EFFECTS OF COVID-19 ON MARITIME ACCIDENTS

ALFREDO TORNÉ REVERTÉ
Nautical-fishing training school of Catalonia. Mediterrani, 2. L'Ametlla de Mar. Tarragona, Spain.
e-mail: alfredo.torne@upc.edu
Orcid:0009-0000-9774-891X

ANTONI ISALGUÉ BUXEDA
Department of Physics, Barcelona School of Nautical Studies, Technical University of Catalonia-BarcelonaTech, Pla de Palau, 18, 08003 Barcelona, Spain.
e-mail: antonio.isalgue@upc.edu
Orcid: 0000-0002-4354-5831

F.XAVIER MARTÍNEZ DE OSÉS
Department of Nautical Science and Engineering, Barcelona School of Nautical Studies, Technical University of Catalonia- BarcelonaTech, Pla de Palau, 18, 08003 Barcelona, Spain.
e-mail: francesc.xavier.martinez@upc.edu
Orcid: 0000-0001-9997-6246

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Abstract

The pandemic caused by the covid-19 virus worldwide left thousands of fatalities and serious social, psychological and economic repercussions. This article analyzes how the pandemic affected maritime accidents, especially those that occurred in the fishing sector. The accidents that occurred and published by the CIAIM are taken as data, in two different periods, one affected by the pandemic and another of the same duration, prior to the pandemic. In these periods, aspects such as the number of accidents, interactions between merchant and fishing vessels, type of accident, modality of fishing, sector, among others, are analyzed to determine what effects the pandemic has produced on maritime accidents that have occurred in the fishing sector in the pandemic period, compared to a period of normal activity. The results obtained are different from those expected, when fewer accidents were recorded in the pandemic period, which indicates that the human factor had no effect and it is estimated that the reduction in accidents was possibly caused by the cessation of merchant activity.

INTRODUCTION

The first news of the Covid-19 virus occurred in China, specifically, in the city of Wuhan. Initially, European countries watched this event from a distance, thinking that it was occurring in a very remote place and that it would never affect them. But it was not like that. The virus quickly began to colonize other countries and its expansion around the world was exponential.

The start of the pandemic is dated November 25, 2019 (The Lancet, 2020). A general state of emergency was then declared on January 30, 2020 (World Health Organization, 2020). The end of the state of emergency occurred on May 5, 2023 (World Health Organization, 2020), more than 4 years and 8 months later. (Government of Spain. 2023)

The pandemic caused by Covid-19 was devastating in terms of people affected and deceased. 702,271,274 confirmed infections (wolrdmeters.2024) and 6,973,021 deaths (wolrdmeters.2024) were recorded (Forbes Mexico.2024).

During the pandemic years, the Government of Spain decreed a series of activities, which could not stop, because they were considered essential for people's lives. Among these activities were all activities related to fishing and shellfish harvesting.

During the pre-pandemic and pandemic periods with confinement, fishing activities continued their course. It is, in these periods, where this study will focus, through the observation of accidents and also the type of accident that occurred, especially with special attention to accidents where the human factor is present as the main cause.

The objective of this work is to determine if the pandemic situation experiencing due to the covid-19 virus had any impact on the density of accidents or the type of accident that occurred.

1 METHODOLOGY

This study is based on the observation of accidents that occurred before and during the pandemic caused by the covid-19 virus. To establish the periods, a previous period is taken, similar to the pandemic, of the same duration. Although the pandemic was declared at the end of November, It was taken as a pandemic period, from the declaration of the state of alarm, until the end of this state, January 30, 2020 could be taken as the start date and the current date as the end date. Although the state of alarm is currently no longer in force, the current situation is taken as final, due to the short time that has elapsed between the end of the state of alarm decree and the few accidents published since the end date of the state of alarm, until the present. For organizational reasons and knowing that the pandemic was declared on November 25, 2019 and that it took a few months to reach in Spain, It was taken January 1, 2020 as the start date and December 31 as the end date of the period. of 2022, being 3 full years.

The data on maritime accidents are obtained from the official Spanish body in charge of investigating maritime accidents, called CIAIM (Commission for the Investigation of Maritime Accidents and Incidents).

During the first period, a total of 77 accidents affecting 91 vessels were recorded in Spain. On the other hand, during the second (pandemic) period, only 44 accidents in total were recorded, affecting 48 vessels. These general data include accidents in fishing, merchant, recreation, services and others. In total the analysis start from a period of 6 years, 3 pre-pandemic and 3 after declaration of the

pandemic, which recorded 121 accidents and 139 ships, from various sectors.

On the other hand, so that the data on accidents that have occurred are more precise, ships must be quantify the vessels registered for each sector and subsequently, in the analysis of fishing accidents exclusively, the vessels registered in each type of fishing. The data on the operational fishing fleet are extracted from the census of the operational fishing fleet, managed by the Ministry of Agriculture, Fisheries and Food, for the periods analyzed.

2 ACCIDENTS HAPPENED IN PRE-PANDEMIC PERIOD 2017-2019

In the period between 2017 and 2019, both included, a total of 77 accidents were recorded, which affected 91 ships from various sectors. This information is presented in a table below.

Sector	Number of vessels involved	Percentage
Fishing ships	57	63%
Merchant ships	29	32%
Recreational ships	2	2%
Service ship (into the port)	2	2%
Others ships	1	1%
Total number of vessels involved	91	100%

Table 1. Vessels involved by sector. Period 2017-2019. Source: Author.

As can be seen in Table 1, the largest number of maritime accidents investigated and published are found in fishing vessels, accounting for well over half of the total. In second place are accidents that occur on merchant ships, which represent 32% of the total. The rest of the affected vessels represent 5% of the total. It is not new, nor is it a surprise that fishing vessels are the most affected, has been spoken and written a lot about this topic. What is really interesting is to observe the number of accidents that occurred and the type of accident, during the pandemic period and compare it with the pre-pandemic period. To achieve this objective, a more detailed study will be carried out later only on accidents related to fishing.

3 ACCIDENTS HAPPENED IN PANDEMIC PERIOD 2020-2022

In the period between 2020 and 2022, both included, a total of 44 accidents were recorded, which affected 48 ships from various sectors. This information is presented in a table below.

Sector	Number of vessels involved	Percentage
Fishing ships	35	73%
Merchant ships	10	21%

Recreational ships	2	4%
Service ship (into the port)	1	2%
Others ships	0	0%
Total number of vessels involved	48	100%

Table 2. Vessels involved by sector. Period 2020-2022. Source: Author.

In this period, the total number of accidents that occurred is lower than in the pre-pandemic period. The fishing vessels affected were 35, the merchant vessels 10 and the rest, including recreational ship sand service ship, only 3 in total. It can be seen in Table 2 that they are the majority in fishing, as was the case in the previous period, but the percentage of the total has increased from 63% to 73%. This increase may be related to a greater restriction of mobility in sectors that were not considered essential. It is necessary to remember that during the pandemic the fishing sector did not cease its activity, but passenger transportation did, even if only for a certain time.

4 EVOLUTION OF THE OPERATIONAL FISHING FLEET

In order to give more reliability to the data analyzed, behavior is studied of the fishing fleet. It was determined in previous works that the fishing fleet suffered a constant decrease in the number of registered vessels, which should consider when establishing the percentage of real accidents that occurred in each of the periods. Below, the total number of vessels for each period and modality is shown in two tables.

Fishing modality	**2017**	**2018**	**2019**
Trawler	944	922	906
Purse seine	595	579	573
Fishing by hood	--	55	53
Bottom long line	--	116	111
Long line (surface)	379	200	199
Fishing net (Not regulated)	--	23	21
Fishing net (Regulated)	67	40	40
Fixed Fishing net	55	60	60
Artisanal (pots, nets and small long line)	7106	6977	6.921
Total	**9146**	**8972**	**8884**

Table 3. Number of vessels registered in period 2017-2019. Source: Author.

In table 3, it is observed that the decrease in the fleet in the 3 years is 262 vessels among all modalities. That said, if during the 2017-2019 period there were 57 fishing vessels affected by accidents, the proportion of accidents, taking into account the average number of vessels registered for the 3 years (9001vessels), was 6.33 vessels. affected by every 1000 vessels registered.

Fishing modality	2020	2021	2022
Trawler	897	891	884
Purse seine	570	561	550
Fishing by hood	53	53	53
Bottom long line	107	101	98
Long line (surface)	196	191	188
Fishing net (Not regulated)	21	21	21
Fishing net (Regulated)	40	41	40
Fixed Fishing net	60	59	58
Artisanal (pots, nets and small long line)	6.895	6.814	6.765
Total	**8.839**	**8.732**	**8.657**

Table 4. Number of vessels registered in period 2020-2023. Source: Author.

Table 4 shows the decrease in the fleet between the years 2020 and 2023. The reduction in the number of vessels was 182 units. Taking into account the average number of fishing vessels registered for the period 2020-2023 (8743 vessels) and the number of fishing vessels affected by accidents in the same period (35 vessels), the proportion is 4 vessels affected by every 1000 vessels registered.

5 ANALYSIS OF ACCIDENTS IN THE FISHING SECTOR

As could be seen in point 4 of this study, accidents in the pandemic period were considerably reduced, with 4 ships affected for every thousand ships registered, while in the period before the pandemic the figure was 6.33 vessels affected per thousand registered.

The fishing sector, unlike other maritime sectors, in which activity was reduced considerably (Mujal-Colilles.A., Nieto Guarasa.J., Fonollosa.J., Llull.T., Castells-Sanabra.M.), fishing continued to carry out its activity without restrictions. Even under these conditions accidents were considerably reduced. Apart from observing the reduction of accidents in fishing, another of our objectives was to determine if the typology of the accidents that occurred had been the same, paying special attention to the events in which it can be understood that they occurred due to human error.

5.1 Fishing zone.

In this section, the distribution of the affected vessels is analyzed in terms of the area where they were fishing at the time of the accident. Table 5 shows the data obtained from the vessels involved for the period 2017-2019.

Fishing zone	Vessels involved
Cantabrigian-Northwest	**33**
Mediterranean	**15**
Cadiz Gulf	1

Canary islands	3
North Atlantic	1
International waters	4
Total	**57**

Table 5. Vessels involved by fishing zone. Source: Author.

Regarding the area where the accidents occurred, that is, the fishing ground, the data analyzed shows that in the period 2017-2019, most of the affected vessels (33/57) were operating in the Cantabrigian-northwest fishing ground, in the Mediterranean fishing ground (15/57) and in the rest of the fishing grounds, data of little significance ranging from 1 to 4 vessels. The fact that most of the vessels affected by accidents in the fishing sector are located in the Cantabrigian-northwest is a fact that follows the line of previous studies in which this phenomenon had already been recorded and which, therefore, remains constant. and does not involve changes.

5.2 Vessel's involved by modality.

One of the objectives of this work is to determine if the number of vessels affected by fishing accidents was greater or less in the pandemic period, compared to a previous period of the same duration and, on the other hand, to observe the type of event that occurred, to determine if the human factor was equally present in the accidents during the pandemic period as in a previous period of the same duration and consecutively. Below, the vessels affected in fishing accidents are analyzed, both periods, by fishing method.

Modality	Vessels involved 2017-2019	Vessels involved 2020-2022
Trawler	17	9
Artisanal fishing	**25**	**21**
Fishing tender	1	0
Purse seine	7	3
Fishing net	1	0
Long line(all modalities)	5	1
Others	1	1
Total	**57**	**35**

Table 6. Vessels involved by modality 2017-2019, and 2020-2022. Source: Author.

It can be seen in Table 6 that the modality that includes the greatest number of affected vessels is that of small gear, in both periods, followed by trawling and purse seining as the most significant. Perhaps the most relevant thing is that between the two periods they accumulate 46 vessels, which represents just 50% of the total number of affected vessels. There is no doubt and it is worth highlighting that the affected vessels were small and carried out their fishing activities near the base port and near the coast, in the majority of the cases that occurred.

5.3 Vessel's involved by typology of accident.

At this point, it is analyzed and compared whether the accidents that occurred in the two periods have the same characteristics or respond to different characteristics, in terms of typology. It is intended to determine if the human factor has had something or a lot to do with the pandemic period. The types of accidents that occurred are: Collision, fire, operational, others, grounding, flooding and capsizing.

Typology	Vessels involved 2017-2019	Vessels involved 2020-2022
Collision (ship to ship)	**13**	**3**
Collision (by objects)	2	2
Fire on board	6	5
Operational	5	6
Grounding	**9**	**1**
Flooding	13	9
Capsizing	**8**	**1**
Propulsion system	**0**	**8**
Others	1	0
Total	**57**	**35**

Table 7. Vessels involved by typology of accidents both periods. Source: Author.

By studying the data of the ships affected by the typology of accidents and comparing them between periods, It is observed that there is a group of accident typologies that are repeated, practically in number, such as collision with objects, fires on board, operational nature, the waterway and the others. Then there is a group of accident typologies that have varied, to a greater or lesser degree, their records when are compare between periods. Among these are collisions, one of the types of accidents that occurred in large numbers in the period 2017-2019 and which, on the other hand, has been considerably reduced in the period 2020-2022. This reduction could be related to the lower activity of merchant ships during the pandemic period. It can also be stated that a large number of collisions, in a normal period, occurred between fishing vessels and merchant vessels and to a lesser extent between fishing vessels only.
Another of the typologies that has reduced its records when compared between periods has been the stranded, which is strange. It is estimated that the pandemic situation produced a feeling of fear in people, due to the events that were taking place, and this situation of fear could affect concentration or lack of attention. But on the other hand, the stranding data are much lower, which suggests that the pandemic situation gave the person a situation of alertness and therefore much more attention and concentration.
The data on the type of overturning accidents have also reduced considerably between periods, perhaps the theory that the pandemic period put fishermen on alert has something to do with it, or perhaps the pandemic made them take less risks in fishing activities.
Finally, data on the type of accident related to propulsion systems has increased during the pandemic period. This type of accident is not related to human error, unless it is related to a lack of maintenance due to the short time spent on the ship, It is assumed to be due to the pandemic situation.

With the data in view, it is emerging that in the pandemic period the types of accidents mainly related to human error have been reduced, unlike the initial hypotheses that defended that the pandemic period could have caused a lack of attention or concentration due to fear of the insecurity of the situation.

5.4 Personal injury.

In this section, the results of the comparison between periods of personal injuries caused by accidents will be observed, with the aim of estimating their evolution.

Personal injury	Period 2017-2019	Period 2020-2022
Deceased	**19**	**10**
Wounded	6	4
Missing	**5**	**2**

Table 8. Personal injury by period. Source: Author.

It can be seen in Table 8 that the number of deaths has been reduced by half, between the pre-pandemic period and the pandemic period. Previously it was seen that the number of accidents had reduced, and therefore it is considered reasonable that the number of fatalities also follows this line. The other data that has varied between periods has been the missing persons, which have been reduced from 5 in the 2017-19 period to 2 in the 2020-22 period. Therefore, the sum of deaths and missing persons is 24 in the 2017-19 period, compared to the same sum in the pandemic period(12), it is observed that the number of fatalities has been reduced between periods by 50%.

6 DISCUSSION

Regarding the type of accidents, a decrease has been seen in the number of ships affected by accidents related to human error, such as collision (ship to ship), collision (by objects), and more accidents not related to human error have been recorded. Perhaps this result is related to several reasons. Firstly, it could be related to a further decline in the merchant marine sector. The EMSA, in its 2022 report on the impact of covid-19 on the maritime transport industry, states that since the WHO declared the outbreak of the virus in March 2020, the calls of merchant ships in European ports is considerably reduced. As seen in table 9, we clearly see that in March, ship calls are reduced, coinciding with the WHO declaration. It is also seen in table 9 that the trend between 2019-2021 reverses starting in June.

Month	2019	2020	2021	2022	Trend 2019 to 2020	Trend 2019-to 2021	Trend 2019 to 2022
January	52.975	57.593	52.827	54.294	9%	0%	2%
February	50.746	50.874	51.153	53.180	**0%**	1%	5%
March	57.871	51.711	59.297	62.284	**-11%**	2%	8%
April	61.954	43.268	59.435	65.477	**-30%**	-4%	6%
May	69.941	49.457	65.452	76.747	**-29%**	-6%	10%

June	73.321	57.977	73.638	82.805	**-21%**	**0%**	13%
July	79.392	70.108	84.044	-	**-12%**	**6%**	-
August	78.470	72.504	86.560	-	-8%	**10%**	-
September	71.383	65.742	77.891	-	-8%	**9%**	-
October	67.140	62.584	70.659	-	-7%	**5%**	-
November	59.549	57.442	61.635	-	-4%	4%	-
December	52.818	57.675	58.593	-	9%	11%	-
Total Year to Date	**366.808**	**310.880**	**361.802**	**394.787**	**-15%**	**-1%**	**8%**

Table 9.Number of ship calls reported to SSN in 2019, 2020, 2021 and 2022 per month. Source: EMSA.

By observing the data, it is clear that the calls of merchant vessels were reduced during the pandemic period and, consequently, the interactions between merchant and fishing vessels were also reduced. That said, it is very likely that the reduction in affected vessels, in part, is related to the decrease in merchant activity during the pandemic period.

Although everything indicates that the reduction in accidents could be related to the decrease in merchant ship calls, table 9 refers to the entire European Union. To specify in more detail the fact that there was a reduction in merchant ship calls in Spain, we looked at the data on merchant ship calls at the state level. We observe in the comparison of EMSA data between 2020-2019 that starting in March, the scale values are reduced to March (-32%), April (-62%), May (-63%), June (-51%), registering values between (-25% to -30%) for the rest of the year. The recovery of positive values began around July 202.

Secondly, it would be necessary to determine whether fishing activities continued their normal activity. To do this, the catches of the fishing vessels from the two periods are accessed, with the aim of determining whether they remained the same or were also affected. According to the statistics of catches made by Spanish fishing vessels, taking into account fresh and frozen catches for human consumption, in metric tons, carried out by the Ministry of Agriculture, Fisheries and Food, we prepared the following table 10.

Year	Total Fishing Spain (tons)	Value (millions €)
2017	940.633	2.147.014,11
2018	917.012	1.839.877,98
2019	877.212	1.767.392,17
2020	787.258	1.554.414,55
2021	797.342	1.767.191,29
2022	807.195	2.065.745,57

Table 10. Total fishing and value in Spain 2017-2022 by year. Source: Author.

If you look at the data in table 10, you can see that since 2017 there has been a reduction in catches, in general, until 2022, with 2020 and 2022 being greater than in 2019, a fact that gives us to understand that perhaps fishing activity was reduced in part, but only slightly. It is recalled that the reduction of the fleet is a fact and that its reduction has an impact on catches. In short, everything indicates that fishing activity, more or less, remained constant and perhaps the lack of activity is not directly associated with the reduction in the number of accidents.

Another piece of information that should be discussed is the rate of affected vessels per 1,000 vessels registered. For this analysis, only the two majority modalities were taken, in terms of number of vessels affected, minor gear and trawling. That said, in point 4 of the text, It was observed that for the period 2017-2019 there are an average of 6971.33 vessels registered in the minor arts modality and for the same period a total of 25 affected vessels were registered, which represents a real rate of 3.58 vessels affected per 1,000 vessels registered. For the period 2020-2022, in the minor gear modality, an average of 6,824.66 registered vessels and a total of 21 accidents were recorded in this modality. The rate of affected vessels per 1,000 registered vessels is 3.07 affected vessels per 1,000 registered vessels.

Regarding the trawling modality, during the period 2017-2019, an average of 924 vessels were registered and a total of 17 vessels affected. The rate of affected vessels stands at 18.39 affected vessels per 1,000 registered vessels. On the other hand, in the period 2020-2022, an average of 890.66 vessels were registered and 9 vessels affected in accidents. The rate stood at 10.10 affected vessels per 1,000 vessels registered.

As you can see, the trawling modality includes a greater number of affected vessels, a fact that had already been verified in previous studies. However, a reduction in the rate is observed in both modalities, being much higher in trawling, perhaps due to lower activity, since some of these vessels carry out their activities in international fishing grounds.

7 CONCLUSION

Initially, it was taken as a hypothesis that fear due to the pandemic situation experienced would impact fishermen and cause them to reduce concentration and risk perception, causing more accidents. But the data shows us that this was not the case, and that for some reason, supposedly motivated by the reduction in merchant activity, the number of vessels affected during the pandemic period was lower. Accidents that occur in the fishing sector continue to be the majority among other sectors. It can be seen that in the pandemic period accidents decreased, compared to the previous period of normality. Everything indicates that this reduction is related to the reduction in merchant activity and therefore the reduction in interactions between fishing vessels and merchant vessels.

The reduction of the operational fleet has been a constant over time. For years, the operational fishing fleet has been reducing. This obviously influences the rate of accidents or vessels affected per 1,000 vessels registered. As observed in previous studies, the fishing ground that collects the most affected vessels is the Cantabrigian-northwest, followed by the Mediterranean. It should be added that the fleet that operates in the first of the fishing grounds is larger than in the second. As for the type of fishing, It is observed that this small gear is the most affected type. However, if you look at the rate of affected vessels per 1,000 vessels registered, trawling is the modality that has the highest rate of affected vessels.

Regarding the type of accident, in the post-pandemic period, the number of ships affected by type of collision event decreased. It is believed that this reduction is due to the reduction of activity of

merchant ships during this period. In general, during the pandemic period, almost all types of events recorded a lower number of affected vessels than in the previous period, except those due to failures in the steering or propulsion systems. It is estimated that during the pandemic, maintenance tasks on propulsion and steering systems may have been reduced, causing a hypothetical increase in the number of vessels affected by this type of event.

The reduction of merchant activity that has been fully demonstrated. In Spain, ship calls during the pandemic period were considerably reduced. On the other hand, it is observed that the amount of tons caught experienced only a small decrease, demonstrating that fishing activity continued its normal course.

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