

Epidemiological Profile of Burn Cases in Ceará, Brazil

Perfil epidemiológico dos casos de queimaduras no Ceará, Brasil

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Abstract

Introduction This study aims to outline the epidemiological profile of burn victims in the state of Ceará, Brazil, highlighting the need for prevention campaigns and improvements in healthcare.

Objectives To present data on the profile of burn victims in the state of Ceará, Brazil.

Materials and Methods This ecological study used data from the Department of Informatics of the Brazilian Unified Health System (DATASUS) from January 2015 to June 2024.

Results This epidemiological study analyzed 7,892 burn patients in Ceará, revealing a predominance of males (66.7%). The highest number of hospitalizations in adults aged 20 to 59 years (58%), followed by children aged 1 to 9 years (20%). Notably, children aged 1 to 4 years accounted for a significant 70% of pediatric admissions. The majority of recorded care was for emergency services (87%) at SUS units. The data indicated that most affected patients were Brown, male, adult, and SUS-dependent subjects from the Fortaleza metropolitan region, underscoring the need for targeted prevention and awareness campaigns about burns, especially in domestic and workplace environments.

Conclusion The data presented in the study revealed that the predominant profile of burn victims in Ceará consists of Brown males aged 20 to 59 years, highlighting the need for attention from authorities. This study fills a gap in the literature on burn epidemiology in Ceará, providing crucial information for the formulation of public policies and healthcare actions.

Keywords

- ▶ epidemiology
- ▶ preventive medicine
- ▶ skin
- ▶ burns
- ▶ transplantation

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Resumo

Introdução Este estudo busca traçar o perfil epidemiológico das vítimas de queimaduras no Ceará, destacando a necessidade de campanhas de prevenção e melhorias nos cuidados de saúde.

Objetivos Apresentar dados a respeito do perfil das vítimas de queimaduras no Estado do Ceará

Materiais e Métodos Estudo ecológico, realizado com dados do Departamento de Informática do Sistema Único de Saúde (DATASUS), entre janeiro de 2015 e junho de 2024.

Resultados O estudo epidemiológico analisou 7.892 pacientes vítimas de queimaduras no Ceará, revelando predominância do sexo masculino (66,7%), sendo registrado o maior número de internações em adultos de 20 a 59 anos (58%), seguidos por crianças de 1 a 9 anos (20%), entretanto, as crianças de 1 a 4 anos apresentaram um quantitativo significativo, totalizando 70% das notificações entre os internamentos infantis. O atendimento majoritariamente registrado foi o de urgência (87%), sendo a maioria dos casos realizados nas unidades do Sistema Único de Saúde (SUS). Os dados indicam que homens pardos, adultos, dependentes do SUS e da região metropolitana de Fortaleza são os principais afetados, reforçando-se a necessidade de campanhas direcionadas à prevenção e conscientização sobre queimaduras, especialmente em ambientes domésticos e de trabalho.

Conclusão Os dados apresentados pelo estudo revelam que o perfil predominante de vítimas de queimaduras no Ceará são homens pardos entre 20 e 59 anos, destacando a necessidade de atenção das autoridades. O presente estudo preenche uma lacuna na literatura sobre a epidemiologia das queimaduras no Ceará, oferecendo informações cruciais para a formulação de políticas públicas e ações de saúde.

Palavras-chave

- ▶ epidemiologia
- ▶ medicina preventiva
- ▶ pele
- ▶ queimaduras
- ▶ transplantes

Introduction

The Brazilian Burn Society (SBQ, from *Sociedade Brasileira de Queimaduras*) defines a burn as any injury resulting from direct contact with hot or cold substances, whether chemically active, electrically charged, or radioactive. The SBQ also considers venomous animals or stinging plants as causes of burns. In some cases, this injury elicits a potent inflammatory reaction, which may trigger a dangerous systemic response when a burn affects at least 30% of the body due to the release of cytokines and other inflammatory mediators.¹

The World Health Organization (WHO) reports that burns kill an average of 180,000 people worldwide each year. The causes of injury vary among different populations, but trauma remains a fundamental epidemiological component,² with 11 million burn victims requiring specialized care globally per year.² This figure exceeds the recorded incidence of tuberculosis and human immunodeficiency virus (HIV).³

Brazil witnesses, on average, 1,000,000 accidents per year, with 100,000 patients seeking hospital care, and around 2,500 cases resulting in death.^{3,4} According to the Department of Informatics of the Brazilian Unified Health System (DATASUS) and SBQ, heat exposure resulting in burns generates costs of approximately R\$ 1,200.00 to 1,500.00 per day of hospitalization,⁴ amounting to a significant expenditure on the Brazilian public health system (SUS). In 2000, for

instance, of all SUS hospitalizations, 3.39% (n = 23,550) were of burn victims.⁴ In 2023, burns affected 6,981 children and adolescents, with an average of 20 hospitalizations registered per day, according to the Brazilian Ministry of Health.

Scientific literature shows that burns mostly affects males, with alcoholism being the chief cause at all ages, except for the age group from 0 to 4 years old, in which scalding is the most common etiological agent, originating from the domestic kitchen environment.⁵ Theoretical bases also confirm that the mean age of burn victims ranges from 25 to 26 years, with a high number of first-degree burns alone, as well as a significant number of combined first- and second-degree burns.⁵

Other academic findings reveal that the average length of hospital stay for burn victims ranges from 1 to 2 weeks, and 51.5% of cases recorded in databases result from domestic accidents, with hot liquids as the most common cause. Furthermore, there is a low rate for attempted suicide (4.95%).⁶

As such, epidemiological studies are fundamental to establishing guidelines for healthcare practices and health promotion actions (such as university extension campaigns for burn prevention and projects improving treatment effectiveness for burn victims).⁷ For these reasons, and considering the scarcity of epidemiological research on this topic in the state of Ceará, Brazil, this study is essential for outlining the epidemiological profile of burn victims in this region for a period of approximately 9 years.

Objectives

This study aimed to present data on the profile of burn victims in the state of Ceará, Brazil, and their epidemiology, aiming to inform projects to combat this adverse scenario. Moreover, it aimed to address research gaps in this subject within the state.

Materials and Methods

This ecological study collected data from 2015 to the first semester of 2024 from the virtual environment of the DATASUS,⁸ using the “Health Information” section.

Data selection on this platform focused on the topics “Epidemiology and Morbidity” and “Hospital Mobility (SUS)”. Initially, “Hospital Morbidity (SUS) - General, by place of admission, from 2008 onwards” was preferred. The data refer to all burn victims in the state of Ceará with recorded hospital care during this period. There were no exclusion criteria.

Individual characteristics, such as sex, age group, and skin color/ethnicity, were added as variables. Next, the diagnosis “burns and corrosions” was selected in the “International Classification of Diseases (ICD)-10 morbidity list” filter. Furthermore, information on the healthcare system (public or private), the notification region, and the type of healthcare provided was researched.

We compared some factors, including sex and age group, sex and skin color/ethnicity, and sex and urgent care. We categorized the patients into five age groups: infants (< 1-year-old), children (1–9-years-old), adolescents (10–19-years-old), adults (20–59-years-old), and seniors (> 60-years-old). We organized the data on Google Sheets (Google LLC.) and presented the results as absolute and relative figures using descriptive statistics.

Since this study utilized secondary data available in the public domain, it posed no risk to patient confidentiality and anonymity. Thus, it did not require approval from the Research Ethics Committee of the Universidade Estadual do Ceará.

Results

This study analyzed 7,892 burn victims from the state of Ceará in the period from 2015 to the first semester of 2024. We stratified the population per skin color/ethnicity, sex, age group, healthcare system (public or private), urgency of care, and notification region year by year (► **Table 1**).

Thus, we could determine that, in Ceará, burns were more predominant in male subjects, accounting for approximately 66.7% of notifications. Regarding the age group, the number of hospitalizations was higher in adults (20–59-years-old), with approximately 58% (n=4,583) of notifications, followed by children (1–9-years-old), with around 20% (n=1,595) of notifications. It is worth highlighting that subjects aged 1 to 4 accounted for 1,112 notifications, representing approximately 70% of the cases among children (► **Table 1**).

Moreover, approximately 87% (6,855) of notifications required emergency care. Most of the registered cases received treatment in SUS (► **Table 2**).

We compared several variables to perform a specific analysis of the population. These comparisons included sex and age group, sex and skin color/ethnicity, sex and health-care system, as well as sex and type of healthcare provided (► **Table 3**). The analysis revealed a predominance of adult, Brown, male subjects, with a higher prevalence of emergency notifications in the public sector.

Discussion

The literature reveals that males account for most burn cases in Brazil.⁹ This also occurs in Ceará, where more than 70% of burns affected male subjects in our analysis. From this perspective, the injuries suffered by this group likely stem from high-risk work, which increases the likelihood of accidents, in this case, burn injuries.

Regarding age group, the results indicate that adults (20–59-years-old) account for the majority of notifications. The existing literature corroborates this trend,⁸ thus placing Ceará as a significant element in the statistics showing that adult men account for the most burn notifications in the country. This finding highlights the importance of prioritizing educational projects focused on adult males.

The fact that most notifications occur in people from 20 to 59-years-old is worrisome, as this demographic represents the economically active portion of the population.^{9,10} The impact on the Brazilian economy also results from the mean daily expenditure of R\$ 1,350 on burn victims¹⁰ who spend, on average, 7 days in the hospital.⁴ As such, each hospitalized burn patient incurs a cost of R\$ 9,450, significantly impacting SUS.⁹

In a descriptive study, Santos et al. reported that most accidents referred to a tertiary hospital in Fortaleza originate from the work environment, with a predominance of first- and second-degree burns.¹¹

Regarding children in this cohort, the literature shows that most subjects were 0 to 3-years-old.^{12,13} In Ceará, DATASUS revealed that the age group most affected by these injuries is 1 to 4 years old. This finding represents a warning for the state, as studies reported that the sequelae of burns consistently affect quality of life,¹⁴ influencing their body image.¹⁴ These outcomes can be worse in children due to their developmental compromise.¹²⁻¹⁴

The literature on children suffering from burn injuries in Ceará is scarce. In an observational study, Secundo et al. reported that second-degree burns were the most common among children.¹⁵ Furthermore, reports indicated that areas such as the head, neck, trunk, and upper limbs are the most affected by burns in this age group.^{15,16}

Our results are consistent with the literature that indicates that most burn victims are Brown.^{11,16} Thus, we determined a profile fitting the majority of the Ceará population, that is, male Brown adults. This profiling is essential for referencing projects on the reality of burn injuries in

Table 1 Epidemiology of burn notifications in the state of Ceará, Brazil, from January 2015 to June 2024

Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL
Skin color/ethnicity											
Black	4	15	9	9	20	17	18	6	4	3	105
Brown	69	628	662	688	590	393	257	323	948	582	5,140
White	16	85	40	62	100	63	48	29	25	8	476
Asian	5	112	56	97	117	116	50	33	9	0	595
No information	626	100	58	41	58	86	365	242	0	0	1,576
Sex											
Male	513	644	534	615	585	470	499	401	622	381	5,264
Female	207	296	291	282	300	205	239	232	364	212	2,628
Age range											
Infants	11	16	17	8	16	10	14	15	8	10	125
Children	153	202	134	173	152	133	154	175	181	138	1,595
Adolescents	61	106	85	86	79	62	54	43	134	31	741
Adults	425	529	520	521	514	407	423	356	556	332	4,583
Seniors	70	87	69	109	124	63	93	44	107	82	848
Healthcare system											
Public	562	–	–	–	–	–	–	–	–	–	562
Private	50	–	–	–	–	–	–	–	–	–	50
Unknown	108	940	825	897	885	675	738	633	986	590	7,277
Type of healthcare provided											
Elective	6	2	5	3	3	3	5	11	84	49	171
Urgent	657	812	702	805	744	583	632	554	837	529	6,855
Other	46	119	117	84	129	88	94	59	60	15	811
Chemical or physical agent	11	7	1	5	9	1	7	9	5	0	55
Notification region											
East shore/Jaguaribe	4	4	3	5	5	10	15	18	12	10	86
Central hinterland	2	13	4	17	16	16	10	13	16	8	115
Cariri	48	44	31	33	31	26	48	38	37	17	353
Sobral	32	32	49	40	51	38	50	24	29	22	367
Fortaleza	634	847	738	802	782	585	615	540	892	536	6,971

Source: Table prepared by the authors using data from TABNET.

Table 2 Data on the healthcare system and type attending burn victims in the state of Ceará, Brazil

Healthcare system/type	Public n (%)	Private n (%)	Unknown n (%)	Total n (%)
Total	562 (7.1%)	50 (0.63%)	7,280 (92.2%)	7.892
Elective	5 (2.9%)	1 (0.7%)	165 (96.4%)	171 (2.1%)
Urgency	526 (7.6%)	41 (0.59%)	6,288 (91.7%)	6,855 (86.8%)
Other traffic accidents	27 (3.3%)	3 (0.36%)	781 (96.3%)	811 (10.2%)
Chemical or physical agent	4 (7.2%)	5 (9%)	46 (83.6%)	55 (0.69%)

Source: Table prepared by the authors using data from TABNET.

Table 3 Epidemiological data in males and females

Sex	Male n (%)	Female n (%)	Total n (%)
Relationship between sex and age group			
< 1	79 (63.2%)	46 (36.8%)	125 (1.6%)
1–4	680 (61.2%)	432 (38.8%)	1,112 (14.1%)
5–9	284 (58.8%)	199 (41.2%)	483 (6.1%)
10–14	226 (73.1%)	83 (26.9%)	309 (3.9%)
15–19	321 (74.3%)	111 (25.7%)	432 (5.5%)
20–29	919 (72.1%)	356 (27.9%)	1,275 (16.1%)
30–39	1,026 (68.5%)	472 (31.5%)	1,498 (18.9%)
40–49	804 (70.8%)	331 (29.2%)	1,135 (14.4%)
50–59	445 (65.9%)	230 (34.1%)	675 (8.5%)
60–69	265 (59.7%)	179 (40.3%)	444 (5.6%)
70–79	163 (60.2%)	108 (39.8%)	271 (3.4%)
≥ 80	55 (41.4%)	78 (58.6%)	133 (1.7%)
Relationship between sex and skin color/ethnicity			
White	293 (61.5%)	183 (38.5%)	476 (6.03%)
Black	71 (67.6%)	34 (32.4%)	105 (1.3%)
Brown	3,383 (65.8%)	1,757 (34.2%)	5,140 (65.1%)
Asian	412 (69.2%)	183 (30.8%)	595 (7.5%)
No information	1,105 (70.1%)	471 (29.9%)	1,576 (19.9%)
Relationship between sex and healthcare type			
Elective	112 (65.5%)	59 (34.5%)	171 (2.2%)
Urgent	4,475 (65.3%)	2,380 (34.7%)	6,855 (86.8%)
Other traffic accidents	643 (79.3%)	168 (20.7%)	811 (10.3%)
Chemical or physical agent	34 (61.9%)	21 (38.1%)	55 (0.7%)
Relationship between sex and healthcare system			
Public	410 (72.9%)	152 (27.1%)	562 (7.1%)
Private	32 (64%)	18 (36%)	50 (0.63%)
Unknown	4,822 (66.2%)	2,458 (33.8%)	7,280 (92.2%)

Source: Table prepared by the authors using data from TABNET.

Ceará. Additionally, it can assist in decision-making for the intended audiences of various health education programs.

Regarding the healthcare system and type of healthcare provided, our data revealed that emergency care is more frequent in the public sector. This result was expected, given that 80% of Brazilians use SUS hospitals, according to the Ministry of Health. Urgent care for burns was also expected,¹⁷ given the treatment protocol, particularly for second- and third-degree injuries.^{17,18}

In our study, a limitation was the cases ignored by the DATASUS system, which reduced the numbers related to the healthcare system in Brazil, as confirmed by the research results.

As for the notification regions in Ceará, the greater Fortaleza area accounted for the majority of cases. This result was also expected, as the 2022 census revealed that this region has the largest population in the state. The second and third regions

with the highest number of notifications were Sobral and Cariri, which present the largest populations after Fortaleza. These two regions had a minimal difference in case numbers and can be considered virtually equal. However, Fortaleza had a significant number of reports, approximately 88%.

As discussed throughout this article, data clearly demonstrated that Brown men aged 20 to 59-years, SUS users, and from the greater Fortaleza area are the primary victims of burn reports in Ceará. This observation highlights the specific target population for future action and education projects aimed at stemming this adverse situation. This study is innovative due to the scarcity of research on this topic in Ceará, focusing on profiling the burn population. Therefore, the government and the state's universities must seek solutions to improve this scenario.

Another point worth highlighting is the care for subjects aged 1 to 4 in the state, as the number of notifications

involving them deserves attention. We also suggest and the promoting campaigns to stop and reduce cases in this age group, which, according to the data, is the most affected by burns among children in Ceará.

Conclusion

Our results showed that most burn patients in Ceará are Brown men, 20 to 59-years-old, corroborating the need for local authorities to address this issue. Also, an age group outside the majority of cases requires further evaluation.

The present study thus enriches the scientific community, filling a gap in articles addressing this topic and scope in the state of Ceará. Furthermore, it highlighted the need for programs and projects promoting health, to mitigate this situation.

Data Availability

Data will be available upon request to the corresponding author.

Authors' Contributions

BPV: data analysis and interpretation; statistical analysis; final manuscript approval; data collection; conceptualization; study concept and design; methodology; writing – original draft; writing – review & editing; validation; and visualization. ETA: data analysis and interpretation; statistical analysis, writing – original draft preparation; and visualization. ALB: writing – original draft; writing – review & editing; validation; and visualization. LFS: conceptualization, writing – original draft; and visualization. LSF: data analysis and interpretation; final manuscript approval; and writing – original draft. EAN: final manuscript approval; writing – review & editing; and validation. MCF: final manuscript approval and writing – review & editing. VBG: final manuscript approval and supervision.

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Clinical Trials

None.

Conflict of Interests

The authors have no conflict of interests to declare.

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