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Risk Assessment in the Working Environment in Estonia

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NOTES

Risk Assessment in the Working Environment in Estonia

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The first step to chart hazards in the working environment in Estonia (labour force: 0.65 million) was taken by the National Board of Health Protection in the beginning of 1996.

The existing chemical, physical, and biological agents in the working environment were investigated with the help of local health inspectors in all counties. An identification of hazards and workers at risk was carried out. The results of the analysis showed that 16% of Estonian industrial workers are exposed to different hazards: 20,000 persons are exposed to noise, 11,000 are working in the conditions of vibration, 10,000 are affected by unsatisfactory microclimate, 6,000 complain about long-lasting work in a compulsory posture, the overexertion of eyes is suffered by 5,500 persons, and physical overload by 3,500 workers. In the group of chemical hazards the greatest numbers of workers are exposed to organic dust (6,500) and welding aerosols (5,400), followed by petroleum products (2,700), and oil-shale dust (4,300). The measurements of working conditions showed that an average of 30.3% of the results are above the standards. Proposals for the improvement of the situation in occupational safety and health are presented.

occupational risks   noise   vibration   chemicals

1. INTRODUCTION

Estonia (area: 45,200 km^2, population: 1.5 million, labour force: 0.65 million) is the smallest of the Baltic States. Like other post-socialist countries, also in Estonia the economy has undergone great changes during

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1991–1996. In work safety and health this means that the structure of hazards in the working environment has changed (Tint, 1996). Big enterprises have been divided into smaller ones, which now produce products that may cause other kinds of danger. The suppliers of equipment and the raw materials have changed, too. More attention is paid to ergonomical factors in the working environment.

Estonia's striving towards the European Union has caused the necessity to re-estimate the problems of safety and health considering hazards and risks. Every activity in everyday life is connected with risk. Sometimes it is bigger (work in a factory, building site), sometimes smaller (office work). For example, safe use of chemicals (work with an acceptable risk) could be described as a situation in the working environment where the permissible content of a hazardous substance in the air has been determined considering all the possible harmful effects on the worker's health.

The general principles concerning risks, safety, and health protection are presented in the Framework Directive on the introduction of measures to encourage improvements in the safety and health of workers at work (89/391/EEC; European Commission, 1996):

1. to avoid risks,
2. to evaluate the risks which cannot be avoided,
3. to combat the risks at source,
4. to adapt the work to the individual,
5. to adapt to technical progress,
6. to replace dangerous work by non-dangerous,
7. to develop an overall prevention policy including aspects of technology, organization of work and working conditions, and social relationships,
8. to give priority to collective protective measures over individual protective measures,
9. to give appropriate instructions to the workers.

Risk management (Figure 1) consists in the identification of hazards, followed by the identification of workers exposed to hazards, assessment of risks (risk estimation and risk evaluation), development of means for risk reduction, and their implementation. The assessment of risks in the working environment in Estonia is complicated as the former Soviet Union exposure limits on chemicals in the air of the working environment are not valid any more and Estonia's own standards have not been developed yet.

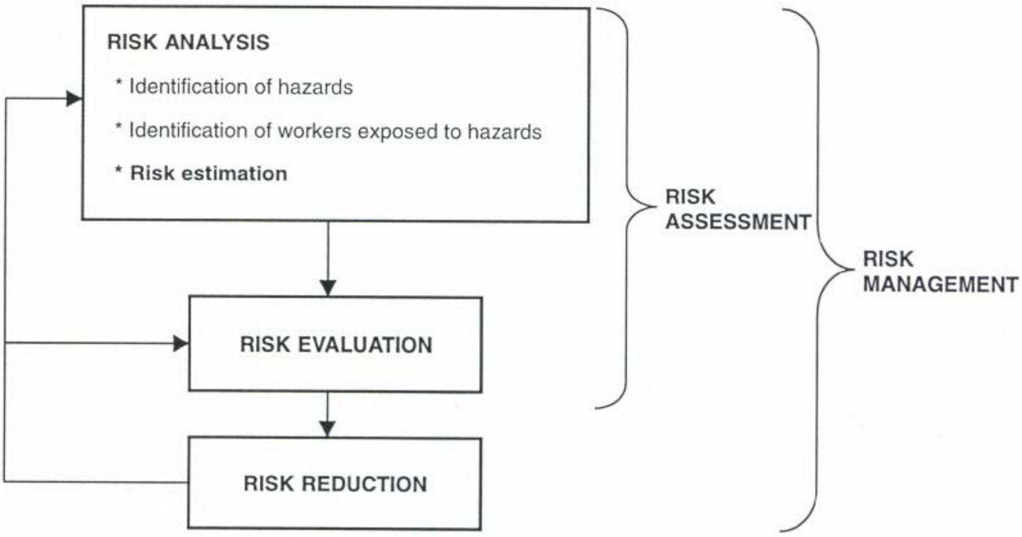

Figure 1. Risk management in the working environment.

The first step to chart hazards was taken in a joint study of Tallinn Technical University and the National Board for Health Protection of Estonia (NBHP) at the beginning of 1996. The existence of chemical, biological, and physical hazards in the working environment was investigated. An identification of hazards and workers at risk was carried out.

2. MATERIALS AND METHODS

A questionnaire was worked out by the NBHP with the character of Estonian economic activities taken into consideration (mainly oil-shale, textile, wood processing, building materials industries, transport and loading of hazardous chemicals). The aim of the check-list was to gather data on the existing risk factors in the working environment and to clarify the number of workers at risk.

According to the arrangement of occupational diseases in the European Union Directive 90/326/EEC (Commission Recommendation..., 1990), the risk factors in the questionnaire were divided into 5 groups (their number is given in parentheses): physical (8 hazards, such as noise, vibration), physiological (4 hazards, such as physical overload, overexertion of eyes, voice), biological (7 hazards, such as antibiotics, protein and vitamin concentrates, ferments), chemical substances (62 different groups, such as benzene and its derivatives, nitric acid and its compounds, carbon disulphide), and industrial aerosols (9 groups, e.g., dusts containing oil-shale, cotton, wood, asbestos, glass fibres).

Data on existing risk factors and workers at risk were gathered with the help of local health inspectors in all counties of Estonia. Industrial activities, transport, storage, and service sectors were included. The statistical processing of the questionnaire was carried out by the risk factors (noise, vibration, physical overload, phenols, asbestos, etc.).

3. RESULTS

Altogether 110,000 cases in which workers were exposed to different hazards (3,600 or 32.7% of them were connected with women) were identified. One worker can be exposed to several hazards, so the number of hazardous cases is larger than the number of workers at risk.

The analysis showed that physical and physiological factors prevailed (Figure 2). At least 20,000 persons are working in the conditions of noise (4,400 or 22% of them women): in oil-shale mining, wood and

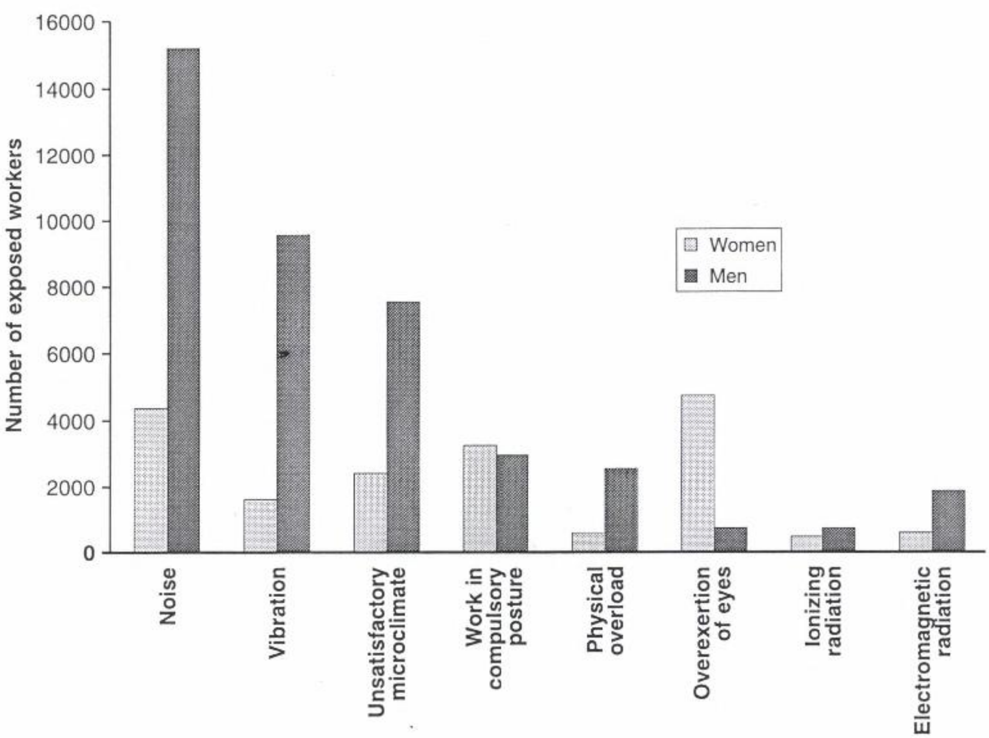

Figure 2. Physical and physiological risk factors and workers at risk.

furniture, textile, and metal industries. More than 10,000 are exposed to vibration in power engineering, agriculture, building materials industry, textile manufacturing, railways, and transport; 10,000 are affected by unsatisfactory microclimate (humidity, high or low temperatures, draught, insufficient or wrongly directed ventilation). The existence of bad microclimate was identified in power engineering, building materials, shipbuilding, chemical industry, oil-shale mining and processing; thousands of workers engaged in loading and transport are affected. High-frequency electromagnetic radiation affects 3,000 and ionizing radiation—1,200 persons.

More than 6,000 workers complain about long-lasting work in a compulsory posture (3,300 or 55% of them are women): They are employees mainly in sewing and other textile industries, drivers, and other transport workers. Overexertion of eyes is suffered by 5,500 persons (4,700 or 85% of them are women) employed in spinning fabrics, repairing electrical equipment, finishing clothes, air transport, and other transport services. Physical overload is suffered by 3,500 workers.

In the group of industrial aerosols (dusts, fumes, mists), the greatest number of workers is exposed to cotton, wood, and so forth, organic dusts (6,500), mainly in wood and furniture industry, spinning, weaving, finishing of fabrics and clothing industry, peat cutting. Welding aerosols

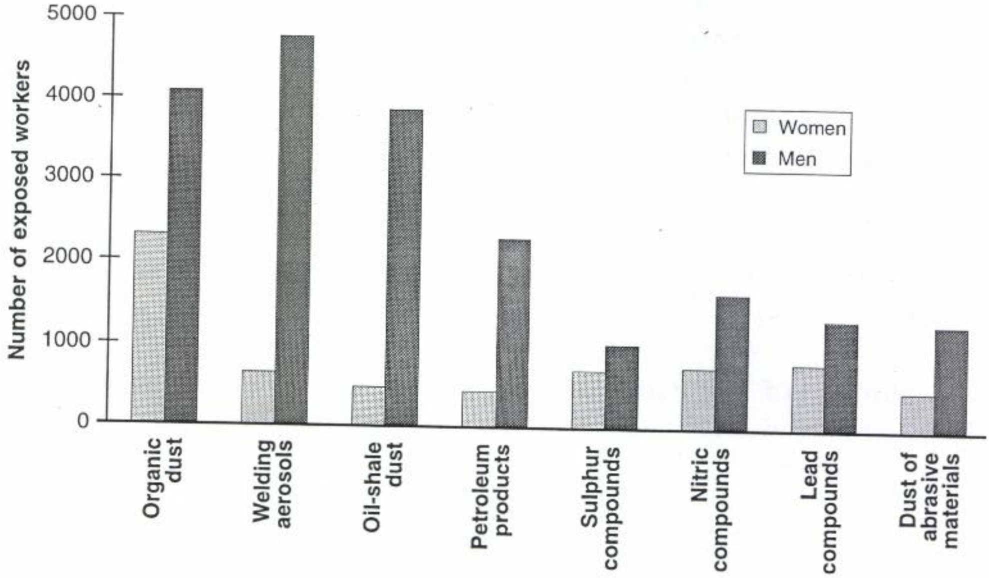

Figure 3. Chemical risk factors and workers at risk.

affect 5,400 persons: in repairs of motor vehicles, other apparatus, machines for agriculture and forest husbandry, shipbuilding and repairs, and so forth. Exposure to oil-shale dust was experienced by 4,300 persons. From chemicals, the greatest number of workers is affected by petroleum products (2,700), nitric (2,400) and lead (2,200) compounds, more than 1,000 workers are in contact with benzene, manganese, nickel, and phenols (Figure 3).

Altogether 27,500 workers are exposed to 57 different groups of chemicals (from the 62 investigated) and 22,000 to various industrial aerosols. Female workers constitute 35.6% of the workers with jobs in which chemicals and aerosols are used or produced. Organic dust (mainly cotton) is first, affecting 2,300 female workers (35.7% of all the examined workers); 775 workers are exposed to biological hazards (antibiotics, protein and vitamin concentrates, ferments, fodder yeast).

4. DISCUSSION

One of the obvious problems for Estonia in the field of work safety and health is the high rate of fatal accidents and the low number of registered occupational illnesses. Solutions must be found for improving safety and health at workplaces. The reform of occupational health system is underway. However, its progress is too slow. In practice, today's situation is even worse than 5–6 years ago. The rapid development of market economy, worsening of the workers' social security, unemployment, deficiencies of legislation, insufficient funding of the occupational health reform, and so forth, have created a number of new problems whereas the old ones have remained.

4.1. Cases of Occupational Diseases Are Registered Quite Rarely

The number of registered occupational diseases in Estonia in 1996 (Roots, 1996) was 174 (30% of them were suffered by female workers). The first places on the list were taken by vibration disease (28.7%), radiculitis, and other physical overload traumas (28.2%), followed by erysipelas (13%) and hearing loss due to noise (9.2%). The changes in the structure of occupational diseases during 1990–1996 are presented in Figure 4.

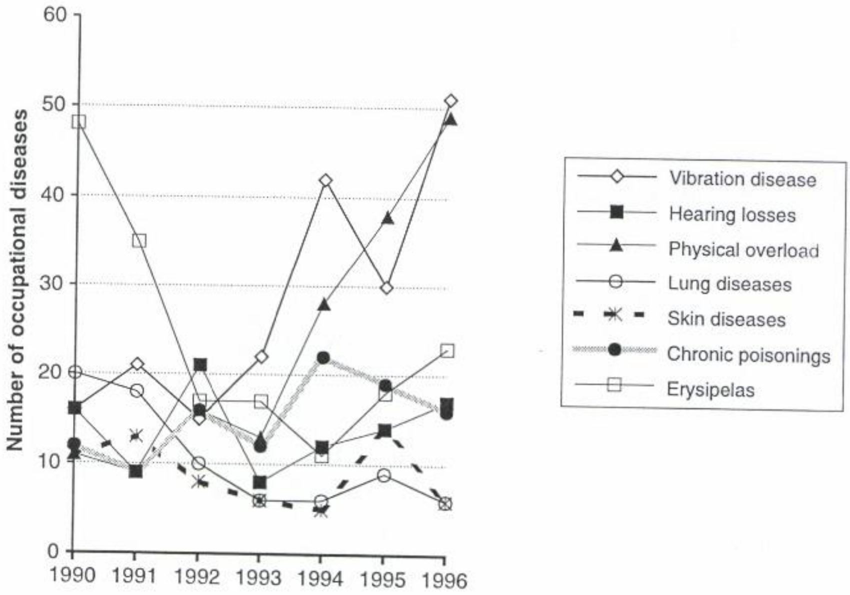

Figure 4. Changes in the structure of occupational diseases (1990–1996).

4.2. The Disease Is Diagnosed at a Late Stage

Some persons suffer several occupational diseases, for example, vibration disease is accompanied by hearing loss, musculoskeletal disorders, or both. This occurs in car and tractor drivers engaged also in the manual handling of loads. Compared with previous years, musculoskeletal disorders have been registered more frequently ("Occupational health in Estonia," 1996). Chronic occupational disease occurs under the long-lasting influence of a risk factor and very often the workers sent to the Clinic of Occupational Diseases are not working any more on the job that had caused the occupational disease.

4.3. Lack of Occupational Health Physicians

The number of registered occupational diseases in Estonia is very much lower than, for example, in the Nordic countries (Antti-Poika, 1993). However, this phenomenon has its reasons. In Estonia, the workers whose health has been damaged in the working environment are sent to the specialists only if the illness is already chronic. There is no possibility to diagnose the illness in its initial stage because of the lack of occupational health specialists at enterprises and firms. Moreover, occupational health doctors are not educated in Estonian tertiary-level schools nowadays.

The structure of occupational diseases is in accordance with the occurrence of risk factors in the working environment. The greatest number of workers is exposed to noise, vibration, physical overload, and to work in compulsory postures. The diseases caused by these factors also come first in the structure of occupational illnesses.

4.4. Control Measurements Show Shortcomings

Control measurements of the working conditions at the enterprises (Roots, 1996), made by the NBHP (Figure 5), showed that noise did not correspond to the standards in 55.8% of the workplaces, microclimate in 24.4% of cases, vibration level was too high in 50.5%, electromagnetic fields did not comply with the standards in 6.4%, and ionizing radiation in 1.8% of cases. The concentrations of chemical substances and dusts in the workplace air were higher than standards in 34.2% and 41.8% of cases, respectively.

According to the Estonian Labour Protection Law (1992), the employer has to guarantee the measurement of working conditions for

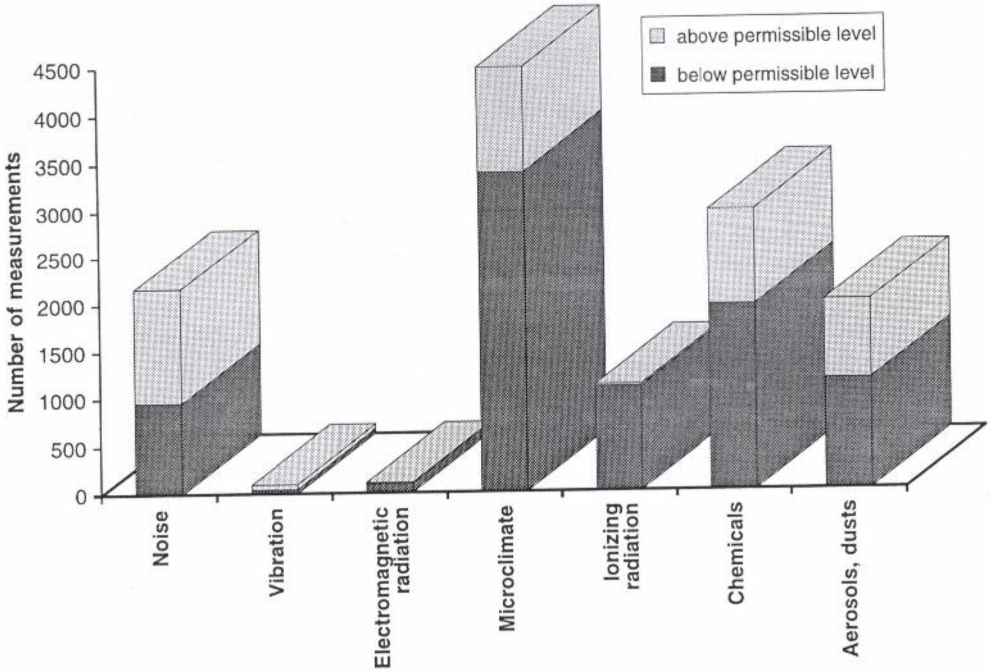

Figure 5. Measurements of working conditions. Compliance with standards.

a 1–2 year period depending on the measured index. However, the number of testing laboratories (recognized by the Estonian Standardization Board) is small (5). Moreover, this work is rather expensive.

The inspection of the organization of health examinations for workers working in hazardous conditions showed that health examinations were not at the required level in 26% of the inspected enterprises.

4.5. Former Soviet Standards Are Not Valid Any More

Former Soviet standards and occupational exposure limits have not been valid any more in Estonia since the beginning of 1997. This is the main reason why estimating risks and follow-up supervision is complicated. Nevertheless, work on elaborating exposure limits is unsatisfactory. Establishing new, health-based exposure limits is taking too much time. At the moment, only the standards regulating microclimate in the working environment and the safety of Video Display Units are valid in Estonia.

4.6. Great Number of Workers Exposed to Different Chemicals

The greatest concern is the large number of people exposed to chemicals, even though big chemical factories have disintegrated and are not always producing chemicals any more. Besides they have dismissed a large number of workers. The present high exposure to different chemicals is connected with the increasing number of petrol stations and loading work at ports and railway stations, as large amounts of dangerous chemicals are transported through Estonia. The problems with the increasing number of petrol stations and transit of chemicals will probably increase in the near future.

4.7. Welding Aerosols, Carcinogenic Substances

The emission of dangerous aerosols during the welding of different materials (non-ferrous or painted metals) on ready objects (e.g., ships) is also worrying. These substances may be carcinogenic (Aitio, 1991; Kalliokoski et al., 1992). Occupational poisonings are mainly caused by organic solvents (mainly affecting house painters) and by manganese from welding aerosols. As more plastic materials come into use, the welding process should become less important. However, figures indicate the opposite tendency. Welding is used in a large number of small enterprises, whose management's and, therefore, also the workers' knowledge about occupational safety may be inadequate.

The buildings for production are not always suitable, with old workshops built for other purposes being used. For example, ventilation systems designed for cattle breeding are not suitable for furniture production.

4.8. Workers' Low Knowledge of Safety

In the factories, there is a great need to get information on different topics such as the toxicity and fire risk of the materials used in the production (Tint & Saarela, 1994). Workers do not use personal protective equipment, especially if it decreases the intensity of their work. However, the greatest possibility to improve the safety and health in post-socialist countries is the change in the attitude to safe work methods by everyone participating in the manufacturing process.

5. CONCLUSIONS

Of Estonian industrial workers, 16% are exposed to hazards (in the first place noise, vibration, physical overload, chemicals). Illnesses caused by these factors constitute the majority of occupational illnesses in Estonia.

On the basis of the investigation, the following can be suggested:

5.1. Establishment of New Exposure Limits

The establishment of new exposure limits, first of all for chemicals, noise, and vibration should not be put off. Risk factors must be charted, measured, controlled with respect to the exposure limits, and collective protective equipment must be developed.

5.2. Risk Charting, Risk Control

Firms and enterprises are closing down all the time and new ones are created. So, data about existing risk factors should be revised every 5 years.

The results of the investigation can be used for predicting changes in the structure of occupational diseases in the future, improving the arrangement of periodic medical examinations, and organizing control measurements in the working environment.

The implementation of the means for risk reduction is up to the management of the enterprises and could be promoted by the government's and press's positive attention to safe work methods and clean working environment.

5.3. Design of Collective and Control Over the Use of Personal Protective Equipment

Ventilation systems and other collective protective equipment should be planned—with consideration for the character of the production—already when designing industrial buildings. Moreover, professional occupational hygienists should be involved in designing processes (Swuste, Corn, & Goelzer, 1994). Control over the use of personal protective equipment by workers is needed.

5.4. Further Investigations in the Working Environment

The results will be first used by the work-group created by the author for developing health-based exposure limits for organic solvents and their charting in the working environment in Estonia. This will be followed by work on establishing standards for all the more frequently occurring chemicals in the working environment in Estonia.

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