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# Actions in small companies to promote occupational health: the case of the food and beverage sector

## Agir em empresas de pequena e média dimensão para promover a saúde dos trabalhadores: o caso do setor de alimentos e bebidas

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## Abstract

**Objectives:** To describe working conditions in small companies in the food and beverage sector and to assess the health and the work ability of the selected workers. **Methods:** Social security data and records from periodic medical examinations were analyzed. For the observations of the work conditions, we used a data sheet created specifically for this study to apply the Short Ergonomic Assessment. For the survey, the Work Ability Index (WAI) and the Nottingham Health Profile (NHP) were used. **Results:** The following risk factors and distress-generating situations were observed: manual transport of loads; work performed while standing and in production lines; improvised workbenches; hazardous facilities; and poorly maintained machines. Most of the workers were male with a mean age of 32 years. The mean WAI score was 43 (SD=4.25), suggesting good work ability. Musculoskeletal diseases were the conditions most frequently diagnosed and the most frequently self-reported symptoms. According to the NHP, the workers' general health status could be considered good. **Conclusions:** Despite the relevance of small companies in the national economy, many of them are family-based and lack the capital needed to invest in infrastructure and productive processes. Furthermore, the lack of knowledge about occupational health and safety puts employees at risk. Positive results were discerned following the present study that included investigation, training and intervention to support small companies, which are generally excluded from broader social actions. The results could be documented through the longitudinal monitoring of the companies.

**Key words:** occupational health; work capacity; perception of health; working conditions; small companies.

## Resumo

**Objetivos:** Descrever as condições de trabalho em micro e pequenas empresas do setor de alimentos e bebidas e avaliar a saúde e a capacidade para o trabalho dos trabalhadores selecionados. **Métodos:** Foram analisados dados previdenciários e registros de exames médicos periódicos. Para as observações das condições de trabalho, utilizou-se uma ficha criada especificamente para aplicar o Diagnóstico Ergonômico Curto e, para o inquérito, o Índice de Capacidade para o Trabalho (ICT) e o Perfil de Saúde de *Nottingham* (PSN). **Resultados:** Os seguintes fatores de risco e situações geradoras de desconforto foram observados: transporte manual de cargas; trabalho em pé e em série; bancadas improvisadas; instalações perigosas e ferramentas em mau estado de conservação. A maioria dos trabalhadores eram homens, com idade aproximada de 32 anos. O escore médio encontrado para o ICT foi de 43 (DP=4,25), indicando boa capacidade para o trabalho. As doenças musculoesqueléticas foram as mais diagnosticadas e os sintomas mais autorrelatados. Segundo o PSN, o estado geral de saúde dos trabalhadores pode ser considerado bom. **Conclusões:** Apesar da relevância das empresas de pequena dimensão na economia nacional, a base familiar e o reduzido capital explicam os baixos investimentos na estrutura física e nos processos produtivos. Ainda, a falta de conhecimento sobre segurança e saúde no trabalho gera situações de risco para o empregado. Vislumbram-se resultados positivos, que poderão ser documentados por meio de monitoramento longitudinal, após esta experiência que aliou investigação, formação e intervenção para apoiar essas empresas, geralmente excluídas de ações sociais mais amplas.

**Palavras-chave:** saúde do trabalhador; capacidade para o trabalho; percepção de saúde; condições de trabalho; pequenas empresas.

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# Introduction

In the 1990s, the economic debate focused on the relevance of small and medium-sized businesses and their relationship with social and economic development concerning employment and income generation. The Serviço Brasileiro de Apoio às Micro e Pequenas Empresas (SEBRAE) defines a company's size based on the number of employees: micro-company (up to 19 employees); small company ( from 20 to 99 employees); and medium-sized company ( from 100 to 499 employees). It is worth noting that this classification refers to the industry and building sector. Between 2001 and 2005, the micro- and small companies were responsible for approximately 52% of urban employment, and for 48% of job posts[1].

The food and beverage (F&B) sector consists of a group of activities that involve the treatment, transformation, preparation, preservation, and packing of food products. The main raw materials are of vegetal or animal origin, and the processing generates a wide range of products, such as breads, biscuits, pasta, grains, dairy products, soft drinks, beer and juice, among others. In 2007, the Brazilian F&B sector had 42.2 thousand companies, 86% of which were micro- or small companies, 3% were medium-sized, and 1% was large companies. In all, the F&B sector encompasses seven million direct jobs[2] and uses management models characterized by an intense use of labor, even in highly-mechanized industrial processes[3].

The ergonomic risks, work accidents, respiratory and dermatological diseases originating from the exposure to raw materials and the difficulties to implement safety measures in this field are all well known[3-4]. Nevertheless, the health conditions of the small companies have not yet been described because of the high rate of business failure in the first year of operation and to the absence of a formal work contract for most of their employees. The aforementioned factors may explain the deficiency and the invisibility of data concerning illness, absenteeism or impairment to work[5].

In the sphere of the actions taken by the Serviço Social da Indústria do Estado da Bahia (SESI-Ba), the present study had the following objectives: to describe the work conditions in micro- and small companies of the F&B sector and to assess the health and working capacity of the selected employees. Based on the results, we attempted to provide elements for the small-business aid policies with regards to compliance with legislation and the promotion of occupational health.

# Methods

## Investigation strategies

In the field of ergonomics, some authors[6-7] have suggested that the work be analyzed in a real-life situation to verify the occurrence of exposure to known risks. Following the principle of the work ergonomics, investigations into work situations use methods and techniques that allow data collection on the experience of workers in the performance of their tasks and on their exposure to health hazards. The purpose of these investigations is to identify contradictions in the industrial production organizations, because the organizational models set production regulations and objectives that usually go against worker well-being, comfort and safety. In the ergonomic perspective, production and health are analyzed in their interrelations, with emphasis on the peculiarities that exist in various work processes[6-7].

Despite the importance of the ergonomic approach, it is well-known that there are limitations to its application, given that it represents a complex, time-consuming and costly investment for the company. In order to overcome this obstacle, the National Agency for the Improvement of Work Conditions (ANACT/France) proposed the Short Ergonomic Assessment (SEA) as a tool for intervention[8]. In Brazil, Silva[5] adopted the SEA in a tire recycling factory and recommended modifications based on another simple instrument called Ergonomic Checkpoints[9] adopted by the International Labour Office (ILO).

Considering that small companies have a shortage of capital and skilled personnel to invest in diagnosis and intervention projects, we chose to adopt the methodological approach put forward by Silva[5] with the addition of two further objectives: to determine the morbidity and to train technicians at SESI-Ba, which ran the intervention project in F&B companies in the 2006-2007 period. By combining methods, the adopted strategy allowed the collection of data from different spheres (work and health) and the preparation of interventions at individual and collective levels (Figure 1). Secondary data on the health of workers in this sector were also analyzed, and that constituted the basis to formulate the hypotheses and to select the instruments for the field work. The instruments aided the collection and recording of primary data on two levels: the work conditions with regard to the nature of the existing risks (phase 1) and the workers' perception of their own health and work capacity (phase 2).

All of the companies included in the present study signed a participation agreement allowing the use of the workers' data. The workers were made aware of the goals of the project and freely agreed to take part in it. Regarding the ethical issues

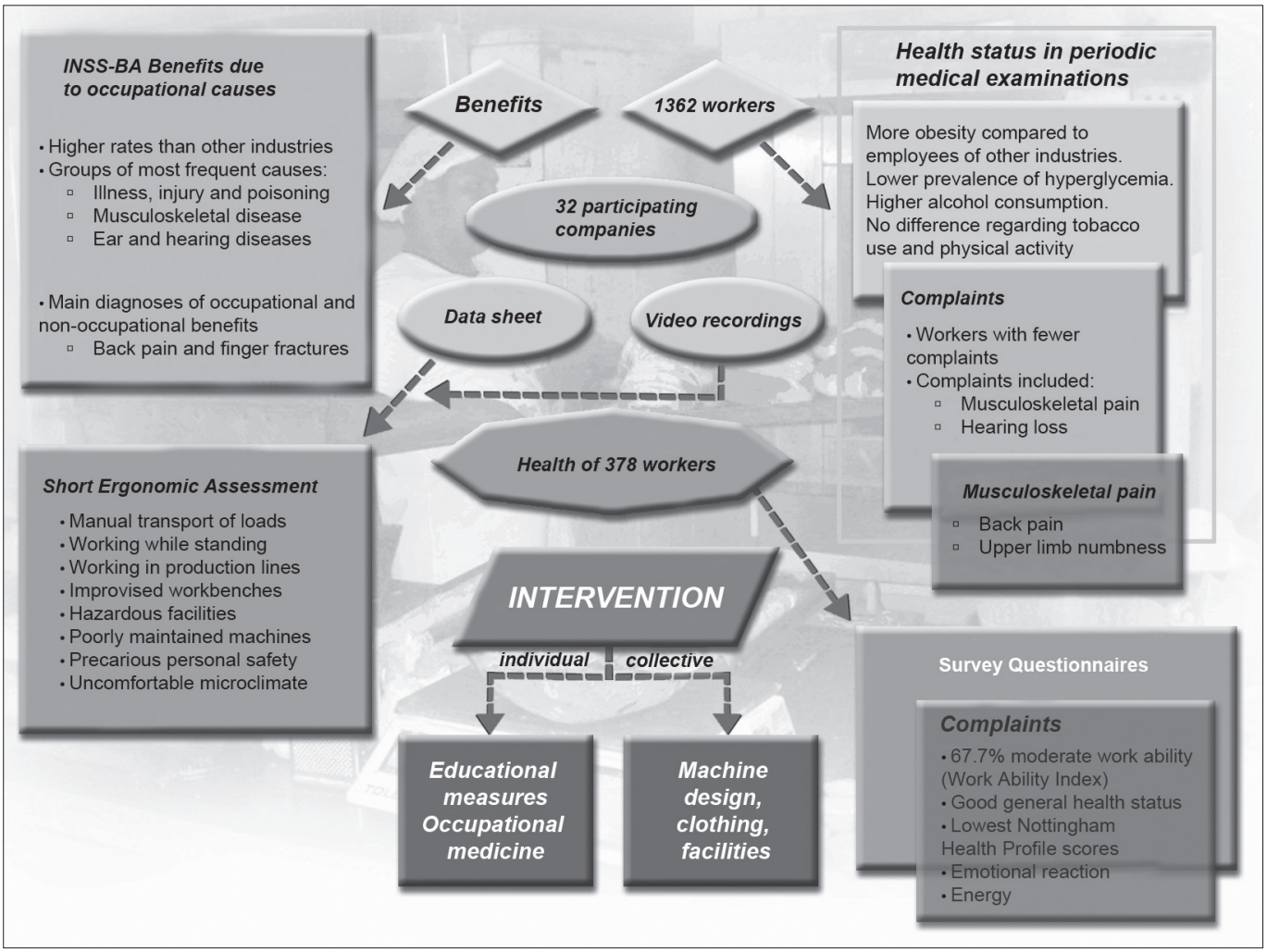


**Figure 1** – Illustration of the stages, techniques and main results of the intervention in small food and beverage companies. Bahia, 2006-2007.

involved in the development of the study, the use of the research data was approved through the document SESI-FCO/UFMG 187/05. In addition to that, the SESI-Ba authorized the use of the data in this article.

## Data collection and instrumentation

In the first phase of the study, a data sheet was prepared and tested for the SEA. The preparation of this sheet was based on the literature and on the observation visits carried out by the technicians of the supervising institution and on the health profile according to the secondary data on the morbidities recorded in specific data banks: periodical health exams carried out by the occupational physicians of the supervising institution and the frequency of leave from work according to the group of causes. The objective of the sheet was to allow the recognition of processes, the accident-related information, the work conditions and the work places of all 32 companies involved in the study.

The direct workplace observations were recorded in the data sheet, and the work conditions were photographed and filmed. The analysis of the data from the three aforementioned sources allowed the preparation of an intervention team that used the ILO Ergonomic Checkpoints manual[9]. The manual offers low-cost, practical solutions for ergonomic problems, particularly in micro- and small companies. It offers 128 interventions for the main ergonomic problems at the workplace: materials storage and handling, hand tools, productive machine safety, workstation design, lighting, environmental hazards, premises and welfare facilities, and work organization[9]. Based on the results of the first phase, an enquiry was carried out to discover the health profile and work capacity of the workers in each of the participating companies.

Two instruments that have been translated and adapted to the Brazilian population were used: the Work Ability Index (WAI) and the Nottingham Health Profile (NHP). The same team that was responsible for the data collection on the work environment and work conditions applied the instruments.

The WAI is an instrument designed to evaluate early changes to work capacity. Due to its predictive value, it can be used to collect data that will serve as a basis for preventive measures in occupational health services[10]. Work ability may be described as "how well a good worker can perform his/her tasks". The WAI is a practical, low-cost and simple instrument[11], composed of 60 questions covering personal information, physical and mental demands at work, and information on the worker's health conditions. The questions are scored according to the instructions, and provide the researcher with a final score that ranges from seven to 49 points and reflects the worker's perception of his/her work capacity. According to this score, the work ability index and the objectives of any measures to be taken and implemented are classified as follows: 7-27 points (poor - reinstate work ability); 28-36 (medium - improve work ability); 37-43 (good - support work ability); and 44-49 (very good - maintain work ability) [10-12].

The NHP is a generic instrument to assess the general health condition and consists of 38 items based on the impairment classification as described by the World Health Organization (WHO), in a yes/no format. The items are organized into six categories that encompass energy level, pain, emotional reactions, sleep, social interaction, and physical mobility. Each NHP category receives a score that ranges from zero to 100, with zero representing the best health condition and 100 the worst[13-14]. The descriptive and inferential analyses of this second phase of the project were carried out in the Statistical Package for Social Sciences (SPSS), version 12.0, with a level of significance of $\alpha$=0.05.

# Results

The main results for each work phase and the resulting interventions were summarized and organized into two different blocks. Thirty-two micro- and small companies took part in the study and were divided into the following F&B subcategories: baked goods (13), grain and milled products (5), foods (11) and beverages (3). These companies employed a total of 532 workers, most of whom were male (67.7%). As for the prevalence of accidents, nine companies (28.1%) reported accidents in the period; eight (25%) did not report any accidents, and fifteen (46.9%) did not keep any records.

## Work condition diagnosis

The environmental and ergonomic diagnosis focused on the facilities, equipments and utensils, handling, storage, and packaging of raw material. In this analysis, the present conditions of each company were identified and some guidance was given based on the ILO Ergonomic Checkpoints. As parameters, we followed the national regulations of occupational health and safety (NR17) and the rules of the Ministry of Agriculture and Supply for the F&B sector.

The following risk factors and distress-generating situations were identified: manual transport of loads; work performed while standing and in production lines; improvised workbenches; hazardous facilities, particularly as regards poorly maintained machinery; the use of hand tools, such as knives in poor condition; exposure to a harsh microclimate combined with unsuitable facilities and cooking of widely used products in the F&B branch. We also identified poor personal hygiene and workers with healthy body parts or open wounds in contact with the manufactured products. Based on these observations, we recommended the design of uniforms, which constitutes a second line of intervention in the present investigation. It is important to highlight that the adopted measure had a transformational goal and were evaluated in real work situations.

## Health and Work

The exposure to the aforementioned risks partly explains the social security benefits to F&B sector workers. In 2006, the main causes of leave from work were: injury, trauma and poisoning; musculoskeletal disorders; and ear and hearing diseases. Lumbar pain was one of the main reasons for occupational and non-occupational benefits in the period being studied and may be associated with working while standing, working in production lines and manual transport of heavy loads. Finger fractures were also reasons for leave and justify future preventive measures aimed at improving machinery design[15]. Emphasis should also be given to the diagnoses found in the periodic medical examination, with a remarkable prevalence of musculoskeletal problems, such as lumbar pain, numbness in the lower and upper limbs and tendonitis.

Based on previous results, an enquiry using a combination of the WAI and NHP instruments was used to detect the workers' health profile and work capacity. Twenty-three of the 32 companies that comprised the sample being analyzed took part in this phase of the study. The sample for this phase consisted of 378 workers (71.0%) aged 17 to 74 years, with a mean age of 32 years (SD=9.71). Of the 378 participants, 246 (65.1%) were men, and 132 (34.9%) were women. Most of them were single (38.4%), and approximately half of them (188) had attended high school.

The WAI results showed that the workers had a mean score of 34 (SD=3.62), which is considered a medium work capacity. Most workers had a medium work capacity (67.7%), followed by good capacity (26.2%), and few participants had poor work capacity

(6.1%). In this study, none of the workers had a very good work capacity. These results showed that a high number of workers would benefit from programs designed to improve work capacity, especially given the fact that this was a young population.

The WAI also allowed the identification of the main diseases and lesions reported by the workers and diagnosed by a health professional. The main diseases and self-reported lesions were of the musculoskeletal system (107), heart diseases and digestive diseases (28), and endocrine and metabolic diseases and emotional disorders (26). The most frequent clinical diagnoses were musculoskeletal disorders (66), heart diseases (33), endocrine and metabolic diseases (26), and digestive diseases (24).

In a more detailed analysis, sex had a significant association with work capacity. The women had a lower WAI (mean=33, SD=3.76) when compared with the men (mean=34, SD=3.48; p=0.034). Age was another factor correlated with work capacity, the younger workers obtaining better results. The work environment interventions can prevent harmful effects in the younger workers and retard or lessen the effects that are expected to occur among the older, more experienced population.

The NHP results displayed in Table 1 show that the general health condition of the workers being analyzed is good, most of them scoring around 10 points in the NHP. It should be pointed out that, among the six NHP categories, those that concentrated the best scores were social interaction, physical mobility and sleep. The worst scores of the general health condition were identified in emotional reactions, energy and pain.

**Table 1:** Scores for the dimensions of the Nottingham Health Profile (NHP) in the studied population (n= 378). Bahia, Brazil 2006-2007.

| NHP Dimensions | Mean score | Standard deviation | Minimum and Maximum |
|---|---|---|---|
| Energy | 11.30 | 21.63 | 0–100 |
| Pain | 9.06 | 17.87 | 0–100 |
| Emotional Reaction | 11.71 | 16.82 | 0–87.2 |
| Sleep | 8.96 | 19.98 | 0–100 |
| Social Isolation | 8.58 | 15.96 | 0–78 |
| Physical Mobility | 8.75 | 16.65 | 0–81.3 |

**Table 2:** Correlation between the work ability, age and dimensions of the Nottingham Health Profile (NHP) in the studied population (n= 378).

| | Work Ability Index (WAI) | | Significance |
|---|---|---|---|
| | r | p-value | |
| Age | -0.254 | 0.000 | Yes |
| Energy | -0.304 | 0.000 | Yes |
| Pain | -0.485 | 0.000 | Yes |
| Emotional Reaction | -0.356 | 0.000 | Yes |
| Sleep | -0.308 | 0.000 | Yes |
| Social Isolation | -0.120 | 0.019 | Yes |
| Physical Mobility | -0.330 | 0.000 | Yes |

With regard to the analyses of work capacity (WAI) and general health condition (NHP), a significant correlation was found between all of the NHP domains and the WAI score, indicating a positive correlation between the general health condition and work capacity of the workers (Table 2).

It is worth noting that, although most workers had a good health profile according to the NHP, there was a significant variability within the studied population, which denounces the existence of individuals with a poor health profile (maximum or near maximum score of 100 in all categories of the instrument).

## Discussion

The results of the present study are in line with those of previous studies that showed the complexity of projects aimed at promoting health and improving work conditions in small companies[16]. In this sense, it was advantageous to adopt the strategy of using concepts taken from different fields of knowledge (ergonomics, epidemiology, occupational health and physical therapy) and to combine data collected from various sources and through different methods (secondary data, observation, self-report, video recording, standardized instruments). This strategy made up for the general lack of indicators in this sector and may be a solution to difficulties in developing longitudinal epidemiological studies or deeper ergonomic studies as both involve elevated costs and long periods of data collection. The European Agency for Safety and Health at Work has recommended the adoption of complementary methods to assess the work conditions and the health of workers in small companies[15].

There is a current trend toward healthcare models that go beyond medical assistance. The WHO[17] cites the limits for the prescription of certain individual behaviors, because this type of approach would be a contrary to the principles of health promotion. The rehabilitation practices, in turn, presuppose a capacity to act on the causes of sanitary issues that affect the life conditions of the population, including work conditions, which were the focus of the present article.

The principles for health promotion are reasonably disseminated in the area of health; however there remains the challenge to translate them into plans of action, strategies, forms of intervention and methodological instruments[18]. The approach adopted in the present study may contribute to reduce these gaps by identifying the pertinence of using instruments to assess and monitor the functional capacity and the general health conditions of workers in the context of ergonomic studies. It has been shown that, within small companies of the F&B sector, the specific physical therapy actions geared toward

individual and collective healthcare are coherent practices in the sphere of health promotion.

The results obtained point to the need of implementing educational measures concerning lifestyles, as well as periodic health tests, and this would justify interventions to correct body posture and the precarious nutritional condition of the workers evaluated at the time of the periodic medical examinations, which indicated obesity combined with a high tendency toward hyperglycemia. The prevalence of musculoskeletal diseases (especially lumbar pain), finger fractures, low health scores in the domains of energy and pain (NHP), good and medium work ability, among others, demand not only assistance itself but also more detailed assessments and the development of specific projects in the physical therapy area.

Work ability is the worker's qualifications to deal with the production demands, and it is the result of the interaction of his/her physical, mental, and social capacity. This indicator results in a dynamic process that involves the individual's resources in relation to his/her work and may be influenced by several factors, such as health conditions, sociodemographic and work traits, lifestyle and age[12-19]. The results of the WAI may corroborate the arguments to act alongside the institutions that support small companies, aiming toward the short-term implementation of measures to improve work conditions and to promote the health of subjects with a medium WAI score, especially due to the concentration of young workers in this sector12. We further suggest special attention to the small group with poor WAI scores.

The fact that the women showed a worse work ability compared with the men evokes the already known and discussed explanations found in the literature about gender inequality in the sphere of employment and production[20-21]. The neutral approach to gender in policies and in legislation contributes to make gender-differentiated work risks invisible[22]. The health risks related to the female work are usually underestimated and neglected both in investigative and prevention projects. Cultural factors, domestic management styles and the casual work process in the F&B sector deserve a deep analysis concerning gender relations, as proposed by the Economic Commission for Latin America and the Caribbean (ECLAC)[23-24].

Regarding the health profile, we chose to adopt a self-referred instrument due to the importance of considering the worker's self-perception of his/her health conditions[25-26]. The NHP had values that were indicative of a good general health condition among the workers under study. The worst scores were identified in the emotional reactions, energy and pain domains. The occurrence of musculoskeletal diseases and harmful work conditions gives us clues to understand these findings. It is relevant to point out that, in spite of the good scores found in the NHP, there is a sharp variability within the studied group, which justifies the implementation of educational measures concerning lifestyle as well as periodic health examinations to detect health problems as early as possible.

Different studies that analyze work ability and health profiles draw our attention to the importance of considering the effects of the healthy worker when results are discussed. In other words, a good result in tests such as work ability and health profile may be related to the selective process for work admission and the non-inclusion in the sample of those individuals who were on leave or who were absent from work due illness[11-12]. However, it is plausible to use the WAI and NHP results as indicators of functional capacity and health conditions, and their combination with other similar assessments could allow an immediate diagnosis and the implementation of interventions. In the future, it will be possible to monitor the workers taking part in the research both individually and collectively to build a system that will allow the short-term implementation of corrective measures.

A wide assessment of the factors that trigger symptoms, diseases and accidents in the workplace may guide the search for solutions to increase the balance between work ability and work demand. There was coherence between the social security data concerning leave (musculoskeletal disorders), the data of the periodic exams concerning lifestyle (smoking habit, alcohol intake and the practice of physical activities), and the environmental conditions (physical demands). It can be inferred that the functional capacity and the general health results may be associated with the identified risks and with the type of leave.

Many factors have contributed, either individually or collectively, to the occurrence of work-related musculoskeletal disorders. The main physical factors are the use of strength, repetitive movements, static posture, vibration, and work in cold environments. The organizational factors include high work demand, lack of control over work, dissatisfaction, repetition, time pressure and lack of support from colleagues and supervisors/employers. The individual risk factors are medical history, physical capacity and age. Some studies have demonstrated that workers at hazardous jobs often do not have a formal work contract and are more exposed to repetitive work and unsuitable postures[27-28], factors that were detected in the companies analyzed by the present study.

In general, women are less exposed to physical risk factors, although hand/arm movements and unsuitable postures are equally experienced by people of both genders. However, it is common knowledge that in certain jobs and sectors women have a higher propensity to develop musculoskeletal disorders. Improvements in the work conditions and programs that promote general health could prevent temporary leave or retirement and premature aging due to work, with special attention to women's health. In this sense, it is important to implement

good practices in small companies to reduce or prevent the appearance of musculoskeletal disorders, e.g. varying tasks in order to avoid long periods of work while standing or handling heavy loads.

Despite the relevance of the small companies in the national economic scenario, some authors believe that many of them are family-based and lack the capital needed to invest in infrastructure and productive processes. Furthermore, the lack of knowledge about occupational health and safety puts employees at risk[5]. It must also be emphasized that micro- and small companies have a high failure rate, and that could have social effects in the sphere of work regulation. Tangible, measurable benefits for these companies will only become apparent in the long run, which justifies a follow-up by the supervising institution that requested the investigation. Furthermore, we foresee positive results from this experience which combined assessment, education and intervention to support small companies, which are usually excluded from wider social actions.

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