

# Correlation between the habit of sleeping in a hammock and the prevalence of back pain in domestic workers: a cross-sectional study

## Correlação entre o hábito de dormir em rede e a prevalência de dores nas costas em trabalhadoras domésticas: um estudo transversal

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### Abstract

**Objective:** To investigate the association between sleeping surfaces (hammock versus bed) and the prevalence and topography of back pain among female domestic workers in socioeconomically vulnerable regions of northern Brazil.

**Methods:** This cross-sectional study included 429 women aged over 30 years, residing in peripheral areas of Belém and rural towns in Pará. Data were collected through structured interviews addressing sleeping habits, presence and location of spinal pain, and treatments used. Associations between sleeping surface and pain variables were analyzed using the Chi-square test, with a significance level of  $p < 0.05$ .

**Results:** Back pain was reported by 87.87% of participants, predominantly in the lumbar region (29.84%). A significant association was found between sleeping surface and pain location ( $p = 0.004$ ). Among bed users, 63.40% reported spinal pain, while 61.54% of hammock users reported no pain. Additionally, 50.35% of participants who experienced pain relief reported regular hammock use. Despite the high prevalence of pain, 59.58% of participants had not received any treatment. **Conclusion:** Sleeping in a hammock was associated with a lower prevalence of lumbar back pain in

### Resumo

**Objetivo:** Investigar a associação entre o tipo de superfície de sono (rede versus cama) e a prevalência e topografia da dor nas costas em trabalhadoras domésticas residentes em regiões socioeconomicamente vulneráveis do Norte do Brasil.

**Métodos:** Estudo transversal com 429 mulheres acima de 30 anos, residentes em áreas periféricas de Belém e municípios do interior do Pará. Os dados foram obtidos por meio de entrevistas estruturadas sobre hábitos de sono, presença e localização da dor na coluna, além dos tratamentos utilizados. As associações entre superfície de sono e variáveis de dor foram analisadas pelo teste do Qui-quadrado, com nível de significância de  $p < 0,05$ .

**Resultados:** A dor nas costas foi referida por 87,87% das participantes, com predominância na região lombar (29,84%). Houve associação significativa entre o local de dormir e a topografia da dor ( $p = 0,004$ ). Entre as usuárias de cama, 63,40% relataram dor na coluna, enquanto 61,54% das usuárias de rede não apresentaram dor. Além disso, 50,35% das participantes que relataram melhora referiram uso regular da rede. Apesar da alta prevalência de dor, 59,58% não realizaram nenhum tipo de tratamento. **Conclusão:** O hábito de dormir em rede esteve associado à menor

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this population. Given the limited access to high-quality mattresses, culturally rooted practices such as hammock use may serve as low-cost strategies to mitigate spinal pain in underserved communities. Further longitudinal studies are needed to explore this potential protective association.

**Keywords:** Back pain; Sleeping habits; Hammocks; Domestic workers; Socioeconomic factors.

prevalência de dor lombar nesta população. Considerando o acesso limitado a colchões de qualidade, práticas culturais como o uso de redes podem representar estratégias de baixo custo no enfrentamento da dor nas costas em comunidades desfavorecidas. Estudos longitudinais são necessários para aprofundar essa possível associação protetora.

**Palavras-chave:** Dor nas costas; Hábitos de sono; Redes; Trabalhadoras domésticas; Fatores socioeconômicos.

## Introduction

Spinal pain is one of the most prevalent and disabling musculoskeletal conditions globally, second only to headache among the most frequent pain-related disorders. Low back pain, in particular, stands as a leading cause of functional limitation, work absenteeism, and healthcare expenditures, exerting a significant economic and social burden. It is estimated that up to 85% of individuals will experience at least one episode of back pain during their lifetime<sup>1</sup>. In Brazil, this condition represents the main cause of work-related disability and sick leave benefits<sup>1</sup>.

Multiple risk factors have been consistently associated with low back pain, including sociodemographic determinants (older age, female sex), behavioral aspects (physical inactivity, smoking), and occupational exposures (repetitive strain, poor ergonomic conditions)<sup>2</sup>. Additionally, the presence of comorbidities such as obesity, chronic diseases, and osteoporosis – particularly in postmenopausal women – contributes to the increased prevalence of spinal disorders in this population<sup>3</sup>.

According to the 2019 Brazilian National Health Survey, the prevalence of chronic spinal pain among adults was 21.6%, with higher rates among women and a marked increase after the age of 45<sup>4</sup>. Furthermore, adverse health behaviors and poor self-rated health have also been strongly associated with back pain<sup>4</sup>.

In socioeconomically vulnerable regions, such as the outskirts of Belém and rural municipalities in the state of Pará, access to high-quality mattresses is often financially unfeasible. As an alternative, the use of hammocks remains a culturally ingrained and economically practical solution for sleeping. However, the biomechanical implications of this habit on spinal alignment and pain perception remain poorly elucidated

– especially among domestic workers, who frequently experience cumulative physical load and occupational strain.

Given the high prevalence of back pain and the widespread use of hammocks as an alternative sleeping surface in northern Brazil, this study aims to investigate the association between sleeping surface type (bed versus hammock) and the prevalence of spinal pain. Secondary objectives include exploring the anatomical distribution of pain, its relation to the primary sleeping surface, and the types of treatment adopted. Understanding these associations is critical for the development of culturally sensitive and cost-effective public health interventions in low-resource settings.

## Method

This study was designed as a cross-sectional investigation involving female domestic workers aged over 30 years, residing in socioeconomically disadvantaged peripheral neighborhoods of Belém and rural municipalities in the state of Pará, northern Brazil. The inclusion criteria targeted populations with restricted financial access to modern bedding systems, who frequently adopt hammock use as an alternative sleeping surface due to cultural and economic factors.

Participants were interviewed in person using a structured questionnaire developed by the research team. The instrument was specifically designed to capture information related to musculoskeletal health and sleeping habits. Only women over 30 years of age were included, as this age group is more likely to experience spinal pain and functional limitations in activities of daily living (ADLs). Exclusion criteria comprised male individuals, women under 30, and any participant who did not provide written informed consent in accordance with ethical standards.



The primary variables assessed were: (1) presence of spinal pain; (2) anatomical distribution of pain (lumbar, thoracic, or cervical); (3) type of treatment most commonly used to manage spinal pain; and (4) perceived impact of pain on ADLs. Additionally, the association between preferred sleeping surface (bed or hammock) and the occurrence of spinal pain was examined. Data were summarized using descriptive statistics, including frequency distributions, measures of central tendency, and variability, presented through tables and graphical formats to delineate the population profile.

Data collection was conducted through face-to-face interviews with voluntary participants using a ten-item structured questionnaire. After collection, data were entered into a research protocol and subjected to statistical analysis. Associations between categorical variables were assessed using Pearson's Chi-square test ( $\chi^2$ ) for two independent samples. The null hypotheses tested were: (1) spinal pain is independent of the sleeping surface used; and (2) there is an association between the anatomical location of pain and the sleeping surface. A significance level of 5% ( $p < 0.05$ ) was adopted to determine statistical relevance.

Statistical analyses were performed using BioEstat software version 5.4, and Microsoft Excel was employed for graphical presentation and tabular formatting.

This study was conducted in accordance with the ethical principles established by the Declaration of Helsinki and the Nuremberg Code, and followed the Brazilian National Health Council's guidelines for research involving human subjects (Resolution CNS 466/12). The research protocol was approved by the Research Ethics Committee of the State University of Pará (approval number 1.409.564).

## Results

Table 1 presents the age distribution of the 429 participants enrolled in the study during the year 2024. The majority were aged between 50 and 60 years ( $n = 139$ ; 32.40%). These findings illustrate a predominantly adult population, which is particularly relevant for analyzing the implications of spinal pain and its impact on daily functional capacity.

Table 2 displays the distribution of participants according to the occurrence of spinal pain and their preferred sleeping surface. Among the 377 individuals who reported spinal pain, 239 (63.40%) reported sleeping primarily in beds. Statistical analysis revealed a significant association between the sleeping surface and the incidence of spinal pain ( $p < 0.001$ ), suggesting

that the type of surface used for sleep may influence the prevalence of spinal pain in this population.

Table 3 examines the association between pain topography and sleeping surface. Among the 126 individuals who reported lumbosacral pain, 67 (53.17%) slept in beds, whereas 59 (46.83%) reported preferring hammocks. The Chi-square test indicated a significant association between sleeping surface and pain topography ( $p = 0.004$ ), reinforcing the hypothesis that sleep surface characteristics may influence the anatomical distribution of spinal pain.

**Table 1.** Age distribution of patients evaluated at a reference unit, 2024

Age Group	N	%
30  -- 40 years	136	31,70
40  -- 50 years	129	30,07
50  -- 60 years	139	32,40
≥ 60 years	22	5,13
No Information Provided	3	0,70
<b>TOTAL</b>	<b>429</b>	<b>100,00</b>

**Table 2.** Distribution of patients according to back pain and preferred sleeping surface

Preferred sleeping surface	Back Pain				Total	
	No		Yes		n	%
	N	%	N	%		
Bed	1	34,62	239	63,40	257	59,91
Hammock	3	61,54	136	36,07	168	39,16
No information	1	3,85	2	0,53	4	0,93
<b>Total</b>	<b>5</b>	<b>100,00</b>	<b>377</b>	<b>100,00</b>	<b>429</b>	<b>100,00</b>

\*  $p < 0,001$

**Table 3.** Correlation between pain topography and preferred sleeping surface, 2024

Pain Topography	Local onde Dormir				Total	
	Bed		Hammock		n	%
	N	%	N	%		
Lumbosacral	67	53,17	59	46,83	126	29,37
Cervical	57	68,67	26	31,33	83	19,35
Whole spine	40	64,52	22	35,48	62	14,69
Toracolumbar	36	70,59	15	29,41	51	11,89
Thoracic	22	75,86	7	24,14	29	6,76
Cervical/ Toracolumbar	18	72,00	7	28,00	25	5,83
No Pain	18	36,00	32	64,00	50	12,12
<b>TOTAL</b>	<b>258</b>	<b>60,56</b>	<b>168</b>	<b>39,44</b>	<b>426</b>	<b>100,00</b>

p-value = 0,004

Table 4 reveals that 141 participants reported improvement in spinal pain when sleeping in a hammock. Of these, 71 (50.35%) reported regularly sleeping in a hammock, while 70 (49.65%) experienced pain relief despite habitually sleeping in a bed.

Table 5 shows that the most frequently reported pain topography was lumbosacral ( $n = 126$ ; 29.37%), followed by cervical pain ( $n = 83$ ; 19.35%). A considerable portion of participants ( $n = 255$ ; 59.58%) reported not having undergone any form of treatment. Among those who did seek treatment, medication was the most commonly reported intervention ( $n = 113$ ; 26.40%).

Further analysis based on treatment modality revealed that non-pharmacological approaches were less frequently adopted: physiotherapy was reported by 34 participants (7.94%), acupuncture and surgical interventions by 7 participants each (1.64%). A combined approach involving medication and physiotherapy was reported by 10 individuals (2.34%), and only 2 cases (0.47%) lacked information regarding the type of treatment undertaken (Table 6).

## Discussion

The adoption of hammocks as an alternative to conventional beds, particularly among socioecono-

mically disadvantaged populations, highlights the need for accessible strategies to improve spinal support and sleep quality. Public health initiatives that consider local cultural and economic habits are essential to mitigate the burden of spinal disorders in these groups. Individuals with limited access to high-quality mattresses often rely on hammocks as an affordable solution, which may influence spinal health in both positive and negative ways.

This context presents a valuable opportunity to examine the relationship between hammock use and back pain prevalence, particularly under conditions of economic vulnerability. Posture, far from being a purely genetic trait, is a dynamic construct influenced by lifestyle and habitual body mechanics over time<sup>5</sup>.

Epidemiological studies consistently demonstrate a higher prevalence of back pain among women<sup>6,7</sup>. The increased burden in this group is closely associated with the disproportionate share of domestic responsibilities<sup>7,8</sup>. Musculoskeletal disorders in women can lead to functional impairments with wide-reaching consequences across physical, occupational, economic, social, and psychological domains<sup>2,3</sup>.

The present findings are consistent with these observations: 87.87% of participants reported spinal pain, with the highest prevalence occurring in the 50-60 age group. Additionally, 35.7% reported limitations in their daily activities. Other studies have noted that spinal pain becomes more prevalent after the age of 45, a phenomenon attributed to progressive changes in spinal curvature, compounded by the postmenopausal period<sup>1,4</sup>.

Degenerative changes in the thoracic spine, including reduced connective tissue elasticity, weakening of the dorsal extensor musculature, and vertebral collapse secondary to decreased bone mineral density, are

**Table 4.** Frequency distribution of pain improvement in relation to preferred sleeping surface (bed or hammock). 2024, Pará

When does the pain improve?	Bed		Hammock		Total	
	N	%	N	%	N	%
When sleeping in bed	63	68,48	29	31,52	92	100,00
When sleeping in hammock	70	49,65	71	50,35	141	100,00
No Difference	105	75,00	35	25,00	140	100,00
<b>Total</b>	<b>238</b>	<b>63,81</b>	<b>135</b>	<b>36,1</b>	<b>373</b>	<b>100,00</b>

**Table 5.** Distribution of pain topography among patients included in the study, 2024, Pará

Pain Topography	N	%
Lumbosacral	126	29,37
Cervical	83	19,35
Whole spine	63	14,69
Toracolumbar	51	11,89
Thoracic	29	6,76
Cervical/Toracolumbar	25	5,83
No Pain	52	12,12
<b>TOTAL</b>	<b>429</b>	<b>100,00</b>

**Table 6.** Distribution of treatment types according to the modality reported. 2024, Pará

Treatment Received	N	%
None	255	59,58
Medication	113	26,40
Physiotherapy	34	7,94
Acupuncture	7	1,64
Surgical Intervention	7	1,64
Medication and Physiotherapy	10	2,34
No information	2	0,47
<b>TOTAL</b>	<b>428</b>	<b>100,00</b>

Note: One participant was excluded from this table due to missing data regarding treatment modality, resulting in a total of 428.



well documented<sup>2,9,10</sup>. Exaggerated thoracic kyphosis, frequently observed in postmenopausal women, is one of the manifestations of these processes<sup>2,11</sup>. In our study, thoracic pain was more prevalent among bed users (75.86%), whereas lumbosacral pain was more frequently reported by hammock users (46.83%). Overall, lumbosacral pain accounted for 29.84% of all cases.

Most participants reported sleeping in beds, and 63.40% of these individuals experienced back pain. Previous findings suggest that patients with low back pain who avoid prolonged bed rest tend to have better clinical outcomes<sup>10</sup>. In our cohort, 61.54% of those who regularly used hammocks reported no pain. Among the 141 participants who experienced symptom relief when sleeping in a hammock, 50.35% reported using it regularly. Interestingly, 49.65% of those who reported pain relief while sleeping in hammocks habitually used beds, which may reflect a perception of benefit rather than habitual use.

Another relevant finding was that 60% of the study population presented with overweight or obesity, a factor frequently associated with reduced spinal mobility and increased lumbar lordosis, contributing to chronic low back pain<sup>2,11</sup>.

Despite physiotherapy being widely recommended for managing spinal pain<sup>10,12-16</sup>, only 17.4% of participants adhered to this form of treatment. The majority (59.58%) reported not receiving any treatment, aligning with findings from previous studies<sup>17</sup>.

In low-income populations, access to advanced mattresses—such as those made with high-density foam, pocket springs, or memory foam—is severely limited due to financial constraints. Consequently, many individuals resort to low-quality or improvised bedding surfaces, which may exacerbate postural dysfunction and spinal pain.

Hammocks, while culturally entrenched and sometimes perceived as comfortable, do not provide standardized orthopedic support in all cases<sup>18</sup>. Their widespread use in the Amazon region makes them a viable alternative for study, particularly in the context of limited access to healthcare and ergonomic bedding. The combination of poor access to treatment and the frequent reliance on culturally embedded, non-standardized sleeping surfaces may contribute to the persistence of spinal complaints in this population. However, emerging evidence suggests that certain features of hammock use, such as its rocking motion, could also offer unexpected neurosensory benefits<sup>17-19</sup>.

This association between hammock use and reduced spinal pain may involve mechanisms beyond postural support. Neurophysiological evidence indicates that the rocking motion of hammocks can modulate brain activity during sleep, promoting faster transitions to deeper sleep stages and increasing the density of sleep spindles and slow oscillations — neural patterns associated with restoration and pain modulation<sup>20</sup>. Vestibular and proprioceptive stimulation caused by swinging appears to influence thalamocortical synchronization, potentially enhancing sleep quality and reducing pain perception. In addition, a recent randomized controlled trial demonstrated that postural hammock therapy significantly reduced chronic low back and neck pain, improving both sleep quality and functional status<sup>21</sup>. These findings reinforce the hypothesis that hammocks, beyond their cultural and economic relevance, may represent a low-cost and accessible therapeutic strategy for musculoskeletal pain in underserved populations.

A limitation of the present study is its geographic and cultural specificity, restricted to the northern region of Brazil. Future studies including populations from other regions, such as the Northeast, or from other low- and middle-income countries with similar socioeconomic and cultural contexts, are necessary to broaden our understanding of the health implications of alternative sleeping surfaces like hammocks.

## Conclusion

This study suggests a potential protective association between habitual hammock use and the prevalence of spinal pain, particularly in the lumbosacral region, among socioeconomically vulnerable women. Given that back pain remains a major public health issue, compounded by limited access to appropriate treatment, our findings underscore the importance of incorporating culturally grounded practices into community-level health strategies aimed at mitigating pain-related disability and improving quality of life.

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