Diving behavior and fishing performance: the case of lobster artisanal fishermen of the Yucatan coast, Mexico

Oswaldo Huchim-Lara 1, Silvia Salas 1, Walter Chin 2, Jorge Montero 1, Julia Fraga 1

1 Centro de Investigación y Estudios Avanzados Unidad Mérida, Mérida Yucatán, Mexico
2 Gonda Center for Wound Healing and Hyperbaric Medicine, David Geffen School of Medicine at UCLA, Los Angeles, California U.S.

CORRESPONDING AUTHOR: Dr. Oswaldo Huchim-Lara – ohl@mda.cinvestav.mx; oswaldohuchim15@gmail.com

ABSTRACT

An average of 209 cases of decompression sickness (DCS) have been reported every year among artisanal fishermen divers of the Yucatan Peninsula, Mexico. DCS is a major problem among fishermen divers worldwide. This paper explores how diving behavior and fishing techniques among fishermen relate to the probability of experiencing DCS (Pdcs). Fieldwork was conducted in two communities during the 2012-2013 fishing season. Fishermen were classified into three groups (two per group) according to their fishing performance and followed during their journeys. Dive profiles were recorded using Sensus Ultra dive recorders (Reefnet Inc.). Surveys were used to record fishing yields from cooperative and individual fishermen along with fishing techniques and dive behavior. 120 dives were recorded. Fishermen averaged three dives/day, with an average depth of 47 ± 2 feet of sea water (fsw) and an average total bottom time (TBT) of 95 ± 11 minutes. 24% of dives exceeded the 2008 U.S. Navy no-decompression limit. The average ascent rate was 20 fsw/minute, and 5% of those exceeded 40 fsw/minute. Inadequate decompression was observed in all fishermen. Fishermen are diving outside the safety limits of both military and recreational standards. Fishing techniques and dive behavior were important factors in Pdcs. Fishermen were reluctant to seek treatment, and symptoms were relieved with analgesics.

INTRODUCTION

Fishing communities of the Yucatan coast and diving behavior

In the coastal communities of San Felipe and Rio Lagartos, located in the eastern region of the Yucatan Peninsula (Figure 1), fishermen work on small boats to gather marine species for personal consumption and commercial sale. Catches comprise mainly lobster (*Panulirus argus*), red grouper (*Epinephelus spp*) and octopus (*Octopus maya*). Among them, lobster is the most profitable species [1-3].

Lobster fishing in this region began in the 1950s with breath-hold diving. Since then, fishing techniques have evolved. Currently, fishermen dive using surface-supplied gas to fish for marine species [3-6]. Decompression sickness in this region has become an epidemic. Between 2003 and 2012, the hyperbaric center of the Mexican Institute of Social Security (IMSS) located in Tizimin City treated an average of 209 cases of decompression sickness (DCS) per year among artisanal fishermen belonging to the fishing cooperatives of San Felipe and Rio Lagartos, a total population of approximately 250 fishermen.

Diving occupations such as aquaculture and commercial fishing carry known health risks of DCS, barotraumas and arterial gas embolisms. In developed countries, DCS is most commonly recognized as a health risk affecting recreational divers utilizing self-contained underwater breathing apparatus (SCUBA), with an incidence of four cases per 13,500 dives (0.03%) and an annual mortality of four cases per 100,000 dives (0.004%) [7,8]. In artisanal fishermen, incidence is

KEYWORDS: decompression sickness, risk, diving behavior, fishing performance
difficult to track due to varying cultural backgrounds, fishing behaviors, training levels, and symptom awareness [9,10]. DCS poses a more prominent health risk for fishermen divers [9,11-15]. The incidence in China is one to two cases per 1,000 divers per year (0.15%), in Tasmania it is 1.4 cases per 100 trained professional abalone divers per year (1.4%), and in the Galapagos it is 3.3 cases per 100 dives (3.3%) [13,16,17-19]. The incidence rates of DCS among artisanal fishermen are much higher than those of recreational or military divers.

Lack of training, improper dive equipment and incomplete knowledge of safety procedures are all known factors that increase risk of DCS [16,20-22]. Artisanal fishermen have substandard dive training and utilize a surface-supplied gas via a hookah system (HS). The HS is cost-effective, has an unlimited supply of gas, and has become the most commonly utilized dive system in artisanal fisheries in developing countries. The system consists of a 5- to 6-horsepower gas-powered engine that powers a pump that compresses 100-120 pounds per square inch gauge (psig) of ambient air into a 1- to 2-cubic-foot volume tank which then delivers gas to fishermen through a plastic hose [9,23]. Fishermen utilizing HS have been shown to exhibit an increased risk of DCS when compared to fishermen utilizing scuba dive systems. Fishermen of Isla Mujeres utilizing a hookah system had a higher pDCS (1.79%) when compared to the group using the scuba dive system (0.78%) [24]. The increase in pDCS is likely due to a change in diving behavior as fishermen using HS had a continuous source of air to continue fishing and thus an increase in nitrogen load.

Fishing behavior and fishing strategies could also contribute to the risk of DCS. Several authors have claimed that fishing behavior among fishermen may be related to psychological gains such as job satisfaction and a positive self-perception [1,25,26]. Other authors have argued that financial profits and factors such as market demands, scarcity of marine resources, and economic stress may be altering this fishing behavior [27,28].

Strategies employed by fishermen may help determine how much risk-taking and alteration of their fishing behavior is incorporated into a fishing journey [29]. For instance, fishermen determine when to dive, where to dive, how deep to dive, and how often to dive according to their aims, potential constraints, available tools, and skill level [30-32]. Fishing strategies allow the individual fishermen reach his kilogram (kg) yield goal. These strategies allow the fishermen to choose between a set of tactics in a given time, to reach said goals, taking into account those factors that favor or limit those goals [33], and are directly linked to
fishermen’s performance or fishing yields. Fishermen are thus willing to take on certain strategies that might present greater risks in order to maximize their catch or just maintain an average supporting income. Limited literature reports have evaluated fishing behavior, fishing performance, fishing strategies, diving profiles and the probability of experiencing DCS. The empirical data collected in the present study evaluates fishing strategies and their association with risk-taking behavior and hence, risk of experiencing DCS.

METHODS

Sample design and fishermen performance

This research project was developed in three separate sections: First, a fishing performance evaluation was conducted among fishermen belonging to the cooperatives in Rio Lagartos and San Felipe. Fishermen were classified into three performance categories. Next, six fishermen from the participating cooperatives were selected following evaluations of their fishing performances. Last, these six selected fishermen were accompanied throughout their daily fishing trips to evaluate and analyze fishing strategies and diving profiles.

Fishing performance was determined according to a fisherman’s catch per unit effort (CPUE) following Salas and Charles (Figure 2) [34].

CPUE can be defined as the total catch (kg) divided by the fishing effort (number of trips) over a specific time period and can be quantified for a single fisherman or an entire group of fishermen. Performance is the quantified fishing efficiency of a single fisherman or a group of fishers over a specific time period of interest, within a specific community of fishermen. Performance for a single fisherman was calculated by:

• first calculating CPUE for the community the fisherman belonged to;
• then the CPUE for the single fisherman was calculated; and
• finally the CPUE for the single fishermen was subtracted from the communities CPUE, resulting in quantified performance.

Data for this analysis was derived from logbooks from 2005 and were provided by the fishing cooperatives from the selected communities. Logs included detailed information about each fisherman’s daily catch by amount and species.

According to their fishing performance a comparative analysis between fishermen from the two fishing cooperatives was conducted in order to allocate fishermen into one of three categories – above average (AA), average (A), and below average (BA) – and to note whether there were differences among diving behaviors. Lobster was denoted as the target species because of its higher value compared to other marine resources, and a separate CPUE was calculated for lobster as the only catch. Inclusion criteria included fishermen older than 18 years of age, utilizing an HS, living in either Rio Lagartos or San Felipe, and belonging to one of the of the performance categories (AA, A, BA).
Field work
Fishing trips usually comprised an average of eight-hour work days, leaving port between 6 and 8 a.m. and returning to port between 3 and 5 p.m. of the same day. The main determinants of trip duration were the amount of catch obtained and weather conditions. Crew members included fishermen who made dives and tenders who monitored the hose and air compressors. Crews in the two studied communities were different: In San Felipe, two of the three crews had two fishermen who were divers; in Rio Lagartos, the three boats had only one fisherman to dive. Revenue was divided into two parts and a half: two for the diver and half for the tender. When the crew consisted of two divers and one tender, the total revenue was divided into three and a half parts: three parts to the fishermen and one half to the tender.

Dive profiles
Dive profiles from the six selected subjects were recorded via Sensus Ultra (Reefnet Inc.) dive recorders. The dive recorder measures 1 inch x 1.3 inches x 1.75 inches, weighs 46.5 grams and has an accuracy of +/- 1 foot of sea water (fsw). Data sampling interval was set at either 10 or 30 seconds. One dive recorder was assigned to each of the selected fishermen and was attached to each fisherman’s weight belt before the first dive of the day. All recorders were collected once the fishermen exited the ocean, and recorded data was downloaded to a desktop workstation. One observer was in the boat with each fisherman to record the amount of catch obtained during the fishing day and also took note of various fishing strategies applied.

At the start of the study researchers collected data through surveys administered to the fishermen. Key demographic information gathered included each fisherman’s age, weight, height, health history, history of DCS, fishing experience, average number of fishing trips per day and season, types of species caught per fishing day, and previous dive training. Fishermen were as asked to report any symptoms of DCS prior to the start of a fishing trip and at the end the fishing trip. Any complaints of musculoskeletal pain and/or neurological symptoms of DCS were obtained after each fishing journey.

Data analysis
For the purpose of data analysis and interpretation, the following definitions were applied. Exposures to pressure and the different parameters associated with diving such as left surface, reach bottom, left bottom, total bottom time, total decompression time, total dive time, ascent time, descent time, and surface interval were consistent with those utilized in dive organizations such as the Professional Association of Diving Instructors (PADI) and the U.S. Navy. Dives were considered anything deeper than 10 fsw and with a bottom time of longer than 10 minutes. Immersions were pressure exposures that had a bottom time shorter than 10 minutes. Surface interval was the time spent at the surface in between immersion or dives. Descent was an uninterrupted linear travel from the surface or 10 fsw, where the fishermen did not pause for longer than 30 seconds. Ascent was an uninterrupted linear travel from the last deepest depth attained to the surface or to a depth less than 10 fsw, where the fishermen did not pause for longer than 30 seconds. A middle ascent was defined as coming up to the surface during the middle of a dive for less than a minute.

Statistical Package for Social Science (SPSS) was utilized to run a non-parametric Friedman test and determine a Kendall rank correlation coefficient (p=0.05) to assure that proper subjects were allocated into the appropriate categories (AA, A, BA) according to their fishing performance. Diving records were analyzed in order to differentiate dives from immersions. Linear regression analysis was performed in order to identify variables and trends present among varying diving behaviors, fishing strategies and fishing performances. Descriptive statistics for CPUE and dive profiles were obtained using InfoStat 2013. T-test analysis was carried out to contrast variance of CPUE and dive profiles between each community with a Welch approximation to account for inequality of variance. Statistical software STATA 12 was employed for a determination of power test to decrease Type I errors. Risk of DCS was estimated using USN93 conditional probabilistic model due to previous publications have used this model to generate DCS risk or pDCS [35-38].
RESULTS

Subject determination

Subjects were selected based on fishing performance. Performance was calculated based on the catch of the 2005 fishing season. The average catch in Rio Lagartos for 125 fishermen during the 2005 season was 22.3 kg for all marine protein and 4.1 kg for lobster per day per fisherman. In San Felipe (n=147) average catch was 21.5 kg and 3.6 kg for lobster. Of the fishermen from Rio Lagartos, 53% performed below average (BA), while only 24% of the fishermen were above average (AA), and 23% were average (A). In San Felipe values observed were 25% BA, 23% AA, and 53% A.

Fishermen description, diving behavior and dive profiles

All subjects were male. Each fisherman was treated for DCS at least once during his fishing career (Table 1). Only one of the six fishermen reported that he had previous professional dive training; the other five fishermen reported being trained by their older peers (members of their family or friends).

We recorded 120 dives and six immersions during 52 days of diving. Of the 120 dives recorded, 24% resulted in decompression obligation and exceeded the 2008 U.S. Navy no decompression limits (Figure 3). These dives were conducted when fishermen targeted high-profit species. The average depth of the 120 dives was 47 fsw (range: 12-87 fsw). The average total bottom time was 95 minutes (range: 12-260) (Table 2). 319 ascents were analyzed. The average speed was 20.3 fsw/minute (range: 2.84-78.22 fsw/minute). A total of 14% of the dives had at least one middle ascent, meaning that the diver reached the surface and went back down to continue fishing without boarding the vessel. Only 5% of the dives had ascent rates that exceeded the recommended ascent rate of 30-40 fsw/minute. Comparing the middle ascents vs. the final ascents, 75% of the middle ascents exceeded the 30-fsw/minute limit.

Two of the six fishermen (33.3%) reported DCS symptoms. In both cases, fishermen did not receive treatment but instead self-medicated with anti-inflammatory medications. Subject SFA reported having arm pain on Diving Day 7, back pain on Diving Day 12, and shoulder pain on Diving Day 16. On those days he descended to depths of 59 fsw for 136 minutes, 51 fsw for 223 minutes, and 44 fsw for 112 minutes. Subject SFBA reported having pain in his arm after completing a dive to 70 fsw for 56 minutes.

Dive profiles were analyzed as single events and pDCS was calculated per event. The average pDCS per dive was 8 ± 1.85% (range: Pdcs 4.74% – 11.7%). We expect that cumulative risk would be higher since the diving patterns involve multiple dives per day with short surface intervals. The average pDCS for RL was 7.6 ± 1.59% (range: Pdcs 4.73% – 10.95%). The average pDCS for SF was 8.79 ± 2.17% (range: pDCS

| Table 1. Fishermen anthropometric parameters and fishing information |
|---------------------|--------|-------|--------|----------|-----------------|--------|
| Diver   | Age (years) | Height (m) | Weight (kg) | BMI      | Fishing experience (years) | DCS injuries |
| RLBA    | 53      | 1.74   | 109     | 36.0     | 28                              | 3       |
| RLA     | 46      | 1.60   | 78      | 30.4     | 22                              | 5       |
| RLAA    | 43      | 1.71   | 96      | 33.5     | 21                              | 9       |
| SFBA    | 36      | 1.67   | 86      | 30.8     | 17                              | 9       |
| SFA     | 21      | 1.54   | 58      | 24.4     | 6                               | 1       |
| SFAA    | 38      | 1.67   | 87      | 31.9     | 20                              | 14      |
| Mean    | 39.8    | 1.66   | 86      | 31.2     | 19                              | 6.8     |
| Range   | 21-53   | 1.54-1.74 | 58-109    | 24.4-36.0 | 6-28                           | 1-14    |
6% – 11.70%). Differences were observed among boats that had two fishermen. Average pDCS for one fisherman was 8.10 ± 1.98% (range: pDCS 4.73% – 11.70%). When the boats had more than one fisherman the average pDCS was 7.65 ± 1.40% (range: pDCS 6% – 10.37%). There was a significant difference in pDCS among boats that either had one fishermen diving or two fishermen sharing the work $t (16) = 0.66$, $p > .0001$.

Simple linear regression analysis showed that depth significantly predicted the fisherman’s pDCS from each single dive (Figure 4). For every fsw, pDCS increases by 0.12% ($T0.05 = 8.61$, E.E. = 0.01, $p < 0.0001$), $R^2 = 0.72$, $gl = 28$, $1 – \beta = 1$. Multiple regression analysis also showed an association between the fisherman’s age and the depth and bottom time spent by fishermen during dives. The results indicated that younger divers tend to dive for longer periods of time and also dive deeper (both known as risk factors for DCS) than older divers ($p < 0.05$).
Fishing behavior

Fishing skills play an important role in determining fishing strategies such as where and how to fish. Figure 5 shows that in Rio Lagartos, fisherman RLAA descended deeper than the other fishermen from his community but also spent the least amount of bottom time; his strategy resulted in the greatest catch and revenues. Subject RLBA made shallower dives but for longer bottom times and achieved high performance and thus higher revenues. These contrasts with different profiles, but similar results demonstrate some of the existing variances in diving strategies, skills and risk perception. Behavior observed between a more experienced fisherman and novice fishermen were different. Novice fishermen spend more time underwater looking for ideal fishing areas; while experienced fishermen knew where to locate fishing areas. Size of the crew also exhibited a noticeable effect on catch and time spent diving. The average catch for one fisherman was 70.5 ± 28.2 kg (range: kg39.5 – 137.6). Boats that had two fishermen diving had an average catch of 67.1 ± 14.1 (range: kg 48.3 – 85.2). There was a difference among catch between boats that had one fisherman diving and those that alternated diving and had two fishermen, t (24) = 0.42, p<0.0001.

The patterns of fishing strategies described during the journeys shows different techniques employed due to the target species. The yo-yo pattern was observed when the fishermen divers went down to the bottom to review the caves: If they found lobster, the crew stayed to fish; if not, they surfaced and the crew moved to a new fishing zone. Long periods of time underwater were observed when the fishermen divers’ target was octopus. This is due to the differences between lobster (crustacean) and octopus (mollusk) habitats. The mollusk habitat is distributed over longer distances. If the distances between lobster caves were known or if the fishermen planned to target octopus, the fishermen divers would remain underwater. If the fishing target zone changed, the fishermen remained underwater and would be dragged via the breathing hose to the next target zone.

DISCUSSION

Artisanal fishermen divers from Yucatan are exposed to health risks due to frequent and untreated DCS. Depth, total bottom time and the yo-yo diving pattern found in the dive profiles of these subjects are similar to those from the Miskito and Galapagos underwater harvesters. Although, pDCS of the single dives was lower in the Yucatan fishermen compared to the pDCS readings obtained from the Miskito divers, it is expected that a cumulative analysis of the fisherman’s entire dive profile could reveal higher pDCS; none-
theless, the relevance cannot be disregarded given the potentially severe impact it could have upon health status [13,38].

From the 319 ascents analyzed, fishermen exceeded recommended ascent rates in the middle of dives to the surface when compared to the final ascent rate at the end of their diving. The final ascent rate might not be an accurate representation of the actual risk of DCS or barotrauma. Ascent rates during the middle of the dive were done to exchange spears or by obtaining a bigger hook to reach lobsters by jilador (a steel stick to engage the fish underwater). In some cases, equipment failure occurred or marine fauna caused interference.

One possible solution to decreasing the number of ascents conducted in the middle of dives would be to find a more efficient way to send catches and spears from the fishermen to the boat. This would eliminate mid-dive ascents that have often exceeded a rate of 75 fsw per minute. Generations of fishermen have learned these diving techniques through family and friends. Altering this diving behavior requires long-term educational interventions. Some fishermen have opted to learn scuba dive techniques but still vary from the diving behavior of recreational divers.

Fishermen are reluctant to seek therapy. Treatment delay or lack of therapy further exacerbates DCS. Ignoring symptoms or self-medicating symptoms is a common problem among artisanal fishermen. For instance, neither of the two fishermen who felt pain during the period of study received treatment. This lack of seeking treatment is a common problem among divers of the Yucatan coast and other fishing communities around the world where pain is considered simply part of the job [39]. In this case study, there were various reasons why fishermen refused to seek treatment: loss of revenue, no secure means of transport to the hyperbaric chamber, location and distance of the hyperbaric chamber, and a lack of symptom awareness. Even though fishermen are covered by medical insurance provided by the IMSS, most prefer to relieve the pain on their own. This decision exposes them to increased risk.

The general health and physical conditions of these artisanal fishermen have previously been studied by this author. Fishermen were overweight, hypertensive, consumed alcohol and smoked. These findings vary from the diving behavior of recreational divers.
suggest that other health disparities can arise in this population, complicating the outcomes, and thereby making the damaging effects of DCS a potential social burden [1,5,23].

Artisanal fisheries use HS for diving because of its cost and ease of homemade assembly. The HS system is commonly used by fishermen around the world and includes countries such as Thailand, Mexico, United States, Turk and Caicos Islands, Nicaragua, Costa Rica, Ecuador and Brazil [13,40-45]. Most of the fishermen who use an HS live in small communities and are repeatedly exposed to DCS and dive accidents. Despite some attempts to alter this fishing method [1,3], this type of diving is still widely used as a preferred fishing system. High-pressure scuba dive cylinders are expensive and require gas refilling.

Risky conditions demonstrated in this study call for a new model of diving specific to hookah diving. A model solely based on the diving behavior of artisanal fishermen would be a model that would accurately predict the risk of DCS. It would serve as a simple model that could be applied to other groups of artisanal fishermen.

Assessment of other existing fishing methods such as diving in artificial shelters for lobsters (casitas) in shallow waters near the coast could help reduce risk of injury among fishermen [46]. The local government sponsors free diving courses for fisherman. These courses are centered on recreational diving. However, income trumps safety. Rules and recommendations are forgotten when “the catch of the day” produces low yields. The scarcity of catch or opening of a new fishery can drastically modify fishermen’s diving. The scarcity of target species makes diving longer and deeper. Opening of new fisheries introduces new financial incentives to dive [25,43,44]. Additionally some of these fisheries are open for a limited amount of days, causing fishermen to increase the amount of time they spend diving [3,25]. These incentives can modify the way fishermen dive. Several authors admit that fishermen would continue long and deep dives in order to increase their catch yield, but, in some cases fishermen will simply look to maintain an average income [18,25].

In this case study, target species had an influence on fishing behavior. When lobster fishing, fishermen dive in a yo-yo pattern, spending a few minutes to hours underwater. When the target is octopus, fishermen were found to spend up to four hours diving, where they moved about underwater from multiple locations. Another pattern that can increase risk of DCS while diving is related to the effort fishermen exert at depth. According to the results of our analysis, crews with one fisherman like RLAA had higher pDCS than the crews with two fishermen like SFAA. Boats with two fishermen divided the time of diving and hence labor. Although, subject RLAA had a higher pDCS he also had higher revenues than SFAA. This alteration could be accounted for by a behavioral change. SFFAA explained:

“I used to take risk diving deeper to obtain more revenue, but not anymore, I am now more careful. I stop drinking and take care of my family.”

The contrast between the two fishermen with different profiles but similar results demonstrates some of the existing variances in dive strategies, skills and risk attitude when defining fishing tactics. The opposite behavior was observed between a more experienced fisherman who knew where to find fish when compared to a fisherman who was forced to spend more time underwater looking for a target zone. The fishing skills (reflected in performance) might have effects on the results of the fishing journey. Furthermore, it can be stated that knowledge of fishing performance and risk taken by fishermen are important factors required to understand dive profiles and the risk of experiencing DCS.

The average catch per boat was higher in crews with a single diver. Crews that included two divers arranged specific diving dynamics: One diver would fish for the first two hours; the second diver would fish for the next two hours; the first diver would then fish for the last two hours of the journey; and the second diver would begin fishing at the beginning of the next day’s journey. Plus, it is important to note that diving time will alter according to catch.

Diving behavior and risk of DCS are strongly influenced by variables that are not related exclusively to diving. At Lake Victoria in east-central Africa, for example, fishermen who possess motorboats and fish for a specific target were categorized as risk-seekers [47]. For Yucatan lobster fishermen, the advantages

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of the HS (continuous air supply) and technology devices could be additional risk factors. Fishing skills have been acknowledged as important factors that define fishing strategies and fishing success, but they can also grant insight into the attitude fishermen exhibit toward risk [25,26,44].

Results also showed that SFA, who was the younger fisherman, tended to dive deeper and spend more time on the bottom than the older fisherman (RLBA), which increased his risk of dive accidents. The relationship between age and dive accident occurrence is described by McGuinnes, et al. [48] in an 11-year review of accidents in a fishing fleet. The study showed that there is a clearly a decrease in the number of accidents with increased age. Antão, et al. [49] describes the opposite finding: In the fishing sector of Portugal, younger fishermen are more skilled than older fishermen and thus experience fewer diving accidents than older fishermen. In the present study, older fishermen have attained a greater sense of awareness over time than younger fishermen toward risk, as one admitted: “I had experience the DCS, so now I have more caution because I know that I can perish underwater.”

The younger fisherman, on the other hand, seemed to focus upon the pressure of a globalized market that incentivized him to take greater risk in order to obtain ideal catches. The increased time that younger fishermen spend underwater could be related potentially to limited diving experience, as they might be willing to take more risk to compensate for lack of skills.

As literature reveals and this study supports, the diving behavior of artisanal fishermen and their risk of DCS is a complex problem that demands specialized multidisciplinary approaches. The relationship of risk of decompression sickness to fishing behavior shows the need to implement a program in this direction. It is necessary to recognize the need for educational interventions that can work in conjunction with local actions in these fishing communities. As reported by Davis [50], most fishermen have learned diving and fishing techniques from their relatives and friends at a very early age. Furthermore, education regarding safe diving practices and first-aid actions can be implemented at early ages before fishermen become involved in diving and learn the same unsafe diving practices by those who have been diving for years.

Cultural influences are also important [39] factors that could be utilized to favor beneficial changes in fishing behavior. Selection of qualified leaders who can use appropriate language would be invaluable resources for instigating desirable change in behaviors [51]. For many fishermen around the world, diving is considered not only a way of life, but it is also the only work they know how to do. In the Yucatan, diving is becoming even more popular among fishermen and is predicted to remain in the region for long time. The price of health in the long-term could increase if diving safety procedures are not recognized and actions taken.

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Conflict of interest
The authors report no conflict of interest with this submission.
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