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GENDER AND OCCUPATIONAL ALLERGY (GOA):

Report from the task force of the EAACI Environmental & Occupational Allergy Interest Group

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ABSTRACT

Women's work has traditionally been considered less hazardous to health in comparison with men's work. The increased women's participation in the workforce has led to an increased attention to women's working conditions. Women and men are unequally represented in individual professions or sectors (horizontal segregation), with women also under-represented in leadership positions (vertical segregation). The selection of specific occupations can result in differences between types and levels of occupational exposures among women and men, and can affect prevalence of occupational allergy. Gender distribution of work-related asthma appears to vary across countries without clear global difference. Occupational rhinitis tends to be higher in women, although it is not clear if this is related to a sex/gender effect or to differences in work exposure. Women are more likely to have occupational contact dermatitis, mainly due to wet work. No clear effects of gender on rates of hypersensitivity pneumonitis have been shown. Besides variation in exposures, physical and physiological characteristics, different behaviors and health consciousness have an impact on the occupational health hazards of women and men. Occupational allergy health promotion strategies need to consider approaches for women and men adjusted by gender, and legislative actions similarly could be implemented in a more gender-sensitive way.

1. INTRODUCTION

Women's work has traditionally been considered safe and less hazardous to health in comparison with men's work. Some years ago, occupational health research was criticized for either not studying women at all, or just "controlling" for gender in the analyses. [1-2]. The increased women's participation in the workforce (up to 42% of the workforce in the EU) has led to an increased gender-sensitive approach among occupational health researchers, and many scientists have suggested that women's working conditions deserve attention.

In addition to undisputable biological differences between men and women which are termed "sex", there are role-specific differences which are termed "gender", which are based on the fact that men and women are treated differently by society, despite legal equality [3]. The occupational activities of men and women, the jobs they do, their respective working conditions, are different. In particular, although almost all professions can now be undertaken by women, there are still so-called "women's professions" (horizontal segregation). Moreover, even within the same profession, women and men occupy different positions in the hierarchy, being women underrepresented at supervisory and management levels, and segregated into low-level jobs without career promotion (vertical segregation). This also implies that in many cases women earn less money, which in turn can be linked to lower social status and more often associated with poorer health.

These differences can affect the hazards and risks faced by men and women in occupational activities, can have an impact on work-related health outcomes and the way in which they are assessed and prevented.

Considering allergy, the involvement of sex hormones in immune reactions may partly explain different prevalences and clinical manifestations between allergic women and men [4-5].

However, in occupational allergy the men's or women's preponderance reported in some occupational allergic reactions or diseases, e.g. severe anaphylactic reactions in men [6-7], or the increased asthma risk in female cleaners [8], probably reflect differences in sociocultural role and allergen exposure, rather than sex hormones' influence.

The influence of gender-specific differences in occupational allergic diseases has been previously evaluated considering separately respiratory and skin diseases.

In the present document GOA (Gender and Occupational Allergy) Task Force we focused on both respiratory and skin allergic diseases related to work exposure with the following aims: .

- To summarize the current scientific evidence on the risks associated with gender in occupational allergy
- To develop an up-to-date consensus document comprising an expert panel of allergologists, pneumologists, dermatologist and occupational medicine physicians from various European countries and far beyond.
- To outline key-messages based on consensus reached by the expert panel members highlighting the need for a gender-sensitive approach also in occupational allergy

2. METHODS

This consensus document was prepared by the EAACI GOA Task Force expert panel of allergologists, pneumologists, dermatologists and occupational medicine physicians. A literature search was conducted by individual panel members using PubMed Medline. Two meetings were held to review the findings and reach informal consensus. Further consensus was obtained through an informal iterative process soliciting input on earlier drafts from all panel members. Due to the heterogeneous quality of published studies evidence-based recommendations could not be developed. This final article is the result of an expert consensus opinion after a thorough review of the available literature. The expert recommendations have been summarized in “key messages” (see Key Messages Box).

Data sources, search strategy and study selection

Published studies in English were identified from PubMed from 1965 to March 2018. All Task Force members did the literature search using the following key words: (work-related* OR

occupational*) AND (asthma OR rhinitis OR respiratory OR hypersensitivity pneumonitis OR dermatitis/eczema) AND (Gender OR sex).

References published within the 1965-2018 timeframe found by checking the lists of references in the publications found by search strategy, that had not been otherwise identified in the initial search, were added where relevant

3. GENDER AND OCCUPATIONAL ACTIVITIES

Gender differences and work-related risks cannot be discussed without looking at the differences between men and women in their working lives. Gender issues are becoming more prominent, because the proportion of women in the European labour market has increased significantly in the past 25 years [9]. Due to occupational segregation women and men are distributed differentially across occupations, but this distribution is not equal over all occupations [10]. While “vertical segregation” means the underrepresentation of women in occupations at the top of an ordering based on attributes like income, prestige, job stability, etc., “horizontal segregation” is the under-(over-) representation of a group in occupations or sectors, not ordered by any criterion, and is often simply referred to as “segregation” [11].

Interestingly, there is evidence that significant increases in female employment are likely to raise the level of segregation in the short and medium run, because that will increase the proportion of women in the public sector and in health care even more [11-12]. As shown by analyzing data of 27 EU countries between 1990 and 2012, women’s employment is considerably higher in the public sector including healthcare, education, public administration, Horeca (hotel, restaurant and catering) and retail [12]. In contrast to this, male-dominated working areas are construction, manufacturing, transport, agriculture, and financial services [9]. While women are employed less in the manufacturing sector, the areas where they are predominating (textile and food industry) have a lower reputation than more male-dominated areas such as car manufacturing [9].

Additionally, occupational activities and their impact on health are also influenced by the average actual hours and years of work, respectively. The average actual hours of work of employed men exceed those of employed women. Individuals' work hours are motivated, not only by their own needs, but by the overall social structure in which they are embedded. There are large nation-

specific differences in the amount of time devoted to work, and countries differ significantly in how strictly work hours are regulated, as well as in the kinds of family models, and therefore in the probability that long working hours be forced or voluntary. Both labour markets' regulation and family policies are closely associated with welfare state regimes [13].

Female excess has been reported in sickness absence in most diseases, especially in mental and behavioral disorders, musculoskeletal diseases, and respiratory diseases [14]. Psychosocial factors, including women's tendency to show preventive health behavior, appear to be at least a part of the explanation [15]. It seems, however, that the impact of working conditions on that finding is independent of gender differences [16-17].

4. GENDER AND EMPLOYMENT CONDITIONS

There has been a considerable increase in women in the labour market over the last decades. For the Euro Area for example, the ratio of female to male labour force participation rates has risen from a value of 62 to 80. This ratio is calculated by dividing the percentage of women in the labour force (participation rate in %) by the corresponding rate for men and multiplying by 100 [18]. The increase has however mostly been due to more women working part-time. One third of women in the EU worked part-time in 2016 as opposed to only 8% of men [19]. Women are more likely to take up part-time work and reduce working hours in order to care for a dependent family member or for other activities not recorded as "economic work" [20]. Men also have a much higher rate of self-employment and more often employ their own workers [21]. The feasibility of becoming self-employed is much higher for men in the EU [22]. Women are often discouraged from labour-force participation via economic disincentives like the tax system. It is assumed that they do not need as much money as a man when sharing work equally in a family [23]. As a matter of fact, women often earn less money than men in the same jobs, and this fact may have also an impact on women's health. Nevertheless, women report a higher level of job satisfaction than men [24].

5. GENDER AND OCCUPATIONAL EXPOSURE TO ALLERGIC RISKS AND HAZARDS

Males and females tend to work in different occupations, and tend to have different responsibilities even within the same occupation, resulting in different types and levels of occupational exposures [25-26]. In a population-based study of Swedish adults, occupational exposures to vapours, gas, dust, and fumes (that may exacerbate asthma) were more common in males [27]. Also, males had more often concomitant occupational exposure to chemicals and dust than women. These results were confirmed in another study in which females and males differed in the occupational exposures associated with their work-related asthma [28]. Thus, these results likely largely reflect combined differences in occupation itself and in exposures within the same occupation.

There are some examples of studies investigating gender effects within the same employer or indeed the same occupation. In Canadian snow crab workers, plant areas with prevalent female jobs were associated with higher aerosolized crab allergens, such as in packing and cleaning jobs, than areas associated with male jobs [29]. In the same study, female workers had worked longer processing snow crab than males and had a higher median cumulative exposure than males. Similarly, in hospital workers, 81% of women and 55% of men were exposed to cleaning or disinfecting tasks [8,30]. Moreover, women had a higher intensity and frequency of occupational exposure than men. Adopting a better strategy to investigate gender-rather than sex-effects, a further study compared women and men in the welding and electrical trades [31]. Here, female welders less often used respiratory protective equipment than male welders, which potentially increases occupational exposure predisposing for asthma.

Altogether, the literature investigating sex differences and even more so gender differences in occupational exposures predisposing to allergic diseases seems scarce. Yet, there is evidence for substantial exposure differences as laid out in the examples above. Future studies should consider differences not only by sex but also by gender with regard to the occupation or job being held and occupational exposures, paying special attention to true differences in (quantitatively measured) exposure levels and perceived or reported differences. In Germany, occupational diseases as well

as work, school and road accidents, which are reported to statutory trade associations and accident insurance companies, are documented and published by the German Statutory Accident Insurance (DGUV) within the documentation of occupational disease (BK-DOK). In 2017, 498 cases of “obstructive airway diseases, including rhinopathy, caused by allergic substances” (BK 4301) were confirmed (Fig. 1). The proportion of men was 66% and that of women 34%. The most common category of disease-inducing hazard triggers was flour, flour products, dough/bakery products (typical triggers of “baker’s asthma”) and for significantly more men than women these are the cause of obstructive airway disease. More women are affected by "hair, bristles, feathers, horn of animals" and also by cosmetics, hair products etc., while the application of “wood, wood components and various other dusts” as well as “cooling lubricants” were more often confirmed as the cause of respiratory allergy in men.

In 2017, 18868 cases were confirmed as “severe or repeatedly recurrent skin diseases” (BK 5101) (Fig. 2). This occupational disease number covers both allergic and irritant-induced skin disease. The classification according to sex shows that 41% men and 59% women were affected by this disease. Working in humid conditions is listed as the most frequent cause for both genders, followed by disinfectants and cleaners in women.

6. GENDER AND OCCUPATIONAL ALLERGY

6.1 IMPACT OF GENDER ON WORK-RELATED RESPIRATORY HEALTH

6.1.1 GENDER AND WORK-RELATED ASTHMA

Gender-related differences have been reported among subjects with obstructive airway diseases (3).

The gender distribution of occupational asthma (OA) appears to vary across different countries and occupations [32]. For instance, the incidence of work-related asthma has been reported to be higher in men than in women in some countries (e.g. France, UK, Belgium) [33-35], while in others higher rates have been reported in women (e.g. Brazil, USA) [28,36], or are quite similar (e.g. Finland) [37]. In the European Community Respiratory Health Survey follow-up study, which investigated new asthma cases in relation to work-related exposures and occupations, men and women had a similar relative risk of new-onset asthma [38]. In USA, it was found that women are more likely to have work-exacerbated asthma and men OA [28].

The prevalence of OA among male and female may vary substantially depending on the occupations, job categories, industries and workplace exposures. Schachter et al [39] performed a meta-analysis of 12 cross-sectional studies to analyze gender-related differences in respiratory outcomes among 3,011 workers employed in industries processing organic compounds. They found a higher prevalence of chronic cough and chronic bronchitis among men than among women. On the contrary, upper respiratory tract symptoms were more frequent in women than in men. In the textile industry women had relatively better lung function than men, whereas no significant differences were observed between men and women among farmers or in the food-processing industry. Dimich-Ward et al [40] conducted another meta-analysis to evaluate gender differences in respiratory health among workers exposed to organic and inorganic dusts in Canada. Women had a higher risk of shortness of breath and asthma than men when exposed to inorganic dust, while organic dust exposure was associated with relatively worse lung function in men than in women. Although it has been reported that women are more likely to suffer from cleaning-related asthma [8,41], a systematic review of epidemiologic studies in this population found contradictory results [42]. All these studies were adjusted for smoking and age.

In summary, among adults with work-related asthma, males and females differ in terms of workplace exposures and occupations. Moreover, the risk of respiratory work disability and job change has been found to be associated with specific occupational exposures that can differ between gender [43]. In addition, Leynaert et al. [44] found evidence that non-allergic asthma is still poorly recognised in men and women, and that women are at increased risk of developing non-allergic asthma compared with men. They suggest that sex hormones or other biological markers that differ significantly between men and women (such as leptin) may be involved in the development of non-allergic asthma.

6.1.2 GENDER AND WORK-RELATED RHINITIS

In the non-occupational setting the distribution of rhinitis in females and males is different. The incidence of rhinitis in atopic subjects and the prevalence of rhinitis associated with asthma were higher in males in childhood/before puberty but reversed to be higher in females in adolescence and adulthood [45-46]. In non-atopic subjects, females had a higher incidence of rhinitis than males from childhood onward. In Sweden, prevalence of self-reported allergic rhinitis was higher in women (29.1%) than in men (26.6%, $p < 0.01$) [47]. In Serbia, women perceive allergic rhinitis as a more threatening disease than men [48].

In the occupational setting, the prevalence of lifetime allergic rhinitis was associated with female gender among US primary farm operators (37.5% in females and 29.5% in males, OR 1.4, 95% CI 1.2-1.6) [49]. In Swedish workers the prevalence of rhinitis was higher in females (42.1%) than males (38.9%, $p < 0.05$), while males were more exposed to vapours, gases, dusts and fumes (VGDF) and chemicals and had an increased risk of rhinitis associated with these occupational exposure [27]. In Northern Europe the incidence of adult-onset rhinitis was higher in ever welders than in never welders and tended to be higher in females (incidence rate 33.8, hazard ratio 1.9, 95% CI 1.4-2.6) than in males (incidence rate 19.5, hazard ratio 1.4, 95% CI 1.2-1.5) [50]. In the above studies done in US, Swedish and Northern Europe workers, no information on skin prick test or serum IgE results were available. However, in Malaysian office workers symptoms of rhinitis were not different among females and males and were associated with positive skin prick tests to house dust mite [51].

In conclusion, occupational rhinitis tends to be higher in females although is not clear if this is related to a sex/gender effect or to differences in work exposure.

6.1.3 GENDER AND HYPERSENSITIVITY PNEUMONITIS

Most large studies of hypersensitivity pneumonitis (HP) that have assessed gender distribution have not specified the proportion due to occupation. A recent study [52] from a large US database of almost 7.500 cases of HP identified from claims-based coding algorithms reported that a small majority (58%) were women. Among a validation sample, 95% were confirmed as HP by clinical-radiological adjudication. However, 74% were classified as unspecified HP and it is unclear whether differences in exposures may have accounted for the gender difference. Older age, fibrosis and male sex were associated with higher mortality rates in unadjusted analyses. A Chinese study of HP [53], with 80% attributed to low-molecular-weight chemicals or animal allergens also reported that 58% were women. Japanese summer-type HP has been reported to be twice as common in women, attributed to greater exposure to the offending antigen at home since 39.8% of the patients were female homemakers [54]. Other studies have shown similar proportions of men and women. [55-56] Terho et al [57] have reported serum precipitins to antigens of farmers' lung to be more common in women but attributed this to local exposure differences, and also reported farmers' lung to be twice as common in women [58]. These findings are in contrast to the reported male predominance of occupational compensation for HP in Germany [3], suggesting either variability in causative occupational exposures, or under-reporting in women. One explanation for the observed differences is certainly the fact that in the German compensation statistics only the cases of illness of insured subjects are recorded. Many more men than women work as farmers and are insured as such. Since occupational compensation is only possible for the insured persons, HP cases of e.g. helping wives and other family members, are not covered. In spite of the relatively high level of family-member support, the proportion of women actually working in agriculture is not reflected in the employment rates for agriculture.

6.2 IMPACT OF GENDER ON WORK-RELATED SKIN HEALTH

Skin diseases constitute up to 30% of all notified occupational diseases and it is estimated that contact dermatitis account for about 90-95% of all occupational skin diseases [59]. Contact dermatitis can be divided into irritant contact dermatitis (ICD) and allergic contact dermatitis (ACD) and most cases manifest as hand eczema [59].

Population-based studies in adults have found a point prevalence of hand eczema around 5%, a 1-year period prevalence of 10-15% and a lifetime prevalence around 20% with a higher prevalence in women compared to men [60-63]. The incidence rate of hand eczema is estimated to 3.3-8.8 per 1000 person year [60,62,64]. The gender difference in the prevalence of hand eczema is generally attributed to different exposure rather than increased susceptibility of female skin [65]. Several groups have published data on work-related skin diseases from national registries although these registers are usually incomplete mainly due to reporting and selection bias and there are heterogeneous occupational health systems and legislation in Europe [66].

The incidence rate of registered occupational contact dermatitis (OCD) is estimated around 1 case per 1000 workers per year and may occur at any age, but OCD peaks among young female workers [59, 67-69]. High risk occupations are health-care workers, cleaners, hairdressers, workers in food industry, metal industry and construction industry [59, 68-70].

The most common type of OCD is ICD [59, 66, 68-70], most prevalent in women [59, 68-70], and most often caused by wet work [59,69]. Many female-dominated occupations involve extensive wet work, e.g., hairdressing, health-care, catering and cleaning: these occupations are also at high-risk for hand eczema [59,68-70]. A review of hand eczema has concluded that female sex could be a factor predisposing to allergic contact dermatitis not so much because of possible differences in intrinsic skin characteristics between the sexes, but more because of different exposure patterns [71].

In a study from UK it was shown that the incidence of occupational contact dermatitis increased with age in men while in women it was highest in the younger age group [72]. The data showed that this pattern reflected the types of agents to which men and women were exposed. Women were more likely to have dermatitis due to wet work, with young age of onset, while men to oils and related substances which appear to be a greater hazard in older workers, perhaps due to longer exposure.

In a recent Danish study on recognized OCD [69], ICD was more prevalent in women than in men while ACD was more equal distributed in both sexes. Rubber chemicals were the most common

cause of ACD followed by epoxy among men. The pattern of ACD may differ between countries depending on exposure with potassium dichromate still being important in some countries [68].

7. GENDER BIAS IN OCCUPATIONAL ALLERGY RESEARCH

In the past researchers have failed to include women in studies and have often not considered gender- and sex-specific factors when designing studies and analyzing data. In addition, survey questions about working conditions are often designed for male dominated working settings [73].

Health hazards within the workplace are also influenced by genetic and environmental factors. Body fat/muscle ratio, for example, is influenced by sex hormones and by nutritional practices which are often different for males and females. Nutritional and exercise practices, in turn, influence the secretion of sex hormones [73]. Due to differences in lung size etc. also respiratory health is influenced by sex. A meta-analysis on 1,367 women and 4,240 men showed that after exposure to organic dust (e.g. grain working, farming) men had a greater risk of occasional wheeze and worse lung function while after exposure to inorganic dust, the risk of current asthma was extremely high for women [40]. Also individual differences within a sex and a great overlap between individual women and men regarding physical capacity should not be ignored [73].

Men and women may also have different health risks outside the workplace. In general women carry out a greater proportion of unpaid duties in the home [9] and probably they are more concerned with private cleaning (exposure to cleaning agents, wet work). There is also evidence that women with small children experience more stress at work compared to women without such responsibilities [73].

Furthermore, women seem to be more sensitive concerning environmental but also work-related and psycho-social factors [74]. They show a higher sensitivity to body and health as well as a greater willingness to accept medical help. In contrast to this, in men often just the later manifestation of a disease leads to the use of medical services [75]. According to the SOPHIE EU-research project, policies that support women's participation in the labour force and decrease their

burden of care, are related to lower levels of gender inequality in terms of health [76]. Therefore, country-specific policies have to be considered.

8. GENDER ISSUES IN OCCUPATIONAL HEALTH LEGISLATION AND POLICY

The European Agency for Safety and Health at Work [77] has adopted and incorporated a comprehensive policy to mainstream gender issues into different areas of occupational health. Thus a policy of gender equality is encouraged and implemented in many countries [78].

Anti-discrimination law concerning the workplace is arranged on two levels, a national and an international one [79], and mainly aims to prevent sexual harassment, provide protection of pregnant and nursing female workers and limit access to certain types of work that are seen to be more dangerous to women, such as night work or lifting weights [80].

Even if equality is guaranteed, implementation of occupational health and safety rules may be discriminatory. For instance, women and men are often offered non-uniform rehabilitation measures for similar work-related health problems, or men are more often offered re-training, while women receive allowances for a shorter time [80]. Based on the different legal systems in EU member states, the comparison of reports on notification, recognition and compensation of occupational diseases within EU is difficult. However, European reports clearly show that compensation systems are less accessible for women than for men, mainly due to the stereotype that women's work is generally less hazardous to health [81].

To mainstream gender into the occupational health system, gender-sensitive legislation and policy are needed at national and European levels. Extremely important is performance at the workplace, especially implementing OSH guidelines and tools. In addition, preventive measures should always be gender-sensitive. The key aim of a gender-sensitive risk-assessment and prevention approach is efficient understanding of the less evident threats that are more common for female employees, in order to take appropriate protective practices [82]. Expanding knowledge on gender-aware approaches to diseases, and how this might be applied to prevention and education, should be a political and social goal in all countries.

9. CONCLUSIONS

In conclusion, due to the gender-specific segregation, women and men are exposed to different risks in the workplace. However, not just sex per se, but differences in employment and working conditions, behaviours, and also in health consciousness are essentially responsible for health problems in the workplace.

The influence of gender in occupational-allergy should not be overlooked, and policy decisions on priorities for legislative action could be implemented in a more gender-sensitive way. In occupational allergy research, future studies should consider differences not only by sex, but also by gender, with regard to the occupation or job being held, and occupational exposures, paying special attention to true differences in exposure levels (quantitatively measured), and perceived or reported differences. Future studies aimed to contribute to a more accurate risk assessment and improved healthcare in the working environment cannot use a simple gender comparison, but should adopt a multivariate model, to evaluate whether the preventive measures proposed for each specific risk should differ by gender [3].

Occupational health policies should consider that workplace health promotion and preventive strategies need different approaches for male and female audiences, especially in working areas where women are predominant. An increased consciousness of the less evident threats that are more common for female employees is the cornerstone to take appropriate protective practices.

In general, health in the workplace should not be a question of gender.

BOX 1

KEY MESSAGES

- Women and men tend to work in different occupations or sectors (horizontal segregation), resulting in various types and levels of occupational exposures
- Different levels of exposures as well as women being under-represented in leadership positions (vertical segregation) are associated with a different prevalence of occupational allergy and differing allergens
- Data on gender-specific exposure levels is scarce. Differences in exposure among women and men have been reported in workers exposed to vapours, gas, dust, fumes, and chemicals, in seafood, hospital workers, and in welders, sometimes even within the same occupation.
- Differing rates of work-related asthma as well as the risk of respiratory work disability and job change are more likely related to specific occupational exposures than to gender-specific reaction patterns
- Gender distribution of work-related asthma appears to vary across different countries without clear global difference
- Occupational rhinitis tends to be higher in women, although it is not clear if this is related to a sex/gender effect or to differences in work exposure
- The sex difference in the prevalence of occupational skin allergic diseases, with the highest prevalence among women, is attributed to different exposure and high-risk professions, rather than to increased susceptibility of female skin
- Not only physical and physiological characteristics, but also heterogeneous behaviors have an impact on the health hazards within the workplace of women and men
- Women have less power and often earn less money in the same jobs, and these facts may have also an impact on women health
- The implementation of gender-sensitive legislation and policy at national and European levels is essential to have gender issues included into the occupational health system

allowing gender-sensitive risk-assessment and gender-oriented prevention approach to occupational allergy.

BOX 2

UNMET NEEDS

- Well-designed studies investigating the association between gender, exposure and occupational allergy are lacking
- Future studies on workplace -related health effects should include exposure assessment taking into account different exposure conditions of women and men in their occupational settings
- Especially healthcare professionals need to consider gender differences in workplace exposure, occupations and industries when diagnosing and treating adults with allergy, including contact dermatitis, rhinitis and asthma
- A gender-sensitive risk-assessment for allergy may be needed to identify gender-specific threats, in order to develop appropriate protective practices
- Occupational health promotion strategies for allergy may require different approaches for women and men

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CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest.

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LEGENDS

Figure 1. Confirmed cases of occupational respiratory diseases including rhinopathy in Germany 2017 (data from DGUV) differentiated by sex. Triggers were grouped into categories and summarized to generic terms. Blue bars: men. Red bars: women..

Figure 2. Confirmed cases of severe or repeatedly recurrent occupational skin diseases in Germany 2017 (data from DGUV) differentiated by sex. Triggers were grouped into categories and summarized to generic terms. Blue bars: men. Red bars: women

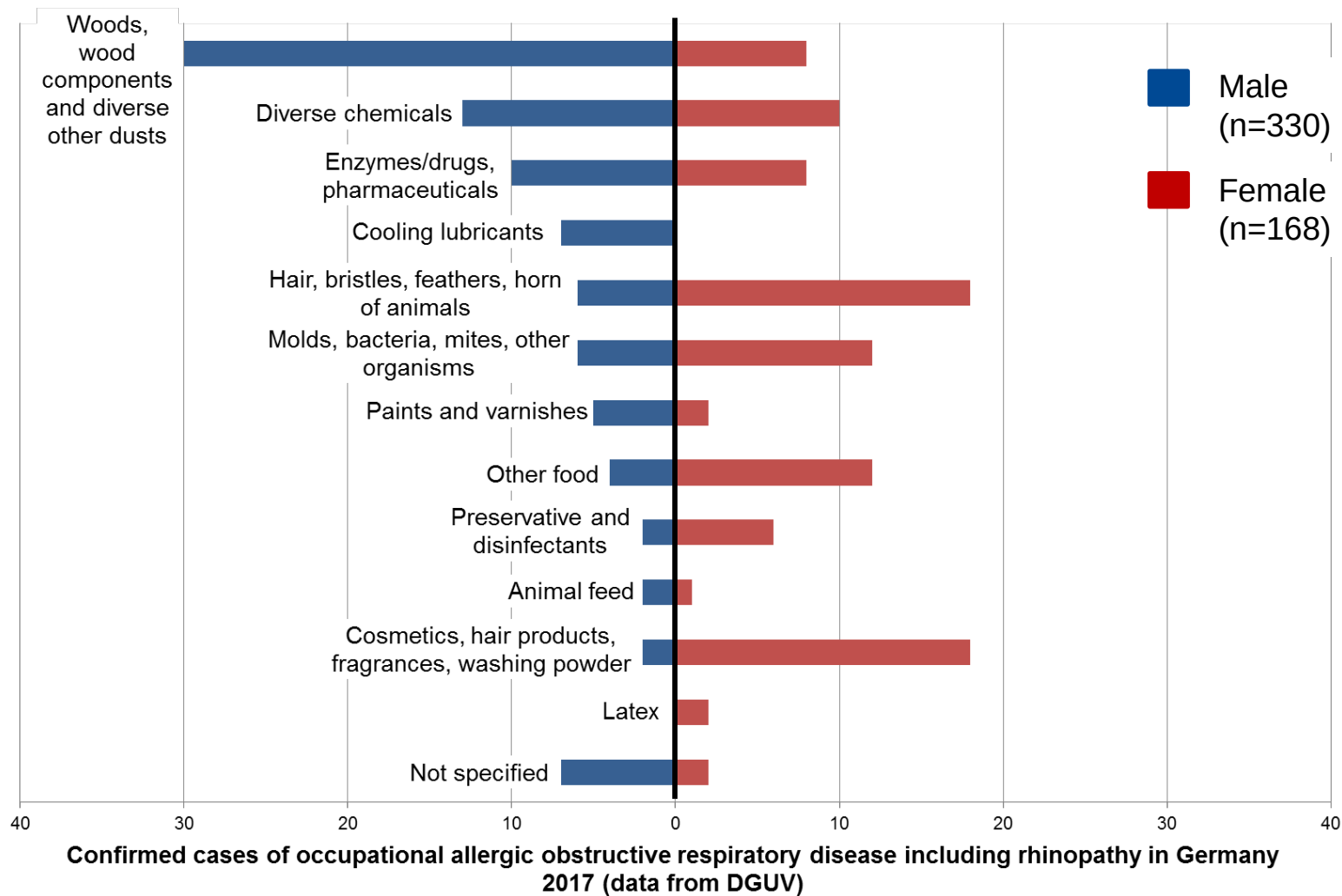
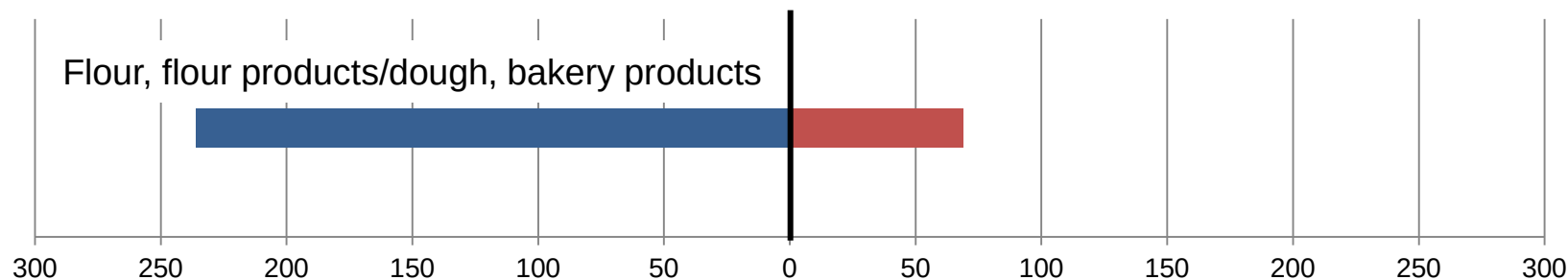


Fig. 1

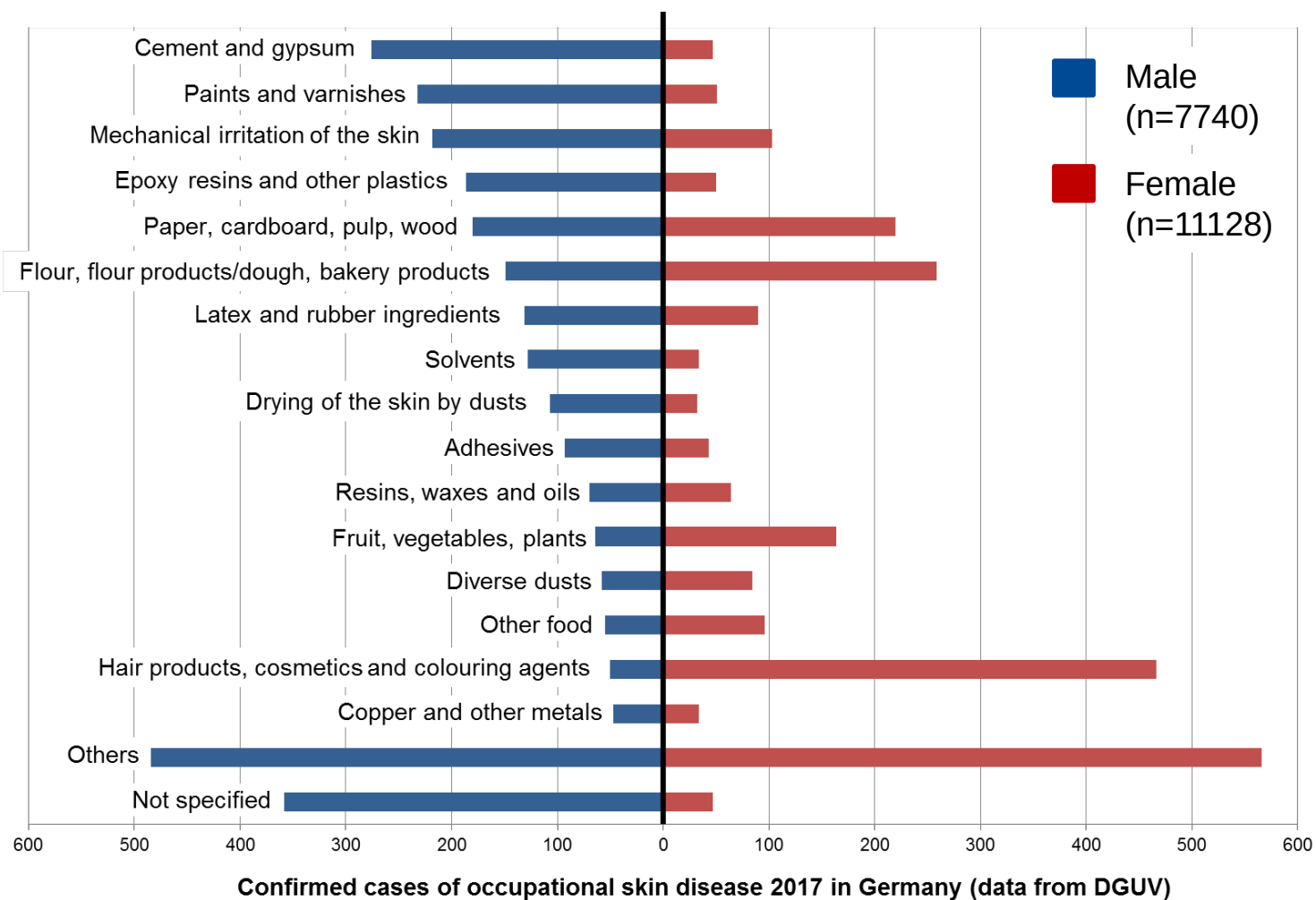
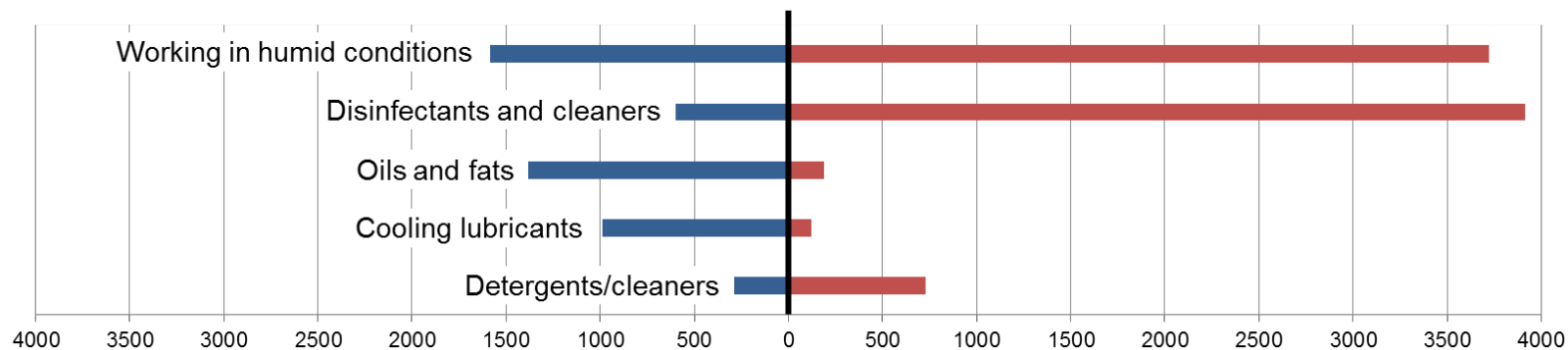


Fig. 2