Working conditions of fishermen concerns the future of artisanal fishing

Condições trabalhistas de pescadores preocupa o futuro da pesca artesanal

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ABSTRACT
The present study sought to understand Fishermen's satisfaction with their profession and their socioeconomic conditions. These data were acquired through semi-structured questionnaires in eight locations in the State of Maranhão. Most interviewees were male (94.55%), with an average age of 43.58. Fishermen from some locations point to the loss of fishing materials and difficulty in purchasing new equipment, professional risks, fatigue, lack of safety and reduction in fishing resources as agents that make fishing activities difficult. The income of the majority varies between 1 and 2 minimum wages, and therefore, there are other activities to generate extra
income. Furthermore, most interviewees do not want their children to inherit the fishing profession. This reality demonstrates that the difficulties encountered in fishing, which exposes neglect, lead to the devaluation of this profession in many fishing communities in Brazil. Therefore, the data from this study serve to alert public management to take steps to improve working conditions, aiming to perpetuate this profession for future generations, a factor that is essential for food security.

**Keywords:** socioeconomics, fishing communities.

**RESUMO**

O presente estudo buscou compreender a satisfação dos Pescadores com sua profissão, bem como suas condições socioeconômicas. Esses dados foram adquiridos por meio de questionários semiestruturados em oito localidades do Estado do Maranhão. A maioria dos entrevistados são do sexo masculino (94,55%), com idade média de 43,58. Pescadores de algumas localidades apontam para a perda de materiais de pesca e dificuldade em comprar novos equipamentos, riscos da profissão, o cansaço, falta de segurança e diminuição do recurso pesqueiro como agentes que dificultam a atividade de pesca. A renda da maioria varia entre 1 a 2 salários mínimos, e por isso, existem outras atividades para geração de renda extra. Além disso, a maior parte dos entrevistados não desejam que seus filhos herdem a profissão de pescador. Essa realidade demonstra que as dificuldades encontradas na atividade de pesca, que por si só escancara o descaso, remete a desvalorização dessa profissão em muitas comunidades pesqueiras do Brasil. Sendo assim, os dados do presente estudo servem para alertar a gestão pública a tomar atitudes de melhores condições de trabalho, visando a perpetuação dessa profissão para as futuras gerações, fator esse que é essencial para a segurança alimentar.

**Palavras-chave:** socioeconomia, comunidades pesqueiras.

**1 INTRODUCTION**

The fishing sector represents the world's third-largest food-producing system, with global marine production in 2020 of 90 million tons, of which 63% corresponds to capture fishing, where at least 60% of this production is due to the contribution of the artisanal fishery (FAO, 2022). According to the Ministry of Integration and Regional Development (2022), there are 1 million accredited artisanal sinners in Brazil.

Artisanal fishing is one of the most traditional economic activities associated with obtaining food for the local population, employing labor and generating income by selling fish in local markets and fairs (ZACARDI et al., 2017). This modality is practiced by self-employed fishermen who work alone and with family labor and use relatively simple gear (CLAUZET et al., 2007; VASCONCELLOS et al., 2011). As a result, due to the lack of quality vessels and
personal protective equipment (PPE), fishermen are subject to accidents in the workplace and exposure to diseases (MELO, 2022).

The International Labor Organization (2000) highlights fishing as one of the most exhausting and dangerous activities carried out by man. Studies point to the fragility of worker safety and health in the fishing sector (GOTARDELO, 2020; MARINHO et al., 2020; COSTA, 2019; DOIMO et al., 2012).

On the coast of Maranhão, this fishing modality is widespread and is a primary means of survival for riverside communities, providing food and work. It also contributes significantly to the regional economy, supply of a source of marine animal protein, identity and social strengthening in the belief system and added values in fishing activities (ISAAC et al. 2006). Although fishing activity is intense along the entire coast of Maranhão, studies on this practice are still very general, not addressing the local realities of each municipality (DINIZ et al. 2020).

Therefore, the present study seeks to understand fishermen’s satisfaction with their profession and characterize the socioeconomic conditions of these individuals in the main fishing centers in the State of Maranhão.

2 METHODOLOGY

The State of Maranhão has approximately an extension of 640 km with distinct regions in terms of physiology and geology, with the Maranhão recesses with vast mangroves to the west and the Maranhão sheets with dunes and natural coastal lagoons to the east. In the central region of the coast of Maranhão, the Golfão Maranhense complex is located, bathed by Baia de São Marcos and Baia de São José. These bays are separated by Maranhão Island (ALMEIDA et al., 2011). The target regions of this study were the municipalities of São José de Ribamar (headquarters and community of Caúra), Raposa, São Luís (Arraial community), Paço do Lumiar, Bequimão, Apicum Açu, Carutapera and Viana.
The information for this study was obtained through structured socioeconomic questionnaires applied to local fishermen, which were based on open and closed questions, in addition to formal and informal conversations and direct observations made during their application.

The information obtained included municipalities of the origin of the fishermen, functions, level of education, family characterization, housing and living conditions, associations, production assets and monthly remuneration. All these purposes centered on fishing activity, as it was realized that it is the main activity of the communities under study.

Descriptive statistical analysis was carried out regarding the mean and standard deviation of the mean concerning gender, age group, categorization of marital status and place of birth of the interviewees. Furthermore, through the PAST program, Principal Component Analysis graphs were obtained to explain the relationship between the most evident age groups and locations, in addition to the relationship between income categories (less than one minimum wage, one minimum wage, two minimum wages, etc.) arising from fishing activities and localities.
3 RESULTS

3.1 SOCIOECONOMIC PROFILE

Regarding all interviewees from the 8 locations, the majority were men (94.55%), aged over 18 years and an average age range of 43.49 (± 11.77) years. Regarding age, for Apicum-Açú the average age is 43.58 (± 11.71), 44.20 (± 9.14) in Arraial, 50 (± 13.94) in Bequimão, 43.85 (± 10.19) in Carutapera, 44.75 (± 8.99) in Caúra, 47.5 (± 14.87) in Viana and 40.55 (± 11.31) in Raposa. Concerning the education level, the majority of respondents have little education, with 24.62% of respondents in the category of incomplete primary education. Regarding marital status, among the categories of single, married, stable union, divorced/separated and widowed, the majority are married (55.50%), followed by singles (34.45%), with the other categories at low levels of respondent numbers. The majority are born in the state of Maranhão (93.78%) and live in their own masonry house (80.38%) (Table 1).
Table 1: Socioeconomic profile of small-scale coastal fishers from the state of Maranhão, Brazil. % = relative citation frequency. NA = Not Answered.

<table>
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<tr>
<th>Variable</th>
<th>Category</th>
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<th>Arraial (%)</th>
<th>Bequimão (%)</th>
<th>Carutapera (%)</th>
<th>Caura (SIDR) (%)</th>
<th>Paço do Lumiar (%)</th>
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The time in which respondents carried out fishing activities ranged from less than one year to more than 50 years. The majority of fishermen from Bequimão (26.92%), Paço do Lumiar (35.15%), and Raposa (34.38%) have been in the activity for 1 to 10 years. In Apicum-Açú (40%), Viana (50%) and Carutapera (30%), they have been in the activity for 11 to 20 years. In Arraial (53.33%) and Caúra (41.18%), most have been fishing for 21 to 30 years.

The PCA was generated from a matrix with municipalities' years of fishing activity. When applying the biplot, PC 1 (70.33%) pointed out that the categories of 31 to 40 years and less than one year mainly influence the municipality Raposa, which is isolated from the other municipalities, as seen in Figure 1. Concerning PC2 (18.14%), the categories with the greatest influence were from 1 to 10 years and 11 to 20 years, mainly for the Apicum and Paço do Lumiar communities (Figure 2).

Figure 2. Analysis of the main components of the fishing time of respondents from the fishing pole municipalities in Maranhão, Brazil.

3.2 SATISFACTION WITH THE FISHING PROFESSION

In all locations, most fishermen (Table 3) are affiliated with the colony in their region. When asked about their satisfaction with the services provided by this part, the majority responded "good" (Apicum: 39.29%; Arraial: 45.45%; Bequimão: 76.92%; Paço do Lumiar: 57.14%; Raposa: 45.45%) and "very good" (Carutapera: 46.15%; Viana: 80%). Even so, both
those who were satisfied and those who were not satisfied with the fishermen's colony's performance presented the following leading suggestions for improving the services provided: financial assistance for the purchase of fishing gear, medical aid, reduction of fees, allocation of resources only to those who actually work with the fishing activity, and even changing the management. In Apicum-Açú (57.50%), Bequimão (61.54%) and Caúra (75%), the majority of fishermen do not receive closed-season insurance, while the majority of localities in Arraial (80%), Carutapera (50%), Paço do Lumiar (56.10%), Raposa (67.57%) and Viana (83.33%) receive closed insurance assistance.

The majority of fishermen from Apicum-Açú (60%), Carutapera (75%), Paço do Lumiar (73.17%) and Raposa (81.82%) have difficulties with their fishing activity. The main reasons for this were loss of fishing materials and difficulty in purchasing new equipment, risks of the profession, fatigue, lack of safety and reduction of fishing resources. In all places, most fishermen do not want their children to inherit the fishing profession because it is a painful, tiring profession with a lack of security, low pay and the hope that they will study to obtain a better way of life. Regarding conflicts between fishermen, only in Paço do Lumiar (41.46%) and Raposa (43.18%) did the majority of respondents mention there being some type. In Paço do Lumiar and Raposa, the most cited conflicts were disagreement (due to the use of drugs, alcohol, arguments and invasion of areas), competition (disputes over fishing and sales locations), non-payment for products or services provided, and intrigues between net and longline fishermen (Table 3).

Table 3: Satisfaction and aspects involved with the fishing activity of artisanal fishermen in Maranhão, Brazil. %

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Apicum-Açú (%)</th>
<th>Arraial (%)</th>
<th>Bequimão (%)</th>
<th>Carutapera (%)</th>
<th>São José de Ribamar (%)</th>
<th>Paço do Lumiar (%)</th>
<th>Raposa (%)</th>
<th>Viana (%)</th>
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<td>0</td>
<td>14.29</td>
<td>18.18</td>
<td>0</td>
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<tr>
<td></td>
<td>Regular</td>
<td>21.43</td>
<td>27.27</td>
<td>0</td>
<td>7.69</td>
<td>46.15</td>
<td>28.57</td>
<td>22.73</td>
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<td></td>
<td>Good</td>
<td>39.29</td>
<td>45.45</td>
<td>76.92</td>
<td>46.15</td>
<td>46.15</td>
<td>57.14</td>
<td>45.45</td>
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<tr>
<td></td>
<td>Very Good</td>
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<td>9.09</td>
<td>15.38</td>
<td>46.15</td>
<td>7.69</td>
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<td>0</td>
<td>80.0</td>
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<td>3.57</td>
<td>18.18</td>
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<td>0</td>
<td>0</td>
<td>13.64</td>
<td>0</td>
<td>20.0</td>
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<tr>
<td>Receives insurance during the closed season for the species</td>
<td>Yes</td>
<td>32.50</td>
<td>80.0</td>
<td>34.62</td>
<td>50.0</td>
<td>25.0</td>
<td>56.10</td>
<td>67.57</td>
<td>83.33</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>57.50</td>
<td>6.67</td>
<td>61.54</td>
<td>40.0</td>
<td>75.0</td>
<td>43.90</td>
<td>32.43</td>
<td>0</td>
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<tr>
<td></td>
<td>NA</td>
<td>10.00</td>
<td>13.33</td>
<td>3.85</td>
<td>10.0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>16.67</td>
</tr>
</tbody>
</table>
As types of remuneration were mentioned, payment for partnership, production and fixed salary with additional production. Among these, in all municipalities in this study, the majority receive remuneration for fishing production. The respondents’ fishing activity income ranged from less than one minimum wage to 5 wages. The majority of respondents receive up to 1 salary in Apicum – Açú (47.5%), Bequimão (61.54%) and Viana (66.67%) and up to 2 salaries in Arraial (46.67%), Carutapera (70 %), Paço do Lumiar (65.85%), São Jose de Ribamar (29.41%) and Raposa (62.50%).

A PCA was generated from a matrix with municipalities' minimum wages received from fishing activities. Applying the biplot showed that the main components correspond to the cities of Raposa, Paço do Lumiar and Carutapera, which are on positive axis 4, contributing 60.63% of the "loadings" values (Figure 3).
Figure 3. Analysis of the main components of the income generated by the fishing activity of the interviewees from the fishing pole municipalities in Maranhão.

The principal components, which are the municipalities of Raposa, Paço do Lumiar and Carutapera, are allocated on the same axis as the "up to 2 minimum wages" category, which indicates that there is a significant difference in the number of respondents in this category compared to the others.

Concerning the analysis of principal components, for PC1 (60.63%), the variable of more than two salaries significantly influences the municipalities Paço do Lumiar and Raposa. Concerning PC2 (31.14%), it is noted that the most influential factor is fishermen receiving more than one salary, with Apicum and Bequimão being the most influenced municipalities.

In addition to fishing, some interviewees cited activities that supplement their income, which is related mainly to the fishing sector, such as the design and maintenance of vessels. But other activities were also mentioned less frequently, such as domestic service and cleaning, processing fish at fairs, carpentry and agriculture.

4 DISCUSSION

The respondents are primarily men aged between 40 and 50 years old, who have many years of experience in fishing activity (most with over 11 years of experience), are native to the state itself, and have their house of the type of masonry. Regarding marital status, the highest percentage is in the married category. When considering the sexuality of those involved in
fishing, it is clear that in these regions, the wife does not directly participate in the fishing activity, as there are low numbers of women respondents in this study. These demographic data are typical of other regions of Brazil (MORAES; SEIDL, 2000; BASAGLIA; VIEIRA, 2005; CARVALHO; MEDEIROS, 2005; CONDINI et al., 2007).

Carvalho et al. (2021), in the State of Pará, highlight that men also carry out fishing activities. This dominance is justified by the risk that this work offers. In this way, women perform secondary tasks classified as less risky, such as shrimp fishing, reselling fish, and making or repairing fishing nets. However, Leal et al. (2018), carrying out studies among fishermen in Tocantins, present results in which the number of men and women involved in fishing activity is balanced. Even though over time it has become accustomed to seeing men as the familiar figure leading fishing, more recent studies show women as the majority concerning the leading role in fishing activities in their communities, as is the case in the municipality of Água Doce do Maranhão (SOUZA et al., 2021), Passarinho community in the city of Araioses, Maranhão (MEIRELES et al., 2017), and in the city of Santarém, Pará (SOUZA et al., 2018).

In the past, the sexual division of labor meant limiting fisherwomen to assistants and supporting female workers in fishing activities (FONSECA et al., 2016; LEAL, 2020). However, in places where there have been improvements in the work of artisanal fisheries, women, as well as younger people, have begun to participate in fishing activities. As happened in Praia do Norte, Tocantins, after the regularization of work and the establishment of the fishing colony, it resulted in social protection and productive inclusion. Thus, women and young people began to join the fishing industry (LEAL, 2020). However, suggestions for improving the fishing community in the regions of this study indicate that the services provided still leave something to be desired, demonstrating that the reality of the entire context of fishing activity differs between the regions of Brazil.

As in the present study, the absence of parental contribution in the fishing profession makes it suitable for partnerships, which can cause conflicts between these fishermen, especially regarding payment. To avoid disputes, having family members in the fishing activity also appears as a strategy to meet the criteria of trust, agreement and companionship in the fishing activity (GALVÃO, 2013), thus avoiding the disappearance of the activity.

The interviewees had low levels of education, which may be related to their early involvement in activities to generate income to help with household expenses. There is still a
greater demand for time and effort in the fishing profession, corroborating school dropout rates. This is typical behavior among the artisanal fishing community, especially in developing countries (SALAS et al., 2011; ALENCAR; MAIA, 2011; FAO, 2016). Alencar and Maia (2011) stated that 75% of Brazilians have incomplete primary education; this percentage is 72% in the Northeast region.

The income of most fishermen corresponded to up to two minimum wages. According to Jimenez et al. (2019), fishermen's income and decision-making powers related to fishing activities tend to be lower than those of other members of the fish production chain. This is because fishermen's bargaining conditions are reduced, as their income leads to limitations on acquisitions (BJORNDAL et al., 2014; WAMUKOTA et al., 2014; LOC et al., 2010). Due to low remuneration, which ranges from 1 to 2 minimum wages for most interviewees, other work activities were reported to help increase their income. Other studies in the municipality of Raposa have already emphasized that both fishermen (SANTOS et al., 2011) and shellfish gatherers (MONTELES et al., 2009) perform other activities as a source of extra income, just as in the municipality of Carutapera (SOUZA et al., 2021). The implementation of income from additional activities was also reported in other municipalities that are not part of the present study, such as Água Doce do Maranhão (SOUZA et al., 2021). Furthermore, other studies also reported complementary activities to the fishing profession in Pernambuco (DOMINGUEZ et al., 2016), Rio Grande do Norte (RODRIGUES, 2022), Bahia (MASSENA et al., 2014), Amazonas (SOUZA; MENDONÇA, 2010; LIMA et al., 2012; SOUSA et al., 2014; CANAFISTULA et al., 2021), in Pará (CARNEIRO, 2020; CARVALHO; JARDIM, 2019; VAZ et al., 2017; BORCEM et al., 2011; SANTOS, 2005; FINCO et al., 2003); Santa Catarina (CAPELLESSO; CAZELLA, 2011) and; São Paulo (RAMIRES et al., 2012; MENDONÇA, 2015), as alternative measures to maintain the household's livelihood. This reality demonstrates that the difficulties encountered in fishing, which exposes neglect, lead to the devaluation of this profession in many fishing communities in Brazil.

5 CONCLUSION
The interviewees are primarily adults, married, with little education and have no family involvement in fishing, nor do they want their children to inherit the profession. The reports of difficulties in fishing activity, search for other means to supplement income, suggestions for
improving the colony and conflict between fishermen contradict their answers related to satisfaction with the services provided by the colony, as the majority rated it positively. This may point to a lack of critical sense on the part of those involved in this research, who may confuse the good reception with the benefits that the colony offers.

The present study presents reports of fishing difficulties and fishermen's desires towards the fishing colony. Furthermore, many interviewed indicate a lack of interest in their children continuing this activity. Therefore, the data from the present study serve to alert public management to take steps to improve working conditions, aiming to perpetuate this profession for future generations, a factor that is essential for food security.

The results of this study demonstrate that the future of artisanal fishing in Maranhão is worrying, considering the social factors that can determine its evolution: the low economic profit, the difficulties that fishermen face with their profession and the lack of appreciation for their children inherit the work.

The need for more studies is also highlighted since fishing communities have specificities. Such information helps develop government strategies and plans across the social and environmental spectrum. With this, it will be possible to set goals for school development, aiming to qualify fishermen better and to help improve the workforce in the region, promoting incentives for the appreciation of women in fishing and the products sold, increasing family income.
REFERENCES


FAO - Food and Agriculture Organization of the United Nations, Technical and socioeconomic characteristics of small-scale coastal fishing communities, and opportunities for poverty alleviation and empowerment, **FAO Fisheries and Aquaculture Circular**, N.1111, 123p., 2016


