

## THEORY AND METHODS

## Occupational epidemiology and work related inequalities in health: a gender perspective for two complementary approaches to work and health research

Lucía Artazcoz, Carme Borrell, Imma Cortès, Vicenta Escribà-Agüir, Lorena Cascant

*J Epidemiol Community Health* 2007;61(Suppl II):ii39–ii45. doi: 10.1136/jech.2007.059774

**Objectives:** To provide a framework for epidemiological research on work and health that combines classic occupational epidemiology and the consideration of work in a structural perspective focused on gender inequalities in health.

**Methods:** Gaps and limitations in classic occupational epidemiology, when considered from a gender perspective, are described. Limitations in research on work related gender inequalities in health are identified. Finally, some recommendations for future research are proposed.

**Results:** Classic occupational epidemiology has paid less attention to women's problems than men's. Research into work related gender inequalities in health has rarely considered either social class or the impact of family demands on men's health. In addition, it has rarely taken into account the potential interactions between gender, social class, employment status and family roles and the differences in social determinants of health according to the health indicator analysed.

**Conclusions:** Occupational epidemiology should consider the role of sex and gender in examining exposures and associated health problems. Variables should be used that capture the specific work environments and health conditions of both sexes. The analysis of work and health from a gender perspective should take into account the complex interactions between gender, family roles, employment status and social class.

See end of article for authors' affiliations

Correspondence to:  
Lucía Artazcoz, Agència de Salut Pública de Barcelona, Pl Lesseps 1, 08023 Barcelona, Spain; lartazco@aspb.es

Accepted 10 July 2007

Gender division that is present in all societies means that men and women are assigned different duties and responsibilities as well as different entitlements. Although the precise definition of this division varies between societies, there is a high degree of consistency in the sexual division of work with those who are defined as female having, primarily, responsibility for household and domestic labour and males having a primary role in paid work.<sup>1</sup> This sexual division of labour permeates all levels and spheres of society, even epidemiological research.

In the field of work and health research, early work tended to draw upon male only samples but by the end of 1980s the situation reversed and many studies focused on women only samples and work related differences in health among women. There was little truly comparative research. Nowadays, the dramatic changes in gender related patterns of employment make necessary a gender comparative approach that also includes men in the analysis. This gender approach means to take into account the sexual division of labour, as well as the potential different meanings of any particular role for men and women in different social contexts. This framework should recognise that the social relations of gender operate in complex ways. Thus, similar circumstances may affect both men and women similarly. Equally, similar social circumstances may produce different effects upon the health of men and women—for example, because of the interaction of other factors or the different meanings of these circumstances depending on sex. It is also important to build an explicit consideration of differences within men and within women into research. Research on gender and health should not be comparative in every case since there may be occasions where it is appropriate to focus on differences within women or men—for example, those related to social class or other dimensions of inequalities, but to highlight the complex ways in which the social relations of gender may impact men's and women's health.<sup>2</sup>

Moreover, the consideration of the role of both sex and gender is required.<sup>3</sup>

Two parallel approaches have dominated research on work and health. On one hand, classic occupational epidemiology has focused on job safety and hygiene hazards prioritising the study of male worker populations where their prevalence is typically higher. Even though women have always worked, less attention has been paid to female workers' occupational health.<sup>4</sup> With the dramatic changes in production, work organisation and labour market globalisation, this situation is starting to change with an increasing interest in the study of women's occupational health and of ergonomic and psychosocial hazards.

On the other hand, research on health inequalities has often considered work as an essential element of conceptual frameworks that differ by sex. Whereas among men the analysis has been focused on social class, often measured through occupation, among women it has been dominated by the role framework, emphasising women's roles as housewives and mothers with paid employment seen as an additional role.<sup>2–5</sup> The dominance of the role framework in studying ill health among women contrasts with the paucity of attention to family roles, and associated burden, and their influence on health in men. On the other hand, studies about social determinants of women's health have often neglected the importance of social class.

The objective of this study is to provide a framework for epidemiological research on work and health that combines classic occupational epidemiology and the consideration of work in a structural perspective focused on gender inequalities in health. The sexual division of labour is the point of departure for the analysis of both paradigms. Moreover, attention is also paid to the importance of social class in examining the impact of work on health. Firstly, a reflection about occupational epidemiology and its gaps in analysing women's health and in integrating a gender perspective is presented. Secondly,

limitations in health research on work related gender inequalities are identified by examining some of the main areas of this type of study. Finally, recommendations are made for future epidemiological research on work and health.

OCCUPATIONAL EPIDEMIOLOGY, SEX AND GENDER

Table 1 summarises some of the most important limitations of occupational epidemiology from a gender perspective. Traditionally, occupational epidemiology has been focused on safety, hygiene and, more recently, ergonomic and psychosocial hazards. Early research operated on the premise that workers were men. As a consequence, criticism has been made that less attention has been paid to women’s job related health problems than men’s. There are many examples that illustrate this statement.<sup>6-7</sup> For example, in many cases safety standards are based exclusively on male samples and results extrapolated to women, with no conclusive evidence of their suitability for females.<sup>8</sup> Regarding hygiene hazards, it is well known that there are sex differences in bone, fat and immune system metabolism, as well as cardiovascular and endocrine function, but little is known about the implications of these differences for the effects of toxic exposures.<sup>9</sup> Moreover, whereas in traditionally feminised jobs exposure to traditional job hazards such as heavy lifting is lower than in male sectors, women’s exposure to repetitive movements that often are not taken into account, either in research or prevention strategies, is usually high.<sup>10</sup>

On the other hand, gender issues have not been taken into account in occupational epidemiology. For example, although men’s occupational health has been better studied than women’s, research on this topic has often focused on physical and biological hazards, and has neglected the analysis of the gender dimension. Differences between men’s and women’s rates of work related injury, disability and fatality are largely attributable to the gendered organisation of paid work. However, little is known about the role of gender in males’ occupational health. The interest in the links between masculinity and health is increasing.<sup>11-12</sup> Overall, the development of a heterosexual male identity usually requires the taking of risks that are hazardous to health. Moreover, an unwillingness to admit weakness may prevent many men from taking health promotion messages seriously or attending health services when they need them.<sup>13</sup> Additionally, health related behaviours that can be used in the demonstration of hegemonic masculinity include the appearance of being strong and robust or the display of aggressive behaviour and physical dominance.<sup>11</sup> These patterns of behaviour are likely to be shown in the work environment in different ways. Moreover, social class can shape the expression of this masculinity stereotype. For instance, male manual workers are likely to show their

masculinity by making visible their physical strength and their resistance to hard physical environments. On the other hand, men of more advantaged social class who work tirelessly, deny their stress and dismiss their physical needs for sleep and a healthy diet often do so because they expect to be rewarded with money, power, position and prestige.<sup>14-15</sup> Clearly, these stereotypic male behaviours are likely to be related to occupational health problems among men.

Besides biological and cultural differences, men and women differ in their employment status, jobs, tasks and assigned responsibilities and these differences are, to a large extent, responsible for gender differences in risk exposures that are examined in the following sections.

Gender segregation in the labour market

There is a horizontal division of the labour market, with the female working population densely concentrated in certain sectors of activity and in certain professions. It is precisely in these sectors that the levels of remuneration are the lowest. Vertical segregation of the labour market—that is, the concentration of women in the lower categories of the professional hierarchy, reinforces the effects of horizontal segregation and also accounts for women’s low wages.<sup>16-17</sup> Even within the same job title, men and women may be assigned to different tasks and be exposed to different working conditions. For example, women in retail sales in Europe more often sell cosmetics and shoes, while men more often sell automobiles and electronic equipment.<sup>18</sup> Differences in gender tasks imply exposure to different hazards. As occupation codes are provided in more detail, differences between women’s and men’s tasks become more evident. However, because of sample size limitations many epidemiological studies about occupational health that assign exposures according to one or two digit codes, face potential classification biases by attributing similar exposures to people who actually carry out different tasks.

Besides gender differences in the exposure to physical hazards, there are also gender inequalities in the exposure to psychosocial risks. For example, in the former European Union of 15 members, females’ jobs are characterised by being more monotonous, with lower participation in planning, higher demands, more psychological and sexual harassment, more exposed to the public, and with lower salaries, less promotion prospects and more precariousness.<sup>19</sup> However, little is known about the reasons why, even when educational levels of women in developed countries are similar or even higher than men’s, females are concentrated in the less qualified occupations, with poorer psychosocial work environments, or about the causes of the “glass ceiling”<sup>20</sup> or gender discrimination in the labour market.<sup>21</sup>

There are also gender differences in the number of working hours that are related to a great extent to differences in family roles. Women are more likely to work part time. Although for some groups part time status may permit a more effective balance between work and non-work activities, in many cases working conditions are poorer than in full time jobs. In Europe, part time jobs are segregated into a narrower range of occupations than full time jobs and are typically lower paid, lower status (such as sales, catering and cleaning), more monotonous and with fewer opportunities for advancement.<sup>22</sup> Most studies carried out in the United States have shown that part timers usually earn less per hour than full timers, even after controlling for education, experience and other relevant factors.<sup>23</sup> Additionally, part time work is often related to job insecurity.<sup>24</sup> On the other hand, men are more likely to work long hours. There is a growing body of evidence suggesting that long working hours adversely affect workers’ health.<sup>25-27</sup>

Table 1 Gaps and limitations in occupational epidemiology from a gender perspective

- (1) Little attention to women’s occupational health problems
- (2) Use of analysis frameworks based on traditional male dominated occupations
- (3) Lack of consideration of sex and gender differences in the work hazards exposures and reaction to occupational hazards
- (4) Lack of studies about the causes and consequences of gender segregation and discrimination in the labour market
- (5) Lack of analysis and recording of domestic work hazards and associated health problems
- (6) Insufficient studies about the impact of part time work or long working hours on health
- (7) Lack of studies of gender differences in the impact of informal care on health

However, despite the increasing concern about the potential health effects of both forms of non-standard work schedules, research on this issue is still scarce.<sup>23 26–28</sup>

Gender segregation in domestic work

Gender segregation is also obvious in domestic labour where most tasks are still carried out by women. As in paid work, unpaid work implies exposure to safety, hygiene, ergonomic and psychosocial hazards. Domestic work related injuries and associated diseases are not systematically collected. From a gender perspective this is extremely important because they are much more frequent among women. The domestic setting can be a source of hazardous chemical exposures. For example, an association has been reported between cleaning tasks and asthma.<sup>29</sup> More research on potential hazards related to the use of products used in cleaning, repairing or domestic gardening is needed.

Domestic work also implies exposure to ergonomic and psychosocial hazards, such as those related to informal care in families with disabled people that, besides physical and mental effort, often poses high emotional demands. Many studies have reported the association between caring tasks and different health indicators among informal caregivers.<sup>30 31</sup> However, most of them analyse samples composed exclusively of females. Although these activities are mostly carried out by women, there are also men and it is expected that their numbers will progressively increase. On the other hand, because of differences in care-giving activities by gender, it is likely that their health impact differs by sex. For example, it can be expected that whereas among women the impact could be higher in mental health, among men it could be in the musculoskeletal system.

RESEARCH ON WORK RELATED GENDER INEQUALITIES IN HEALTH

Besides being a potential source of exposure to physical, hygiene, ergonomic and psychosocial hazards, work is one of the main axes that shapes life and identity, and its meaning differs by gender. Nowadays, in a context of transition from the traditional gender roles to more equal positions of men and women in society, employment has become more and more important in women's lives, while family roles are expected to become more and more important for men. However, gender differences and inequalities in paid and non-paid work still persist and the meaning of being a parent, whether married or not, and being in paid employment or not, is still likely to be different between men and women, and likely to appear differently depending on social class. Table 2 summarises some of the main limitations of work related gender inequalities in health research.

As mentioned above, research on gender inequalities in health has been dominated by the multiple roles approach but this literature has paid little attention to social class or

socioeconomic position that can interact with gender in determining women's employment status.<sup>2</sup> In general, more highly educated women are more likely to be in employment, or in full time employment.<sup>32</sup> Furthermore, educational level plays an even bigger part when women have children and other family responsibilities.<sup>33</sup> Therefore, different employment status can have a different meaning, not only by sex, but in different educational levels and, as a consequence, its impact on health may differ. However, gender research about work and health has rarely considered the potential modifying effect of educational level.

On the other hand, although it has been reported that gender inequalities differ depending on the health indicator analysed,<sup>34–36</sup> many studies on gender and health have analysed only one health indicator—that is, mental health,<sup>37</sup> self perceived health status<sup>38 39</sup> or long standing limiting illness.<sup>40 41</sup> Additionally, many studies about gender inequalities in health are based on cross sectional health surveys, therefore making that potential reverse causation bias cannot be ruled out. For example, poor health status can be the reason for being a full time homemaker, being unemployed or holding a precarious job, there being reverse causal pathways in contrast to what many studies conclude, with insufficient control of this potential bias, or at least a discussion of this aspect.

To overcome some previous limitations of research into work related gender inequalities in health requires considering three axes of social stratification: work (considering both paid and domestic work), gender and social class. From an epidemiological point of view it means the examination of multiple interactions in the analysis of different health indicators. So far, little is known about the impact on health of a given role taking into account the potential modifying effect of other factors, nor about the potential gender differences by social class. In the following sections we illustrate some of the gaps in this area of epidemiology by examining epidemiological questions such as health differences between full time homemakers and female workers, gender differences in the impact of combining job and family responsibilities and in being unemployed or working with a temporary contract, from a combined perspective of gender and social class.

Full time homemakers and female workers

It is widely recognised that paid employment has a beneficial effect on women's health with those in paid work being in better health than those who are not.<sup>42–44</sup> Moreover, some studies have generally confirmed that the better health of employed women does not simply reflect a "healthy worker effect."<sup>45 46</sup> The job environment can offer opportunities to build self esteem and confidence in one's decision making, social support for otherwise isolated individuals and experiences that enhance life satisfaction.<sup>47</sup> Additionally, income provides women with economic independence and increases their power in the household unit. These findings support the role enhancement hypothesis. However, other studies support the role overload or role conflict hypotheses. For example, it has been reported that employment has beneficial effects on health for unmarried women but little or no effect for married women,<sup>46</sup> or that the benefits of a job for mothers' health are restricted to those working part time.<sup>48–50</sup> Although it cannot be ruled out that certain social or cultural differences may explain the inconsistencies among studies, there are also some methodological limitations that could have an important role.

One of the reasons behind the contradictory findings in the role literature may be the insufficient characterisation of each role. In some studies multiple roles implies having more than one principal role (thus, number of roles is the focus); in others, it means combining job and family responsibilities (thus, type

Table 2 Gaps and limitations in work related gender inequalities in health research

- (1) Social class has rarely been considered
- (2) Need to analyse gender inequalities in a broad range of health indicators
- (3) No control of potential reverse causation effects in many cross sectional studies
- (4) Insufficient characterisation of domestic and paid work roles
- (5) No consideration of the potential interactions between gender, social class, family roles and employment status
- (6) Frequent use as dependent and independent variables, subjective concepts which are self reported



of roles).<sup>51</sup> However the relation between multiple roles and health not only depends on the number or the type of roles occupied, but also on the nature of the particular roles—that is, the exposures related to the job differ by occupational social class, or those associated with marital or parental status depend to a great extent on the family demands associated with these roles. Moreover, the effect of family demands on health may be different for different employment status or even for the same employment status there may be an interaction with occupational social class.

Few studies have examined the interaction between employment status and social class—that is, does being a full time homemaker or a worker mean the same and does it have the same impact on health for women independently of social class? For example, it has been reported that differences in health status among full time homemakers and female workers are more consistent among women of less favoured social class.<sup>52</sup>

Many studies analysing differences in health status among housewives and women workers have been based on samples of adult women with no restrictions on age or marital status. Housewives tend to be older than the average female worker and most of them have family responsibilities; many female workers have no family demands, therefore the association between employment status and ill health being due to differences in family responsibilities or to cohort effects cannot be ruled out.

### Combination of job and family responsibilities

Despite the dramatic increase of women in the labour market in recent decades, there has been no significant change in the distribution of domestic work, even when both partners are working.<sup>53</sup> Some of the most important limitations in current research into the impact of work-life balance on health is the frequent restriction of the samples to women, as well as the lack of consideration of the effect of social class.<sup>54</sup> For example, in a study carried out in Catalonia, in a sample of workers married or cohabiting, family demands, measured through household size, were related to several poor health outcomes among less privileged women but not among men, no matter their social class, nor among women of more advantaged social class.<sup>55</sup>

On the other hand, resources for facing domestic work should be taken into account. It has been reported that hiring a person to do domestic tasks is associated with good self perceived health status among married female workers after adjusting for age and social class. No such association was found among married male workers.<sup>56</sup> Interestingly, a protective effect of living with people older than 65 has been found among married, employed Spanish females with low education.<sup>55</sup> This finding could be explained by the fact that, nowadays, people older than 65 years of age have few limitations in their daily activities as compared with some years ago,<sup>56</sup> and they can provide emotional, operative and even economic support to female workers at home.

Many studies about the relation between family roles and health status have focused on psychological factors instead of using a social structural approach based on objective indicators of domestic burden (that is, number of young children at home or having someone hired for domestic tasks). In the first approach the measure of family demands includes strains actually experienced in various family roles (parent, wife) or in performing particular tasks (childcare, housework, etc).<sup>57–59</sup> That approach however has several limitations. On one hand, feelings of strain are to some extent affected by other aspects, such as personality characteristics, rather than the structural living or working conditions. On the other hand, when both dependent and independent variables are subjective and self

reported, personality may influence both of them and associations can be overestimated because of the sharing of a common variance. Moreover, whether the focus of analysis of health inequalities primarily relies on structural or on psychological factors has policy implications. Whereas the first approach mainly leads to political interventions addressed to changing structural factors that generate health inequalities, the second one emphasises the need for individual or cultural changes.

### Unemployment and mental health

One of the most extensively studied health effects of unemployment is that of psychological distress among the unemployed.<sup>60</sup> However, despite the high prevalence of unemployment and mental health disorders among women, the different position of men and women in the labour market and gender differences in the social determinants of mental health,<sup>61</sup> potential gender differences in health effects of unemployment have rarely been addressed. Indeed, many studies on unemployment have included only men.<sup>62–63</sup>

Unemployment can cause poor mental health because of financial strain, and the beneficial effects of unemployment compensations have been reported.<sup>64–66</sup> But unemployment can also be associated with poor mental health due to the lack of non-financial benefits provided by the job, such as time structure to the day, social status, self esteem, physical and mental activity, use of skills, decision latitude, interpersonal contacts, and “traction,” a reason to go on through the day and from one day to the next.<sup>60</sup> The association between these factors and mental health status is likely to be mediated by the social context in which individuals live, which is largely determined by family roles and social class. Moreover, the role of these factors is likely to differ by gender since they have different meanings for men and women. In addition, social class can act as a modifying factor.

In a study about the impact of unemployment on mental health status, carried out in a Spanish population, the authors confirmed this complex framework of interactions. The beneficial effects of unemployment compensations were not equally distributed across different categories of gender, family roles and social class; the higher impact of unemployment on men's mental health was accounted for by workers with family responsibilities, with marriage increasing the risk of poor mental health for manual men, whereas for women, being married, and particularly living with children, acted as a buffer; and the mediating effect of social class on the impact of unemployment on mental health differed by gender and family roles. From these results, it can be inferred that being married can be a source of serious financial strain for unemployed men from less advantaged social classes who traditionally assume the role of breadwinners at home. Moreover, because of their traditional low involvement in nurturing roles, for males, family responsibilities cannot successfully replace a job as an alternative source of a goal and meaning in life. Conversely, among women, who still have a principal role in the family in developed countries, family roles could replace the rewards that were once provided by the job.<sup>67</sup>

However, another explanation for these findings is possible. Women could be more health selected than men into unemployment. Those who have children and defined themselves as unemployed—therefore, they are looking actively for work—could be the ones who are particularly strongly motivated to do so, and equipped with good health enough to volunteer for the possible role overload that may result. These alternative or complementary explanations for the lower impact of unemployment on mental health of females with children deserve further research.

## Flexible employment arrangements and health

Between the extreme positions in the labour market represented by working with permanent contracts or being unemployed, there is a broad range of unstable employment situations with potentially damaging effects on health. Although increasing job flexibility is one of the main features of current labour market policies, in comparison with literature about unemployment, very little research has been done to analyse the impact of flexible employment on individuals' health and living conditions. Moreover, results of different studies are not consistent. In a review about research on temporary work and health, Virtanen *et al*<sup>68</sup> emphasised the importance of considering contextual variables such as unemployment rates, national employment protection and social security legislation in relation to poor wages, poor social security, job insecurity and a lack of unionisation and industrial safety.

Although these contextual factors are obviously important, from a gender perspective it is essential to further consider the higher proportion of women with flexible contractual arrangements, their lower position in the labour market as well as their family roles. A study carried out in Spain reported that the effect on mental health of flexible contractual arrangements, other than fixed term temporary contracts, was higher among less privileged groups (women and manual male workers), and that the impact of flexible employment, either fixed term or non-fixed term contracts, on family formation was more pronounced among men.<sup>69</sup> In most countries, holding a job is an important predictor for cohabitation, marriage and parenthood among men. Moreover, in countries with a strong male breadwinner model, long term and full time employment for men is considered necessary in order to consolidate the financial basis considered as necessary for these transitions.

Previous research on job insecurity and health has been largely based on the analysis of perceived insecurity and positive association with poor psychological and physical health have been found.<sup>70-75</sup> This approach, however, has some limitations because feelings about job insecurity are to some extent affected by aspects other than the objective contractual arrangements.<sup>76</sup> Moreover, as mentioned earlier, when both dependent and predictor variables are subjective, associations can be overestimated because of sharing a common variance.

## RECOMMENDATIONS FOR FUTURE RESEARCH

Sex, gender and social class should be taken into account in research about work and health. Moreover, the concept of work should also include unpaid work. Some recommendations for future research addressing these challenges are listed below:

- *Occupational epidemiology*: classic analysis of safety, hygiene, ergonomic and psychosocial hazards should include, when applicable, both sexes and examine the potential interactions between sex and social class. Moreover, a similar approach should be used in the examination of domestic work hazards. The meaning of the sex variable should be interpreted both as a biological concept and a sociological one.<sup>77</sup>
- *Conceptual frameworks*: more effort should be devoted to the development of conceptual frameworks that take into account gender, paid and domestic work, as well as social class, as different dimensions of social stratification with complex inter-relations among them.
- *Study design*: cross sectional studies are likely to have a reverse causation bias. More longitudinal studies are undoubtedly needed in order to overcome this limitation. However, longitudinal studies are costly and, when they are prospective, a long time is needed to obtain results. This

## What is already known

Two parallel approaches have dominated research on work and health.

- On one hand, classic occupational epidemiology has focused on job safety and hygiene hazards prioritising the study of male workers populations where their prevalence is typically higher.
- On the other hand, research on health inequalities has often considered work as an essential element of conceptual frameworks that differ by sex. Whereas among men the analysis has been focused on social class, often measured through occupation, among women it has been dominated by a role framework that emphasises family roles and non-paid work.

## What this paper adds

- We provide a framework for epidemiological research on work and health that combines classic occupational epidemiology and the consideration of work in a structural perspective of work related gender inequalities in health. Limitations of current research on work and health from a gender perspective are identified.
- Moreover, attention is also paid to the importance of social class in examining the impact of work on health, as well as, to the complex interactions among gender, social class, paid work and family demands.

## Policy implications

- Expanding the analysis of the impact of work on health, from the classic occupational health approach based on the exposure to different hazards, to an structural perspective that considers work as a determinant of social inequalities in health has important policy implications.
- Whereas in the first approach responsibility for occupational health primarily corresponds to occupational health professionals and is focused at the workplace level, the second one implies taking into account the impact of economic, social and labour policies in workers' occupational health.
- So far, many political decisions in these areas are based on economical reasons and the need to adapt to globalisation and higher competitiveness, but they would have to take into account the impact on occupational health as one of the key elements in the decision making processes.

limitation is especially important for studies of social inequalities in health in a context of a rapidly changing society since results could cease to be valid only a few years after the start of the study. There are other alternatives to reduce the reverse causation bias, such as restricting the study populations to people with no long standing limiting illness, for example.

- *Analysis of multiple interactions in work related gender inequalities:* the epidemiological analysis and interpretation of results of the multiple interactions between paid work, family demands, gender and social class is not easy. Either models with interaction terms can be fitted or the analysis can be disaggregated for different categories of the interacting variables. However, although the first position can be defended based on statistical grounds, an important part of theoretical richness and intuitive interpretation is lost. It has been pointed out that the second approach, which requires large samples, is more easily understood and preferable when there are several terms of interaction or terms with many interacting variables.<sup>78</sup> This approach means analysing different pieces of reality by restricting the study populations according to some variables; to fit separated statistical models for the social variables of interest and to give full theoretical voice to the complexity of the socially constructed meaning of the combined impact of gender, social class and work.
- *Selection of variables:* selected variables should adequately capture exposures and outcomes for both sexes. In examining job hazards it has been recommended that we measure exposures rather than infer them from their occupational code.<sup>7</sup> It is also recommended that we capture demands and resources relating to domestic work. Regarding outcomes, research should analyse different health outcomes, when applicable, in order to understand the complexity of the associations of working and living conditions with health. Finally, studies should avoid simultaneous subjectivity in both dependent and independent variables.

## CONCLUSIONS

Gender sensitive epidemiology on work and health is something more than just disaggregating the analysis by sex. It requires the development of conceptual frameworks with men and women included and the consideration of the strong sexual division of work and of society in general, as well as taking into account the interactions among work (paid and unpaid work), gender and social class. In addition, the role of sex and gender in observed differences should be carefully discussed. Moreover, there may be occasions where it is appropriate to focus on differences within women or men in order to highlight the complex ways in which the social relations of gender may impact men's and women's health.

There may be an ideological resistance to gender sensitive research because although consideration of gender has been traditionally regarded as essential in social science, this is not the case in epidemiological research. Gender sensitive research may be considered by some sectors as ideological contamination. However, this is not only a political issue, it means improving the quality of research, not only for women, but for both sexes.

## ACKNOWLEDGEMENTS

This study was partially financed by two research grants: Epidemiology and Public Health Centres Network (G03/09) and Gender and Health Network (G03/42).

## Authors' affiliations

**Lucía Artazcoz, Carme Borrell, Imma Cortès, Lorena Cascant,** Agència de Salut Pública, Barcelona, Spain  
**Lucía Artazcoz, Carme Borrell, Imma Cortès, Vicenta Escribà-Agüir, Lorena Cascant,** CIBER Epidemiología y Salud Pública (CIBERESP), Spain  
**Carme Borrell,** Universitat Pompeu Fabra, Barcelona, Spain  
**Vicenta Escribà-Agüir,** Valencian School for Health Studies (EVES), Generalitat Valenciana, Spain

Conflicts of interest: none.

## REFERENCES

- 1 Doyal L. Gender equity in health: debates and dilemmas. *Soc Sci Med* 2000;**51**:931-9.
- 2 Annandale E, Hunt K. Gender inequalities in health: research at the crossroads. In: Annandale E, Hunt K, eds. *Gender inequalities in health*. Buckingham: Open University Press, 2000.
- 3 Doyal L. Sex, gender, and health: the need for a new approach. *BMJ* 2001;**323**:1061-3.
- 4 Messing K, Punnett L, Bond M, et al. Be the fairest of them all: challenges and recommendations for the treatment of gender in occupational health research. *Am J Ind Med* 2003;**43**:618-29.
- 5 Sørensen G, Verbrugge LM. Women, work, and health. *Ann Rev Public Health* 1987;**8**:25-51.
- 6 Niedhammer I, Saurel-Cubizolles MJ, Piciotti M, et al. How is sex considered in recent epidemiological publications on occupational risks? *Occup Environ Med* 2000;**57**:329-37.
- 7 Messing K, Mager-Stellman J. Sex, gender and women's occupational health: the importance of considering mechanism. *Environ Res* 2006;**101**:149-62.
- 8 Messing K. Prostitutes and chimney sweeps both have problems: towards full integration of both sexes in the study of occupational health. *Soc Sci Med* 1993;**36**:47-55.
- 9 Messing K, Ostlin P. *Gender equality, work and health: a review of the evidence*. Geneva: World Health Organization, 2006:8-9.
- 10 Punnett L, Bergqvist U. Musculoskeletal disorders in visual display unit work: gender and work demands. *Occup Med State Art Rev* 1999;**14**:113-24.
- 11 Moynihan C. Theories of masculinity. *BMJ* 1998;**317**:1072-5.
- 12 Schofield T, Connell R, Walker L, et al. Understanding men's health and illness: a gender-relations approach to policy, research and practice. *J Am College Health* 2000;**48**:247-58.
- 13 Cameron C, Bernardes D. Gender and disadvantage in health: men's health for a change. *Social Health Illn* 1998;**18**:673-93.
- 14 Courtenay WH. Constructions of masculinity and their influence on men's well-being: a theory of gender and health. *Soc Sci Med* 2000;**50**:1385-401.
- 15 Courtenay WH, Keelin RP. Men, gender, and health: toward an interdisciplinary approach. *J Am Coll Health* 2000;**48**:243-6.
- 16 Messing K, Dumais L, Courville J, et al. Evaluation of exposure data from men and women with the same job title. *J Occup Med* 1994;**36**:913-17.
- 17 McDiarmid M, Olivé M, Ruser J, et al. Male and female rate differences in carpal tunnel syndrome injuries: personal attributes or job tasks? *Environ Res* 2000;**83**:23-32.
- 18 Messing K, Chatigny C, Courville J. "Light" and "heavy" work in the housekeeping service of a hospital. *Appl Ergon* 1998;**29**:451-9.
- 19 Paoli P, Merlié D. *Third European survey on working conditions 2000*. Luxembourg: Office for Official Publications of the European Communities, 2001.
- 20 Colomer C, Peiró R. Techos de cristal y escaleras resbaladizas. *Gac Sanit* 2002;**16**:358-60.
- 21 Krieger N. Embodying inequality: a review of concepts, measures, and methods for studying health consequences of discrimination. *Int J Health Serv* 1999;**29**:295-352.
- 22 Fagan C, Burchell B. *Gender, jobs and working conditions in the European Union*. Luxembourg: Office for Official Publications of the European Communities, 2002.
- 23 Kalleberg AL. Non-standard employment relations: part-time, temporary and contract work. *Annu Rev Sociol* 2000;**26**:341-65.
- 24 Quinlan M, Mayhew C, Bohle P. The global expansion of precarious employment, work disorganization, and consequences for occupational health: a review of recent research. *Int J Health Serv* 2001;**31**:335-414.
- 25 Harrington JM. Working long hours and health. *BMJ* 1994;**308**:1581-2.
- 26 Van der Hulst M. Long workhours and health. *Scand J Work Environ Health* 2003;**29**:171-88.
- 27 Caruso CC, Hitchcock EM, Dick RB, et al. *Overtime and extended work shifts: Recent findings on illnesses, injuries and health behaviours*. Cincinnati: US Centers for Disease Controls, National Institute for Occupational Safety and Health, 2004.
- 28 Spurgeon A, Harrington JM, Cooper CL. Health and safety problems associated with long working hours: a review of the current positions. *Occup Environ Med* 1997;**54**:367-75.
- 29 Medina-Ramón M, Zock JP, Kogevinas JP, et al. Asthma symptoms in women employed in domestic cleaning: a community based study. *Thorax* 2003;**58**:950-4.
- 30 Pinquart M, Sorensen S. Correlates of physical health of informal caregivers: a meta-analysis. *J Gerontol B Psychol Sci Soc Sci* 2007;**62**:126-37.
- 31 Navaie-Walser M, Spriggs A, Feldman PH. Informal caregiving: differential experiences by gender. *Med Care* 2002;**40**:1249-59.
- 32 Jaumotte F. *Female labour force participation. Past trends and main determinants in OECD countries*, Economics Department Working Papers, No 376, OECD Publishing, 2003.
- 33 Ballarín P, Euler C, Le Feuvre N, et al. Women in the European Union. [www.helsinki.fi/science/xantippa/wee/wee1.html](http://www.helsinki.fi/science/xantippa/wee/wee1.html) [Accessed 2 Sep 2004].
- 34 Macintyre S, Hunt K, Sweeting H. Gender differences in health. Are things really as simple as they seem? *Soc Sci Med* 1996;**42**:617-24.
- 35 Lahelma E, Martikainen P, Rahkonen O, et al. Gender differences in ill-health in Finland: patterns, magnitude and change. *Soc Sci Med* 1999;**48**:7-19.



- 36 **Matthews S**, Manor O, Power C. Social inequalities in health: are there gender differences? *Soc Sci Med* 1999;**48**:49–60.
- 37 **Chandola T**, Martikainen P, Bartley M, *et al*. Does conflict between home and work explain the effect of multiple roles on mental health? A comparative study of Finland, Japan, and the UK. *Int J Epidemiol* 2004;**33**:884–93.
- 38 **Gilmore AB**, McKee M, Rose R. Determinants of and inequalities in self-perceived health in Ukraine. *Soc Sci Med* 2002;**55**:2177–88.
- 39 **Bobak M**, Pikhart H, Rose R, *et al*. Socio-economic factors, material inequalities, and perceived control in self-rated health: cross-sectional data from seven post-communist countries. *Soc Sci Med* 2000;**51**:1343–50.
- 40 **Arber S**. Class, paid employment and family roles: making sense of structural disadvantage, gender and health status. *Soc Sci Med* 1991;**32**:425–36.
- 41 **Lahelma E**, Manderbacka K, Rahkonen O, *et al*. Comparisons of inequalities in health: evidence from national surveys in Finland, Norway and Sweden. *Soc Sci Med* 1994;**38**:517–24.
- 42 **Nathanson CA**. Illness and the feminine role: a theoretical review. *Soc Sci Med* 1975;**9**:57–62.
- 43 **Nathanson CA**. Social roles and health status among women: the significance of employment. *Soc Sci Med* 1980;**14**:463–71.
- 44 **McMunn A**, Bartley M, Hardy R, *et al*. Life course social roles and women's health in mid-life: causation or selection? *J Epidemiol Community Health* 2006;**60**:484–9.
- 45 **Passannante MR**, Nathanson CA. Female labour force participation and mortality in Wisconsin, 1974–1978. *Soc Sci Med* 1985;**21**:655–65.
- 46 **Waldron I**, Weiss CC, Hughes ME. Interacting effects of multiple roles on women's health. *J Health Soc Behav* 1998;**39**:216–36.
- 47 **Sorensen G**, Verbrugge LM. Women, work, and health. *Ann Rev Public Health* 1987;**8**:25–51.
- 48 **Bartley M**, Popay J, Plewis I. Domestic conditions, paid employment and women's experience of ill-health. *Social Health Illn* 1992;**14**:313–43.
- 49 **Walters V**, Denton R, French S, *et al*. Paid work, unpaid work and social support: a study of the health of male and female nurses. *Soc Sci Med* 1996;**43**:1627–36.
- 50 **Bartley M**, Sacker A, Firth D, *et al*. Social position, social roles and women's health in England: changing relationships 1984–1993. *Soc Sci Med* 1999;**48**:99–115.
- 51 **Sorensen G**, Verbrugge LM. Women, work, and health. *Annu Rev Public Health* 1987;**8**:235–51.
- 52 **Artazcoz L**, Borrell C, Benach J, *et al*. Women, family demands and health: the importance of employment status and social class. *Soc Sci Med* 2004;**59**:263–74.
- 53 **Artazcoz L**, Artieda L, Borrell, *et al*. Combining job and family demands and being healthy: what are the differences between men and women? *Eur J Public Health* 2004;**14**:43–8.
- 54 **Arber S**. Class, paid employment and family roles: making sense of structural disadvantage, gender and health status. *Soc Sci Med* 1991;**32**:425–36.
- 55 **Artazcoz L**, Borrell C, Benach J. Gender inequalities in health among workers: the relation with family demands. *J Epidemiol Community Health* 2001;**55**:639–47.
- 56 **Artazcoz L**, Cortès I, Moncada A, *et al*. Influencia del trabajo doméstico sobre la salud de la población ocupada. *Gac Sanit* 1999;**13**:201–7.
- 57 **Kandel DB**, Davies M, Raveis VH. The stressfulness of daily social roles for women: marital, occupational and household roles. *J Health Soc Behav* 1985;**26**:64–78.
- 58 **Simon RW**. Parental role strains, salience of parental identity and gender differences in psychological distress. *J Health Soc Behav* 1992;**33**:25–35.
- 59 **Simon, RW**. The meanings individuals attach to role identities and their implications for mental health. *J Health Soc Behav* 1997;**38**:256–74.
- 60 **Janlert U**. Unemployment as a disease and diseases of the un-employed. *Scand J Work Environ Health* 1997;**38**(suppl 3):79–83.
- 61 **Piccinelli M**, Wilkinson G. Gender differences in depression. *Br J Psychiatry* 2000;**177**:486–92.
- 62 **Bartley M**, Owen C. Relation between socio-economic status, employment and health during economic change, 1973–93. *BMJ* 1996;**13**:445–9.
- 63 **Leino-Arjas P**, Liira J, Mutanen P, *et al*. Predictors and consequences of unemployment among construction workers: prospective cohort study. *BMJ* 1999;**319**:600–5.
- 64 **Rodríguez E**, Lasch K, Mead JP. The potential role of unemployment benefits in shaping the mental health impact of unemployment. *Int J Health Serv* 1997;**27**:601–23.
- 65 **Rodríguez E**, Frongillo EA, Chandra P. Do social programmes contribute to mental well-being? The long-term impact of unemployment on depression in the United States. *Int J Epidemiol* 2001;**30**:163–70.
- 66 **Rodríguez E**. Keeping the unemployed healthy: the effect of means tested and entitlement benefits in Britain, Germany, and the United States. *Am J Public Health* 2001;**91**:1403–11.
- 67 **Artazcoz L**, Benach J, Borrell C, *et al*. Unemployment and mental health: understanding the interactions among gender, family roles, and social class. *Am J Public Health* 2004;**94**:82–8.
- 68 **Virtanen M**, Kivimäki M, Joensuu M, *et al*. Temporary employment and health. A review. *Int J Epidemiol* 2005;**34**:610–22.
- 69 **Artazcoz L**, Benach J, Borrell C, *et al*. Social inequalities in the impact of flexible employment on different domains of psychosocial health. *J Epidemiol Community Health* 2005;**59**:761–7.
- 70 **Joelson L**, Wahlquist L. The psychological meaning of flexible employment and job loss: results of a longitudinal study. *Soc Sci Med* 1987;**25**:179–82.
- 71 **Dooley D**, Rook K, Catalano R. Job and non job stressors and their moderators. *J Occup Psychol* 1987;**60**:115–32.
- 72 **Muntaner C**, Nieto FJ, Cooper L, *et al*. Work organization and atherosclerosis. *Am J Prev Med* 1998;**14**:9–18.
- 73 **Mattiasson I**, Lindgarde F, Nilsson JA, *et al*. Threat of unemployment and cardiovascular risk factors: longitudinal study of quality of sleep and serum cholesterol concentrations in men threatened with redundancy. *BMJ* 1990;**301**:461–6.
- 74 **Domenighetti G**, D'Avanzo B, Bisig B. Health effects of flexible employment among employees in the Swiss general population. *Int J Health Serv* 2000;**30**:477–90.
- 75 **Ferrie JE**, Shipley MJ, Stansfeld SA, *et al*. Effects of chronic flexible employment and change in job security on self-reported health, minor psychiatry morbidity, physiological measures, and health related behaviours in British civil servants: the Whitehall II study. *J Epidemiol Community Health* 2002;**56**:450–4.
- 76 **Benach J**, Amable M, Muntaner C, *et al*. The consequences of flexible work for health: are we looking at the right place? *J Epidemiol Community Health* 2002;**56**:405–6.
- 77 **Krieger N**. Genders, sexes, and health: what are the connections—and why does it matter? *Int J Epidemiol* 2003;**32**:652–7.
- 78 **Kunkel SR**, Atchley RC. Why gender matters: being female is not the same as not being male. *Am J Prev Med* 1996;**12**:294–6.