

# Gender perspective in occupational medicine and workplace risk assessment: state of the art and research agenda

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## Abstract

*The aim of this study was to investigate the current situation and the research agenda in the field of gender differences, both generically in the occupational settings and in the specific activity of risk assessment. Gender is a key determinant of health; the evaluation of documents and scientific literature shows increasing attention to a gender oriented approach, as demonstrated by the development of Gender Medicine, actually cross-oriented in all medical specialties, the publication of books dedicated to this topic and the birth of “ad hoc” new scientific societies and journals. Even today, however, the gender differences are not considered as they should in the context of health disciplines, including occupational medicine. In this respect, in fact, the critical issues to be overcome are numerous, such as the phenomena of “segregation”, the exposure to risk factors and their effects, related also to non-professional, socio-cultural features that differentiate male and female workers. All these factors can lead to situations of inequality in health. In fact, the European directives on safety at work repeatedly highlight the attention to gender differences in prevention, assessment and management of risks. In this regard, the European Agency for Safety and Health at Work advocates an approach “more sensitive” to gender in all the processes of assessment and risk management, from the research of all potential sources of risk to the decision-making processes, in order to address the prevention of risks in a holistic manner.*

## Introduction

Any public health professional, carrying out her/his activities both in general and occupational settings, immediately learns to deal with the determinants of health. These determinants are all the variables that can influence the health of individuals and communities, and include a large number of factors. Over the years, the World Health Organization (WHO) has given more and more space to the social determinants,

that are all the conditions in which people are born, grow and live. In particular, the Commission on Social Determinants of Health of the WHO highlighted that the most important determinants are represented by income, level of education, occupation, social class, race/ethnicity and gender. These factors, together with the context and the resulting socio-economic determinants, are considered structural and social determinants of health inequities. Among them, gender is a variable of particular concern because has

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never been subjected to strong insights until a few decades ago, despite the evidence of differences among males and females (1).

The aim of the present work was to investigate the state of the art, the current critical points and the research agenda in terms of gender differences and gender approach in occupational medicine and risk assessment in the workplace. For this reason, we firstly reported the distinctive definitions and concepts around the term “sex” and “gender”; then, we evaluated the importance of gender difference in epidemiological, pre-clinical, and clinical sciences; finally, we critically reviewed the state of art and the main needs in term of gender differences and gender approaches in the field of occupational medicine and in the models used for workplace risk assessment.

## **Sex, gender and human health**

### *Sex and gender: two terms, two definitions*

The introduction of a gender perspective in the social structure can be considered an “epochal” anthropological change because, after many centuries, there has been a redefinition of male and female identities, involving globally all populations. In this context, the term “gender” instead of “sex” is not adopted by chance. Indeed, the words “sex” and “gender” are not interchangeable having a very different meaning; they are used, respectively, for distinguishing biological identity and gender roles (2). In particular, sex is determined by the specificity of the biological and physical/physiological characteristics, such as different levels of the reproductive hormones, while gender concerns “socially constructed differences between the sexes, and the relationships between them established in terms of distinctive and appropriate behaviors”. These concepts and definitions are the result of researches carried out in the social and anthropological sciences (3).

Even in the context more closely to health sciences, a specific definition was proposed by the WHO: “sex refers to the biological and physiological characteristics that define men and women” while “gender refers to the socially constructed roles, behaviours, activities, and attributes that a given society considers appropriate for men and women”. In other words, WHO considers “male” and “female” as sex categories, while “masculine” and “feminine” as gender categories (4). Biological, genetic, hormonal, physiological body/organ factors are strictly related to sex while behaviours, social, economic and family roles are closely connected to gender (5). Other definitions to distinguish the terms sex and gender were given by the Committee on Understanding the Biology of Sex and Gender Differences of the US Institute of Medicine, that described sex as “the classification of living things generally as either male or female, according to their reproductive organs and functions assigned by the chromosomal complement”, considering sex as a classification of living organisms in males and females on the basis of their own bodies and their genetically attributed reproductive functions. The same Commission defined gender as “a person’s self-representation as male or female, or how that person is responded to by social institutions on the basis of the individual’s gender presentation”, attributing to gender a rigorously social connotations (6).

Given these definitions, it is quite obvious that aspects related to sex do not vary substantially in different societies, while those related to gender can differ, even very significantly. In practice, in terms of public health, although sex and gender are undeniably interconnected, sex may be considered as the variable that involves the genetically determined sensitivity to the determinants of health, and gender as the variable that underlies the social power which, in turns, can influence the exposure

to factors playing a fundamental role on human health (7).

### *Sex and gender as determinants of health and diseases*

In order to understand the relevance of sex and gender as determinants of health and diseases, first of all it can refer to the conceptual framework on the social determinants of health recently elaborated by the WHO Commission on Social Determinants of Health. This framework refers not only to the determinants that affect the health of individuals and communities, but also to those variables involved in the unequal distribution of health within different populations. Moreover, in these models there is an explicit reference to gender as a factor that can influence the health. In particular, according to the WHO Commission on Social Determinants of Health, the most important social determinants are represented by income, level of education, occupation, social class, race/ethnicity and gender. These factors, together with the context and the resulting socio-economic determinants, are considered structural and social determinants of health inequities. All these determinants represent the first link in a chain and must be considered crucial determinants, but they act through other factors, the so-called intermediate determinants, whose action is more directly linked to the onset of a disease (1).

Besides, the relevance of sex and gender on human health is evidenced by several diseases “gender-associated”. In this context, the first example is related to the cardiovascular diseases, for which there is the most consistent plenty of data in terms of gender differences. Several epidemiological studies, in fact, showed that cardiovascular diseases are more common in men than in women until menopause (8), a period in which the woman is “protected” by these events by hormonal status (9). Later, proceeding towards older age, this gap narrows and the incidence of cardiovascular diseases become

the leading cause of death worldwide even for the female population (10, 11). The second example is related to autoimmune diseases, that typically affect the female population. Scientific evidence suggests that, even in this case, sex hormones (male and female) are involved in the regulation of immune disorders and that estrogens may play a key role in the occurrence of autoimmune diseases explaining, at least in part, differences in term of incidence between men and women (12). Furthermore, scientific evidences have shown differences also for many kinds of cancer in terms of incidence, survival, aggressiveness, localization and response to therapy (5, 12, 13). Still, associations between onset and sex were found for some respiratory diseases. Finally, two neurodegenerative disorders – Parkinson’s and Alzheimer’s diseases – must be mentioned. In particular, Parkinson’s disease is more frequent in men respect to women, while Alzheimer’s disease in female population. Explanations for these differences are still not been clarified but, with regard to Parkinson’s disease, one of the most accepted hypotheses is that it is influenced by genetic mutations on chromosome X, that occurs in 100% of cases in men, while only in half of the cases in women (5, 12).

All the reported conditions and possible explanation are strictly related to sex but, indeed, it can be considered that they are typical multifactorial diseases and, consequently, their pathogenesis and progression are affected by different risk factors, which may be endogenous (biological factors) exogenous (associated with exposure to chemicals, radiation, infectious agents), and behavioural. The endogenous factors are closely linked to sex, while behavioural variables are associated to gender; however, the independent contribution of sex and gender in the onset and in the progression of a multifactorial disease is very difficult to distinguish and quantify.

*Gender differences and medicine: birth and development of a new healthcare orientation*

As reported in the previous paragraph, sex and gender are factors that cannot be neglected in health sciences. This assumption is confirmed by a new and independent field of medicine, the so-called “Gender Medicine”. Gender Medicine studies the ways in which the diseases differ between male and female populations in terms of prevention, clinical presentation, response to the therapeutic approach, prognosis, psychological and social impact (14). In practice, Gender Medicine is an attempt to explore the concept of gender differences and, then, to apply it to all medical specialties, in order to ensure the best health status and the best possible healthcare to both men and women (15).

The origins of Gender Medicine dates back to the late 1980s when, after theorized a perfect equivalence between men and women for millennia, it was discovered that women affected by cardiovascular diseases were treated with an inadequate therapeutic approach (based on studies on male populations) (16). In this regard, we must mention a key paper published in 1991, which was one of the main starting points of Gender Medicine: the editorial of Bernadine Patricia Healy, an American cardiologist, on one of the most prestigious scientific journals, the *New England Journal of Medicine*. In this article she described the “Yentl syndrome”, from the name of a heroine of the story of Isaac B. Singer, who had to pretend to be a man to gain access to the Jewish school. The Yentl syndrome was used to highlight the enormous discrimination of women in the context of the diagnostic and therapeutic approaches, that the author had noted during her professional career (17). The editorial represented a motivation for a greater inclusion of women in clinical trials and to further basic and clinical research, in order to fill the lack of scientific knowledge

in this area. After almost ten years, the “ad hoc” committee on gender differences of the US Institute of Medicine published a monograph entitled “Exploring the Biological Contributions to Human Health. Does Sex Matter?” (6) in order to highlight the needs of answers for the questions related to the importance of sex and gender in medicine.

Since then, Gender Medicine attracted an increasing interest, as evidenced by the change of the curricula of the Faculty of Medicine made by some Universities, such as Georgetown in the United States, Monash in Australia or University of Tel Aviv entering, in a formal way, specific aspects of gender in their teaching plans. In addition WHO created, in the context of its departments, the Department of Gender, Woman and Health, specifically dedicated to research in this field. Besides, several books or specific journals on Gender Medicine were published, such as “Gender Medicine” and “Men’s Health and Gender” (both published by Elsevier). Finally, to understand how much the scientific community focalized the attention on Gender Medicine, we would like to cite specific international and national scientific societies developed over the years, such as the International Society for Gender Medicine, and societies born in Sweden, Germany, Italy, Austria and Israel, actively involved in the promotion of knowledge of gender approach in research and clinical medicine (18).

However, it should be emphasized that, despite the evolution occurred in the last twenty years, the significance of Gender Medicine today is not always well understood. In fact, Gender Medicine does not mean just to focus on diseases that occur more frequently in men or in women, or diseases associated to the reproductive system, but to investigate the specific ways in which diseases occur in male and female populations, and to evaluate differences in all the moments of the natural

history of the disease, from prevention to clinical presentation, diagnosis, treatment, rehabilitation. Therefore, Gender Medicine cannot be considered a specific medical specialty, but an interdisciplinary dimension of medicine, which is designed to evaluate the impact of sex and gender variables on the physiology, pathophysiology and human diseases, involving in all other specialty (19).

### **Gender approach and occupational medicine**

#### *Occupational scenarios and gender differences: global and national perspectives*

Despite the relevance of the issue “gender differences” in research and clinical practice, the gender approach is not fully entered in the strategies for protecting workers’ health in occupational settings. Thus, considerable efforts are needed in order to achieve a shared vision that takes into account the gender paradigm (20). To understand the importance of the gender approach in the assessment of the workplace risks, firstly, it can be considered differences that characterize the employment market of male and female populations and the possible explanations to these differences. The global perspective of gender differences is well-described in a document of WHO, published in 2004: women and men commonly perform different tasks and are assigned to different working areas, women are more likely to be engaged in housework or, more frequently, they work from home and, generally, they occupy lower ranks than men. In addition, the working conditions and the type of employment can vary according to gender: in some countries, women do heavy works and men do administrative jobs while, in other countries, working conditions are completely opposite. Besides, in some regions women are more likely to be unemployed while, in others, men are more frequently unemployed. Yet,

globally, women are most affected by the growing competitive pressure, resulting in greater job insecurity, limited opportunities for training and promotion and inadequate social benefits, such as insurance, sick leave, etc. Further differences can be demonstrated in terms of exposure to various factors of physical and psychological stress: for example, is well-known that women suffer discrimination, bullying and harassment in the workplace to a greater extent than men (21).

However notice that, considering the global situation over the years, a review on this issue evidenced that, since 1970, it began a decline in professional differences, at least in part, as the result of the progress of the feminist movement, the promulgation of laws prohibiting sexual discrimination and the reduction of typical gender stereotypes, both in terms of educational levels and employment (22). The analysis of the situation, however, still shows relevant differences, which are well known and described by other authors (23-25).

The Italian condition does not differ from general situation: data provided by the National Institute of Statistics (ISTAT) evidenced that, in 2014, the percentage of women and men aged 15-64 and employed were equal to 46.8% and 64.7%, respectively; differences were even more relevant considering the age group between 35-44 years: 61.1% for women and 82.4% for men. However, gender gaps are reduced considerably with the increasing of the educational level of the population, with rates ranging from 24.0% of women with primary school to 80.9% of women with a degree or a doctorate, while the same rates ranging from 51.6% to 92.4% for men (26). Another interesting information revealed by ISTAT data regards the comparison of the Italian situation respect to other European countries: despite the growth in female employment occurred in recent decades in Italy, the employment rates for women are

lower than the European Union average for each class of age (27).

It is important to note that, even if gaps in men and women employment are sufficiently documented, the reasons underlying these differences are still not entirely clear. Over the years, several empirical models have been developed in order to predict the probability that workers are employed in a given profession on the basis of their individual characteristics, or for estimating possible predictors of inequality in terms of career and to evaluate the possibility of the occurrence of the so-called phenomena of vertical and horizontal “occupational segregation” (28-32). These phenomena describes the situations in which individuals are excluded from certain jobs and over-represented in others, because of their race, ethnicity or gender (33). For example, Gabriel and Schmitz developed a mathematical model in order to determine the reasons of gender differences in labour market. Their results evidenced that differences are linked to different voluntary choices rather than a segregation “discrimination-based”. However, these findings are related to a sample of workers; thus, the scientific community continues to investigate whether these disparities are the result of gender differences in career choices, or based on market distortion characteristics (32).

#### *Occupational scenarios and gender differences: normative evolution*

The gender approach should be considered in occupational medicine as a strategic and valuable key point to address the issue of prevention and safety in the workplace, in accordance with the principles recognized by the international and national legislation.

The European Union, since several years, supports and promotes equality between women and men through parliamentary initiatives and “ad hoc” surveys and directives, in order to foster an ethical orientation and competitive economic growth. Currently, the

main areas of interest in this field are related to the need to close the gap between men and women populations, and to stimulate employment and entrepreneurship among women. For this reason, since 1993 and in accordance with the Maastricht Treaty, all Member States must ensure the principle of equal pay for the same work performed by men and women. Later, in 1997, the Treaty of Amsterdam reiterated the need to eliminate gender discrimination and promote equality in the employment context. Still, in 2009, the Lisbon Treaty reinforces the same principles and inserts them as values and objectives of the European Union (34). The guidelines for employment defined during the Lisbon cycle 2005 - 2008, in fact, reaffirmed the need for a twin approach aimed primarily to ensure gender mainstreaming, and also to encourage specific measures to increase female participation and to reduce inequalities between men and women in unemployment, employment and pay (35). Gender mainstreaming is an innovative concept from that of equality, adopted by the European Commission since 1996 not to replace the equal opportunities policy, but to complete it, defining gender mainstreaming as “the (re)organization, improvement, development and evaluation of policy processes, so as to incorporate a gender perspective in all policies, at all levels and at all stages, by all actors normally involved in policy design” (36).

The current European scenario is linked to the objective of the new comprehensive strategy “Europe 2020”, which aims not only to overcome the economic crisis that many countries are facing in recent years, but also to resolve the gaps in the pattern of growth, and to create the conditions for an economic growth more intelligent, sustainable and inclusive (37).

As regard the Italian situation, the gender approach in occupational medicine is firstly linked with the principles of the Italian Constitution, as prescribed by the Articles

3 and 32, which deal with the issue of equality, workers' rights and their right to health, without distinction of sex. However, an explicit reference to gender differences have entered fully into the regulations on health and safety in the workplace with the Legislative Decree of 9 April 2008, n. 81. This Decree (Article 28) introduces a specific reference to gender difference, to which should be given particular attention by employers in training activities, in the prevention interventions, and in risk assessment and management (38, 39). Indeed, the Decree ranks consistently in a regulatory framework for the occupational context well-established in Italian normative, that has long focused its attention to possible problems associated with gender differences. For example, it may be mentioned the Legislative Decree no. 216/2003, implementing the EU Directive 2000/78/EC on equal treatment in employment and occupation. Besides, others relevant laws are the Italian Law no. 125 of 10 April 1991 on "Positive actions for the realization of gender equality in the workplace", the Legislative Decree no. 151 of 26 March 2001, the so-called "Consolidated for motherhood and fatherhood", the Legislative Decree no. 198 of 11 April 2006, the "Code of equal opportunities between men and women" (39).

#### *Gender approach and the workplace: risk assessment and management*

In the light of the information presented here, it is evident the strong need of workplace risk assessment and management processes taking into account differences related to the variables sex and gender.

Besides, in addition to what has been reported, it is important to note that there are a great number of differences in term of risk, both regarding the exposure to occupational risks and/or the related adverse effects.

Firstly, notice that there are a great number of works in which women are predominately employed; thus, specific risks linked to these

types of work should be carefully considered to protect women's health. For example, some of these works involve the use, very consistent for some activities, of chemicals that can be potentially harmful for human health, such as detergents, disinfectants, solvents, etc. In addition, women perform jobs that involve more contact with the public and, therefore, are more exposed to the risks of biological diseases determined by human transmission. Also, women are particularly exposed to repetitive movements, with greater engagement of smaller muscle groups, and they are also more vulnerable respect to men. Still, women are more exposed to psychosocial risks because more often employed in jobs that require a high use of relational and emotional resources. Finally, it must be not neglected that women still carry most of the housework, which involve not only an additional burden in terms of physical and psychological effort, but that may result in exposure to other risk factors that may have additive or synergistic effects with respect to the risk factors present in the workplace (40-42).

In terms of differences of adverse effects, it is well-known that there are several differences in toxicokinetic and toxicodynamic mechanisms, in target organs susceptibility, and in specificity of the hormonal and the reproductive systems which, for the same exposure, may lead to different biological effects (43). In addition to these factors, strictly related to sex, there are several socio-economic and cultural factors that may affect human health even significantly, because they can act as co-factors on the occurrence of damages due to occupational exposures (42).

In this regard, the European Agency of Occupational and Health at Work (EU-OSHA) dedicated the Factsheet No. 43 (44) to the gender approach in risk evaluation and management process. In this document, EU-OSHA recommended the implementation of a strategy that accurately

considers gender dimension, and it proposed a method to make the risk assessment “more gender-sensitive”. In practice, the five-step process recommended for the workplace risk assessment (1. Identifying hazards and risks; 2. Assess risk and assign priorities; 3. Decide on preventive action; 4. Implement solutions; 5. Monitoring and Review) should be implemented by some general recommendations gender-sensitive. First, it needs to positively and seriously consider gender issues, to examine the real work situation, involve all workers, men and women, at all levels, and to avoid to establish “a priori” hazards and people at risk. About the involvement of all employees, it is highly desirable the participation of the workers’ representatives in all the processes of risk assessment and management, from the beginning of the process until to the end, in order to identify all potential sources of risk that may be present in work activities. Other general measures are represented by the following points:

- check the “safety policies”, integrating it with the gender mainstreaming;
- ensure that the healthcare services used by workers adopt an approach gender-sensitive;
- ensure adequate information and appropriate training on gender issues and health risks to all the involved professionals, such as the responsible for risk assessment, the responsible for risk management, workers’ representatives, etc;
- integrate all the actions necessary to ensure the safety and the health protection at work in all the actions for equality;
- encourage more women to participate in safety committees.

## General remarks and conclusions

Gender issues at workplaces discussed in the previous paragraphs involve several insights. Firstly, at today, epidemiological

data on workers population and gender differences are still scarce in relation to the need for scientific evidence. Therefore, it should be desirable to perform appropriate researches, especially related to women’s work, specific exposure and specific related adverse effects.

Indeed, looking at the past, the situation has greatly improved, and more attention was given to gender differences in health science and to a gender-oriented approach in the workplaces, as demonstrated by the born of Gender Medicine, the production of scientific papers and books related to this argument, and the creation of the scientific societies dedicated to gender differences. Besides, regarding the workplaces, gender approach is prescribed by international and national laws, especially in relationship to risk assessment and management processes more gender-sensitive.

However, the analysis of the current situation still shows significant gender differences in healthcare disciplines, including occupational medicine. In this context, differences are evidenced in the employment of men and women in market labour, in exposure to occupational risk factors and related adverse effects. All these phenomena and factors should be taken into close consideration to avoid health inequities.

## Riassunto

*La prospettiva di genere nell’ambito della medicina occupazionale e della valutazione dei rischi nei luoghi di lavoro: stato dell’arte e research agenda*

Obiettivo del lavoro è stato quello di indagare la situazione attuale e le *research agenda* in tema di differenze di genere sia in generale nell’ambito occupazionale che nell’attività specifica di valutazione dei rischi.

Il genere rappresenta un determinante di salute fondamentale; l’esame dei documenti e della letteratura scientifica sull’argomento evidenzia una crescente attenzione ad un approccio *gender oriented*, come dimostrato dalla nascita della Medicina di Genere, vero e proprio



orientamento trasversale a tutte le specialità mediche, alla pubblicazione di libri dedicati a questa tematica e alle riviste e società scientifiche “ad hoc”. Ancora oggi, tuttavia, le differenze di genere non sono considerate come dovrebbero nell’ambito delle discipline sanitarie, compresa la Medicina del Lavoro. A questo riguardo, in effetti, le criticità da superare sono numerose, quali ad esempio fenomeni di “segregazione”, esposizioni a fattori di rischio ed effetti connessi ad essi e altri fattori extra-professionali socio-culturali che differenziano lavoratori e lavoratrici. Tutti questi fattori possono determinare condizioni di iniquità di salute. In effetti, le Direttive europee in tema di sicurezza sul lavoro richiamano più volte l’attenzione alle differenze di genere nelle attività di prevenzione, valutazione e gestione dei rischi. A tal proposito, l’agenzia d’informazione dell’Unione europea nel campo della sicurezza e della salute sul lavoro raccomanda un approccio “più sensibile” al genere in tutti i processi della valutazione e gestione dei rischi, a partire dalla ricerca di tutte le potenziali sorgenti di rischio fino ai processi decisionali, al fine di affrontare la prevenzione dei rischi in modo olistico.

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