



## Occupational risks in brazilian agriculture

### Riscos ocupacionais na agricultura brasileira

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**RESUMO** - Poucos estudos no setor agrícola contemplando o viés saúde e aspectos do trabalho em detrimento do econômico ainda é escasso. Este trabalho tem como objetivo identificar, a partir de publicações brasileiras, os riscos ocupacionais e as doenças do trabalho na agricultura. Foi realizado uma revisão integrativa da literatura, com busca na base de dados da Biblioteca Virtual em Saúde e no Portal do Medical Publisher a partir da combinação no uso dos Descritores Controlados em Ciências da Saúde: Riscos Ocupacionais e Agricultura. Foram identificadas 171 publicações e nove constituíram a amostra final. Após realização da pesquisa, foram identificados os seguintes riscos ocupacionais em ordem de importância: químicos, físicos, ergonômicos, psicossociais e de acidentes. Quanto às doenças vinculadas ao trabalho agrícola e decorrentes da exposição a tais fatores, destacaram-se lesões musculoesqueléticas, câncer, doença da folha do tabaco verde, doenças mentais, cansaço físico, cansaço mental, entre outras. Foi possível identificar alguns riscos inerentes a atividade agrícola e sua contribuição ao surgimento de agravos a saúde do trabalhador envolvido em atividades agrícolas. De posse dos achados, é fundamental adotar estratégias de promoção e vigilância a saúde deste grupo.

**Palavras-chave:** Riscos Ergonômicos. Agricultores. Segurança do Trabalhador Rural.

**ABSTRACT** - Few studies in the agricultural sector contemplating the health bias and aspects of work to the detriment of the economic one is still scarce. This paper aims to identify, from Brazilian publications, occupational risks and diseases of work in agriculture. An integrative review of the literature was carried out, with a search in the Virtual Health Library database and in the Medical Publisher Portal, based on the combination of the Controlled Descriptors in Health Sciences: Occupational Risks and Agriculture. We identified 171 publications and nine were the final sample. After conducting the research, the following occupational hazards were identified in order of importance: chemical, physical, ergonomic, and psychosocial and accident hazards. As for the diseases linked to agricultural work and due to exposure to such factors, musculoskeletal injuries, cancer, green tobacco leaf disease, mental illness, physical fatigue, mental fatigue, among others, were highlighted. It was possible to identify some risks inherent in agricultural activity and its contribution to the emergence of health problems of workers engaged in agricultural activities. Given the findings, it is fundamental to adopt health promotion and surveillance strategies for this group.

**Keywords:** Ergonomic Risks. Farmers. Rural Worker Security.

## INTRODUCTION

For the *Food and Agriculture Organization* (FAO, 2000) and Oliveira (2015) the debate on the importance and role of agriculture, especially family farming - as it is the most common modality in the country - to Brazilian development has been gaining strength over time driven by the concept of sustainable development, generation of jobs and income, food security and local development.

To give you an idea, family farming represents the numerically major sector of the national agro. According to 2006 data from the Agricultural Census of the Instituto Brasileiro de Geografia e Estatística (IBGE, 2007), Brazil in 2006 had a total of 5.175.489 agricultural establishments, of which more than 80% were classified as family farming. This means that the first results of the 2006 Agricultural Census were published on September 30, 2009. This was due to the complexity of data collection in a country with the continental dimensions of Brazil.

Despite the importance of the sector in this country, the truth is that few studies addressing the health bias and aspects of work to the detriment of the economic aspect are still little contemplated. Riquinho and Hennington (2012) highlight the assertion, when stating that studies in Brazil on occupational risks that involve the work process of farmers are still scarce.

Corroborate with the aforementioned authors Zago et al. (2018, p. 1353), by reinforcing that “agriculture concentrates a higher risk of occupational accidents, however its dimension is unknown due to the scarcity of Brazilian studies and underreporting in the rural area”.

Accidents at work and occupational diseases can be caused by risk factors to which workers are exposed. Among these, physical, chemical, biological, ergonomic, psychosocial and mechanical or accident risks are mentioned, which are potentially capable of harming the quality of life and health of the worker. Such risks make occupational activities in the Brazilian agribusiness sector very dangerous (RIBAS; MICHALOSKI, 2017; SPECK et al. 2017).

Physical risks are the exposure of workers to ventilation and humidity, external temperature (heat and cold), noise, vibration, ionizing and non-ionizing radiation in their work environment. Chemists are related to the manipulation of chemical substances that can penetrate the organism, through the skin, through the respiratory route or ingestion. Therefore, mineral, vegetable, alkaline, mists, gases, vapors, asphyxiating, pesticides and other dusts can be reported (DIAS et al., 2015; RIBAS; MICHALOSKI, 2017; RODRIGUES; SANTANA, 2015).

As for biological risks, the authors mentioned list the exposure to microorganisms such as bacteria, fungi, viruses and others. As for psychosocial risks, these are related to overtime work, stress, fatigue, the fast pace of work, monotonous and repetitive work (MARTINS et al., 2014; RIBAS; MICHALOSKI, 2017).

Regarding ergonomic factors, they are related to the adaptation of man to the work environment, as well as to inadequate postural aspects when handling equipment, materials and others. In relation to mechanical risks or accidents, they result from physical and technological improper conditions, capable of endangering the physical

integrity of the worker, such as unprotected machinery, defective lighting and electrical connections, defective tools, among others (DIAS et al., 2015; RIBAS; MICHALOSKI, 2017).

Therefore, this study aims to identify, from Brazilian publications, occupational risks and occupational diseases in agriculture. It is justified by trying to contemplate a theme that is still little addressed, in order to try to fill the existing gaps.

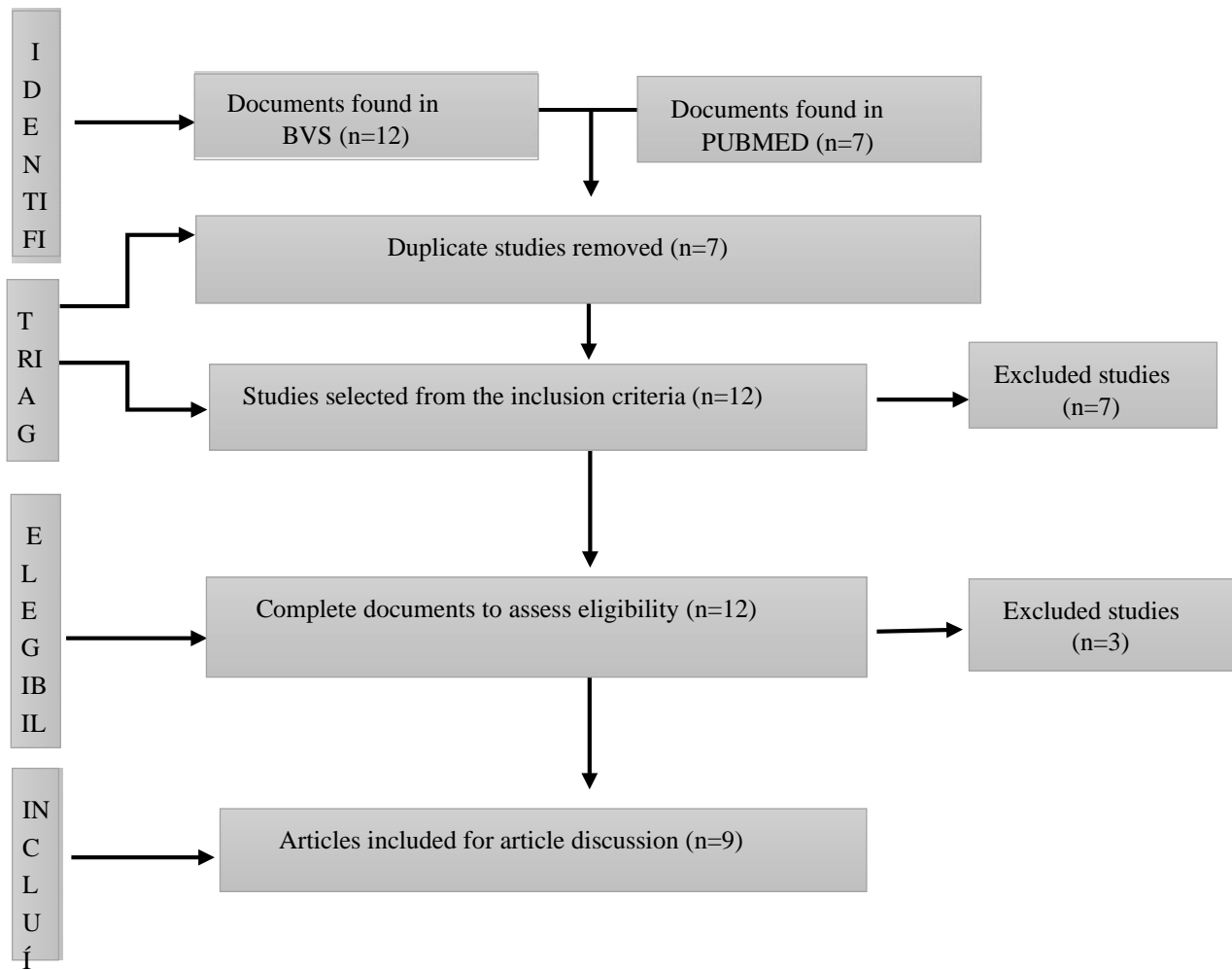
## METHODOLY

Revisão Integrativa da Literatura (RIL), a method that proposes to select the main studies and synthesize them for a better approach on a given topic under study (ROTHER, 2014). Thus, for its effectiveness, Sousa (2016) clarifies the need to develop some steps so that the systematization of the findings occurs satisfactorily. For the author, RIL should contemplate the realization of six stages, namely: definition of the problem; sample selection; characterization of studies; analysis of the selected material; presentation and discussion of the findings; and finally, synthesis of the results.

Based on all necessary steps for satisfactory implementation of the RIL, this review started with the formulation of the primary research question: << What are the occupational risks and occupational diseases in Brazilian agriculture? >>. The articles were selected from the da Biblioteca Virtual em Saúde (BVS) database and the Portal do Medical Publisher (PUBMED). On this basis, the associated use of *Medical Subject Headings* (MeSH) from the Boolean operators *AND* and *OR* was: “*occupational risk*” *OR* “*Occupational Risks*” *AND* *Agriculture AND Brazil*.

In the BVS, the *Descritores Controlados em Ciências da Saúde* (DeCS) were combined as follows: “*Occupational Risks*” *AND* *Agriculture AND Brazil*. Another association was also made on this search platform cited: “*Occupational Risk*” *AND* *Agriculture AND Brazil*. This country was chosen as a descriptor, as it seeks to portray the reality of the national farmer as to the issues that have implications for his health and work. As eligible criteria, research was determined in any language, type of free document, virtually available and published from 1989 (30 years). The repetitions were excluded, with the text remaining only once and those documents that did not meet the guiding question.

**Figure 1:** PRISMA flow chart of article selection for integrative literature review.



Source: Own Authorship (2018).

Figure 1 shows the path taken for the selection process of the final sample, which consisted of nine (n = 9) documents. It is noteworthy that the reasons for exclusion from studies were repetitions / duplicates (n = 7), research with animals (n = 1) and that did not address the research question (n = 2).

The selected material was read and categorized into 1) Occupational Risks and 2) Occupational Diseases. In addition, the following information was extracted from the documents: Author (s) / Year, Title, Type of Document; Data base; Language; and Region. The findings were analyzed, discussed and the RIL was concluded with the synthesis of the results of the Brazilian studies.

**RESULTS AND DISCUSSION**

After conducting the research and applying the inclusion and exclusion criteria, nine (n = 9) documents were selected, as previously mentioned. Of these 100% (n = 9), 55,56% (n = 5) were published in the *Literatura Latino-Americana e do Caribe em Ciências da Saúde* (LILACS) and were in the English language (55,56%; n = 5), and the most cited region of Brazil was the Northeast with three publications (33,33%).

**Table 1:** Characterization regarding authors, year, and title, type of document, database, language and region.

| Author (s) / Year                  | Title   | Type of document | Database | Language   | Region/ Localization    |
|------------------------------------|---|------------------|----------|------------|-------------------------|
| Carvalho, Berbert and Rocha (1989) | Evaluation of occupational exposure of applicators to hexachlorocyclohexane (HCH) in cocoa crop in the State of Bahia, Brazil | Article          | LILACS   | Portuguese | Nordeste – Sul da Bahia |

|  |   |         |               |            |  |
|--|---|---------|---------------|------------|--|
| Carvalho (1991)                        | Risk factors related with occupational and environmental exposure to organ chlorine insecticides in the state of Bahia, Brazil, 1985                          | Article | PUBMED        | English    | Nordeste – Sul da Bahia  |
| Faria et al. (2006)                    | Farm work, dust exposure and respiratory symptoms among farmers   | Article | PUBMED        | English    | Sul  |
| Jobim et al. (2010)                    | Is there an association between cancer mortality and the use of pesticides? A contribution to the debate  | Article | LILACS        | Portuguese | Sul -Região Noroeste Colonial do Rio Grande do Sul comparados com o Brasil |
| Carvalho, Pedrosa and Sebastião (2011) | Acute myeloid leukemia versus professional occupation: profile of workers treated at the Hematology Hospital of Recife  | Article | LILACS        | Portuguese | ordeste – Recife   |
| Riquinho e Hennington (2012)           | Health, environment and working conditions in tobacco cultivation: a review of the literature   | Article | LILACS        | English    | Não se aplica  |
| Freitas and Rodrigues (2014)           | The consequences of the process of deterritorialization of artisanal fishing in Sepetiba Bay (RJ, Brazil): a look at worker health issues and the environment | Article | PUBMED        | Portuguese | udeste – Rio de Janeiro  |
| Oliveira et al. (2017)                 | Occupational Health and Safety in Aquaculture: Insights on Brazilian Public Policies.   | Article | PUBMED        | English    | Não se aplica  |
| Zago et al. 2018                       | Workplace Accident Prevalence and Associated Factors among Tobacco Farm in São Lourenço do Sul-RS, Brazil   | Article | LILACSExpress | English    | Sul - Lourenço do Sul, RS  |

Source: Own Authorship (2018).

According to the categories, 52,94% (n=9) of them fall into category 1 (occupational risks) and 47,06% (n=8) to category 2 (occupational diseases).

**Table 2: Characterization of thematic approaches**

| <b>Category 1 – Occupational Risks</b> |   |          |          |
|--|---|----------|----------|
| <b>Author(s)/year</b>                  | <b>Objective of the study</b>   | <b>N</b> | <b>%</b> |
| Carvalho, Berbert and Rocha (1989)     | Assess the risk of occupational exposure to hexachlorocyclohexane (HCH).  | 9        | 50       |
| Carvalho (1991)                        | Identify the risk factors related to occupational exposure and impact to organ chlorine insecticides in the state of Bahia, Brazil, 1985.   |          |          |
| Faria et al. (2006)                    | Assess the prevalence of respiratory symptoms among farmers and associations of these with occupational risk factors.   |          |          |
| Jobim et al. (2010)                    | Contribute to the debate of how much the areas chronically exposed to pesticides could present a higher prevalence of neoplasms and if, with the government data available today, this relationship can be in fact suggested. |          |          |

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|   |  |           |            |
|---|--|-----------|------------|
| Carvalho, Pedrosa and Sebastião (2011)    | Know the profile of workers in economically active age group admitted from 1997 to 2007 in a hematology hospital diagnosed with acute myeloid leukemia (AML); to verify the professions with the highest prevalence among the assisted workers who died and to identify the occupational risks compatible with the appearance of AML in the professions prevalent. |           |            |
| Riquinho and Hennington (2012)            | Review the scientific literature published between 1979 and 2010, on working conditions in tobacco cultivation, with particular emphasis on the Brazilian context.   |           |            |
| Freitas and Rodrigues (2014)              | Analyze the consequences of deterritorialization in Sepetiba Bay on the work process and health of artisanal fishermen in that territory.  |           |            |
| Oliveira et al. (2017)                    | Show the risks associated with the aquaculture sector and present a critical view of Brazilian public policies on the occupational health of the aquaculture.  |           |            |
| Zago et al. (2018)                        | Assess the prevalence and factors associated with occupational accidents in tobacco growers in São Lourenço Sul-RS   |           |            |
| <b>Category 2 – Occupational diseases</b> |  |           |            |
| <b>Author(s)/year</b>                     | <b>Objective of the study</b>  | <b>N</b>  | <b>%</b>   |
| Carvalho, Berbert; Rocha (1989)           | Assess the risk of occupational exposure to hexachlorocyclohexane (HCH).   | 8         | 50         |
| Carvalho (1991)                           | Identify the risk factors related to occupational exposure and impact to organ chlorine insecticides in the state of Bahia, Brazil, 1985.  |           |            |
| Faria et al. (2006)                       | Assess the prevalence of respiratory symptoms among farmers and associations of these with occupational risk factors.  |           |            |
| Jobim et al. (2010)                       | Contribute to the debate of how much the areas chronically exposed to pesticides could present a higher prevalence of neoplasms and if, with the government data available today, this relationship can be in fact suggested.  |           |            |
| Carvalho, Pedrosa and Sebastião (2011)    | Know the profile of workers in economically active age group admitted from 1997 to 2007 in a hematology hospital diagnosed with acute myeloid leukemia (AML); to verify the professions with the highest prevalence among the assisted workers who died and to identify the occupational risks compatible with the appearance of AML in the professions prevalent. |           |            |
| Riquinho and Hennington (2012)            | Review the scientific literature published between 1979 and 2010, on working conditions in tobacco cultivation, with particular emphasis on the Brazilian context.   |           |            |
| Freitas e Rodrigues (2014)                | Analyze the consequences of deterritorialization in Sepetiba Bay on the work process and health of artisanal fishermen in that territory.  |           |            |
| Zago et al. (2018)                        | Assess the prevalence and factors associated with occupational accidents in tobacco growers in São Lourenço Sul-RS   |           |            |
| <b>Total</b>                              |  | <b>17</b> | <b>100</b> |

Source: Own Authorship (2018).

The studies selected in this Integrative Literature Review covered two categories, which were occupational risks and occupational diseases in agriculture, based on Brazilian publications, since the working conditions of national farmers and marked by the “high degree of unhealthiness to which workers are exposed, such as hand tools, venomous animals, unsafe attitudes due to lack of training and not using personal protective equipment”. (JESUS, 2009, p. 141).

For Speck et al. (2017), the agricultural work process, in addition to being old, is characterized by the diversity of tasks, which gives it the title of one of the sectors that most posed health and safety risks in the field. It is opportune to clarify that,

[...]In the analysis of the work process, two categories can be used: loads and wear. The loads are divided into two groups: those that

have materiality external to the worker's body, such as physical, chemical, biological and mechanical loads, and those that only acquire materiality in human corporeality, that is, the physiological and psychic loads. The effects of physical loads affect accidents and the development of problems, mainly biological. The physiological loads are expressed in the working conditions that subject the worker inappropriate positions and postures, repetitive effort, etc. Psychic loads can be of the type that cause prolonged tension or those that cause psychic overload - such as constant attention, rhythm, pressure to meet goals, constant charging and supervision, etc. The loads act among themselves in the work process and affect the worker (LAURELL; NORIEGA, 1989 apud



PINTO; MUROFUSE; CARVALHO, 2015, p. 238).

Therefore, considering occupational risks, all studies (CARVALHO, BERBERT; ROCHA, 1989; CARVALHO, 1991; FARIA et al., 2006; JOBIM et al., 2010; CARVALHO; PEDROSA; SEBASTIÃO, 2011; RIQUINHO; HENNINGTON, 2012; FREITAS; RODRIGUES, 2014; OLIVEIRA et al., 2017; ZAGO et al., 2018) highlighted in to a lesser or greater degree its presence as a result of the work process in agriculture.

Specifically, citing the risks mentioned in each of the selected studies, it is possible to identify the following findings:

- Carvalho, Berbert and Rocha (1989) contemplated the chemical risk, due to exposure to hexachlorocyclohexane in the management of agricultural crops;
- Carvalho (1991) mentioned the chemical risk due to the use of pesticides;
- Faria et al. (2006) identified that the majority (52%) of the interviewees worked in activities with intense exposure to high levels of organic and mineral dust, also emphasizing how common exposure to chemical agents is;
- Jobim et al. (2010) emphasized that farmers are chronically exposed to pesticides, which confers the chemical risk very present in the activity
- Carvalho, Pedrosa and Sebastião (2011), agricultural occupations are considered to be involved in exposure to various risks, especially those of chemical nature (solvents, insecticides, other pesticides, etc.).
- Riquinho and Hennington (2012), in turn, they highlighted the exposure to chemical, ergonomic and psychosocial factors.
- Freitas and Rodrigues (2014) contemplated exposure to physical risks (sun exposure) and psychosocial risks (mental strain).
- Oliveira et al. (2017), mention all risks, that is, physical, chemical, biological, ergonomic, psychosocial and accident risks.
- Zago et al. (2018) highlighted the mechanical and/or accident risks. The authors reinforced that the prevalence of these is around 24% throughout life.

In view of the findings described, it can be seen that chemical risks were mentioned by most studies (n = 7). This data is in line with the literature, which emphasizes that with the modernization of agriculture, both the mechanization of farming (which can generate ergonomic risks) has increased, as well as the increase in the use of pesticides, in addition to increasing the risk of accidents.

However, they still cited physical, psychosocial, ergonomic, and biological and accidents. "Agricultural and livestock workers are constantly exposed to numerous physical, chemical and biological agents, such as machines, implements, hand tools, pesticides, ectoparasitocides, domestic animals and venomous animals, which can cause accidents" (JESUS, 2009, p. 141).

Although there are many risks in agricultural activity, the main obstacles to this exhibition focus on the lack of protection among workers in the sector and also some personal characteristics of farmers (SOUSA; ASSIS;

FEITOZA, 2014). Zago et al. (2018) emphasized how the male gender becomes an aggravating factor, being a sedentary and the fact that the farmer has minor psychiatric problems. For Jesus (2009, p. 141), in the sector, there is a "prevalence of accidents among men, with predominantly typical accidents, occupational diseases and commuting accidents" (JESUS, 2009, p. 141).

Thus, it is essential to contemplate occupational diseases that arise from exposure to such occupational risks. Among the aggravations in agriculture, the authors (CARVALHO, BERBERT; ROCHA, 1989; CARVALHO, 1991; FARIA et al., 2006; JOBIM et al., 2010; CARVALHO; PEDROSA; SEBASTIÃO, 2011; RIQUINHO; HENNINGTON, 2012; FREITAS ; RODRIGUES, 2014; ZAGO et al., 2018) cited:

- Carvalho, Berbert and Rocha (1989) punctuated important hematological changes, especially leukocytosis with statistically significant neutrophil and lymphocytopenia;
- Carvalho (1991) highlights the injuries related to blood;
- Faria et al. (2006) cited that higher dust concentration showed an increased risk of respiratory symptoms related with work. Some even had more symptoms of chronic respiratory disease;
- Jobim et al. (2010) reported about cancer. The results of their study cite the association between the exposure of pesticides and their contribution to a higher mortality rate from neoplasm;
- Carvalho, Pedrosa and Sebastião (2011) focus the risk of Acute Myeloid Leukemia (AML);
- Riquinho and Hennington (2012), contemplated several diseases, among which "green tobacco leaf disease", respiratory disorders, musculoskeletal injuries and mental illnesses.
- Freitas and Rodrigues (2014) cited the exacerbation of physical exhaustion at work, health inequity promoted by hypertrophy associated with psychological and social fatigue;
- Zago et al. (2018) emphasized fractures, which keep rural workers out of their work process.

Most studies considered occupational diseases related to exposure to chemical agents. Among these, greater emphasis was placed on pesticides. A study entitled "the impacts of pesticides on health, work and the environment in the context of agribusiness in Brazil", also mentions their underreporting in the Brazilian system, and warns of acute, chronic intoxications and the deaths resulting from them (CARNEIRO et al. 2014).

For Asfaw et al. (2018), the chronic respiratory symptoms, such as chronic cough and phlegm, wheezing, shortness of breath and chest pain are common clinical manifestations among occupational exposures.

From the grievances previously listed and to militants in the field of Occupational Health, it is emphasized that the debate on the topic is still very current and instigating, still lacking new approaches, as it understands how work in the Brazilian agro sector is configured and its interference with the health and life of workers is fundamental, especially in the intention to

provide actions that privilege the prevention of diseases and the promotion of the health of the group must not cease.

After all, the findings of this research point to how fundamental it is to provide opportunities for “changes in the work environment to minimize risks in care procedures and in the work environment, in addition to training, awareness of safe practices for rural workers” (SPECK et al, 2017, p. 60).

## FINAL CONSIDERATIONS

It was possible to identify the main occupational risks for the appearance of health problems of workers involved in agricultural activities. Highlight was given to chemists, due to the exposure of farmers to various dust. It is necessary to consider the aforementioned diseases, which the majority were related to respiratory problems.

Given the findings, it is essential to adopt strategies to promote and monitor the health of this group. Also, it is essential to institute and create strategies for public policies that prevent occupational accidents and measures to promote the health of rural workers.

Sensitizing about the use of Personal Protective Equipment (PPE's) can be an excellent start.

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