

SURVEY AND ANALYSIS OF THE DISTRIBUTION OF DROWNINGS ON BEACHES IN THE STATE OF SANTA CATARINA (2019 - 2023): THE IMPACTS OF MONITORING AND THE IMPORTANCE OF PREVENTION PERFORMED BY CBM- SC

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Abstract: This article presents an analysis of deaths due to drowning based on data from 2019 until July 2023 in the State of Santa Catarina. The study examined the total distribution of deaths, deaths in salt water, deaths on manned beaches, and the average age of victims involved in these events. Furthermore, the report sets out prevention measures to reduce the number of drownings and promote awareness of water safety by the Santa Catarina Military Fire Department.

INTRODUCTION

DROWNINGS AROUND THE WORLD AND IN BRAZIL

Drowning is a silent disaster that affects thousands of lives around the world every year. The alarming statistics show the urgency of awareness and prevention measures. It is estimated that millions of people around the world die from drowning each year, making it one of the leading causes of accidental death. This reality is no different on the coast of Brazil, a country known for its extensive beaches and strong maritime culture (MINISTRY OF HEALTH, 2022).

Drowning off the coast of Brazil is a constant concern. The country's vast coastline attracts millions of tourists and locals to the beaches, creating an environment conducive to water accidents. Located in the south of Brazil, the state of Santa Catarina has a stunning coastline that attracts countless visitors. But this idyllic setting has its dangers. Drownings still occur, often due to lack of knowledge about water safety measures (INBRAEP, 2019).

Among the regions of Santa Catarina, Florianópolis, the state capital, also faces challenges related to drowning. As a coastal city, it is a popular destination for tourists looking for idyllic beaches and water activities. Despite efforts to ensure the safety of bathers, drownings continue to occur, highlighting

the importance of awareness campaigns and lifeguards on beaches.

Based on this context, it is clear that cases of drowning are a comprehensive problem that requires immediate action. It is essential that governments, local communities and organizations work together to raise awareness of the risks associated with aquatic activities and promote the adoption of preventive measures. Safety on the beach must be a priority to protect lives and ensure that everyone can enjoy this type of leisure with awareness and responsibility.

MANAGEMENT AND PREVENTION FOR DROWNING

Effective management and prevention of the risk of drowning has been a topic of concern around the world, given the frequency of these incidents and their tragic consequences. The management problem lies in the complexity inherent in supervising public water areas and promoting safe behavior. Often, a lack of resources, adequate training and public awareness contribute to the persistence of drownings, making the urgent need for coordinated actions evident.

Given the frequency of these accidents and their tragic consequences, effectively managing and preventing the risk of drowning has become a global concern. Management challenges lie in the complexity of monitoring and promoting safe operation at public saltwater sites. In many cases, a lack of resources, adequate training and public awareness contribute to the continuation of drownings, highlighting the urgent need for coordinated action.

The need for effective control and prevention is undeniable. In addition to the lives lost, drowning has a significant emotional and financial impact on communities. Families are destroyed, medical resources are depleted and tourism may be affected locally.

Therefore, it is important to implement strong prevention strategies, as breaking this cycle will directly influence other crops in these locations.

Preventing drowning requires a comprehensive, multifaceted approach. Above all, it is important to invest in education and general awareness. Information campaigns can emphasize water-related risks, promote the correct use of life jackets, and emphasize the importance of supervising children in the aquatic environment. Furthermore, the presence of trained lifeguards on beaches, swimming pools and water parks is essential for a quick response to emergencies.

Currently, the use of technology can play a fundamental role in preventing drowning. Early warning systems, pool and beach safety equipment, and mobile apps for weather and ocean conditions can provide swimmers and beachgoers with real-time information to help them make safe decisions.

In short, managing and preventing drowning requires a collaborative and proactive approach involving government, community, non-governmental organizations and the public. Education, awareness, training and technology are fundamental pillars to reduce drownings and save lives.

THE ROLE OF MILITARY FIRE DEPARTMENTS ON BEACHES

Military firefighters play an important role in controlling and preventing drownings on Brazilian beaches due to their experience in water rescue and their ability to implement effective safety measures. Its actions range from public education to emergency response.

Administered directly by the Government of the State of Santa Catarina, the Santa Catarina Military Fire Department (CBMSC) is the public security body responsible for the safety and protection of bathers in the Santa Catarina region. In addition to monitoring

the beaches and acting directly on the safety of their users, it develops several social projects aimed at raising awareness and educating bathers on the state's coastal beaches.

METHODOLOGY

The methodology used in this report consisted of three stages for a comprehensive approach to the topic: bibliographic survey, data collection in the CBMSC internal system and integrated analysis of the information gathered.

A priori, a bibliographic survey was carried out, consisting of the reading and analysis of technical reports, articles and reports related to drowning incidents. This phase allowed a broad view of the topic, as well as the main trends, risk factors and precautions associated with this type of event.

The second stage of the methodological approach focused on searching for specific information in the internal system of the Fire Department of the State of Santa Catarina (CBMSC). The internal search focused on documents, records, activity reports and procedures related to the topic of drownings on the coast of Santa Catarina. At this stage, relevant data was identified in incidents attended by CBMSC, such as drowning location data, age of victims, weather conditions, activities involved and rescue measures adopted. Furthermore, the strategies and practices used by the corporation to raise awareness among the population about the seriousness of these events were identified.

Finally, an integrated analysis of the data obtained from the bibliographic survey and internal search in the CBMSC system was carried out. This cross-analysis resulted in the identification of the main aspects related to drowning, prevention and management of these occurrences attended by the corporation on the coast of Santa Catarina. The conclusions and recommendations presented in this

report come from this integrated analysis and aim to discuss prevention and awareness measures about water safety by the Military Fire Department of Santa Catarina.

RESULTS

CBMSC has a computerized system to manage its operational activities. Between January 2019 and July 2023, 824,866 incidents were recorded. Of these, 891 were drowning cases. It is important to highlight that a limitation was found in the present study. During this survey, it was not possible to access data on the distribution of lifeguards in that period, making it impossible to carry out a more detailed analysis of the relationship between deaths due to drowning and the number of staffs in each location. On the other hand, in cases of drowning, one of the parameters found in the records was within areas that have lifeguards, which could have true or false values, indicating the possibility of assistance by a lifeguard from the Fire Department.

DROWNING DATA

The 891 drowning incidents were distributed as follows:

| | |
|--------------------------------------|---------|
| Afogamentos com recuperação | 572 |
| Deaths due to drowning (total) | 319 |
| Deaths due to drowning in salt water | 128 |
| Deaths in a garrisoned area | 37 |
| Average age of victims | 33 anos |

Table 1: Distribution of drownings in Santa Catarina.

Source: CBMSC (2023).

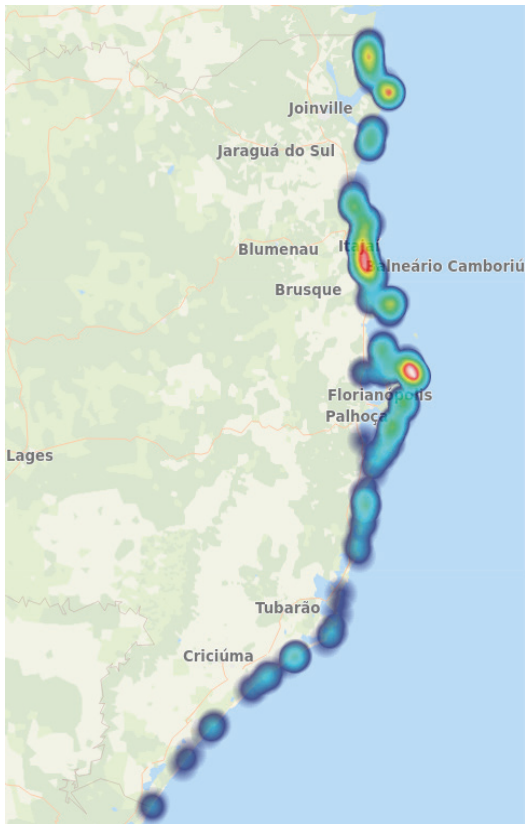


Figure 1 - Density Map. Deaths due to drowning between 2019 and 2023.

Source: Adapted from CBMSC (2023).

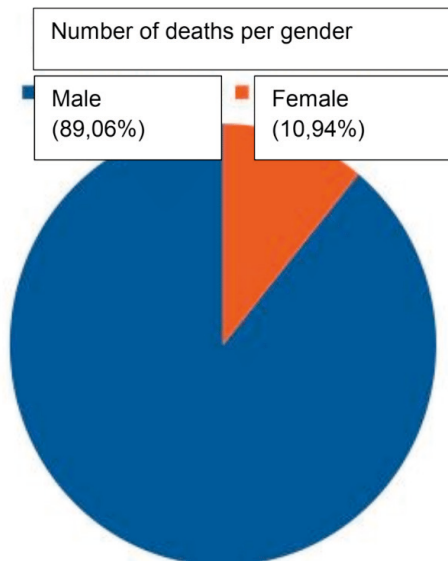


Figure 2 - Proportion of drownings by gender.

Source: Adapted from CBMSC (2023).

The deaths of 114 male and 14 female victims were recorded.

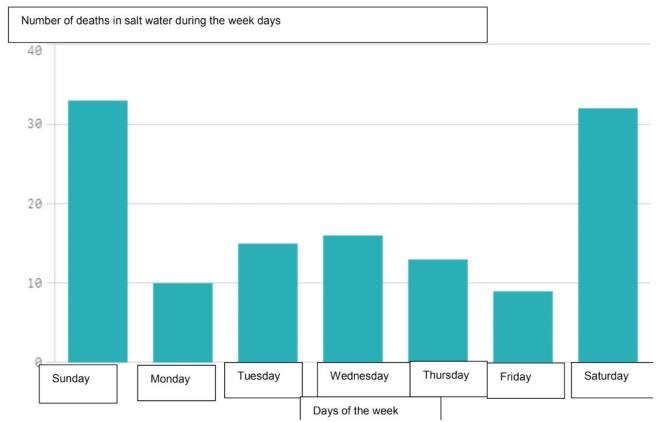


Figure 3 - Dispersion of drownings by day of the week.

Source: Adapted from CBMSC (2023).

When analyzing the data obtained in relation to deaths and days of the week, it is clear that up to 3 times more deaths occur during weekends compared to weekdays. The occurrence of more drowning deaths on weekends, especially on Saturdays and Sundays, can be attributed to a combination of factors. It must be taken into consideration, that on weekends most people have more free time and can dedicate themselves to various relaxation and leisure activities.

The main factors for the increase in deaths on Saturdays and Sundays are leisure activities on beaches and places with water activities, public crowds on beaches and bathing areas, excessive alcohol consumption on weekends, lack of knowledge of regions suitable for bathing on beaches by tourists and limited supervision of places due to crowds.

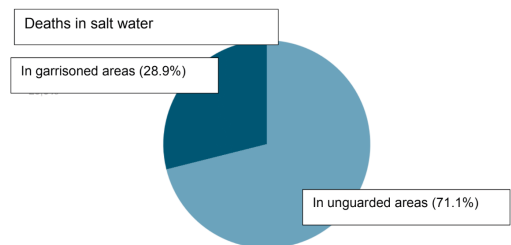


Figure 4 - Proportion of drownings in fresh or salt water.

Source: Adapted from CBMSC (2023).

The record of deaths in salt water presented refers to 91 deaths occurring in unmanned areas and 37 in garrisoned areas. When analyzing drowning statistics related to garrisoned areas and unmanned areas during the period from January 2019 to July 2023, we can conclude that drownings in unmanned areas (71.1%) are much more common than in garrisoned areas (28.9%). These data can be justified by the fact that people engage in risky behaviors leading to drowning, such as swimming in unsupervised areas, ignoring warnings about dangerous sea currents or underestimating the dangers associated with water. These behaviors are even more prevalent during weekends, as shown in Figure 3, when people are looking for fun and relaxation and often tend to isolate themselves in remote locations without supervision or monitoring.

data related to drownings on the coasts of Brazil and Santa Catarina, advises the preference for using beaches with lifeguard services, highlights the use of the CBMSC Cidadão application and recommends the population not to bathe at sea marked with a red flag. Furthermore, the Fire Department defines the term Return Current, responsible for more than 42% of drownings in salt water (VANZ & FERNANDES, 2014).

MANAGEMENT AND PREVENTION BY CBMSC

In order to reduce the number of drownings in the state of Santa Catarina, the Military Fire Department of the State of Santa Catarina develops several activities aimed at raising awareness and education regarding the dangers related to water activities.

INSTITUTIONAL WEBSITE

On the institution's website you can view a dedicated tab marked by Citizen. This tab contains guidance for the community on numerous topics, from how to enter a career as a military firefighter as well as social projects. Among these subjects is Prevention Tips, which has general recommendations with an emphasis on Beaches, Swimming Pools and Freshwater, with the main objective being to instruct and guide citizens regarding these aquatic environments that can lead to serious consequences if they are misused, targeted or unidentified.

In the Praia field, CBMSC seeks to bring

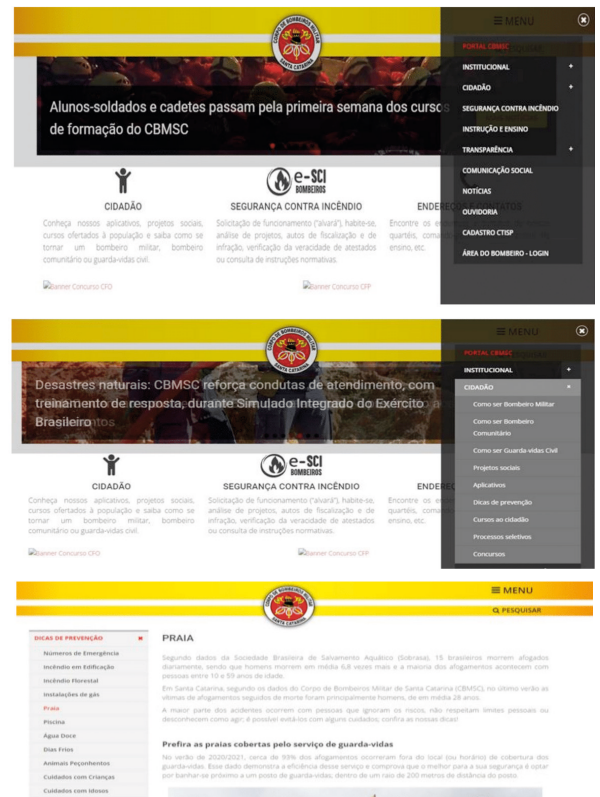


Figure 5, 6 and 7 - CBMSC Prevention Tips.

Source: CBMSC (2023).

PROJECTS

The CBMSC promotes projects entitled Junior Firefighter, Youth Firefighter, Best Age Firefighter, Dolphin Project and Accessible Beach Project. They all aim to educate all age groups in the community, however, each project has its own specificity regarding a basic subject, such as pre-hospital care, firefighting, among others. Projects related to the theme of this work will be explored below.

JUNIOR FIREFIGHTER PROJECT

The Junior Firefighter Project is aimed at elementary school students from public and private schools in Santa Catarina. Its main purpose is to enable children and young people to act preventively in situations involving risk of accidents, through the development of practices that complement the educational process. This initiative aims not only to promote a safer society, but also encourages active participation in citizenship.

The program, which totals 12 hours of activities, covers various topics, such as emergency services, accident prevention in childhood and adolescence, notions of specific first aid for young people, safety guidelines and preventive measures related to natural disasters and fires, among others. themes. In addition to theoretical and practical approaches, students have the opportunity to visit the Fire Station and complete the program through a graduation ceremony.

In this Project we can highlight the awareness and sensitization of students about the potential dangers associated with aquatic environments, teaching the basic actions to be taken in the event of drowning, as well as encouraging the adoption of safe and responsible practices in these scenarios.



Figure 8 - Junior Firefighter.

Source: CBMSC (2023).

PROJECT: ``LITTLE DOLHPIN``

The Dolphin Project began in 1998 and is a program aimed at raising awareness and preventing risks in aquatic environments, in addition to promoting citizenship and politicization regarding environmental care. The program is held free of charge every year during the summer and is aimed at children. Its central purpose is to educate participants in an interactive way, providing fun and learning moments.

When carried out in coastal areas, the project includes topics such as dangers associated with swimming in the sea, instructions about the sea, waves and tides, awareness of the signs used in swimming areas, responsibilities and work carried out by lifeguards, actions to be taken in accidents and water events, beach cleaning and environmental maintenance, among others.



Figure 9 - Project: ``Little dolphin``

Source: CBMSC (2023).

ACCESSIBLE BEACH PROJECT

Carrying out since 2013, the project aims to provide safety and accessibility for wheelchair users and people with disabilities on the beaches of the state of Santa Catarina. The project offers free chairs specially adapted for sand and sea for bathers with reduced mobility. The use of these chairs is monitored by Lifeguards on site, who monitor and

protect bathers.

The Military Fire Department of the State of Santa Catarina has around 80 amphibious chairs, available on around 60 beaches. The location of the beaches participating in the project are available on the “CBMSC Cidadão” application. In this application it is also possible to consult information about the location and availability of Lifeguard stations, general conditions of the beach and sea, presence of jellyfish, among others.



Figure 10 - Accessible Beach Project.

Source: CBMSC (2023).

APPLICATIONS

In 2018, CBMSC produced the Praia Segura application and according to CBMSC (2018):

“Developed in 2016, the application aims to present citizens with information for safety and accessibility on Santa Catarina beaches. It can display information on sea conditions, the flags of the day on each beach, as well as the incidence of jellyfish. Furthermore, it is possible to check which locations have amphibious chairs available, which are adapted chairs that can be used by people with special needs, for safe sea bathing. In 2018, the application took 1st place in the Good Practices in Public Management award, organized by the Department of Public Administration of the Center for Administration and Socioeconomic Sciences (Esag), at Universidade Estadual

de Santa Catarina” (UDESC). Like other applications developed at CBMSC, Praia Segura was created using free software, allowing other corporations to benefit from using open source.”

At the moment, the application is deactivated and another application, CBMSC Cidadão no Google Play (2023), more complete, is active and has this functionality called Beaches, as can be seen in the image below:

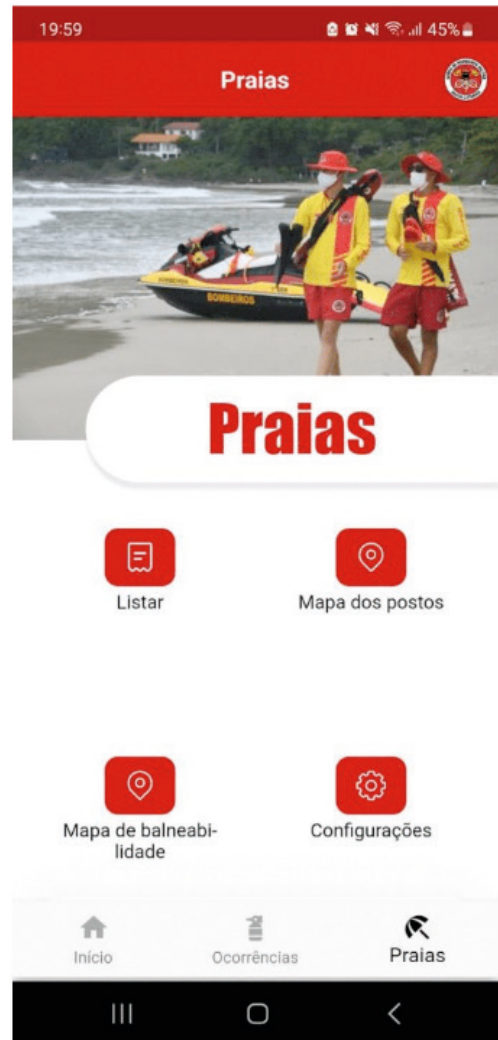


Figure 11 - Application home page when the Beaches option is selected.

Source: GOOGLE PLAY (2023).

Using the app, you can list the beaches that have lifeguards and their respective flags, as shown in the figure below.



Figure 12 - Page that appears when you select List.

Source: GOOGLE PLAY (2023).

Another function of the application is to show a map of lifeguard stations, as shown in the figure below.



Figure 13 - Page that appears when selecting Station Map.

Source: GOOGLE PLAY (2023).

It is also possible, using the Bathing Map option, to find out whether the beach is suitable or unsuitable for swimming, as shown in the Figure below.

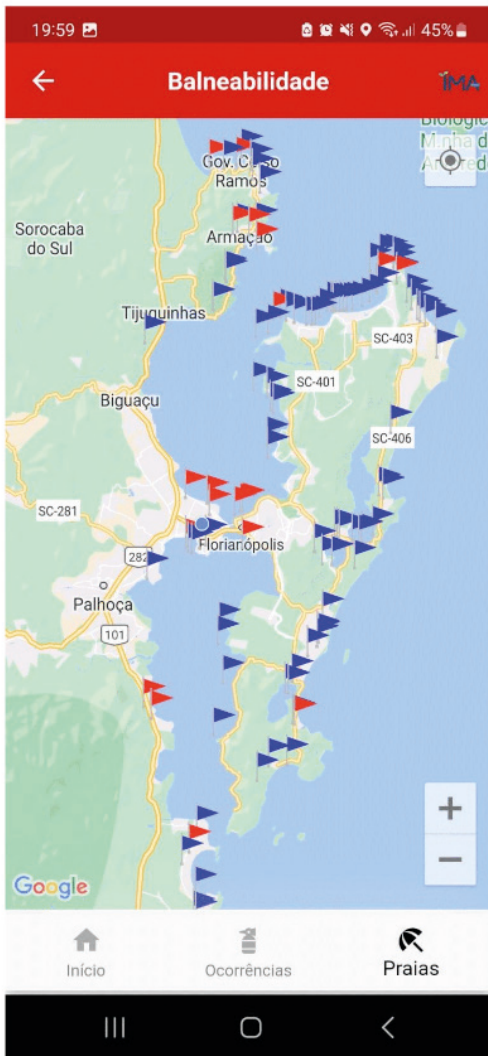


Figure 14 - Page that appears when selecting Bathing Map.

Source: GOOGLE PLAY (2023).

COURSES FOR THE COMMUNITY

Community Firefighter Course

The community firefighter course is a course offered to citizens over 18 years of age and aims to enable them to act voluntarily in the prevention of fire and various accidents, as well as pre-hospital care for victims in the most diverse scenarios. including in drowning situations. The latter highlights once again CBMSC's concern in ratifying the need for a more capable and educated community regarding aquatic environments.

Civil Life Guard Course

Among the projects and courses offered to citizens, the most demanding is the Civil Life Guard course, since these professionals, once qualified, have great responsibility, due to their role, which is to protect and prevent drownings of the local population and tourists. on the coasts of the entire state.

To enter this course, you must be over 18 years old, demonstrate physical ability through aquatic tests and, in addition, undergo a toxicological exam. Additionally, it is necessary to take the recertification course every year, to make the lifeguard skilled for future years.

The life guard activity has been imperative since 2006, when the civil life guard activity was regulated by State Law Number: 13,880. The regulation of this activity through legislation guarantees safety, quality and responsibility in the provision of the service and, consequently, increasingly improves assistance in the prevention and management of drownings on the coasts of Santa Catarina.



Figure 15 - Civil Lifeguard.

Source: CBMSC (2023).

CONCLUSION

The analysis of drownings that occurred in salt water in the state of Santa Catarina, in the period between 2019 and 2023, reveals the complexity and importance of approaching water safety in a holistic way. During this period, a significant number of drowning incidents were recorded, pointing to the need

for effective prevention strategies and targeted interventions.

It was evident that certain factors may contribute to the occurrence of these drownings, including the victim's gender, day of the week, whether or not the location is monitored by lifeguards, in addition to a possible lack of resources for adequate surveillance and rescue in other areas not monitored.

The Santa Catarina Military Fire Department, aware that awareness emerges as a crucial tool in preventing drownings, invests in educational campaigns that address the risks associated with water activities, that promote the adoption of safe behaviors and in the development of software that elucidates such awareness in those who frequent the beaches of Santa Catarina. Furthermore,

improving safety infrastructure, such as the presence of trained lifeguards at strategic locations, can play a significant role in reducing these incidents. It must also be noted that implementing a more comprehensive data collection system and carrying out ongoing studies can provide valuable information to guide more effective and evidence-based prevention policies.

Finally, this report highlights the continued need to invest in preventative measures, public education and safety infrastructure to minimize the number of saltwater drownings in Santa Catarina. In doing so, we can envision a safer and more protected aquatic environment, where residents and visitors can enjoy beaches with peace of mind and awareness of potential dangers.

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