor should they be stored together with foodstuffs. In the context of good housekeeping at the workplace, almost more than any of the other areas covered in this paper, it is clear that a little common sense can go a long way towards preventing accidents.

3.8. Maintenance of electrical installations

Although electrocution is not reported as frequently as some other types of accidents in the food and drink industries, the risk is constantly present, particularly in view of the abundant use of water around machines. The basic rules in this context include: the proper installation of all electrical equipment, including grounding; periodical maintenance by a competent electrician; the checking of wires for cracking and fraying; the use of appropriate fuses; the use of splashproof, hoseproof or watertight equipment where there is a danger of contact with water during the operation or cleaning of machinery; and the installation of an adequate number of sockets and outlets to minimize the need for trailing cables. Faulty wiring and inadequate maintenance of electrical installations can result in burns, fires and even loss of life.¹⁴

All machines used in the workplace should be equipped with safety devices. For example, machines for which the power is supplied through a permanent cable should have their own switches to disconnect the power supply. Such switches can be placed directly on the machine or on a nearby wall, but must be within easy reach of the machine operator. This precautionary measure is particularly necessary for cleaning and repair work. Recognized standards for the design of machine control systems require START buttons to be recessed or shrouded to prevent unintended operation and STOP buttons to be red and protruding for easy operation. Machines with exposed blades, such as the slicers and choppers which are commonly used in the sector, should be fitted with a no-volt release device, which ensures that the machine can be started only by means of the start button. Recently manufactured machinery is likely to be equipped with this device; older equipment should be modified to this standard whenever the opportunity arises, such as during a major repair.¹⁵

3.9. Lighting

A study on the working environment and health of food workers in Finland¹⁶ reports that about one-quarter of respondents to a questionnaire mentioned poor lighting or glare as one of the physical hazards at the workplace. Poor lighting or glare can result in reduced productivity and eyestrain. In many countries, employers are obliged by law to provide adequate illumination at the workplace. The adequacy of lighting depends on the design of the premises and the nature of the work to be performed.

The best lighting is natural light from windows. The recommended size of window-area is one-tenth of the room area.¹⁷ However, artificial lighting is evidently necessary at certain times of the day, in certain weather conditions and during specific seasons, particularly in large plants, even if there are no night shifts. The light levels suggested by law vary between countries. The following are some examples. The Occupational Safety and Health Regulations in Japan provide that the lighting in the workplace should be 300 lux or more for precision work, 150 lux or more for normal work and 70 lux or more for rough work.¹⁸ In Germany, illumination of at least 200 lux is recommended in workplaces which are permanently occupied and a higher level in areas where work involving eyestrain is performed. The German recommended levels for other spaces are as follows: 50-100 lux in storage rooms and traffic routes; 100 lux in boiler rooms and washrooms; 500 lux in offices and 300-500 lux in machine and manual workrooms.¹⁹ Light fixtures should be installed in such a way that the entire premises are lit evenly, without glare or shadow, and so that spent bulbs can be replaced easily and safely.

3.10. Personal protective equipment

Labour legislation in many countries provides that it is the duty of the employer to provide personal protective equipment to workers engaged in hazardous tasks. Under this legislation, workers who handle dangerous hand tools and machines, under extreme temperatures, handle hazardous substances or run the risk of inhaling such substances, or are exposed to radiation, have to be provided with appropriate protective equipment and have the duty to utilize them properly. Personal protective equipment is clearly essential in protecting workers from risks at the workplace. However, such equipment should be regarded only as supplementary protection. The main challenge facing any industry is to eliminate hazards

at source. Personal protective equipment therefore becomes a supplementary, although very important, means of protecting workers.

Workers in the meat, marine products, vegetable and fruit processing branches are at particular risk due to the sharp hand tools which they use. Workers who process large carcasses face the risk of more serious wounds because they have to use sharper and heavier butchers' knives in order to cut greasy and sometimes unstable pieces of meat. Furthermore, due to the animal fat which falls on the floor, there is also a risk of falling while holding dangerous tools.

The parts of the body most commonly cut, particularly in the meat and marine products processing branches, are the fingers, hands and torso. While it is essential for the workers to be thoroughly trained in the safe handling of dangerous tools, it is also necessary to prevent such injuries by protecting the parts of the body which are exposed to danger. For example, it is recommended that the meat processing workers who have to exert extra force, in operations such as de-boning, be provided with gloves and aprons made from metal mesh or interlocking rings. It is particularly important for inexperienced workers to be protected with such equipment, although experienced workers also need the protection, particularly since dexterity generally declines when working in cold temperatures. A study on the relationship between dexterity and workplace temperatures revealed that "the threshold of hand skin temperature below which dexterity is affected is 23-24°C."²⁰ The dexterity of meat processing workers who perform their tasks in temperatures which are often below 10°C is therefore bound to diminish considerably.

The importance of wearing protective equipment is vividly illustrated by the number of accidents which occur when such equipment is not used. A number of the reports provided by governments in response to the ILO questionnaire sent out for the preparation of the Second Session of the Food and Drink Industries Committee, held in 1991, stated that accidents often occurred because of workers' failure to comply with safety instructions. In the United States, meat-packing plants are among the most hazardous workplaces; however, a study conducted by the Bureau of Labor Statistics²¹ showed that half the injured meat-cutters and butchers interviewed in January-April 1981 were not wearing protective gloves at the time of their accidents.

Different tasks require different types of protective gloves and aprons. For example, cuts are also common in the drinks industry, where workers are often exposed to broken glass bottles. When cleaning, they should wear appropriate gloves and boots to prevent injury to hands and feet. The boots should be heavy-soled and slip-resistant. Workers in the drinks industry are also recommended to use tongs and brushes when handling pieces of broken glass which are large enough to be seen and vacuum cleaners when cleaning up smaller particles. Bare hands should not be used at any time.²²

Various processes used in the food and drink industries involve the use of heat, with a consequent risk of burns. Heat-proof mittens and rubber aprons are the best forms of protective clothing to prevent such injuries. However, it is also very important for the workers to be attentive enough to reduce their own risks. Some simple rules can be followed, such as, when lifting a pot cover, the worker should tilt it slightly away from the body in order to release the steam before opening it completely. Heated oven doors should

never be left open, and hot liquids should be poured away from body.²³ Observance of simple rules of this type, when combined with the use of protective equipment, can be very effective in reducing the risk of burns.

In the meat processing branches it is strongly recommended that the use of slip-resistant safety boots be made mandatory. In other branches, workers who have to work on floors which are likely to become wet and slippery should also be provided with similar shoes.

Safety boots are also effective in protecting workers who carry hot substances. When the author visited a small drinks manufacturing plant employing a relatively primitive level of technology in the outskirts of the capital in India, the general manager reported that there had been two cases of burns in 1991. Apparently, two workers suffered burns on their toes as a result of a spillage while they were carrying a large metal bowl containing fruit juice mix which had just been sterilized at boiling point. At the time of the visit, the author observed that most of the workers were wearing light rubber sandals which left a large part of the foot exposed, although some were wearing long boots. Although the accident record made no mention of the footwear worn by the two workers at the time of the accidents, there is a high probability that they were wearing sandals. The general manager spoke of the difficulty of making some of the workers understand the need to wear boots when performing certain tasks, since many of them are seasonal workers from nearby villages who normally work in the fields in bare feet and are not used to wearing modern shoes. In addition, the hot climate in the region does not encourage workers to follow the safety rules.

Other types of personal protective equipment which are often used in the food and drink industries include earplugs, helmets, goggles or face shields and respirators. Earplugs are commonly used in flour mills and bottling plants where the noise level can be harmful. The problem of hearing impairment is covered in the following Chapter. Goggles, face shields and respirators are normally worn by workers who mix hazardous chemical substances, in order to prevent splashing and inhalation of the substances. Safety helmets are used by workers who are responsible, for example, for stacking finished products ready for shipment. Those who operate and maintain moving or stationery machines should also be issued with helmets.

The provision of appropriate personal protective equipment is essential in order to ensure safety at the workplace. However, for equipment to serve its purpose adequately, it is necessary to ensure that it is the right size for each worker. Moreover, the workers have to be well aware of the purpose of each different piece of equipment and the correct manner for its use. They should also be adequately trained in the proper use of the equipment under different circumstances. Cooperation between employers and the workers in the provision of appropriate equipment and ensuring that proper use is made of it is therefore a vital part of reducing the accident rate in the food and drink industries.

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CHAPTER 4

Prevention of occupational diseases in the food and drink industries

4.1 Common occupational diseases in the sector

As well as being exposed to the risk of injury from accidents which may occur during their work, certain working conditions in the food and drink industries may have a more gradual impact on the health of the workers and may eventually result in chronic physical or mental disorders and disabilities. These occupational diseases require specific preventive measures.

Table 5 indicates the diseases which are most commonly reported in the sector. Although it is more difficult to obtain information on developing countries, it is interesting to note that the diseases reported by Colombia do not differ greatly from those in the industrialized countries covered by the Table. According to the information contained in the Table, the most common diseases are respiratory disorders, followed by musculo-skeletal disorders. Other illnesses frequently suffered by the workers in the sector include hearing impairment, skin diseases, various types of allergy and infections transmitted by animals.

A study conducted among food workers in Finland reported that 29 per cent of bakery workers, 27 per cent of dairy workers and 23 per cent of meat-packing workers suffered from some kind of chronic disease. Among those who were surveyed, arthrosis of the cervical vertebrae, degenerative arthritis, arthrosis of the lower back and sciatica were the most frequently reported diseases, followed by hypertension, eczema and other skin diseases and hearing defects.¹

4.2. Respiratory disorders

According to the information given in Table 5, respiratory disorders are among the most common diseases which affect food and drink processing workers. Respiratory problems can largely be classified as follows: rhinitis, which affects the nasal passages; broncho-constriction in the major airways; and pneumonitis, which consists of damage to the fine structure of the lung.² In the food and drink industries, exposure to airborne dust from various foodstuffs, as well as to chemical substances, may lead to diseases such as emphysema and asthma.³ Occupational asthma is recognized in the United Kingdom for the purposes of industrial injury compensation and the recognized causes of occupational diseases in the sector include the handling of enzymes, animals, grains and flour and the inhalation of their dusts.⁴

It is well known that many bakery workers suffer from a respiratory disorder called "baker's asthma", although a number of studies now suggest that other categories of workers in the sector may be affected by similar problems. For example, the Finnish study referred to above found that chronic rhinitis was particularly common among slaughterhouse and

Table 5: Most common occupational diseases in the food and drink industries in selected countries

Country	Year	Most common occupational diseases			
		1	2	3	Other
Austria	89	bronchitis, asthma	hearing impairment	skin diseases	infections transmitted by animals
Belgium (Food)	88	diseases induced by inhalation of substances	by physical agents	skin diseases	infections/parasites from animals
(Drink)	88	diseases induced by physical agents	by chemical agents	by inhalation of substances	
Colombia	89	hearing impairment	respiratory disorders (asthma)	musculo-skeletal disorders	skin diseases
Czechoslovakia	88	respiratory disorders	musculo-skeletal disorders	digestive disorders	circulatory disorders, skin diseases
Denmark	88	physical coordination disorders	skin diseases	hearing impairment	infections, allergies
France	88	asthma & other respiratory disorders	strains in various parts of body (knees, elbows)	septicemia (blood poisoning) & other infections	hearing impairment
Poland	89	respiratory disorders	skin diseases	infections	hearing impairment
Sweden	89	musculo-skeletal disorders	allergies (contact with chemical agents)	hearing impairment	infections
United States	89	disorders associated with repeated trauma	skin diseases	disorders due to physical agents	respiratory conditions associated with toxic agents

Sources: (1) Caisse Nationale de l'assurance maladie de Travailleurs Salarié, Statistiques Nationales d'Accidents du Travail (Paris, 1990).

(2) U.S. Department of Labor, Bureau of Labor Statistics, Occupational Injuries and Illnesses in the United States by Industry, 1989 (Wash. D.C., April 1991).

All the above information was provided by the respective Governments for the Second Session of the Food and Drink Industries Committee.

pre-cooked foods workers (30 %), mill and bakery workers (26 %) and food processing workers (23 %).⁵ In contrast, only 14 per cent of food processing workers and 11 per cent of slaughterhouse and pre-cooked foods workers suffered from chronic coughs. Flour dust is the main cause of these ailments in the bakery branch, while temperature variations and various kinds of dust are believed to be the cause of these diseases in other branches.⁶

Chronic problems in the respiratory organs are very common among food processing workers in workplaces which have a high concentration of airborne dust. These include workers in spice factories. A study⁷ of 92 female workers in a spice factory (mean age, 36 years; mean exposure, 12 years) in the former Yugoslavia found a much higher prevalence of chronic respiratory symptoms than in a control group of 104 female workers (mean age, 36 years; mean exposure, 11 years) employed in environments which are not affected by dust. Among the spice factory workers, of the various respiratory disorders, dyspnea or breathing difficulty was the most common complaint (57.6 %), followed by nasal catarrh (37.0 %), chronic cough (22.8 %), sinusitis (27.2 %), and chronic phlegm and bronchitis (19.6 %). Although dyspnea was also the most common disorder in the control group, only 21.2 per cent of spice factory workers complained of it, followed by chronic coughs (3.9 %) and sinusitis (2.9 %). The other disorders were not significant.

The study also measured the ventilatory capacity of the exposed and control groups by recording maximum expiratory flow volume (MEFV) on a spirometer. Changes in ventilatory capacity over a working day were also compared by measuring MEFV on a Monday before work started (6 a.m.) and after it finished (2 p.m.). The results showed that acute reductions in lung function were statistically significant over the workshift among the exposed group. The study therefore concluded that workplace dusts were closely associated with the development of chronic respiratory disorders and lung function impairment among workers in the spice factory.

A study of cinnamon workers in Sri Lanka also found a high prevalence of disorders such as asthma, mainly due to their exposure to cinnamic aldehyde, an irritant contained in the bark of cinnamon trees.⁸ Cinnamon is bleached with sulphur dioxide and fumigated. Although the workers who peel the bark off the tree are not particularly exposed to the dust, workers in local buyers' stores are exposed to high levels of dust and sulphur dioxide. Of the 21 female and 19 male cinnamon workers studied (mean age, 31.8 years; mean exposure, 4 years), 15 (37.5 %) complained of coughs, while 9 (22.5 %) suffered from asthma. Other abnormalities included loss of weight (65 %), irritation of the skin (50 %), loss of hair (37.5 %), smarting of the eyes (22.5 %) and rashes (12.5 %). In total, 35 of the 40 workers suffered from one or more of the above symptoms.

According to the study, seven of the nine workers who complained of asthma had developed the condition since taking up the job of handling cinnamon. The findings also showed a high prevalence of asthma cases among cinnamon workers (22.5 %) compared with other categories of workers, such as tea workers (6.4 %) and kapok workers (2.5 %), who also work under similar conditions of a high concentration of airborne dust of vegetable origin at the workplace. Although five men who smoked about seven cigarettes a day were included in the 35 workers who suffered from one or more of the disorders described above, smoking was not believed to be directly related to the coughs affecting 15 workers, since they included eight non-smoking women. In this context, coughing is caused by cinnamon

dust, which acts as an irritant to the respiratory mucosa.

A study similar to the one of spice factory workers was made of animal food processing workers in the former Yugoslavia.⁹ Animal food processing workers are exposed to a variety of ingredients for animal food products, including powdered coriander, garlic dust, cinnamon dust, red paprika dust and dust from other spices. The study examined and compared the prevalence of acute and chronic respiratory symptoms and the presence of lung function abnormalities in an exposed group of 71 male employees (mean age, 40 years; mean exposure, 15 years) and a control group of 55 male office workers (mean age, 41 years; mean exposure, 16 years). Among non-smokers, the study showed a significantly higher prevalence of chronic phlegm and chest tightness in the exposed group compared with the controlled group. Among smokers, on the other hand, a significantly higher prevalence of chronic coughs, chronic phlegm, chronic bronchitis and chest tightness were observed in the exposed group in comparison with the control group. The frequency of acute respiratory symptoms associated with the working day was high among the exposed group, while the ventilatory capacity of the smokers was significantly lower than predicted. The study therefore concluded that exposure to animal food dust was closely associated with the development of respiratory disorders among the workers and that smoking aggravated their condition.

In addition to the above studies, a number of others have examined the relationship between respiratory disorders and the allergens and antigens originating in foodstuffs which are present in workplace dust, such as egg protein¹⁰ and seafood products.¹¹ Although most of these studies could not assert that the specific workplace dust to which each group was exposed was solely responsible for the development of various acute and chronic respiratory disorders among the workers, the study results nevertheless indicate a strong association between the disorders and the work environment.

In addition to airborne dusts originating from foodstuffs, respiratory disorders may also be caused by the inhalation of hazardous chemical substances at the workplace. For example, many new chemical products have been introduced as cleaning agents and new additives have been developed as preservatives or colouring and flavouring agents. They are often supplied in powder form and can easily be released into the air and inhaled by workers.

In view of the variety of workplace dusts to which workers in the sector are exposed, many preventive measures have been recommended. Since everyone does not react the same way to workplace dusts originating from foodstuffs or chemical agents, one measure which may be adopted is to examine all the employees for their susceptibility to the dusts to which they are likely to be exposed. Those who are found to be highly sensitive to particular dusts and are likely to develop respiratory problems could be assigned to a workplace in which they are not exposed to them. In order to ensure that both employers and workers are aware of the hazards to which the work exposes them, it is important to measure workplace dust concentrations as often as possible. With a view to reducing the risk of inhaling airborne chemical dusts, the chemicals which are used can be changed from solid or small-particle forms to liquids. In place of an air gun, which is often used for cleaning, but which raises the dust concentration in the air, the use of a vacuum cleaner would reduce the risk of the inhalation of hazardous dusts.

Due to the nature of work performed in the food processing industry and the prevalence of airborne dust, local exhaust ventilation systems are one of the best ways of reducing dust concentrations in the air and therefore of combatting respiratory disorders. Local ventilation systems capture, rather than dilute, hazardous dusts before they escape into the workplace environment because they are located at the source of the generation of contaminants. The general ventilation system is also important in keeping the level of airborne contaminants below unhealthy levels. However, it is essential that the system does not have the effect of recirculating the airborne contaminants throughout the workplace.¹²

Another important means of preventing respiratory problems is the use of personal protective equipment, such as a nose and mouth masks, in order to prevent the inhalation of contaminated air. Different types of masks are worn for different purposes, depending upon the work to be performed and the level of the hazard. It is important that the mask is appropriately selected for the type of work and the working environment, that it fits the face of each individual and that it is cleaned before being used. Preventive measures of this type can be very effective in reducing exposure to contaminated air and the incidence of respiratory disorders among food processing workers.

4.3. Musculoskeletal disorders

The study of Finnish food workers referred to above found that 85 per cent of those whose tasks had been automated in the previous two years felt that their work speed had accelerated. This feeling increased with the age of workers. For example, 67 per cent of those under 25 years considered that their work speed had become faster as opposed to 82 per cent of those between 25 and 44 years, and 90 per cent of those over 44.¹³ This feeling was also greater among women (68 %) than men (52 %).¹⁴ When asked what had contributed the most to the acceleration of their work speed, 35 per cent of the women replied that it was the increased velocity of the machine or conveyor belt, while 33 per cent of the men pointed to the work schedule.¹⁵ The study also found that the velocity of the machine or conveyor belt increased most for packaging workers, followed by food processing workers and dairy workers.¹⁶ This goes some way to explaining why more women and elder workers felt that their work speed had been accelerated by automation. Women make up a large majority of unskilled and semi-skilled workers, whose tasks are the first to be automated, particularly on processing and packaging lines. The average age of women workers also tends to be higher than that of men because women often re-enter the labour market as part-time and temporary workers after a break of several years to bear and rear children.

Today, more workers in the food industry than ever before work in automated plants and their work speed is regulated by the machine or conveyor belt. Tasks in automated plants tend to be monotonous, with workers repeating the same movement all day long. Monotonous work of this type uses only certain parts of the body at an increased speed and frequently leads to musculo-skeletal disorders, which are among the most common occupational diseases in the sector.

In the Finnish study, nearly 40 per cent of workers surveyed reported that they performed repetitive work all day.¹⁷ Of those who performed repetitive work, 60 per cent

used their hands, while 37 per cent used more than one part of the body and 3 per cent used their feet.¹⁸ With regard to occupational groups, 70 per cent of cleaners, 67 per cent of slaughterhouse, pre-cooked foods and packaging workers, 56 per cent of warehouse and transport workers, and 54 per cent of dairy workers were found to be performing repetitive work for two-thirds or more of their working hours.¹⁹

The findings of this study confirmed the comments made in a number of government replies to the ILO questionnaire sent out prior to the Second Session of the Food and Drink Industries Committee that monotonous work at increased work speed, due to widespread automation, is affecting the health of the workers. One government reported that repetitive strain caused by poor work organization and posture, combined with the lack of initiatives to rotate jobs, has become one of the major occupational hazards in the sector. Another reported the synovitis and bursitis have become prevalent in the sector as a result of the increase in highly repetitive work. Above all, the meat and poultry processing branches were closely associated with repetitive strain disorders in many government reports.

Repetitive strain disorders also include tendonitis and tenosynovitis, or inflammation of the tendon or tendon sheath. These are prevalent among meat-packing workers, whose jobs require repetitive hand movements. In contrast, carpal tunnel syndrome (CTS) is generally caused by repeated bending of the wrist combined with gripping, squeezing and twisting motions. Inflammation in the wrist joint causes pressure on the nerve system in the wrist, causing a tingling sensation in the fingers. This disorder is often misdiagnosed as arthritis, and can result in permanent numbness and severe pain in the hands, elbows and shoulders.²⁰

The increase in the incidence of musculo-skeletal disorders in the poultry meat processing branch is largely due to the evolution of poultry meat products. In the 1950s the poultry industry tended to supply the market with whole fresh or frozen birds, while cutup parts were introduced in the 1960s. Although less than 20 per cent of all young chickens slaughtered were cut up for retail in 1965, this figure had risen to more than 40 per cent by 1981. Moreover, in the late 1970s, poultry meat products were further diversified, with the growing popularity of products such as preformed patties, prepackaged part trays, luncheon meats and frankfurters.²¹ These changes required more complicated processing methods, and particularly cutting operations which place greater strain on the wrist.

With regard to work speed in the poultry industry, in the United States, by way of illustration, the speed of all manual and mechanical operations is set by the speed of the conveyor belt, in accordance with the regulations established by the Department of Agriculture. Average line speeds have increased from 56 to 70-90 birds per minute over the past 15 years. This change in speed is partly due to changes in the inspection systems, under which the inspectors now concentrate more on the actual inspection of the product than on the operation of the plant.²² The fact that poultry workers are now required to perform more tasks which involve repetitive movements at a higher speed would appear to be linked to the rise in the incidence of musculoskeletal disorders in the branch. The number of reported cases of carpal tunnel syndrome in both the meat-packing and the poultry industries are also increasing. Workers in these branches often suffer inflammation or irritation of the joints, tendons (tendonitis) and peripheral ganglia, as well as nervous disorders.

4.4 Vibration

The increased level of mechanization in industry exposes workers to more vibration than before. Food workers are no exception, although the problem may not be as serious as for certain other industries. In the food and drinks sector workers are usually exposed to vibration when using machines such as bandsaws, grinders, mixers and cutters. In the Finnish study referred to above, 5 per cent of the workers surveyed were found to be exposed to a fairly high level of vibration, while 9 per cent were exposed to some level of vibration.²³

Excessive exposure to vibration leads, among other problems, to musculoskeletal disorders in the wrists, elbows and shoulders. The type and degree of disorder depends on the type of the machine used, the manner in which it is used (the work position) and the level of oscillation involved. High levels of exposure to vibration can result in the growth of a protuberance on the bone or the gradual destruction of the bone in the joint, resulting in severe pain and/or limited mobility.²⁴

In view of the growing hazards caused by vibration, regulations have been adopted in a number of countries to minimize oscillation-related physical disorders. In Japan, for example, work using such machines is limited to be less than two hours a day; no task involving exposure to vibration should last more than 30 minutes, with at least a five minute break between the tasks.²⁵ Other measures which can be taken to reduce exposure to vibration include careful inspection of the oscillation level when purchasing new equipment and the provision of personal protective equipment such as gloves which can absorb vibration to a certain extent.

One of the ways of minimizing the risk of musculoskeletal disorders is the rotation of tasks among workers with a view to avoiding repetitive movements. Another is to examine the positions in which work is performed in order to minimize stress through the optimum ergonomic design of machines, tools and work stations. The Finnish study referred to above found that 38 per cent of the food workers surveyed had to perform their work crouching, bending or in other awkward positions for more than or nearly half of their work time. The proportion of workers having to work in awkward positions was highest in the slaughterhouse and meat processing branch. In terms of occupational groups, warehouse and transportation workers were found to be the largest group (38%) performing tasks in stressful positions, which combined crouching and bending with physical exertion.²⁶

The objective of ergonomic analysis is to identify and correct ergonomic hazards and therefore to reduce musculoskeletal disorders. Once hazards are identified, they can be corrected by means of engineering design, the organization of work practices, administrative control and the use of personal protective equipment. It is possible, for example, to design workstations, working methods, machines and hand tools which are ergonomically sound and accommodating for the workers using them. Ergonomic engineering techniques aim to eliminate or minimize the need for chronic muscle contraction or the use of steady force over a long period, extreme or awkward finger, hand and arm positions, repetitive movements requiring strength and the need for an excessive grip, or the actions of pinching or pressing with the hand and fingers. Work practice controls include ensuring through training that tools and machines are used correctly, as well as modifying such elements as line speeds,

tools and machines are used correctly, as well as modifying such elements as line speeds, staffing levels and the size, weight or temperature of the product handled. Administrative controls cover measures such as job rotation systems, providing rest pauses to relieve fatigued muscles and tendons and increasing the number of workers assigned to lifting heavy objects. Finally, personal protective equipment, such as braces, splints and back belts, can also be effective in protecting workers from the risk of musculoskeletal disorders.²⁷

4.5. Hearing impairment

Increased levels of mechanization in the food and drink industries are exposing workers to higher levels of industrial noise for long hours, which can give rise to hearing impairment. A study conducted in Finland in 1980 and repeated in 1985 found that the proportion of workers in the sector who are exposed to considerable workplace noise increased from 47 to 56 per cent over the five-year period.²⁸ As indicated in Table 5, hearing impairment is one of the most common occupational illnesses in the sector. Hearing impairment caused by exposure to noise is an incurable illness which causes communication disorders and is particularly stressful for workers whose work demands concentration.²⁹ As a result, the psychological and physiological performance capacities of the workers concerned deteriorate.³⁰

The workplace is more hazardous for hearing impaired workers. There are also grounds for believing that high noise levels may be associated with abnormal blood pressure, heartbeat, respiration rate and volume, spasms in the stomach and intestines and other nervous disorders.³¹ Although the hazards of exposure to noise are well recognized in the industrialized countries, workers in developing countries tend to be less aware of them. This is partly due to the lower level of mechanization in developing countries and to the fact that hearing loss, in the same way as many other occupational illnesses, may take a long time to manifest itself. Susceptibility to noise hazards also depends on the sensitivity to noise of the individual, the exposure time and the frequency and intensity of the noise.³²

Although the noise limits set by safety and health codes vary from country to country, workers' exposure to the noise levels of 85-90 dB is generally limited to eight continuous hours of work.³³ It is generally considered that ear protection equipment should be made available to workers at a level of 85 dB or above, and that the use of such equipment should be recommended at 90 dB or above.³⁴ It is advisable to carry out audimetric testing at the workplace whenever new machines or new processing methods are introduced with a view to ensuring that the noise levels are not hazardous.

New techniques are being sought to reduce noise levels in the workplace both in the developing and the industrialized countries. The methods which are adopted depend greatly on the availability of trained staff, equipment, materials and financial resources.³⁵ One approach is to design and construct low-noise and low-vibration machines by replacing, wherever possible, metal parts with softer materials, such as rubber. Employers can greatly influence the noise level at the workplace by selecting low-noise equipment when purchasing new machines. Another effective measure is to install silencers at air valves and exhaust pipes. One of the most important factors is the design of the workplace with a view to reducing workers' exposure to noise. This includes the installation of noise-proof partitions or noise-absorbing ceilings.³⁶ Enclosing noise-producing machines is another commonly

used method of reducing noise at the workplace. The optimum solution is a judicious combination of all these preventive measures in a manner which is adapted to the needs of each workplace.

Where it proves difficult or impossible to render noise levels harmless at source, it is necessary to issue equipment to protect the ears. Indeed, the provision of ear protection equipment to workers exposed to hazardous noise levels is the most widespread means of preventing hearing impairment. However, effective protective equipment is sometimes scarce in developing countries.³⁷ Moreover, lack of awareness among workers of the importance of wearing such protection is a serious obstacle, particularly since hearing impairment develops over a long period without the victims necessarily being aware of the problem.

4.6. Infectious and parasitic diseases (zoonoses)

The occupational diseases which are most specific to the food and drink industries are infectious and parasitic diseases of animal origin which are transmitted to man. These diseases are most common among meat-packing and dairy workers due to their direct contact with animals infected by them, particularly since the animals may not give any overt signs of the diseases. Although it would appear that infectious and parasitic diseases are not the most frequent occupational illness in the sector, several governments emphasized the risk of these diseases in their replies to the ILO questionnaire sent out prior to the Second Session of the Food and Drink Industries Committee. These diseases are also transmitted to agricultural and other workers who come into contact with infected animals. In rare cases, consumers of uncooked and contaminated food may also be infected by the micro-organic pathogens which cause these diseases. Although the diseases are found throughout the world, brucellosis is the most prevalent in Northern and Central Europe and in North America.³⁸ Erysipeloid was the most frequently reported infectious or parasitic disease in the sector in Czechoslovakia,³⁹ while the French Government indicated that brucellosis and particularly septicemia caused the most problems.⁴⁰ Erysipeloid is transmitted by infected pigs and fish through skin wounds. It produces redness, irritation, a burning sensation and pain in the infected area, which can spread to the blood stream and lymph nodes.⁴¹ Workers who are infected with brucellosis suffer constant and recurring fever, headaches, weakness, joint pains, night sweats and loss of appetite.⁴² The disease is generally caused by the pathogenic bacteria, which is usually transmitted by cattle, and *brucella melitensis*, which is most prevalent in the Mediterranean area and is transmitted by goats and sheep. Brucellosis may also give rise to symptoms such as arthritis, influenza, asthenia and spondylitis.⁴³

The other common zoonoses include leptospirosis, epidermomycosis and dermatophytosis. Leptospirosis is transmitted through direct contact with infected animals or their urine and its symptoms include headaches, aching muscles, eye infections, fever, vomiting and chills. In more serious cases, it causes kidney and liver damage and cardiovascular and neurological complications. Antibiotics are generally effective in treating the disease, although fatal cases have been reported. Epidermomycosis is caused by parasitic fungi on the skin of animals. When this disease is transmitted to man through direct contact, it may cause erythema and blistering. Dermatophytosis, also known as ringworm, is also a fungal disease transmitted by direct contact with the hair and skin of infected animals. Infected persons suffer hair loss and small crusts on their scalp.⁴⁴

Reference should also be made to toxoplasmosis, a common disease transmitted through contact with infected animals or animal products. The disease is caused by the pathogen which infects sheep, goats, cattle, pigs and poultry. Because its symptoms, which include fever, muscle pain, sore throats, headaches, swollen lymph nodes and an enlarged spleen, are fairly mild, infected persons may not be aware of the disease. However, a long-term effect of the disease can be the development and spread of cysts to the brain and muscle cells which may cause complete loss of sight and severe illnesses. Pregnant women in meat processing plants are at particular risk because the infection can easily be transmitted to the foetus. The severity of the disease depends on when in the pregnancy the mother acquires the infection, and can give rise to still or premature births. Even if the foetus grows to its full term, it may be blind or suffer heart or brain defects or even death. Since the infection can be treated with anti-bacterial and anti-parasitic drugs if detected early, workers who may be infected require immediate medical treatment.⁴⁵

Researchers have also detected a high incidence rate of lung cancer among butchers and slaughterhouse workers in England, Wales, Denmark and Sweden.⁴⁶ In view of this phenomenon, a study was conducted to examine the mortality of 1610 men who had been employed at three British meat-packing companies since 1946 and who had by 1971 completed at least six months of work entailing regular contact with live animals or animal flesh. The subjects were traced to the end of 1986. The results showed that the overall death rate among them was less than that of the national population, but that deaths from cancer exceeded the rate for the overall population, and particularly cases of lung cancer. Infection by carcinogenic papilloma viruses and exposure to polycyclic aromatic hydrocarbons and nitrites used to preserve meat are possible causes of lung cancer among these workers,⁴⁷ which may also be aggravated by smoking.

Maintaining a high standard of personal hygiene for all employees is one of the fundamental principles for preventing the contraction and spread of infectious and parasitic diseases. This means that, in addition to providing clean toilets and washrooms, shower facilities should also be made available, particularly for workers who are in direct contact with animals and animal flesh. Uniforms, personal protective equipment and hand towels need to be washed, or in certain cases sterilized, as frequently as possible. Any wounds, even minor ones, have to be sterilized and protective equipment such as gloves should be worn. Keeping the workplace clean and healthy is just as important. This includes the thorough washing of cutting boards, knives and other materials which come into contact with animal flesh after each day's work, the extermination of rats or other rodents on the premises and the exclusion of dogs, cats and other animals from the workplace.

In many countries, the measures taken against infectious and parasitic diseases include the vaccination of animals and the inoculation of workers.⁴⁸ In any case, workers should be required to undergo frequent medical exams, in addition to the pre-recruitment examination, since early detection and treatment of diseases is essential in order to contain and even eradicate them. Workers should therefore be examined as soon as any symptoms of the diseases appear, such as recurring coughs, fever, headaches, sore throats and intestinal disorders. It should also be a requirement that any identified cases of the diseases should be reported to the public authorities. This would make it possible for the authorities to warn all the other enterprises concerned and to suggest appropriate preventive measures against a possibility of the outbreak of an epidemic.

4.7. Dermatitis and allergies

Dermatitis, or skin disorder, is another illness which is prevalent among workers in the food and drink industries. It consists of an inflammatory reaction of the skin as a result of exposure to agents such as chemical substances and food additives. Although the organisms used in biotechnology are considered to be harmless and pose no threat to the health of those who handle them,⁴⁹ there is growing concern that workers may become highly sensitized to the microbial proteins and peptides generated by fermentation and extraction, which may lead to eczema and other allergies.⁵⁰ An allergy is a hyper-sensitive response of "any type that is greater than that which normally occurs in response to antigens in the environment."⁵¹ In the food and drink industries, allergies are generally caused by the various allergens contained in the dusts of foodstuffs such as spices, grains, vegetables and fruits. The symptoms are irritation of the eyes, the skin and the lungs.

Chemical substances such as mercury compounds, formaldehyde gas and formalin are used in microbiological techniques, while phenolics, hypochlorites and glutaraldehyde are commonly used as disinfectants in the laboratories of the food and drink industries. In addition, quaternary ammonium compounds are frequently used as cleaning agents. All these chemical substances can cause irritation to the eyes, skin and lungs and can be highly toxic if not handled properly.⁵² Instructions therefore need to be followed closely when diluting, applying and storing them.

Certain chemical substances are also used as reagents in the preparation of food additives and processing aids. For example, glutaraldehyde is used in the preparation of immobilized enzymes, while acetic anhydride, adipic anhydride and vinyl acetate are employed in the manufacture of modified starches.

The problem of the allergens contained in certain food additives was raised at the Joint FAO/WHO Expert Committee held in 1983. The Committee recognised that a number of food additives may cause allergies to susceptible individuals, and stressed that the substances that caused serious or widespread hypersensitivity reaction should not be approved for food additive use. It also suggested that final products which contain additives with a potential for provoking allergic reactions should bear appropriate labels.⁵³

The spores of fungi and actinomycetes are widely found in food processing, and increasingly in biotechnological processes. Many of them have been associated with occupational asthma, while some are suspected of causing infection or carrying mycotoxins. Fungi such as aspergillus and penicillium are frequently present in the air in bakeries. Penicillium is also found in dairy and meat processing plants, since it plays an important role in maturing some cheeses and sausages and may grow abundantly on the surface of these products. When the products are cleaned prior to being sold, the micro-organisms are dispersed into the air and workers who are exposed to them may develop allergic alveolitis.⁵⁴

Biotechnological techniques are being used increasingly to produce proteins and enzymes. For example, amylases, which are used to convert starches into sugar, are produced from certain species of aspergillus and bacillus. Yeasts turn starch into acetone. Cellulases, which break cellulose down into carbohydrates, are produced using trichoderma

and penicillium. In general, most of the micro-organisms used in the food and drink industries are considered to be harmless.⁵⁵ However, the occurrence of hypersensitivity, respiratory diseases and occupational dermatitis has been reported in relation to certain enzymes such as trypsin, chymotrypsin and protease, particularly among laboratory workers.⁵⁶

The principle behind the prevention of dermatitis and allergies is to reduce the level of exposure to the causative agents. Airborne spores can be controlled to a certain extent by adequately drying foodstuffs prior to their storage and by storing them under clean conditions. In biotechnological processes, the release of aerosols needs to be prevented. An appropriate ventilation system is instrumental in preventing the dispersal of spores or aerosols throughout the workplace.⁵⁷ The use of personal protective equipment, such as gloves, masks and uniforms, to protect workers from direct contact with causative agents, can also minimize the risk of developing dermatitis and other forms of allergies.

Since insufficient information is available on the effects of biotechnological food processing techniques, the medical surveillance of workers engaged in the industrial application of microbiology is necessary. This surveillance should include "(1) a pre-employment examination with the collection of baseline serum, (2) periodic follow-up, (3) the evaluation of all illnesses causing 48 hours absence from work, (d) epidemiological studies (e) the periodic evaluation of data, and (f) regular communication of results to management and workers."⁵⁸ A number of governments are now in the process of collecting more data on the use of biotechnological techniques in the food and drink industries for dissemination to employers and workers to ensure that everyone concerned is aware of any possible risk.

4.8. Intoxication by hazardous substances

Hazardous chemical substances are frequently used in the production of food and drink. Hazardous substances come in solid, liquid or gaseous form and exposure to them often results in skin and eye irritation and respiratory disorders. Intoxication due to exposure to hazardous chemicals may also produce other symptoms such as headaches, salivation, burning of the throat, perspiration, nausea and vomiting.

Ammonia is a colourless gas used as a refrigerant and sometimes as a cleaning agent.⁵⁹ It is also used in the fumigation of foodstuffs.⁶⁰ Exposure can occur following leaks from refrigeration pipes or direct contact with liquid ammonia. Exposure to ammonia can result in corrosive burns to the skin or blistering, in addition to the symptoms of chemical intoxication described above. If exposure is extensive, bronchitis and pneumonia may follow.⁶¹

Other chemicals found frequently on the premises of food and drink manufacturing plants include solvents such as trichloroethylene, hexane, benzene, carbon monoxide, carbon dioxide and polyvinyl chloride (PVC). Trichloroethylene and hexane are used for olive oil extraction.⁶² Carbon monoxide is a colourless, odourless gas which is difficult to detect; exposure to it can be a result of the poor ventilation of smokehouses,⁶³ or through work in grain silos, wine fermentation cellars or in places where products such as fish are stored.⁶⁴ Symptoms of intoxication by carbon monoxide include headaches, dizziness, drowsiness,

nausea, vomiting and, in extreme cases, even death. Carbon monoxide is also known to aggravate other conditions, and particularly heart and respiratory ailments. Some workers risk exposure to carbon dioxide from the dry ice used in the packaging of frozen and chilled products. Over-exposure to this gas gives rise to the same symptoms as carbon monoxide. Finally, when PVC food-wrap film is heated, its thermal degradation causes irritation to the eyes, nose and throat. Workers may also develop wheezing, chest pains, breathing difficulties, nausea, muscle pains, chills and fever in more serious cases.⁶⁵

Two approaches can be adopted to minimize the risk of intoxication from hazardous chemicals. One is to concentrate on eliminating the use of such materials and substituting them with less hazardous products. This may involve, for example, replacing a substance which is supplied in the form of small particles with a liquid, which may have the effect of reducing the level of air contamination. The other approach is to control exposure through the adoption of appropriate measures and handling practices. These include: the introduction of workplace design, such as total or partial enclosure, which minimizes the dispersion of hazardous dust at the workplace; the installation of a suitable ventilation system; a reduction in the numbers of workers exposed by ensuring that the risk area is not accessible to other staff members; a reduction in the period of exposure if workers are not required to be in the contaminated area continuously; and the provision of suitable personal protective equipment.⁶⁶

It is also very important for employers and workers to take steps jointly to assess the level of toxic contamination at the workplace and to ensure that exposure levels do not exceed the limits set out in safety codes. Contamination levels should be measured frequently, especially following changes in processing methods or in the chemical substances which are used at any stage of the work.

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23. Nurminen: op. cit., p. 172.
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25. Ibid., pp. 25-26.
26. Nurminen: op. cit., p. 172.
27. OSHA, USDL: Ergonomic Program Management Guidelines for Meat-packing Plants (Wash. D.C., 1990), pp. 4-5.

28. Nurminen: op. cit., p. 155.
29. FIOSH (1988): op. cit., p. 24.
30. Nurminen: op. cit., p. 154.
31. Ibid., p. 158.
32. ILO and FIOH: op. cit., p. 10.
33. Ibid.; FIOSH (1988), op. cit., p. 24.; and Todo Kijun Chosakai: Seizogyono Anzen Sagyo Hyojunshu (Tokyo, 1990), p. 68.
34. FIOSH (1988), op. cit.
35. ILO and FIOH: op. cit., p. 11.
36. FIOSH (1988), op. cit., p. 25.
37. ILO and FIOH: op. cit., p. 11.
38. ILO: Report III: Occupational Safety and Health and Working Environment in the Food and Drink Industries, First Session, Food and Drink Industries Committee (Geneva, 1984), p. 23.
39. According to the government reply received in 1991 in response to the ILO questionnaire for the Second Session of the Food and Drink Industries Committee held in December, 1991.
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CHAPTER 5

Safety and health issues in respect of women workers in the food and drink industries

Women's participation in paid employment has increased considerably in recent decades in many sectors throughout the world. In the clothing industry, for example, women make up 80 per cent or more of the workforce, particularly in the industrialized world, but also in some developing countries. Other sectors in which women workers make up a large proportion of the workforce include textiles, leather and footwear; and hotel, catering and tourism.¹ Their participation in paid employment is generally much higher in industrialized countries than in developing countries, since women have traditionally been engaged in unpaid household chores and subsistence agricultural work in the latter.

As in many other sectors, women's employment in the food and drink industries has expanded considerably in most countries, while men's employment has declined in some industrialized countries as a result of mechanization in the wave of restructuring. In the United States, for example, the number of women workers in the food industry increased by 7.3 per cent between 1980 and 1989 in contrast to a 4.1 per cent decline in male employment during the same period.

Similarly, in Belgium and Australia, women's employment in the sector increased by 17.8 and 9.9 per cent respectively, whereas men's employment declined by 4.3 and 10 per cent respectively between 1980 and 1988. In the drinks industry, both male and female employment declined in the United States by 18.6 and 2.4 per cent respectively between 1980 and 1988. In many developing countries, on the other hand, employment of both men and women has increased in the food and drink industries in recent years. In Kenya, for example, the number of men and women workers in the food industry increased by 32.6 and 55.5 per cent respectively between 1980 and 1988. The proportion of women in the total labour force of the food and drink industries ranges from as high as about 60 per cent in the former USSR to a very low percentage in some developing countries.²

Despite the fact that a much greater proportion of women is now employed in the food and drink industries, their working conditions are often inferior to those of men in general. A large majority of workers with unstable contracts are women. For example, women constitute 80 and 65 per cent of seasonal workers in Argentina and the former USSR respectively. In Australia, the former Federal Republic of Germany, Japan and the United Kingdom, women make up 73, 81, 91 and 88 per cent respectively of part-time workers in the sector.³

Although some women are highly qualified professionals, a large proportion of female workers are unskilled or semi-skilled workers who are employed on temporary or part-time contracts and are often paid on a piece-rate basis or receive hourly wages with few fringe benefits. Many are engaged in seasonal and labour-intensive tasks such as cultivating, harvesting, processing and canning fruit and vegetables. Many others perform tasks such as sorting and packing. Many of these tasks are among the first to be eliminated with the introduction of semi- or fully-automated production systems.

The study on the Finnish food workers referred to earlier examined in detail various factors attributed to occupational accidents and illnesses in the industry. According to the study, a total of 4,239 accidents were reported in Finland in 1984 in occupations statistically classified as pertaining to the food industry, of which 31 per cent involved women workers. The injured were classified into three different age groups; women's injuries accounted for 23 per cent among those under the age of 25, 26 per cent among those in between 25 and 44 years old and 50 per cent for those over 44 years old. The proportion of accidents occurring among women therefore increased with age.⁴

Differences were also found between men and women in relation to changes in work speed. The Finnish study reported that 68 per cent of women workers felt that their work speed had increased considerably during the past years, as opposed to 52 per cent of male workers. Again, there was an age factor, with older workers feeling that their work speed had intensified more than their younger colleagues.⁵ In the context of work tempo, the intensity required by work performance was also examined. The results showed that women felt more often than men (19 % as opposed to 12 %) that work was not getting done fast enough despite the efforts made. More often than men, women in each age group felt that they had worked to the limits of their endurance. This feeling was also more frequently expressed as age increased.⁶

A segregation of tasks by sex can be identified in the food and drink industries. Among female workers in the plants covered in the Finnish study, 21 per cent worked at a conveyor belt, 28 per cent at machines other than conveyor belts, 29 per cent at a worksurface, working mainly with their hands with the aid of various hand tools, and 21 per cent performed diverse duties at different places. In contrast, among male workers, 47 per cent performed diverse tasks at different places, 10 per cent worked at a conveyor belt, 18 per cent at a machine, 16 per cent at a worksurface and 9 per cent at a control panel.⁷ This indicates that more women tend to be engaged in repetitive tasks at a fixed work station.

When men and women workers covered in the study were asked how much of their work was of repetitive nature, 38 per cent of men replied that two-thirds of their work time involved repetitive movement as opposed to 59 per cent of women. Moreover, while 35 per cent of men responded that less than one quarter of their work was of a repetitive nature, only 10 per cent of women gave the same response.⁸ This finding confirms once again that women in the sector perform more monotonous work than their male counterparts.

The Finnish study also broke down occupational health problems by sex. Of the illnesses reported, musculoskeletal disorders, such as arthrosis of the cervical vertebrae and lumbar vertebrae, sciatica and rheumatoid arthritis, were the most common. Moreover, they were more prevalent among women workers than men. For example, 12 per cent of women

complained of arthrosis of the cervical vertebrae as opposed to 4 per cent of men. More women (17 %) than men (13 %) also suffered from arthrosis of the lumbar vertebrae and sciatica. Furthermore, 12 per cent of women were reported to have complained of rheumatoid arthritis as compared with 5 per cent of men. All these common diseases were also associated closely with age. For example, no men or women under the age of 25 years complained of arthrosis of the cervical vertebrae, while 21 per cent of those above 44 years old suffered from it. Age was also a significant factor in the cases of arthrosis of lumbar vertebrae, sciatica and rheumatoid arthritis.⁹

The other common diseases reported by the Finnish workers included chronic rhinitis and coughs, hypertension and eczema; their frequency rates were also examined by sex. The study found that, whereas more men complained of chronic rhinitis and coughs than women (27 % as opposed to 17 %),¹⁰ more women than men suffered from hypertension (9 % as opposed to 4 %).¹¹ On the other hand, no appreciable differences were observed by sex in the case of eczema.¹²

Although statistical data on the distribution of occupational accidents and illnesses by sex are rare, some information of this type is available concerning food and drink workers in the United States.¹³ According to these data, a higher proportion of women than men suffered from bruises and crushed parts of the body; inflammation of the joints and diseases of the nerves and peripheral ganglia, while a higher proportion of men reported cuts, fractures and sprains/strains. Women workers suffering from bruises and crushed parts of the body were particularly common in the dairy, fruit and vegetable processing, and fats and oil extraction branches. Inflammation of the joints, as well as diseases of the nerves and peripheral ganglia were prevalent both in the meat and grain milling branches.

It was repeatedly found that certain occupational accidents and illnesses from which women suffered more frequently than men were affected by age. As in many sectors, the average age of women workers in the food and drink industries also tends to be higher than that of men, because many women tend to re-enter the active labour market after a break of some years for the bearing and rearing children. By way of illustration, 51 per cent of women covered by the Finnish study were between the ages of 45 and 60 years, as opposed to 24 per cent of men.¹⁴

The situation is similar in Japan, where the accident rate among workers of 50 years or older is nearly twice as high as for those in the 20-29 age bracket. Moreover, when involved in an accident, older workers tend to suffer more severe injuries than younger ones. This would appear to suggest that working conditions and procedures for older workers should be adapted to their mental and physical capacities.¹⁵ For example, older workers who handle heavy loads are at greater risk from lumbago, while uncomfortable work postures, such as crouching and half-sitting, are more liable to result in musculoskeletal disorders among older workers.

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CHAPTER 6

Legal texts, policies and tripartite cooperation

6.1. International labour Conventions relevant to the sector

Protecting workers against dangerous and unhealthy conditions in the working environment through the establishment of international labour standards has been one of the most important missions of the International Labour Organization (ILO) since its foundation in 1919. These standards consist principally of international labour Conventions and Recommendations. Conventions are a form of multilateral international treaty, since they are open to ratification by member States and, once ratified, create specific binding obligations. The government of a State which has ratified a Convention is obliged to report regularly on its application, and complaints regarding alleged violations of the Convention may be made by other governments or by social partners. Recommendations, on the other hand, are intended to offer guide-lines for action by member States without imposing any specific obligations. ILO member States are required to follow certain procedures, including the submission of the texts of recently adopted Conventions and Recommendations to the legislative authorities, and to report on the measures taken or envisaged to give effect to the texts.¹

International labour standards in the field of occupational safety and health can be classified into four categories: those which provide protection against specific risks (such as asbestos and the guarding of machinery); standards which provide protection in specific branches of economic activity (construction, the maritime sector, mining); those which highlight specific protection measures (the medical examination of young workers, the prevention of occupational cancer); and standards which set policies for action, such as the Occupational Safety and Health Convention (No. 155) and Recommendation (No. 164), 1981, and the Occupational Health Services Convention (No. 161) and Recommendation (No. 171) 1985.²

The Guarding of Machinery Convention (No. 119) and Recommendation (No. 118) were adopted by the International Labour Conference in 1963. The Convention came into force in April 1965, twelve months after its ratification by two member States had been registered with the ILO. As of 30 November 1992, a total of 43 ILO member States had ratified the Convention.³

The Convention, which is applicable to all power-driven machinery, new or second-hand, in all branches of economic activity, provides that the sale, hire, transfer in any other manner or exhibition of machinery without appropriate guards shall, to such extent as the competent authority may determine, be prohibited by national laws or regulations. The obligation to ensure compliance with these requirements rests on the vendor or the person letting out on hire or transferring the machinery, or on the manufacturer. As far as the use of power-driven machinery is concerned, the employer is obliged to ensure that only machinery with appropriate guards is allowed in the workplace. Furthermore, the employer

is expected to bring national laws or regulations regarding the guarding of machinery to the notice of workers and to instruct them concerning the dangers in the use of machinery. No worker, on the other hand, is expected to use any machinery without the guards provided being in position.

The adoption of this Convention marked an important shift in the approach taken in the prevention of occupational accidents caused by dangerous machinery. Previously, regulations on the guarding of machinery had concentrated on safety rules for the operation of the machinery. However, the causes of accidents often lie in the design and manufacture of potentially dangerous machinery. Moreover, the manufacturer and, in turn, the purchaser may not be particularly concerned whether the machinery produced, sold or bought is equipped with the necessary safety devices. It had become evident that laying all the responsibility for accident prevention on the workers placed too much of burden on them, and that effective protection could therefore only be assured if this responsibility was shared equally by all those engaged in its production, purchase and use.⁴

The most apparent difference between the Convention and its accompanying Recommendation is that, while prescribing the same measures in respect of the sale, hire, transfer in any other manner or exhibition of dangerous machinery, the Recommendation also applies them to the design and manufacture of such machinery. It is important to emphasize that the guarding of machinery in practice begins in the design department. This concept is gaining importance from a legal point of view, with the effect that in most producing countries the designer or manufacturer now has to comply with safety and health legislation.⁵

The Working Environment (Air Pollution, Noise and Vibration) Convention (No. 148) and Recommendation (No. 156), 1977, are also very relevant to the food and drink industries. The Convention came into force in July 1979, and as of November 30 1992, it had been ratified by 27 member States. Although it applies to all branches of economic activity, a ratifying State may exclude, after consultation with the social partners, certain branches from its application. It also provides flexibility in the sense that, after consultation with the social partners, a ratifying State may accept the obligations of the Convention separately in respect of air pollution, noise or vibration. Three of the 27 States which have ratified the Convention have accepted the obligations in respect of air pollution only, while another State has accepted them in respect of air pollution and noise only.⁶ The rest have accepted the obligations in respect of all three hazard areas.

Article 4 of the Convention provides that national laws and regulations shall prescribe measures, which may take the form of technical standards and codes of practice, for the prevention and control of, and protection against, occupational hazards in the working environment due to air pollution, noise and vibration. The competent authority is called upon to act in consultation with employers' and workers' representatives in elaborating the measures adopted for the practical implementation of the Convention. It is also responsible for establishing criteria for determining the hazards of exposure to air pollution, noise and vibration and specifying their exposure limits, which must be supplemented and revised regularly in the light of up-to-date knowledge and data.

Employers are made responsible under the Convention for compliance with the prescribed measures and workers are required to comply with safety procedures relating to

the prevention and control of occupational hazards due to air pollution, noise and vibration. If the measures taken to keep the working environment free of hazards due to air pollution, noise or vibration fail to keep them within the prescribed limits, the workers must be provided with personal protective equipment by their employers. The competent authority is required to conduct regular supervision in respect of these hazards, and all persons concerned have to be adequately informed of potential occupational hazards in these areas.

One of the common features of Conventions Nos. 119 and 148 is the importance which they place on the consultation of employers' and workers' representatives by the competent authority in order to ensure the protection of workers against the hazards in question. This is particularly notable in Convention No. 148, which provides in Article 7(2) that "workers or their representatives shall have the right to present proposals, to obtain information and training and to appeal to appropriate bodies so as to ensure protection against occupational hazards due to air pollution, noise and vibration in the working environment."

Consultation of the representatives of workers by their employers is also covered by Paragraph 21(2) of Recommendation No. 156, which provides that workers' representatives should be "informed and consulted in advance by the employer on projects, measures and decisions which are liable to have harmful consequences on the health of workers, in connection with air pollution, noise and vibration in the working environment". This form of collaboration is further emphasized in Paragraph 24, which states that in order to enable workers' representatives to play an active role in respect of the prevention and control of these specific hazards, they should have the facilities and necessary time as well as "the right to seek assistance from recognized experts of their choice." Furthermore, tripartite collaboration is provided for in Article 5(4) of Convention No. 148, which provides that employers' and workers' representatives shall have the opportunity to "accompany inspectors supervising the application of the measures prescribed in pursuance" of the Convention.

In contrast to the above instruments, which deal with specific occupational hazards and risks, the Occupational Safety and Health Convention (No. 155) and Recommendation (No. 164), 1981, constitute the first attempt by the ILO and its member States to establish a systematic and comprehensive national policy on occupational safety and health for action at the enterprise level.⁷ Convention No. 155 came into force in August 1983, and has so far been ratified by 17 member States.

Convention (No. 155) and Recommendation (No. 164) apply to all categories of workers in all branches of economic activity and tripartite collaboration is fundamental to their effective application. Articles 4, 7 and 15 of the Convention and Paragraphs 7 and 9 of the Recommendation provide for measures to be taken to ensure tripartite participation in the formulation, implementation and review of policies and practical measures. The functions and responsibilities of the competent authority as well as of employers' and workers' representatives are set out more fully in Articles 6, 11, 16 and 18 of the Convention.⁸

The main responsibilities of the employer under the Convention and the Recommendation are to ensure, in so far as is reasonably practicable, the safety of the workplace, machinery, equipment and processes under their control. They are also required to take appropriate measures to ensure that the chemical, physical and biological substances

under their control are without risk to health, and where necessary, they have to provide adequate protective equipment to prevent any adverse effects on health. They are also required to establish measures to deal with emergencies, including first-aid facilities. Workers, on the other hand, are required to cooperate with the employer in the field of occupational safety and health and take reasonable care for their own safety and that of others who may be affected by their acts. They are also required to inform their supervisor of any situation which could constitute a hazard and which they cannot correct themselves, as well as to report any accident which occurs in the course of work.

The Occupational Health Services Convention (No. 161) and Recommendation (No. 171), 1985, are the other international labour standards which place emphasis on the need for a concerted effort by the tripartite partners with a view to establishing a coherent national policy on occupational health services. Adopted in 1985, the Convention came into force in February 1988, and has so far been ratified by 11 member States.

Convention (No. 161) and Recommendation (No. 171) set out a comprehensive approach to keeping the working environment safe and healthy. They attempt to achieve their objectives in a flexible manner, such as through the progressive development of services to cover workers in all undertakings and the establishment of occupational health services by means of laws, collective agreements or in any other manner approved by the competent authority in consultation with the social partners. The major task of occupational health services lies in the field of prevention, although they are also responsible for giving advice to employers' and workers' representatives on requirements relating to the establishment and maintenance of a safe and healthy working environment and the adaptation of work to the capabilities of workers in the light of their physical and mental health.⁹

The main functions of the services provided for in the Convention and Recommendation include surveillance of the working environment and of workers' health, participation in the design and implementation of training programmes in respect of health and hygiene and the provision of first-aid and emergency treatment in the event of accidents. Both the Convention and the Recommendation provide that occupational services should adopt a multidisciplinary approach. Their composition and the qualifications of the personnel should be determined in the light of the nature of the duties performed. Measures have to be taken to ensure adequate cooperation and coordination between occupational health services and other bodies concerned, and health service personnel have to enjoy full professional independence from employers and workers. However, in order to enable occupational health services to identify the relationship between health hazards and ill health at the workplace, full cooperation is required from employers and workers in providing information on any factors which may affect workers' health or any cases of illness.

The most recently adopted international labour standards which are very relevant to the food and drink industries are the Chemicals Convention (No. 170) and Recommendation (No. 177), 1990. The Convention has just been ratified by two member States and will come into force as of 4 November 1993.

Convention No. 170 also applies to all branches of economic activity in which chemicals are used and provides that employers' and workers' representatives are to be consulted on the measures to give effect to the Convention. The most important of these

is that each ratifying State undertakes to formulate, implement and periodically review a coherent policy on the use of chemicals at work. The competent authority is also given the power to prohibit or restrict the use of certain hazardous substances on the basis of a classification of all chemicals according to the degree of physical hazards. Another important provision of the Convention is that all chemicals must be identified and marked clearly.

The Convention sets out the responsibilities of all parties concerned for the purposes of its effective enforcement. By way of illustration, suppliers of chemical substances must ensure that chemicals have been classified, marked and labelled appropriately and that chemical safety data sheets have been prepared and provided to the employer. Employers, on the other hand, must ensure, inter alia, that all chemicals used at work are labelled and marked as required and that only the substances which have been correctly classified are allowed at the workplace. In addition, they are required to keep a record of hazardous chemicals used at work, which must be accessible to the workers concerned. They are also obliged to ensure that workers' exposure to chemicals does not exceed exposure limits and to minimize health risks through their choice of chemicals, technologies or working systems or, where recourse to the above measures does not suffice, through the provision of personal protective equipment to the workers. Employers are also responsible for providing adequate information and training to the workers in respect of the use of hazardous chemical substances. Workers in turn are called upon to cooperate with the employer and to comply with all the safety procedures in order to eliminate or minimize risks to themselves and to others concerned.

All the Conventions and Recommendations relevant to safety and health in the food and drink industries which are discussed above emphasize the importance of tripartite collaboration in minimizing safety and health risks and in preventing accidents and illnesses at the workplace. Collaboration between the competent authorities and the representatives of employers and workers often commences at the time when national policies on safety and health are being formulated and the measures to enforce them are being drawn up. This is because problems such as safety and health at the workplace could not be eliminated without the full cooperation and coordination of all the parties concerned.

In addition to international labour standards on safety and health, through which the ILO and its member States are endeavouring to achieve the goal of eliminating occupational hazards at the workplace, the ILO's Food and Drink Industries Committee has adopted conclusions and resolutions concerning occupational safety and health. These conclusions and resolutions are to be followed up in each member State and the progress made in complying with them reported at each session of the Committee. For example, the Second Session of the Committee held in December 1991 adopted Conclusions No. 28 concerning skill requirements, vocational training and retraining in the food and drink industries, which reemphasized the need for all workers to be fully informed of any potentially hazardous effects of new technologies. In Resolution No. 30 concerning occupational safety and health in the food and drink industries, which was also adopted at the Second Session, the tripartite constituents in member States are encouraged to promote the ratification of specific Conventions and to establish safety and health committees with a view to ensuring the observance of safety and health standards relevant to the food and drink industries.

6.2. National policy on occupational safety and health

Despite the fact that a large majority of the ILO's member States have not yet ratified the international labour Conventions reviewed above, each State has its own policy on occupational safety and health, which is enforced through legislative measures or other means which accord with national practice. According to the government responses to the questionnaire sent out in preparation for the Second Session of the Food and Drink Industries Committee, international labour standards play an important role in elaborating their national standards on occupational safety and health. While some statutes are aimed at specific sectors and branches of economic activity, most apply to all branches. The inspectors responsible for enforcing safety and health standards usually cover all economic branches, although in a few countries inspectors are assigned specifically to the food and drink industries.

National legislation is revised and amended as required in the light of new developments in technology and findings on how new industrial techniques affect the safety and health of the workers concerned. In Finland, the Occupational Health Care Act came into force in 1979 with the aim of preventing various occupational hazards in the workplace. In 1988, it was supplemented by the Occupational Safety Act, which emphasizes the significance of anticipatory labour protection and focuses on labour protection problems in respect of the working environment, working premises, methods of production, machinery and tools. Recent legislation in Germany includes the Dangerous Substances Ordinance of August 1986, which has subsequently been amended twice. This Ordinance regulates the sale and handling of dangerous industrial substances. In India, the provisions relating to the safety, health and welfare of workers employed in the manufacturing sector are contained in the Factories Act of 1948, which was amended in 1987. The amended Factory Act lays down that every employer shall ensure, so far as is reasonably practicable, the health, safety and welfare of all workers at the workplace. It also provides that designers, manufacturers, importers and suppliers shall ensure that articles used at the workplace be safe without risk to the health of workers when properly used.¹⁰ These are only a few examples of national legislation which has been amended and supplemented to reflect the changing working environment in industry as a whole.

The various processes for the formulation of national and regional statutes on occupational safety and health reflect the specialized nature of the subject. In the United States, the Occupational Safety and Health Administration (OSHA) in the Department of Labor can initiate standard-setting procedures in response to petitions from other parties, and particularly the Secretary of Health and Human Services (HHS), the National Institute for Occupational Safety and Health (NIOSH), state and local governments, any nationally recognized standard-producing organizations and employers' and workers' representatives. When OSHA judges that a specific safety and health standard is needed, any of several advisory committees may be called upon to submit recommendations. All advisory committees must have members representing the tripartite constituents, as well as one or more individuals designated by the Secretary of the HHS. Recommendations may also be made by NIOSH, which was established by the Occupational Safety and Health Act of 1970 as an agency of the Department of HHS. NIOSH conducts research into various safety and health problems and provides technical assistance to OSHA. When OSHA wishes to propose, amend or delete a standard, it publishes it in the Federal Register as a "Notice of

Proposed Rulemaking," to solicit written responses. A public hearing may also be requested. After this process, OSHA publishes in the Federal Register the full, final text of the new or amended standard and the date upon which it is to become effective, along with any other relevant information.¹¹

State laws and ordinances and the accident prevention regulations of employers' liability insurance associations in Germany are mutually complementary in the field of occupational safety and health. Accident prevention regulations include rules and prohibitions covering thousands of machines, types of equipment and technical systems. They stipulate the protective measures which have to be implemented in relation to individual machines and they set out rules of conduct for the workers who handle them. The detailed provisions relating to occupational safety and health which cannot be contained in laws, ordinances and accident prevention regulations are set out in other rules and regulations called "General Administrative Regulations" and "Instructions on Implementing Accident Prevention Regulations." These contain details of how safety and health laws and ordinances can be enforced, and are supplemented further by technical rules at a lower level. They include DIN (German Institute of Standardization) standards, MAK (Maximum concentrations of dangerous working substances at workplace) values of the German Research Institute and other guidelines. Since the adoption or modification of legislation requires a complicated parliamentary process, it is easier to formulate and modify safety and health rules based on verified scientific knowledge and working practices which are able to reflect the needs of the workplace more rapidly.¹²

National safety and health standards in many countries are formulated on the basis of joint discussions involving government authorities, employers' and workers' representatives and independent experts. When all the parties concerned are closely involved in developing regulations, at the national or local level, irrespective of whether they are laws or practical guidelines, the implementation of such standards at the enterprise level is rendered smoother and surer. This is particularly so when cooperation mechanisms are established involving employers and workers for their effective enforcement.

Although legislation is normally adopted at the national level, a number of countries, such as those of the European Communities, are now in the process of taking concerted steps in legislative matters. As from 1993, the 12 Member States of the European Communities plan to form the Single Market, in which people, goods and services will be able to move freely within the boundaries of the Communities. In an effort to achieve this goal, the member States are now adopting new legislation to bring the laws of each country into line with European Directives. One of the fields in which this is taking place is occupational safety and health.

While it is expected that legislation in some countries will have to be upgraded in order to comply with the Directives, no country is permitted to lower its standards in order to fall in line with EC Directives. The principle of minimum obligatory standards was established in the framework Directive adopted on 12 June 1989. The framework Directive makes it compulsory for employers to take a more active position with regard to safety and health at the workplace by, inter alia, developing an overall safety and health policy; evaluating risks, making up-to-date assessments and introducing preventive measures; recording risks and accidents; consulting workers on all aspects of safety and health;

providing personnel training in all those areas; and providing medical supervision of workers. All of its provisions are due to be integrated into the safety and health standards of member States by the end of 1992, or by 1995 at the latest in some exceptional cases.¹³

Many directives have since been formulated to amplify the framework Directive. The first individual Directive (89/654/EEC) adopted in November 1989 is on the subject of the workplace. It ensures that electrical installations are safe, ventilation is provided, and emergency exits are clearly marked and equipped with automatic emergency lighting. It also covers, *inter alia*, the provision of first-aid areas, rest rooms for people who perform heavy manual work, pregnant women and nursing mothers and proper equipment and facilities in the event of fire. The second (89/655/EEC) and the third (89/656/EEC) Directives, also adopted in November 1989, concern work equipment and personal protective equipment. The former emphasizes that machines must be safe, fitted with control systems which are clearly visible and easily accessible, and be equipped with an emergency stop sequence. The latter provides that personal protective equipment has to be comfortable (not impede movement) for work and compatible with other protective equipment.¹⁴

In addition to these directives, the one which is most relevant to the food and drink industries concerns measures of protection against the risks resulting from exposure to biological agents (90/679/EEC). Biological agents are classified into four groups. The agents contained in groups 3 and 4 are the most dangerous and may constitute a serious threat to workers. Once again, employers are made responsible for ensuring the safety of their staff by conducting risk evaluation, formulating preventive measures, providing adequate training and furnishing all available information.¹⁵

Adequate training of workers and the dissemination of information is essential for the implementation of safety standards. Machine-related accidents often occur either due to the malfunctioning of the equipment or its inappropriate operation by the workers concerned. Accidents of these types can often be avoided through the adequate training of workers in the proper operation and maintenance of equipment. Because of the increased level of mechanization in the food and drink industries, training in the proper operation of machines has taken on even greater importance. Although the provision of such training is required by law in many countries, the training which is actually supplied may be inadequate, since many accidents involving machinery are still reported.

The Industrial Safety and Health Law in Japan requires the employer to provide training to newly recruited workers, including part-time and seasonal workers, workers reassigned to new tasks, workers assigned to dangerous tasks involving toxic substances and to newly appointed foremen and supervisors. The training curriculum, depending on the needs of the trainee, covers any combination of the following areas: the hazards, toxicity and proper methods of handling machines and raw materials used at work; methods of handling safety equipment and procedures to control harmful substances; work procedures; inspection prior to the commencement of operations; the causes and prevention of occupational illnesses which may arise from the performance of the work; keeping the workplace orderly; first aid in the event of accidents; the determination of work methods and the assignment of workers; the guidance and supervision of workers; the maintenance of machinery, equipment and the workplace; and decision-making in the event of an emergency.¹⁶

However, training has to be provided in accordance with a systematic plan to produce a desired result. In the first place, any safety problems in the workplace have to be identified. The next step is to survey and analyse the machines, equipment and tools used, the operations performed, the raw materials employed and the accidents which have been reported. Based on these data, a training plan with a specific duration, curriculum and methods can be decided upon. While implementing the plan, it is essential for the trainer to confirm at each stage that the trainees have learned each lesson thoroughly, since the aim of the training is for the trainees to be able to use the knowledge and skills in their actual work setting.¹⁷

Conducting training is very costly and usually only large enterprises are equipped with adequate instructors, training materials, equipment and facilities. Therefore, the training which is needed for small and medium-sized enterprises in Japan is undertaken collectively by the local employers' association or by semi-public agencies, such as the Japan Industrial Safety and Health Association (JISHA). JISHA has established the Safety and Health Education Centre to train future trainers in occupational safety and health. It has also established safety and health service centres in a number of cities, in order to make training facilities available to small and medium-sized enterprises for the training of their staff.¹⁸

In the United States, OSHA runs 72 service area offices which provide a variety of information services and technical advice. In addition, the OSHA Training Institute in Illinois provides basic and advanced training in safety and health for federal and state employees as well as for employers' and workers' representatives. The training courses cover the areas of electrical hazards, machine guarding, ventilation and ergonomics. OSHA also provides financial assistance to non-profit-making organizations which develop training programmes for employers and workers in the field of safety and health.¹⁹

In order to raise the awareness of workers in relation to safety and health in the workplace, various workers' organizations are also taking an active role in developing training materials which meet the specific needs of particular industrial activities.

6.3. Tripartite cooperation

The importance of cooperation between the government authorities responsible for enforcing safety and health regulations and employers' and workers' representatives cannot be overemphasized in minimizing hazards in the working environment and reducing occupational accidents and illnesses. To facilitate tripartite cooperation, international labour standards and national legislation have spelled out in detail the role and responsibilities of each of the tripartite constituents.

Emphasis is now placed on the prevention of accidents and diseases rather than on the treatment of injuries and diseases. Since workers are in the best position to identify workplace hazards, they can make a valuable contribution when the authorities draft safety legislation in consultation with the parties concerned. The system is mutually reinforcing, a type of "virtuous circle". Adequate training helps workers to become more aware of safety and health problems in their own work environment, and their heightened awareness facilitates smoother enforcement of rules as far as their responsibilities are concerned. Moreover, employers are generally aware that a safe and healthy working environment is an

essential factor in ensuring the prosperity of both the enterprise and the workers, and that the achievement of such a working environment requires close cooperation and regular consultation between the two groups at all levels. However, employers also tend to emphasize the need to obtain reliable scientific data which the authorities can analyse before establishing any new rules. Furthermore, they also tend to feel that the authorities should also analyse the economic consequences of each rule in order to ensure that business competitiveness is not lost as a result of its enforcement.²⁰ The key for employers and workers is to find common ground based on the principle that ensuring safety and health at the workplace is in the interests of both parties.

Safety and health authorities are responsible not only for drawing up regulations in consultation with the social partners, but also for enforcing the implementation of standards through inspection of workplaces. In the United States, employer's and workers' representatives are given the opportunity to accompany the inspector during inspection visits. If there is a plant safety committee, a worker member of the committee is usually selected as the worker representative to accompany the inspector. Under no circumstances is the employer permitted to appoint the worker representative for this purpose. The inspector may stop and question any worker, in private if necessary, and workers are protected under the Occupational Safety and Health Act for exercising their safety and health rights. After the visit, the inspector, the employer and the worker representatives engage in a free discussion of any safety problems which need to be improved. The employer may be penalized by the OSHA area director for serious violations of regulations, but only after a full report has been submitted.²¹

Although inspectors can play a significant role in workplace safety and health, government budgets in most countries are not sufficient to hire and train enough of them to cover all establishments. For example, the director of the AFL-CIO's occupational safety and health department stated before a congressional committee after the tragic fire in a poultry plant in North Carolina, U.S.A., in which 25 persons were killed and 50 others injured, that a total of only 2,000 federal and state inspectors were inspecting approximately 5 million establishments.²² A simple calculation shows that a large majority of establishments are never or hardly ever inspected. In view of the limitations of the government inspection system in most countries, complementary means of enforcing safety and health codes are needed.

In view of this situation, through its major programme on occupational safety and health, the ILO promotes the establishment of bipartite safety and health committees at the enterprise level. Because of its close ties with employers' and workers' organizations, the ILO is in the best position at the international level to promote such bodies. Safety and health committees, composed of the representatives of management and workers, should meet regularly with government inspectors in workshops and seminars where safety and health information is exchanged and disseminated. The committees should be responsible for monitoring their own workplace and for training fellow workers to protect themselves. Committee members are responsible for raising the awareness of all concerned that their safety and health is in their own hands. Although more enterprises are setting up bipartite safety and health committees in many countries, much progress still needs to be made in this respect.

There are basically two types of safety and health committees. The first is a union committee composed of safety representatives elected among workers who meet to discuss problems and work out ways of solving them. The members may represent either a large workplace or a number of workplaces. In order to be effective, they have to work closely with other union committees, such as workers' education and women's committees. The other type is joint management and workers' committees. These are usually composed of an equal number of employer and worker representatives and should have the authority to make binding decisions in the area of safety and health.²³

National practice in respect of safety and health committees varies considerably at the national level. In the twelve Member States of the European Communities, the establishment of such committees is compulsory by law, although the law only applies to enterprises employing 20 or more workers in Denmark and Ireland, 35 or more in the Netherlands, 50 or more in Belgium, Greece and France, 100 or more in Spain and 150 or more in Luxembourg. In the United Kingdom, committees only have to be set up upon the request of workers' representatives.²⁴ In view of the fact that there are a significant number of small establishments in the food and drink industries, this would tend to imply that many workers in the European Community are employed in establishments where such committees do not exist.

The composition of safety and health committees varies from country to country, although in most cases they are basically bipartite. In Belgium, the committee must have an equal number of employer representatives (including the works doctor and the head of safety) and worker representatives, although it is chaired by the employer. In Denmark, it is composed of one management representative, two team leaders and two worker representatives. In Portugal and the United Kingdom, on the other hand, it is only composed of worker representatives. Starting in 1993, however, the safety and health committees in all the Member States of the European Communities must be brought into line with the EC Directive, which prescribes that the committee be composed jointly of the representatives of management, workers and the government for balanced participation. According to the Directive, the committee members are to be provided with information concerning risks at the workplace, a list of industrial accidents involving at least three days absence from work and the reports submitted to the competent authorities. They have to be consulted in good time on all questions affecting safety and health at work and on training programmes and measures for the prevention of accidents.²⁵

At a large food processing plant outside Tokyo, which the author had the opportunity to visit in the spring of 1992, the safety and health committee was composed of nine members representing the management and an equal number representing the workers. The committee meets and conducts a safety patrol of the plant once a month, with a check list of occupational safety points to be examined. If any point is found to need improvement, it is recorded in the report and the members of the committee are responsible for correcting it before the next safety patrol. This mechanism seems to work rather well in this plant, since only two workplace accidents had been reported in 1990 and 1991 respectively. One of the accidents which occurred in 1990 was an injury to the hand of a worker which had been jammed in a conveyor belt. The worker had been away from work for 147 days. The other was a minor injury sustained in a fall from which no workdays were lost. The injury to a finger of a worker, which resulted in the loss of three workdays, was the most serious

workplace accident reported in 1991. The committee members reported that the workers were involved in more traffic accidents while commuting to and from work than workplace accidents.²⁶

In general, safety and health committees are established in relatively large enterprises, and are unlikely to exist in the hundreds of thousands of small enterprises which operate in many countries, including in the industrialized countries. The ILO and its tripartite constituents therefore need to pursue their endeavours to promote these bodies in order to improve protection in the food and drink industries. In the plants where such bodies already exist, their members need to ensure that the mechanism functions as intended. In order to do so, they need to be sufficiently well-trained in up-to-date knowledge and working methods. This is particularly important in view of the fact that new technologies which may have an adverse effect on the safety and health of workers are constantly being introduced. Tripartite cooperation is essential to the achievement of the desired goals in the field of occupational safety and health at the workplace.

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Les conditions d'emploi des travailleurs des plantations: Compte-rendu d'un atelier tripartite national (P. Egger)	1993	SAP 2.33/WP.58
Ajustement structurel, politiques agricoles et efforts d'adaptations paysannes en Côte d'Ivoire (M. Allechi, Y. Affou, D. Ngaresseum)	1993	SAP 2.34/WP.59
White-collar unionism in selected European countries: Issues and prospects (E. Kassalow)	1993	SAP 4.17/WP.60
Les enjeux des services bancaires: hommes, techniques et marchés (J. d'Alançon)	1993	SAP 4.18/WP.61
Occupational Safety and Health in the Food and Drink Industries (Shizue Tomoda)	1993	SAP 2.35/WP.62