

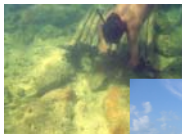
Participatory research to improve stock conditions and fishers health: The lobster fisheries in Yucatan, Mexico

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The context

- The lobster fishery started to operate in the 1950's at the north of Yucatan coast in Alacran reef area.
- Lobster were extracted by the use of small nets called "jamos", they were so abundante and were easy to catch. Sail boats were employed.
- By the 1970's the lobster and other valuable species were allocated in exclusivity to fishing cooperatives.
- The lobster provides important economic value to the fisheries in the region.

Given the high value of lobster fishers population increased and new fishing methods were searched for.



Skin diving



Use of jamo



Traps

Hookah system



Casita cubana

- Why the hookah system has been maintained?
 - Allows for longer diving time
 - Allows access to deeper fishing zones
 - Cheaper than scuba diving
 - Local adaptations had taken place
- Health problems came in paralel with the hookah
 - Decompression sickness
 - Disabilities
 - Deaths
- People were trained in their own without taking into account diving rules.

Study area and goals



- San Felipe and Rio Lagartos fishing communities, by the eastern coast of Yucatan.
- Only hookah system is employed in this region over natural and artificial habitats.
- The goals of the study were to identify risk factors associated to the decompression sickness, evaluate risk perception of fishers regarding the fishing method employed.

Methods.



- Participatory observation.
- 196 interviews were applied to fishers in both communities that had suffer decompression.
- Information regarding health problems that contribute to the sickness was obtained.
- High and weight measures of fishers were taken.
- Analysis of data was undertaken base on descriptive statistics and multiple regression analysis.

Results.

- Overweighed fishers dominated the sample.
- Other illnesses that can constrain diving activities were also present.
- Some fishers presented some degenerative and chronic illnesses.

Illnesses	Fishers that present the illness in % (n=196)			
	Diabetes	Hypertension	Dyslipidemia	Total
Overweigh				87.7
Diabetes	4	0	0	4
Hypertension	0	6	0	6
Dyslipidemia	2	2	12	16
Asma				3.0
Ear infections or associated				6.1
Total	6	8	12	26

Fishers are not used to have check ups on health centers before undertaking diving activities or on regular basis.

- 47 % of fishers declared to be active smokers smoking up to two packages a day.
- Consumption of marihuana (*Cannabis sativa*) was also acknowledged.
- 70% of interviewed fishers are alcohol consumers.

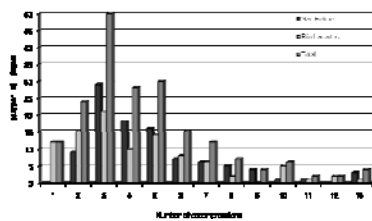
- 100% of interviewed fishers use the hookah system.
- 74% of fishers dive in each immersion above 2 hours
- The fishing journey has as a minimal 2 immersions and 8 as a maximum.
- Average diving depth was 23.14 ±8.47 brazas (1 braza= 1.8 m).
- Distance from the coast is about 20.8 ±8.5 Nautical miles (1.5 km=1 mile).

Limited knowledge on impact of diving

- Diving training is minimal or nil
- There is a lack of knowledge on the illness symptoms and its causes.
- Only 16% of fishers knew about the accumulation of nitrogen bubbles as a cause of bends and decompression illnesses



- Some fishers declare to had experienced 14 decompression events



- Fishers indicate that they keep on diving because of the need to maintain an income.

- Been a smoker and alcohol consumer seems to increase the risk to have a decompression event.

No. of decompression events	Regression coefficients	Standard error	Z	P>[z]	Confidence interval 95%	
Alcohol	0.296	.077	3.83	<0.001	.144	.447
Tabacco	0.438	.067	6.47	<0.001	.305	.570

- Been overweighed also contributed to increase the risk of decompression events.

No. of decompression events	Regression coefficients	Standard error	Z	P>[z]	Confidence interval 95%	
Normal weigh					Reference value	
Overweighed	.125	.116	1.08	0.280	-.102	.353
Obese G I ^a	.311	.124	2.50	0.012	.067	.555
Obese G II ^b	.688	.175	3.91	<0.001	.343	1.03

- Blood hypertension, long-associated illnesses and dyslipidemia can favour decompression illnesses

No. of decompression events	Regression coefficients	Standard error	z	P>[z]	Confidence interval 95%
Diabetes	.295	.157	1.88	0.060	-.012 .604
Hypertension	.527	.128	4.12	<0.001	.276 .779
Long-associated illnesses	.677	.135	4.99	<0.001	.411 .943
Dyslipidemia	.481	.101	4.76	<0.000	.283 .680

- Given more chorinc degenerative illnesses also favored an increase of decompression events in fishers.

No. of decompression events	Regression coefficients	Standard error	z	P>[z]	Confidence Interval 95%
0	No events				
1	.149	.144	1.03	0.301	-.134 .433
2	.564	.156	3.62	<0.001	.259 .870
3	1.02	.197	5.20	<0.001	.641 1.41
4	1.50	.328	4.59	<0.001	.862 2.14

- Number of inmersiones was associated to decompression events.

No. of decompression events	Regression coefficients	Standard error	z	P>[z]	Confidence interval 95%
Working hours	.037	.029	1.26	0.208	-.020 .096
Time of immersion	.073	.033	2.17	0.030	.007 .140
No. of divers	.751	.370	2.03	0.042	.025 1.47
Number of inmersions	.063	.021	2.97	0.003	.021 .105

- Distance-Depth interaction while diving were significantly associated to decompression events.

No. of decompression events	Regression coefficients	Standard error	z	P>[z]	Confidence interval 95%
Distance-Depth interaction	.012	.002	6.00	<0.001	.008 .016

Conclusions.

- Several factors associated to physical conditions of fishers can contribute to decompression problems; been overweighed, been a smoker and alcohol consumer can generate a predisposición for the bends.
- Lack of control on time of immersion, depth and number of inmersions are significant variables that can contribute to decompression events.
- Evidence of different type of sicness present in high proportion of fishers indicates lack of attention on their personal health; fishers are not used to have regular check ups before or after diving.
- There is not proper diving training and fishers do not knowlege the risk of this activity. Fisher need improve their knowledge and skills in this regard.
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- Participatory research allowed to obtain information to a fine scale and also to generate trust among fishers, who could benefit from programs that help them to improve their health, knowledge and source of income, the fishery.
- Integrative studies that include fisheries evaluations that incorporate the understanding of the biological and human system are necessary in order to improve fisheries performance and wellbeing of fishers.

