



Death at Sea: Passenger and Crew Mortality on Cruise Ships



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Abstract

Introduction: This study reports the global occurrence of passenger and crew mortality on cruise ships. To date, no comprehensive study of passenger and crew mortality has been published.

Methods: All data on passenger and crew mortality between 2000 and 2019 were obtained from 78 ocean and river cruise lines registered globally and analyzed by their age, gender, nationality, cruise line, and recorded cause of death.

Results: There were 623 reported deaths. Out of all deaths, 89% were passenger deaths and 11% were crew deaths. United States residents accounted for 61% of passenger deaths and crew from India (18%) and the Philippines (17%) recorded the highest crew deaths. Falls overboard or onto lower decks (23%), suicide, murder, and a terror attack (19%), unspecified natural causes (18%), and cardiac incidents (16%) were the primary causes of passenger deaths. Suicide and murder (29%) and falls overboard or from height (24%) were the primary cause of crew member deaths. The most passenger deaths occurred on Carnival Cruise Lines (29%), Royal Caribbean Cruises (12%), and Norwegian Cruise Line (10%). The highest crew member deaths occurred on Carnival Cruise Line (19%) and Royal Caribbean Cruises (19%).

Conclusion: Falls overboard or onto lower decks, cardiac incidents, and suicides are the leading cause of passenger deaths. Suicide and murder and falls are the leading cause of death for crew members. Travel health advisories targeting US citizen passengers and crew members from India and the Philippines are warranted. The addition of mental health care to ship infirmaries is also suggested.

Keywords: Travel, Cruise Ships, Mortality, Falls, Myocardial Infarction, Suicide

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Introduction

Travelling by sea is one of the earliest known forms of transportation.^{1,2} From ancient times to the present, people have traveled by sea for reasons such as trade, conquest, and leisure.^{2,3} Over the past few decades, travel by sea for the purpose of cruise tourism has become exceptionally popular.⁴ For example, from 2009-2018 the annual number of individuals boarding cruise ships increased from 17.8 million to 28.2 million passengers.⁵ Since then, the cruise ship industry has been recognized as the fastest-growing segment of the global travel and tourism industry.^{6,7}

Given the increasing popularity of cruise tourism and the expansion of the industry into new markets, cruise industry researchers have raised concerns about passenger and crew safety.⁸ For instance, as the industry continues to expand it is likely more passengers and crew will be exposed to

life-threatening injury and illness.^{9,10} The existing research literature has done well to identify traveler's diarrhea and respiratory infections as frequent illnesses incurred on cruise ships and cardiovascular incidents as a frequent issue leading to the death of elderly passengers.^{9,11-16} Additional studies have raised concern about the occurrence of varicella and hepatitis E outbreaks on cruise ships.^{17,18} However, while these studies have provided valuable data to the Vessel Sanitation Program and the ILI (Influenza-like illness) surveillance mechanism operated by the US Centers for Disease Control and Prevention, they are still limited in number and scope.¹² For example, only a few known studies have investigated the mortality of cruise ship passengers and none have investigated the global occurrence of passenger and crew mortality on cruise ships.^{8,16,19,20}

Deaths on cruise ships often receive considerable media

attention. In turn, this attention threatens to have a negative economic impact on the cruise industry and the travel destinations dependent on the industry. Knowing the distribution and factors contributing to deaths on cruise ships can be helpful in the management of ship infirmaries and planning for medical emergencies. It is also key to developing preventive initiatives. In order to address the limited knowledge about cruise ship mortality, this study aims to examine the global incidence and patterns of passenger and crew mortality.

Methods

A retrospective analysis was conducted using data collected by the International Cruise Ship Wave Network. This network is a global research initiative that collects all fatal incident reports of passenger and crew deaths from 51 registered ocean cruise lines and all 27 registered river cruise lines. For the purpose of this study, only data from leisure-based cruises were utilized. Cruise ships were defined as large passenger ships used for ocean or river voyages in which the voyage itself, the onboard amenities, and the different ports of call form the passenger experience. Data from smaller utility-based ferries with the primary purpose of transporting passengers, cargo, and vehicles from one destination to another were excluded from this study.

All fatal incident reports involving passenger and crew deaths from January 1, 2000 to December 31, 2019 were reviewed and coded in an IBM SPSS statistical spreadsheet (v. 22.0). Each incident was first classified as an onshore or on-the-boat incident. The date of the incident, the gender, age, the nationality of each victim, and the name of the reporting cruise ship were coded and entered into the database. The primary cause of death and any contributing factor or comorbidity as determined by a medical examiner, coroner, or equivalent authority were entered for each fatal incident. Cross-tabulations and descriptive statistics were performed to summarize the data. No living subject ethical approval was required for the completion of this study.

Results

Between January 1, 2000 and December 31, 2019 there were 623 reported deaths on cruise ships globally. Five hundred and fifty-seven (89%) of these deaths were classified as passenger deaths and 66 (11%) deaths involved crew members. The number of passenger deaths ranged from a low of three in 2001 to a high of 75 deaths in 2015 and the number of crew deaths ranged from zero reported in 2000-2003 to 10 reported deaths in 2019 (Table 1).

The number of deaths reported by nationality is displayed in Table 2. Out of the 623 total deaths, the majority were from the United States (61%) followed by the United Kingdom (7%), Canada (4%), Australia (3%), and Italy (3%). When broken down by passenger and crew deaths, passengers from the United States (66%) again had the highest number of deaths followed by the United Kingdom (7%), Canada (4%), Australia (3%), and Italy (2%). In contrast, crew members from India (18%) and the Philippines (17%) recorded the highest number of crew deaths. The highest

Table 1. Total Reported Deaths on Cruise Ships, 2001-2019

Year	Passenger	Crew
2019	27	10
2018	38	5
2017	46	6
2016	44	4
2015	75	5
2014	20	6
2013	20	5
2012	27	1
2011	51	6
2010	39	4
2009	37	3
2008	25	1
2007	33	2
2006	33	3
2005	16	4
2004	10	1
2003	4	0
2002	4	0
2001	3	0
2000	5	0
Total	557	66

number of passenger deaths (Table 3) were reported from Carnival Cruise Line (29%), Royal Caribbean Cruises (12%), Norwegian Cruise Line (10%), Holland American Line (8%), and Princess Cruises (8%). Carnival Cruise Line and Royal Caribbean Cruises both accounted for 19% of the total crew deaths followed by Norwegian Cruise Line at 14%.

The gender of deceased passengers and crew members was disclosed in 92% of the fatality reports. Males accounted for 58% of the passenger deaths and 76% of crew deaths. The age of the deceased was reported for 564 (93%) of the total passenger and crew deaths (Table 4). The age groups reporting the highest number of passenger deaths were passengers aged 70-79 (18%), 60-69 (17%), and 50-59 (15%). The age groups reporting the highest number of crew deaths were crew members aged 20-29 (50%) and 30-39 (22%).

Out of the total passenger deaths, 87% occurred on board the cruise ship and 13% occurred while the passengers were in the port and participating in onshore excursions. Injury trauma such as falls into the sea or to lower decks accounted for 23% of passenger deaths, 19% were the result of suicide, murder, and a terror attack in Tunisia, 18% died from unspecified natural causes, 16% died from cardiac-related incidents, and 5% died from pre-existing conditions such as late-stage cancer (Table 5). In contrast, suicide and murder accounted for 29% of crew deaths while falls overboard and falls from height accounted for an additional 24%. Alcohol was identified as a contributing factor in 52% of the passenger falls but was not identified as a factor in crew falls.

Discussion

Despite the image of safe all-inclusive vacations projected by the international cruise industry, incidents resulting in the

Table 2. Reported Passenger Deaths by Nationality, 2001-2019

Cruise Line	Passenger	Crew	Total
Australia	18	0	18
Bahamas	1	0	1
Belarus	1	0	1
Belgium	1	0	1
Bosnia	0	1	1
Brazil	3	3	6
Bulgaria	0	1	1
Canada	23	0	23
Chile	0	1	1
China	3	0	3
Croatia	0	1	1
Denmark	1	0	1
Finland	2	0	2
France	9	0	9
Germany	12	1	13
India	3	12	15
Indonesia	0	4	4
Ireland	3	1	4
Israel	2	0	2
Italy	13	3	16
Japan	3	0	3
Macedonia	0	1	1
Malaysia	1	0	1
Mauritius	0	2	2
Mexico	6	2	8
Peru	0	1	1
Philippines	0	11	11
Poland	2	0	2
Portugal	1	0	1
Romania	0	1	1
Russia	6	0	6
Serbia	0	2	2
Singapore	1	0	1
Spain	6	0	6
Sweden	2	0	2
South Africa	3	1	4
Taiwan	1	0	1
Ukraine	0	1	1
United Kingdom	37	5	42
United States	370	8	378
West Indies	1	0	1
Unreported	22	3	25
Total	557	66	623

death of passengers and crew do occur. The present study is the first to report the global occurrence of passenger and crew deaths on cruise ships and was successful in identifying 623 deaths between 2000 and 2019. It should be emphasized the intent of this study is not to find fault or suggest unsafe conditions exist aboard cruise ships. However, it is difficult to ignore the high number of passenger deaths on Carnival Cruise Line, Royal Caribbean Cruises, Norwegian Cruise Line, Holland America Line, and Princess Cruises. Out of a total of 78 registered cruise lines internationally, these five lines account for almost 70% of all passenger deaths. Given that Carnival Cruise Line, Royal Caribbean Cruises, and Norwegian Cruises alone control 77% of the global cruise market, the higher number of deaths reported on these cruise

Table 3. Reported Passenger and Crew Deaths by Cruise Line, 2001-2019

Cruise Line	Passenger Deaths	Crew Deaths
Alaskan Dream Cruises	0	1
Carnival Cruise Line	159	13
Celebrity Cruises	33	4
Costa Cruises	4	3
Cunard Line	9	2
Disney Cruise Line	11	1
Dream Cruises	1	0
Fred. Olsen Cruises	6	0
Holland America Line	45	5
Magic 1 Cruises	1	0
MS Serenissima	0	1
MSC Cruises	35	5
National Geographic	2	0
Norwegian Cruise Line	55	9
P&O Cruises	14	2
Prime Time Travel	3	0
Princess Cruises	42	4
Regent Seven Seas Cruises	4	1
Royal Caribbean Cruises	66	13
Scandinavian World Cruises	1	0
Seabourn Cruises	11	0
Silja Line Cruises	1	0
Silversea Cruises	3	0
Spirit of America Cruises	1	0
Star Cruises	6	0
Tallink & Silja Line	2	0
TUI Cruises	1	1
Viking Cruises	2	0
Unreported	39	1
Total	557	66

Table 4. Age Group Distribution Reported for Passenger and Crew Deaths, 2001-2019

Age Group	Passenger	Crew
90-99	6	0
80-89	49	0
70-79	100	1
60-69	94	8
50-59	83	2
40-49	58	7
30-39	50	14
20-29	56	32
10-19	12	0
0-9	10	0
Unreported	39	2
Total	557	64

lines is likely proportional to the number of passengers they carry.

The predominance of United States citizens accounting for 61% of all passenger deaths is not surprising given that passengers from North America consistently make up for over 50% of cruise passengers each year.⁵ Almost all passenger deaths involving US citizens were reported from cruise destinations in the Caribbean, Bahamas, and Bermuda; destinations easily accessible to passengers basing from the United States. Likewise, the prevalence of passengers aged 50-

Table 5. Cause of death Reported for Passenger and Crew, 2001–2019

Cause of Death	Passenger Deaths	Crew Deaths
Anaphylaxis	1	0
Aneurysm	1	1
Asphyxia/choking/smoke inhalation	11	0
Cardiac incident	89	8
Drowning (ship pool)	9	0
Falls		
Fall from height	21	2
Fall overboard	58	14
Fall from bed (rough seas)	5	0
Slip/Fall	2	1
Internal bleeding	1	0
Legionnaires disease	3	0
Meningococcal meningitis	1	0
Multiple organ failure	1	0
Murder		
Head trauma	2	2
Multiple trauma	3	0
Stabbing	1	0
Strangulation	1	0
Thrown overboard	7	4
Myocarditis (viral)	2	0
Natural causes (unspecified)	98	5
Norovirus	8	0
Pneumonia	10	1
Pre-existing condition		
Cancer	10	0
Cirrhosis	1	0
COPD	1	0
GI hemorrhage	1	0
Kidney failure	2	0
Parkinsons disease	1	0
Unspecified	10	1
Pulmonary embolism	1	0
Respiratory complication (TB)	2	1
Septicemia	3	1
Stroke	8	1
Suicide		
Hanging	2	8
Drug overdose	5	0
Jump overboard	55	5
Jump to lower deck	8	0
Toxic gas exposure	0	3
Trauma		
Head trauma	2	0
Crush injury	2	2
Onshore / Excursion Deaths		
All-Terrain vehicle crash	2	0
Bus crash	15	0
Bicycle crash	1	0
Car crash	4	1
Cardiac (hiking)	1	0
Drowning		
Swimming in sea	12	0
Overturned boat	1	0
Dune buggy crash	2	0
Float plane crash	13	2
Motor scooter crash	2	2
Terror attack	21	0
Unreported cause	33	1
Total	557	66

79 accounting for 40% of passenger deaths is not surprising given the known demographics of cruise passengers. Prior research investigating illnesses and injuries among cruise passengers has consistently identified passengers in the 50–79 age demographic as having the highest number of medical incidents.^{11,13}

The present study was successful in identifying key trends supported by existing research. For instance, the high number of cardiac incidents supports prior studies that identify cardiovascular emergencies as some of the most common critical incidents leading to death on cruise ships.^{3,14} Additionally, existing research investigating passenger injuries reports that almost one-third of the injuries occur while the passengers are onshore.⁸ Bus crashes, swimming at beaches, and nature-based excursions were identified as common onshore activities leading to passenger injuries. While only 13% of all passenger deaths in the present study occurred while the passengers were onshore, bus crashes, float plane crashes, and swimming were the most common activities leading to death. The lone terror attack killing 21 passengers during an onshore excursion has not been discussed in existing research but does highlight a growing concern that cruise ships and their passengers are vulnerable targets.^{21,22}

Two additional areas of concern identified in this study are the high number of deaths related to falls overboard or onto lower decks and the high number of deaths related to suicide and murder. Slips, trips, and falls are known to be common injury events on cruise ships.⁸ The fact that 15% of passenger deaths and 26% of crew member deaths in the present study resulted from falls indicates that falls are also common events leading to death on cruise ships. Moreover, while there were a few cases of elderly passengers falling from bed during rough seas, the majority of the cases for both passengers and crew involved falls overboard and falls to lower decks. Alcohol consumption and passengers climbing up on and sitting on deck railings were common factors contributing to falls. Most modern cruise vessels have man overboard camera systems in place that can capture any fall. However, they are not alarm systems alerting the boat that someone has fallen overboard. Thus, in the absence of a witness to the fall, an individual can be left behind in the water for hours or days until their absence is reported and the camera tapes are reviewed.

Cruise ships are often described as the perfect location for murder given the perceived ease of dumping victims overboard and the lack of any clear law enforcement jurisdiction in international waters. However, cruise ships are not commonly thought of as a gateway for those intending to commit suicide. Suicide is a complex issue and high numbers of suicides among tourist populations and seafarers working on merchant ships have been previously documented.^{23–25} The fact that 13% percent of passenger deaths and 20% of crew member deaths in this study can be attributed to suicides identifies a new area of concern for the cruise industry. Jumps overboard were the suicide method of choice in 79% of passenger suicides and 38% of crew suicides. Moreover, out of the 70 passenger suicides identified in this study, 14% were the result of domestic conflict, 14% were attributed to alcohol and drug addiction, and 13% were attributed to pre-existing

health conditions with a terminal diagnosis. This latter finding suggests that some passengers go on cruises with the intent to commit suicide. In contrast, all crew suicides involved employees from less developed countries and were attributed to long-term separation from family and social networks, poor working conditions, and economic stress.

Conclusion

The purpose of this study was to report on the global distribution and occurrence of deaths on cruise ships. As evidenced by this study, a variety of deaths occur while cruising that impacts both passengers and crew members. With the popularity and growth of the cruise ship industry expected to continue globally, emphasizing saving lives beyond the required lifeboats, life rafts, and life preservers should be expected. This includes continued and improving monitoring for any falls and jumps overboard or to lower decks. The upgrading of medical facilities and medical care on cruise ships is always welcome but given the high number of suicides amongst passengers and crew, the addition of mental health care is warranted. Likewise, given the predominance of the United States citizens in the overall death totals, any travel health advisory and awareness campaign measures intended to help passengers have the safest cruise experience possible should specifically target United States citizens intending to cruise. The same can be done for potential crew members from India and the Philippines. As with any retrospective study, the present study was restricted by the limitations of that study design and a concern for underreporting. However, this should not overlook the uniqueness of the data and documented deaths of the 623 passengers and crew.

Authors' Contributions

Both authors were responsible for the study conception, data collection, and data interpretation. TWH was responsible for the preparation of the manuscript. Both authors read and approved the final version of the manuscript.

Conflict of Interest Disclosures

The authors have declared no conflict of interest.

Ethical Approval

This study did not require ethics committee approval.

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Research Highlights

What Is Already Known?

Existing research on cruise ships has primarily focused on illness, infectious disease, and disease outbreaks.

What This Study Adds?

This study identifies falls overboard or to lower decks, suicides, and cardiac incidents as the leading causes of passenger deaths on cruise ships. Suicides, murder, and falls overboard or to lower decks are the leading cause of death for crew members. United States citizens account for the majority of cruise passenger deaths while crew members from India and the Philippines account for the highest number of crew deaths.

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