



# Inserm

La science pour la santé  
From science to health

**Gender, Occupational  
Health and the  
Environment**

**Statement of Intent**

**Inserm Ethics  
Committee**

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## 1. Context

The impact of the environment on human health is a major public health concern. According to the World Health Organization's (WHO) definition, *environmental health* includes those aspects of human health – including quality of life – that are determined by the physical, chemical, biological, social, psychosocial and esthetic factors of our environment. Given the scope and complexity of the subject, knowledge of the exposures and health risks is still highly insufficient (The Lancet Commission on Pollution and Health, Landrigan *et al.* 2017).

In terms of research, many programs and projects have been carried out and are currently being developed in France and internationally. The French Public Health Law of August 9<sup>th</sup> 2004 established for a National Environmental Health Action Program (PNSE) every five years. The third such program, carried out between 2014 and 2018, examined the health challenges posed by many environmentally-related illnesses, such as cancer and allergy, as well as reproductive, metabolic, infectious and neurodegenerative diseases. The resulting report underlined the need to consider not only the contribution of physicochemical and biological environmental factors but also factors related to the socioeconomic environment. This approach is the guiding principle for the recent concept of the **exposome**, which is defined as every exposure (chemical, physical and biological) to which an individual is subject to from conception to adulthood, and incorporates the psychosocial and economic factors surrounding working and living conditions (Barouki 2018, Wild 2012).

In 2018, a group of experts from the Inserm wrote a report entitled “Préfiguration du volet recherche du 4<sup>ème</sup> Plan National Santé Environnement” [Preliminaries on the Research Component of the 4th National Environmental Health Action Plan] (PNSE4). This report expands on the concept of the exposome and outlines the methodological basis for its exploration and for its applications in evaluating the environmental impact on health. Emphasis is placed on the importance of cross-referencing various types of exposures with socioeconomic factors and avoiding compartmentalization according to the nature of the agents (chemical, physical, infectious, psychosocial, etc.). From this viewpoint, identifying the health determinants linked to **living and working conditions** is essential in order to gain insight into the exposome. This particularly involves analyzing the specific vulnerability of certain populations who have certain lifestyle, working or unemployment, physical activity/lack thereof, diet and living conditions, etc.

It has become clear that taking the **gender perspective** into consideration in differentiated exposure of women and men to health risks is an integral part of this field of research. Paradoxically, in the majority of environmental health reports and action programs, the concept of gender is not considered as such, except when considering sexual and

reproductive health. Indeed, the decrease in female and male fertility and the vulnerability of pregnant women and fetuses constitute a major area for research and for prevention policies (Reproduction et Environnement: expertise collective INSERM 2011 [Reproduction and the Environment: A Collective Expert Review by the Inserm, 2011]). Another gender-related concern is the increased vulnerability of women in the developing countries in the midst of ongoing climate change: drought, food shortages, migration, etc. (UN Women 2018 report, “Women, Gender Equality and Climate Change”).

We, therefore, consider it essential to reflect more broadly on the environmental health of women and men, explicitly taking into account the sociocultural and economic factors related to gender in exposure to health risks, without compartmentalization by disease or country or geographical location. We have chosen to address this issue in two sectors that affect women and men differently: **occupational diseases and economic insecurity**. We will look at the situation in France, North America and Europe. This comparative analysis will be useful as it contributes research on the exposome and formulates proposals whose end goal is to improve the identification and prevention of health risks for women and men.

This document is the first in a series of subsequent and more in-depth reflection that will emerge from expert hearings in the domain of health related to the environment, work and gender.

## 2. Gender, occupational health and the environment: The situation in France

### 2.1 Occupational health

The convergence of issues relating to the environment, health and work has been the subject of major research institution and public authority mobilization. Since 2006, the French agency for Food, Environmental and Occupational Health and Safety (ANSES) has been conducting a national “Environmental and Occupational Health” (PNREST) research program. It covers a broad range of investigations, including the evaluation of occupational health risks that involve risks related to various types of exposure (chemical, biological, physical agents, etc.) as well as psychosocial risks.

Several national surveys (SUMER, RNV3P, SIP) have revealed *major differences between women and men in exposure to occupational risks* (see the reports by DARES and DREES). One primary cause lies in the segregation of occupations. Men, who account for the majority of industry and construction workers, have health risks related to asbestos, diluent

solvents, carrying heavy loads, noise, etc. Women, who account for the majority of workers in the retail, service and care industries, are exposed to pollutants contained in cleaning products, cosmetics, cash register receipts (bisphenol A), etc. That being said, differences in risk exposure are not restricted to physical and chemical environmental factors. They also involve those related to working arrangements and constraints that affect women and men differently (see research by the French Research Institute for Environmental and Occupational Health-IRSET).

Regarding these topics, the French National Agency for the Improvement of Working Conditions (Anact) has demonstrated how physical working conditions, working arrangements, risk exposures and career breaks and discontinuities impact the health of women and men differently. One alarming observation made by Anact is the *more marked lack of occupational risk exposure visibility when it comes to women*. Indeed, a hierarchy exists in the representations of risks associated with various occupations (Chappert, 2016). Greater attention is paid to the difficulties of male work associated with intense physical effort, carrying heavy loads, noise, etc. Consequently, the mainly female occupations are generally considered easier and less dangerous: a view that contradicts the reality of difficulties linked to many female occupations (Messing 2014). One example among many is the overexposure of women to repetitive weight carrying, which particularly affects nurses, home care employees, store clerks, manual workers, etc. These are all occupations in which loads often exceed the 25 kg French Labor Code limit for women. Meanwhile, psychosocial risks related to working arrangements are often more commonly encountered in female occupations: low-qualified roles, lack of autonomy, fragmented working hours, piecemeal work, psychological tension, sexism, etc. The mental health impact of these risks is not recognized by French State health insurance.

One textbook example of the invisibility of risks incurred by women is the *lack of recognition of occupational cancer*. Surveys performed by GISCOP93 (a scientific interest group on occupational cancer in the Seine-Saint-Denis region) showed that epidemiological studies on exposure to carcinogens contained bias and prejudice relative to occupational risk inequality in function of gender.

One notable bias is the limited number of studies on the etiology of occupational cancer in women (Council 2014, Hohenadel 2015). A review of the literature on lung cancer between 2003 and 2014 showed that the carcinogenic risks remained largely understudied in women (2.9% of the studies) compared with men (55.6%), irrespective of industry (Betansedi, 2016, 2018). Another example is the absence of epidemiological studies on carcinogens used in the cleaning sector, in which women account for the majority of the workers. Tests on the contents

of a female office cleaner's trolley revealed the presence of 14 carcinogens which are used with no particular information, warning or protection for the employee (Cavet 2013).

We may therefore conclude that in many occupational health epidemiology publications, the authors tend to generalize the results obtained from studies conducted only in men.

### ***Recommendations***

The invisibility of risk factors and the difficulties of work carried out by women represents a major obstacle to the recognition of occupational diseases and the implementation of preventive measures. To counteract this, Anact insists on the need to produce gender statistics, which continue to remain insufficiently documented. The concept of gender must be explicitly included in epidemiological studies of occupational risks. Such data are essential in order to evaluate the occupational risk exposures of men and women, and to supplement the existing criteria in order to improve the consideration given to female working conditions.

### **2.2 Economic insecurity**

People in situations of economic insecurity accumulate social and economic difficulties that impact physical and psychological health and impedes access to healthcare. Precarious living conditions lead to increased health risks compared to the general population: substandard housing, poor diet, lack of physical activity, difficult and unstable nature of work.

Substandard housing can cause or worsen many diseases: poisoning from lead paint, respiratory diseases linked to humidity, infectious diseases brought about by unsanitary living conditions. This leads to a deterioration in lifestyle linked to poor diet, alcohol and tobacco consumption and lack of physical activity – all these factors promote obesity, diabetes, cardiovascular diseases, depression, etc. It thus follows that the lack of financial means is one of the primary reasons for forgoing healthcare.

*Women currently account for the majority of the people living in precarious conditions.*

A broad and comprehensive analysis of this reality was provided in the 2017 report by the French High Council for Equality (HCE) entitled "Santé et accès aux soins : une urgence pour les femmes en situation de précarité" [Health and Healthcare access: An Emergency for Women Living in Precarious Conditions] by Danièle Bousquet and Geneviève Couraud.

Women account for 70% of all impoverished workers, occupy 82% of all part-time jobs and represent 85% of all single-parent families, of the latter, one in three living below the poverty line. Obesity is much more common in women experiencing economic insecurity (35%) than in men (17.6%). Among women who have low incomes and receive supplementary health coverage (Couverture Maladie Universelle Complémentaire – CMU-C), 15% are overweight compared to 9% of the general population.

Female manual workers present a cardiovascular mortality rate that is three times higher than for female executives, due to the increased risk related to lifestyle, less frequent screenings and delayed treatment (see Inserm Memo). The women most confronted with economic insecurity – low-level employees and manual workers – are by far the most affected by musculoskeletal disorders (MSDs). The frequency rate of MSDs in female manual workers is 8.4 per million working hours versus 2.4 for male manual workers.

Working nights is also known as a risk factor in the development of breast cancer, as was recently demonstrated in an international study carried out by a team from the Inserm (Cordina-Duverger 2018). The health risk is 26% higher in women who worked nights compared to women working days. Women in a situation of economic insecurity for whom working nights is more common are the most exposed: 14% of female manual workers usually or occasionally work nights versus 8% of executives (Menegaux 2013). More generally, women in precarious situations attend screenings for specific female cancers less often and survive them less often.

It must be noted that many environmental health studies and action programs do take into account the vulnerability of populations of low socioeconomic level. However, very rare are the reports that extend their analysis to include the situation of women who are nevertheless the primary victims of economic insecurity.

### ***Recommendations***

The promotion of living and working conditions conducive to good health requires taking into account socioeconomic inequalities in relation to environmental risks and paying particular attention to the condition of women experiencing economic insecurity. Failure to seek healthcare for socioeconomic reasons remains too common. It is imperative to inform vulnerable populations of environmental risks and improve access to health care and social rights, particularly for women.

### 3. Gender, occupational health and the environment: The situation in North America and Europe

#### USA

In 1970, the US Congress created the Occupational Safety and Health Administration/OSHA – a federal agency falls under the auspices of the Department of Labor. Its role is to ensure safe and healthy working conditions for public and private sector workers through the establishment of safety standards and access to prevention and assistance resources. “Gender, Occupational Health and the Environment” is a research area specific to the National Institute for Occupational Safety and Health (NIOSH) that works under the auspices of the Centers for Disease Control (CDC). Several reports have been published: *Gender and Toxicity* (1997), *Working Women Face High Risks From Work Stress, Musculoskeletal Injuries, Other Disorders* (2000), *Women’s Safety and Health Issues at Work* (2001), *Gender Differences in Acute Pesticide-Related Illnesses and Injuries* (2012).

It must be noted that due to the workings of the US Federal system, labor law depends on the policy of each state. The OSHA and NIOSH recommendations concern only the national level and are not binding on the states.

In 1969, the National Institute of Environmental Health Sciences (NIEHS) was founded in order to promote environmental health research in the USA. The concept of the exposome has been the subject of specific programs since 2012 (*Exposome: Time for Transformative Research* (2012), *The Exposome: Partnerships for Environmental Public Health* (2014), *Toward Greater Implementation of the Exposome Research Paradigm Within Environmental Epidemiology* (2017). The exposome is a research priority of the NIEHS’s 2018-2030 Strategic Plan.

The objective of the National Council for Science and the Environment (NCSE) created in 1990 is to advance research on the impact of environmental changes on health by bringing together scientific experts, civil society representatives and political decision-makers. The Inserm is a partner of the NCSE within the Science Alliance on Environmental Health. We hope that among the missions of the Alliance, the issue of “Gender and Occupational Health” will be the subject of particular attention when it comes to creating prevention policies for vulnerable populations.

#### Canada

Since 2008, the Canadian Institutes of Health Research (CIHR: the equivalent of the Inserm) support the study of “Gender, Occupational Health and the Environment”.



Two researchers are pioneers in the field: Karen Messing, biologist, professor at the UQAM and Chair of the International Ergonomics Association Technical Committee on Gender and Work; and Katherine Lippel, legal specialist and holder of the Canada Research Chair on Occupational Health and Safety Law. Together they created the “Canadian Institutes of Health Research Gender team” within the CIHR, in order to develop approaches and methods for incorporating gender in studies that look at the impact of the environment and working conditions on health.

This research on the differences of male-female exposure to occupational risks led the Canadian health authorities (Canadian Centre for Occupational Health and Safety CCHST, Acts and Regulations Section, 2019) to review criteria defining the difficulties of work and the recognition of occupational illnesses in the following domains: exposure to carcinogens, dermatological diseases, musculoskeletal disorders, exposure to neurotoxins, diseases related to working in a standing position (Antle, D. *et. al.* 2013), impact of multiple chemical sensitivities related to multiple daily low-dose exposures to cocktails of chemical substances in domestic and professional environments of which women are the primary victims.

In Canada, the environmental health research programs are distributed among various federal agencies: the Canadian Institutes of Health Research, Health Canada, the Public Health Agency of Canada, the Canadian Food Inspection Agency. In the 2014-2019 strategic program (Capturing Innovation to Produce Better Health and Health Care for Canadians), the impact of the environment on health are addressed according to the nature of the agents involved (chemical, physical, infectious and psychosocial) with little mention, though, of the exposome concept. What is nonetheless worthy to note is the 2019 launch of The Social Exposome Research Cluster Project by the University of British Columbia which aims to understand the influence of social and environmental factors on children’s health and development.

## **Europe**

### **1. The European Framework Directive on Safety and Health at Work (OSH, Directive 89/391 EEC).**

This Directive guarantees minimum safety and health requirements throughout Europe, and Member States are also allowed to establish more stringent measures (EU-OSHA, 1989). The “Gender and OSH” issue is not addressed as such in this Directive. It includes only a few guidelines by employment sector (EU-OSHA, 2003, updated in 2019).

In 2017, a proposal for a new European Directive was submitted, entitled Work-Life Balance for Parents and Carers (Eur-Lex, 2017). The objective is to increase the participation of women in the labor market and promote work-life balance. It particularly involves enabling

women and men to take time off for family commitments and to benefit from more flexible working arrangements. This proposal is still being discussed (European Commission, Employment, Social Affairs and Inclusion, 2019).

## **2. The European Agency for Safety and Health at Work (EU-OSHA)**

This agency, created in 1996, gives special attention to research on “Gender and Occupational Safety and Health (OSH)”. Under the auspices of the EU-OSHA, the European Risk Observatory provides a statistical overview of trends in terms of employment and working conditions, exposure to risk, work accidents and health problems for women. It particularly explores combined exposures, occupational cancer, access to rehabilitation, women and informal employment and female occupations in the home care and domestic work sectors. Several reports on “Gender and OSH” have been published (EU-OSHA, 2014, 2016 and 2019). The principal conclusions and recommendations are as follows:

- Occupational risks to the health and safety of women have been underestimated and neglected in relation to those of men, both in terms of research and prevention. This imbalance should be corrected in the realm of research, awareness-raising and prevention.
- Research and monitoring can be improved by taking systematic account of the gender aspect in data collection and by basing the evaluation of the exposure on actual research.
- Epidemiological methods should be evaluated in order to detect any gender bias.
- European directives in terms of health and safety do not cover domestic workers (who are mainly women). Women working informally, for example the wives or partners of men managing a family farm, are also not always covered by the legislation. Gender-related incidences should be evaluated for current and future directives in terms of OSH, and mechanisms of defining standards and modes of compensation should be adapted.
- Women are under-represented at all levels in decision-making structures relating to occupational health and safety. They should be more directly involved, and their opinions, experience, knowledge and skills should be taken into consideration when formulating and implementing OSH strategies.
- Adopting a holistic approach in terms of OSH, taking into account the interactions between personal and professional life and the broader issues of work and employment arrangements, can improve the prevention of professional risks, in the interests of both women and men. Such is the aim of the proposal of the new European Directive Work-Life Balance for Parents and Carers (Eur-Lex, 2017).

### **3. The Horizon 2020 European Research Program**

The Horizon 2020 program incorporates the issue of gender and male/female equality in its seven societal challenges. The first of its seven research projects is “Health, Demographic Change and Wellbeing” aimed at understanding the determinants of the European population’s health in the professional, social environment, and climate contexts and, of course, emphasizes gender.

The 2018-2010 Horizon 2020 program includes funding and tender opportunities for research projects on “The Human Exposome Project: A Toolbox for Assessing and Addressing the Impact of the Environment on Health”. The concept of gender is explicitly mentioned. The topic description stipulates that “effective preventive action will need to be designed, building on knowledge of various risk factors, including exposure to pollutants in daily life, individual behavior and the social context, taking into account gender issues” (Horizon 2020, The Human Exposome Project, Funding and Tender Opportunities).

### **4. The Health and Environment-Wide Associations Based on Large Population Surveys/HEALS European program**

This project, launched in 2014, brings together a consortium of 15 European countries to study the health impact of environmental stress on the European scale. Its objective is to conduct a vast survey that includes the various exposome research activities: genome, epigenome, transcriptome, proteome, metabolome, sociocultural environment and economic status. The ongoing survey is being conducted on a cohort of 300,000 people followed over a period of 5 years.

One of the Work Packages (WP no. 10) is responsible for studying the health impact of the social, cultural and economic environment, with special attention to vulnerable groups: underprivileged socioeconomic status, ethnic minorities, children and the elderly.

It is worthy to note that issues related to working conditions and the situation of women are not explicitly mentioned in the objectives. We hope that they will be taken into consideration as the research of the WP (HEALS, Working Package 10) progresses.

## Conclusion and Perspectives

Taking social and economic living conditions into account in order to address the health impact of environmental risks forms an integral part of the exposome concept. Studies conducted in France and abroad all agree that exposure to occupational risks and work difficulties are underestimated, and that particularly for female-dominated occupations, it is rare that these factors are recognized. Women are the primary victims of economic insecurity, which is linked to an increased exposure to environmental risks. Hence, an ethical perspective approach is needed.

It is indeed time to broaden our approaches to the exposome: **the convergent topics of “environmental health” and “occupational health” should be linked to “gender health”**. The objective is to enrich knowledge in research and produce cross-disciplinary interrogations by encouraging dialogue among various scientific communities. Another important objective is to refine our perspectives on prevention initiatives and providing information to vulnerable populations, in particular women.

We indeed consider it desirable that the theme “Gender, Occupational Health and the Environment” should be explicitly integrated into future research plans on environmental health where Inserm teams are stakeholders: PNSE4, IFRES (French Environmental Health Research Initiative), HERA (European Health Environment Research Agenda), International Science Alliance on Environmental Health, etc.

The expert hearings that the Inserm Ethics Committee Gender and Health Research Group will hold in 2020 will enable us to consider in greater detail and formulate proposals to improve the identification and prevention of health risks for women and men.

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