Fatal ocean drownings, 2009-2018

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Methodology

• Primary data source: death certificate database
  – Includes:
    • Unintentional deaths with drowning as underlying cause of death (UCD)
    • Deaths (unintentional or related to diseases) with drowning as contributing cause of death (CCD)
  – Excludes:
    • Deaths with drowning as underlying cause of death, but either intentional (usually suicide, but also homicide) or possibly intentional (undetermined intent)

• UCD drownings are 92% of the total
  – Proportion varies by year (lowest (82%) in 2016)
  – Proportion varies by county (lowest (87%) for Maui)
Leading causes of fatal injuries in Hawaii, by residence of victims, 2009-2018

**Hawaii residents**
- Suicide: 24.8%
- Falls: 17.8%
- Poisoning: 17.8%
- Motor vehicle: 15.2%
- Ocean drowning, UCD: 4.0%
- Assault: 3.8%
- Suffocation: 3.7%
- Other drowning: 1.3%

**Non-residents (visitors)**
- Ocean drowning, UCD: 45.7%
- Motor vehicle: 10.4%
- Suicide: 10.2%
- Falls: 7.8%
- Other drowning: 6.1%
- Poisoning: 5.6%
- Suffocation: 2.4%
- Other transport: 2.4%
Ocean drownings in Hawaii, 2009-2018

- Average of 71 per year (range from 53 to 85)
  - Generally increasing trend, particularly for non-residents

- Slightly more non-residents (55%) than Hawaii residents (45%)
  - Varies by county: lower for Hawaii (43%) and Oahu (44%), higher for counties of Kauai (75%) and Maui (73%)
Number and ten-year rate of ocean drownings in Hawaii, by residence of victim, 2009-2018

**Number**

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>International</td>
<td>112</td>
</tr>
<tr>
<td>US mainland</td>
<td>280</td>
</tr>
<tr>
<td>Visitors, total</td>
<td>392</td>
</tr>
<tr>
<td>HI residents</td>
<td>320</td>
</tr>
</tbody>
</table>

**Rate (/100,000)**

<table>
<thead>
<tr>
<th>Category</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>International</td>
<td>211.2</td>
</tr>
<tr>
<td>US mainland</td>
<td>185.5</td>
</tr>
<tr>
<td>Visitors, total</td>
<td>192.2</td>
</tr>
<tr>
<td>HI residents</td>
<td>22.8</td>
</tr>
</tbody>
</table>
### State or country of residence for victims of fatal ocean drownings in Hawaii, 2009-2018

<table>
<thead>
<tr>
<th>State/Country</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>California</td>
<td>87</td>
<td>22%</td>
</tr>
<tr>
<td>Japan</td>
<td>46</td>
<td>12%</td>
</tr>
<tr>
<td>Washington</td>
<td>42</td>
<td>11%</td>
</tr>
<tr>
<td>Canada</td>
<td>27</td>
<td>7%</td>
</tr>
<tr>
<td>Texas</td>
<td>18</td>
<td>5%</td>
</tr>
<tr>
<td>Oregon</td>
<td>18</td>
<td>5%</td>
</tr>
<tr>
<td>South Korea</td>
<td>15</td>
<td>4%</td>
</tr>
<tr>
<td>Colorado</td>
<td>15</td>
<td>4%</td>
</tr>
<tr>
<td>China</td>
<td>9</td>
<td>2%</td>
</tr>
<tr>
<td>oth Asia/Pacific</td>
<td>8</td>
<td>2%</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>7</td>
<td>2%</td>
</tr>
<tr>
<td>other country</td>
<td>7</td>
<td>2%</td>
</tr>
<tr>
<td>New York</td>
<td>7</td>
<td>2%</td>
</tr>
<tr>
<td>Minnesota</td>
<td>7</td>
<td>2%</td>
</tr>
<tr>
<td>New Jersey</td>
<td>5</td>
<td>1%</td>
</tr>
<tr>
<td>Michigan</td>
<td>5</td>
<td>1%</td>
</tr>
<tr>
<td>Alaska</td>
<td>5</td>
<td>1%</td>
</tr>
<tr>
<td>oth 30 States</td>
<td>64</td>
<td>16%</td>
</tr>
</tbody>
</table>
Ocean drownings in Hawaii, by activity of victim, 2009-2018

- boating/kayaking: 21
- fell in/swept in: 36
- fishing from shore: 14
- picking ophihi: 17
- free diving: 46
- scuba: 26
- snorkeling: 206
- swimming: 142
- surfing/body boarding: 51
- other activity: 39
- unknown activity: 114
Ocean drownings in Hawaii, by residence and activity of victim, 2009-2018

- **boating/kayaking**: 3 HI residents, 18 non-residents
- **fell in/swept in**: 12 HI residents, 24 non-residents
- **fishing from shore**: 14 HI residents
- **picking ohihi**: 17 HI residents
- **free diving**: 4 HI residents, 42 non-residents
- **scuba**: 16 HI residents, 0 non-residents
- **snorkeling**: 189 non-residents, 17 HI residents
- **swimming**: 74 non-residents, 68 HI residents
- **surfing/body boarding**: 9 HI residents, 42 non-residents
- **other activity**: 22 HI residents, 17 non-residents
- **unknown activity**: 63 HI residents, 51 non-residents

189 non-resident drownings from snorkeling. Out-numbers deaths from: Strokes (175), motor vehicle crashes (72), falls (63), homicides (12), or aircraft crashes (16)
Activities among non-resident victims of ocean drownings in Hawaii, by 5-year periods, 1994-2018
### Contributing causes of death among ocean drowning victims in Hawaii, 2009-2018 (n=712)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart diseases</td>
<td>35.6%</td>
</tr>
<tr>
<td>Traumatic injuries</td>
<td>16.4%</td>
</tr>
<tr>
<td>Illicit drugs*</td>
<td>2.9%</td>
</tr>
<tr>
<td>Alcohol related</td>
<td>2.8%</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>2.7%</td>
</tr>
<tr>
<td>Hypertension</td>
<td>2.5%</td>
</tr>
<tr>
<td>Cancer</td>
<td>1.0%</td>
</tr>
<tr>
<td>Cerebrovascular diseases</td>
<td>1.0%</td>
</tr>
</tbody>
</table>

Most commonly cardiomegaly (12%), and atherosclerotic heart (10%), cardiovascular (8%) and hypertensive (7%) heart disease.

45% among victims 45 years and older, 54% for 65 years and older.
Contributing causes of death among 40 to 70 year-old victims of fatal unintentional injuries, 2009-2018

- Heart diseases: 41.0%
- Other injuries: 21.9%
- Illicit drugs*: 7.2%
- Diabetes mellitus: 4.3%
- Alcohol related: 4.2%
- Hypertension: 2.9%
- Cancer: 1.4%
- Respiratory diseases: 0.0%
- Other ocean drownings (310):
- Snorkelers (139):

*Includes poisoning by or dependence on cocaine, cannabinoids, hallucinogens, opioids (including prescribed), stimulants, and “multiple drug use and psychoactive substances”.
EMS-attended snorkeler drownings, 2009-2018

• Case identification
  – **Linkage to death certificates** (200 (97%) of the 206 fatal drownings)
  – **Linkage to hospital records with drowning diagnoses** (2009-2016)
  – **Text search of “snork” in narrative of EMS candidate records**

• Results (n=688 records)
  – **33% mortality, incl 29% UCD/CCD drowning** (4% oth (non-drowning) COD excl)
    • About half (49%, or 97) of the 200 fatalities died at the scene
    – 45% transported to hospitals
  – 62% transported to hospitals, discharged alive
    • Most admitted (61%) or to observation (14%) (data through 2016)
    – 25% discharged from emergency department
  – 8% discharged at scene

• Lifeguards attended 49% of the patients
  – Lowest for Maui County (32%), highest for Kauai and Oahu (~70%)
<table>
<thead>
<tr>
<th></th>
<th>Fatal (n=206)</th>
<th>Nonfatal (n=463)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number/year</strong></td>
<td>21</td>
<td>46</td>
</tr>
<tr>
<td><strong>Trends</strong></td>
<td>increasing?</td>
<td>no clear trend</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td>71% male</td>
<td>64% male</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td>Ave= 59 years</td>
<td>55 years</td>
</tr>
<tr>
<td></td>
<td>45 to 75 years: 76%</td>
<td>45 to 75 years: 70%</td>
</tr>
<tr>
<td><strong>Geography</strong></td>
<td>46% Maui</td>
<td>44% Maui</td>
</tr>
<tr>
<td></td>
<td>34% Oahu</td>
<td>26% Oahu</td>
</tr>
<tr>
<td></td>
<td>9% Hawaii</td>
<td>17% Hawaii</td>
</tr>
<tr>
<td><strong>Residence</strong></td>
<td>91% non-resident</td>
<td>93% non-resident</td>
</tr>
<tr>
<td></td>
<td>70% mainland, 22% foreign countries</td>
<td>76% mainland, 17% foreign countries</td>
</tr>
</tbody>
</table>
Kauai: 24
Maui: 94
Oahu: 70
Hawaii: 18
Kauai: 80

Maui: 298

Hawaii: 99

Oahu: 192

Snorkeler drownings
- fatal
- nonfatal

Hawaii: 99
County-specific data
Ocean drownings on Kauai, 2009-2018

• **Summary**

  • 73 total, 3 to 12 per year
  • No clear trend
  • Mostly (75%) non-residents
  • Activity: Snorkeling (33%) and swimming (19%)
Napali coast: 5 drownings, 3 Hanakapiai

Hanalei to Kilauea coast: 12 non-residents

Kapaa area: 11

Poipu area: 18 mainland, 12 snorkelers

16 of 23 (70%) of north shore drownings during April to September
Ocean drownings on Oahu, 2009-2018

- **Summary**
  - 335 total, 19 to 41 per year
  - No trend since 2014
  - Slightly more residents (56%)
  - Activity: swimming & snorkeling

### Number of drownings, by activity
- unint. immersion
- swimming
- snorkeling
- diving
- other activity
- unknown

### Annual trends, by residence of victims
- total (335)
- non-residents (148, 44%)
- HI residents (187, 56%)
Kaena to Turtle Bay: 39, 28 (72%) residents, 27 (69%) from April-Sept.

Yokohama to Koolina: 54 drownings, 18 snorkelers, 45 (83%) from April-Sept.

Hanauma Bay: 32, 28 (88%) non-residents, 11 (34%) from 2017-2018

Hilton Hawaiian to Kapahulu: 50, 41 (82%) non-residents, 42 (84%) from April-Sept.
Ocean drownings on Hawaii County, 2008-2017

- **Summary**
  - 111 total, 5 to 17 per year
  - No clear trend
  - Slightly more residents (57%)
  - Activity: wide distribution

Annual trends, by residence of victims

Number of drownings, by activity

- unint. immersion
- swimming
- snorkeling
- diving
- other activity
- unknown

- Total (111)
- Non-residents (48, 43%)
- HI residents (63, 57%)
Waipio Valley: 4 drownings, all non-residents

Kaloko to Kekaha Kai: 14, 12 (86%) from April-Sept

Waikoloa to Mauna Kea: 21, 17 (81%) non-res, 8 snorkelers

Hilo: 10, all residents

Kailua-Kona to Keahou: 15, 11 (73%) from April-Sept

Ocean View to South Point: 7
Ocean drownings on Maui County, 2009-2018

• **Summary**
  • 193 total, 12 to 29 per year
    – (183 on Maui, 7 Molokai, 3 on Lanai)
  • **Increasing trend**
  • Mostly (73%) non-residents
  • Activity: Snorkeling (48%) and swimming (19%)
Wailuku to Hookipa: 13 drownings, 11 (85%) from April-Sept

Black Rock: 24, All non-residents, 18 (75%) snorkelers

Haiku to Kaupo: 11 drownings, 9 (82%) residents

Makena Landing to Makena BP: 20, 17 (85%) non-residents, 11 snorkelers

Molokini: 15, 14 (93%) from mainland

Kam 1 to Polo: 31, 26 (84%) non-residents, 16 from 2016-2018
Summary

• Leading cause of injury-related mortality
  – Particularly among non-residents (visitors)
    • Majority of victims on Kauai and Maui counties

• Snorkeling the most common activity among victims
  – Increasing trends
  – 92% non-residents
  – EMS data shows comparable demography for nonfatal snorkeler drownings
    • Similar geographic distributions
      – Maui island has highest numbers of fatal or nonfatal snorkeler drownings