Post-retirement surveillance of workers exposed to asbestos or wood dust: first results of the French national SPIRALE Program

Matthieu Carton [1 *] **, Sophie Bonnaud** [1] **, Mélissa Nachtigal** [1] **, Angel Serrano** [1] **, Claudette Carole** [1] **, Sébastien Bonenfant** [1] **, Dominique Coste** [2] **, Patrick Lepinay** [3] **, Brigitte Varsat** [4] **, Bertrand Wadoux** [5] **, Marie Zins** [1] **, Marcel Goldberg** [1]

[1] *CESP, Centre de recherche en épidémiologie et santé des populations INSERM : U1018 , Université Paris XI - Paris Sud , Université de Versailles Saint-Quentin-en-Yvelines , INED , FR*

[2] *Centre d'examens de santé de la CPAM de la Vienne CPAM , FR*

[3] *Centre d'examens de santé de la CPAM du Loiret CPAM , FR*

[4] *Centre d'examens de santé de la CPAM de Paris CPAM , FR*

[5] *Centre d'examens de santé de la CPAM de Saint-Nazaire CPAM , FR*

* Correspondence should be adressed to: Matthieu Carton <matthieu.carton@inserm.fr >

Abstract

Objectives

In France, 15 000–20 000 cancers attributable to occupational exposure occur each year. These cancers appear most often after the worker has retired. Since 1995, a system of post-retirement medical surveillance (PRMS) has been set up for former workers, but it remains largely underused.

Design

The SPIRALE program is a public health intervention aimed at identifying the former workers having been exposed to asbestos or wood dust during their working life and to propose them a PRMS. Additionally, it is also an epidemiologic research on the long-term effects of occupational exposure. We report the results of first years of the program conducted in 2006–2008, in 13 districts.

Setting and participants

A self-administered questionnaire was sent to 50 000 newly retired men, to identify potential past occupational carcinogen exposure. For respondents detected as possibly exposed, exposure was assessed in Health Screening Centres and a PRMS was recommended if necessary.

Main outcome measures

participation rate, rate of confirmed exposure, increased rate of PRMS, satisfaction about the program.

Results

The participation rate was 24%. From 12 002 questionnaires analysed, 72% of respondents were identified as possibly exposed: 3% to wood dust, 50% to asbestos and 19% to both exposures. Exposure to asbestos was confirmed for 73.4%, and according to the level of exposure, PRMS was recommended for 47.1%. Wood dust exposure was confirmed for 56.7%.

In these districts, PRMS for asbestos increased by 45% and for wood dust by 600%. Additional surveys showed that participants showed a high degree of satisfaction about the program.

Conclusions

The results are positive in terms of detection, information and medical surveillance of exposed workers.

Author Keywords Carcinogens ; occupational exposure ; medical follow-up of retirees ; Screening system ; Public health intervention

INTRODUCTION

An estimated number of 15 000 to 20 000 cancers attributable to occupational exposure occur each year in France; asbestos alone accounts for about 2600 of them and is expected to be the cause of 50 000 to 100 000 cancer cases from 2000 through 2020 (1). Exposure to occupational carcinogens is common: the national SUMER survey estimated that 13.5% of the employees are exposed during one standard work week to workplace carcinogens in France (2); in Europe, the CAREX study found that 23% of the workers were exposed

from 1990 through 1993 (3). Cumulative exposure data are available for asbestos and wood dust, the two most common carcinogens in France. Estimates indicate that in France about 25% of currently retired men were exposed to asbestos during at least one job (4) and 8% to wood dust (5), the figures being much lower among women.

French regulations assign responsibility for surveillance of the health of current workers to occupational physicians through mandatory annual medical visits. This surveillance ends, once the worker is unemployed or has retired. Cancers induced by exposure to asbestos and wood dust occur, however, decades after exposure began and most often after the worker has retired. The Dresden Declaration on the protection of workers against asbestos recommended in 1993 to continue the medical surveillance of workers exposed to asbestos after exposure has finished (6). Some countries have set up more or less extensive medical surveillance programs for retired workers having been exposed to asbestos during their working life. In certain cases, these programs are devoted to persons having worked in specific companies or industries, such as in the USA (7), or in Spain (8). In other countries, the programs aim at cover the whole population of exposed workers at a regional or national scale, like in Finland (9), Italy (10), Switzerland (11), or New Zealand (12).

In France, since 1995 (13), a system of post-retirement medical surveillance (PRMS) has been available for former workers known to have been exposed to occupational carcinogens. Administered by the workers' compensation department of the local Health Insurance Fund office (CPAM) and funded by the National Fund for Health and Social Action, it monitors health events associated with past workplace exposures, taking over from the occupational medicine system. In 1999, a Consensus Conference acknowledged that the health benefits of a systematic surveillance of workers exposed to asbestos was not established, but that the social recognition and compensation benefits were potentially important, and recommended a strategy for the medical surveillance of workers exposed to asbestos taking into account the cumulated level of exposure. PRMS, includes for medium and high levels of exposure to asbestos a medical visit and a chest CT scan in accordance with the recent recommendations of the French High Health Authority (14 , 19). The French PRMS system has long been underused, mainly because both the eligible workers and healthcare professionals are unaware of its existence. Thus, an initial experiment, the ESPACES pilot survey (15), was conducted to actively identify retirees among residents of 6 French districts (“ departments”) who had been exposed to asbestos during their working life and to inform them of their eligibility to PRMS. Comparison between the ESPACES results and data from a sample of controls departments showed that the ESPACES procedure dramatically increased the number of people benefiting from PRMS because of asbestos exposure. After the ESPACES survey, the principal national Health Insurance Fund (CNAMTS) decided to implement a national PRMS program named SPIRALE and to extend it also to past wood dust exposure.

The SPIRALE program has a main objective: to carry out a large-scale public health intervention and an accessory objective: to conduct an epidemiologic study. It took into account only the two most common occupational carcinogens — asbestos and wood dust. The public health intervention consists in identifying former workers exposed to one or both of these agents during their working life, confirming this exposure, informing the subjects of their right to PRMS, and aiding them to benefit of this procedure. At the same time, the epidemiologic study will make it possible to obtain a comprehensive overview of complete lifetime occupational exposure, to identify exposed occupations and industries, to implement long-term follow-up of the effects of exposure through the “SPIRALE Cohort”, and finally to assess the potential benefits of PRMS in terms of health and compensation.

The SPIRALE program is progressively targeting the whole population of retirees in France, in successive waves. This report describes the procedures used to implement the program and presents the results from the first wave.

STUDY POPULATION AND METHODS

Study population

The target population of the SPIRALE Program is retirees affiliated to the Health Insurance Fund of salaried workers. Self-employed craftsmen, farmers and most of the agricultural workers are not included in the SPIRALE Program, since they are affiliated to specific health insurance systems. SPIRALE being restricted to retired salaried workers, the ESPRi program for self-employed craftsmen, quite similar to SPIRALE is also currently conducted by the Occupational Health Department of the Institute for Public Health Surveillance in collaboration with the social insurance fund for independent workers (RSI) (www.invs.sante.fr/espri).

The SPIRALE program was first conducted among all the recently retired men living in 13 departments distributed all across France (Figure 1), covering about 20% of the French population. For this pilot phase, the departments were selected on the willingness of the Health Screening Centres (HSCs) of the Health Insurance Fund to participate. The main basic characteristics of the population of these departments are almost similar to their distribution in France according to the 1999 census (results not shown). Subjects were men born in 1942 and 1943 (most of the men of these birth years were recent retirees) and their postal address was extracted from the national data base of the national Health Insurance Fund. Overall, the study population included 50 662 men.

Study design

The SPIRALE program is based on a two-stage identification of PRMS eligible retirees.

In the first stage, potentially eligible subjects received a screening questionnaire (www.spirale.rppc.fr), designed to identify people with a high probability of exposure during their working life. The questionnaire, developed from specialised available population-based job-exposure matrices, was accompanied by an information letter and brochure and a postage-paid return envelope; a free telephone service was also set up to answer retirees' questions. The questionnaire included questions on self reported asbestos and wood dust exposure, on industries and jobs held for at least one year, and 10 asbestos-associated tasks.

Subjects classified as possibly exposed to asbestos or wood dust were the retirees: self-reporting occupational exposure to asbestos or wood dust; or reporting having worked in at least one of the industries or having held a job listed in the questionnaire; or having performed an asbestos-associated tasks and who are not yet included in a PRMS. The respondents not classified as exposed received a thank-you letter. The full job histories of a sample of 100 subjects not classified as exposed were analysed by industrial hygienists, and no false negative was found.

Subjects classified as possibly exposed participated to the second stage of the program, which is based on the Health Screening Centres (HSCs) of the Health Insurance Fund. In accordance with the Social Security regulations, every person affiliated to the Health Insurance Fund is entitled a free health screening every 5 years; for this purpose, HSCs were set up in almost all French departments. The relevant HSC sent to the selected subjects an invitation for a periodic health examination, along with a form for completing their full job history before coming. At the HSC, a physician trained to assess occupational exposure interviewed face-to-face the subjects to assess and confirm exposure using their job history.

If exposure to asbestos was considered high or medium (according to the 1999 French Consensus Conference recommendations (14) on the basis of a combination of the mean level of exposure of all the professional episodes entailing an exposure to asbestos and of the duration of exposure, or if wood dust exposure was considered high (at least 1 year of exposure), HSC staff helped subjects with the administrative procedures required for PRMS. At the same time, all those whose exposure was confirmed at the HSC were asked to sign an informed consent for participating in the epidemiologic follow-up (the SPIRALE Cohort).

The main objective of the SPIRALE program being to increase the number of exposed retirees benefiting from PRMS, we asked for evaluation purposes to the 15 participating local CPAMs the number of requests for PRMS that they had received for past exposure to asbestos or wood dust and the number they had approved. The information covered the years 2002 to 2008 and distinguished PRMS for wood dust and for asbestos for each year. From 2006 to 2008, it also distinguished the requests received (and approved) through SPIRALE from those independent of it.

We also conducted two additional surveys based on mailed questionnaires: one to assess the satisfaction of participants on a random sample of 300 subjects who attended one of the participating HSCs; the second aimed to describe the main characteristics of non-participants included a random sample of 400 subjects who did not answer the initial questionnaire.

The first wave of the SPIRALE Program was carried out between April 2006 and March 2008; however, visits to the HSCs extended over a longer period, and results reported here rely on the data collected up to the end of 2009.

Data analysis

Results are descriptive and are expressed in number or percent. Chi-square tests were performed to compare the main characteristics of participants and non-participants to the SPIRALE program. All analyses were carried out with SAS software, version 9.1.3 (SAS Institute, Cary, North, Carolina, USA).

Approval

The protocol of the SPIRALE Program was approved by the French National Ethics Committee and by the National Data Protection Authority (CNIL).

RESULTS

Response rate and percentage of subjects classified as exposed

The study procedure is outlined in figure 2 with the relevant numbers and percentages of subjects involved at each stage.

During a 10-month period, 50 662 self-administered questionnaires were sent to retirees; 11 630 were completed and returned, for a final response rate of 23.7%. Although the SPIRALE protocol did not plan to send reminders to non-respondents, we nonetheless tested their effect on a sample random of 1 000 non-responders, with a response rate of 38.4%; applying this estimate to the entire population would yield a response rate with reminders of 49.9%. The questionnaires returned after reminders were included in the analysis, for 12 002 responses overall.

According to the departments, the response rate by HSC varied from 15.4% to more than 30%. Of the retirees who returned their questionnaire, 8 640 (72.0%) were classified as potentially exposed — 50% to asbestos, 3% to wood dust, and 19% to both agents. These percentages were relatively similar from one HSC to another, except for the city of Paris, where the percentage of exposed subjects was lower than for the other HSC.

By the end of 2009, 44.5% of those potentially exposed had come for appointments to their HSC. Among them, exposure to asbestos was confirmed for 2 728 (73.4%) and for 1 751 (64.2%) at a medium or high level according to the criteria of the Consensus Conference, entitling them to PRMS (14). Of the 1 240 potentially exposed to wood who went to their HSC, exposure for at least one year was confirmed for 703 (56.7%).

In all, more than 88% of the persons who came to a HSC intended to request PRMS from their CPAM, and 97% agreed to participate in the SPIRALE Cohort.

Consistency between self-reported exposure and identification

Of the people classified as exposed because of an asbestos-related task, industry, or job (n=8 107), 4 318 self reported asbestos exposure.

Nearly half the subjects (46.7%) were unaware of their possible asbestos exposure. Of those who answered that they did not know if they had been exposed to asbestos, 74.7% (1 921/2 570) were classified as potentially exposed; this percentage was only 44.7% (1 868/4 177) for the subjects who reported that they were not exposed. Among subjects who reported that they were not exposed to asbestos, 40% had an asbestos-associated task, or industry or job.

Of the persons classified as exposed because of an industry or occupation related to wood dust (n=2 597), 2 247 self reported exposure. Thus only 13.5% were unaware of their possible exposure to wood dust. Of the retirees who answered that they did not know if they had been exposed to wood dust, only 7.8% (94/1 201) were classified as potentially exposed; this percentage was only 3.3% (256/7 708) for the subjects who reported they were not exposed. Thus when retirees reported that they had not been exposed to wood dust, lack of exposure was confirmed for more than 90% of them.

Description of Industries, jobs, and tasks involved

Asbestos exposure

The population identified as potentially exposed to asbestos worked most frequently in the following industries: construction, automobile and truck repair, shipbuilding and repair, and chemical plants (figure 3).

The percentage of subjects whose exposure level was confirmed as medium to high was highest for automobile repair (79.4%), manufacture of articles containing asbestos before 1997 (76.9%), and shipbuilding and repair (75.4%). In contrast, while construction was the industry with the greatest number of exposed subjects (35.8%), exposure was confirmed as medium or high for only 54%.

The most common jobs among those identified as potentially exposed to asbestos were in the construction industry (welders, masons, electricians, plumbers, etc.), and mechanics and boilermakers (figure 4). While there were few insulators in the sample (3.5% of the respondents), their exposure was most often confirmed as medium to high (90.5%); in contrast, only 57.3% of the masons were confirmed to have medium to high exposure.

Tasks involving asbestos exposure were very common among subjects who came to the HSC (figure 5). Half the sample had, at least occasionally during their working life, milled or drilled fibre cement, worked with or near hot metals, or done insulation work. These tasks were frequently associated with confirmed asbestos exposure, at a low, medium, or high level.

Wood dust exposure

Of the 1207 retirees identified as potentially exposed to wood dust who came in a HSC, the most frequent industries were wood industries and sawmills (figure 6a). The percentage of subjects whose exposure was confirmed was highest for wood industries (84.8%) and sawmills (84.8%) and lowest for forestry (55.6%) and pulp/paper mills (28.6%). The most common jobs among potentially exposed retirees were wood workers (cabinetmaker, carpenter, parquetry worker) and wood preparation workers (wood sawyer, plywood maker) (figure 6b), and their confirmation rate was very high (82.6% and 83.9%, respectively).

Requests for PRMS

Data from the participating CPAMs showed a clear increase of 45% in 2007 of the requests for PRMS for asbestos exposure and of 600% for wood dust exposure attributable to SPIRALE (figure 7) (data available for 13 of the 15 CPAMs). For 2006, 2007 and 2008, there were 849 requests through the SPIRALE program for PRMS for asbestos exposure and 305 for wood dust.

Satisfaction survey

The response rate to this specific survey after one reminder was 79.5%. The procedure was considered as simple and satisfactory by 86 % of the retirees, and the SPIRALE program was judged as useful by almost 99% of them. Only 6 respondents (2.6%) reported having been worried by the information about their probable past exposure to asbestos or wood dust.

Main characteristics of non-participants

The response rate to this additional survey after one reminder was 46.2%. Compared with SPIRALE's participants, non-participants were less likely to be retired at the time of SPIRALE (80.6% vs 87.8%, p=0.02), to self-report asbestos exposure (24.4% vs 41.1%, p<0.0001) and to have held jobs, industries or tasks involving asbestos exposure.

DISCUSSION

This study showed that the SPIRALE program is an efficient way of increasing the rate of participation to PRMS, that the HSCs are able to manage it and that participants are globally satisfied. For the nationwide extension of SPIRALE, some minor improvements of the procedures will be introduced on the basis of the results of this first wave.

Participation

Compared to the response rates for mailed health surveys in France, which are usually between 10 and 20% (16), the global participation was high, the response rate being almost 24% and doubled after a reminder was sent. Participation varied according to departments, and was lower in regions were occupational exposure was less frequent, such as the city of Paris, and higher in industrial regions. The survey of non-respondents further suggested that participation was positively associated with exposure.

The mean rate of HSC visits among those classified as exposed was around 45%, which was also quite satisfactory and higher than that generally observed after usual HSC invitations for health screening. The rate of HSC visits varied from one HSC to another and was related especially to the geographic distance from the home of the subjects and their HSC (results not shown).

For the future, it is probable that information through local media and physicians will further improve participation.

Assessment of exposure

For asbestos, the identification of exposure by the self-administered screening questionnaire was confirmed after a personal interview in a HSC in nearly 75% of cases; however, only 75% among those confirmed were classified as medium to high (the threshold for benefiting from a PRMS), and the final confirmation rate thus fell to 55%. In the SPIRALE program, subjects were screened positive for asbestos exposure when they reported working in one of the industries listed, even if they did not mention a job or task associated with asbestos exposure (for example, an accountant who worked in the chemical industry was considered to be potentially exposed). This choice was made to optimise both the sensitivity of the questionnaire and its ease of completion and concision. This study showed that this decision rule brought many unexposed or slightly exposed subjects to the HSC. Thus, for the continuation of SPIRALE, it is planned to consider asbestos exposure as possible only when the industry is associated with a task or job involving exposure or with a positive self-report.

The SPIRALE results confirm that retirees are frequently unaware of their asbestos exposure: of those reporting that they were not exposed, potential exposure was found for more than 40%. This result, also found in the ESPACES study (15), shows that asking retirees if they were or were not exposed to asbestos is not sufficient. Checking for asbestos exposure requires a precise investigation of the person' s lifelong jobs, industries, and tasks. It was easier to identify wood dust exposure than asbestos exposure, and almost all people who were exposed to wood dust know it.

The overall high confirmation rate can be explained by the good sensitivity of the screening questionnaire but also by self-selection by the retirees themselves. In fact, the characteristics of the subjects who did not come for HSC visits are similar to those who came and whose exposure was found to be either low or nonexistent. Improving the specificity of the questionnaire should increase the confirmation rate for exposure to wood dust and medium to high exposure to asbestos, while reducing the number of subjects invited to a HSC.

PRMS requests

The rates of intention to request for PRMS and to be included in an epidemiologic cohort, both above 85%, show the interest of retirees for the SPIRALE Program. Moreover, the impact of SPIRALE on PRMS requests is significant — an increase of 45% for asbestos and 600% for wood exposure in 2007.

Ethical aspects

The French National Ethics Committee was consulted before the implementation of the SPIRALE program, since an active search for past exposure to carcinogens in subjects who have not asked for information raises ethical questions. Knowledge of exposure to a carcinogen may have psychological consequences for these subjects who were mainly exposed to low doses and who thus have a low risk of developing related diseases. Moreover, it is not established that medical surveillance reduces morbidity and mortality of persons exposed to asbestos or wood dust. Considering these questions, the Committee nonetheless concluded that the duty to provide information and the potential benefits for the subjects, in terms of facilitating compensation for occupational diseases, outweighed the negative aspects and that the principal ethical issue, if any, lay instead in indifference to exposed retirees. The opinion of the National Ethics Committee was in accordance with official reports from the French Senate, National Assembly (17), and Ministry of Labor (18) who also recommended PRMS.

Next steps of the SPIRALE Program

Considering the potential social and individual financial compensation benefits, the French national High Health Authority recently recommended that the medical surveillance of all recent retired workers formerly exposed to asbestos has to be continued, even if systematic screening is not recommended on the grounds of health benefits (19). The High Health Authority is also currently preparing recommendations for the post-retirement surveillance of workers formerly exposed to wood dust. Based on these new results, we are currently preparing the progressive extension of the SPIRALE program to the entire country. Estimates of the numbers of new retirees each year and of the expected numbers of participants to the mail questionnaire, to the HSC visits and to the PRMS are being computed, and the logistics and other practical points are under preparation, as well as the follow-up of the SPIRALE Cohort and a protocol for the long-term evaluation of the program benefits.

What is already known?

In France, the annual incidence of cancer is 280,000, about 15,000 of which are attributable to occupational factors. These cancers appear most often after the worker has retired.

- About 25% of currently retired men were exposed to asbestos during at least one job, and 8% to wood dust (two common carcinogens in France).
- Despite the set-up of a system of post-retirement medical surveillance (PRMS) in 1995, few retirees know it and use it.

What this study adds?

- The SPIRALE program identifies and informs the former workers having been exposed to asbestos or wood dust, and offers them a PRMS.
- About 40% of retired workers were unaware of their asbestos exposure, only 14% for wood dust.
- After this program, the number of beneficiaries of PRMS for asbestos increased by 45% and for wood dust by 600% in pilot districts.
- Participants showed a high degree of satisfaction about the program.

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Figure 1

Departments included in SPIRALE

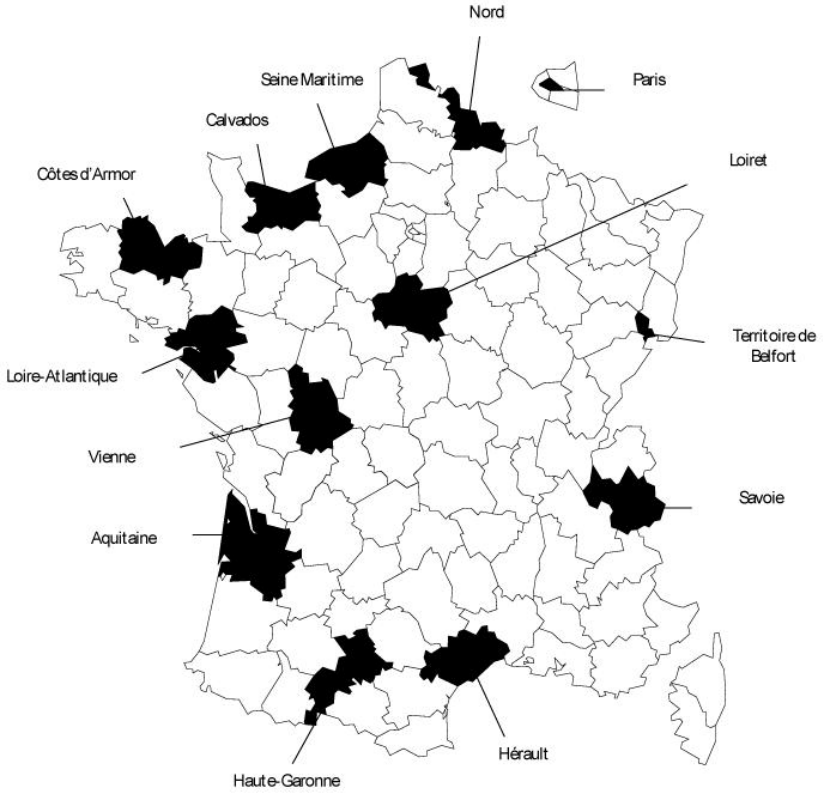

Figure 2

Study design

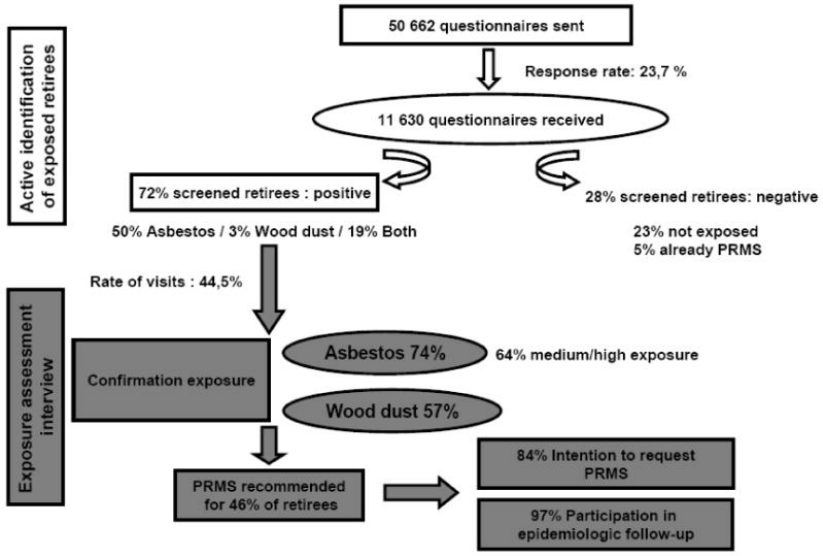

Figure 3

Industries involving asbestos exposure sorted by frequency

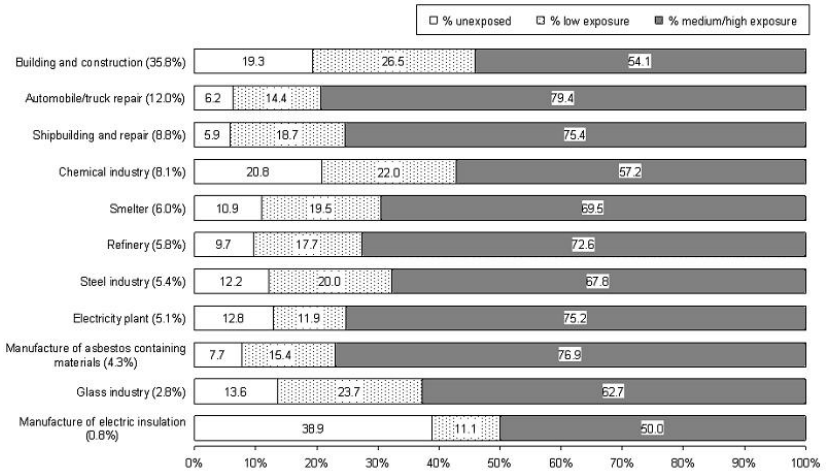

Figure 4

Jobs involving asbestos exposure sorted by frequency

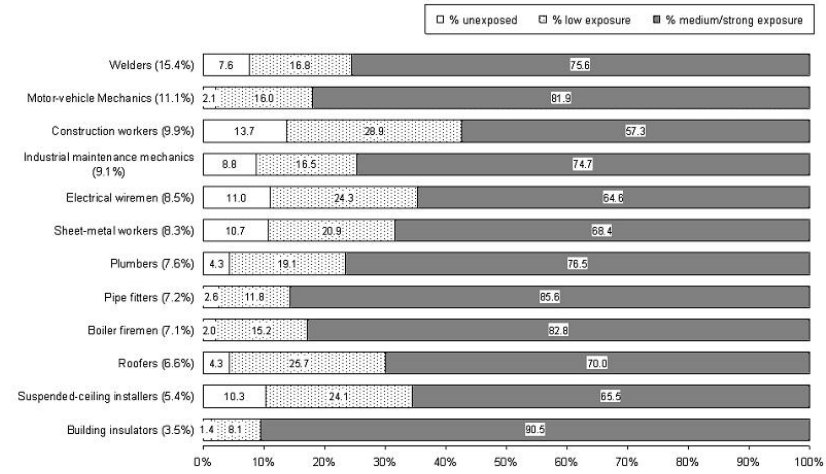

Figure 5

Tasks involving asbestos exposure sorted by frequency

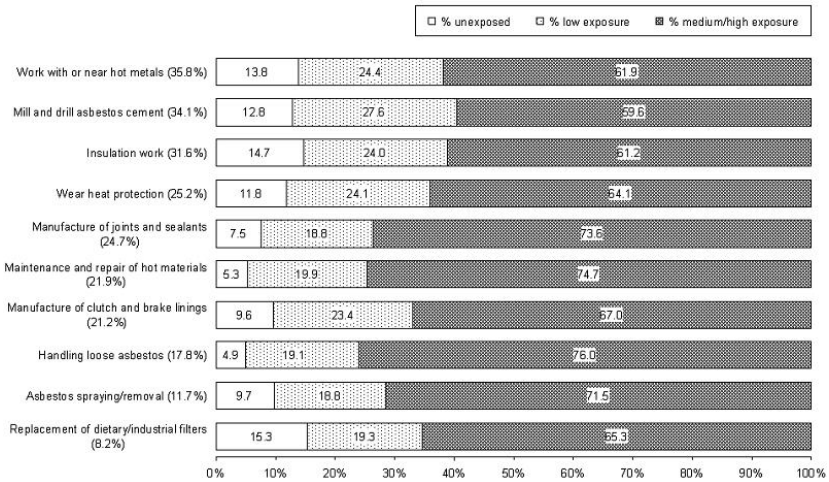

Figure 6

Industries (a) and jobs (b) involving wood dust exposure sorted by frequency

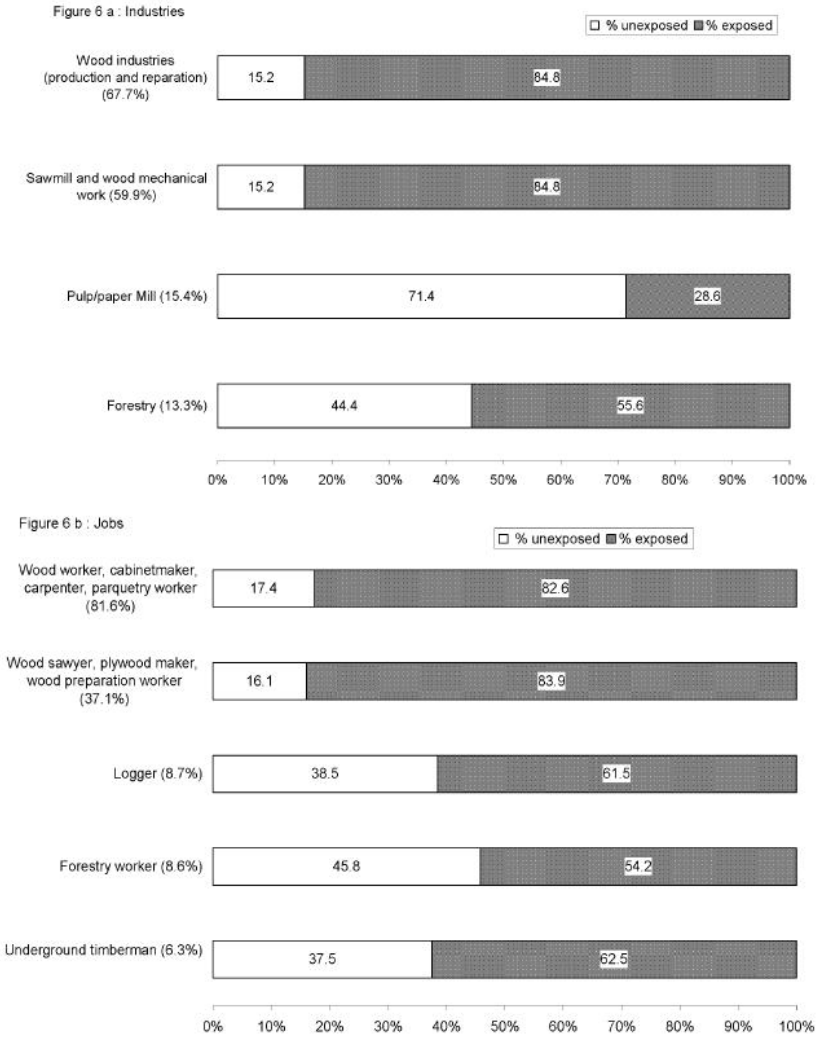

Figure 7

Trend in the number of requests and acceptances for PRMS (a: asbestos, b: wood dust) per year in 13 CPAM

Fig. 7a : Asbestos

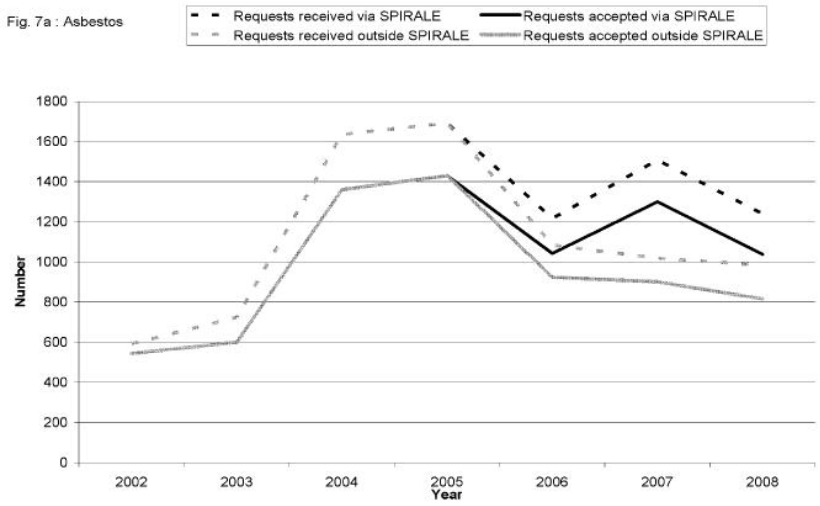

Fig. 7b : Wood dust