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# Prevalence of digestive signs and symptoms and associated factors among rural workers

Prevalência de sinais e sintomas digestórios em trabalhadoras rurais e fatores associados

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## Keywords

Signs and symptoms, digestive; Rural workers; Public health nursing; Occupational health nursing; Nursing assessment

## Descritores

Sinais e sintomas digestórios; Trabalhadores rurais; Enfermagem em saúde pública; Enfermagem do trabalho; Prevalência

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## Abstract

**Objective:** To determine the prevalence of digestive signs and symptoms in rural workers and identify frequently associated factors.

**Methods:** This cross-sectional study included 182 rural and horticultural farm workers aged 18 years or older. To assess internal data consistency, the Cronbach's alpha coefficient was used. To compare means between groups, student's t-test was used for independent samples. The Mann-Whitney test was used in cases of asymmetry.

**Results:** The prevalence of digestive signs and symptoms was 31.9%. The signs and symptoms included epigastric pain (27.4%), regurgitation (18.1%), bloating (9.9%), nausea (9.9%), and vomiting (6.0%).

**Conclusion:** The prevalence of digestive signs and symptoms reported by rural workers was high and was associated with being older than 60 years, using agricultural pesticides, and being of Italian descent.

## Resumo

**Objetivo:** Conhecer a prevalência de sinais e sintomas digestórios em trabalhadoras rurais e identificar fatores associados mais frequentes.

**Métodos:** Estudo transversal que incluiu 182 trabalhadoras rurais maiores de 18 anos e de agricultura de hortifrutigranjeiros. Para avaliar a consistência interna dos dados utilizou-se o coeficiente alfa de *Cronbach*. Para comparar médias entre os grupos, o teste *t* de *Student* foi aplicado para amostras independentes. Em caso de assimetria, foi utilizado o teste de *Mann-Whitney*.

**Resultados:** A prevalência de sinais e sintomas digestórios relatados foi 31,9%. Os sinais e sintomas digestórios relatados foram: dor epigástrica (27,4%), regurgitação (18,1%), inchaço (9,9%), náusea (9,9%) e vômitos (6,0%).

**Conclusão:** A prevalência de sinais e sintomas digestórios relatados por trabalhadoras rurais foi alto e esteve associado a idade maior de 60 anos, utilização de pesticidas agrícolas e ascendência italiana.

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**Conflicts of interest:** there are no conflicts of interest associated with this publication.

## Introduction

Gastric disorders include clinical signs and symptoms that suggest possible infections and/or gastric diseases,<sup>(1)</sup> which comprise epigastric pain, halitosis, bloating, weight loss, postprandial fullness, nausea, regurgitation, satiety, and vomiting. These clinical manifestations are perceived and measured by individuals who present them and can help nurses and other healthcare professionals to diagnose their morbidities, associated factors, and disease risk.

Sociodemographic factors such as gender, age, and education, among others, combine individual profiles and are associated with environmental factors, such as food culture (including food preparation and consumption habits), working conditions (physical and mental demands and time spent performing work), workload and frustration level at work, and use of pesticides in cultivation. These factors may exacerbate morbidities, which appear as symptoms, and their origins can be confirmed by clinical diagnosis.

In addition to the factors associated with individuals, environment, and labor, use of pesticides can cause clinical complications, including inflammation, gastritis, esophagitis, and stomach cancer. Evidences of the associations between gastric disorders and pesticide application by rural workers have been reported in the literature.<sup>(2-6)</sup> A study involving individuals who applied pesticides reported gastrointestinal symptoms, including nausea, vomiting, severe abdominal pain, and retrosternal pain or discomfort. These symptoms were attributed to gastrointestinal irritation produced by the release of phosphine into the stomach.<sup>(2)</sup> Gastric disorders have also been reported in cases of mild intoxication with the pesticide Abamectin.<sup>(3)</sup> In addition, genetic research on gastric cancer in patients affected by the disease indicated a higher frequency of cancer in patients living in rural environments. Increased exposure to various pesticides in the field could explain the higher rate of gastric cancer in these patients.<sup>(4)</sup>

A common infection associated with gastric disorders and occurrence of morbidities is infec-

tion with the bacterium *Helicobacter pylori*. Some studies<sup>(7,8)</sup> have shown that gastric disorders may be associated with infection by this bacterial species. Another complication associated with this bacterial infection is gastroesophageal reflux, which was investigated in a study involving rural workers, and this complication was more prevalent in women than in men.<sup>(9)</sup> In addition, women presented the most cases of gastric disorders in other studies.<sup>(10,11)</sup> Similarly, the evaluation of the rural population is very important to identify gastric disorders and infections because of this group's socioeconomic status<sup>(7)</sup> and the type of work they perform, which is tiring, exhausting, heavy, without a fixed schedule, and its success is dependent not only on workers but also on the weather.<sup>(6)</sup>

Rural workers also perform domestic work, which can exacerbate physical, mental, and temporal demands in the execution of multiple activities. A previous study involving men and women and investigating on the use of their time to reconcile work and family life indicated that women were tied to domestic responsibilities and that this might contribute to increased stress.<sup>(12)</sup> A study on the inequality of domestic work in British couples showed that the women felt burdened not only by the domestic work but also other activities and by not sharing household chores with their companions.<sup>(13)</sup>

Therefore, assistance to female rural workers with gastric disorders needs to be further investigated. In this respect, public health nursing seeks to use clinical knowledge to identify gastric disorders resulting from different motives. One study that reported the experience of patients with gastroparesis indicated that the main symptoms of the disease were nausea, vomiting, and depression and that the behaviors of patients with this diagnosis were associated with feelings of loss, isolation, and rejection.<sup>(14)</sup>

Therefore, nursing has sought to define cases of gastric infection and/or disease by identifying epigastric disorders. This diagnosis assists in primary and secondary care by focusing on living conditions and particularly on working condi-

tions. The objective of this study was to determine the prevalence of digestive signs and symptoms in rural workers and to identify frequently associated factors.

## Methods

This cross-sectional study included 182 rural workers in the state of Rio Grande do Sul, which is located in southern Brazil. The total number of rural workers was not reported by official, state, and municipal sources involved in rural activities. Therefore, the sample was non-probabilistic and convenient; in other words, the search for rural workers was conducted in residences and rural areas were informed by the Technical Assistance and Rural Extension Company of Rio Grande do Sul.

This procedure allowed the construction of a study sample with a larger number of rural workers considering the following inclusion criteria: residence in rural areas where work was conducted, minimum age of 18 years, and work in the area of fruit and vegetable farming.

For data collection, structured interviews were conducted with rural workers and included independent sociodemographic variables (age, ethnicity, marital status, literacy, education level, monthly income, ancestry, and type of residence) and work conditions (length of employment in rural activities, property size, daily working hours, robust variable-hours versus years, application of agricultural pesticides, use and length of use of personal protective equipment, physical and mental effort for execution of field and domestic work, and level of frustration in rural and domestic activities). The dependent variable was the occurrence of digestive signs and symptoms (epigastric pain, regurgitation, bloating, nausea, and vomiting).

To assess the internal consistency of answers, i.e., data reliability, the Cronbach's alpha coefficient was used. The value found was 0.850, which was within the expected values (between 0.80 and 0.90). This condition confirmed the

reliability of the measuring instrument applied to rural workers.

Quantitative variables were expressed as means and standard deviations or medians and interquartile ranges. Categorical variables were expressed as absolute and relative frequencies. To compare means between groups, student's t-test was used for independent samples. The Mann-Whitney test was used in cases of asymmetry. For the comparison of frequencies, Pearson's chi-square test or Fisher's exact test were used. For the adjustment of confounding factors, Poisson regression analysis was performed. The criterion for the inclusion of the variable into the model was a  $p$ -value  $<0.20^{(15)}$  in the bivariate analysis. The measure used was the prevalence ratio together with the 95% confidence interval. The significance level was 5% ( $p \leq 0.05$ ), and the analyses were performed using IBM Statistical Package for Social Sciences software, version 21.0.

The execution of this study adhered to national and international standards of ethics in research involving humans.

## Results

The mean age of 182 rural female workers was 48.9 years, with a predominance of Caucasians (167, 91.8%); 160 (87.9%) were married, and 120 (65.9%) had not completed elementary school. In addition, 58 (31.9%) women reported having work-related gastric disorders, including epigastric pain (50, 27.4%), regurgitation (33, 18.1%), bloating (18, 9.9%), nausea (18, 9.9%), and vomiting (11, 6.0%). The qualifiers related to the severity of these disorders were mild for 21 women (36.2%), moderate for 16 (27.6%), severe for 18 (31.0%), and very severe for 3 (5.2%).

In addition, 36 (19.8%) reported being involved in the application of agricultural pesticides. Of these, 24 (66.6%) had gastric disorders. During pesticide application, workers reported the use of personal protective equipment, including head protection (4, 2.2%), water-repellent coat (3, 1.6%), faceshield (2, 1.1%), water-repellent pants (2, 1.1%), and ear protection (1, 0.5%).

During the univariate analysis of sociodemographic variables and working conditions among rural workers with or without gastric disorders, the variables such as ethnicity; marital status; literacy; education level; monthly income; Portuguese, German, and Uruguayan descent; type and size of the property, daily work hours; robust variable (hours versus years); use of personal protective equipment; and application of agricultural pesticides had no significant association. An association was identified ( $p < 0.20$ ) for the variables age ( $p = 0.174$ ), being of Italian descent ( $p = 0.162$ ), type of residence ( $p = 0.121$ ), and length of employment in rural work ( $p = 0.191$ ).

Poisson regression analysis indicated that workers aged  $\geq 60$  years had a 57% greater probability of developing gastric disorders and that the workers of Italian descent had 70% greater prevalence of gastric disorders compared with workers of other descents (Table 1).

**Table 1.** Sociodemographic variables

Variables	PR (95% CI)	p-value
Age $\geq 60$ years	1.57 (1.01-2.44)	0.046
Italian descent	1.70 (1.06-2.72)	0.027

pr - prevalence ratio; 95% CI - 95% confidence interval

With regard to the requirements of domestic and rural work, the monovariate analysis indicated that the female workers with gastric disorders had more demanding physical requirements ( $p = 0.003$ ), temporal requirements ( $p = 0.026$ ), and increased frustration levels ( $p < 0.001$ ) during rural work compared with those who did not present these disorders. For the workers who performed domestic work, the frustration level was significantly associated with gastric disorders ( $p = 0.003$ ).

After adjustment, the rural workers who also performed domestic activities were 52% less likely to have gastric disorders compared with those who did not perform these activities.

The workers with an additional point in the temporal requirements in their workload in the field had a 5% higher prevalence of work-related gastric disorders. The workers with an additional point in the frustration level related to the workload in the

field had a 5% higher likelihood of developing gastric disorders (Table 2).

**Table 2.** Domestic and rural work

Variables	PR (95% CI)	p-value
Performed domestic work	0.48 (0.24-0.93)	0.030
Temporal requirements in the rural work	1.05 (1.00-1.09)	0.038
Level of frustration related to workload in the field	1.05 (1.02-1.09)	0.003

pr - prevalence ratio; 95% CI - 95% confidence interval

## Discussion

The limitations of the results of this study are related to its cross-sectional design, which did not allow the establishment of cause and effect relationships.

The results indicated that rural female workers aged 60 years or older had a 57% increase in the probability of developing gastric disorders. This result approximated the general characteristics of organic functionality related to increased age for onset of gastric symptoms. A previous study of a rural population aimed to determine the prevalence of *H. pylori* infection and its role in the pathogenesis of gastrointestinal diseases reported the same disorders identified in the present study, in addition to other complications, including epigastric pain, nausea, vomiting, early satiety, bloating, postprandial fullness, regurgitation, weight loss, and melena, in both men and women. In addition, the highest prevalence occurred in the age group of 41-50 years,<sup>(7)</sup> which is similar to the results of the present study.

Age is an important biological marker. Moreover, long-term infection with *H. pylori* increases the risk for developing gastric cancer; in addition, it is one of the most common infections and may be responsible for nearly 75% of the cases of gastric cancer worldwide.<sup>(16)</sup> It should be stressed that this is not a case of constructing approximations but instead considering how to confirm these possibilities in new studies and clinical follow-up for this group of workers who present a high prevalence of gastric disorders in order to identify other symptoms indicative of gastric diseases.



Another relevant factor, despite the lack of statistical significance, was the association between pesticide application and gastric disorders among rural workers. The findings of this study indicate that out of the 36 women who reported applying pesticides, 24 (66.6%) had at least one gastric disorder. Pesticides are identified in the literature as a risk factor for the health of the rural population worldwide. A study conducted on rice farmers in Malaysia reported stomach pain and vomiting as harmful health outcomes resulting from the use of pesticides.<sup>(17)</sup> Another study that evaluated potential health risks to the population exposed to contaminated water in pesticide disposal sites showed that gastric cancer was among the outcomes of such exposure.<sup>(18)</sup> This finding indicates that pesticides do not only impair the health of the workers who apply them but also the population groups who are exposed near the application sites. Accordingly, the group of 34 workers who reported not applying pesticides but who had gastric disorders worked at sites where pesticides were applied.

One of the measures to minimize the risk of pesticide exposure is the use of personal protective equipment. A study conducted in Brazil with rural workers investigating pesticide use and exposure levels showed that more than 50% of the workers rarely or never used personal protective equipment.<sup>(19)</sup> Another study comparing differences between genders in relation to knowledge, practices, and symptoms of intoxication resulting from pesticide handling indicated that women (especially those with lower education levels) had little knowledge of the pesticides, in addition to risky behavior when handling them, which contributes to increased risk of poisoning. In addition, women used less personal protective equipment when handling pesticides compared with men.<sup>(20)</sup> Of note is the similarity of this profile with that of rural female workers evaluated in the present study, who had incomplete elementary school education and made inadequate use of personal protective equipment.

It is known that use of personal protective equipment alone does not eliminate the risk of absorbing pesticides and consequent development of gastric disorders. A study conducted in nine hospi-

tals using a secondary collection method involving 586 patients after ingestion of agricultural pesticides highlighted the need for chemical studies in order to reduce gastrointestinal absorption of these harmful substances.<sup>(21)</sup>

Another factor associated with the development of gastric disorders among rural workers was being of Italian descent. Accordingly, the women of Italian descent had a 70% greater prevalence of digestive signs and symptoms compared with the prevalence among women of other descent. A study conducted in Italy on energy and nutrient consumption at the national level reported excessive intake of certain foods, such as fats and alcohol, and decreased consumption of fiber and vitamins.<sup>(22)</sup> A study conducted in Iran on the relationship between diet and gastric cancer showed that consumption of animal fat, such as meat, milk, and fatty cheeses, can increase the risk of this disease.<sup>(23)</sup>

The promotion of healthy eating habits is a strategy recognized as positive for the health conditions of the population in general<sup>(1)</sup>, particularly for gastric disorders and gastric diseases. In this respect, without focusing on the nutritional components of food, the present findings indicate that women who performed domestic activities, such as cooking, were 52% less likely to have gastric disorders compared with those who did not perform these activities.

Domestic work, in most cases combined with other activities, has been reported in the literature as a stress factor.<sup>(12,13)</sup> However, in the present study, it was identified as a protective factor for gastric disorders. This finding underscores the effort to correlate food culture with its behavioral effects.

Moreover, the findings indicate that time spent in rural activities increases both the prevalence of gastric disorders and the level of frustration in relation to these activities by 5%. Results of a study of Bangladeshi garment factory workers showed that the length of daily work and frustration at work contribute to the development of health problems, including gastric disorders characterized by gastric pain, nausea, and vomiting.<sup>(10)</sup>

Digestive signs and symptoms are subjective indicators and should be considered in all instances

where they are identified, whether in the investigative process, as in the present study, or in health assistance and diagnosis of gastric diseases. These disorders indicate potential organic changes and are clinical markers that can lead to other lines of investigation in future studies, including whether different causes and consequences can be suspected for gastric diseases based on the female workers' gastric symptoms and associated factors.

However, the prevalence of gastric disorders in a group of women whose work is recognized socially and scientifically as having the potential to accelerate organic decline and development of disease requires attention. Interventions can be conducted in these groups to predict such outcomes or minimize their consequences with the view toward promoting healthier behaviors and improving quality of life.

## Conclusion

The prevalence of digestive signs and symptoms reported by rural workers was high and was associated with being aged 60 years or older, use of agricultural pesticides, and being of Italian descent.

## Collaborations

Cezar-Vaz MR contributed to the design and supervision of the project, execution of the study, analysis and interpretation of data, manuscript preparation, and critical review of the intellectual content. Bonow CA contributed to the collection, analysis, and interpretation of data, manuscript preparation, and critical review of the intellectual content. Couto AM and Gelati TR contributed to manuscript preparation and critical review of the intellectual content.

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