**Ferry Fatalities: Statistics and Causation of Major Accidents 2000-2014**

**September 2014**

**For the Worldwide Ferry Safety Association**

***An analysis of the proximate causes of ferry fatalities based on an intensive, data-driven study of the circumstances of ferry accidents between 2000 and early 2012. This study will pave the way for further analysis of ferry accident severity based on seasonal weather patterns, human error, waterway characteristics, etcetera.***

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**Introduction**

Although ferries generally offer a safe and discretionary form of transportation in North America and Europe, this is far from the case in the developing world. Many countries in Southeast Asia, the Pacific, and elsewhere rely on ferries as the primary mode of transportation for people and goods, and accidents are frequent. This high rate of accidents and fatalities is linked to a complex of causes, included substandard vessels, overcrowding, and a lack of training for emergency scenarios. Such failures are highlighted by the recent sinking of the Sewol ferry off South Korea, in which the captain and crew abandoned ship while hundreds of students were still aboard.[[1]](#endnote-1)

Efforts to improve ferry safety in the developing world are handicapped by incomplete recordkeeping in many poorer countries and sparse or non-existent media coverage of accidents there by major news outlets. Reports of ferry accidents often don’t include the name of the vessel involved, the company that owned the vessel, and the root cause of the accident. Often, even the number of passengers on the ferry is unknown, because overcrowding is massive, rampant, and unrecorded.[[2]](#endnote-2)

 Any serious attempt to decrease the number and fatality count of ferry accidents in the developing world—as Interferry and the Worldwide Ferry Association have pledged to do—must have a complete record of past incidents to draw on. This project works to fill in the gaps of an existing dataset of ferry accidents compiled by the Worldwide Ferry Association, spanning 160 accidents in the 14-year period between 2000 and 2014. Each accident entry includes, where available, these elements:

* The number of fatalities, both confirmed and listed as missing, compared to the total passenger load.
* Date, location, and time of day of each accident.
* Proximate cause of the accident, if known, as well as any exacerbating factors.
* Names of the vessel(s) involved and as much information about vessel age, capacity, and state of repair as can be discovered.
* Weather conditions at the time of the accident.
* Any reports of poor judgment or poor training by the captain and crew.
* Timing and effectiveness of search and rescue efforts, if any.

**Methods and Sources**

Information in the dataset is drawn from news sources around the world, both local and international; particularly well-represented sources include the BBC and the English-language version of China’s Xinhua News Agency. In many entries, one or more of the desired metrics is missing, reflecting incomplete media reporting of ferry accidents, complex and multilayered accident causes, and a lack of reliable accident investigation. However, the lack of records about these factors can itself be considered an important data point in the understanding of ferry accidents, since it indicates poor record keeping and accident investigation in those countries. Therefore, the existence of a number of incomplete accident records at the end of this project should not be taken as a sign of the project’s failure, but as another form of information about ferry safety in that country.

**Results**

 This report records details about 160 ferry accidents over the 14-year period covered here (Table 1, separate file). In total, a conservative estimate of 16,880 lives was lost in these accidents, an average of 106 deaths per incident. Both confirmed deaths and those listed as missing were included in the estimate. The accidents included here occurred in 39 different countries around the world, with Bangladesh possessing the highest number of incidents (40 cases) followed by Indonesia (27 cases) and the Philippines (19 cases).

**Human Error Analysis**

 Conventional wisdom holds that about 80 percent of vessel accidents are caused by some form of human error, but this number has not been put to the test of a rigorous quantitative analysis, especially for ferry accidents (rather than cargo vessels, tankers, and so on).[[3]](#endnote-3) The twelve-year dataset compiled in this paper provides the opportunity to run an analysis of the role of human error across more than 150 ferry accidents around the world. Two analyses have been run on all accidents in the dataset, one defined by conservative and one by liberal parameters for what constitutes human error. For each analysis, the percentage of all accidents attributable to human error and the percentage of all fatalities attributable to human error were determined.

 1. *Conservative parameters.* Human error includes only those errors that led directly to the incident in question. Vessel disrepair and misjudgments about the safety of sailing during bad weather would not qualify. Human error that led to increased fatalities, but not the incident itself, would not count (i.e. failure to provide passengers with life vests). Overloading of passengers, unbalanced rolling cargo, and collisions with other vessels (even if news reports do not assign blame for these failures) are classic examples of human error under conservative conditions.

 2. *Liberal parameters.* Criteria are as broad as possible. Factors like misjudgment of the weather and vessel disrepair qualify as human error under this analysis. Human error leading to increased fatalities (as defined above) qualifies. Overloading that is not borne out by hard numbers on the number of passengers vs. vessel capacity will count under this analysis but not the conservative one.

 In both cases, I have disregarded incidents caused by malicious damage, most notably the 2004 SuperFerry bombing by an Islamist terrorist group in the Philippines. Cases for which the cause of the accident is unknown have not been included in either analysis.

 The results of this analysis are given below (Table 2). Under conservative parameters, 54% of all total accidents were caused by human errors, and under liberal parameters, 77% of all total accidents were caused by human error. However, when cases possessing incomplete data were removed from the analysis, the higher measure of 60% of cases being caused by human error was obtained by the conservative measure, and 86% by the liberal measure. Under the conservative analysis, 68% of all ferry accident fatalities were caused by human error. Under the liberal analysis, 88% of all fatalities were caused by human error.

Table 2. Summary of the results of an analysis of 147 ferry accidents worldwide to determine what proportion of accidents are caused by human error (HE). ‘Total cases’ refers to all cases included in the dataset, including those in which no cause could be assigned. ‘Total known’ refers to only those cases in which a cause (human error/no human error) was assigned.

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| --- | --- | --- |
|  | **Conservative** | **Liberal** |
| **Number of Accidents** |
|  | *%HE by total known:* | 60.14 | 86.01 |
|  | *%HE by total cases:* | 53.75 | 76.88 |
|  | *% unknown:* | 11.88 | 11.88 |
| **Fatalities (dead and missing)** |
|  | *# fatalities caused by HE:* | 11,552 | 14,856 |
|  | *% fatalities caused by HE by total cases:*  | 68.44 | 88.01 |

**Directions for Further Research**

The data collected here offers a wealth of opportunities to further determine what major factors that contribute to ferry accidents around the world. Potentially fruitful avenues of study include:

* *Seasonal cycles.* Seasonal weather conditions such as monsoon season or tropical storm season may contribute to seasonally higher rates of accidents in regions like Southeast Asia. Based on the data collected here, researchers may be able to pinpoint where such seasonal cycles in ferry accidents might occur, with an eye to encouraging more stringent safety precautions during dangerous seasonal periods.
* *Visibility.* Many news sources about ferry accidents include information about the time of day at which the incident occurred. It is likely that low-visibility periods such as nighttime, dawn/dusk, and fog are correlated with higher rates of accidents, especially collisions. If this expectation is borne out by the majority of cases included here, ferry safety researchers will be able to push for greater nighttime safety precautions with a strong data-driven backing.
* *Common accident causes.* In most cases, accidents are caused by interactions between several different unsafe conditions (poor vessel repair, overcrowding, and bad weather, for instance), none of which would be fatal on their own. If researchers can determine which factors are most likely to occur together, they can target those factors together.
* *Dangerous waterways.* Several individual waterways, like Meghna River in Bangladesh and Lake Tanganyika in eastern Africa, are unusually highly represented in this dataset. These two examples, along with other high-risk areas, could be designated “hot spots” of vessel loss, with the recommendation that time and resources for improving ferry safety be directed there.
1. Harlan, Chico. (2014) “South Korean president says ferry captain’s actions ‘tantamount to murder.’” *Washington Post.* April 21, 2014. <http://www.washingtonpost.com/world/asia_pacific/south-korean-president-says-ferry-captains-actions-tantamount-to-murder/2014/04/21/5936bd36-c93c-11e3-a75e-463587891b57_story.html> [↑](#endnote-ref-1)
2. Lawson and Weisbrod (2005) [↑](#endnote-ref-2)
3. Rothblum, Anita M. “Human Error and Marine Safety.” U.S. Coast Guard Research and Development Center. <http://www.bowles-langley.com/wp-content/files\_mf/humanerrorandmarinesafety26.pdf> [↑](#endnote-ref-3)