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The voice of Mexican small-scale fishers in times of COVID-19: Impacts, responses, and digital divide

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ABSTRACT
The COVID-19 pandemic has dramatically, quickly, and extensively affected fisheries, the effects of which have yet to be quantified globally, although some efforts have already been made locally and regionally. This study provides insights regarding the impacts of the pandemic in Mexican small-scale fisheries, explores community responses and digital divide. A total of 1493 interviews were conducted, and a social media analysis that reviewed 9079 posts from April to December 2020 was performed. The results show large socio-economic and environmental impacts (e.g. 89% of the markets closed in April, and 72% of respondents perceived an increase in the amount of solid waste). Women have faced increased inequalities when accessing fishing resources or healthcare. Responses have been varied and include closing communities, and fishing organizations distributing emergency funds. Fishers relate feeling very or moderately comfortable with technology and have spent more time using digital platforms during the pandemic than before. While the effects are still unfolding, there is an urgent need to breach the digital divide to guarantee equal opportunities for all. Efforts are needed to ensure that the most vulnerable groups (e.g. women, indigenous people, and elderly individuals) are not excluded from opportunities to access, use or manage resources, including technology. This global crisis may also bring opportunities for adaptation and the implementation of local solutions (e.g. reducing the fishing effort for high-value products), to prepare for future shocks. The findings in this study serve to promote development strategies that build resilience in fishing communities for healthier oceans.

1. Introduction

The coronavirus SARS-CoV-2 (COVID-19) pandemic has added pressure to a world already in flux, affecting every aspect of daily life. The pandemic has dramatically, rapidly, and extensively affected fisheries worldwide, although its effects have yet to be fully quantified. Small-scale fisheries (SSF) are no exception. Market closures, collapsed prices, lockdown measures, traveling restrictions, and overloaded health services continue to impact the livelihoods of those living in coastal communities.

There are ~ 260,000 small-scale fishers in Mexico [8], most of whom live in remote, coastal communities without access to the same levels of health care, information, facilities, supplies, or basic services that are found in large, urban centers. Members of the SSF sector have had to choose between staying at home or continuing to fish to ensure the wellbeing of their families. In particular, young fishers with mortgages on their boats or homes and limited savings [34] have been pushed to keep fishing and accept any price for their catch that the market has to offer.

By December 2020, 20% of all COVID-19 cases were reported in the Latin American and Caribbean (LAC) region, which registered the highest reported mortality rate worldwide [20]. The LAC region is not only in second place with regard to the number of reported infections, after the United States [20], it is also the region that has reported the largest inequalities in the world, in addition to general inequity, discrimination, ineffectual institutions, and political instability [30]. In Mexico, the imbalanced access to drinking water, drainage, and formal employment has also deepened social inequalities [1,7].

By late March, when preparation and response measures were first enacted in Mexico [13], fisheries like that of the spiny lobster had

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already been hit by Asian market closures that had been in place since January [3,24]. At this point, almost all efforts were focused on the sanitary crisis in big cities, which were showing higher numbers of COVID-19 cases than those reported in rural areas and small towns.

The pandemic has not only impacted human health; it also represents a threat to human rights [21], increasing the vulnerability of marginalized groups (e.g., women, children, and indigenous people). In addition, environmental impacts due to pollution and limited monitoring and surveillance have also been reported [3,16,17,35]. The most vulnerable groups in society, namely elderly individuals, women, children, indigenous people, and those living in rural communities, have been among the most affected [2,17]. Therefore, special attention must be given to these groups and the surrounding issues to reduce the unequal consequences of the COVID-19 crisis [21].

The pandemic has also revealed a world that is eager to stay connected but faces great disparities in terms of access to technology and digital literacy. Although the need to address digital discrimination and the digital divide was being addressed before the pandemic, inequalities with regard to technological access have been exacerbated by COVID-19 and the subsequent lockdown measures, generating a new source of discrimination, the digital divide [40]. A stable internet connection is crucial for ensuring access to education, training opportunities [41], information, markets, and service transactions [3] while simply remaining connected in a socially distant world. Importantly, connecting rural, remote, and coastal communities must also be achieved while respecting privacy, digital rights, and net neutrality [39].

The COVID-19 crisis has brought about unprecedented uncertainty, hitting everywhere at once, and on a large scale. Nonetheless, some fishers have been able to adapt rapidly, creating local market opportunities and reducing middlemen and the complexity of value chains [3,25]. However, there is still an urgent need for practical and tailored COVID-19 safety procedures and protocols for fishers [34]. In Peru, a digital platform (pescalibredecovid19.org) provides valuable, free, outreach materials that indicate how to safely resume fishing activities.
which may be adapted and scaled to the requirements of other countries. In Mexico, no such platform exists and access to important information is yet lacking.

Fishers have a tremendous amount of local and traditional knowledge that informs their decision making, which can be used to foster sustainable fisheries management when combined with scientific knowledge [14,18]. Under non-pandemic conditions, small-scale fishers have proven to be adaptable, quickly shifting from one fishery to another, even under other shocks at scale such as climate change [24]. The pandemic, however, has changed many community dynamics. A resurgence of gender inequalities and abusive buying practices (by driving down prices) has been observed, which has caused fishers to choose between sustainability and economic survival.

This study, which took place from April to December 2020, aimed to elevate the voices of small-scale fishers and coastal community members in Mexico to understand how they are coping with the COVID-19 pandemic. To this end, a national consultation with small-scale fishers in Mexico on three key themes (i.e., the impacts of COVID-19, the responses to the pandemic, and the digital divide) was conducted. The results of this study describe the lessons that have been learned and discuss how fishing may be resumed under what is now the new normal.

2. Methods

Interviews were conducted using eight questionnaires, and social media was monitored. The analysis focused on three themes (i.e., socio-economic and environmental impacts, responses to the pandemic, and the digital divide) which were broken down into seven subthemes (i.e., social, economic, environmental, gender, adaptive capacity, use of digital platforms, and digital connection). Each subtheme included specific content (22 variables in total) that was covered in 60 questions (see Table A.5) and a social media analysis.

2.1. Interviews

A total of 1493 semi-structured interviews were conducted over the phone with 397 fishers (24% women) that were either members of fishing organizations (156 organizations were identified in this study) or that were free fishers (people that were not affiliated with a fishing organization). In all, members from 102 communities were interviewed, of which 45 communities only had one interviewee that participated in the study (Fig. 1, see also Fig. A.7 and Table A.6).

Each month, an average of 187 people (from 93 to 241) participated in the interviews, with 83 (21%) people participating once, 58 (15%) people participating twice, and 256 (64%) people participating three or more times. Fishers were 43 years old on average (43 years, men; 39 years, women). The most frequent age range among all interviewees was 30–39 years old for men (23%) and women (9%). The least frequent age ranges among interviewees for men and women were 18–29 (10%) and +51 years old (16%), respectively.

A total of 22 fisheries where included in the study, with 63% of interviewees involved in production, 32% in post-production, 1% in activities complementary to production, and 1% participating in all stages (3% not applicable; see Table A.7). In this study, the term fishers encompass all women and men directly involved in the extraction and/or processing of fishery products. Testimonies where collected from the interviewees. Due to the uncertain nature of the pandemic and lockdown measures, the interviewing process was designed to be remotely implemented via phone calls and, complementary, text and voice messages.

Eighteen trained interviewers applied the questionnaires, which combined open and closed questions, over the phone. The duration of telephone interviews did not exceed 40 min. Before each interview, the interviewer asked for consent to conduct the interview and gave the interviewee the opportunity to terminate the interview at any point. The questionnaires included from 2 to 13 questions. The collected data was disaggregated by gender, age, stage of the value chain, and fishery and quantitatively analyzed (i.e. ratio and proportion) (see Table A.7).

The classification proposed by Solano et al. [33] for the fishery system and stage of the value chain was used, clustering the fishery system into the four categories of 1) pre-production (bait fishing and supplies), 2) production (harvesting and shipment), 3) post-production (landing, aggregation or storage, processing, transportation, wholesale and retail, and administration) and 4) complementary to production (maintenance of fishing gear/equipment, services, social commission, surveillance, monitoring, beach cleaning, transport, and family support). Fisheries were categorized based on the classification of the target species of the National Fisheries Charter [11,12].

Some questions were posed on several occasions to document changes over time. There was no minimum number of interviews conducted per coastal community, although a maximum limit of 32 interviews per month (see Table A.6) was established to avoid iterative responses. Participants were also encouraged to propose other interviewees. The interviewees were first contacted by someone they already knew (e.g. people working with them in the field prior to the COVID-19 pandemic). After each interview, the participants where asked if they would like to continue to be interviewed.

2.2. Social media monitoring

Given the importance of social relationships in fisheries for acquiring information and building knowledge, a social media monitoring approach was applied in the study. The qualitative analysis provided insights to better explore the role of technology in SSF during the COVID-19 pandemic and complemented the analysis of the themes selected for this research, by looking at what information was shared among fishing communities and information targeting SSF (e.g., governmental agencies and civil society organizations.). Social media monitoring also allowed for changes in perceptions of the pandemic to be tracked through a narrative analysis.

A total of 9079 posts were analyzed on social networks (i.e. Facebook and Twitter; see Table A.6) from 137 profiles (39, 35, 22, 11, 11, and 9 profiles from the government, community members, fishing organizations, civil society organizations, international organizations, and collective action platforms, respectively). The social media monitoring process uncovered challenges and local solutions that were shared in reports and discussed in WhatsApp groups, online trainings, meetings, and webinars by participants and other stakeholders. The lessons learned, such as the need to remain organized and connected, and to search for economic alternatives, were used to explore the conditions under which fishing could resume.

Seven trained monitors analyzed two social media platforms: Facebook and Twitter. Facebook is popular among fishers and local fishing organizations, whereas institutions, organizations, academics, and some fishers from confederations (fishing cooperatives are aggregated in federations -regional scale-; and at the same time, federations are aggregated in confederations – national scale) prefer Twitter (observations from the authors). Variables were monitored in relation to the content (key words, original post, or shared post), message format (plain text, photograph/image, video, or link), and category (problem insights, solutions, and collaborative networks...). Data were collected using search tools and filters. In this way, it was possible to determine which
Fig. 2. Perceived social, economic and environmental impacts during the COVID-19 pandemic. The proportion of respondents interviewed is shown (%).
digital platforms were the most used by fishers. Furthermore, by incorporating social media monitoring in the analysis, it was possible to validate the findings from the interviews.

3. Results

The analysis of impacts, responses, and digital divide showed that SSF in Mexico experienced an overwhelming shut down at the early stages of the pandemic. Nine in every 10 interviewees reported market closures and price drops (March-June 2020). Although the markets had reopened by November 2020 (91% of respondents), they opened with limitations (e.g., reduced fishing effort and prices). During the early stages, some of the more isolated coastal communities, protected themselves by closing access to their communities. Five to six months later, most had reopened. The newly reopened communities provided opportunities to reactivate economies, although reopening came hand in hand with an increase in the number of reported COVID-19 cases, despite the preventative measures that were in place. This was evident from the surveys of several questionnaires. Fishers believe that the pandemic has allowed for a certain degree of environmental recovery, although they stress that some complex threats remain ongoing (e.g., pollution and illegal fishing). Moreover, adaptive responses are few and far between or implemented locally. Fishing organizations who had higher levels of organization prior to the pandemic managed to adopt some important measures. Fishers have used technology in their favor to stay informed, engage in e-commerce, and remain connected to others, although less than half (mostly men in their 40’s) reported feeling very comfortable in the digital world.

3.1. Socio-economic and environmental impacts

When participants were asked about socio-economic impacts in the early months of the pandemic (March-April 2020), 89% of the interviewees reported market closures, fishery shut downs, and price reductions with reduced landings. A 51-years-old fisher from the Mexican Pacific shared that “There was no one buying or consuming marine resources. At the beginning of the pandemic, we stopped everything. We closed the processing plant and halted production”. Price reductions were observed in 70% of national and international sales, except in the seaweed fishery of the Pacific, which was the only fishery to experience an increase in demand and price due to the pharmaceutical industry.

| Fishery                        | Market                      | Early impacts | Price variation |
|--------------------------------|-----------------------------|---------------|-----------------|
| California spiny lobster       | Asia                        | January 2020  | ↓ 40-60%        |
| Caribbean spiny lobster        | Asia and Europe             | January 2020  | ↓ 30-40%        |
| Penshell                       | Asia                        | March 2020    | ↓ 30-50%        |
| Finfish                        | United States and Mexico    | March 2020    | ↓ 50-60%        |
| Seaweed (Gelidium sp.)         | International               | Remained open | ↑ due to the pharmaceutical industry |

Support and aid from the government, which came mainly from local governments, was available during the first months of the pandemic. Food supplies were delivered door-to-door to families during April-May. Cash was also provided through fisheries subsidies and support was given to close access to communities. One fisher commented in May, “If you are lucky, the municipality gives you one papaya per family, one kilogram of meat, or a little chicken. Could you survive the quarantine with that...”
Fig. 3. Impacts on well-being in fishing communities, related to health, household care, and access to subsidies. BIENPESCA is a federal fishing subsidy.

| Affiliation to public healthcare | Beneficiaries of fishery stimulus (BIENPESCA) |
|---------------------------------|---------------------------------------------|
| Men (55%)                       | Men (72%)                                   |
| Women (39%)                     | Women (28%)                                 |
| No affiliation (6%)             |                                             |

| Changes in household care |
|---------------------------|
| No (54%)                  |
| Yes (46%)                 |

| Communities undertaking adaptive actions | Closed access to communities |
|------------------------------------------|------------------------------|
| NA (11%)                                 | Yes (45%)                   |
| No (44%)                                 | No (74%)                    |
| Yes (29%)                                | Yes (26%)                   |

| Changed product presentation for commercialization | Food bartering and community exchanges |
|----------------------------------------------------|----------------------------------------|
| No (71%)                                           | No (92%)                               |
| Yes (29%)                                          | Yes (8%)                               |

| Continuity of sustainable practices | Activating emergency funds |
|-------------------------------------|-----------------------------|
| Resumed (21%)                       | Yes (44%)                   |
| No (35%)                             | No (85%)                    |
| Yes (44%)                            | Yes (15%)                   |
food and a little chicken? Of course not, the pandemic is about social classes, where the poorest always have to sacrifice and at the same time be thankful for what we get, otherwise we do not eat. Subsistence fishing is too expensive, and catches cannot be sold well... from my fishing trips I come back with $200 pesos (US$9). Half of the respondents perceived the distribution of aid to be uneven as it did not reach everyone, and the quantities received (MX$ 2000/US$ 90) are lower than seventeen salarios mínimos (minimum wages; roughly MX$123/ US$ 6 per day) in Mexico in 2020. Interviewees were unsure of the criteria used to provide support to different social groups, with only one every three interviewees being able to provide specific answers while 89% stated that they had not received any information from the government about safely resuming fishing (11% received face-to-face information or where informed via Facebook and WhatsApp). Personal protective measures (PPM) were reported to have been used in all communities, except for those that were closed and had not registered any COVID-19 cases (Table 2). Fishers generally lack access to hospitals and clinics in their communities and depend on basic healthcare systems (Fig. 2). Therefore, 94% of the participants reported taking measures to prevent bringing the virus into their homes, and 99% stated that their

| Age range | With responses | Without responses |
|-----------|----------------|------------------|
| 18–29     | 51%            | 49%              |
| 30–40     | 56%            | 44%              |
| 41–50     | 58%            | 42%              |
| +51       | 66%            | 34%              |
The size of the word is directly related to the number of times the keyword was used.

Table 4
Proportion (%) of the most-used social media and e-commerce platforms. Most respondents use multiple platforms. NA: Not Applicable.

| Social media network   | Rate use | E-commerce |
|------------------------|----------|------------|
| WhatsApp               | 95%      | 19%        |
| Facebook               | 90%      | 31%        |
| Instagram              | 26%      | NA         |
| Twitter                | 9%       | NA         |
| TikTok                 | 5%       | NA         |
| MercadoLibre           | NA       | 26%        |
| Amazon                 | NA       | 13%        |
| Other (AliExpress, eBay, Shopify, local webs) | NA | 11% |

Half of the interviewees perceived positive impacts on biodiversity due to lockdown measures (e.g. cleaner seas and beaches, and clearer water with less oil due to reduced boat traffic and an increased abundance of certain species). A 36-year-old fisher said, “We have had very beautiful days that we have not seen in a long time.” However, fishers were also concerned about negative impacts due to the increased volume and deficient management of solid waste (e.g., increased solid waste due to discarded facemasks) as well as being concerned with climate change (e.g. changes in currents, elevated water temperatures, and hurricanes and storms affecting their fishing days). As a 49-year-old fisher said, “I don’t know if we should attribute this situation to climate change or bad weather, but there are no octopuses; I have talked to my wife and colleagues who are also fishers, and the truth is that fishing has not gone well and we are worried.”

Half of the respondents had the perception that the quantity of fishing resources had not changed due to the suspension of fishing activities. When asked about illegal fishing, half stated it had not changed and had always been present in their communities (Fig. 2). Respondents included fishers working in areas that included fish refuges or community reserves (83%). As a result of the pandemic, the way in which these areas are managed has not changed since these zones are not fished. The rest of the participants (17%) argued that it had changed due to the suspension of monitoring and enforcement activities. Two communities in the Pacific and one in the Caribbean reported a temporary opening of their community (voluntary) reserves for subsistence fishing and as a measure to reactivate the local economies.

Despite the fisheries lockdowns and having spent many months with limited working days, household care did not notably change for half of the families. When the fisheries value chain was observed, most of the participants were found to have contributed to either production (63% on average) or post-production (32% on average) activities. However, this was not the case when taking into consideration the federal BIEN-PESCA subsidy, a subsidy that fishers receive each year to support their livelihoods, especially during closed fishing seasons. As this is a subsidy oriented for producers, and women typically engage in other stages of the value chain different to production [33], only 28% of the reported beneficiaries were women (Fig. 3). There were no participants involved in only pre-production activities; those who had reported being involved in that stage where also involved in all the other stages (see Table A.7).

3.2. Responses

Responses were evaluated by observing variables related to adaptive capacity and community actions undertaken towards adaptive solutions. Fishers have developed local solutions individually (58%). Three of every four fishers who found a solution mentioned that they had implemented it without the participation of external stakeholders. The fishers who reported being unable to adapt (42%) stated that they had taken no action due to a variety of factors, such as lacking market alternatives, concerns about their health, and the need to comply with lockdown measures. A perception that their cooperative or colleagues lacked the ability to effectively organize in order to adapt was also present. When observing the community, less than half of the fishers reported having undertaken adaptive actions (Fig. 4).

Access to some small (<2500 people) coastal communities was restricted. When possible, fishers switched to low-value products (mainly finfish), leaving the high-value products unfished (e.g. lobster and penshell). Some coastal communities (65%) successfully maintained or resumed collaboration practices aimed at sustainability (e.g. collaborative research with universities; beach cleanups; underwater, fishery and oceanographic monitoring; and surveillance; Fig. 4).

With regard to the fishery system, changing the presentation of the product constituted the most common adaptation, although this percentage decreased overtime (29% in April and 15% in June). Participating in alternative street and online (Facebook, WhatsApp) local markets was also a common activity. Only some well-organized fishing organizations that were located primarily in Baja California, Baja California Sur and Quintana Roo were able to access emergency funds to cover salaries and loans. A few communities organized food exchanges and support networks by donating fish. For example, a fisher from Baja California Sur stated that his cooperative had donated five tons of fish to local communities, whereas in Quintana Roo another fisher started a small, online crowdfunding initiative to cover the operation costs of fishing to donate to others. Other communities were selling items cheaply or bartering for foods like beans, corn, or pork. Respondents (45%) acknowledged that women were leading the development of alternative economic activities, such as designing and sewing reusable facemasks, or preparing and selling food.

There was no difference in the capacity to document solutions by gender, although the most successful age group in implementing solutions was that of fishers aged over 51 years of age (Table 3).
3.3. Digital divide

To evaluate the use and access to technology, the use of digital platforms and the digital connection were assessed. Fishers feel very to moderately comfortable using technology and have access to smartphones and other hardware like tablets and laptops. There was no significant difference between women and men with regards to the rates of social media use. Participants reported an increased use of social media since the pandemic for all age groups and segments of society (Fig. 5, Table 4) with digital natives (under 35 years old) spending more time online (women spend on average seven hours and men spend on average four hours). A fisher said, "I am coming out of COVID-19; in these days when I have not been able to see anyone, my ally has been my cell phone and technology."

In places where the internet is available, 56% of participants accesses the internet via their home Wi-Fi, 37% used mobile data from their cell phones, and 7% used free Wi-Fi hotspots in their communities or workplaces. When asked about their willingness to pay for digital subscriptions, 73% said they would be either willing to pay (52%) or would consider it (21%). Others said they would not pay due to a lack of income and the fact that free platforms would already exist (Fig. 5).

From all of the analysed social media posts (9079), 18% (1661) included selected keywords used to filter and track relevant messages (Fig. 6). When including the keyword “gender”, only 3% of the analyzed posts included that keyword, along with “fishing” and “COVID-19.” The most common format chosen for social media posts included pictures and photographs (71%), followed by content shared from other websites (19%), with few videos (6%), and plain text (4%).

The number of times that the word “COVID-19” appeared in posts, decreased over time. A total of 56% of posts reported a problem related to COVID-19 in April, whereas this percentage dropped to 5% in October. Likewise, the normalization of the use of facemasks was documented by their increased use in posts that were accompanied by videos or photos of a meeting or conference.

4. Discussion

The COVID-19 pandemic has caused a global health crisis that has brought with it social and economic fragmentation that has cascaded across all sectors of society, including fisheries [7,16]. There is a collective global concern about health, safety, well-being, coupled with the recognition that the poorest and most vulnerable are most affected by the pandemic. However, the impacts of the pandemic have affected primary, secondary, and tertiary activities differently, in addition to affecting cities and rural communities differently [28]. This study elevates the voices of Mexican fishers during the pandemic and provides information about its impacts, responses, and the digital divide. Additionally, the uncertainty about the duration, intensity, and novelty of the pandemic has added extra pressure, triggering social and economic instability that have made it difficult for some fishing communities to adapt [26] or continue with conservation and sustainability efforts. The needs and opportunities identified in this study can be used to develop programs tailored to mitigate the effects of COVID-19 in SSF while promoting adaptation and community resilience (e.g. public and private aid and funding portfolios) and fostering further research.

The impacts of COVID-19 on social, economic and environmental factors are yet to be quantified globally, although some efforts have already been made at the regional level [3,24]. Mexican SSF and the associated communities are not exempt from these impacts [16,24,34]. Fishers worldwide have reported reduced income with declines that vary from 20% in the United States [34] to 100% in Indonesia as a result of the complete cessation of activities [43]. Other studies have also reported lower incomes in fishing communities that have been specifically related to lack of commercialization channels of fresh seafood ([16,25,35]).

The socio-economic and environmental impacts of COVID-19 on Mexican SSF have been similar to those that have been found worldwide ([16,17,34,25,29]). One of the most important early impacts of the pandemic was the closure of markets and the price drop in seafood resources (Fig. 2), which affected most fisheries. The price decreased between 30% and 60% for various species of both international and domestic interest, with the exception of those used by the pharmaceutical industry (Table 1). Fishers showed a preference for selling low-value products locally [25], as prices stretched around high-value products due to the closures of international markets [3,23] and reduced household incomes. After eight months, the fishing sector had resumed fishing but reported investing less effort coupled with continued price drops. Coastal communities received support from the governments, locally in the form of food and federally in the form of subsidies. Nonetheless, many fishers were not satisfied, as they perceived the aide as having been unequally distributed while being sparse. On the other hand, communities and well-organized fishing organizations have played an important role in developing community networks to support the families in need during extended periods of time. In addition, vaccination programs over the world have brought hope of more normalized conditions, with Mexico starting its vaccination program in February 2021 [9]. On the other hand, potentially reduced sanitary measures due to the fact that people start to be vaccinated, may jeopardize the sector’s recovery if the perception of lower risks lead to diminished sanitary measures. Further research will be needed to know if the application of vaccination programs will allow to resume fishing under normal conditions.

During the last two decades, various international instruments have focused on equality and a respect for human rights to reduce economic, social and environmental gaps for humanity [45]. The fishing sector has also echoed on the need of integrating social, economic, and environmental dimensions more forcefully [44]. However, the pandemic has exacerbated challenges related to health, markets, working conditions and the digital divide, which is particularly notable in SSF in rural communities [13,17]. Most of the fishers (66%) indicated having basic health services (Fig. 2; i.e., medicines, one bed, one doctor, and one nurse). However, those resources did not include the specialized equipment needed to treat a person diagnosed with COVID-19. The fishing sector has followed the federal government restrictions that have been implemented since March 2020 to avoid infections, with 96% of fishers using at least one form of PPE (e.g., face mask or hand sanitizer) and adhering to social distancing (Table 2).

With regard to gender, the results of this study show that women represent less than one third of people that have been benefited from the federal fishery subsidy while having less access to public healthcare than their male counterparts [17]. Women are important drivers of fishers’ sustainability and marine conservation in fishing communities [31,37] and adaptive efforts must ensure their voices are heard and considered. When including gender in the social media analysis, the number of messages and posts consistently and substantially dropped, suggesting that the incorporation of a gender perspective in fisheries is lacking in the context of the crisis of the global pandemic.

During the lifetimes of the people alive today, shocks have been either local or regional (e.g., storms, hurricanes, and earthquakes) or have had complex effects that are difficult to track (e.g., climate change). They have, so far, never hit humanity all at the same time. The COVID-19 pandemic is a once in a lifetime event, and it provides an
important opportunity to create an adaptive capacity and the momentum to foster resilience in the face of other global shocks such as climate change, economic recessions, inequality, and the increased discrimination of vulnerable and marginalized groups [2,17,24,25]. The pandemic has demonstrated that the fishing sector has the capacity to adapt and that they can do so quickly by changing product presentations or finding alternative markets. Some of these solutions have begun to be developed at the local scale and include closing or regulating access to communities or adapting to online selling and home delivery. Well organized fishing communities that provisioned emergency funds to their members were better able to cope than those that did not. These lessons can be shared and upscaled within the fishing sector.

Adaptation comes from documenting, learning, and sharing [42]. If we are to adapt to an everchanging world, it is important to document impacts and solutions, in order to discover and co-create new opportunities for fisheries management and governance [4,6], even in the face of shocks [32]. Despite this, cross-analysis studies are scarce, particularly in the appearance of social networks [36], and has offered valuable insights into fisheries management. In fisheries, barriers to local, adaptive capacity have been reported to be largely related to institutional and sociocultural factors, especially those related to inequity with regard to access, resource use, and information [27]. Efforts to include diverse, equitable, and equally represented groups of people when conducting research, are paramount to keep advance science, improve ecosystem management, and foster sustainable livelihoods. This study has given a voice to small-scale Mexican fishers during the pandemic, contributing to a documentation of its effects, and providing information of the need and opportunity to design programs (e.g., public and private aid and funding portfolios) and inspire further research.

During three decades of technology development, humanity has pushed for products to perform tasks, facilitate procedures, and quickly and efficiently communicate. Technology has become essential in all aspects of our lives [19]. Every day, an increasing number of people use technology and more activities become available online. This has also led to massive increases in the number of employees working from home [15], the traffic on digital messaging applications, and the use of video platforms for work, education and leisure. Mexico has ~ 81 million Internet users (70% of the population; [22]), a number that grows every year. Most of the people who connect to the Internet do so through their smartphones (95%), and most of the urban population (77%) uses the Internet, while only 48% of rural communities have access [22]. This digital divide increases inequalities [41] between individuals who have access to high-speed Internet and those with limited incomes and coverage or who do not have the skills and tools to use it. This is particularly important in a world under lockdown and in which technology has become a great ally to remain connected; as such, household internet access should be made ubiquitous [2]. The inequalities generated by the lack of stable internet connections or a total lack of access to the Internet and even to phone signals and their impacts have not yet been documented in fishing communities in Mexico.

Social media analysis has been used in the social sciences since the appearance of social networks [36], and has offered valuable insights into fisheries management and governance [4,6], even in the face of shocks [32]. Despite this, cross-analysis studies are scarce, particularly those including quantitative and qualitative information on social networks [4,6], even in the face of shocks [32]. Experience shows that the fishing answers will greatly vary depending on the quality of their fishing day (authors knowledge), which could bias the data collected from the interviews. In this study, it was possible to determine which digital platforms were used most by fishers by analyzing social media use, which may foster the co-development of improved communication and engagement strategies [10,38].

With regard to the use of technology use, fishers gave a range of responses. Nonetheless, participants reported that they had spent more time each day using digital platforms during the pandemic compared to their level of pre-pandemic use (Fig. 5). These platforms have been used to sell seafood, communicate with family members, and receive information about COVID-19 (Fig. 5). In the US, fishers have stated that online meetings are not suitable to effectively communicate their concerns regarding fisheries management [34]. Therefore, digital strategies should also be combined with non-digital means to ensure that the people that are not familiar with, or unable to access, technology are not left behind. In addition, increased efforts (e.g., capacity building and internet connection) are also needed to improve digital connectivity between fishing communities. Overall, the decrease in the use of the keywords “fisheries” and “COVID-19” in the social media analysis indicates that COVID-19 is no longer talked about as much as previously. This may be due to the fact that the pandemic has begun to be “normalized” in Mexico.

5. Concluding remarks

Fishers in Mexico experienced a massive shut down during the early stages of the COVID-19 pandemic but have now resumed fishing to some extent. Most of the fishers did not have the organizational resources in place to effectively respond to the pandemic and thus, experienced notable socio-economic impacts. The adaptive capacity of small-scale fishers to foster community-based solutions and responses appears to be more closely related to organization than to innovation. Community-based solutions such as those focused on the implementation of PPM, the development of local markets, and the existence of emergency funds; are needed to foster resilience in fishing communities. Also, new solutions will be needed in the context of the New Normal, as conditions change, and the pandemic evolves.

Overall, as a result of the first pandemic to take place in the age of widespread information technology and globalization, fishers have spent more time in the digital world than fishing. Small-scale fisheries have gone through a digital transition in order to be connected. This has revealed important gaps regarding inclusion and equity in the digital and fisheries world, mainly with regard to vulnerable groups (e.g., women and elderly individuals). To avoid disenfranchising the fishing communities in Mexico and the LAC region, new and existing digital infrastructure for SSF, must provide novel ways to breach the digital divide. This will foster a better and fairer connectivity among fishers while fostering the mobilization of local solutions and opportunities for the sustainable recovery of SSF. Both of these factors are needed to increase increasing community resilience and the sustainability of SSF.

Credit authorship contribution statement

Ines Lopez-Ercilla: Formal analysis, Investigation, Methodology, Visualization, Writing - original draft, Writing – review & editing. Maria Jose Espinosa-Romero: Conceptualization, Funding acquisition, Methodology, Writing - original draft, Writing - review & editing. Francisco J. Fernandez Rivera-Melo: Investigation, Formal analysis, Visualization, Writing - original draft, Writing - review & editing. Rebeca Fernandez: Arturo J. Hernandez-Velasco: Data curation, Formal analysis, Investigation, Methodology, Writing - original draft. Araceli Acevedo-Rosas: Data curation, Formal analysis, Investigation, Methodology, Writing - original draft. Maria

Declarations of Competing Interest

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number 2019–69961]; the Sandler Supporting Family Foundation [grant number 20200404], the Marisla Foundation [grant number 20200304], and the Summit Foundation [grant number 20200165].

Data Availability

The datasets generated in this study are available upon request from the corresponding author.

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Appendix A

See Appendix Tables A.5-A.7. Fig A.7.

Table A.5

Questions applied in the interviews (60) divided into three themes, eight subthemes, and 22 content variables considered in the study. Some questions were open (qualitative) while others included a range of answers (quantitative). Data were categorized and disaggregated by gender and age. PPM: personal protected measures. BIENPESCA: federal subsidy provided to fishers in Mexico.

| Theme                                    | Socio-economic and environmental impacts                                      |
|------------------------------------------|-------------------------------------------------------------------------------|
| **Subtheme**                             | **Community impacts**                                                         |
| Content                                  | What has been the impact of COVID-19 in your community?                        |
| Support provided by the government       | Has your community received any support from the government?                   |
| Support and aid provided by the community| Is someone supporting or providing aid to your fishing organization?           |
| Access to hospitals/clinics in your community | Are there health care services in your community?                            |
| Prevention                               | Do you implement personal protective measures (PPM)?                          |
| **Subtheme**                             | **Markets and price variations**                                              |
| Markets and price variations             | How are the prices of the products changing?                                 |
| Fishing activity variation               | Are you still fishing?                                                        |
| Changes in commercialization             | Before COVID-19, did your fishing organization process products to sell?      |
| **Subtheme**                             | **Biodiversity conservation**                                                 |
| Biodiversity conservation               | Do you harvest inside a protected area? (e.g. fauna and flora protection areas, natural resources protection areas, national parks, or biosphere reserves) |
| **Subtheme**                             | **Fishing resources**                                                         |
| Fishing resources                        | Do you perceive that as a result of the pandemic, the confinement and the     |
|                                          | Have you observed the first COVID-19 impacts?                                 |
|                                          | If so, what kind of support?                                                  |
|                                          | Have you yourself or anyone in your family, presented COVID-19 symptoms?      |
|                                          | During the pandemic, have you received any advice or support from a public agency regarding information on how to resume safely the economic activities in your community? |
|                                          | Have you taken preventive measures inside your home to avoid contagion of Coronavirus? |
|                                          | Have you had difficulty obtaining PPE?                                        |
|                                          | Has the price of these items been maintained?                                 |

(continued on next page)
| Theme | Socio-economic and environmental impacts |
|-------|------------------------------------------|
| **Subtheme** | **Gender** | **Has that support (from the government) been distributed to any specific group? Which group (women, single mothers, the elderly, others)?**<br>**Has you the title holder of social services?**<br>**Has your fishing organization given support to women and men equally?**<br>**In the stages of supply chain, who received BIENPESCA?**<br>**Have women in the community had the same opportunities to receive government support? Yes/ No** |
| **Household care** | **Do you perceive any changes in the distribution of domestic work due to COVID-19? Yes/No**<br>**Now that children are staying home for school education due to COVID-19, who is responsible for their care?**<br>**Besides your activities (e.g., work, domestic duties, taking care of the family) are you or anyone in your family, taking care of a sick person? (any disease or suffering, besides COVID-19)** |
| **Role of women in local economy** | **Are women from the community taking part in alternative economic activities to generate income during the pandemic?** |
| **Theme** | **Responses** | **What actions did you take to find solutions to the problem?**<br>**Has your fishing organization taken any action to face the COVID-19 crisis?**<br>**What actions of sustainable fishing have you been able to maintain during the pandemic?**<br>**Could you share with us which of the actions that you have taken has been the most successful or the one that has worked the best?**<br>**When did you start to implement these actions?** |
| **Theme** | **Digital divide** | **Use of digital platforms** | **Do you have a smartphone?**<br>**How many hours a day do you navigate the internet?**<br>**Have you changed the way you use social media during the pandemic?**<br>**Have you changed the way you use social media during the pandemic?**<br>**If so, which platform do you use?** |
| **Use of social media** | **Have you ever purchased or sold any product online?**<br>**Would you be willing to pay for a digital service or platform?** |
| **Use of e-commerce** for buying/selling | **Willingness to pay to access a digital platform** |
| **Subtheme** | **Digital connection** | **How comfortable do you feel using technology? (apps, digital platforms)** | **Do you or your family have access to a computer or a tablet?**<br>**Do you consider that it is necessary to improve the internet connection in your community?**<br>**Do you have phone signal in your community?** |
| **Level of comfort using technology** | **Access to hardware** | **How comfortable do you feel using technology? (apps, digital platforms)** | **How do you connect to the internet?** |
| **Wi-Fi at home** | **How do you navigate the internet?**<br>**How many hours a day do you surf the internet?**<br>**How many hours a day do you surf the internet?**<br>**If so, which platform do you use?** | **How do you navigate the internet?** | **How many hours a day do you surf the internet?**<br>**If so, which platform do you use?** |
Table A.6
Communities and states with participants of this study. The information is disaggregated by gender: women (W) and men (M).

| # | State                  | Community            | W | M | SubTotal |
|---|------------------------|----------------------|---|---|----------|
| 1 | Baja California Sur    | Agua Verde           | 1 | 0 | 1        |
|   | Bahía Asunción         | 1                    | 2 | 3 |          |
|   | Bahía Magdalena        | 0                    | 1 | 1 |          |
|   | Bahía Tortugas         | 1                    | 3 | 4 |          |
|   | Cabo Pulmo             | 2                    | 2 | 4 |          |
|   | Cabo San Lucas         | 0                    | 2 | 2 |          |
|   | El Esterito            | 0                    | 1 | 1 |          |
|   | Ensenada Blanca        | 1                    | 0 | 1 |          |
|   | Ensenada de Cortés     | 0                    | 1 | 1 |          |
|   | Guerrero Negro         | 0                    | 3 | 3 |          |
|   | Isla Natividad         | 5                    | 8 | 13|          |
|   | La Bocana              | 1                    | 3 | 4 |          |
|   | La Paz                 | 2                    | 6 | 8 |          |
|   | Las Barrancas          | 0                    | 3 | 3 |          |
|   | Ligüi                  | 2                    | 3 | 5 |          |
|   | Loreto                 | 0                    | 1 | 1 |          |
|   | Puerto Adolfo López    | 0                    | 1 | 1 |          |
|   | Puerto Chale           | 0                    | 1 | 1 |          |
|   | Puerto San Carlos      | 0                    | 1 | 1 |          |
|   | Punta Abreojos         | 0                    | 2 | 2 |          |
|   | Punta Eugenia          | 0                    | 1 | 1 |          |
|   | San Hipolito           | 0                    | 1 | 1 |          |
|   | San Juan de la Costa   | 0                    | 1 | 1 |          |
|   | San Juanico            | 0                    | 1 | 1 |          |
|   | Santa Rosalía          | 0                    | 3 | 3 |          |
|   | Tembabichi             | 0                    | 1 | 1 |          |
|   | **SubTotal Baja California Sur** |         | 14 | 50 | 64 |
| 2 | Baja California        | Bahía de los Ángeles | 5 | 0 | 5        |
|   | El Rosario             | 3                    | 4 | 7 |          |
|   | Ensenada               | 3                    | 8 | 11|          |
|   | Isla Guadalupe         | 2                    | 1 | 3 |          |
|   | Puerto Canoa           | 1                    | 3 | 4 |          |
|   | San Felipe             | 3                    | 0 | 3 |          |
|   | San Quintín            | 0                    | 1 | 1 |          |
|   | Tijuana                | 0                    | 1 | 1 |          |
|   | **SubTotal Baja California** |        | 12 | 23 | 35 |
| 3 | Sonora                 | Bahía de Kino         | 9 | 12| 21       |
|   | Guaymas                | 6                    | 5 | 11|          |
|   | Puerto Libertad        | 3                    | 10| 13|          |
|   | Puerto Peñasco         | 3                    | 1 | 4 |          |
|   | San Carlos             | 0                    | 1 | 1 |          |
|   | **SubTotal Sonora**    |                      | 21 | 29 | 50 |
| 4 | Sinaloa                | Altata                | 2 | 0 | 2        |
|   | Culiacán               | 0                    | 1 | 1 |          |
|   | El Castillo            | 1                    | 0 | 1 |          |
|   | Mazatlán               | 1                    | 1 | 2 |          |
|   | **SubTotal Sinaloa**   |                      | 4 | 2 | 6        |
| 5 | Nayarit                | Antonio R. Laureles   | 1 | 1 | 2        |
|   | Llano del tigre        | 1                    | 2 | 3 |          |
|   | Palmar de Casas     | 0                    | 1 | 1 |          |
|   | Pescadero              | 1                    | 2 | 3 |          |
|   | Punta de Mita          | 1                    | 1 | 2 |          |
|   | Rosarituda             | 0                    | 4 | 4 |          |
|   | San Blas               | 0                    | 1 | 1 |          |
|   | San Miguel             | 2                    | 1 | 3 |          |
|   | Tecuala                | 1                    | 1 | 2 |          |
|   | **SubTotal Nayarit**   |                      | 7 | 14| 21       |
| 6 | Jalisco                | Puerto Vallarta       | 0 | 1 | 1        |
|   | **SubTotal Jalisco**   |                      | 0 | 1 | 1        |
| 7 | Colima                 | Manzanillo            | 1 | 0 | 1        |
|   | **SubTotal Colima**    |                      | 1 | 0 | 1        |
| 8 | Michoacán              | Cojumatlan Petatán    | 0 | 1 | 1        |

Table A.6 (continued)

| # | State                  | Community            | W | M | SubTotal |
|---|------------------------|----------------------|---|---|----------|
| 9 | Michoacán              | Ciudad de México     | 0 | 1 | 1        |
| 10| Guerrero               | Acapulco             | 1 | 1 | 2        |
|   | El Mogote              | 2                    | 1 | 3 |          |
|   | **SubTotal Guerrero**  |                      | 3 | 2 | 5        |
| 11| Oaxaca                 | Bahía de Huatulco    | 0 | 1 | 1        |
|   | Puerto Ángel           | 1                    | 8 | 9 |          |
|   | San Agustínillo        | 1                    | 0 | 1 |          |
|   | **SubTotal Oaxaca**    |                      | 2 | 9 | 11       |
| 12| Chiapas                | El Cantasio          | 0 | 1 | 1        |
|   | Las Garzas             | 0                    | 1 | 1 |          |
|   | **SubTotal Chiapas**   |                      | 0 | 2 | 2        |
| 13| Quintana Roo           | Banco Chinchorro     | 1 | 12| 13       |
|   | Chetumal               | 1                    | 1 | 2 |          |
|   | Cozumel                | 1                    | 2 | 2 |          |
|   | Holbox                 | 0                    | 1 | 1 |          |
|   | Isla Mujeres           | 0                    | 2 | 2 |          |
|   | María Elena            | 1                    | 5 | 6 |          |
|   | Puerto Morelos         | 1                    | 1 | 2 |          |
|   | Punta Allen            | 5                    | 12| 17|          |
|   | Punta Herrero          | 3                    | 4 | 7 |          |
|   | Xcalak                 | 0                    | 1 | 1 |          |
|   | **SubTotal Quintana Roo** |                    | 13 | 40| 53       |
| 14| Yucatán                | Chuburná             | 10| 7 | 17       |
|   | Dzilam de Bravo        | 0                    | 47| 47|          |
|   | Progreso               | 0                    | 2 | 2 |          |
|   | Río Lagartos           | 0                    | 4 | 4 |          |
|   | San Cristo             | 0                    | 14| 14|          |
|   | San Felipe             | 3                    | 0 | 3 |          |
|   | Sisal                  | 0                    | 15| 15|          |
|   | Telchac Puerto         | 0                    | 1 | 1 |          |
|   | **SubTotal Yucatán**   |                      | 13 | 40| 53       |
| 15| Campeche               | Ciudad del Carmen    | 0 | 2 | 2        |
|   | Isla Aguada            | 0                    | 2 | 2 |          |
|   | Nuevo Campechito       | 1                    | 9 | 10|          |
|   | San Francisco de Campeche |                | 0 | 1 | 1        |
|   | San Roman              | 0                    | 1 | 1 |          |
|   | **SubTotal Campeche**  |                      | 1 | 16| 17       |
| 16| Tabasco                | Cárdenas             | 0 | 2 | 2        |
|   | Frontera               | 0                    | 3 | 3 |          |
|   | Frontera, ejido El Palmar |              | 1 | 0 | 1        |
|   | San Pedro              | 0                    | 1 | 1 |          |
|   | Tembladeras            | 0                    | 1 | 1 |          |
|   | **SubTotal Tabasco**   |                      | 1 | 7 | 8        |
| 17| Veracruz               | Arroyo de Lina       | 1 | 2 | 3        |
|   | La Vigueta             | 0                    | 1 | 1 |          |
|   | Las Barrancas          | 0                    | 1 | 1 |          |
|   | Los Arrecife           | 0                    | 2 | 2 |          |
|   | Nuevo Chicayán         | 0                    | 1 | 1 |          |
|   | Quintanangua           | 0                    | 1 | 1 |          |
|   | Zapotitán              | 0                    | 6 | 6 |          |
|   | **SubTotal Veracruz**  |                      | 1 | 14| 15       |
| 18| Tamaulipas             | Frontera             | 0 | 1 | 1        |
|   | Miguel de la Madrid    | 0                    | 1 | 1 |          |
|   | La Pesca Tamaulipas    | 0                    | 1 | 1 |          |
|   | **SubTotal Tamaulipas**|                      | 1 | 2 | 3        |
|   | **Total number of participants** |        | 94 | 303 | 397 |

24%  76%  100%
Table A.7
Questionnaire information. The categories for the fisheries value chain are based on those of [33]. Fisheries were categorized based on the National Fishery Charter [11,12]. Date format DD/MM/YYYY. Abbreviations: women (W) and men (M).

| Consultation dates | Content of each interview | Number of interviewees | Most and less common age range (years old, %) | Stage of value chain (%) | Number of fishing organizations | Number of communities | Number of questions | Number of monitored publications on social media | List of states (% coastal states represented, n = 17) | List of fisheries |
|-------------------|---------------------------|------------------------|-----------------------------------------------|--------------------------|-------------------------------|----------------------|------------------|-----------------------------------------------|-------------------------------------------------|------------------|
| 30/03/2020 – 15/04/2020 | Social and economic impacts | 93 (34 W, 59 M) | 30–40 (40%) 18–29 (15%) | Production 48% Post-production 40% Complementary to production 3% Not applicable 8% All the stages 1% | 34 (2 free fishers) | 29 | 6 | 338 | Baja California, Baja California Sur, Campeche, Nayarit, Quintana Roo, Sinaloa, Sonora, Yucatan (47%). | Abalone, clam, conch, finfish, octopus, ornamental fish, oyster, penshell, seaweed, shark, shrimp, spiny lobster (California and Caribbean), squid, and swimming crab. |
| 6/05/2020 – 14/05/2020 | The role of the State | 241 (64 W, 177 M) | 30–40 (36%) 18–29 (15%) | Production 60% Post-production 35% Complementary to production 1% Not applicable 4% All the stages 1% | 90 (22 free fishers) | 62 | 4 | 1416 | Baja California, Baja California Sur, Campeche, Ciudad de México (*), Nayarit, Oaxaca, Quintana Roo, Sinaloa, Sonora, Tabasco, Yucatan (59%). | Abalone, clam, conch, crab, finfish, jellyfish, octopus, ornamental fish, oyster, penshell, sea cucumber, sea urchin, seaweed, shark, shrimp, spiny lobster (California and Caribbean), squid, swimming crab. |
| 1/06/2020 – 12/06/2020 | Local Solutions | 223 (60 W, 163 M) | 30–40 (39%) 18–29 (14%) | Production 62% Post-production 34% Complementary to production 1% Not applicable 4% All the stages 1% | 90 (20 free fishers) | 67 | 6 | 1093 | Baja California, Baja California Sur, Campeche, Chiapas, Ciudad de México (*), Nayarit, Oaxaca, Quintana Roo, Sinaloa, Sonora, Tabasco, Yucatan (65%). | Abalone, clam, conch, crab, crown conch, finfish, jellyfish, octopus, ornamental fish, oyster, penshell, sea cucumber, sea urchin, seaweed, shark, shrimp, spiny lobster (California and Caribbean), squid, swimming crab, yellowtail (mariculture). |
| 24/06/2020 – 09/07/2020 | Gender | 219 (58 W, 161 M) | 30–40 (35%) 18–29 (16%) | Production 59% Post-production 37% Complementary to production 1% Not applicable 2% All the stages 1% | 95 (21 free fishers) | 102 | 12 | 934 | Baja California, Baja California Sur, Campeche, Chiapas, Guerrero, Nayarit, Oaxaca, Quintana Roo, Sinaloa, Sonora, Tabasco, Yucatan (71%). | Abalone, clam, conch, crab, crown conch, finfish, jellyfish, octopus, ornamental fish, oyster, penshell, sea cucumber, sea urchin, seaweed, shark, shrimp, spiny lobster (California and Caribbean), squid, yellowtail (mariculture). |
| 29/07/2020 – 10/08/2020 | Access to healthcare | 207 (47 W, 160 M) | 30–40 (32%) 18–29 (16%) | Production 67% Post-production 30% | 86 (37 free fishers) | 60 | 6 | 1826 | Baja California, Baja California Sur, Campeche, Guerrero, Nayarit, Oaxaca, | Abalone, clam, conch, crab, crown conch, finfish, jellyfish, octopus, ornamental fish, oyster, | (continued on next page) |
| Consultation dates       | Content of each interview                           | Number of interviewees | Most and less common age range (years old, %) | Stage of value chain (%) | Number of fishing organizations | Number of communities | Number of questions | Number of monitored publications on social media | List of states (% coastal states represented, n = 17) | List of fisheries                                      |
|-------------------------|---------------------------------------------------|------------------------|-----------------------------------------------|--------------------------|-------------------------------|-----------------------|---------------------|-----------------------------------------------|-----------------------------------------------------|------------------------------------------------------|
| 28/08/2020 – 09/11/2020 | Technology and digital divide                     | 183 (39 W, 144 M)     | 30–40 (34%)                                   | Production 67%           | 81 (28 free fishers)           | 59                    | 13                  | 1071                                          | Quintana Roo, Sinaloa, Sonora, Tabasco, Yucatán (65%). | penshell, sea cucumber, sea urchin, seaweed, shark, shrimp, spiny lobster (California and Caribbean), squid, swimming crab, yellowtail (mariculture). |
| 28/09/2020 – 09/10/2020 | Environmental impacts                             | 161 (33 W, 128 M)     | 30–40 (33%)                                   | Production 69%           | 76 (25 free fishers)           | 62                    | 12                  | 1334                                          | Baja California, Baja California Sur, Campeche, Ciudad de México (*), Nayarit, Oaxaca, Quintana Roo, Sinaloa, Sonora, Yucatán (53%). | Abalone, clam, conch, crab, crown conch, finfish, jellyfish, octopus, ornamental fish, oyster, penshell, sea cucumber, sea urchin, seaweed, shark, shrimp, spiny lobster (California and Caribbean), squid, swimming crab, yellowtail (mariculture). |
| 28/10/2020 – 09/11/2020 | Principles for the New Normal                     | 166 (35 W, 131 M)     | 30–40 (37%)                                   | Production 72%           | 86 (27 free fishers)           | 62                    | 1                   | 1067                                          | Baja California, Baja California Sur, Campeche, Guerrero, Jalisco, Michoacán, Nayarit, Oaxaca, Quintana Roo, Sinaloa, Sonora, Tabasco, Tamaulipas, Veracruz, Yucatán (88%). | Abalone, clam, crab, crown conch, finfish, jellyfish, octopus, ornamental fish, oyster, scallops, sea cucumber, sea urchin, seaweed, shark, spiny lobster (California and Caribbean), swimming crab, yellowtail (mariculture). |

*Ciudad de México (Mexico City) was not considered in the percentages of represented coastal states (n = 17, total coastal states in Mexico)
Fig. A.7. Number of interviews applied per period and state throughout this study.

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