

4. Towards New Prevention Strategies



Joan Benach
Occupational Health Research Unit.
Department of Experimental
Sciences and Health. University
Pompeu Fabra, Barcelona, Spain

C. Muntaner
Department of Behavioral
and Community Health and
Department of Epidemiology and
Preventive Medicine. University of
Maryland-Baltimore, U.S.A.

F. G. Benavides
Occupational Health Research Unit.
Department of Experimental
Sciences and Health. University
Pompeu Fabra, Barcelona, Spain

M. Amable
Occupational Health Research Unit.
Department of Experimental
Sciences and Health. University
Pompeu Fabra, Barcelona, Spain
Department of Occupational
Health. Ministry of Health and
Social Affairs, Buenos Aires,
Argentina

P. Jódar
Department of Political and Social
Sciences. University Pompeu Fabra,
Barcelona, Spain

A new occupational health prevention for a new work environment : needs, principles and challenges

Abstract

At the turn of the XXlth century, the emergence of new forms of work organization are transforming what had become standard forms of work arrangement in industrialized countries. In this new work environment, new firms, new types of workers and new risk factors are powerfully emerging. Contrary to common belief, we argue that emergent occupational health hazards should not be approached only as "technical" or "economic" value-free problems. Rather, we contend that many of the new challenges faced by occupational health policy are largely related to professional values as well as to the political ideologies and economic interests of key players in the decision-making process. Some of the key principles needed to put into action efficient and equitable occupational health policies in the new work environment are discussed. We end with an alternative proposal on the necessary conditions and settings to address the new challenges that are needed to reach effective occupational health policy.

Introduction

Working conditions have changed dramatically in the two last decades. At the turn of the XXlth century, the growth in the internationalization of investment, production and trade, the political resurgence of flexible labor markets, the application of new technologies in computing and robotics to a large array of workplaces, and the emergence of new forms of work organization are transforming what had become standard forms of production in industrialized countries. In this new work environment, new companies, new types of workers and new risk factors are powerfully emerging (1, 2, 3).

These changes in the labor process call for a radical change in occupational health prevention. The combination of old and new occupational hazards call for an integrated preventive approach which needs to redefine occupational health policies and services. Under these circumstances, improving occupational health for all workers requires implementing several essential steps that integrate research and practice :

- search for appropriate knowledge of occupational health needs;
- implementation of policy strategies and interventions;
- evaluation of processes and outcomes to assess the efficiency of our interventions.

Putting this model into practice, however, is not easy. There is no institutional assurance that those steps will be followed in the real world of occupational health policy. The mere assessment of occupational health hazards does not imply that proper strategies will be developed (4). Similarly, technical reports with an exhaustive list of strategies and actions do not necessarily mean effective prevention. Even the implementation of occupational health laws is a necessary but not sufficient condition to increase prevention at the workplace (5).

The gap between occupational health research and policy on the one hand, and change in the workplace needs to be better understood. To understand this lack of correspondence it is crucial to analyze the key principles that govern the occupational health decision making process. Contrary to common belief in many occupational health circles, we argue that emergent occupational health hazards should not be approached only as 'technical' or 'economic' value-free problems. Rather, we contend that many of the new challenges faced by occupational health policy are largely related to professional values in response to emerging changes in labor relations. Thus, we argue that the political ideology and the economic interests of key players in the occupational health decision-making process cannot be avoided. Occupational health is more than ever linked to the fate of labor market and social policies.

We review some of the key emerging occupational needs in occupational health research and policy making special emphasis on the European Union. We discuss key principles needed to put into action efficient and equitable occupational health policies in the new work environment. We end with an alternative proposal on the necessary conditions and settings to address the new challenges that are needed to reach effective occupational health policy.

Emerging needs in occupational health research and policy

According to the World Health Organization (WHO) and other international organizations "every citizen in the world has a right to healthy and safe work and to a work environment that enables him or her to live a socially and economically productive life" (6). In spite of those

good intentions, the reality is that at the beginning of the XXIth century the workplace is still a dangerous place to work for the majority for workers and a death trap for millions. Major occupational health needs include traditional problems such as unemployment and physical, chemical, and biological hazards, as well as modern problems such as those caused by psychosocial factors or new types of flexible employment. Moreover, those risks are unequally distributed by country, economic sector, social class, gender and ethnicity.

Moving from unemployment to precarious employment

Although it might sound counterintuitive, for most workers the first occupational health hazard is the lack of work. There is overwhelming evidence that unemployment is strongly associated with mortality and morbidity, harmful lifestyles and reduced quality of life (7). At present, 19.6 million in the European Union (8). However, today the frontier between many types of flexible employment and unemployment is becoming blurred and workers experience a variety of dynamic employment forms ranging on a continuum from unemployment through underemployment to satisfactory employment or even overemployment (as in forced overtime). The 'standard' full-time permanent job with benefits is decreasing while new types of 'flexible' work such as home-based work, temporary work, informal work, among others, with reduced job security compensation and impaired working conditions are growing (9). In Europe, 'flexible' employment (defined as part-time workers, workers with a temporary contract and self-employed) increased by 15 per cent in the period 1985-1995 (10). Today, 'precarious paid employment' (defined as fixed-term and temporary contracts) account for at least 15% of paid employment in the EU ranging from 9% in Luxembourg and Austria to 40% in Spain (11).

Since new forms of work organization and flexible employment are likely to share some of the unfavorable characteristics of unemployment it seems plausible that they could also produce adverse effects on health (12,13). The experience of job insecurity has been associated with psychological ill health, and insecure jobs tend to involve high exposure to work hazards of various kinds (14,15,16,17,18) while there is some evidence

with regard to the health effects of different types of 'flexible' employment (19). In the EU, in comparison to permanent workers, employees with temporary contracts are much more exposed to poor working conditions such as vibrations, loud noise, hazardous products or repetitive tasks (11). In addition, in comparison to full-time permanent workers, employees with temporary contracts are two times more likely to report dissatisfaction even after adjusting for various individual- and country-level variables (20).

Moving from safety and hygiene hazards to psychosocial factors

Dozens of ergonomic conditions and physical work loads, hundreds of biological factors, and thousands of chemicals (between 1,500 and 2,000 chemicals are widely used) have been identified as hazardous conditions of work (21). Approximate about 32 millions workers (23% of those employed) in the EU are exposed to agents covered by carcinogen exposure. At least 22 million workers were exposed to IARC group1 carcinogens. Estimates for occupationally determined part of cancer morbidity out of the total cancer morbidity vary between 2% and 38% (6). At present, it is estimated that occupational exposures might be responsible for 13 to 18% of lung cancers, 2 to 10% of bladder cancers, and 2 to 8% of laryngeal cancers in European men (22). Between 10% and 30% of the workforce in industrialized countries are exposed to physical factors and in some high-risk sectors such as mining, manufacturing and construction all workers may be affected (6). The ILO estimates that the European risk averages are 25/1,000 for accidents and 6.25/100,000 for fatalities.

The need to adapt to new forms of employment and management systems in non traditional work-time arrangements with pressure of higher productivity is increasing psychosocial risk factors together with those of health and safety (23, 24,25). Stress (28%) was one of the most common work-related health problems reported in the Second European Survey of Working Conditions in the EU (26), and only one third of the workforce can freely choose its working times such as starting times, holidays and breaks (27). Psychosocial factors such as new demands of higher productivity and workers' skills, and loss of control over work are threatening workers' physical and mental health (28,29,30). Thus,

common diseases such as coronary heart disease, musculo-skeletal disorders, depression or sickness absenteeism are strongly influenced by those new psychosocial aspects of work (31).

Moving from hazardous workplaces to social inequalities in health at work

Work hazards are not equally distributed across social groups, occupations and firms. Today, evidence of social inequalities in health and health care and their impact on health outcomes is overwhelming in a number of industrialized countries in which, for a range of health indicators the lower social classes show worse outcomes (32,33). Working conditions play an important role in explaining those inequalities in health (34,35). The lower the occupational class the more likely are the people to experience poor working conditions, including physical strain, low job control, greater noise and air pollution, shift-work, a monotonous job, and a force pace of work with fewer voluntary pauses (36,37,38). In Sweden, for example, poor working conditions were judged to be the main determinant of inequalities in somatic diseases among occupational groups (39).

The risk of occupational disease and accident vary substantially between different occupations. For example, a list of specific occupational health problems have been recognized for working women. They include the double work burden of job, lower-paid manual jobs, problems of occupational exposures that are hazardous to reproductive health, the threat of violence or to sexual harassment, the design of machinery and work tools often made according to male anthropometry, a higher than average risk of unemployment among low-paid female workers and less job opportunities for women (6).

Small-scale industrial and service enterprises often have few resources, heavy workloads and multiple tasks for one worker. Family members of the workers and entrepreneurs, including children, pregnant women and elderly people, share the work in small-scale enterprises, home industries, small farms in all countries and cottage industries particularly in less developed countries.

Finally, considerable differences are found in the access to occupational health services. According to the WHO, it is estimated that in Europe in



Joan Benach

1999 about 200 million out of 400 million workers are without access to occupational health services. However, while in Finland over 90% of the workforce is covered in other countries perhaps as little as 20% of the workforce may benefit from access to occupational services (40).

Moving from knowledge to policy

Knowledge should be a major pillar in the formulation and implementation of health policy (41). Although in the EU, suitable knowledge on a number of traditional occupational problems is already available (27) the lack of comprehensive, reliable and comparable occupational health data (42,43) is still a major policy limitation for implementing evidence-based policy. A large part of occupational problems are unknown because they are undiagnosed and/or unreported by the current information systems (44). On the other hand, occupational injuries (45) are not appropriately comparable and the situation is even worse for sickness absence (46). Finally, although the European Surveys on Working Conditions have improved our knowledge on occupational risk factors, significant changes to improve the validity and accuracy of the data are needed. In spite of the valuable information generated in the last decade, data are still today unable to provide the necessary knowledge on the workplace to implement evidence-based methods, which only have been applied to occupational health risks and interventions in a very limited way (47).

In the emerging work environment, a new comprehensive strategy in occupational health research, that will require a profound reorientation in many research institutions, is needed. Recently, experts consulted at the European level identified psychosocial issues, ergonomics and chemical risk factors as the top priority areas for future research (48). These general priorities of EU reached by a succinct and informal process contrast with more specific priorities (e.g., fertility and pregnancy abnormalities, indoor environment and risk assessment methods) identified by NORA Agenda in the United States developed by a wide and long consensus-building process lead by NIOSH (49). We argue that research on the causal role of many workplace risk factors in the production of disease and injury is insufficient, data on health inequalities in the workplace is very scarce, and we know virtually nothing about the impact on health of precarious employment.

Indeed, many of the implications of the changing work environment to the health of the workers and the families they support remain to be studied.

Principles for a new occupational health agenda

The health of the working population is strongly driven by the choices and actions taken by social and occupational health policies. A simplified standard framework of the policy cycle includes the following phases :

- assessment of population health;
- assessment of potential interventions;
- assessment of policy choices;
- policy implementation; and
- policy evaluation (41).

This structure, however, only reflects an idealized model of the policy process. Real policy is a much more complex process that is far from following a rational or logical route. To understand the lack of correspondence between occupational health research, policy and the needs of occupational health it is crucial to analyze the key principles that govern the decision making process. Priorities are not value-free and health policy decisions are not neutral or objective choices; rather, they are closely linked to the values, interests and power of the actors involved in the policy process (50).

Health policy priorities (or what is important ?)

Although the needs in occupational health are large, and the need to implement proper policies to tackle them seems obvious, those problems have not attained so far a real priority position on the health policy agendas. In most EU countries, many traditional problems and almost all of the new ones are waiting to be included as issues of main concern.

If priorities express the preferred order of implementation of actions, so far European policies have mostly focused on health and safety policies with a number of initiatives mainly focused on the development of legislation, the promotion of activities on occupational health services, the spread of information and the improvement of data collection. While those actions have produced some significant improvements, serious doubts of their overall effectiveness have been raised. It has been argued, for example, that the

change resulting from the 1989 Community framework Directive has been relatively limited (51). For example, legislative changes have not produced much improvement in small and medium-size enterprises, significant differences still exist in the extent and functions of preventive services, and there is not still a consolidated federal Agency with proper research background to support evidence-based policy, and limitations on current data gathering have already been pointed out.

In order to attain a renewed occupational health priority agenda that tackle the occupational health European needs, a first step is to keep in mind the concepts lying behind the establishment of those priorities. We postulate that the following items have contributed to the establishment of those priorities in occupational health. First, the need to harmonize the legislation governing occupational health in the countries of the EU (52). Second, the dominance of the lifestyle approach in the occupational health field which converts social problems into problems of individuals neglecting the role played by social and organizational factors (53). Thirdly, a reductionist approach of occupational health in which interventions mainly focus on treatment of sick workers through health care interventions rather than on all working population and prevention affected by a wide range of occupational health activities (54).

Issues on value judgement (or why things are important ?)

Occupational health action is never a technical value-free process but rather one influenced by the ideologies, beliefs and values of key actors such as officials and national governments, workers and trade unions, employers and corporations, or experts and agencies, among others (55). Occupational health interventions are driven by two main aims : workers' health and economic rationality. Although both are crucial, social actors emphasize them very differently. For workers, unions and some experts and occupational health professionals, health is first. For other actors, however, health is not the most important value rather firm economics come first. This conflict of interest shapes occupational health policies. Thus, unless worker hazards become costly to the firm, companies do not have any priority incentive to protect workers' health. Therefore the acknowledgement of an underlying (political and ideological) conflict over workers' health becomes

a necessary step to understand the process of occupational health policy in a realistic manner.

Today, a popular trend in many occupational health circles, is to treat occupational health policies as mainly a financial variable. The main issues of concern -sometimes not explicit- are economic costs and benefits and the most important approach to that economic appraisal is cost-benefit analysis (56). Contrary to this view, we argue that the main focus of occupational health should be to put health first and the main tools should be cost-effectiveness and cost utility analyses in which measurement of outcomes are expressed in health terms (57). The main reasons may be summarized as follows :

- workers have the legal right to work in a healthy and safe work;
- most occupational health hazards are avoidable and preventable; and
- a healthy, productive and well-motivated workforce is a key agent for overall socioeconomic development (6,58).

The relatively low priority given to health is more remarkable in view of the fact that most occupational health hazards are preventable and that poor occupational health and reduced working capacity of workers may cause large economic loss. Even the World Bank, an institution not suspicious of being in favor of workers, has estimated that up to two thirds of occupationally determined loss of disability-adjusted life years (DALYs) could be prevented by occupational health and safety programmes (59).

Issues on power (or who influences whom ?)

In articles, technical reports or other publications on occupational health policies there is little attention paid to the political issues influencing the making of health policy. From the very beginning, the health policy process is shaped by political and economic forces. Differences in the distribution of political and economic power of those forces will have a profound influence on the work environment and health (55).

The process of negotiation, bargaining and the accommodation of different interests reflect the different values and levels of power of key actors in the decision-making process. In turn, power determines key issues such as which health regulations will be approved, which kind of working

conditions, who will be exposed to risks and what is considered an acceptable risk, which choices will be chosen and which will have to wait. Governments are centrally involved in health regulation and provision of occupational health policy. However, too often occupational health laws implemented by governments are considered as the final goal to reach prevention rather than being just an important first step to achieve the crucial outcome : to improve as much as possible the health of all workers.

The strength of labor movement determines a multitude of the issues that directly influence workers health, including what information is generated about workplace hazards. It has been said that probably the major influence in the history of occupational health has been social movements (60). However, too often, labor has focussed on male occupations and full-time permanent jobs neglecting women and new types of flexible employment, that are less likely to be unionized, as in the Spanish case.

Management's perceptions of worker ill health and occupationally derived disease are strongly conditioned by economic considerations related to the growing pressure of higher productivity faced by companies. In fact, there is frequently opposition, sometimes well organized by pressure groups or economic lobbies, against the goal of workers' health. The case of asbestos is a known example. It is expected to cause 500,000 asbestos cancer deaths in Western Europe over the next 35 years and millions world-wide (61). Although asbestos is one of the most dangerous environmental carcinogens (62) an immediate European and worldwide ban on the production and use of asbestos is long overdue (63). Although the use of amphibole asbestos has been banned in most European countries, to employ chrysotile asbestos in a number of widely used products it is not justifiable when there are technically adequate substitutes (64).

Pressing policy challenges to tackle large health needs

Although the need for a new occupational health prevention seems evident, the health of the working population has yet to become a top priority of the European policy agenda. As we have argued above, traditional occupational health interventions,

thought to be implemented on a typical permanent job of a mid- and large- standard company, for a typical male employee, and for traditional occupational hazards, are unlikely to meet the emerging changes of a new work environment. According to our analysis, the main challenges of our discipline are to establish the priority of public health over economics, to improve our knowledge of contemporary occupational health needs, to implement more efficient interventions, to increase worker participation in these interventions, and to enforce and assess them properly.

Putting health first

Occupational health policies can not mainly be prompted by purely economic concerns. Health is a right and diseases should be prevented.

Implementing action on evidence-based knowledge

For many classical occupational diseases greater gains in health might be made from the application of current knowledge. In those cases action rather than more knowledge is needed. In addition to the available information on known risk factors, a substantial part of occupational health research is unused and lacks any application. An important distinguishing feature of many occupational diseases and injuries is that they are already preventable but often established scientific evidences on occupational health risk factors have a delay of decades or even centuries until preventive action is taken. When enough information has already been generated, it is socially unacceptable not to act to reduce the risks of the work environment (1). Indeed, if we could make use of existing knowledge, with all its limitations, the effects on European worker's health would be enormous.

Expanding and improving occupational health information and data systems

The production of knowledge is not neutral but rather a social process defined by the social values and interests of researchers, social groups and society as a whole. Today there is a strong need of expanding and improving international, national and company health information systems. Efforts are needed for improving methods of risk assessment, for making reliable summaries of personal occupational histories and occupational exposures collected from several short-term pieces in several enterprises or in varying jobs (65).

Improving research on poorly known occupational hazards and new risk factors

Research is socially constructed rather than a static and objective body. The improvement of research is crucial for making better occupational policy. The need to obtain of better knowledge may include the following challenges. First, to study the interactions between the physical, chemical and biological agents of traditional occupational hazards as well as of the complex combinations of adverse ergonomic, psychological and psychosocial modern factors of the work environment. Second, to study a number of “invisible” occupational issues. For example, much of the scientific research and policy standards has concentrated on men’s occupations (66). The lack of research about health consequences of women’s working conditions makes it difficult to estimate both the full range of effects and the extent of exposure to hazards in the workplace (67). Third, better well-designed epidemiological studies on evaluating the causes and consequences of interventions are needed (65) and other research approaches must play an important role in shown risk factors and demonstrating that measures taken to eliminate some hazards are effective. Fourth, globalization makes workers move geographically into culturally and socially new environments with numerous, and often unknown exposures. Globalization and flexibilization of work are macro trends with a large influence on population’s health, that need to be studied (65).

Tackling major inequalities at the workplace

Working conditions play an important role in making inequalities in health. Identification of high-risk occupations and occupational groups is of great importance for focusing prevention and control and for setting priorities. Today, there are major inequalities between existing preventive systems and problems of incorporating the provisions of the European Union into national safety at work legislation. Knowledge, priorities and interventions should be adapted to each type of worker, workplace and company (29). In this regard, the problems of females, migrants and precarious employees as well as those of small enterprises deserve special attention.

To increase workers participation

Worker participation at different levels in the occupational health policy process is necessary. Drawing from successes in occupational health

research, participation should be expanded into other areas (policy, prevention, interventions, health and care services) and levels (european, national, and company). As Sen has recently argued, democracy (including workplace democracy) is an essential feature of development, including health (58). Two decades of research on worker control and health allow us to draw this conclusion. Workers could be much more involved in all stages of research concerning them, including: priority setting, formulation of hypotheses, study design, data collection, interpretation of findings, and recommendations for control measures through such mechanisms as joint labor / management-administered programs.

Increasing the integration and quality level of occupational health services

Occupational health services, integrated by an occupational health team including physicians, ergonomists, safety engineers and hygienists, should develop a multidisciplinary task, from risk assessment to medical surveillance, to protect workers' health and maintain their work capacity (68). Implementation of quality management systems in occupational health services is needed. Government must ensure a minimum mandatory requirements establishing a certification scheme. Self-regulation should only be applied to measures that exceed the legislative requirements. In fact, quality management standards should only be seen as tools to facilitate compliance with legal requirements and policies (69). Today, except for occupational physicians (70), there is not a clear professional career at the European level for professionals such as hygienists, ergonomists or safety engineers.

Implementing systemic interventions that go beyond legislation through the enforcement and compliance of preventive actions

Occupational health laws are often considered as the final goal to reach prevention rather than being just an important first step to achieve the outcome of improving health. Modern legislation is permitting more flexibility in the use of the workforce. More and more often we observe how previously non admitted situations are made legal. The growing precarization of work is making existing labor law less useful in the protection of an even larger number of workers, and precarious workers face a huge pressure to regain control of the health aspects of their workplaces. In contrast

to many non-occupational diseases, occupational diseases can almost always be prevented. Even the most hazardous jobs could be arranged so as to minimize the risk of death for any individual worker. It is ultimately government's, the labor movement, and labor based political organizations responsibility to define and be accountable for a clear occupational health policy for the whole country. The enforcement of actions on all levels, accountability through mechanisms for coordinating, monitoring and evaluating progress in policy implementation and responsibility of compliance of occupational safety and health standards.

Conclusions

Occupational health policy in the EU is at a critical stage. Although deaths, diseases and injuries caused by occupational exposure to dangerous working conditions are today major problems, many crucial issues of occupational health remain low at the occupational agenda. Neither most of the national authorities nor the European Union institutions are providing the right knowledge and the action to protect the health of all Europe's workers. Even though we have been taught to think of progress in linear terms, the evolution of occupational health will not necessarily follow that path (60). If the needs in the new work environment are extraordinary, the actions also need to be extraordinary.

Political events of recent years reflect the precarious position of occupational health in the health policy arena. Despite the large numbers of professionals providing services and the high costs associated with them, the institutional role of occupational health is low. It is easier to investigate or close a restaurant after a case of food poisoning than to investigate or close a factory after the outbreak of an occupation-related disease (60). These pressing challenges will inevitably face up to the issue of power at work. Democracy at work should be promoted as not only just and fair, but also as a method to reduce ill health, and to allow for further development of people's emotional, intellectual and social capacities (58,71). A new occupational health agenda is waiting to be implemented. The future is open to opportunities, the task ahead is enormous.

Joan Benach, C. Muntaner, F. G. Benavides,
M. Amable and P. Jódar

References

- (1) Hernberg S. Towards a new millenium. *Scan J Work Environ Health* 1999;25:465-9.
- (2) Rantanen J. Challenges for Occupational Health from work in the Information Society. *Am J Industrial Medicine* 1999;1:1-6.
- (3) Herzberg SA, Alic, JA, Wial, H. *New rules for a new economy. Employment and Opportunity in Postindustrial America*. Ithaca, NY, Cornell Univ Press, 1998.
- (4) Meyer IH, Schwartz S. Social issues as public health: promise and peril. *Am J Public Health*. 2000;90:1189-91.
- (5) Rosner D. When does a worker's death become murder? *Am J Public Health*. 2000;90:535-40.
- (6) World Health Organization. *Global Strategy on Occupational Health for All. The Way to Health at Work*. Geneva, 1995.
- (7) Dooley D, Fielding J, Levi L. Health and unemployment. *Annu Rev Public Health* 1996;17:449-465.
- (8) Eurostat. Collection: Key Indicators. Theme: Population and Social Conditions. Available at: <http://europa.eu.int/comm/eurostat/Public/dashop/print-catalogue/> Accessed August 30, 2000.
- (9) Kuhn S, Wooding J. The Changing Structure of Work in the United States. The Impact on Income and Benefits. In: Levenstein C and Wooding J, eds. *Work, health and Environment. Old Problems, New Solutions*. New York: The Guilford Press, 1997:19-40.
- (10) De Grip A, Hoevenberg J, Willems E. Atypical employment in the European Union. *International Labour Review* 1997;136:49-71.
- (11) Letourneux V. Precarious Employment and Working Conditions in the European Union. European Foundation for the Improvement of Living and Working Conditions. Luxembourg: Office for Official Publication of the European Communities, 1998.
- (12) Hurrell JJ. Jr. Are you certain?-uncertainty, health, and safety in contemporary work. *Am J Public Health*. 1998;88:1012-3.
- (13) Benach J, Benavides FG, Platt S, Diez-Roux AV, Muntaner C. The Health-Damaging potential of New types of Flexible Employment: A Challenge for Public Health Researchers. *Am J Public Health* 2000;90:1316-7.
- (14) Burchell B. The social and psychological costs of labour market flexibility. Paper presented in the XVIIth International Working Party on Labour Market Segmentation, Sienna, July 1995.
- (15) Bosma H. Peter R. Siegrist J. Marmot M. Two alternative job stress models and the risk of coronary heart disease. *American Journal of Public Health* 1998;88:68-74.
- (16) Ferrie JE, Shipley MJ, Marmot MG, Stansfeld SA, Smith GD. An uncertain future: the health effects of threats to employment security in white-collar men and women. *Am J Public Health*. 1998;88:1030-6.

- (17) Ferrie JE, Shipley MJ, Marmot MG, Stansfeld S, Davey Smith G. The health effects of major organisational change and job insecurity. *Soc Sci Med*. 1998;46:243-54.
- (18) Ferrie JE. Health consequences of job insecurity. *WHO Reg Publ Eur Ser*. 1999; 81:59-99.
- (19) Benavides FG, Benach J. *Precarious employment and health-related outcomes in the European Union*. Dublin: European Foundation for the Improvement of Living and Working Conditions. Luxembourg: Office for Official Publication of the European Communities, 1999.
- (20) Benavides FG, Benach J, Diez-Roux AV, Román C. How do types of employment relate to health indicators? Findings from the Second European Survey on Working Conditions. *J Epidemiol Community Health* 2000; 54: 494-501.
- (21) Weeks, JL, Levy D and Wagner, G 1991 Preventing occupational disease and injury APHA, Washington, DC.
- (22) Boffetta P, Kogevinas M. Introduction: Epidemiologic research and prevention of occupational cancer in Europe. *Environ Health Perspect* 1999;107 Suppl 2:229-31.
- (23) Muntaner C, Eaton WW, Garrison R. Dimensions of the psychosocial work environment in a sample of the US metropolitan population. *Work and Stress*, 1993;7:351-363.
- (24) Muntaner C, Schoenbach C. Psychosocial dimensions of work in US metropolitan areas: a test of the Demand/Control and demand/Control/Support models. *International Journal of Health Services* 1994;24:337-353.
- (25) Härmä MI, Ilmarinen JE. Towards the 24-hour society - new approaches for aging shift workers? *Scan J Work Environ Health* 1999;25:610-15.
- (26) European Foundation for the Improvement of Living and Working Conditions. *Working Conditions in the European Union*. Luxembourg: Office for Official Publication of the European Communities, 1998.
- (27) Dhont S, Houtman I. European Foundation for the Improvement of Living and Working Conditions. Indicators of Working Conditions in the European Union. Luxembourg: Office for Official Publication of the European Communities, 1997.
- (28) Marmot M, Feeney A. Work and health: implications for individuals and society. In: Blane D, Brunner E, Wilkinson R, eds. *Health and Social Organization*. London: Routledge, 1996:235-254.
- (29) Griffiths A. Organizational interventions. Facing the limits of the natural science paradigm. *Scan J Work Environ Health* 1999;25:589-96.
- (30) Muntaner C, Eaton WW. Psychosocial and Organizational Factors. Health Effects: Mental Illness. In: Stellman J, Ed. *ILO Encyclopedia of Occupational Health and Safety*. Geneva: International Labour Office. Volume II, part V, 1998:34.62-34.64.
- (31) Marmot M, Siegrist J, Theorell T, Feeney A. Health and the psychosocial environment at work. In: Marmot M, Wilkinson R, eds. *Social determinants of health*. New York: Oxford University Press, 1999:105-131.
- (32) Blane D, Brunner E, Wilkinson R, eds. *Health and Social Organization*. London: Routledge, 1996.
- (33) Marmot M, Wilkinson R, eds. *Social determinants of health*. New York: Oxford University Press, 1999.
- (34) Moncada S. Working conditions and social inequalities in health. *J Epidemiol Community Health* 1999;53:390-1.
- (35) Lynch J, Kaplan GA. Socioeconomic position. In: Berkman L, Kawachi I, eds. *Social Epidemiology*. New York: Oxford University Press, 2000.
- (36) Fox J, ed. *Health Inequalities in European Countries*. Gower: Aldershot, 1989.
- (37) Vahtera J, Viirtanen P, Kivimäki M, Pentti J. Workplace as an origin of health inequalities. *J Epidemiol Community Health* 1999;53:399-407.
- (38) Schrijvers CT, van de Mheen HD, Stronks K, Mackenbach JP. Socioeconomic inequalities in health in the working population: the contribution of working conditions. *Int J Epidemiol* 1998;27:1011-8.
- (39) Whitehead M, Dahlgren G. What can be done about inequalities in health? *Lancet* 1991;338:1059-63.
- (40) World Health Organization. *Occupational Medicine in Europe: Scope and Competencies*. Bilthoven: WHO European Centre for Environment and Health, 2000.
- (41) Spasoff RA. *Epidemiologic methods for Health Policy*. New York: Oxford University Press, 1999.
- (42) European Foundation for the Improvement of Living and Working Conditions. *European Working Environment in Figures*. Luxembourg: Office for Official Publication of the European Communities, 1996.
- (43) Piotet F. European Foundation for the Improvement of Living and Working Conditions. *Policies on Health and Safety in Thirteen Countries of the European Union. Volume II. The European Situation*. Luxembourg: Office for Official Publication of the European Communities, 1996.
- (44) Karjalainen A. International Statistical Classification of Diseases and Related Health Problems (ICD-10) in Occupational health. Geneva: World health Organization, 1999.
- (45) Sixteenth International Conference of Labour Statisticians. Resolution concerning statistics of occupational injuries resulting from occupational accidents. International Labour Office, Geneva, 1998.
- (46) Gründemann RWM, van Vuuren CV. *Preventing absenteeism at the workplace*. European Foundation for the Improvement of Living and Working Conditions. Luxembourg: Office for Official Publication of the European Communities, 1997.
- (47) Carter T. The application of the methods of evidence-based practice to occupational health. *Occup Med (Lond)* 2000;50:231-6.
- (48) European Agency for Safety and Health at Work. Future Occupational Safety and Health Research Needs and Priorities in the Member States of the European Union.

Available at: <http://agency.osha.eu.int/publications/reports/resprior/>. Accessed August 30, 2000.

- (49) Rosenstock L, Olenec C, Wagner GR. The national occupational research agenda: a model of broad stakeholder input into priority setting. *Am J Public Health* 1998;88:353-356.
- (50) Walt G. *Health Policy. An introduction to Process and Power*. London: Zed books, 1998.
- (51) Walters DR. Preventive Services in Occupational Health and Safety in Europe: Developments and trends in the 1990s. *Int J Health Services* 1997;27:247-71.
- (52) Vogel L. *Prevention at the Workplace*. European Technical Bureau for Health and Safety, Brussels, 1998.
- (53) Berlinguer G, Falzi G. Ethical problems in the relationship between health and work. *Int J Health Services* 1996;26:147-171.
- (54) Levy BS., Wegman DH. Occupational health. Recognizing and Preventing Work-related Disease. Boston: Little, Brown and Company.
- (55) Levenstein C and Wooding J, eds. *Work, health and Environment. Old Problems, New Solutions*. New York: The Guilford Press, 1997.
- (56) European Foundation for the Improvement of Living and Working Conditions. *The Costs and Benefits of Occupational Safety and Health*. Luxembourg: Office for Official Publication of the European Communities, 1998.
- (57) Patrick DL, Erickson P. *Health Status and Health Policy*. New York: Oxford University Press, 1993.
- (58) Sen A. *Development as freedom*. Alfred A. Knopf, Inc. 1999.
- (59) Murray CJL, López AD. *The Global Burden of Disease: A comprehensive assessment of mortality and disability from diseases, injuries, and risk factors in 1990 and projected to 2020*. Boston: Harvard University Press, 1996.
- (60) Cullen MR. Personal reflections on occupational health in the Twentieth Century: Spiraling to the Future. *Annu Rev Public Health* 1999;20:1-13.
- (61) Peto J, Decarli A, LA Vecchia C, Levi F, Negrio E. The European mesothelioma epidemic. *Br J Cancer* 1999; 79:566-672.
- (62) Orenstein MR, Schenker MB Environmental asbestos exposure and mesothelioma. *Curr Opin Pulm Med* 2000; 6:371-7.
- (63) Anonymous. Call for an international ban on asbestos. *Scan J Work Environ Health* 1999;25:633-5.
- (64) Harrison PT, Levy LS, Patrick G, Pigott GH, Smith LL. Comparative hazards of chrysotile asbestos and its substitutes: A European perspective. *Environ Health Perspect* 1999;107:607-11.
- (65) Rantanen J. Research challenges arising from changes in worklife. *Scan J Work Environ Health* 1999;25:473-83.
- (66) Messing K, Neis B, Dumais L. Introduction. In: Messing K, Neis B, Dumais L, eds. *Invisible. Issues in Women's Occupational Health*. Charlottetown: CINBIOSE, 1995.
- (67) Klitzman S, Silverstein B, Punnett L, Mock A. A Women's Occupational Health Agenda for the 1990s. In: Levenstein C and Wooding J, eds. *Work, health and Environment. Old Problems, New Solutions*. New York: The Guilford Press, 1997:426-445.
- (68) Convention 161. Convention concerning occupational health services. Geneva: International Labour Office, 1985.
- (69) Westerholm P, Baranski B (eds). *Guidelines on quality management in multidisciplinary occupational health services*. Bilthoven: WHO European Centre for Environment and Health, 1999.
- (70) MacDonald E, Baranski B, Wilford J. Occupational medicine in Europe: scope and competencies. Bilthoven: WHO European Centre for Environment and Health, 2000.
- (71) Landisbergis PA, Schurman SJ, Israel BA, et al. Job Stress and Heart Disease. Evidence and Strategies for Prevention. In: Levenstein C and Wooding J, eds. *Work, health and Environment. Old Problems, New Solutions*. New York: The Guilford Press, 1997:171-197.



Towards New Prevention Strategies

Other paper available
on our web site : www.etuc.org/tutb/uk/conference200062.html

■ Ageing and sustainable work ability

Juhani Ilmarinen, Finnish Institute of Occupational Health, Helsinki, Finland