



Y2021-S1 Accidental drownings 2021



Y2021-S1

PREFACE

On 19 October 2020, the Safety Investigation Authority, Finland decided to initiate a themed investigation under section 2 of the Safety Investigation Act of Finland (525/2011) into accidental drownings in 2021. A themed investigation is a joint investigation of several similar accidents or incidents.

The purpose of a safety investigation is to improve public safety, prevent accidents and hazardous situations and mitigate the damage caused by accidents. A safety investigation is not conducted in order to allocate legal liability.

Safety Investigator Timo Naskali was appointed as the head of the investigation team. The following experts were appointed as the team members:

- Mika Hatakka (psychology)
- Juho Henttonen (police operations and investigation)
- Jussi Kangasmaa (technology)
- Ari Kurppa (diving and swimming instruction)
- Knut Lehtinen (rescue services)
- Petri Pelkonen (police operations and investigation)
- Sami Raappana (maritime navigation)
- Antti Virtanen (medicine)
- Mikko Virtanen (emergency medical service)

Chief Safety Investigator Kai Valonen served as the investigator-in-charge. Safety Investigators Heikki Harri and Hannu Hänninen participated in the on-call and data acquisition arrangements. Infographics were created by expert Kari Ylönen and graphic designer Sole Lätti.

The investigation was carried out in cooperation with the Emergency Response Centre Agency, the police, fire and rescue departments, emergency medical service and the Finnish Border Guard. The collaboration allowed for rapid notifications and quick access to additional information.

Information on the weather and ice situation was provided by the Finnish Meteorological Institute and the Finnish Environment Institute. Furthermore, plenty of information on drownings as a phenomenon was exchanged with the Finnish Swimming Teaching and Lifesaving Federation.

The investigation report includes an account of the investigated cases and safety recommendations addressed to other parties regarding measures that are necessary to promote general safety, prevent further accidents and hazardous situations, prevent damage and improve the effectiveness of the operations of rescue services and other authorities.

Key stakeholders were given the opportunity to comment on the draft investigation report. Their comments were taken into account when finalising the investigation report. There is a summary of the opinions at the end of this investigation report.

This investigation report and the summary were published on 22 June 2022 on the website of the Safety Investigation Authority, Finland at www.sia.fi.

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1 DESCRIPTION OF THE INVESTIGATION

1.1 Arrangements for the themed investigation, classification and selection of data

The themed investigation is a follow-up to a themed investigation carried out in 2011. At that time, all water-related deaths were investigated. The 2021 themed investigation was limited to accidental drownings. Data acquisition was made more rigorous to better obtain information on the events and circumstances that led to the drownings.

The investigated cases were collected from several sources to ensure a comprehensive and accurate dataset. The Safety Investigation Authority agreed with the various collaborating authorities that they would report all suspected accidental drownings to the on-call officer at the Safety Investigation Authority. No notification was requested in cases where there was justified reason to believe that the case was a suicide, homicide or death due to an illness. The experts in the investigation team requested further information on the cases, which led to **165** cases being added to the list of accidental drownings. Dozens of cases that were initially investigated were excluded because they turned out to be non-accidental drownings. Most of these were probable suicides.

The cases were referred to a member of the investigation team or an investigator from the Safety Investigation Authority. Typically, the investigator would call an authority who was present at the site or was otherwise aware of the case, asking for information and requesting photographs and written materials. The approach varied slightly depending on the case. Key data included an S notification relating to the inquest and an alarm report and an accident report from the Pronto database of the rescue services. Forensic medical examination data was available once the examination was complete. It included documents such as forensic chemistry results and past medical records.

Investigation team members recorded the information about each case on a spreadsheet and saved the background information. The data was classified in different ways, such as based on the purpose of the activities, the time, the place, the age of the person and any other background information available.

In some cases, it was impossible to determine whether the person who drowned would have survived their bout of illness had they not been in or around water at the time, which led to the drowning. There were eight such cases in the dataset. Some of these ended up in the cause of death statistics as deaths due to an illness. In other words, the person could have survived if the health problems had occurred on dry land.

Among the cases initially included in the investigation, there were also some where the death caused by illness would have been certain also on dry land. These were excluded from the dataset.

Some cases that would not have been detected from drowning statistics were also included. This is because in many cases, the distinction between a drowning and a death due to an illness or other type of injury is open to interpretation.

Cases where a person who was found drowned in a body of water in 2021 had drowned in 2020 were removed from the dataset. Two cases in late 2021 were such that a drowning accident had most likely occurred but the persons remained missing for a long period of time. These cases were included in the dataset.

1.2 Specific features of the investigated period

The **COVID-19 pandemic** affected people's daily lives throughout 2021. There was less international travel than usual, and there were fewer tourists in Finland. Travelling within Finland, spending time at summer cottages and boating were more popular than usual. The investigation team's assessment based on the case data is that the effect on the number of drownings was negligible. In most cases, the nature of the activity and factors such as the person's age indicated that the activity was in line with a behavioural pattern that had been adopted years or decades ago.

The **summer of 2021**, i.e. the period between June and August, was warmer than normal in the whole of Finland, even record-breaking in the southern and central parts of the country. Surface waters were also warm. It is likely that the hot weather also attracted persons in poor health to take a dip in a body of water. Furthermore, heat causes health problems, which in many cases led to difficulties in the water that ultimately led to drowning.

Overall, temperatures in May remained at the average level or slightly below it despite five days when the temperature exceeded +25°C, which is the temperature limit for a hot day in Finland. The month was unusually or even exceptionally rainy in much of the country.

With the exception of Lapland, June was a record-breaking or exceptionally warm month. In June, the average temperature in Finland was the highest on record, with a total of 25 hot days. This is the highest number since the start of the digitised temperature records, i.e. since 1961. Typically, there are eight hot days in June. Temperatures of over 30°C were measured during the Midsummer week as far north as in Kainuu and North Ostrobothnia. The southern and central parts of the country, in particular, got relatively little rainfall.

The very warm weather continued until mid-July, after which the weather became more changeable. However, the average temperature in July was still well above the national average. July was unusually or exceptionally warm in much of the country. There were 24 hot days. This was not a record, but it was well above the average of 16. Much of the country received less rain and more sunshine than usual.

The period between June and July was the longest uninterrupted period of hot weather in Finland since 1961. In Kouvola, the temperature exceeded 25°C during 31 consecutive days.

August was cooler and wetter than average in almost the entire country. There was one day when the temperature exceeded 25°C.

The Finnish Meteorological Institute performed the analyses using specific criteria for good weather, including a daily maximum temperature of more than 22°C, at least three hours of sunshine and less than 1 mm of rain. Using these criteria, there have been several years in the past decades with more days of good weather than in the summer of 2021. Lappeenranta was used as the example municipality.

At the beginning of June 2021, **surface water temperatures** had increased to 15–19°C at the meteorological stations in Southern Finland, with the temperature in Central Finland being 13–19°C and the temperature in Northern Finland 6–18°C. The temperatures were higher than the average in almost the entire country. In June, surface waters continued to warm up before mixing and cooling down due to storm Vieno.

During the Midsummer week, surface waters warmed to 4–7°C above the average in many places. At that time, the water temperature was between 21–24°C in Southern Finland and 18–23°C in Central Finland. Further north, bodies of water were cooler in June but warmed up to become warmer than the average in July.

In July, surface waters were record-breaking warm: temperatures in excess of 25°C were measured in many places. Throughout Finland, surface waters were several degrees warmer than the average for that time of year. Furthermore, lake water remained warm to a considerable depth in mid-July. Surface water temperatures dropped to the average or below it towards the end of July. In August and September, surface water temperatures were generally around the seasonal average or slightly below that.

Ice conditions may affect the number of people drowning by falling through the ice. The early winter of 2020–2021 was mild, which meant that the thickness of the ice in lakes in Southern Finland could not be safely measured until 20 January. The ice was 10–20 cm thick, i.e. 10–15 cm thinner than the average for that time of the year. In Central Finland, the ice was 10–30 cm thick, or 5–20 cm thinner than the average. The open parts of large lakes had not frozen over yet. The ice cover in Northern Finland was also thinner than the average. As is typical of early winter, the ice cover varied treacherously in different parts of the same body of water, even over a small area. Snow had fallen on the ice in many places, which slowed down the thickening of the ice cover. The snow cover also slowed down the thickening of the ice in February, increasing the formation of snow ice in early March. Snow ice is frozen half-melted ice that is significantly weaker than blue ice.

At the end of March, the ice cover at the meteorological stations in Southern and Central Finland changed so that the boundary between snow ice and blue ice was no longer discernible, i.e. the entire ice cover had become more brittle. The ice had already melted from the southernmost lakes by 10 April, and by the end of April the ice conditions had deteriorated to such an extent that ice thickness measurements could only be taken to the north of the Pello-Suomussalmi line. The melting season was earlier than the average in Southern and Central Finland, and the ice also melted slightly earlier than the average in Central Lapland. The ice winter was shorter than the average.

Winter 2021–2022 started at the end of the investigated period, and the ice measuring season started in mid-November in Northern Finland. Large lakes had already frozen over by then, but the ice conditions were poor in many places. Of the meteorological stations in Lapland, only Lake Kevojärvi had an ice cover strong enough to measure. There was ice in the southern and central parts of the country in late November, but in general, the ice in all bodies of water south of Oulu was too weak to be safely measured.

A frosty spell in early December somewhat strengthened the ice cover, but weak ice continued to occur in Southern and Central Finland and, as is typical for early winter, the ice thickness varied a great deal in different parts of bodies of water. Furthermore, heavy snowfall in Eastern Finland immediately after the bodies of water had frozen over slowed down the thickening of the ice cover. Towards the end of December, the ice cover strengthened to around 25–35 cm, especially in Southern Finland, and in measurements taken in late December, the ice cover was stronger than the average or close to the average. In Central Finland, the thickness of the ice varied between 20 and 30 cm, and the ice cover was around the average or thinner than the average, except for a few meteorological stations. The situation was the same at the meteorological stations in North Ostrobothnia and Kainuu, where the ice thickness varied between slightly less than 20 cm and 30 cm. At the meteorological stations in Lapland, the total ice thickness varied between 35 and 50 cm, being close to the average for the season. However, there were still observations from all over Finland that the thickness of the ice cover varied widely; ice was dangerously thin in areas with strong currents and there were cracks in it.

Compared to the previous winter, the beginning of the 2021–2022 ice season was closer to the start of the average ice season throughout Finland, but the ice conditions remained poor and variable for quite a long time after freezing in Northern, Central and Southern Finland. At the beginning of December, the ice was as thick or even thicker than the average in Southern Finland and Lapland, and as thick or thinner than the average in Central Finland and North Ostrobothnia.

1.3 Statistics on the number of drownings

The number of drownings has continued to decrease in Finland for a long time. In the 1970s, an average of 360 persons per year drowned. This was followed by a steadier period: in the 1980s and 1990s, 240 persons per year drowned on average. Some 200 persons per year drowned during the first decade of the new millennium. In the last ten years, an average of 147 persons per year have drowned accidentally. According to the statistics, around 12,000 persons have accidentally drowned in the past 50 years. A total of 88% of them were men.

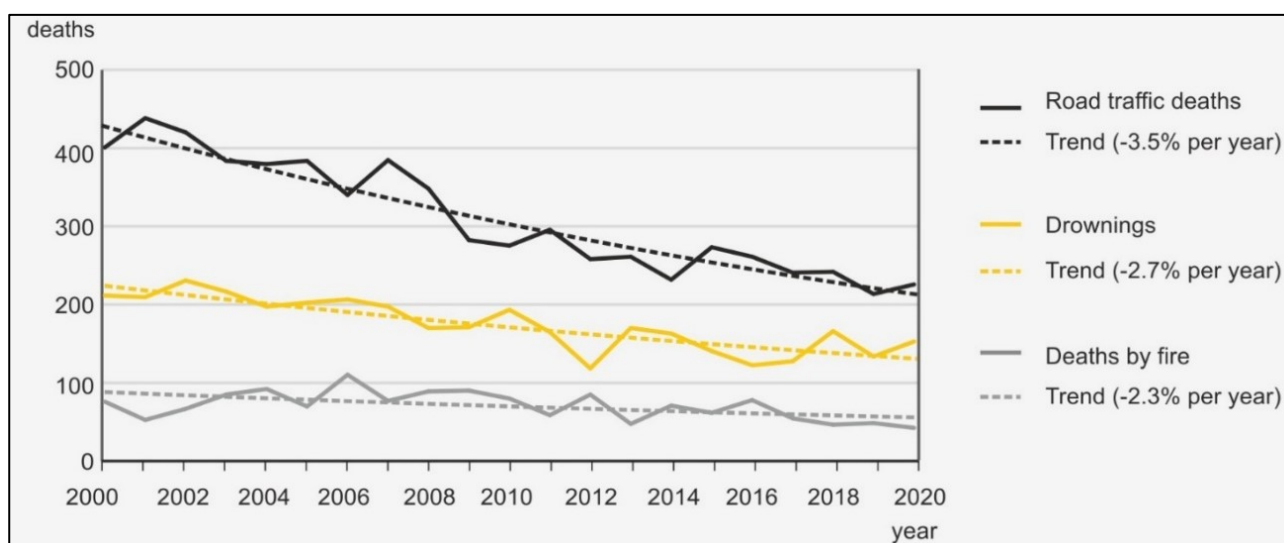


Figure 1. The number of fatal accidents in general has decreased. Traffic safety has improved more than other types of accidents. (Image by the Safety Investigation Authority, information by the Finnish Institute for Health and Welfare/cause of death statistics)

There are twice as many drownings in Finland than in Sweden and Norway. Relative to the population, the number of drownings in Finland has varied between 1.6 and 3 drowned persons per 100,000 inhabitants in 2009–2019. In 2021, 3.0 persons per 100,000 inhabitants drowned in Finland. The corresponding figure in Sweden has been 1.1 in recent years, and the figure for 2021 was even lower at 0.9.¹ In Norway, 1.6 persons per 100,000 inhabitants drowned in the 2010s and 1.4 in 2021.² Drowning cases in Norway are concentrated in the northernmost parts of the country. In terms of the age distribution, the figures for Finland and Sweden are broadly similar.

The drowning figures from various sources differs from the number of cases examined in this investigation due to difficulty in differentiating between deaths due to illness and an accident, as well as difficulty of identifying possible suicides in some cases. In some cases, there may be uncertainty because a death that took place in a boat was not caused by water

¹ Svenska Livräddningssällskapet. 11 May 2022. <https://svenskalivreddningssallsskapet.se/sakerhet/drunkningsstatistik>.

² Redningsselskapets drukningsstatistikk. 11 May 2022. <https://rs.no/drukning>.

but injuries sustained during a collision, for example. Factors other than water often contribute to the death, but for statistical purposes one must settle on a single cause of death.

2 ACCIDENTAL DROWNINGS IN 2021

2.1 General description of the dataset

The number of accidental drownings investigated by the investigation team in 2021 was **165**.

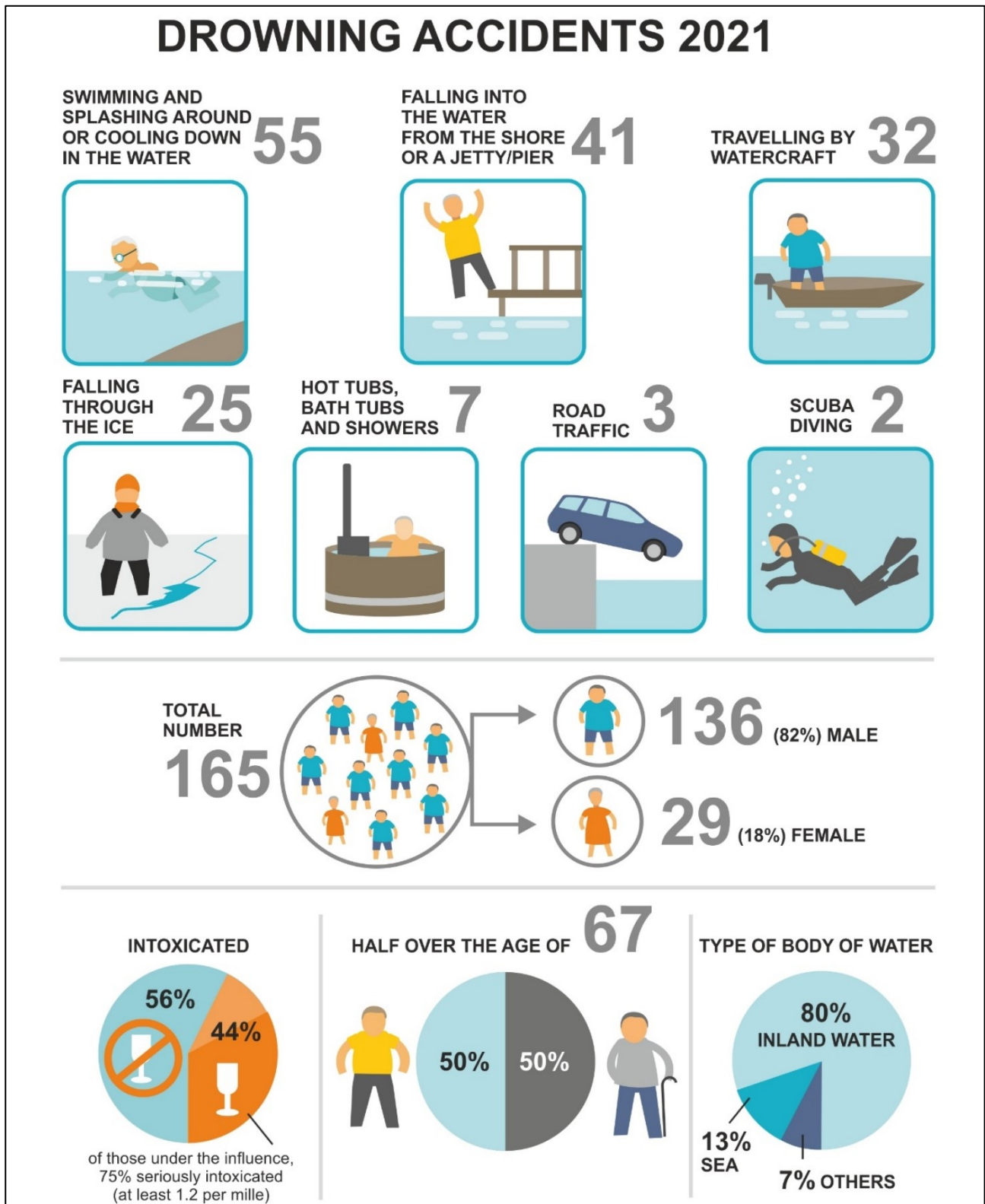


Figure 2. An overview of the entire dataset. (Image by the Safety Investigation Authority)

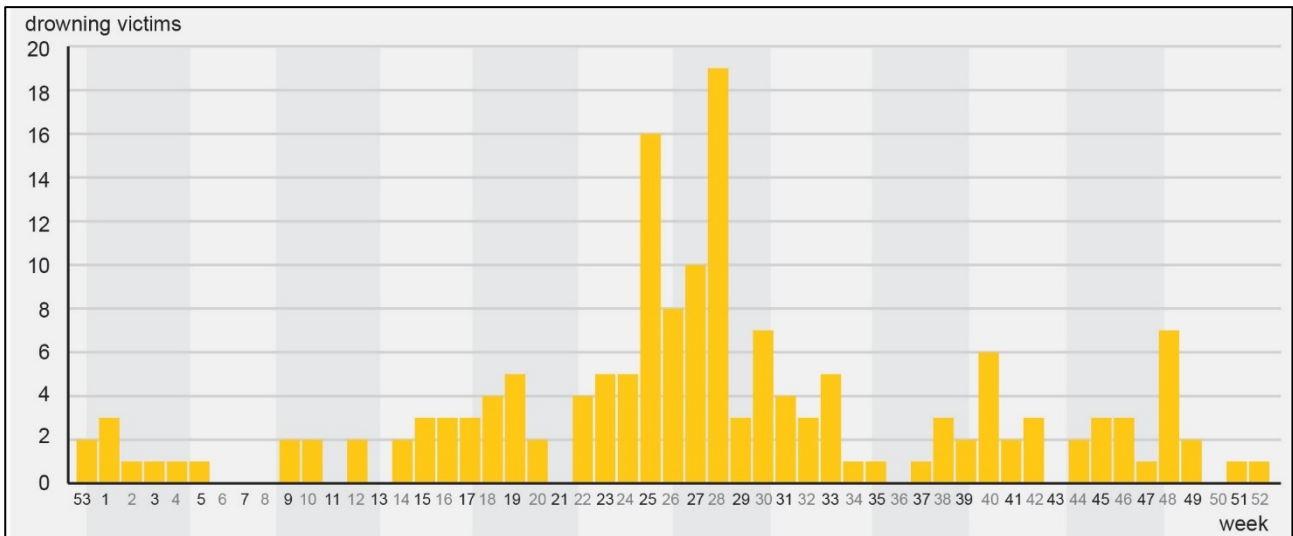


Figure 3. The accidental drownings in 2021 were evenly distributed throughout the year. The weekly variation was high. The months are separated by the grey and white background. The busiest week was in July. (Image by the Safety Investigation Authority)

2.2 Age and gender

The age distribution of the drowning victims was dominated by the elderly. The average age was 64 years. A total of 82% of those drowned were men, and their average age was 63 years, while the proportion of women was 18% and their average age was 66 years. The median age was 67 years. This means that half of those who drowned were more than 67 years of age. Of the women, 65% were over the age of 64. The highest proportion of female drownings was in the oldest age groups. More than half of the men (54%) were over the age of 64

and almost a third (30%) were over the age of 75. A total of 38 of the persons, or 23% of the total number of victims, were over the age of 80. There were four persons over the age of 90, three of whom were male and one female. The oldest person was 94.

More than a quarter of the persons (28%) were in the early retirement age, i.e. between 65 and 74 years of age. A total of 68 (41%) were of the working age, i.e. between 18 and 64 years of age. There were six (4%) young adults (aged 18 to 29). All six of them had an underlying medical condition or were seriously intoxicated.

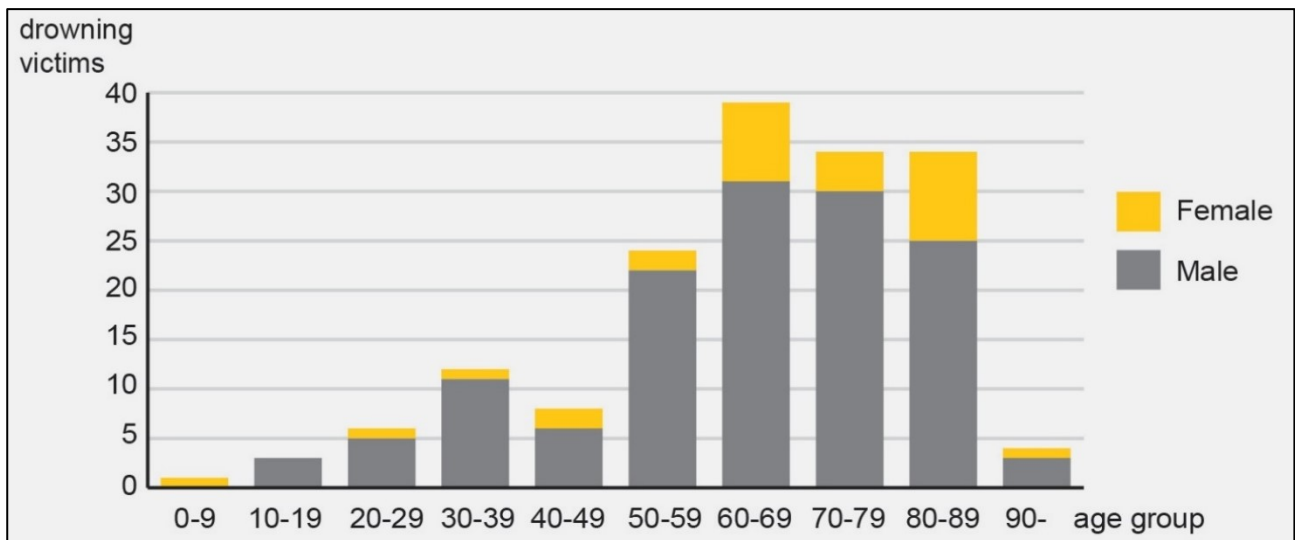


Figure 4. Age groups of the drowning victims by gender. (Image by the Safety Investigation Authority)

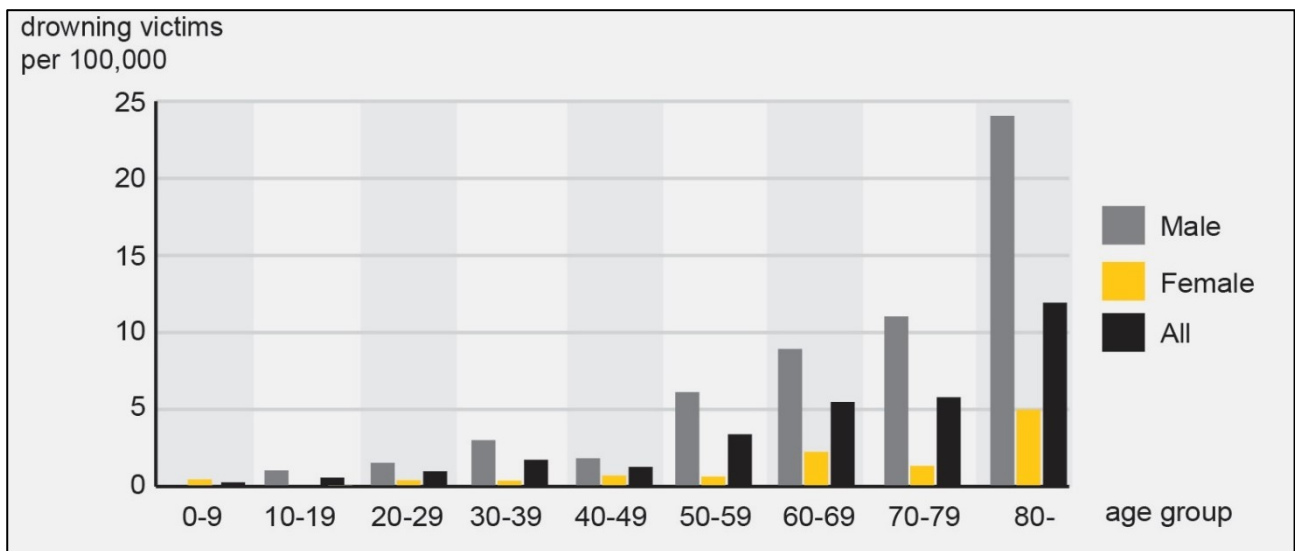


Figure 5. Age groups of the drowning victims by gender in relation to the size of the age group. (Image by the Safety Investigation Authority, demographic data by Statistics Finland³)

Almost a third of the drowning victims of the working age had limited functional capacity due to their deteriorated state of health. Of the rest, four out of every five were intoxicated. This means that ten of the drowned working-age persons had normal functional capacity at the time of the accident and were not intoxicated, although some of them did have some records of mental health problems, other illnesses or medication.

In the case of the women, the drowning cases were concentrated around swimming, particularly splashing around in the water and cooling down after the sauna or without sauna. In addition to the reasons mentioned above, men were particularly prone to falling through the ice, drowning while using a watercraft for various purposes and falling into the water at a

³ Official Statistics of Finland: Väestörakenne. ISSN = 1797-5379. Helsinki: Statistics Finland 4 April 2022. <http://www.stat.fi/til/vaerak/meta.html>.

marina, for example. No women fell through the ice, and all the drowning victims in cases involving water and land vehicles, fishing or hunting were men.

A total of four persons under the age of 18 drowned. They were aged 9, 14, 15 and 16. All of them were sober. The youngest and oldest of the underage children had an immigrant background, which may have affected their swimming skills. Neither of them could swim, and both ended up in too deep water at a bathing beach.

The 15-year-old drowning victim could swim but got in trouble while swimming in the middle of a pond that had formed in a gravel pit. The cause of the trouble is unknown, but it could be related to sudden fatigue on a hot day. There were no known health problems. Meanwhile, the 14-year-old had a severe developmental disorder, disappeared from their home and ended up in a river.

The number of drownings among children, i.e. persons under the age of 18, has decreased over the past two decades. The highest annual number occurred in 2002, when 16 underage persons drowned. In the early years of the new millennium, there were seven years during which at least ten children drowned. Since 2008, the maximum number has been eight, with such years including 2008 and 2019. By 2020, there had been five years during which fewer than five children drowned. The average between 2000 and 2020 was 7.3 child drowning victims per year, compared to 5.3 between 2010 and 2020. In Sweden, the corresponding figure for the last decade is 8, meaning that relative to population, fewer children drown in Sweden than Finland. In recent years, some ten children have been treated in hospital in Finland every year due to ending up in the water.

2.3 Nature of activities



Figure 6. Accidental drownings by type of activity in 2021. (Image by the Safety Investigation Authority)

Almost all the drowning cases involved people spending their leisure time, usually in the immediate vicinity of their home or summer cottage. Only three of the cases showed the characteristics of a job duty. These involved fishing, snowmobiling during reindeer husbandry and cleaning up a riverbed by scuba diving.

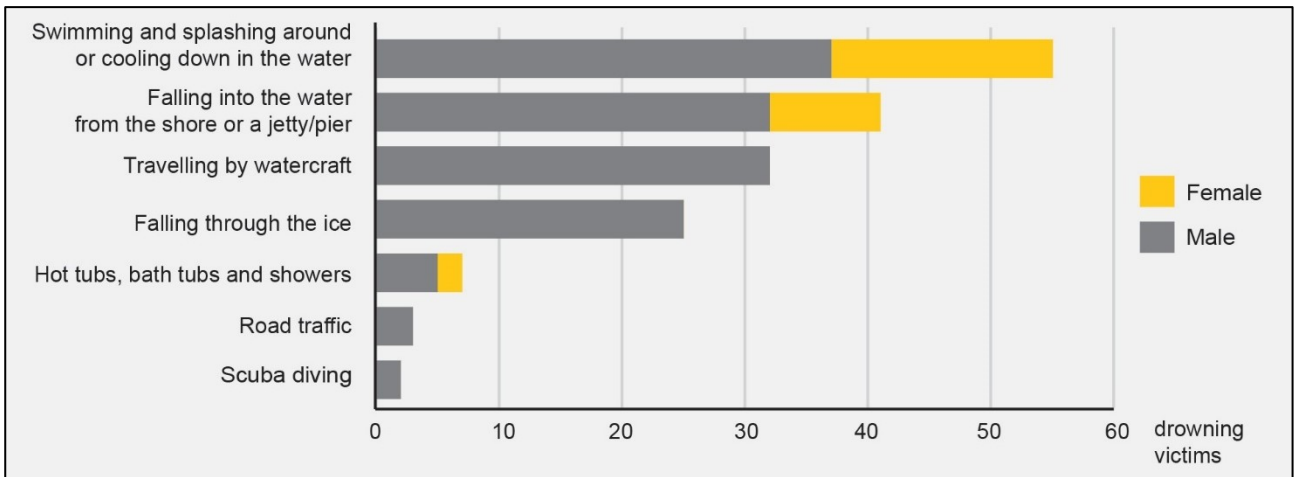


Figure 7. Drownings by type of activity and gender. (Image by the Safety Investigation Authority)

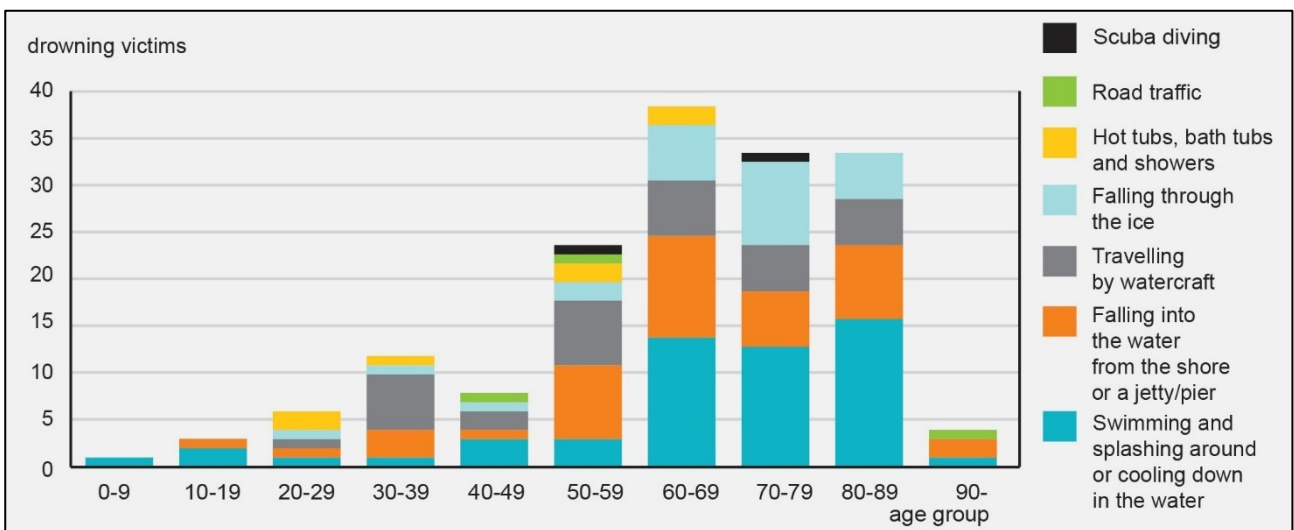


Figure 8. Drownings by age group and type of activity. (Image by the Safety Investigation Authority)

2.3.1 Swimming and splashing around or cooling down in the water

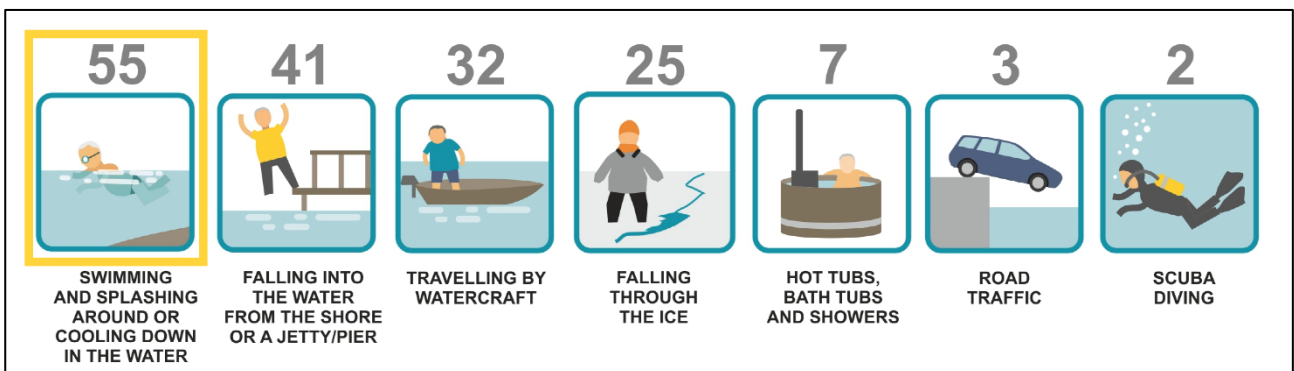


Figure 9. Swimming and splashing around or cooling down in the water was the most common type of activity. A third of the cases fell in this category. (Image by the Safety Investigation Authority)

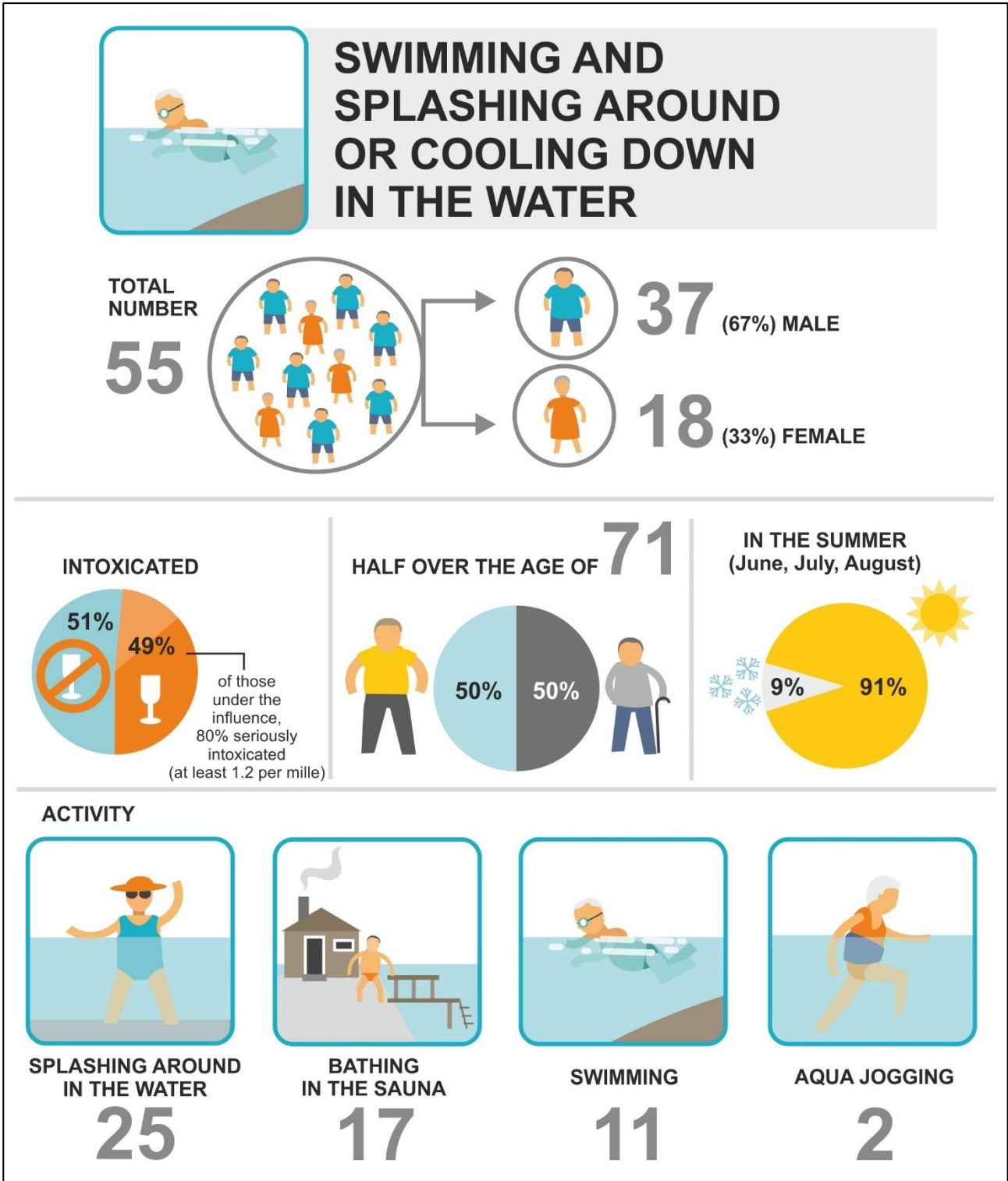


Figure 10. General information about persons who drowned while swimming or splashing around in the water. (Image by the Safety Investigation Authority)

Cooling down, splashing around in the water and swimming is the most common description of the nature of the activity. There were 55 (33%) of such cases. The majority of the women in the entire dataset (62%) and a little over a quarter of the men (27%) drowned under such circumstances. Many of the drowning victims were elderly and had underlying medical conditions, such as cardiovascular diseases. In half of the cases, there was alcohol in the person's blood. Almost all of the cases occurred in inland waters.

Comprehensive data on the persons' ability to swim was not available. Of the 32 persons who went for a swim or to splash around or cool down in the water were said to have been able to swim, while five of them were reported as unable to swim. There was no information in the case of 17 persons. Practically all the cases were such that swimming skills could have been useful. The persons got into trouble while in the water, however, causing the drowning of persons who were able to swim. In two of the cases, a person who did not know how to swim got too deep into the water while splashing around. In such a case, any level of swimming skills would have been beneficial.

Most of the people entered the water in order to splash around or cool down, not to swim for exercise. There were 25 cases involving splashing around in the water, of which 14 took place a maximum of 10 metres from the shoreline or a jetty/pier. A total of eight persons drowned farther away, 11–50 meters from the shoreline. One person who had an SUP board was even farther away from the shore than that. There is no precise information on the distance in two of the cases. Most of these persons (16 out of 25) were over the age of 64.

Examples of drowning cases relating to splashing around in the water:

An elderly man went for an evening swim from stairs attached to a cruising boat moored at the shore. His spouse was asleep in the cabin. The spouse woke up a couple of hours later and started to look for her husband. When she couldn't find him aboard the boat or at the beach, she called her son, who arrived to the scene by boat. The husband's glasses and clothes were found from the boat. A next of kin who had come to help spotted a human figure underwater some six metres from the boat. He was seriously intoxicated.

A man who was over the age of 70 had gone to an island in a rowing boat to do maintenance on a summer cottage on a hot summer's day. He phoned home and said that he would go for a swim before heading back home. His wife became concerned when the man didn't return home and called the emergency services. Passing boaters found the man floating naked close to the boat and a jetty. When the emergency services arrived at the scene, the man was still in the water, because nobody had been able to lift him onto a boat. The man's clothes and backpack were in the boat. The man had a latent medical condition.

An elderly man went into the sea to cool down on a hot day. A female outsider who was going for a swim saw something flash in the water but wasn't sure what it was because of the waves. The woman was swimming in the water parallel to the shore when she saw another glimpse of something pale. She realised that there was a person in the water. She called others to help, and the man was successfully pulled out of the water. Attempts were made to resuscitate him. He had several medical conditions and was on medication. He was also seriously intoxicated.

A significant proportion of the drowning cases involved cooling down after bathing in the sauna. There were 17 of such drowning cases, of which 11 took place 0–10 metres from the shoreline. Typically, the person had been bathing in the sauna alone, or had gone into the water before the others or stayed in the water while the others returned to the sauna. What is essential is that there was nobody there to see when the person got into trouble (15 out of 17 cases).

Examples of drowning cases involving bathing in the sauna:

An elderly man went for a swim after the sauna while his partner remained in the sauna. The partner followed him, but stopped on the terrace for a while to talk to a third person. The partner noticed that the man was nowhere to be seen and started to look for him. When the man was not found, they called the emergency services. A surface rescuer from the emergency services found the man in the water 1.5 metres below the surface at the end of a jetty. The man had been in the water for some 30 minutes at that point. The man had somewhat limited functional capacity due to a latent medical condition.

A middle-aged man who was alone at a summer cottage had bathed in the sauna. In the evening, a next of kin came to see why the man was not answering his phone, only to find him lifeless in the water near a jetty. The

sauna oven had already cooled down, the door to the sauna was open and there was a towel on the porch. He was seriously intoxicated.

An elderly couple was bathing in a sauna on an island. The woman went for a swim in the lake right next to the sauna. The man followed her a couple of minutes later, only to find her lying lifeless in the water close to the shore. The man held her head above the water and shouted for help. A neighbour came to help from a nearby island in a rowing boat, called the emergency services and started resuscitation. The resuscitation was not successful. The woman was lifeless when the first responders arrived at the scene. Her ability to function was significantly impaired due to medical conditions.

The distinction between splashing around in the water and swimming is not unambiguous, but 13 of the persons were swimming for exercise or for other purposes and two were aqua jogging. Furthermore, half of the swimming-related incidents took place less than ten metres from the shoreline or a jetty/pier. Most of the drowning victims were over the age of 64 (9 out of 13).

Examples of drowning cases relating to swimming:

Two elderly women went swimming. One of them returned to the jetty only to notice that the other one, a visually impaired woman who was over the age of 80, was swimming backstroke away from the shoreline. The woman on the jetty tried to shout to the other woman to turn back towards the shore, but she did not react. After having noticed that the woman who had swam farther away was in trouble, the woman on the jetty ran to a neighbour for help. The neighbour called the emergency services, swam to retrieve the woman, who was lifeless, and started resuscitation. At that point, the woman had been in the water, partially submerged, for 5–10 minutes. First responders continued the resuscitation, but to no avail.

An elderly man was swimming towards the open water from a bathing beach near his home. This was a usual activity for him. His next of kin had often told him to swim parallel to the shoreline, but despite the requests, he had always wanted to swim from the shore to the open water and back. He was found some 30–50 metres from the shoreline. He was a strong swimmer and had been swimming in open waters for decades. He had a latent medical condition.

A group of teenagers were swimming from shore to shore, a total distance of some 100 metres, at a gravel pit pond. One of them apparently got tired or encountered a problem, as he started to scream and quickly went under the water. At first, the others thought that he was joking around. A diver from the emergency services had to retrieve the victim from the bottom of the deep gravel pit. According to the friends, the victim was a good swimmer.

A middle-aged man was at a summer cottage spending time with relatives. The relatives left the cottage during the evening. At some point, possibly the following day, the man had gone swimming while seriously intoxicated. His brother went to check on him when he hadn't been able to contact him. When he got to the jetty, he saw his brother floating nearby, drowned. Surface rescuers from the emergency services had to take an alternative route when bringing the man to the shore, because the jetty was tall and there was no ladder. The drowned man's glasses and clothes were on the sauna porch, and the sauna oven had already cooled down. The man had a medical condition that had been asymptomatic, at least before.



Figure 11. Locations of the incidents involving swimming and splashing around or cooling down in the water. (Photos by the police)

2.3.2 Falling into the water from the shore or a jetty/pier

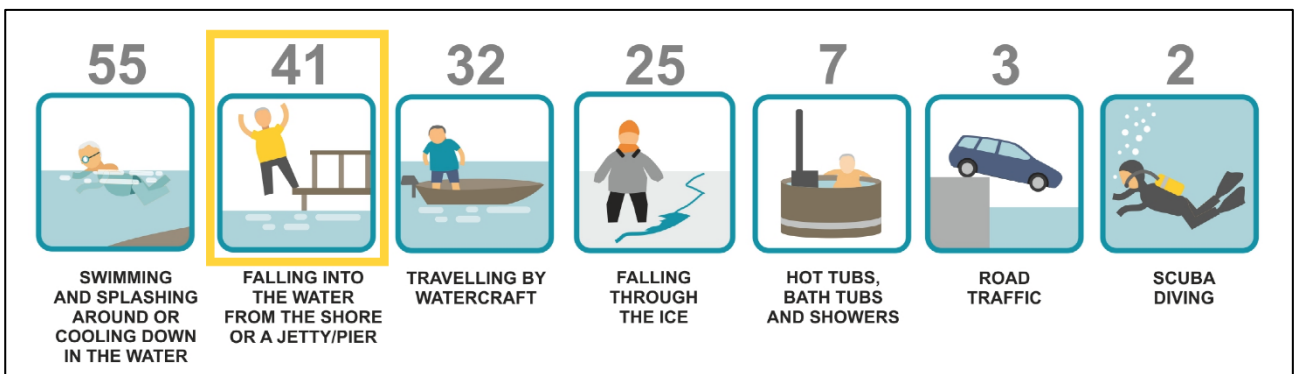
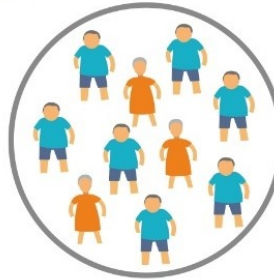


Figure 12. Falling into the water from the shore or a jetty/pier was the second most common type of incident. A quarter of the cases were such incidents. (Image by the Safety Investigation Authority)



FALLING INTO THE WATER FROM THE SHORE OR A JETTY/PIER

TOTAL NUMBER
41



32 (78%) MALE



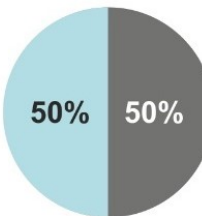
9 (22%) FEMALE

INTOXICATED



of those under the influence, 75% seriously intoxicated (at least 1.2 per mille)

HALF OVER THE AGE OF **65**



ACTIVITY



FALLING FROM THE SHORE **17**



AT A MARINA **9**



DOING SOMETHING CLOSE TO THE SHORELINE **8**



FALLING FROM A JETTY/PIER **3**



FALLING INTO A DITCH **3**



FALLING INTO A WELL **1**

Figure 13. General information on people accidentally falling into the water from the shore or a jetty/pier. (Image by the Safety Investigation Authority)

A total of 41 people who fell into the water from the shore or a jetty/pier drowned. In one case, two people drowned. Cases where the persons had been doing something on the shore, on a jetty/pier, at a marina or by the water and accidentally ended up in the water were included in this category. More than half of the people who accidentally ended up in the water were over the age of 64. The majority of them were male (32 out of 41). The person's functional capacity was slightly or significantly impaired in more than half of the cases (24 out of 41).

There were a total of 17 cases involving falling into the water from the shore. There were slightly fewer cases where the person was intoxicated than in many of the other accident groups (7 out of 17). Around half of the victims (9 out of 17) had impaired functional capacity. None of the persons in this category were very elderly, i.e. over the age of 80. Six of the drowning victims were aged between 65 and 79, and eleven were aged 64 or under.

Examples of falling from the shore into the water:

To alleviate back pain, a middle-aged man decided to walk in the yard of a summer cottage in the evening when his spouse went to bed. The spouse woke up early in the morning and went looking for her husband. She found him at the shoreline, fully clothed, kneeling with his torso in the water. He was seriously intoxicated.

A middle-aged man woke up his spouse and went to the beach. The spouse made breakfast and then went out to run some errands. Upon returning, she noticed that her husband hadn't eaten anything, so she went looking for him. She found the man at the shoreline with his face underwater. A group of boaters passing by noticed the woman waving at them on the jetty and went to help. They lifted the man out of the water and started resuscitation. The delay was too long, however, apparently several hours. The deceased was wearing a pair of jeans, which does not suggest that he intended to go for a swim. He was seriously intoxicated.

Kayakers found a middle-aged man drowned close to the bank of a river. He was fully clothed and, judging by the fishing gear in his backpack, he had been fishing at the riverbank. He had a latent medical condition that impaired his functional capacity.

There were a total of 12 cases of falling into the water at a marina or from a jetty/pier, nine of which occurred at a marina. Typically, a drowning incident at a marina involved a person getting on or off a boat, or moving items such as belongings on or off a boat. None of the persons who drowned at a marina were wearing a life jacket.

Examples of falling into the water at a marina or from a jetty/pier:

Persons who happened to arrive at the scene found a middle-aged man they knew next to a boat dock, at the bottom of the lake that was some two metres deep. They lifted the deceased onto the shore and covered him with a tarpaulin. The drowned man's boat had been tied to a bench on the dock so that it was between the deceased and the shore. The man was wearing a long-sleeved shirt with the buttons undone, trousers and rubber boots. He was seriously intoxicated.

A very elderly woman with several medical conditions was spending Midsummer at a summer cottage with her next of kin. While the others went inside for a moment, the woman walked, leaning on her crutches, to a pontoon platform on the water. A couple of minutes later, she was nowhere to be seen. The crutches were found in the water, and a person who dove into the water found the woman herself 1–2 metres below the surface under the pontoon platform. The next of kin were unable to lift her from the water, and could thus not resuscitate her. A next of kin held her head above the water until the emergency services arrived. A boat passing by may have caused the pontoon platform to sway, causing her to stumble and fall into the water.

A middle-aged man was at the beach of a summer cottage about to go pick up a next of kin to bring them to the cottage. When he did not arrive, the next of kin phoned the neighbouring cottage. The neighbour found the man drowned in between the boat and the jetty. The boat was still moored. He was seriously intoxicated. He did not wear a life jacket.

Activities by the water included chores such as repairing a jetty or maintaining a boat. There were eight such cases. All but two of the drowning victims were over the age of 64. There was one woman. Five of the persons had significantly impaired functional capacity.

Examples of cases involving activities by the water:

An elderly man was repairing a jetty. The jetty was wobbly, and the ladder had been pulled up. The man ended up in the water in his working clothes. A next of kin came to see why the man couldn't be contacted, only to find him lifeless next to the jetty. The water was 1–1.5 metres deep. It was spring, and the water was still cold. The man had severely limited functional capacity due to a medical condition.

An elderly woman went to rinse out a chamber pot in the lake early in the morning. Apparently, she took a tumble on the rocky beach and fell into the water, hitting her head. A next of kin woke up later, only to find her floating on her stomach in the shallow water close to the shore. She had severely limited functional capacity due to several medical conditions.

A woman found her elderly husband drowned in a pond in the yard of their detached house, fully clothed. The man had apparently been repairing the suction hose of a water pump at the end of a jetty. The pond was small, and only 1.5 metres deep at its deepest. First responders attempted to resuscitate the man to no avail. The man knew how to swim. He had several medical conditions.

Three persons who fell into a ditch during a walk also ended up in the category of accidentally falling into the water. Two of them were women, two were almost 90 and one was under 40 years of age. All of them had medical conditions. Furthermore, a man aged almost 90 drowned after falling into a well.



Figure 14. Photos of locations where people accidentally fell into the water. (Photos by the police)

2.3.3 Travelling by watercraft

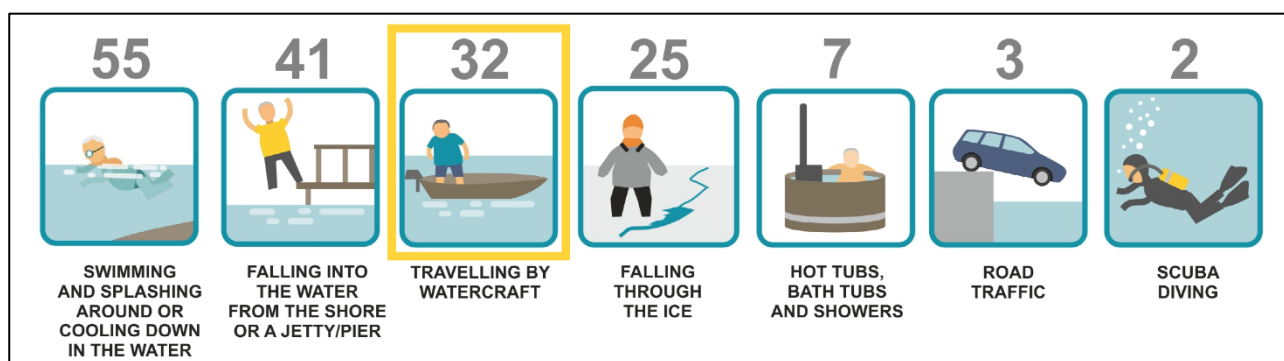


Figure 15. Drowning cases that occurred while travelling by watercraft accounted for approximately one fifth of all the drowning cases. (Image by the Safety Investigation Authority)

A total of 32 people drowned in accidents involving watercraft. In 22 of the cases, the person was in the watercraft alone, while in the remaining nine cases there were several persons onboard. In one of the cases, two people drowned.

The majority of the cases (21) involved an accident while travelling in a small boat of the rowing boat size. Of these, 14 took place in a tapered rowing boat, eight of which were equipped with a small outboard motor. Two of the remaining rowing boats were square-sterned, one of which was equipped with an outboard motor. The hull type of two of the boats could not be determined. The rest of the boats grouped in this category were two canoes and one kayak. Based on the incident data, it was estimated that in 14 of the cases, the initiating event was a person falling off the boat. In the remaining seven cases, people ended up in the water because the boat capsized or partially or completely sunk. In 18 of the cases, the reason for being in the boat was fishing or hunting. In most of the cases, the activity can be described as more a pastime than actual fishing. In two of the cases, the purpose of the activity was bird hunting, while in the remaining three cases the purpose was simply travelling by water.

Seven people drowned in motorboat-related incidents. All of the motorboats were small undecked boats. Some of the boats were square-sterned boats equipped with a motor that could also be moved by rowing. Most of the boats were made from fibreglass or reinforced plastic, while one was a wooden boat with a fibreglass surface and one was a rubber boat. In three of the cases, people ended up in the water because they fell from the boat and in four of the cases, the boat capsized or sank. The reason for being in the boat was fishing in three of the cases, while the other persons were just boating without any other purpose.

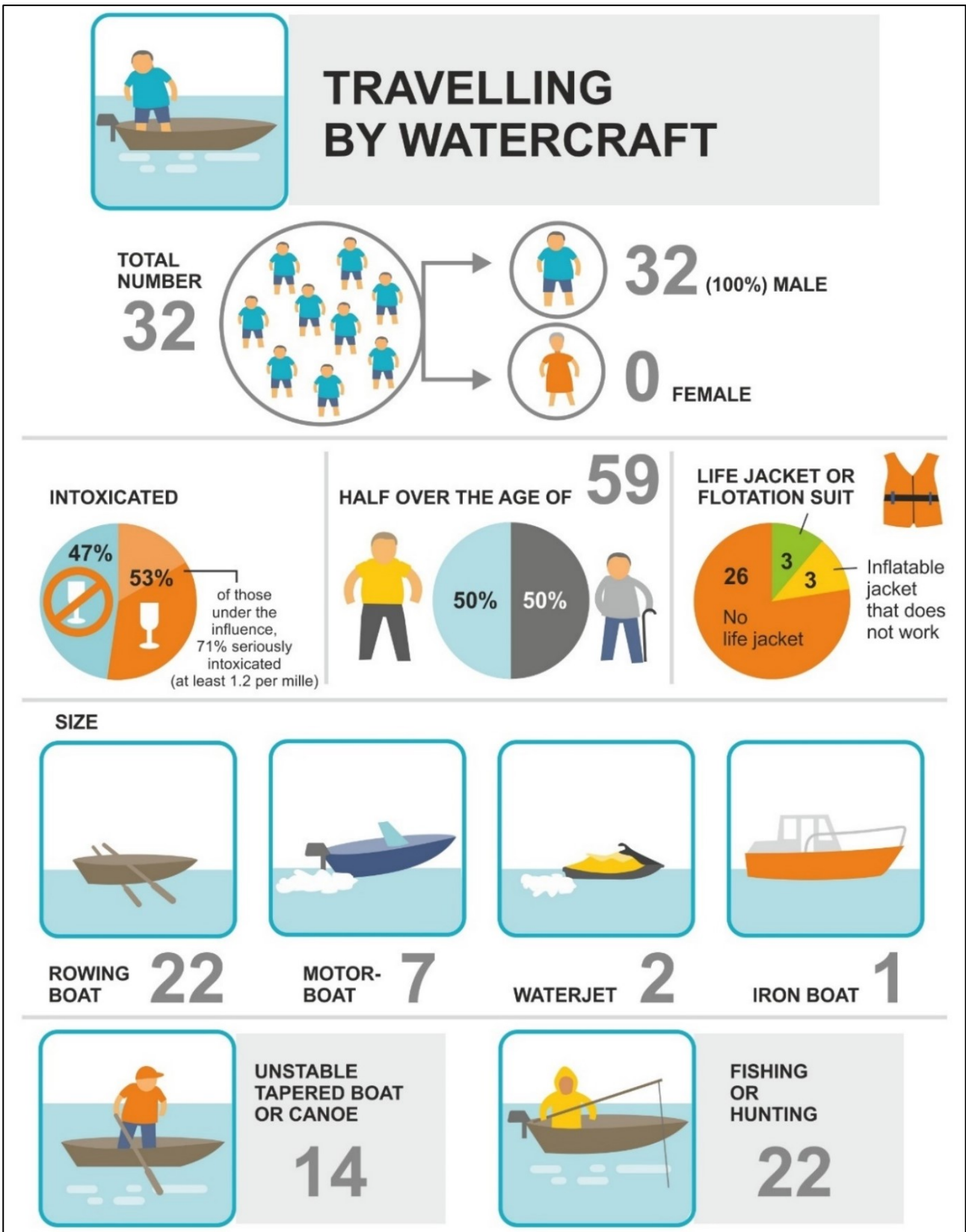


Figure 16. General information on drowning cases while travelling by watercraft. (Image by the Safety Investigation Authority)

Of the remaining three cases involving a watercraft, two involved a water jet and one a recreational iron boat. People using water jets ended up in the water because they fell off, and

in the case of the iron boat, a person fell from the deck while throwing the bow mooring line onto a pier.

Overall, the most common causes of accidents involving a watercraft are falling from the boat and the failure to wear a life jacket. Of the total number of people (32) who drowned while using a watercraft, 21 were assessed as having normal functional capacity. Four people had slightly impaired and seven significantly impaired functional capacity. Impaired functional capacity may be a contributing factor to both falling into the water and the inability to rescue oneself.

Examples of drowning cases while travelling by watercraft:

Two male pensioners were hunting for birds. They had placed decoys in the water, but the decoys had drifted too far out. They set off in a tapered rowing boat equipped with a small outboard motor to move the decoys. When they were moving the decoys, one of them stumbled, which caused the boat to begin to fill with water, starting from the stern. They tried to detach the outboard motor, but ended up in the water. One tried to keep the other afloat, but didn't have the strength. He saved himself by climbing on a nearby submerged rock, from where he was picked up by boat and taken to shore. Neither of the men wore a life jacket. Rescue divers found the drowned man at the bottom of the lake close to the boat.

A middle-aged man was spinning for fish on a lake in a tapered rowing boat equipped with an electric outboard motor. It was a beautiful and hot summer's day. He fell into the water and started shouting for help. A bystander came to the scene in a rowboat, but arrived too late. The man was seriously intoxicated and had a latent medical condition. Reportedly, he was a good swimmer. He did not wear a life jacket.

Two men went to lift fishing nets in a square-sterned four-metre fibreglass boat. The boat was equipped with a four-horsepower outboard motor. The boat hit something, possibly a sunken log. Apparently, this caused the motor to turn sideways and the boat to tilt to one side, which allowed water into the boat. The boat did not capsize, however. One of the men was able to grab the side of the boat to switch off the motor that had been left running. The other man had gone overboard and the boat had drifted far away from him, however. He tried to stay afloat with a life jacket in his hands. The man who was holding onto the side of the boat was able to shout for help and catch the attention of a person on the shore, who called the emergency services. The emergency services came to take both men ashore. The one who was farther away had been floating on the surface but still died despite of resuscitation. The men had used their life jackets as seat cushions in the boat. The man who drowned had severely limited functional capacity due to several medical conditions.

A fairly young man was on his big boat alone, with only his dog as company. He had been bathing in a sauna aboard. He was throwing the bow mooring line onto a pier when he slipped on the deck and fell over the pulpit. He was able to grab the pulpit, but rolled over it, hit his chin on the pier and fell in between the boat and the pier. The blow could have knocked him unconscious, which would have made him incapacitated. He was seriously intoxicated. Bystanders noticed that the boat was not moored, became concerned and called the emergency services. Rescue divers found the drowned man under the pier.

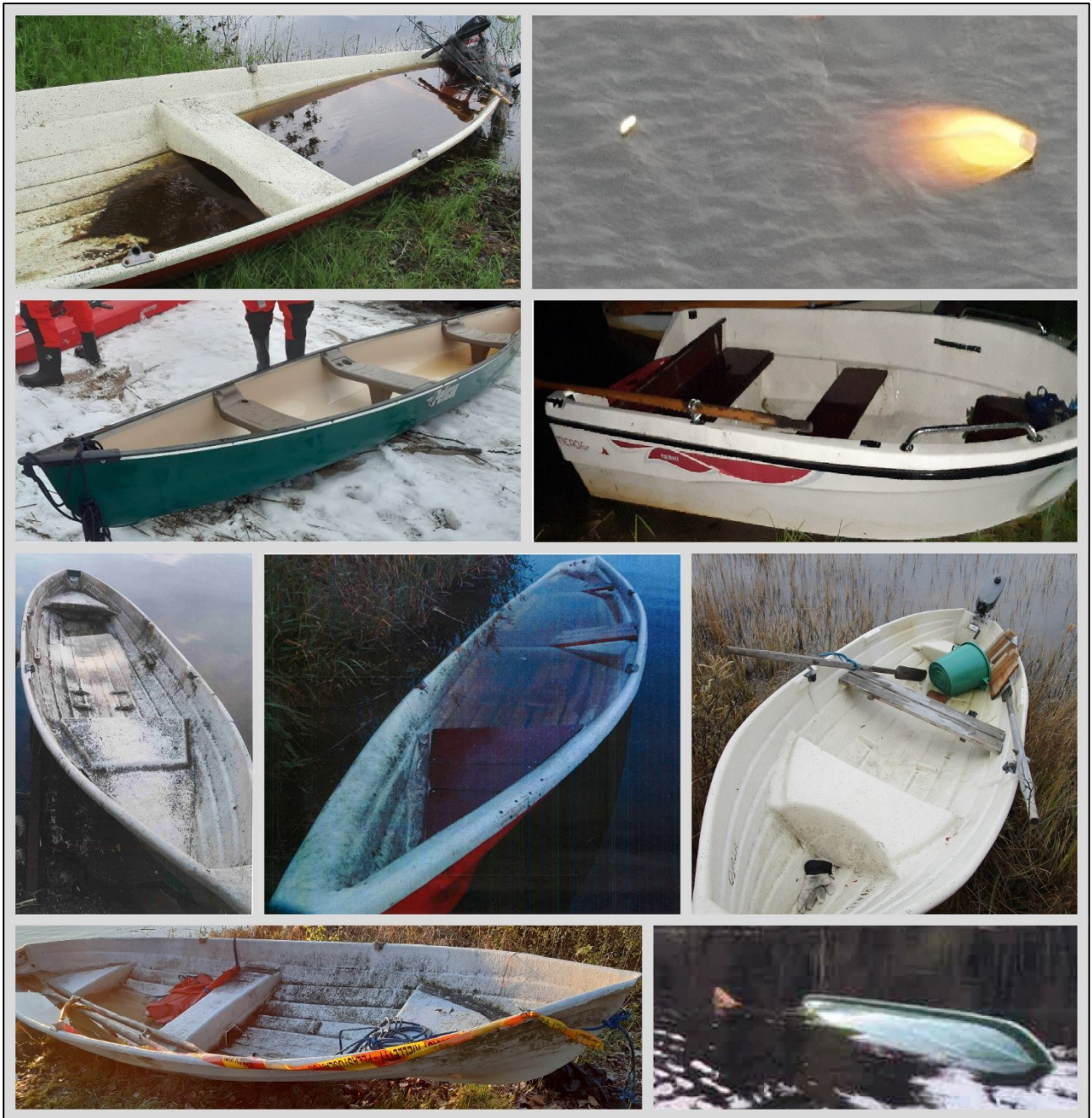


Figure 17. Rowing boats involved in drowning accidents. Most of the accidents with a boat of the rowing boat size category involved a tapered rowing boat. (Photos by the police and the emergency services)



Figure 18. Motorboats involved in drowning accidents. The motorboats were small undecked ones. (Photos by the police and the Finnish Border Guard)

The key characteristics of the drowning cases involving watercraft are good conditions and a familiar, moderately small body of water. The boats were typically rowing boats, which can be considered to be designed for the conditions and bodies of water in question. These factors may lead to an excessive sense of security that can lead to people not wearing life jackets, for example. Of those who drowned in an incident involving a watercraft, 53% were intoxicated.

2.3.4 Falling through the ice

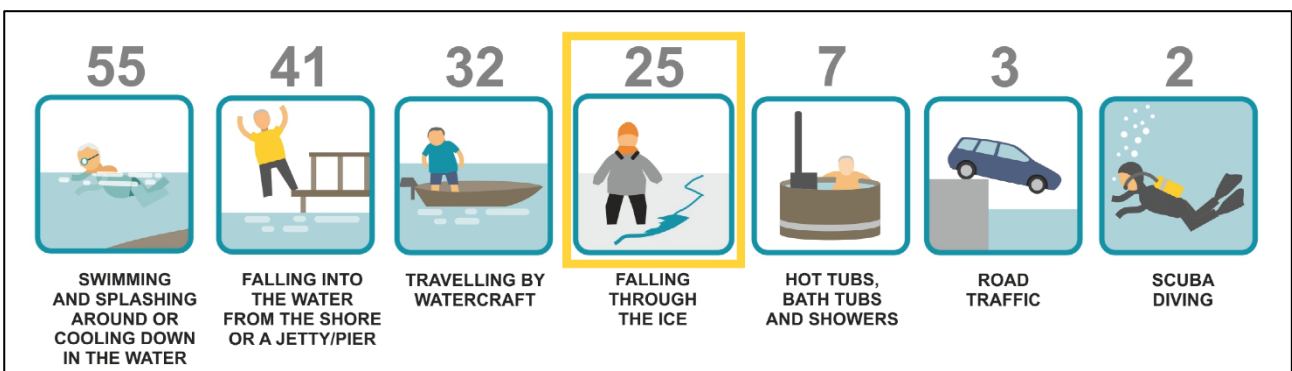


Figure 19. Nearly one sixth of all the people who drowned fell through the ice. (Image by the Safety Investigation Authority)

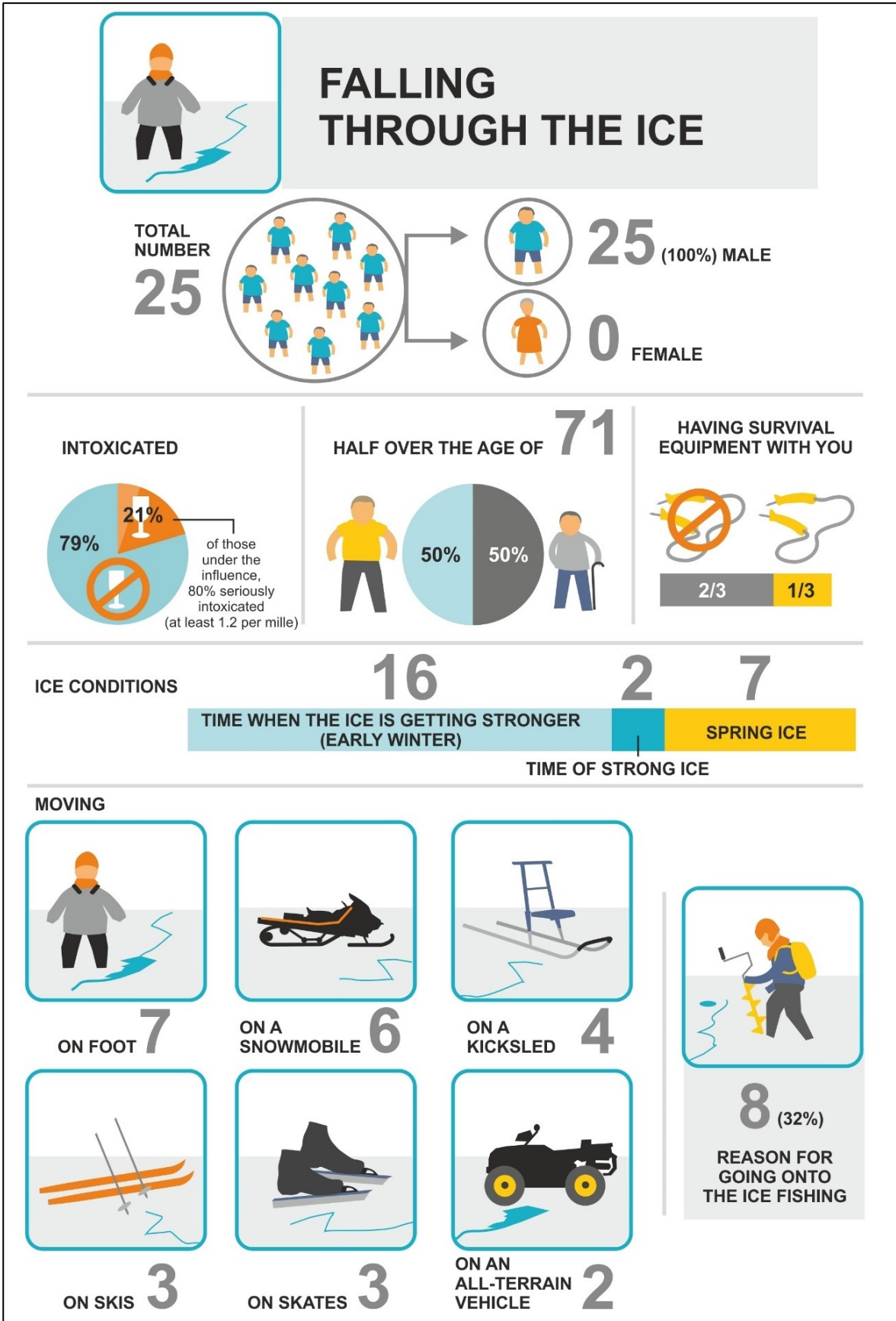


Figure 20. General information on falling through the ice. (Image by the Safety Investigation Authority)



Figure 21. Photos of locations where people drowned on the ice. (Photos by the police)

A total of 25 people drowned due to falling through the ice, all of them male. In eight of the cases, the reason for being on the ice was ice fishing or the checking of snares. A total of seven people were moving on foot, six on snowmobiles, four on kicksleds, three on skis and three on four skates. Two people drowned in one case involving an all-terrain vehicle. Two of the persons who used a snowmobile and the two persons who used the all-terrain vehicle were seriously intoxicated.

Nearly two out of every three persons who drowned due to falling through the ice had no survival equipment with them. Six of them had ice picks, and one of these six had a flotation vest. Two of them had a flotation jacket only. One of them had tried to get out of the hole in the ice with a knife.

Most of the people who fell through the ice were elderly (17 out of 25). The functional capacity of ten of them was slightly or significantly impaired. Getting out of a hole in the ice is difficult even if the person has ice picks or a piece of clothing that makes you float. Saving oneself is even more difficult if the person's functional capacity is impaired. Furthermore, hypothermia will quickly start to reduce the chances of rescue if the person is unable to get back onto the ice quickly.

The highest number of drowning cases took place between the period from November to early January (16 cases). Seven persons drowned during the melting of the ice between March and May. Two persons drowned when the ice was at its strongest, between late January and the end of February.

One of the common characteristics of the cases was the person often moving in the area and being familiar with the circumstances. In nine of the cases, it was estimated that the activity involved significant risk factors. For example, the person had gone onto the ice despite warnings or was driving a motor vehicle while intoxicated, or the ice conditions were obviously poor. Elevated risk factors were estimated to be present in 12 of the cases of falling through the ice. The elevated risk factors included moving on risky ice without any survival equipment, for example. There were no special risk factors in three of the cases.

Examples of falling through the ice:

An elderly man went out on the ice of a lake in the morning on a kicksled to ice fish. He was missed a couple of days later. During the search, tracks of the kicksled went to a place located some 100 metres from the shoreline, and there were some belongings on the ice. The man was found under the ice close to a hole he had made. He was wearing an ice fishing suit and boots, and had ice picks with him. When the man was found, one of the picks was in one of his hands and the other next to his other hand. He had likely tried to get out of the hole in the ice. He had several chronic medical conditions.

An elderly man went to a hole in the ice of a river in the daytime to see whether there was any fish in a fish trap. The edge of the ice gave way or the man slipped from the edge of the hole into the water. He may have hit his head on the edge of the ice when falling. When his car had been parked close to the shore for an unusually long time, someone went to see what was going on and found the man in the hole in the ice. He was wearing winter overalls and thermal boots. He did not have any survival equipment with him.

A middle-aged man went skiing on the ice of a lake. Later, two holes in the ice were found some 50 metres from the shoreline. The man had fallen into them. He had been able to get his skis and shoes off after having fallen into the first hole, and he had got up on his own. After having fallen into the water the second time, he had sunk below the surface and drowned. He did not have any survival equipment with him. There had been a snowfall of some 10 cm the night before. The ice was approximately 10 cm thick, but it was brittle and wasn't able to support a life raft of the emergency services, for example.

An elderly man went out on a snowmobile in the afternoon to make skiing tracks on the ice of a lake. He liked to spend time in the wild and had plenty of experience on moving on the lake. Before leaving, he had said that he would only drive close to the shoreline. He nevertheless started to cross a bay, and both him and his snowmobile fell through the ice in the middle of the bay. When the man didn't return home, his spouse called a neighbour who found the snowmobile tracks that ended in a hole in the ice. As the temperature was low, the hole was already covered by a thin layer of ice when the rescue services arrived. The drowned man was found in a hole in the ice. There were a leather mitten and a hat at the edge of the hole. He did not have any survival equipment with him, and he had limited functional capacity due to several medical conditions. The man and his neighbour had been out to raise fish nets the day before, at which time the ice had been 16 cm thick at its strongest, but clearly thinner in areas with a snow cover. There was only some 2 cm of ice at the sinking site. The water depth at the sinking site was two metres.

2.3.5 Hot tubs, bath tubs and showers

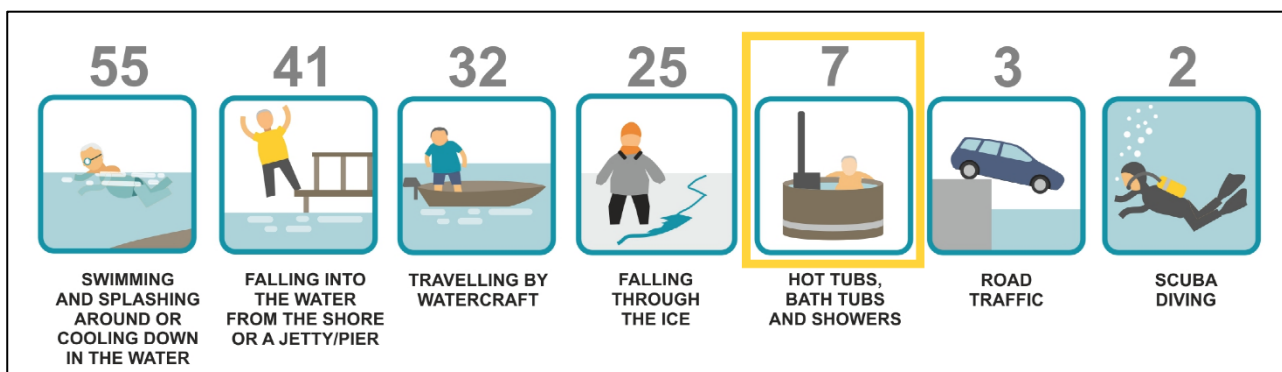


Figure 22. Approximately 4% of all the drowning victims drowned in a hot tub, bath tub or shower. (Image by the Safety Investigation Authority)

Four persons aged approximately 30, 50, 55 and 70 drowned in a hot tub. Three of them were male and one female. They had been bathing in the hot tub after the sauna. In three of the cases, they were with someone. In two of these cases, the drowning took place at a time when the person was alone in the hot tub, however. The other people present noticed what had happened when they returned to the hot tub. All four of the hot tub cases involved alcohol, and two of them also involved narcotics and pharmaceuticals.

A young woman, who was under the influence of narcotics, drowned in a bath tub. In addition, a young man drowned in a whirlpool bath as the result of a bout of illness. A man living in a nursing home developed health problems while in the shower, which caused him to collapse, blocking the floor drain. His face remained submerged.

2.3.6 Road traffic

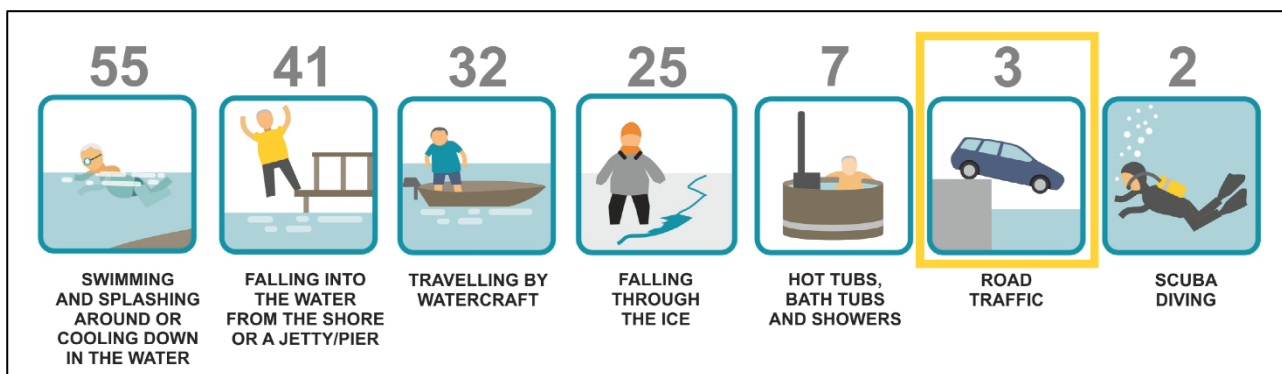


Figure 23. Three persons died in road traffic accidents. (Image by the Safety Investigation Authority)

Two road traffic accidents involved the drowning of a total of three persons. In one of the cases, two intoxicated middle-aged men drove off the road at high speed, and the car ended up in the water. They also sustained other serious injuries. In the other case, a very elderly man had a bout of illness while driving, which caused him to drive into a lake. Although he was able to make an emergency call to report the incident, he was unable to exit the car to save himself.

2.3.7 Scuba diving

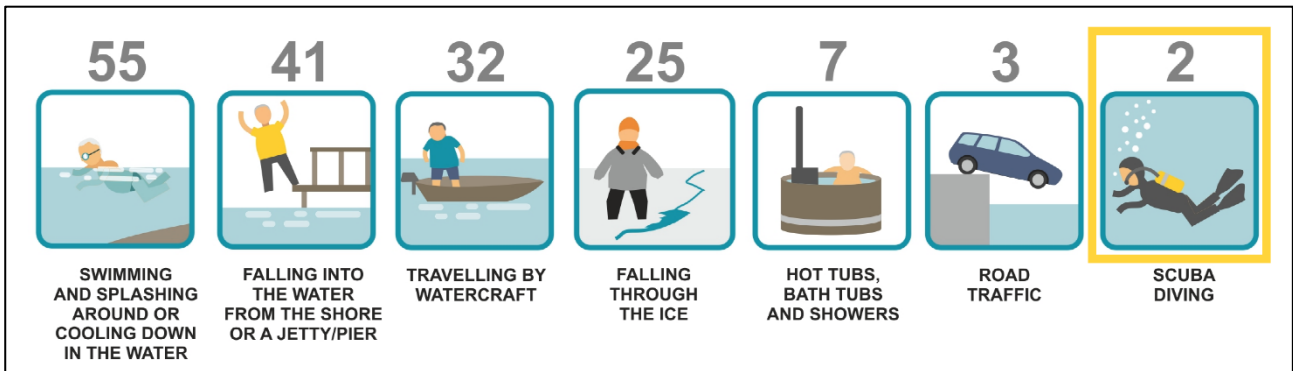


Figure 24. Two persons died while scuba diving. (Image by the Safety Investigation Authority)

Two persons died while scuba diving. A middle-aged man had an accident while diving in a mining cave. A pair of divers was diving very deep in a network of caves when one of them started to have problems. He had problems using his closed-circuit diving equipment, and the problems did not end when he switched to open-circuit tanks. When the man had switched the equipment and his diving partner had given the exit signal, both of them started to exit the cave using their underwater scooters, the man experiencing the problems leading the way. He proceeded fast and failed to stop at the agreed place. He continued to go up a route through which it is not possible to exit the cave without returning deeper to a stopping place. No safety stops were made. The man got even more into trouble, completely lost his functional capacity and finally stopped taking in breathing gas. The ascent had been too fast, and gas eventually ran out as well. The partner attempted to help by offering the man a working regulator and other gear, but then exited the cave at an accelerated pace after finding the situation impossible. A post-incident inspection of the deceased's diving equipment did not find any problems with the equipment that could have contributed to the accident.

In another scuba diving accident, a pair of divers attending a diving club's volunteer event were cleaning up a riverbed. The plan was to use a rope to lift up goods from the bottom of the river. The diving pair consisted of a middle-aged man and an elderly man. The older diver's job was to attach the rope to chairs that were at a depth of some four metres. The younger diver lost sight of his partner and surfaced to see the bubbles created by the partner. This helped him to locate his partner and dive to him. The younger diver assumed that everything was fine and continued working until he noticed, a moment later, that the older diver was rising feet first towards the surface with the rope tangled in his legs. Closer to the surface, the younger diver noticed that his partner did not have the regulator, which is part of the diving equipment, in his mouth. The younger diver and some assistants at the riverbed were able to lift the older man onto a pier, where he died despite resuscitation. Even though the older diver's general functional capacity was normal, he had medical conditions.

2.4 Location and body of water

Most of the drowning cases took place in natural waters. A total of 132 persons (80%) drowned in lakes, ponds and rivers, and 21 (13%) in the sea. A total of 12 persons (7%) drowned at a location that was not a body of water, such as a hot tub, a ditch, a well or a shower. Nobody drowned in a swimming pool.

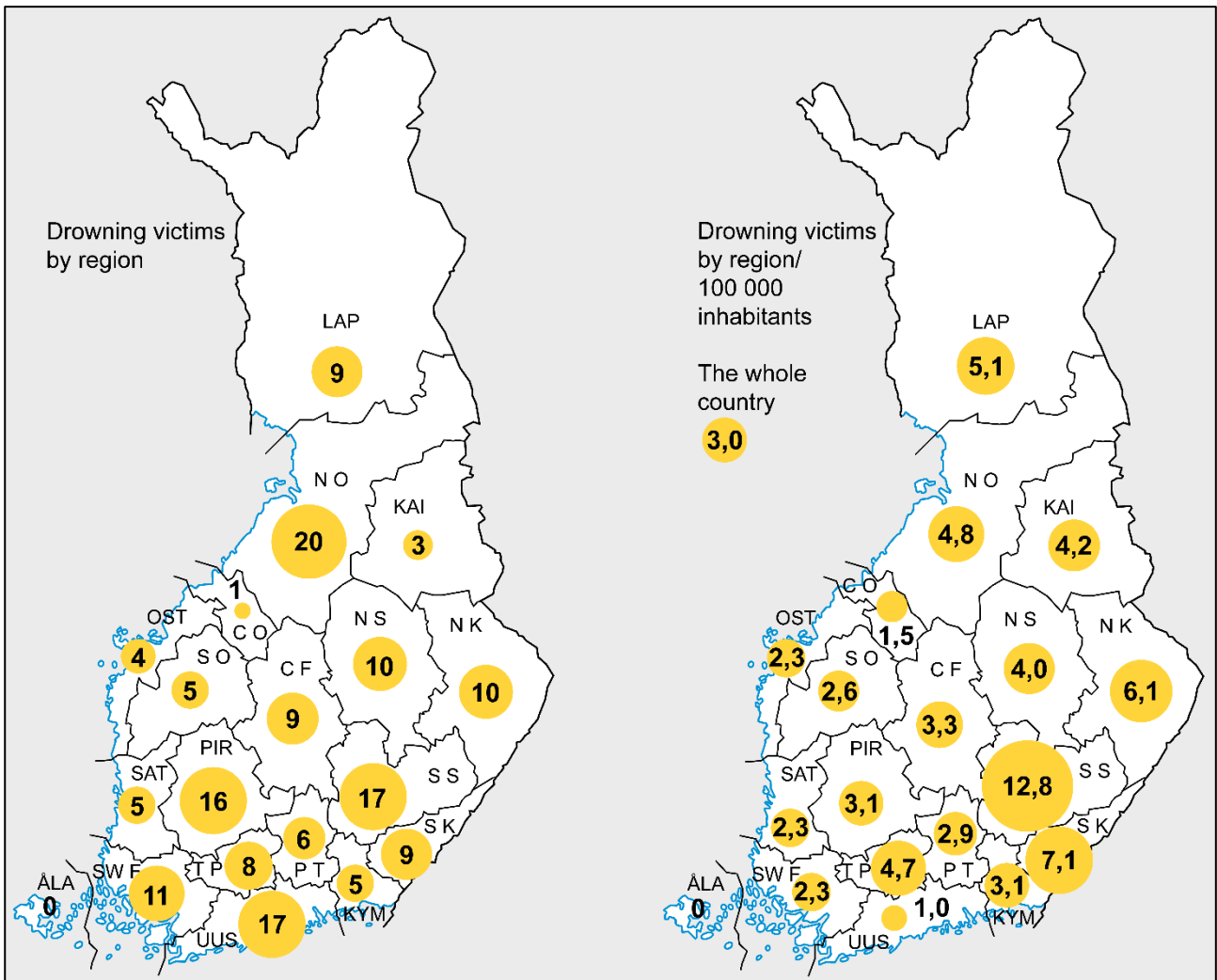


Figure 25. Number of drowning victims by region. (Image by the Safety Investigation Authority)

The number of drowning cases was relatively evenly distributed by location, with the number ranging from one to five. The figures were not higher even in the largest cities, despite the large population. Compared to the permanent population, a few regions had a high number of drowning cases, which was partly due to the high number of summer residents.

Drownings typically occur at private beaches. Ten persons drowned at public beaches. Two of them were under the age of 18 and three were middle-aged. Two of them had significantly impaired functional capacity, and the third had consumed narcotics and a large volume of alcohol. The remaining five persons were between the ages of 66 and 83. One of them was seriously intoxicated and one had several chronic medical conditions. The remaining three also had some health problems. Apparently, none of the bathing beaches were supervised, at least at the time of the incidents.

Of all the drowning cases, 59% took place 0–10 metres from the shoreline or a jetty/pier. A fifth of the victims drowned farther away, 11–50 metres from the shore, and 18% more than 50 metres from the shore. The distance to the shore is unknown in 20 cases.

Drowning cases relating to cooling down or splashing around in the water and swimming typically took place in inland lakes, ponds and rivers (51 out of 55). The remaining four persons drowned in the sea.



Figure 26. Typical bodies of water where drowning cases took place. (Photos by the police)

The majority of those travelling by watercraft for a variety of purposes (24 out of 32) also drowned in inland waterways. Eight people drowned at sea.

2.5 Intoxicants

Blood alcohol content was classified according to the limits used in road traffic: mildly intoxicated (less than 0.5 per mille), moderately intoxicated (at least 0.5 but less than 1.2 per mille) and seriously intoxicated (at least 1.2 per mille). The effects of alcohol vary from one person to the next, depending on factors such as the person's habituation to the central nervous system depressant effect of alcohol.

A total of 90 (56%) of the drowning victims were completely sober and 53 (33%) were seriously intoxicated. Nine were moderately and five mildly intoxicated. Most of the intoxicated persons were seriously intoxicated, and in seven of the cases, the blood alcohol content was 3 per mille or more. Eight persons had used narcotics or pharmaceuticals. Five of them had in their blood only narcotics or pharmaceuticals used for the purpose of becoming intoxicated, and three also had consumed alcohol. Two of the victims were still missing at the time of the writing of this report, which is why there is no information on any intoxicants they might have used. Substance abuse data for one of the victims was not available for other reasons.

Moderate to serious intoxication was most common in the age group of 18–75. More than half of the victims falling in this age group were at least moderately intoxicated or under the influence of narcotics and pharmaceuticals.

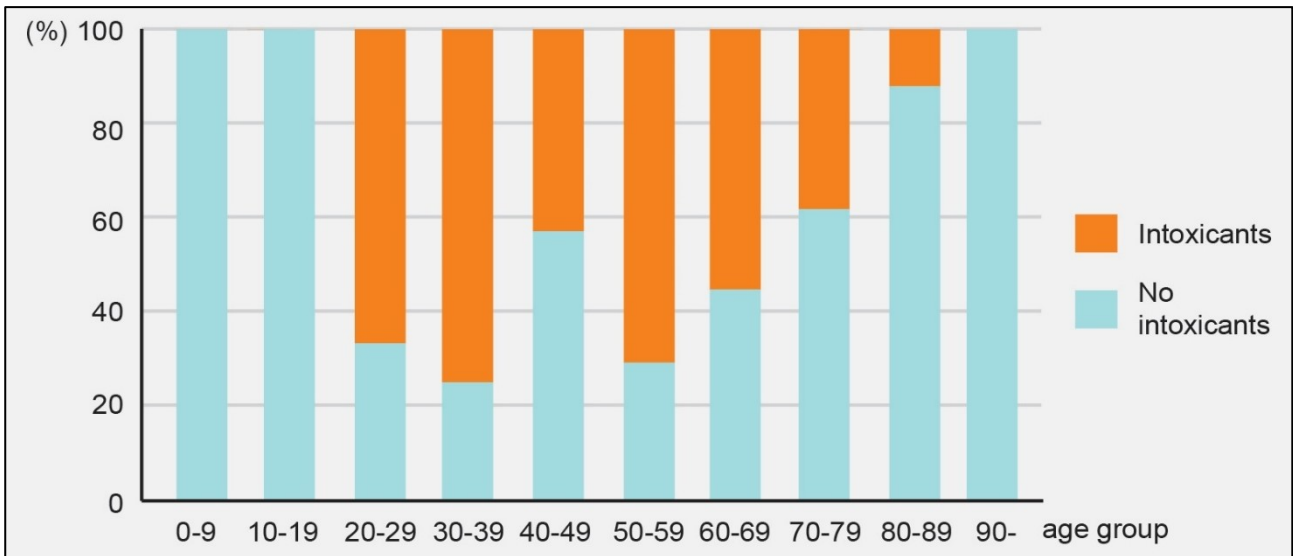


Figure 27. Share of intoxicated persons by age group. (Image by the Safety Investigation Authority)

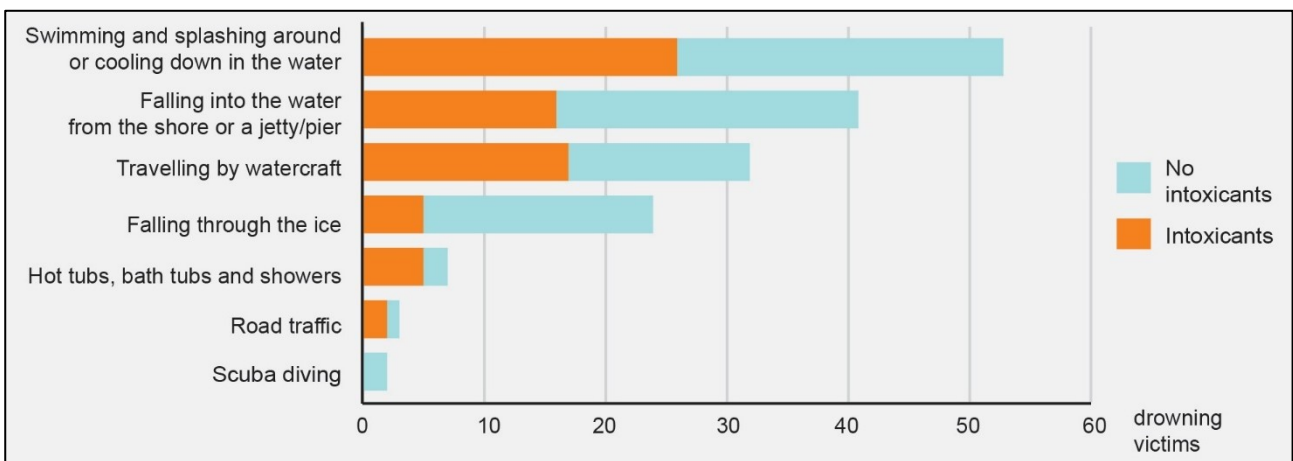


Figure 28. Drowning cases classified by the nature of activity and the use of intoxicants. (Image by the Safety Investigation Authority)

The highest proportion of persons drunk on alcohol was among those who had gone into the water to splash around, cool themselves or swim, as well as among those who travelled by watercraft for some purpose. Half of the persons in these groups were at least moderately intoxicated. Of the 32 persons who drowned while using a watercraft, 15 were completely sober and 17 were intoxicated. The blood alcohol content of 13 of the intoxicated persons was above the threshold for drunk driving a boat, 1.0 per mille. Six of them were using a boat with a motor. A little over a third of the persons who accidentally fell into the water were at least moderately intoxicated.

Of those who had used narcotics or pharmaceuticals to become intoxicated (8), one drowned because of skating into thin ice, one drowned in a hot tub and one drowned in a bath tub. Three persons drowned because they fell into the water, one of them while on their way for a swim. One drowned while swimming and one after going into the water to dive for a mobile phone that had been dropped into the water.

Alcohol has a paralysing effect on the central nervous system. Its effects can be divided into mental and motor ones. The mental effects include but are not limited to reduced caution, impaired judgement and heightened emotional reactions. The mental effects occur already at

a low blood alcohol content. The motor effects become more pronounced as the blood alcohol content rises. Balance and general motor coordination are affected. An extremely high blood alcohol content will lead to the loss of consciousness or passing out. Intoxication is also a major stress factor for the body, the heart in particular.

Several pharmaceuticals have effects similar to alcohol. Narcotics, on the other hand, have mainly mental effects. Amphetamine, in particular, makes a person more likely to take risks and be reckless.

A typical characteristic of the boating incidents was a person falling off the boat. The impaired motor coordination and balance caused by alcohol increase the risk of losing one's balance aboard a boat. The risk is more pronounced if the boat is small and unstable. A person under the influence of alcohol may also forget to put on a life jacket. Another factor is the impact of intoxication on the ability to rescue oneself. The decisions one makes while intoxicated are not necessarily optimal. Furthermore, the extra stress alcohol puts on the body can impair the ability to rescue oneself, especially in the case of persons with medical conditions. In the cases involving swimming and splashing around or cooling down in the water, the strain alcohol causes on the body may have been one of the causes of drowning, in addition to the risk-taking. Five of the six drownings in hot tubs or other small pools were caused by the person passing out because of intoxicants.

Examples of accidents involving intoxicants:

A seriously intoxicated elderly man was driving a snowmobile on the ice of a lake. It was dark and snowing heavily. He lost his way and drove into a strait where the snowmobile's rear started to sink through the ice. At this point, the man was still dry, and he attempted to escape by crawling. However, he was mistaken about the direction of the shoreline and the stronger ice. He crawled towards the unfrozen water and drowned.

Two middle-aged men went fishing in a tapered rowing boat. Both were seriously intoxicated. One of them fell from the boat near the shore. The boat capsized while the other was trying to help the one who had fallen into the water. Someone managed to throw a life preserver from the shore, with which one of the men was able to stay afloat, trying to keep the other one afloat as well. He didn't have enough strength, and the second man drowned. There were life jackets in the boat, but the men had not put them on.

2.6 Survival equipment

Six of the 32 people who drowned while travelling by watercraft were wearing survival equipment, two of them a traditional life jacket and one a flotation suit. Three persons were wearing inflatable life jackets that did not function as expected. One jacket was missing a gas canister, the second did not inflate for some reason and the third person was wearing their jacket incorrectly. In all three cases, the chances of rescue would have been higher had the life jacket worked properly. In at least three cases, there were life jackets in the watercraft, but the persons did not wear them.

Only two of the cases involving a watercraft were such that a life jacket would probably not have helped. In one case, the person who fell into the water sustained serious injuries and in the other, the person had severely limited functional capacity due to several medical conditions. Using a life jacket or the life jacket functioning correctly would have helped 19 of the people to rescue themselves with a moderate degree of certainty, and it may have helped an additional five. In the remaining cases, the person had severely limited functional capacity or had suffered injuries that prevented them from rescuing themselves.

Survival equipment can also be used when boarding or disembarking a boat. Nine people drowned while falling from a boat dock in such situations, and seven of them might have been

saved had they been wearing life jackets. Functional capacity of two of them was so poor that a life jacket would most likely not have helped.

Nearly two out of every three persons who drowned due to falling through the ice had no survival equipment with them. A total of six persons had ice picks and two were wearing a flotation jacket. One had ice picks and was wearing a flotation vest. One had a knife that he tried to use to rescue himself.

It is difficult to assess the impact of the lack of survival equipment in the case of the 25 persons who drowned because they fell through the ice. Getting out of a hole in the ice is difficult even if one has ice picks. In nine of the cases, the drowning victim had some kind of a tool that could have assisted him in getting out of the hole in the ice or that allowed him to float, but he did not manage to get out anyway. In ten of the cases, the person might have been saved had he had survival equipment with him and had he used them. In seven of the cases, the person's functional capacity was impaired due to medical conditions to such an extent that even survival equipment would not have likely assisted him in getting back onto the ice.



Figure 29. Photos of survival equipment. On the left, an inflatable life jacket that had been packaged or put on incorrectly, which is why it did not work as intended. On the right, an example of the attempt of a person who fell through the ice to use ice picks. (Photos by the police)

2.7 State of health and functional capacity

Functional capacity of the drowning victims was assessed on the basis of available medical records, information obtained during the police investigation and information collected by the investigation team. There were three categories: normal, slightly impaired and significantly impaired functional capacity. A person's age was not taken into account in the assessment as a separate factor, because there are large differences in the functional capacity of people even at an advanced age. It was the known functional capacity of the person prior to the accident that mattered. The assessment of functional capacity prior to the accident did not take into account the effect of alcohol or other intoxicants, either. A known history of long-term alcohol abuse was recorded as a factor reducing the functional capacity if it was known to have caused other health problems. The aim was to determine the person's actual functional capacity without any intoxicants.

It was possible to assess on the basis of the forensic medical examination matters such as whether the victim had sustained injuries when falling into the water that would have reduced their functional capacity. Such injuries were detected in eight cases. Factors influencing performance, such as intoxicants and medical conditions that were not known during the person's lifetime, could also be identified. These were recorded as factors reducing functional capacity. Functional capacity prior to the accident was deemed normal in several

cases where the post-mortem examination revealed serious medical conditions that were not known or that were previously asymptomatic.

Functional capacity was deemed normal in 89 (54%), slightly impaired in 30 (18%) and significantly impaired in 44 (27%) of the cases. It should be noted, however, that of the persons with normal functional capacity, 39 (44%) were moderately or seriously intoxicated. A little less than a third of the persons with slightly or significantly impaired functional capacity were at least moderately intoxicated.

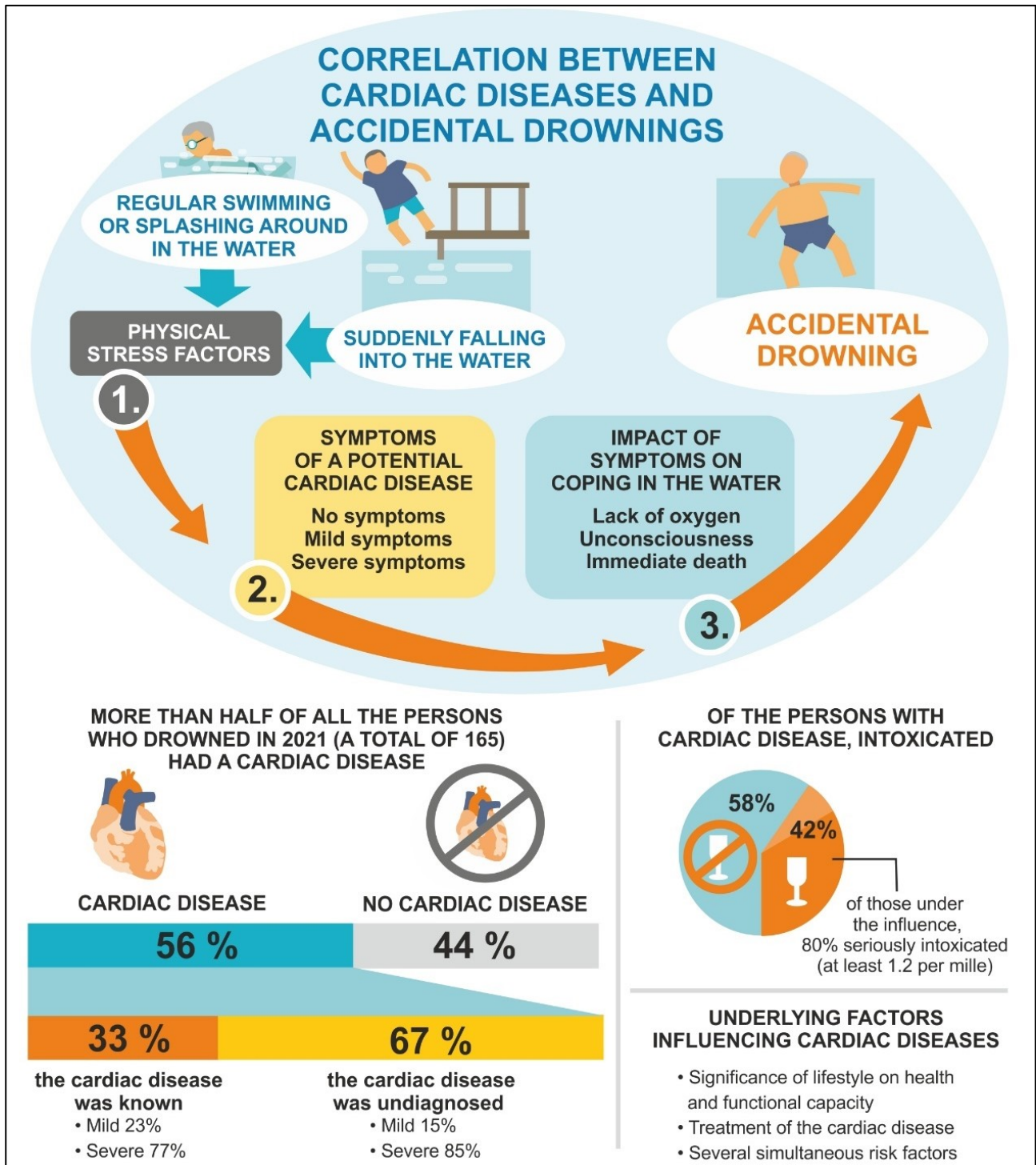


Figure 30. Information on cardiac diseases of the drowning victims. (Image by the Safety Investigation Authority)

A total of 29 persons did not have any health problems detected prior to the accident or during the post-mortem examination. The most common diagnosed health problem was a mild or severe cardiac disease, in the case of a total of 93 persons (56%). Many of them also had other medical conditions. Typically, the cardiac disease was not previously known to them. There were 62 such cases.

Pain in the chest area is common and often caused by non-heart related problems. The symptoms of coronary artery disease can also range from asymptomatic oxidative stress of the heart muscle to sudden cardiac death. Sometimes the only symptom of coronary artery disease is transient shortness of breath during exertion. Such exertion may be caused by the heat of a sauna, rowing, swimming or cool water, for example. Coronary artery disease does not always give any warning signs, and sudden cardiac death may be the first detectable symptom of the disease. In general, a little over half of the persons who have a coronary artery attack are over the age of 75 and more than 60% are female.

There were 14 persons with multiple medical conditions in the dataset. Neurological diseases had been diagnosed in 15 persons and musculoskeletal disorders in 11 persons. A total of 18 persons were long-term alcohol abusers. The large number of various types of medical conditions is understandable given the high average age of the drowning victims.

In 156 of the cases, the recorded cause of death was an accident, while in six cases, a medical condition detected during the post-mortem examination was recorded as the cause of death. The cause of death remained unclear in two cases. These cases were not excluded from the dataset, because they still occurred in the water and may have involved the inhalation of water. It is likely that these cases were cardiac ones that did not involve any unequivocal immediately fatal changes. The persons might have survived had they experienced the bout of illness on dry land. The most common factors contributing to death were intoxication due to the consumption of alcohol and different types of cardiovascular diseases. There were no contributing factors in 25 of the cases.

2.8 Risk level of activity

The level of risk associated with the drowning incidents was defined using a three-point scale: normal, elevated and significant risk. The risk level was examined through the factors contributing to the cases, and it does not directly reflect the conscious risk-taking of the drowning victim. Activities such as the following were assessed as activities with an elevated risk level:

- Consciously going onto very thin ice
- Boating without wearing a life jacket
- Moving on the ice without any survival equipment
- A person with a known cardiac disease engaging in an activity that requires exertion
- Poor condition of the swimming beach or jetty of a summer cottage (a dangerous environment)
- An unstable means of transport (boat) that is unsuitable for the user or the intended use
- The person having been warned of the risk associated with the activity
- Moderate intoxication (0.5–1.2 per mille) combined with boating

A risk was considered significant when several elevated risk factors were involved. Examples:

- Heavy intoxication (more than 1.2 per mille) combined with boating
- A person who does not know how to swim boating without a life jacket

- A person with reduced mobility going into the water to cool down at a difficult to access beach of a summer cottage
- A person with a known cardiac disease bathing in the sauna and splashing around in the lake alone while seriously intoxicated (more than 1.2 per mille)

Examples of cases where the risk level of the activity was normal

- A tour skater wearing a flotation vest and carrying ice picks falling through ice that is strong enough for such activity
- A person fishing in a boat with a life jacket on close to the shoreline when the water is warm
- A person with normal functional capacity bathing in the sauna and swimming with a blood alcohol content of 0.6 per mille
- A person walking close to the shoreline and accidentally slipping into the water

The risk level of the activity was deemed normal in 45 of the cases (27%), while the risk level was deemed elevated in 72 (44%) and significant in 46 (28%) of the cases. In two of the cases, the information about the incident was so incomplete that it was not possible to estimate the risk level. All in all, the risk level was elevated or significant in more than 70% of the cases.

2.9 Point in time

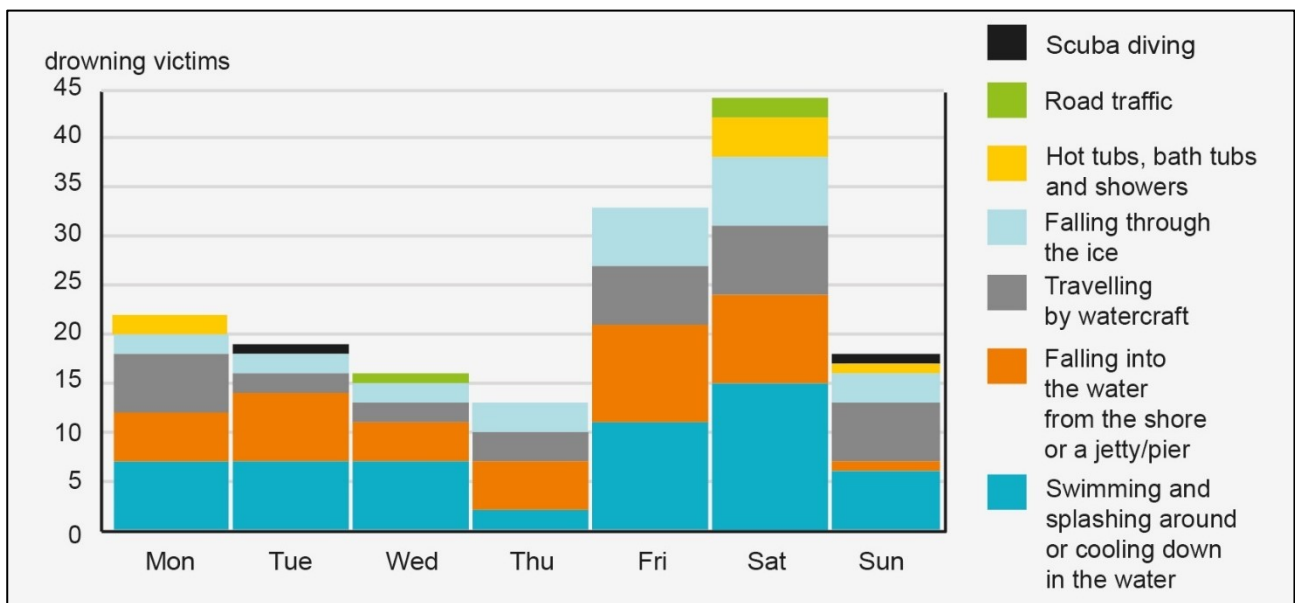


Figure 31. Drowning cases by day of the week, divided by type of activity. (Image by the Safety Investigation Authority)

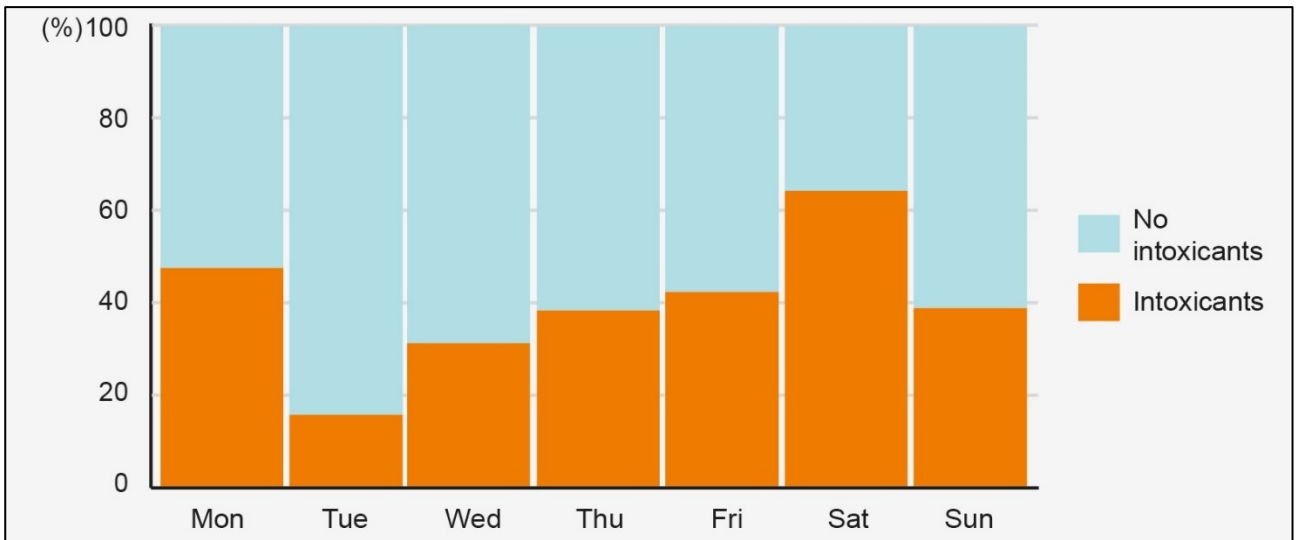


Figure 32. Involvement of intoxicants by day of the week. (Image by the Safety Investigation Authority)

Saturday (44 cases) and Friday (33 cases) were the most common weekdays on which accidents took place. Combined, these two days of the week accounted for little less than half (47%) of the cases. The number of drownings on other days of the week was 13–22.

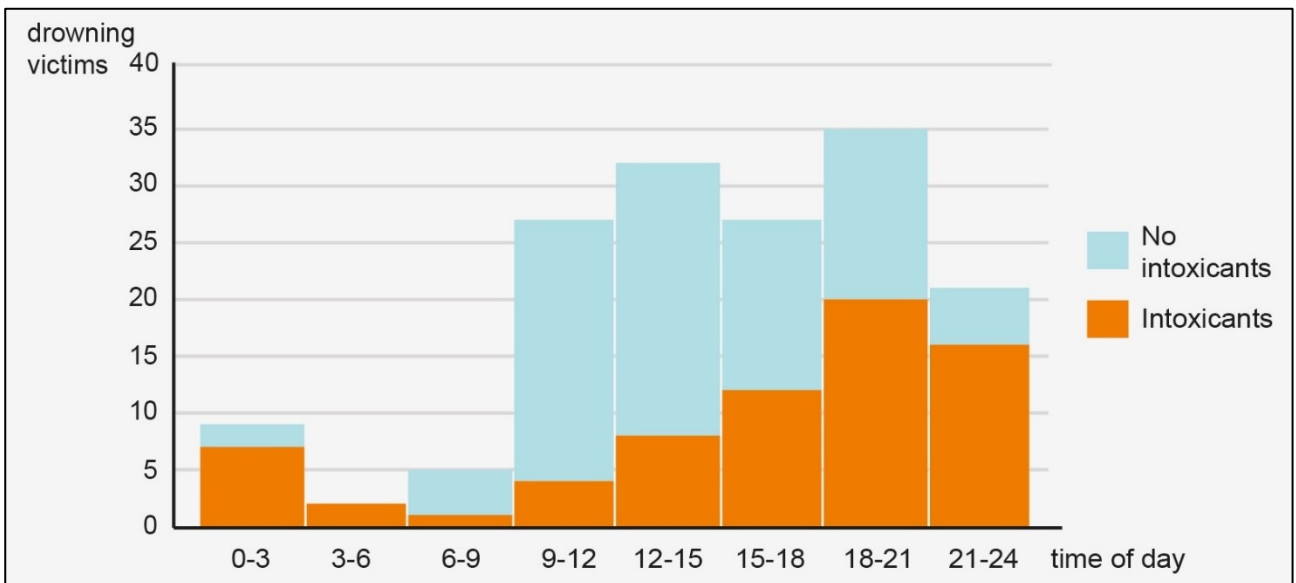


Figure 33. Drowning cases by time of day, divided based on substance use. (Image by the Safety Investigation Authority)

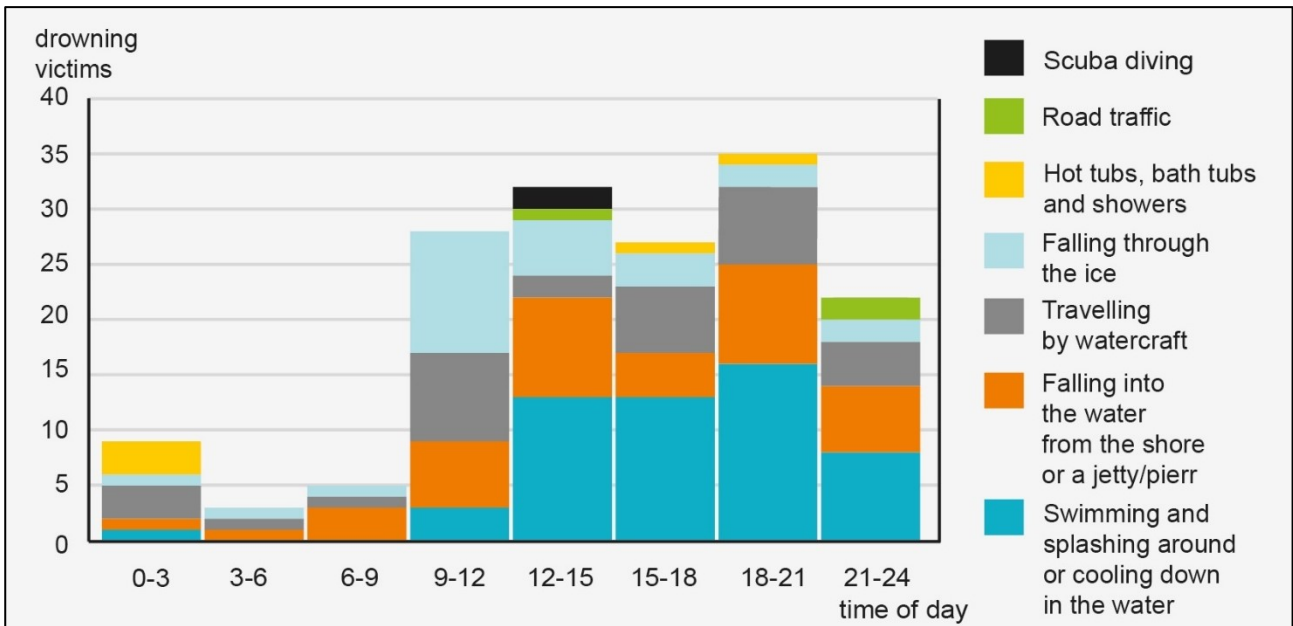


Figure 34. Drowning cases by time of day, divided based on the type of activity. (Image by the Safety Investigation Authority)

The exact time of day was not known in 26 of the cases. Of the cases for which the time of day is known, half occurred in the daytime, i.e. between 10 am and 6 pm. A little less than a third occurred in the evening, between 6 pm and 10 pm. A total of 17 persons drowned at night, between 10 pm and 6 am, and ten persons in the morning between 6 am and 10 am.

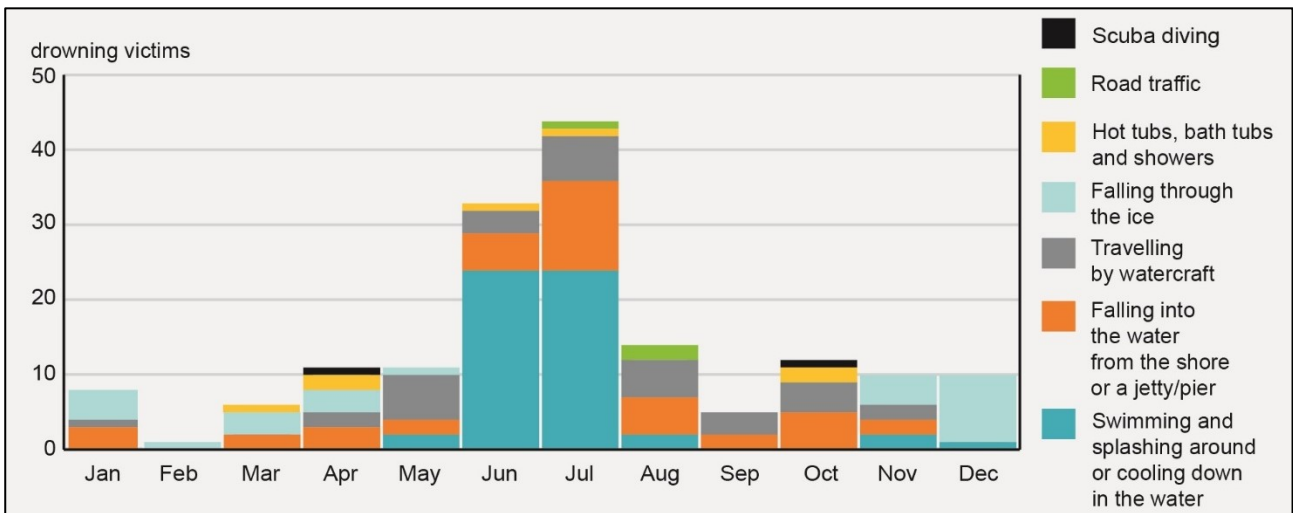


Figure 35. Drowning cases by month, divided based on the type of activity. (Image by the Safety Investigation Authority)

A total of 19 persons drowned during the winter months (December to February), 28 during the spring months (March to May), 91 during the summer months (June to August) and 27 during the autumn months (September to November).

There was an exceptionally long hot period during the summer of 2021: the temperature in some part of Finland exceeded 25°C almost every day in June and July. It is likely that this increased the amount of time people spent by the water and the need to cool down. The Midsummer week was hot in practically the entire country.

The summer months saw the highest number of drowning cases, with the incidents concentrated at the weekends. A total of 11 persons drowned during the first three weekends of June, and 13 persons drowned during Midsummer (24–27 June). In July, four people drowned over the weekend of 2–4 July, seven during the weekend of 9–11 July and eight during the weekend of 16–18 July, after which time the number of drowning cases on summer weekends clearly decreased. The number of drowning cases during Midsummer was somewhat higher than during the few peak weekends in July, but almost the same numbers were recorded on the other weekends in July as well. The highest daily number was six, on two different days. In addition to the good weather, the number of drowning cases was likely influenced by the summer holiday season.

The number of drowning cases during Midsummer⁴ can be compared to the temperature⁵. On average, 5.5 persons have drowned during the Midsummer weekend (Thursday to Sunday) in the past ten years (2011–2020). Between 2011 and 2020, there were five Midsummer weekends when the temperature in Finland exceeded 25°C. The average number of drownings during these years was 8.4. The temperature did not exceed 25°C in any part of Finland during five Midsummer weekends, during which the average number of drowning cases was 4.3.

The number of drowning cases during the summer months⁶ can also be compared with the number of hot days during the month. The drowning cases in June and August are clearly not linked to the heat of the month, but the number of drowning cases in July seems to correlate with the number of days during which the temperature exceeded 25°C.

⁴ Finnish Swimming Teaching and Lifesaving Federation. 11 May 2022.

https://www.suh.fi/tiedotus/hukkumistilastot/juhannuksena_hukkuneet.

⁵ Finnish Meteorological Institute. 11 May 2022. <https://www.ilmatieteenlaitos.fi/helletilastot>.

⁶ Finnish Swimming Teaching and Lifesaving Federation. 11 May 2022. <https://www.suh.fi/tiedotus/hukkumistilastot>.

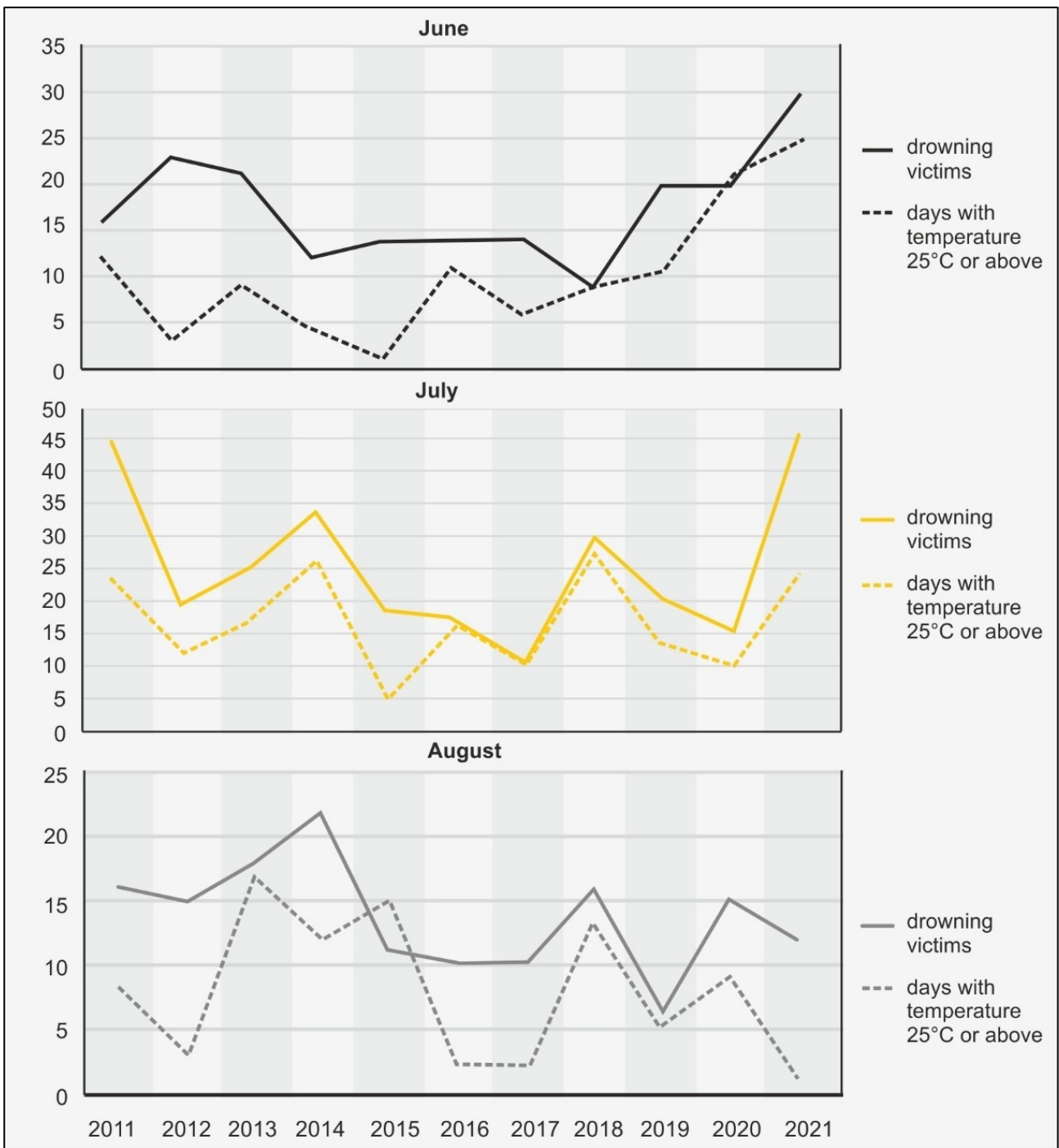


Figure 36. The number of days with the temperature exceeding 25°C and the number of drowning cases during the summer months in 2011–2021. The number of hot days correlated with the number of drowning cases only in July. (Image by the Safety Investigation Authority)

The investigation examined the significance of the temperature of the air on drowning cases that occurred during swimming, splashing around or cooling down in the water, based on the location and the time of drowning. In 12 cases, the temperature of the air was less than 20°C. The anticipated functional capacity of two of these drowning victims was slightly or significantly impaired. A total of 21 persons drowned when the temperature was 20–25°C, 13 of whom had slightly or significantly impaired functional capacity. A total of 22 people drowned at a temperature of more than 25°C, of whom twelve had slightly or significantly impaired functional capacity.

This means that in the majority of the drowning cases involving swimming or splashing around or cooling down in the water, the temperature of the air was at least 20°C. On average, the functional capacity assessed prior to the accident of those who drowned in warm weather was poorer than the functional capacity of those who drowned in cool or cold weather.

Of the persons who drowned at a temperature of more than 25°C, 15 had a mild or severe cardiac disease that either had been diagnosed prior to the accident or was only discovered during the post-mortem examination. However, the functional capacity prior to the accident was assessed as normal in the case of some of these persons. Similarly, 14 persons with a mild to severe cardiac disease drowned at a temperature of 20–25°C. Of the twelve persons who drowned in cooler temperatures, ten had a mild or severe cardiac disease that was detected either before or after the accident. However, functional capacity prior to the accident was assessed as normal for most of them, and the cardiac disease had not been diagnosed prior to the accident.

Of the persons who drowned at temperatures above 25°C, 14 out of 22 and of the persons who drowned at temperatures of 20–25°C, 15 out of 21 were aged 65 or over. Nine out of the twelve persons who drowned at cooler temperatures (below 20°C) were aged 65 or over.

Nine persons were moderately or seriously intoxicated at both the temperature of 20–25°C and the temperature of more than 25°C, compared to six in the cooler temperatures. The share of intoxicated persons was thus higher among those who drowned at cooler temperatures.

When compared to the temperature of 20–25°C, hot weather does not seem to accentuate the effect of the poor functional capacity of drowning victims. However, a considerable share of those who drowned when the temperature was below 20°C had a cardiac disease. They were also older than those who drowned when the temperature was higher.

2.10 Swimming skills

The swimming skills of Finns have been surveyed among sixth-graders and conscripts, but there is no comprehensive data on the swimming skills of people in different age groups and segments of the population. According to the Nordic definition, a person who is able to swim for 200 metres continuously, of which at least 50 metres backstroke, after having jumped into water of swimming depth can swim. According to a survey performed in 2016⁷, 76% of sixth-graders are able to do this. One per cent stated that they could not swim at all, and the remaining 23% estimated that they could swim 10–200 metres.

In a survey performed in 2001–2004, 4% of conscripts could not swim. Around 13% had poor swimming skills, i.e. could swim 25–200 metres. The rest, more than 80%, could swim more than 200 metres. In a more recent survey (2012–2020), more than 90% of conscripts could swim more than 200 metres. A total of 7% had satisfactory swimming skills, i.e. could swim 50–200 metres.

The swimming skills of adults vary considerably between age groups. According to a 2011 survey⁸, swimming skills of the middle-aged population are significantly poorer than the younger age groups. Of persons aged 15–24, 86% could swim, compared to 49% of persons

⁷ Hakamäki, M. (2016). *Kuudesluokkalaisten uimataito Suomessa*. Liikunnan ja kansanterveyden julkaisu 323. 11 May 2022. <https://docplayer.fi/32173299-Kuudesluokkalaisten-uimataito-suomessa.html>.

⁸ Rajala, K. and Kankaanpää, A. (2012). *Kuudesluokkalaisten ja aikuisten uimataito Suomessa vuonna 2011*. Liikunnan ja kansanterveyden julkaisu 259. Katajamäki Print & Media/Painohäme. 11 May 2022. https://www.suh.fi/files/200/uimataitoraportti_fin.pdf.

aged 55–64. Women in this age group were particularly poor swimmers, with less than half of them able to swim.

At the time of the investigation at hand, the people in the older age group of the 2011 survey are between the ages of 65 and 74. One can assume that their swimming skills have certainly not improved, and that the swimming skills of the older age groups are not likely to be any better. It is likely that the younger generations will be able to swim better than those born around the mid-20th century also when they are elderly.

There is no comprehensive information on the swimming skills of the drowning victims in the investigation dataset. That piece of data is completely missing in more than half of the cases (58%). A total of 33% of the drowning victims have been reported to be able to swim at least to some extent, and 9% of them have been reported as having no swimming skills.

Of the 55 persons who drowned while swimming or cooling down or splashing around in the water, 32 could swim at least to some extent. Five of them could not swim. There was no information on 18 of the persons. It can therefore be concluded that in most of the cases, the problem was something other than the lack of swimming skills. Furthermore, many of the incidents took place close to the shoreline or in shallow water. In the different types of cases where a person fell into a body of water, five of the persons were reported as not being able to swim and ten as being able to swim. No information was available on the swimming skills of most of the victims. In the cases involving watercraft, 5 of the 32 drowning victims were reported as not being able to swim and 5 out of the 32 were reported as being able to swim. There is no information on 22 of the victims.

Seven of the persons who fell through the ice were reported as being able to swim. There is no information on the swimming skills of the rest. The significance of swimming skills when falling through the ice is not certain. A person who knows how to swim will be able to more effectively kick themselves out of the hole in the ice, but many other factors, such as physical condition, also play a key role. According to the dataset, even having survival equipment does not guarantee rescue.

Based on the descriptions of the accidents, potential significance of swimming skills in each case was assessed during the investigation. Based on the descriptions, almost all of the cases involving swimming or cooling down or splashing around in the water were such that swimming skills would be relevant in a similar situation. The significance of swimming skills is not so clear in the different cases of falling into a body of water. Based on the descriptions of the circumstances, the significance of swimming skills is clear only in a few of the cases. Swimming skills could have played a role in two thirds of the cases and swimming skills were irrelevant in a third of the cases. A similar estimate suggests that swimming skills would have been relevant in all but two of the cases involving watercraft.

In 2021, two persons under the age of 18 with an immigrant background accidentally drowned. The lack of swimming skills among immigrants has been observed in several contexts. Several children and young people with an immigrant background have drowned in recent years. This appears to have been caused by their poor swimming skills and their lack of familiarity with water, which has caused them to overestimate their abilities and underestimate the danger posed by water. There have been indications that they went along with other people they saw splashing around in the water even though they did not know how to swim. Controversies over the proper attire at an indoor swimming pool and nudity requirements have presumably reduced participation in swimming lessons and the use of indoor swimming pools. The same obstacles are likely to occur also among people other than

immigrants, however. There are indications that immigrants are motivated to learn how to swim and make sure that their children also learn how to swim.

2.11 Cases with several victims

There were five cases with several victims. In the first one, a very elderly couple was spending time at their summer cottage. They went for a swim before bathing in the sauna. Both of them were found drowned in the water near the shoreline. In the second case, two men went fishing on a lake in a small rowing boat equipped with an electric outboard motor. The boat capsized and the men ended up in the water. The boat sank because the plugs of its buoyancy tanks were open. Neither of the men wore a life jacket. In the third case, a seriously intoxicated middle-aged couple was returning to their houseboat after a night out. The man fell into the water and the spouse also ended up in the water. Both drowned. In the fourth case involving two drowning victims, an all-terrain vehicle where two people can sit side by side sank through the ice of a lake and both people in the cabin drowned. The fifth case was a traffic accident in which a car ended up in a lake because it was driven to a bend at excessive speed. Two middle-aged men drowned in the accident.

There are six accidents in the dataset involving not only the drowning victim but persons who tried to rescue them ending up in the water. In the first one, an intoxicated couple was riding a water jet. The water jet fell over and both ended up in the water. The man drowned, but the woman was rescued. She was wearing a life jacket. In the second case, a small outboard motor boat took on water during a heavy swell, and the three men who were onboard ended up in the water. One of them was able to rescue himself by swimming to the shore and another one by holding onto the capsized boat, which did not sink. All of them, including the one who drowned, were wearing a life jacket. In the third case, two men were travelling in a small tapered rowing boat equipped with a small outboard motor. The boat tilted, and both men ended up in the water. One of them could not swim, and the friend was unable to carry him. The man who could swim rescued himself by swimming to a nearby submerged rock. Neither of them were wearing a life jacket.

In the fourth accident, a small outboard motor boat reportedly capsized after having hit a sunken log, and the two men in the boat ended up in the water. One of them was able to rescue himself by holding onto the boat, which did not sink. There were life jackets in the boat, and the man who drowned was holding one in his hands. In the fifth accident, two intoxicated men drove their snowmobile into unfrozen water. One of them managed to get up onto the ice and rescue himself, but the other drowned. In the sixth accident, three persons ended up in the water after a canoe capsized. Two of them were able to rescue themselves by swimming to the shore. All were wearing a life jacket, but the one who drowned was wearing their inflatable jacket incorrectly.

2.12 Opportunities for rescue and assistance

A key factor in many of the drowning cases was the person being alone in the situation. In 68% of the cases, the person was alone at a location like a summer cottage or a boat, or had gone into the water without being seen by nobody. Even in cases where a bystander had noticed the incident, there was little chance for helping due to circumstances such as weak ice or a long distance between the helper and the person to be helped. Furthermore, in many of the cases where the victim was elderly, the other persons present were also elderly and therefore unable to help. Similarly, in the case of victims who were intoxicated, the entire party was often intoxicated. Even if a person was with someone, them being submerged was often not noticed by anyone.

In the vast majority of the cases, no attempt to resuscitate the victim was made due to the delay being excessive and the victim therefore having become lifeless before help arrived. Such cases amounted for 74% of all the cases. The drowned person may have been submerged in water for several days before being found, for example. In forty of the cases, a layperson started resuscitation.

First responders attempted to resuscitate 42 of the victims. In 31 of these cases, first responders continued resuscitation that had been started by a layperson. In nine cases, a layperson had started resuscitation, but the first responders found it unnecessary and did not continue it. First responders started resuscitation in eleven cases.

Pronto database of the rescue services⁹ included a total of 451 water rescue assignments where 91 persons drowned in 2021. Based on the descriptions of the incidents, the investigation team assessed whether the situations caused a serious threat to life. There was no serious threat to life in most of the cases, such as cases involving a broken motor or a drifting boat.

In nearly all cases, the emergency call was made by a bystander. In only few of the cases with a serious threat to life, the person involved was able to call for help themselves. Assistance from bystanders or, in some cases, another involved person was of great significance, especially in cases involving a serious threat to life. Deterioration of the situation was successfully prevented until the first responders arrived.

In 23 of the emergencies involving a serious threat to life, the person was able to rescue themselves. A bystander assisted the person in serious danger until the first responders took over in 35 cases. In 18 cases, a person was rescued from serious danger by their own actions and the assistance of the first responders. Example of such cases include a person to be rescued managing to get out of a hole in the ice but not daring to move on the ice or a person being able to climb onto a capsized boat. A total of 54 persons were rescued from serious danger by the actions of the first responders alone. The average time until the start of effective rescue operations was 15 minutes and 41 seconds, meaning that the first responders got to the scene fairly quickly. In the majority of the cases, the rescue method was surface rescue¹⁰.

The Pronto data shows that survival equipment played a significant role particularly in the rescue of persons in a serious life-threatening situation. Equipment such as life jackets, flotation devices and ice picks give a person in distress some more time to get help. In addition, the persons who were rescued were able to hold on to the side of a boat, climb on top of a capsized boat or hang onto a swimming ladder until help arrived, even though they did not have enough strength to get out of the water. If the person in need of help is not able to stay afloat on their own, the ability of first responders to assist them is limited. In an acute emergency, there is often little time for the rescue operation. When a person is alone, the chances of getting help are reduced.

⁹ Maintained by the Ministry of the Interior, Pronto is a resource and accident statistics system for the rescue services.

¹⁰ Surface rescue refers to the rescue of a person, animal or property and the prevention of damage at the surface of the water or immediately below the surface without the use of underwater rescue diving equipment.

3 ANALYSIS

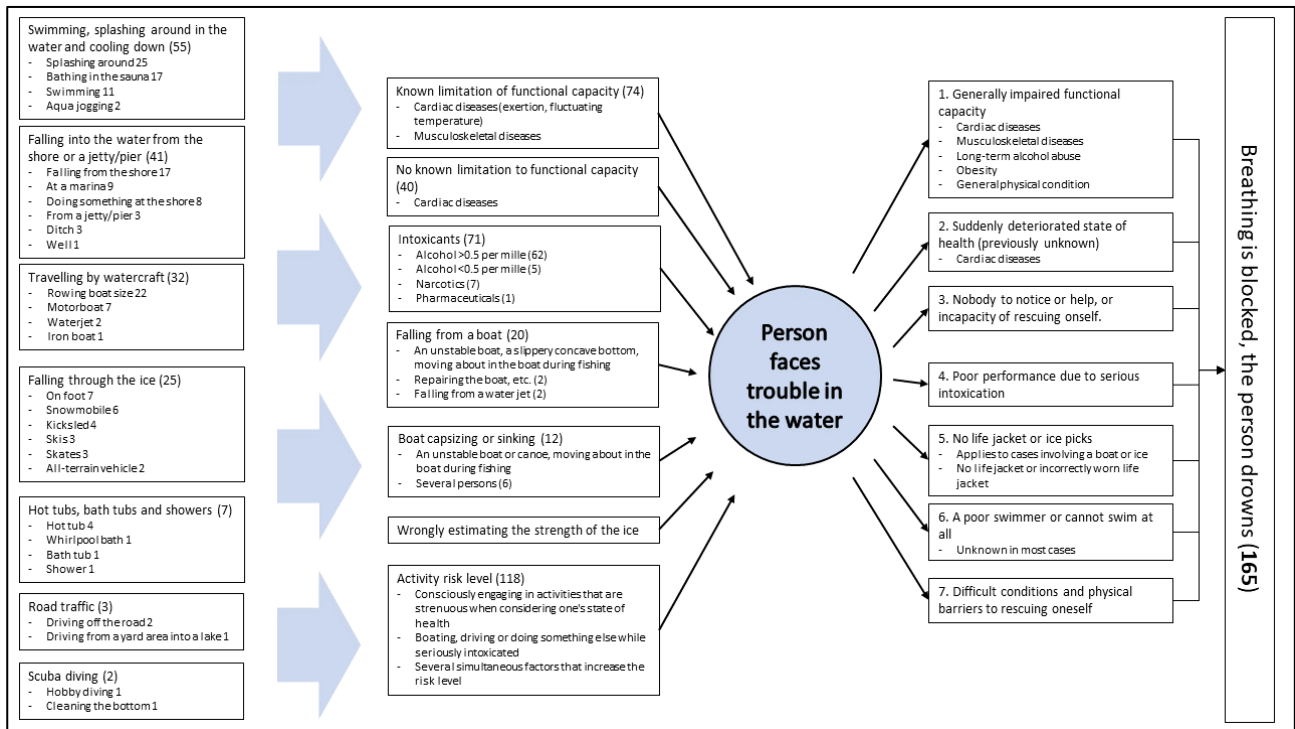


Figure 37. Bow tie analysis diagram. (Image by the Safety Investigation Authority)

3.1 Key risk factors and situations

Nearly two out of every three persons who drowned had a previously known or undiagnosed medical condition that **limited their functional capacity**. In most cases, it was a cardiac disease, but neurological conditions, musculoskeletal disorders and long-term alcohol abuse were also fairly common. The risk of problems caused by a cardiac disease increases when the temperature fluctuates or the person exerts themselves.

In addition to medical conditions, **intoxicants** affect one's functional capacity. There was some type of intoxicant, most commonly alcohol, in the blood of 71 of the drowning victims (44%). Alcohol intoxication was serious in the majority of the cases.

A typical characteristic of the **boat-related drowning cases** was falling from the boat. The boats were usually small rowing boats, often old ones with a tapered stern. Instability of the boat and a slippery, concave bottom increase the risk of falling when moving about in the boat during fishing or when repairing the motor, for example. Instability also increases the risk of capsizing, especially when there are several people aboard.

A key problem in **cases involving falling through the ice** is assessing the durability of the ice. Strength of the ice may vary a great deal over a short distance due to factors such as currents, the shape of the bottom and the snow depth. Most of the persons who drowned in the ice were moving in a familiar area, but still erroneously assessed the durability of the ice.

During the investigation, the **risk level of activities** was assessed using a three-tier scale: normal, elevated and significant risk. The risk level is increased by activities that are strenuous or difficult considering the persons state of health or functional capacity, for example. Such activities include a person with a cardiac disease bathing in the sauna and swimming alone, or a person with a musculoskeletal disorder going onto a shaky jetty.

Boating while seriously intoxicated was also considered a high-risk activity. The level of risk was considered significant when there were several simultaneous risk factors, such as a person who was seriously intoxicated and had a cardiac disease bathing in the sauna alone.

The risk level was assessed as elevated or significant in more than 70% of the cases. This reflects the situation and the fact that it is possible to influence the risk factors that affect drowning cases. A single risk factor rarely led to drowning, and several risk factors contributed to most of the cases. Some were transient risks during the activity, while others were limitations, habits or assumptions formed over a long period of time. The transient ones included factors such as intoxication and the long-term ones factors such as general impairment of functional capacity.

The same activity using the same equipment or at the same location may not have previously been as risky for the person in question, but factors such as age-related medical conditions and limitations may have changed the situation. The person's perception of their actual functional capacity no longer corresponded to the reality. In many of the cases, the risk level may have significantly increased, but the person failed to notice the change from their own perspective. It is therefore not always a question of conscious or recognised risk-taking, but of a gradual process.

In some of the drowning cases, the factors that increased the risk also affected the person's other actions and increased the risk of other types of accidents. For example, a seriously intoxicated person drove themselves to the shore where they took a boat out on the water. Several risk factors that increase the risk of accidents also in other areas of life are particularly dangerous when water is involved.

3.2 Impaired functional capacity

Impaired functional capacity plays a key role in drowning cases, as it increases the risk of falling into the water from the shore or a boat, for example. On the other hand, impaired functional capacity can make it difficult to rescue oneself if one falls through the ice or from a boat, for example. Getting out from a hole in the ice or climbing onto a boat requires strength and good physical condition.

In many of the cases, the person had suddenly got into trouble while swimming or cooling down in the water, for example. It is likely that state of health influenced the situations that led to drowning. The data is heavily weighted towards people over 60 years of age. Different types of medical conditions become more common as people age. The largest group of medical conditions in the dataset is cardiovascular diseases. Furthermore, musculoskeletal disorders, long-term alcohol abuse and, in some cases, obesity also contributed to the accident. There were some persons with mental health problems in the dataset, but the correlation between the mental health problems and the incidents is not clear. Explicit suicides were excluded from the dataset.

Based on the data, it seems that people in full health with normal functional capacity only rarely drown. Several factors influenced the functional capacity of the drowning victims that increased the risk of drowning and likely also the risk of other accidents. However, one can compensate for known risks by not going into the water or spending time near the water alone. Furthermore, keeping the beach and jetty at one's summer cottage in good condition and easily accessible reduces the risk of falling into the water. In addition, special attention should be paid to stability when choosing a boat.

Many of the activities that led to drowning were ones in which person had been engaged for decades, perhaps previously surviving dangerous situations. However, as their functional capacity deteriorated, the activities became high-risk activities without the person realising it.

3.3 Suddenly deteriorated state of health (previously undiagnosed)

A cardiovascular disease was detected for the first time during the post-mortem examination in the case of many of the drowning victims. The likelihood of latent cardiac diseases increases with age. The symptoms of a cardiac disease may be very mild prior to a bout of illness that will seriously impair one's functional capacity. Even a momentary loss of function under stress is dangerous when a person is in the water. For example, rescuing oneself after falling from a boat or falling through the ice requires strong effort, which increases the risk of impaired functional capacity even if the person did not have any obvious cardiac symptoms before. Older persons, in particular, should try to ensure that someone who can help is present when they go near or into the water.

3.4 Nobody to notice and help, or no ability to rescue oneself

In two thirds of the cases, even resuscitation by a layperson was not started because of a long delay. Rescuing a person who has gone under water is a matter of minutes, which means that getting help quickly is essential. The drowning victim was alone or momentarily alone in 68% of the cases. In many of the cases, the drowning victim was part of a group or one of two people who were bathing in the sauna, but ended up being in the water alone for some time after having got into trouble.

Furthermore, when several people simultaneously fall off a boat, they will find helping each other difficult. Even eyewitnesses may not be able to help due to circumstances such as a long distance or poor ice conditions. Rescuing another person requires good physical condition and normal functional capacity. The prerequisites for helping are poor if the person trying to help is also elderly or in poor health. In addition, a party consisting of intoxicated people can easily miss one person's distress, and they are also less able to help.

3.5 Poor performance due to serious intoxication

Intoxication contributes to many drowning cases. A total of 44% of the drowning victims were intoxicated from alcohol or under the influence of drugs or pharmaceuticals. The number of persons seriously intoxicated from alcohol was high, 53 persons. The loss of balance and impaired motor coordination caused by serious intoxication makes a person more susceptible to stumbling and falling, which can lead to falling off a boat, shore or jetty/pier. Half of the persons who were swimming or splashing around or cooling down in the water were intoxicated. Intoxication puts a strain on the body, increasing the risk of loss of functional capacity. Alcohol also impairs one's risk assessment capabilities. A drunk person does not realise the danger posed by their own actions. In many of the cases, other persons present also underestimated the level of intoxication.

3.6 No life jacket or ice picks

In the case of boat-related incidents and falling through the ice, the use of survival equipment was assessed as a key factor. In the vast majority of the boat-related cases, the drowning victim did not have a life jacket with them or had not put it on. Of the 41 persons who drowned in water traffic or at a marina, only six were wearing a life jacket or flotation suit, but there were problems with these as well.

Nearly all of the accidents took place in inland waters and under good conditions. Only in one case did increased wind affect the accident. Rowing boats, ones with a tapered stern in particular, are unstable and people can easily fall off them. However, when the conditions are good and the body of water is familiar, people do not perceive the risk, and wearing a life jacket seems unnecessary. In accidents involving boats or marinas, an appropriate or functional life jacket would have assisted 24 persons to save themselves with a moderate degree of certainty, and an additional ten might have been able to save themselves.

Nearly two out of every three persons who drowned due to falling through the ice had no survival equipment with them. In nine of the cases, the drowning victim had some kind of a tool that could have assisted him in getting out of the hole in the ice or that allowed him to float, but he did not manage to get out anyway. In the case of a person falling through the ice, survival equipment cannot be said to be a certain way to save oneself. In seven of the cases, the person's functional capacity was impaired to such an extent that even survival equipment would not have likely helped him. In ten of the cases, rescuing oneself with the help of survival equipment might have been possible, but this is uncertain. If a person is not able to act quickly, cold water will prevent any effective attempts to rescue oneself.

3.7 Poor or non-existent swimming skills

In Finland, persons in the older age groups are poorer swimmers than younger persons. The majority of the persons who drowned in 2021 were elderly, with a higher proportion of those who cannot swim than in the population on average. No comprehensive data on the swimming skills of the drowning victims was available for the investigation at hand. However, it can be said that most of the cases, especially those involving boating and swimming or splashing around or cooling down in the water, were such that if the person was able to function, they could have made use of proper swimming skills. It is known, though, that a significant proportion of the drowning victims knew how to swim, which means that the drowning was caused by a problem in the water rather than the lack of swimming skills. In addition, most of the cases occurred close to the shore, so the victims could have survived even with limited swimming skills had they not got into trouble. The significance of swimming skills is less clear in the cases of falling into the water. These cases took place in shallow water close to the shore, and the number of factors affecting functional capacity was apparently high.

It is known that a third of the persons who travelled by watercraft did not know how to swim, but there is no information on the swimming skills of the majority of these persons. Furthermore, almost all of the cases involving boats were such that swimming skills would have been useful. When travelling by watercraft, the use of survival equipment is a key factor regardless of whether the person can swim.

Assessing the significance of swimming skills in the cases involving falling through the ice is difficult. Quickly getting back onto the ice is the key, which emphasises the importance of good physical condition and survival equipment. Admittedly, several of the victims included in the dataset had ice picks or other survival equipment with them, but even those did not help.

Several children and young people with an immigrant background have drowned in recent years even though drowning cases involving children and young people are rare in Finland by international standards. Two underage persons with an immigrant background who could not swim, one child and one adolescent, drowned in 2021. Although Finnish children generally have relatively good swimming skills, there are gaps in the swimming skills of children and young people with an immigrant background.

3.8 Difficult conditions and physical barriers to rescuing oneself

The opportunities of the person to rescue themselves were limited in many of the cases. When one falls through the ice, they must quickly rescue themselves. Getting back onto the ice is difficult even if the person has ice picks. Getting out of a hole in the ice also requires good physical condition. A suit that keeps one dry makes a decisive difference to a person's chances of being rescued. Getting out of the water into a boat also requires good physical condition. Other obstacles to rescuing oneself include a steep store or ending up in a narrow space, such as in between a pier and a boat. Eight people suffered injuries during their fall that made rescuing themselves difficult. On the other hand, there were some cases where merely standing up straight would have rescued the person, but they were unable to do so due to their impaired functional capacity.

4 CONCLUSIONS

The conclusions include the underlying causes of drowning. A cause refers to the various factors in the background of the events and the direct and indirect circumstances affecting them.

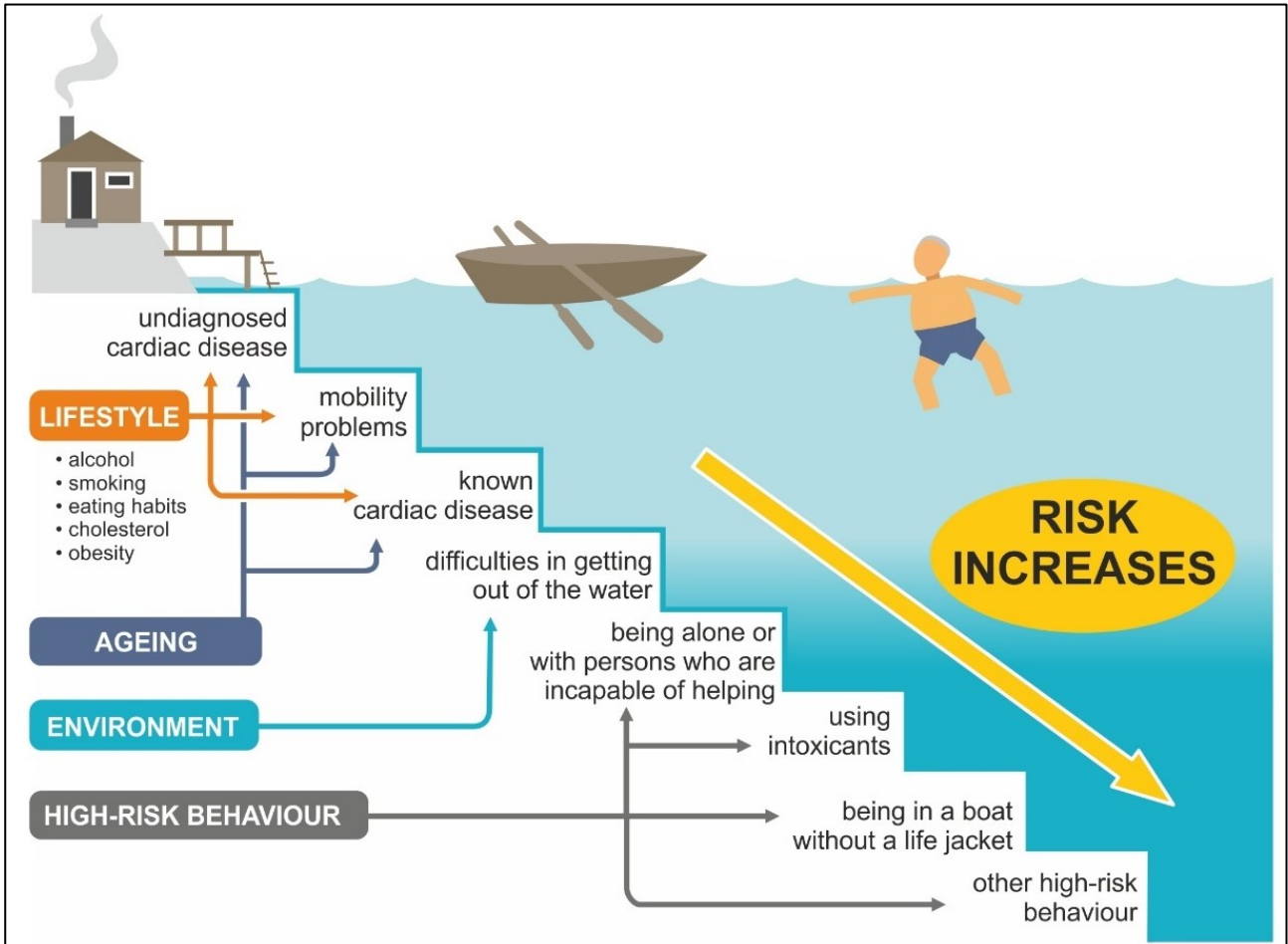


Figure 38. Susceptibility to drowning builds up over time. Key factors include the maintenance of one's health and habits when it comes to water. (Image by the Safety Investigation Authority)

1. The 2021 investigation dataset consisted of **165** accidental drowning cases.

Conclusion: *The number of drownings in Finland is clearly higher than the number of deaths by fire but lower than the number of fatal road traffic accidents. The trend is downward. When compared to the population, the figure is higher than in Sweden and Norway, for example.*

2. The main incident types were: 1. swimming or splashing around or cooling down in the water (55), 2. accidentally falling into water (41), 3. travelling by watercraft (32) and 4. falling through the ice (25). These make up 93% of the dataset.

Conclusion: *Most drownings occur in people's private lives, which society can influence mainly through communication.*

3. The drowning cases are concentrated among the elderly, who typically have known or undiagnosed medical conditions. The most common such condition is a cardiac disease. Many younger drowning victims also had health or substance abuse problems.

Conclusion: *A person's state of health and physical condition proved to be important underlying factors for drowning. These depend on one's genetic makeup, but are also crucially affected by the choices one makes during their life.*

4. Most drowning cases occur in situations and during activities that have become familiar to the person over the decades. They have continued in the same manner, such as continued not to wear a life jacket, even though their functional capacity has deteriorated. In many cases, a person is alone when drowning.

Conclusion: *One's perception of one's ability to survive is often overestimated, and in many cases there is nobody to help nearby. Intoxicants make the situation even worse.*

5. A difficult or poor environment that involves water often causes problems. Problems may arise because of a jetty in poor repair, a rough shoreline, an unstable boat or thin ice, for example. These cause the person to unexpectedly end up in the water and make rescuing themselves difficult.

Conclusion: *A safe environment and the avoidance of intoxicants will improve safety, especially in the case of people whose functional capacity and health have deteriorated over the years. Based on the investigation findings, a sturdy CE-marked boat is a good choice. Jetties and shores should be made safe and kept in good condition.*

6. Cardiac diseases are a key factor in drowning cases: 56% of the drowning victims had a known or undiagnosed cardiac disease. When symptoms occur in the water, they can lead to accidental drowning.

Conclusion. *The number of drowning cases can be influenced by people maintaining a persistently healthy lifestyle, i.e. proper eating habits, exercise, refraining from smoking and moderate use of intoxicants. The level of risk-taking should also be reduced with age.*

7. In Finland, several parties work on matters involving safety on the water. The work has likely had an impact, although it is difficult to influence the target group of the drowning victims.

Conclusion: *Many factors influence drownings in general, many of which are related to different life stages. Society needs to provide comprehensive swimming education for children and lifelong communication on safety on the water and health. Habits never change quickly.*

5 SAFETY RECOMMENDATIONS

The accidental drownings in 2021 were divided into seven incident types, which were:

- Swimming and splashing around or cooling down in the water (55)
- Accidentally falling into the water from the shore or a jetty/pier (41)
- Travelling by watercraft (32)
- Falling through the ice (25)
- Hot tubs, bath tubs and showers (7)
- Road traffic (3)
- Scuba diving (2)

The aim of the themed investigation was to find ways to avoid accidental drownings. This can be achieved by ensuring that people do not accidentally end up in the water and they do not get into trouble while in the water and, on the other hand, by ensuring that they are able to rescue themselves.

5.1 Content of the work on safety on the water and division of labour

In most of the investigated cases, the susceptibility to drowning had developed over the years. The susceptibility is related to personal circumstances, such as state of health, substance abuse and learned behaviours. Furthermore, the setting is often private, such as the shore of a summer cottage or one's home. It is difficult for society to influence such issues. In fact, the only tool is communication on the right issues.

Figure 39 indicates the main communication themes. It shows the most important factors influencing the different incident types, i.e. the individual measures that could be taken to prevent drowning cases.

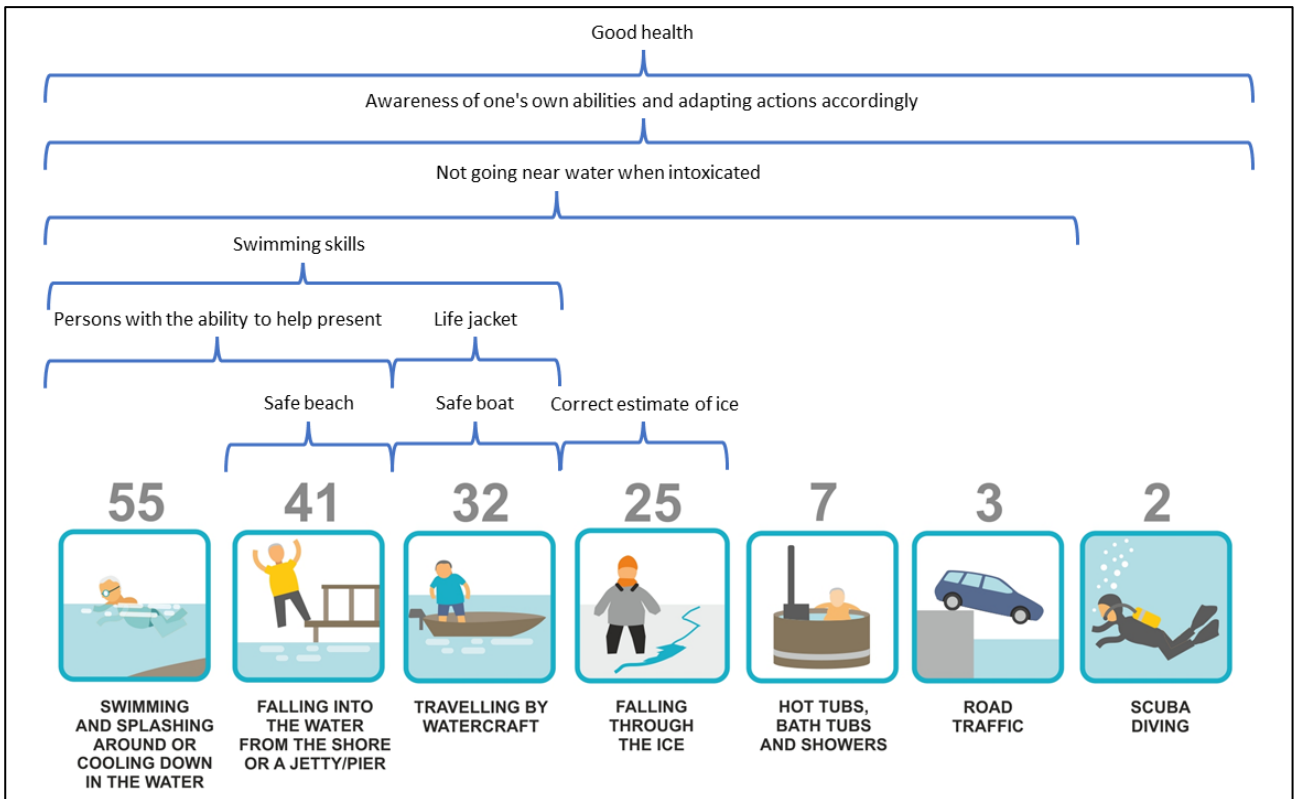


Figure 39. Key factors to prevent different types of drowning cases. (Image by the Safety Investigation Authority)

The Safety Investigation Authority recommends the following:

Parties influencing safety on the water (Ministry of Social Affairs and Health, Finnish Institute for Health and Welfare, Finnish Transport and Communications Agency Traficom, Finnish Border Guard, the police, Finnish Safety and Chemicals Agency, Finnish Swimming Teaching and Lifesaving Federation, Finnish Marine Industries Federation Finnboat and Finnish Maritime Rescue Federation Meripelastusseura) check the scope and content of their work to ensure that they correspond to the issues detected in themed investigation Y2021-S1. [2022-S18]

The Safety Investigation Authority recommends the following:

The Ministry of Social Affairs and Health and the Finnish Institute for Health and Welfare clarify the priorities, division of labour, funding and continuity of the work of the parties influencing the safety of water traffic and ensure that the big picture corresponds to the issues revealed by themed investigation Y2021-S1. These parties include but are not limited to the Ministry of Social Affairs and Health, the Ministry of Transport and Communications, the Finnish Institute for Health and Welfare, the Finnish Transport and Communications Agency Traficom, the Finnish Border Guard, the police, the Finnish Safety and Chemicals Agency (Tukes), the Finnish Swimming Teaching and Lifesaving Federation, Finnish Marine Industries Federation Finnboat and Finnish Maritime Rescue Federation Meripelastusseura. [2022-S19]

The common objective must be retaining and strengthening of the downward trend in the number of accidental drownings.

5.2 Recommendations of the 2010–2011 themed investigation

The Safety Investigation Authority also repeats the seven recommendations given based on the previous themed investigation S1/2010Y, which can still be used to support the development of safety:

Together with the Ministry of Social Affairs and Health and the Ministry of Transport and Communications, the Ministry of the Interior should present concrete goals to reduce the number of accidental drownings and a model of an organisation enabling effective and comprehensive work to prevent deaths by drowning. These could be included in the Internal Security Strategy, for example. [S1/10Y/S1]

The Ministry of Social Affairs and Health should develop a procedure for gathering data needed to prevent deaths by drowning and for publishing such data in real time. This data could be collected by an organisation such as the National Institute for Health and Welfare, which should co-operate with the Police. [S1/10Y/S2]

The Ministry of Justice should introduce a bill which sends the message to boaters that it is unacceptable to venture onto the water while under the influence of alcohol. Blood alcohol limits should be tightened and should also apply to rowing boats. [S1/10Y/S3]

The Ministry of the Interior should target water traffic supervision and, in particular, alcohol use supervision on inland waters and small lakes on a broader scale, in order to bring a greater number of Finnish waters under at least periodic supervision. Even small spot checks in previously unsupervised areas would send out the message that there is a risk of being caught and that taking unnecessary risks on water will not be tolerated. [S1/10Y/S4]

Together with the Finnish Transport Safety Agency (Trafi) (currently the Finnish Transport and Communications Agency Traficom), the Ministry of Transport and Communications should develop means of significantly increasing the use of flotation garments, especially in small boats. The Investigation Commission believes that regulatory guidelines should be introduced as an effective means of pursuing this aim. [S1/10Y/S5]

The National Board of Education should set the goal that all school children who are capable of learning to swim should do so while still at primary school. In areas with no swimming halls, transportation, camp-based instruction or visits to natural waters should be arranged. Such co-operation should include the Defence Forces, whose task would be to ensure that all who pass through military service know how to swim.
[S1/10Y/S6]

The Finnish Broadcasting Company (YLE) should be tasked with the distribution of safety information and the production of various reviews, as a permanent part of their public service remit. Related themes, such as safety on water, should be chosen on the basis of the magnitude of the problem in question, its estimated effects and topicality.
[S1/10Y/S7]

During its follow-up of the recommendations, the Safety Investigation Authority has noticed that the implementation of the first two recommendations is still ongoing. It has been indicated that the third and fourth recommendation will not be implemented. The final three recommendations have been implemented. In the case of all the recommendations, it should be checked whether there is any need to boost the measures and whether continuity has been secured.

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Investigation materials

- 1) Data on the investigated cases:
 - Police investigation notices and photographs
 - Emergency and accident reports as well as photographs of the rescue services from Pronto
 - Photographs and videos of the Finnish Border Guard
 - CCTV materials and other camera recordings
 - Data from forensic medical examinations
- 2) Data on weather and ice conditions in 2021 in Finland
- 3) Data on drownings and other types of accidents
- 4) Drowning statistics of the Finnish Swimming Teaching and Lifesaving Federation
- 5) Statistics on the demographics of Finland
- 6) Data on rowing boats sold in Finland
- 7) Data on campaigns realised in Finland
- 8) Data on water rescue assignments recorded in the rescue services' Pronto system in 2021
- 9) Drowning data from the other Nordic countries
- 10) Data on the swimming skills of Finns
- 11) Duodecim Current Care Guidelines
- 12) Temperature statistics of the Finnish Meteorological Institute
- 13) Infographics: Sole Lätti and Shutterstock.

SUMMARY OF STATEMENTS REGARDING THE DRAFT INVESTIGATION REPORT

The draft investigation report was submitted for comments to the Ministry of Social Affairs and Health, the Ministry of the Interior, the Ministry of Justice, the Ministry of Transport and Communications, the Finnish Transport and Communications Agency Traficom, the Finnish Safety and Chemicals Agency Tukes, the Finnish Institute for Health and Welfare, the Finnish Border Guard, the National Police Board, the Finnish National Agency for Education, the Finnish Broadcasting Company Yle, the Finnish Swimming Teaching and Lifesaving Federation, the Finnish Marine Industries Federation Finnboat and the Finnish Maritime Rescue Federation Meripelastusseura.

In its opinion, the **Ministry of Transport and Communications** commented on the recommendations repeated in the draft investigation report, which were originally issued in connection with themed investigation S1/2010Y. The fifth recommendation concerns a substantial increase of the use of life jackets and personal flotation devices, especially when using a small boat. According to the Ministry, this issue is comprehensively covered by measures 57 and 101 of the Traffic Safety Strategy. These measures concern safety communication on personal flotation devices and a preliminary study on how the use of life jackets could be promoted through legislation.

The safety of water traffic has also been promoted by the new Water Traffic Act that entered into force in 2020. The Act does not include any provisions on the mandatory use of life jackets and personal flotation devices, nor does it stipulate that life jackets and flotation devices should be available in all watercraft. The parliamentary Transport and Communications Committee has discussed the government proposal. Hearings of experts called for making the use of life jackets mandatory in the case of all watercraft. The experts were of the opinion that more widespread use of life jackets would reduce the number of drowning deaths, a significant proportion of which occur in inland waters, often close to the shore and when using a small boat. The Committee found that regulation of the use of life jackets should be carefully considered in the future. The Committee also emphasised that the importance of properly targeted and genuinely effective communication on safety and attitude education play a significant role in the reduction of deaths by drowning.

The Traffic Safety Strategy covers the years 2022–2026, and the authorities and other parties have already started to implement the measures included in the strategy. A control working group to follow up on the measures will be established. It will start its work in the autumn of 2022.

The **Ministry of Justice** stated that it does not have any comments on the draft investigation report.

The **Finnish Transport and Communications Agency (Traficom)** commented on the recommendation on the targeting and content of the work to prevent drowning cases. As stated in the programme of measures included in the Traffic Safety Strategy, cooperation on the work on water traffic safety will be boosted by establishing a subgroup of a working group consisting of boating authorities and other organisations working with boating and water traffic (the "boating network") in June 2022 to coordinate and manage water traffic safety campaigns. The subgroup will help to ensure effective cooperation in communications matters and efficient targeting of safety campaigns. Traficom notes that the work of the subgroup on safety communications will be persistent, long-term safety activity that supports the development of safety in water traffic.

Traficom also commented on the recommendation on life jackets given in the previous themed investigation (S1/2010Y), emphasising the amendment of the Water Traffic Act which requires that life jackets or other flotation devices must be worn or easily available. Traficom is continuing its Näytä vesimerkkiä ("Set a good example on the water") campaign, which encourages people to wear a life jacket.

Traficom considers maintaining and strengthening of the downward trend in the number of accidental drownings important. The trend in drowning cases involving watercraft has been downward, as can be inferred from the results of the previous themed investigation, for example. According to Traficom, this can also be inferred based on the fact that the number of drowning cases has decreased even though the number of boats registered in the Transport Register has increased. As before, the most common causes of accidents involving watercraft are falling from the boat and the failure to wear a life jacket.

One can conclude that general water safety education has been effective and should be continued. Traficom also finds continuing with the thematic investigations on accidental drowning cases important.

In its opinion, the **Finnish Safety and Chemicals Agency (Tukes)** states that the investigation report is well written and the infographics excellently illustrate the investigation results.

According to Tukes, the draft investigation report contains information that will enable Tukes to contribute to the implementation of the recommendations and that Tukes will be able to use in its control of consumer products and services. Tukes will take into account the findings pertaining to personal protective equipment, such as life jackets and ice picks, in its control operations and especially in its communication directed to consumers. Here, emphasis will be on cooperation with parties such as Traficom.

Tukes will realise a life jacket control project in 2022. Communication will also be a major part of this project. Tukes was also involved in the promotion of the use of life jackets during the Pelastusliivipäivä ("Life Jacket Day") on 28 May 2022. Personal protective equipment meant for use in water (such as life jackets) is one of Tukes' risk-based surveillance focus areas in the control of personal protective equipment. Even though a notified body (a third party) is required when placing these products on the market, Tukes has detected some non-compliant products on the market.

Tukes informs the other EU member states and authorities of its control measures through the EU Safety Gate system. The system can be used to make a significant contribution to ensuring that only products that comply with the requirements are available on the market. Testing methods make the testing of life jackets expensive and the testing of individual products difficult. Tukes having sufficient resources for testing also in the future is important.

In terms of the number of fatalities, public beaches involve the highest risk among all the consumer services controlled by Tukes. The control of public beaches therefore plays a key role in the control of consumer services, even though only a small share of all accidental drownings takes place at public beaches. Tukes will continue to provide guidance to service providers on the safety of public beaches. Tukes will assist them in the identification of risks and communication about them, the assessing of the need for lifeguards and the investigation of accidents that take place at beaches to learn from them. Where necessary, Tukes will also apply control measures to ensure that the above-mentioned measures are put into practice.

The **Finnish Institute for Health and Welfare** emphasises that persons with coronary artery disease, a cerebrovascular disorder or a neurological condition should exercise caution when

swimming and moving on the water, use safety equipment and, whenever possible, avoid swimming or moving on the water alone. More education and information should be provided to persons with a cardiac disease and professionals working with them, and cardiac disease associations should be invited to joint the work on preventing drowning cases.

In addition to a reduction in the use of alcohol and other intoxicants in general, a key factor in the prevention of drowning cases is preventing people from going into the water or using a boat when intoxicated. This can be achieved by doing persistent work to prevent substance abuse and by allocating the necessary resources for the work. As part of accident prevention, the work should be targeted at groups at a higher risk of drowning and the risk factors through public communication, the addressing of substance abuse and other means available in the Action Plan on Alcohol, Tobacco, Drugs and Gambling, for example.

The Finnish Institute for Health and Welfare requests additional information on some of the drowning cases involving children, and points out a recommendation by the WHO emphasising the provision of rescue and survival skills education to children and adolescents. In incidents involving the drowning of children of the school age, older children and young people, in particular, the other persons present may be other children and adolescents, which means that their ability to act quickly to help the victim is important.

The role of organisations working in the field of gerontology is important, which is why further deepening the cooperation between the Finnish Institute for Health and Welfare and these organisations is important. There is a lack of research on the means to prevent drowning cases among the elderly, and thus research at the university level is required.

According to the Finnish Institute for Health and Welfare, the recommendations are a step in the right direction. The work done by the Finnish Institute of Health and Welfare already affects the underlying factors influencing drowning cases. In addition, the Finnish Institute of Health and Welfare coordinates the implementation of the Target Programme for the Prevention of Home and Leisure Injuries. The aim of the programme is to reduce the number of accidents by 25% by 2030. The same target could be applied to deaths by drowning. The long-term target is zero.

The Finnish Institute for Health and Welfare notes that due to the ongoing nature of the work on safety, programmes and strategies implemented since the previous themed investigation, the development of the national core curriculum in terms of children's swimming skills and the valuable development work done by different organisations should be mentioned, among others.

Finally, the Finnish Institute for Health and Welfare points out that the investigation dataset only consists of data on accidental drownings during one year. The dataset would have been stronger had it included drowning deaths from several years. On the other hand, the main findings using the larger dataset would most likely have been highly similar.

The **Finnish Border Guard** deems the investigation report commendable and states that it provides the authorities with valuable fact-based information on the underlying factors influencing deaths by drowning.

The investigation report clearly indicates that the factors common to all the accidents involving watercraft are falling from the boat and the failure to wear a life jacket. Of the 32 persons who drowned while using a watercraft, only three were wearing properly functioning survival equipment. The Finnish Border Guard therefore considers it justified that the requirement on the use of survival equipment be appropriately taken into account in the investigation report's recommendations and in future legislative work.

The majority of the drownings involving watercraft (24 out of 32) occurred in inland waters. Eight persons drowned at sea for similar reasons. The difference can be considered significant. This fact, which was observed during the investigation, should be taken into account in public education and control work, and in the targeting of the recommendations based on the investigation report.

In its opinion, the **Finnish National Agency for Education** describes the general principles of the Basic Education Act and the purpose of physical education and swimming teaching in particular.

The purpose of swimming lessons for pupils in the first and second grade of comprehensive school is to familiarise the pupils with water sports and ensure that they have basic swimming skills. The aim during grades 3–6 is to teach the pupils to swim so that they can move around in the water and rescue themselves from the water, while the swimming lessons for pupils in grades 7–9 reinforce the swimming and water rescue skills so that the pupils know how to swim and are able to rescue themselves from the water.

The number of swimming lessons at school correlates with the swimming skills of children. In municipalities where the swimming lessons included in the curriculum are not provided at all, children's swimming skills are clearly poorer (63%) than in municipalities where swimming lessons are provided in every grade (79%). Even though the swimming skills of children are influenced not only by swimming lessons at school but also the proximity of a public indoor swimming pool and whether they visit the pool at leisure, swimming during leisure cannot compensate for the lack of swimming lessons at school, and swimming skills can easily be lacking.

The Finnish National Agency for Education comments on the recommendation repeated from the previous themed investigation (S1/2010Y) regarding swimming teaching in comprehensive school. The Finnish National Agency for Education has set a target that swimming and water rescue skills should be taught in one form or another in every Finnish comprehensive school. The education provider should ensure that the national targets set for education can be achieved during comprehensive school.

Swimming and water rescue are the only forms of physical activity separately mentioned in the physical education targets of the basic education curriculum. According to the Finnish National Agency for Education, the absence of a public indoor swimming pool or an unreasonably long distance to the closest pool may be a reason for offering a different learning environment and form of physical activity instead of swimming lessons. However, lack of money should not be a reason for the education provider to neglect the teaching of swimming and water rescue skills.

The basic education national core curriculum from 2014 requires that young people learn swimming and water rescue skills during comprehensive school, and as the education provider, the school is responsible for the achievement of this target. The rationale behind the provision of swimming and water rescue lessons in comprehensive schools is that swimming is a civic skill for Finns and that swimming and water rescue teaching in schools plays an important role in the promotion of water safety in the country.

The **Finnish Broadcasting Company Yle** comments on a recommendation addressed to it in the previous themed investigation regarding communication on various safety issues as part of Yle's public service broadcasting remit. In its opinion, Yle refers to legislation, which does not include any provisions on the details of the content of public broadcasting. This means that the choice of topics and details are subject to the journalistic decision-making process.

Decisions on news topics are not made by the legislator or any other body outside the journalistic organisation.

Safety topics have been a regular feature in the news and current affairs programming of Yle, in particular. Topics related to safety on the water are regular news items in winter when the ice conditions deteriorate and at the start of the summer holiday season, for example. Yle also broadcasts public service announcements created by third parties on several topics relating to safety on the water. Yle selects the public service announcements on the basis of matters such as public interest value and topicality. For example, Yle plans to broadcast several public service announcements on safety on the water in 2022.

Thus, Yle's coverage, selected on journalistic grounds, has also included the transmission of information relevant to the safety of the general public. The company has consistently provided such information as a permanent part of its public service broadcasting for several decades.

The **Finnish Swimming Teaching and Lifesaving Federation** deems the investigation very important and useful, as there is little evidence-based information on the underlying causes of drownings and the related human factors.

The trend of drowning cases has been downwards, although more people still drown in Finland than in the other Nordic countries per capita. However, the number of drowning cases among the elderly seems to have increased even faster than one would expect considering the ageing of the population. On the other hand, drowning still remains one of the most common causes of accidental deaths for young children, even though no children under the school age drowned during the 2021 thematic investigation.

The Finnish Swimming Teaching and Lifesaving Federation points out that normative guidance can be used to influence people's private lives. When the Water Traffic Act was being amended, the Finnish Swimming Teaching and Lifesaving Federation proposed imposing a stricter obligation to wear a life jacket and extending the obligation to all types of watercraft, including smaller ones. The legal responsibility of the master of a watercraft to ensure that life jackets are used when the circumstances so require is insufficient. The investigation shows the importance of life jackets as a factor that promotes the safety of people using watercraft, also in inland waters and when the conditions are good. The Finnish Swimming Teaching and Lifesaving Federation continues to support the recommendation of the 2010–2011 thematic investigation on a stricter blood alcohol limit in water traffic.

The investigation report notes that adopting new habits and learning new skills often proves a challenge, especially for the elderly. For this reason, the seventh conclusion should include, in addition to lifelong water safety and health communication, that society must offer children and adolescents the opportunity to learn how to swim and rescue themselves at school. This idea is supported by recent evidence-based WHO guidelines (2022). According to a study made by the Finnish Swimming Teaching and Lifesaving Federation (2022), children living in different municipalities are not equal in terms of the swimming lessons offered at school, and the comprehensive school curriculum is far from being fully implemented in all schools. The COVID-19 pandemic further complicated the situation.

The investigation report includes two new recommendations, both of which are welcome. Regarding one of them, the Finnish Swimming Teaching and Lifesaving Federation notes that communication on water safety and many of the measures have been left mostly to the responsibility of organisations, and the resources allocated to the prevention of drownings are very limited compared to many other resources, such as those used for the prevention of

accidents at home and at leisure. Due to responsibilities involving the Traffic Safety Strategy, the second recommendation should also be addressed to the Ministry of Transport and Communications.

The Finnish Marine Industries Federation Finnboat considers the investigation important and comments on cases related to watercraft. Special attention should be paid to stability when choosing a boat. In many of the cases, impaired functional capacity increased the risk level of a customary activity. An unstable boat with a concave and slippery bottom is linked to this. There are more than 400,000 rowing boats in Finland. However, only a few thousand rowing boats are sold in Finland each year, meaning that the vast majority of the boats in use were manufactured before the entry into force of the Recreational Craft Directive, making them significantly less safe than new CE-marked boats. The photographs in the investigation report show that the boats involved in the accidents do not comply with the current regulations.

As the boat size increases, so does the non-sway moment; conversely, the smaller and lighter the boat, the less stable it is. Light weight of a boat is often valued because of ease of rowing, but it also reduces the safety of the rowing boat in other uses, such as fishing.

In the vast majority of the boat-related cases, the drowning victim did not have a life jacket with them or had not put it on. Nearly all of the accidents took place in inland waters and under good conditions. Only in one case did increased wind affect the accident. However, when the conditions are good and the body of water is familiar, people do not perceive the risk, and wearing a life jacket seems unnecessary. The use of life jackets and personal flotation devices should be increased, especially when using a rowing boat.

Finnboat recommends that old rowing boats without a CE-marking that have reached the end of their service life be recycled or combusted for energy instead of used any more. Finnboat also recommends that the rules on blood alcohol limit when boating be made stricter and the rules on the use of life jackets be also applied to rowing boats. Funding should be addressed without delay for safety communication and education, and the communication should be targeted at summer cottages where almost all of the reported deaths involving watercraft took place.

The **Finnish Maritime Rescue Federation** considers the investigation necessary and notes that it can be used to help prevent deaths by drowning and increase the effectiveness of measures to improve the safety of water traffic. The number of drowning cases in Finland is disproportionately high when compared to deaths by fire in Finland and drowning cases in the other Nordic countries. When compared to the transport performance and also to road traffic deaths, the number of deaths in water traffic is high.

The investigation results support the Finnish Maritime Rescue Federation's understanding of the key importance of the use of life jackets in the prevention of water traffic deaths. When the Water Traffic Act was being amended, the Finnish Maritime Rescue Federation hoped that the obligation to wear a life jacket in all types of watercraft would be included in the Act. A recommendation given in the previous themed investigation (S1/2010Y) also states that effective promotion of this matter requires normative guidance. The obligation to wear a life jacket was not included in the Water Traffic Act, however, which means that the normative guidance is still defective. The recommendation has nevertheless been recorded as implemented in the performance follow-up by the Safety Investigation Authority, and this issue should be addressed. The use of a life jacket should be made mandatory in all types of watercraft by law.

According to the draft investigation report, drowning cases in water traffic usually occur under good conditions. The Water Traffic Act requires the use of a life jacket when conditions so require, but the observation in the investigation report supports the Finnish Maritime Rescue Federation's view that a life jacket is necessary under all conditions.

In terms of the conclusions, the Finnish Maritime Rescue Federation notes that identifying the target groups and planning and targeting the communication to these groups is very important. This should also be supported through legislation by, for example, expanding the obligation to wear a life jacket. The Finnish Maritime Rescue Federation considers essential the conclusion that lifelong communication on safety on water is required. Adequate effectiveness cannot be reached without concentrating the work on safety on water and securing the resources allocated to the work. Currently, the work on safety on water is fragmented and largely dependent on the organisations' own resources.

The Finnish Maritime Rescue Federation notes that the recommendations can be used to improve the effectiveness of the work to improve safety on water. In reference to the Traffic Safety Strategy, the Finnish Maritime Rescue Federation hopes that the recommendation on the focus areas, division of labour, funding and continuity of the work on safety on water be also addressed to the Ministry of Transport and Communications. The Traffic Safety Strategy's programme of measures includes a scheme on strengthening the financial basis of safety communication, but the funding is still insufficient and does not allow for continuity of the work.