

## WORKLOADS AND OCCUPATIONAL ACCIDENTS IN A RURAL ENVIRONMENT<sup>1</sup>

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**ABSTRACT:** This study's objective was to identify the types of workload accruing from agricultural work that are recognized by farmworkers and to verify occupational accidents in two rural environments. This quantitative, exploratory and descriptive study was conducted with 259 farmworkers in the state of Rio Grande do Sul, Brazil using a semi-structured questionnaire. Descriptive analysis, Person's Chi-Square test, and coefficient of contingency were used. The workloads most frequently reported by farmers were heat, fungi, chemicals, dust, repetitive movements, heavy load-lifting, and inappropriate postures. Most accidents occurred with farm implements followed by falls. Significant associations were found among different instruments and accidents. The results suggest the need for investment in health actions in rural environments to prevent or minimize work-related accidents and diseases so that nurses can contribute in a broad and efficient manner.

**DESCRIPTORS:** Occupational health. Workload. Accidents, occupational. Nursing.

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## CARGAS DE TRABALHO E ACIDENTES DE TRABALHO EM AMBIENTE RURAL

**RESUMO:** Objetivou-se verificar os tipos de cargas de trabalho decorrentes do trabalho da agricultura, conforme reconhecimento dos trabalhadores e identificar os acidentes de trabalho ocorridos entre os agricultores de dois ambientes rurais. Estudo quantitativo, exploratório e descritivo realizado com 259 agricultores no Rio Grande do Sul, por meio de questionário semiestruturado. Utilizou-se a análise descritiva, e os testes Qui-quadrado de Pearson e Coeficiente de Contingência. As cargas mais evidenciadas pelos agricultores foram calor, fungos, produtos químicos, poeira, esforços repetitivos, levantamento de carga pesada e postura inadequada. A prevalência de acidentes ocorreu com instrumentos de trabalho, seguido das quedas. Identificaram-se associações significativas entre diferentes instrumentos utilizados e os acidentes ocorridos. Os resultados sugerem a necessidade do investimento em ações de saúde no ambiente rural, a fim de prevenir ou minimizar os acidentes e doenças relacionadas ao trabalho, e a Enfermagem pode contribuir de forma ampla e eficaz.

**DESCRIPTORIOS:** Saúde do trabalhador. Carga de trabalho. Acidentes de trabalho. Enfermagem.

## CARGAS DE TRABAJO Y ACCIDENTES DE TRABAJO EN AMBIENTE RURAL

**RESUMEN:** Se tuvo como objetivo verificar los tipos de cargas de trabajo recurrentes del trabajo de la agricultura, conforme reconocimiento de los trabajadores e identificar los accidentes de trabajo ocurridos entre los agricultores de dos ambientes rurales. Estudio cuantitativo, exploratorio y descriptivo realizado con 259 agricultores en Río Grande del Sur, por medio de cuestionario semiestructurado. Se utilizó el análisis descriptivo, y los testes Chi cuadrado de Pearson y Coeficiente de Contingencia. Las cargas más evidenciadas por los agricultores fueron el calor, hongos, productos químicos, polvo, esfuerzos repetitivos, levantamiento de carga pesada y postura inadecuada. La prevalencia de accidentes ocurrió con instrumentos de trabajo, seguido de las caídas. Se identificaron asociaciones significativas entre diferentes instrumentos utilizados y los accidentes ocurridos. Los resultados sugieren la necesidad de la inversión en acciones de salud en el ambiente rural, a fin de prevenir o minimizar los accidentes y enfermedades relacionadas al trabajo, y la Enfermería puede contribuir de forma amplia y eficaz.

**DESCRIPTORES:** Salud laboral. Carga de trabajo. Accidentes de trabajo. Enfermería.

### INTRODUCTION

Any work process has, in its essence, factors that generate workload, which are inherent to the process and environment in which the task is performed, directly or indirectly affecting the health of workers. To identify and understand the presence and the effect causing the workload, one needs to pay attention to the different characteristics and operations that take place during the work process.

Workloads that require physical effort are more easily identified because they are associated with pain, discomfort, and disorders arising from tissue damage and wear on musculoskeletal structures that occur from performing a given activity. Psychological load, in turn, may be associated with the characteristics of the worker himself/herself, with the job's inflexibility or pace or be a representation of the worker's dissatisfaction or dissociation between a worker's job and his/her expectations or desires.<sup>1</sup> Dissatisfaction may be generated by occupational accidents caused by a lack of attention or the presence of stress, which leads to a change in one's performance and may damage one's health.<sup>2</sup>

In this study, we address farmworkers as a human work force, the uniqueness of the rural environment and the conditions of the work process that generate workload. Even today, agriculture still represents the largest labor force worldwide, with workers living and working in poor conditions, the routine of which imposes diverse demands, sometimes dangerous ones, promoting occupational accidents and work-related health problems.<sup>3</sup>

The conditions of the work process that contribute to these health situations may be summarized by the handling of specific equipment

and vehicles, tools/instruments and animals; weight loading and other activities that generate musculoskeletal injuries; exposure to noise, vibration, infectious agents, dust, chemicals, organic substances; conditions inherent to rural areas, such as working under harsh weather conditions, high temperatures, sun radiation, the risk of being bitten by poisonous animals; as well as the risk of slipping, tripping and falling, among others.<sup>4</sup> An intense work rhythm is also coupled with the need for high productivity, long working hours, lack of rest breaks, lack of proper hydration, low income and other aspects related to the organization of agricultural work.<sup>4</sup>

Given the previous discussion, we consider the perspective from which the concept of workload assumes a division in the internal or external materiality of the worker's body. For external workloads we list: physical (noise, vibration, heat, cold, humidity, and radiation), chemical (vapors, dust, fumes, gases, and chemicals), biological (viruses, bacteria, fungi, parasites), and mechanical (material/equipment, tools handled in inappropriate working conditions). Loads of internal materiality include: physiological (physical exertion, inappropriate postures, lifting heavy loads) and psychological (related to situations that cause stress, tension or impose limitations on work; an inflexible work rhythm, or demands constant attention).<sup>5</sup>

In view of these aspects, we understand the direct relationship between the worker's health and the socio-environmental context to be such that there is a need to pay attention to potential harms imposed to health that is produced in the relationship with the work environment. The need to investigate/assess/monitor the work environment arises from an acknowledgment of occupational aspects that are often overlooked,

though they continuously act on the health of workers.

Nursing workers need to become closer to the socioenvironmental context of workers to develop health practices that ratify the view that environment is essential to the health-disease continuum. For that, is important to recognize the environments, conditions and circumstances of work that give rise to health problems so to highlight the relevance of this relationship.<sup>6</sup> The interaction between occupational health nursing and an socioenvironmental perspective is grounded on the characteristics of the nursing professional, referring to knowledge of work environments, to the mastering of clinical knowledge, the ability to integrate concepts concerning the environment and health in the development of health promotion activities, among other skills/competencies.<sup>7</sup>

Understanding the environmental characteristics of workloads is important for nurses to recognize these in various occupational environments, in order to act toward reducing damage to workers' health. The knowledge constituted by nurses is essential to directing their practice based on the object and its socioenvironmental context.<sup>8</sup>

In this context, this study's objective was to identify the types of workloads accruing from agricultural work that are recognize by the workers themselves and verify occupational accidents among workers from two rural environments.

## METHOD

Quantitative, exploratory and descriptive study conducted with 259 workers from two different rural environments in Rio Grande do Sul, Brazil: 129 workers from Ilha dos Marinheiros, in Rio Grande, and 130 workers from Uruguaiana. Inclusion criteria were: farmworkers living in the aforementioned rural areas; being 18 years old or older; directly working with horticultural farming, even if only on a subsistence basis. Rural workers who did not work with agriculture at the time of data collection were excluded.

The sample was computed using StatCalc, Epi Info version 3.5.2., based on the total number of inhabitants from rural regions; official sources, such as the *Instituto Brasileiro de Geografia e Estatística* (IBGE), did not have the total number of workers. The following parameters

were used: unknown prevalence of phenomena and level of confidence of 95%, which resulted in a sample of 369 subjects. Approximately 179 of the subjects were in Ilha dos Marinheiros and 190 in Uruguaiana.

We contacted the Rural Workers Union, the Technical Assistance and Rural Extension Company (EMATER) and the city's Department of Agriculture; 157 workers were indicated in Rio Grande and another 194 were indicated in Uruguaiana. EMATER helped the researchers to map and screen the region providing transportation to the residents in Uruguaiana. Simultaneous to these strategies, the interviewees indicated other people and we screened every house, locating the workers who would also compose the sample. Considering the rural areas with difficult access, a total of 26 individuals refused to participate in the study and another 36 were not located after at least five attempts to contact the individuals by visiting their houses on different weekdays.

The data collection process included a pilot study, which was conducted in March 2013 in Ilha dos Marinheiros with seven workers randomly selected according to the inclusion criteria and after signing free and informed consent forms. The pilot study was effective and enabled restructuring the instrument's questions by adjusting nomenclatures, and further detailing and clarifying questions. The individuals who participated in the pilot study were also interviewed during data collection, given the workers' interest to do so.

Data were collected from March to October 2013 using a semi-structured questionnaire, which addressed the profile of workers such as: age, sex, schooling (in complete years); characterization of the work process performed by the workers according to the variables: work tools, type of workload recognized by the workers, and occupational accidents. The instrument NASA-TLX, developed by the National Aeronautics and Space Administration, was used to measure and identify workloads.<sup>10</sup>

The statistical analysis of data was performed using the Statistical Package for the Social Sciences (SPSS), version 20.0. Descriptive analysis and association was used by employing Person's Chi-square test ( $\chi^2$ ) and the Coefficient of Contingency (CC) to assess the strength of association between workloads and sex; and work tools and occupational accidents. The Mann-Whitney test

was used between workload and occupational accidents. A p-value<0.05 was adopted for statistical significance in all the analyses. Law No. 8,213 from July 24<sup>th</sup>, 1991 and the Statistical Yearbook of the Social Security (AEPS) was used to clarify the concept of occupational accident.<sup>11-12</sup> The description of work tools was based on Regulating Standard 31.<sup>13</sup> The weighted average of the demands (rates x weights) and the overall weighted rate of each interviewee was computed in the analysis of workload. after which the Mann-Whitney test was performed.

The study was approved by the Institutional Review Board at FURG, according to report N. 026/2013. All the participants signed free and informed consent forms after receiving clarification regarding the study's objectives and procedures.

**RESULTS**

The study involved 148 (57.1%) male workers and 111 (42.9%) female workers; their average age was 51.20 years old (SD=14.55), ranging from 18 to 81 years old. Table 1 presents the workers' sociodemographic characteristics.

**Table 1 - Workers' sociodemographic characterization. Rio Grande-RS, Brazil, 2013 (n=259)**

Variables	Categories	n	%
Sex	Male	148	57,1
	Female	111	42,9
Marital status	Single	30	11,6
	Married	211	81,5
	Widowed	7	2,7
Literate	Separated/Divorced	11	4,2
	No	19	7,3
	Yes	240	92,7
Education	Incomplete middle school	166	64,1
	Middle school	28	10,8
	Incomplete high school	17	6,6
	High school	18	6,9
	Vocational education	4	1,5
	Some undergraduate studies	4	1,5
	Bachelor's degree	2	0,8

Table 2 presents the results from the analysis on workload found among workers in relationship with their work processes. The most evident physical loads include heat, biological loads, and contact with fungi. Chemical loads include the

use of and contact with chemicals and dust, while physiological and psychological loads refer to repetitive movements followed by lifting heavy loads and inappropriate postures.

**Table 2 - Associations between workloads recognized by workers according to sex. Rio Grande-RS, Brazil, 2013 (n=259)**

Workloads	Male workers		Female workers		p
	n	%	n	%	
Physical					
Noise*	26	10	8	3,1	<b>0,015</b>
Vibrations†	20	7,7	3	1,2	<b>0,002</b>
Heat	110	42,5	83	32,0	0,934
Cold	92	35,5	77	29,7	0,228

Workloads	Male workers		Female workers		p
	n	%	n	%	
Humidity	94	36,3	66	25,5	0,506
Non-ionizing radiation <sup>†</sup>	82	31,7	47	18,1	<b>0,037</b>
Ionizing radiation	3	1,2	-	-	0,131
Abnormal pressure	4	1,5	8	1,9	0,433
Biological					
Virus	42	16,2	25	9,7	0,287
Bacteria	45	17,4	32	12,4	0,784
Protozoa	20	7,7	18	6,9	0,543
Fungi	62	23,9	38	14,7	0,210
Parasites <sup>§</sup>	44	17,0	21	8,1	<b>0,047</b>
Bacillus	11	4,2	14	5,4	0,162
Chemical					
Dust	71	27,4	49	18,9	0,541
Fumes	13	5,0	5	1,9	0,180
Vapors	20	7,7	18	6,9	0,543
Mist	39	15,1	27	10,4	0,711
Gases	23	8,9	10	3,9	0,119
Vapor <sup>  </sup>	20	7,7	5	1,9	<b>0,015</b>
Chemicals <sup>¶</sup>	90	34,7	45	17,4	<b>0,001</b>
Physiological and psychological					
Lifting of heavy loads	98	37,8	62	23,9	0,090
Inappropriate posture	96	37,1	81	31,3	0,165
Repetitive effort <sup>**</sup>	106	40,9	93	35,9	<b>0,022</b>
Inappropriate lighting	25	9,7	21	8,1	0,673
Slippery surfaces	37	14,3	17	6,6	0,058
Scattered materials	39	15,1	20	7,7	0,114

\*CC=0.150; †CC=0.185; ‡CC=0.128; §CC= 0.122; ||CC= 0.149; ¶CC= 0.197; \*\*CC=0.141.

Table 3 presents the instruments used by workers and accidents caused due to the work place and process. A total of 190 (73.4%) workers experienced occupational accidents. Work tools were the instruments most frequently mentioned by the workers (n=99; 38.2%) followed by falls in the workplace (n=82; 31.7%) for the second category of accidents. Significant associations were found among the variables: burns caused by the use of pesticides (p=0.050; CC=0.121); injuries caused by work tools such as rakes (p=0.013; CC=0.144), mowers (p=0.036; CC=0.129), and wheel barrows (p=0.012; 0.154); falls while using shovels (p=0.025; CC=0.138), towing (p=0.018; CC=0.146), plowing (p=0.028; CC=0.136) or using chainsaws (p=0.018; CC=0.146). Fractures were significantly associated with the use of machetes (p=0.41; CC=0.126), pruning shears (p=0.009; CC=0.161), sickles (p=0.016;

CC=0.148), and axes (p=0.017; CC=0.147); while sprains were significantly associated with the use of rakes (p=0.034; CC=0.130).

No significant associations were found between workloads and accidents, though workloads comprise working conditions such that the test performed with work tools –representative for workload – refers to significant results for this study.

In this context the workers (n=190) were asked why they believed the occupational accidents took place: 110 workers (61.5%) reported lack of attention; 41 (37.3%) mentioned an excess of simultaneous activities; 40 (36.7%) reported lack of Personal Protective Equipment (PPE); 38 (35.5%) reported work overload; and 10 (12.7%) reported lack of knowledge.

**Table 3 - Work tools and self-reported accidents. Rio Grande-RS, Brazil, 2013 (n=259)**

Variables	n	%
Manual tools/equipment		
Hoe	247	95.4
Wheel barrow	240	92.7
Watering pot	227	87.6
Shovel	221	85.3
Rake	220	84.9
Agricultural inputs	219	84.6
Personal Protective equipment	218	84.2
Packaging	215	83
Sprayer	212	81.9
Machete	208	80.3
Ax	194	74.9
Agrochemicals	169	65.3
Sickle	152	58.7
Irrigation equipment	148	57.1
Pruning shears	145	56.0
Mechanical tools/equipment		
Tractor	143	55.2
Scale	128	49.4
Mower	127	49
Towing	104	40.2
Chainsaw	77	29.7
Plow	75	29
Manual seed planter	55	21.2
Rotate rake	12	4.6
Injuries and contamination from occupational accidents		
Animal sting	74	28.6
Animal bite	11	4.2
Burn caused by an animal	13	5.0
Burn caused by chemicals	7	2.7
Injury caused by work tools	99	38.2
Shock	38	14.7
Contamination by chemicals	17	6.6
Fall	82	31.7
Fracture	17	6.6
Dislocation	13	5.0
Sprain	23	8.9
Others	20	7.4

## DISCUSSION

The rural workers' sociodemographic characteristics revealed that most were men and aged

between 18 and 81 years old. These characteristics are also reported by another study, which suggests that many of these individuals start working in

agriculture while young and remain in this occupation until old age.<sup>14</sup> Low educational levels were observed in the rural population, confirming a previous study's results.<sup>15</sup>

In the relationship between rural work and work overload, significant associations were found between sex and the following variables: noise, vibrations, non-ionizing radiation, parasites, vapors, chemicals, and repetitive effort. These associations reinforce the existence of different types of workloads that harm the health of these workers and show the need for these individuals to be able to recognize and prevent them.

From this perspective, this study confirms the importance of investigating the types of workloads accruing from rural work from a socioenvironmental view, since the environment and work process directly influence the health of workers. Workloads may be internal to the human body, which in that case are observed as a disorder or disease, or external to human body, which can be visualized in the environment. Both affect the body and lead to health problems.<sup>5</sup>

Therefore, investigating pain, disorders, diseases and occupational accidents requires one to take some aspects into account: workload, the worker him/herself, the tasks to be performed and the environment, and in the relationship of how these are presented in order to achieve healthier work processes. Additionally, one has to pay attention to the nature of workloads, the limitation of workers, whether the tools are appropriate to the process, the use of PPE, weather, lighting, positions required during activities, etc.<sup>16</sup>

The National Center for Farmworker Health is concerned with the exposure of rural workers to elements that are harmful to health, as is the case with other occupational environments.<sup>17</sup> The same sort of concern is expressed in attention to specific aspects concerning farm work, such as heavy physical work performed with heavy equipment, exposure to workloads that can lead to visual or hearing disorders, occupational accidents, skin, infectious or respiratory diseases and musculoskeletal injuries.

Other studies in the field of occupational health corroborate these results and report a concern with the work process of farmworkers due to: their exposure to the elements, especially hot weather under non-ionizing radiation; injuries caused by equipment and tools; the use of chemicals; contact with dust; injuries such as fractures or

muscle strain, cancer, and exposure to poisonous animals.<sup>4,18</sup>

Among biological loads, the one most frequently reported by the workers were fungi. Scientific evident ground this result; some mycoses and fungal diseases such as chromoblastomycosis are more common among rural workers.<sup>19-20</sup>

The main cause of chromoblastomycosis is plant manipulation, made possible by contact with etiological agents dispersed in the rural environment, in the soil, decaying vegetation and animals, also possibly acquired when handling agricultural machinery. Such lesions are mainly observed on the lower limbs, especially among those who walk barefoot, though to a lesser extent, they can also affect other regions of the body.<sup>19-20</sup>

The chemical loads observed in this study were mainly related to pesticides, widely used in agriculture.<sup>21-23</sup> Hence, farmworkers are exposed to chemicals when handling such products and/or when coming into contact with contaminated plantations, or even when only physically close to other people who apply the product. The reactions may be acute, mild or even severe and involve fatal intoxications. Clinical manifestations include dizziness, paraesthesia, disorientation, and difficulty breathing, among others, which can lead to occupational accidents or diseases.<sup>4</sup> Dust was also frequently reported. This is an important identification because it is a specific load in the environmental conditions experienced by farmworkers. Dust is associated with respiratory diseases such as asthma and chronic respiratory disease.<sup>15</sup>

Considering physiological and psychological loads, the ones most frequently reported were repetitive movements, which is significantly associated with sex. The European Agency for Safety and Health at Work confirms the importance of this finding based on data concerning European farmworkers, as more than 50% perform repetitive movements, manual work, lifting of heavy loads, and adopt inappropriate postures more than half of the time in which they perform activities.<sup>16</sup>

It is important to highlight manual activities, such as weeding, which impose repetitive movements on the upper limbs. In addition, inappropriate postures overload other parts of the human body. The spine, arms, head and shoulders are especially at risk of developing lesions and occupational diseases.<sup>24</sup>

In addition to the aforementioned associations, noise and vibrations were variables that were significant. Such an issue is evidence of the use of machinery, equipment and work tools and agricultural vehicles, necessary for agricultural work. The mechanization of work, however, exposes workers to bodily vibrations and noise for long hours while preparing the soil, planting, and harvesting.

Exposure to vibrations can lead to distorted visual and auditory information, generating accidents, vascular, nerve, bone, and muscle problems, acute or chronic joint lesions in the spine and back, such as degeneration of intervertebral discs, causing harm in the future that tends to leave the worker unable to work.<sup>4</sup> Continuous exposure to noise may lead to slow and progressive hearing loss, irritability, stress, fatigue, high blood pressure, and sleep disorders. According to one study conducted in Australia, occupational lesions caused by noise and hearing loss are common health problems among farmworkers. One study shows the need for health interventions, as from 60% to 70% of these workers present considerable hearing loss in comparison to other types of professionals.<sup>25</sup>

Farmworkers perform arduous tasks that demand muscle strength, awkward body postures, and long hours in adverse environmental conditions. The nature of the work is strenuous, with an intense pace, repetitive, use of machinery and work tools, among other elements that expose workers to physiological and psychological loads strongly related to pain, lesions, disorders and diseases in the cervical and back regions, arms and legs as a result of accidents.<sup>16</sup>

Among the aspects that determine the health-disease continuum in the context of farmworkers we note the prevalence of occupational accidents, skin diseases, hearing loss, Repetitive Strain Injuries and Work-Related Musculoskeletal Disorders (RSI/WMSD).<sup>16,25</sup> This study shows that most workers experienced occupational accidents, among which injuries caused by work tools/equipment, falls, and bites from venomous animals stood out. A similar context was reported by one study conducted in Australia.<sup>14</sup> Note that the agricultural labor requires the use of manual and mechanized tools, which like the environment itself, expose workers to the risk of accidents.

The occurrence of accidents with agricultural tools and machines can generate traumas and

injuries of varying degrees, such as mutilations or fractures, while accidents with poisonous animals like snakes, spiders, or scorpions can lead to poisoning and burns. These are very common accidents in rural regions and may lead to death.<sup>4</sup> Additionally, among occupational accidents is the unsafe decision of workers not to use, or to use improperly, PPE such as the absence of appropriate shoes (rubber boots) during tasks potentially leading to falls and resulting in twists, sprains, or musculoskeletal sprains.<sup>4</sup>

One study conducted in Ohio, USA reports that assistance to farmworkers in triage areas included traumas from occupational accidents characterized by falls, or caused by the use of equipment, vehicles, or contact with animals.<sup>26</sup>

Occupational accidents were significantly associated with work tools, presenting relationships with burns and the use of pesticides and the use of manual and mechanical tools, in addition to the occurrences of lesions, falls, fractures, and sprains. Studies describe accidents such as cuts, amputations, and fractures related to the use of manual or mechanical tools, as well as falls related to large-sized animals.<sup>27</sup> There are also incidences of skin irritation, allergic reactions in response to pesticides, lesions such as sprains, bruises, lacerations, fractures, and dislocations related to agricultural machinery and falls while loading products.<sup>18,28</sup>

It is worth noting that annual statistics from the Brazilian social security system regarding occupational accidents are alarming in Rio Grande do Sul and the cities under study. Many of the disorders, diseases, amputations and mutilations that disable individuals from working are caused by occupational accidents. A total of 705,239 work-related accidents were reported in 2012 in Brazil; 55,013 of these were in Rio Grande do Sul. In 2011, a total of 1,107 occupational accidents took place in Rio Grande and 428 in Uruguaiana. In regard to typical accidents, those arising from the specificity of the work performed, in 2012 a total of 423,935 were reported in Brazil, 32,280 of which occurred in Rio Grande do Sul. In 2011 there were 744 typical accidents in Rio Grande and 174 in Uruguaiana. In regard to occupational diseases, 14,955 diseases were reported in Brazil and 1,261 accidents caused by occupational diseases in Rio Grande do Sul.<sup>12,29</sup> In 2011, the city of Rio Grande totaled 11 cases of occupational disease and seven in Uruguaiana.<sup>29</sup>



In 2012, the reports by sector of economic activity show that the accidents involving farmworkers (producers and workers) totaled 25,244: of these 18,300 were typical accidents and 173 were accidents caused by occupational diseases.<sup>12</sup> Note that the information involved concerns workers enrolled in the Brazilian Institute of Social Security (INSS) based on the search, on the part of workers, for accident benefits, which implies that the numbers are probably even higher, since many accidents are not reported, or recorded by the INSS, while others are ignored or neglected by the workers themselves. Additionally, the statistics do not permit quantifying occupational accidents by specific professions, as would be the case for farmworkers, who fall in one large category of farming.

Concerning the reasons provided by the workers for the occurrence of work-related accidents, most report lack of attention and, to a lesser extent, an excess of simultaneous activities, the absence of PPE, work overload, and a few reported a lack of knowledge. Lack of attention may be related to the imperceptible nature workloads assume when they become a routine, in which workers grow accustomed to them and do not recognize what generates wear and fatigue. The literature shows that the perception of an individual in regard to exposure that is harmful to health is a complex construct and is related to the way each individual understands and experiences the phenomenon. An individual's perception may be influenced by familiarity with the source that generates the harm, by a feeling of having control over the situation or by the nature of the event. Rare events are usually overvalued while common events tend to be underestimated.<sup>30</sup>

Therefore, this paper sought to identify workloads accruing from the agricultural process and accidents among farmworkers, to be a source of information for future studies and to contribute to the work of nurses when implementing preventive interventions among these workers. Such an understanding involves the human work force, the uniqueness of the rural environment and workloads that lead to work-related diseases and accidents. Hence, the health-work-environment triad must be seen as an inseparable relationship in science and in the practice of nurses.

## CONCLUSIONS

The conclusion is that the work process of farmworkers shows diverse workloads with the

potential to lead to occupational diseases and accidents. Agriculture requires the use of manual and mechanized tools and equipment, which requires attention to the way these are used. The environmental conditions and the intensity of work are determinants for the health of workers.

The work-related accidents reported show the need for health interventions to be implemented among farmworkers to encourage adherence to preventive measures and health protection. These aspects refer to the need to invest in health actions in the rural environment to prevent or minimize accidents and occupational diseases. Nurses can act by recognizing the work environment and the workers' characteristics and conditions, associating their clinical knowledge with the workers' health-disease continuum in order to contribute to individual and collective health and to public health policies based on practical and investigative actions.

The work of nurses in the field of occupational health is important in the diverse urban and rural environments. In this study, we address workers from the rural environment based on the arduous work they perform, the difficulty in commuting from home to the areas in which they work due to the long distances, which can also generate difficulty accessing healthcare and information on health. These vulnerabilities show the need for a more effective work process on the part of nurses in cooperation with primary healthcare teams and Family Health Strategy workers to promote joint actions to reach this population more effectively. This study's results motivate the formation of strategies to change this context and nursing can contribute in a broad and effective manner.

## REFERENCES

1. Silva NR. Fatores determinantes da carga de trabalho em uma unidade básica de saúde. *Ciênc. Saúde Coletiva*. 2011 Ago; 16(8):3393-402.
2. Organización Mundial de la Salud. Entornos laborales saludables: fundamentos y modelo de la OMS: contextualización, prácticas y literatura de apoyo. Ginebra: OMS; 2010.
3. Organización Internacional del Trabajo. Boletín Internacional de Investigación Sindical. Enfrentar el desafío del trabajo precario: la agenda sindical. Ginebra (CH): Oficina Internacional del Trabajo; 2013.
4. Organización Internacional del Trabajo. Programa de Actividades Sectoriales. Repertorio de recomendaciones prácticas sobre seguridad y

- salud en la agricultura. Ginebra (CH): Oficina Internacional del Trabajo; 2010.
5. Kirchhof ALC, Lacerda MR, Sarquis LMM, Magnago TSB, Gomes IM. Compreendendo cargas de trabalho na pesquisa em saúde ocupacional na enfermagem. *Colomb Med*. 2011; 42(2):113-9.
  6. Cezar-Vaz MR., Weis AH, Costa VZ, Soares JFS, Bonow CA, Cardoso LS, et al. Estudo com enfermeiros e médicos da atenção básica à saúde: uma abordagem socioambiental. *Texto Contexto Enferm*. 2007 Out-Dez; 6(4):645-53.
  7. Mcphaul KM, Lipscomb J. Incorporating environmental health into practice: the expanded role of the occupational health nurse. *AAOHN J*. 2005 Jan; 53(1):31-6.
  8. Cezar-Vaz MR, Cardoso LS, Bonow CA, Sant'Anna CF, Sena J. Conhecimento clínico do enfermeiro na atenção primária à saúde: aplicação de uma matriz filosófica de análise. *Texto Contexto Enferm*. 2010 Jan-Mar; 19(1): 17-24.
  9. Triola MF. Introdução à estatística. 10ª ed. Rio de Janeiro (RJ): Livros Técnicos e Científicos Editora S.A.; 2008.
  10. Hart SG, Staveland LE. Development of a NASA-TLX (Task Load Index): results of empirical and theoretical research. In: Hancock PA, Meshkati N, editors. *Human mental workload*. Amsterdam (NL): North-Holland; 1988. p.139-83.
  11. Ministério da Previdência Social (BR). Lei n. 8.213, de 24 de julho de 1991: dispõe sobre os Planos de Benefícios da Previdência Social e dá outras providências [Internet]. Brasília; 1991 [aceso 2013 Set 22]. Disponível em: <http://www.previdencia.gov.br/legislao-federal/>
  12. Ministério da Previdência Social (BR). Anuário Estatístico: seção IV - Acidentes de trabalho [Internet]. Brasília (DF): MTE; 2012 [acesso 2013 Nov 28]. Disponível em: <http://www.previdencia.gov.br/estatisticas/aeps-2012-anuario-estatistico-da-previdencia-social-2012/aeps-2012-secao-iv-acidentes-do-trabalho/aeps-2012-secao-iv-acidentes-do-trabalho-tabelas/>
  13. Ministério de Trabalho e do Emprego (BR) Portaria n. 2.546 de 14 de dezembro de 2012. NR 31 - Segurança e saúde no trabalho na agricultura, pecuária silvicultura, exploração florestal e aquicultura. Brasília (DF): TEM; 2012 [acesso 2012 Nov 10]. Disponível em: <http://portal.mte.gov.br/legislacao/normas-regulamentadoras-1.htm>
  14. Day L, Voaklander D, Sim M, Wolfe R, Langley J, Dosman J, et al. Risk factors for work related injury among male farmers. *Occup Environ Med*. 2009 May; 66(5):312-8.
  15. Faria NMX, Facchini LA, Fassa AG, Tomasi E. Trabalho rural, exposição a poeiras e sintomas respiratórios entre agricultores. *Rev Saúde Pública*. 2006 Out; 40(5):827-36.
  16. European Agency for Safety and Health at Work (EU-OSHA). Musculoskeletal disorders in agriculture [Internet]. Bilbao (ES): EASHW. 2012 [acesso 2013 Dez 03]. Disponível em: [https://osha.europa.eu/pt/sector/agriculture/index\\_html/msds](https://osha.europa.eu/pt/sector/agriculture/index_html/msds)
  17. National Center for Farmworker Health, Inc. Farmworker occupational health and safety. Farmworker Health Factsheet [Internet]. 2013 Mar [acesso 2013 Dez 03]. Disponível em: <http://www.ncfh.org/docs/fs-Occ%20Health.pdf>
  18. Hofmann JN, Crowe J, Postma J, Ybarra V, Keifer MC. Perceptions of environmental and occupational health hazards among agricultural workers in Washington State. *AAOHN J*. 2009 Sep; 57(9):359-71.
  19. Correia RTM, Valente NYS, Criado PR, Martins JEC. A cromoblastomicose: relato de 27 casos e revisão da literatura. *An Bras Dermatol*. 2010; 85(4):448-54.
  20. Ribeiro EL, Soares AJ, Ferreira WM, Cardoso CG, Naves PLF, Dias SMS. Cromoblastomicose: doença presente na realidade populacional brasileira. *Rev Bras Anal Clin*. 2006; 38(3):189-92.
  21. Nieuwenhuijsen MJ, Grey CN, Golding J. Exposure misclassification of household pesticides and risk perception and behaviour. *Ann occup Hyg*. 2005 Aug; 49(8):703-9.
  22. Peres F, Lucca SR, Ponte LMD, Rodrigues KM, Rozemberg B. Percepção das condições de trabalho em uma tradicional comunidade agrícola em Boa Esperança, Nova Friburgo, Rio de Janeiro, Brasil. *Cad Saúde Pública*. 2004 Jul-Ago; 20(4):1059-68.
  23. Recena MCP, Caldas ED. Percepção de risco, atitudes e práticas no uso de agrotóxicos entre agricultores de Culturama, MS. *Rev Saúde Pública*. 2008 Abr; 42(2):294-301.
  24. Costa CKL, Lucena NMG, Tomaz AF, Másculo FS. Avaliação ergonômica do trabalhador rural: enfoque nos riscos laborais associados à carga física. *GEPROS*. 2011 Abr-Jun; 6(2):101-12.
  25. Lower T, Fragar L, Depczynski J, Challinor K, Mills J, Williams W. Improving hearing health for farming families. *Rural Remote Health*. 2010; 10(1):1350.
  26. Forst L, Erskine T. Farm injuries in Ohio, 2003-2006: a report from the emergency medical services prehospital database. *J Agric Saf Health*. 2009 Apr; 15(2):171-83.
  27. Menegat RP, Fontana RT. Condições de trabalho do trabalhador rural e sua interface com o risco de adoecimento. *Cienc Cuid Saúde*. 2010 Jan-Mar; 9(1):52-9.
  28. Weigel MM, Armijos RX. Exploratory study of the occupational health and health-seeking of migrant and seasonal farmworkers on the U.S. - Mexico Border. *J Immigr Minor Health*. 2012 Aug; 14(4):648-56.
  29. Ministério da Previdência Social (BR). Anuário Estatístico de Acidentes de Trabalho 2011. Brasília

(DF): MTE; 2012 [acesso 20 Nov 2013]. Disponível em: [http://www.previdencia.gov.br/arquivos/office/1\\_130129-095049-870.pdf](http://www.previdencia.gov.br/arquivos/office/1_130129-095049-870.pdf)

30. Oltedal S, Moen B-E, Klempe H, Rundmo T. Explaining risk perception. An evaluation of cultural theory. Norway (NO): Rotunde publikasjoner; 2004.

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