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Abstract

Small-scale fisheries are frequently characterized as “the poorest of the poor”. However, it has been recently pointed out that they are not necessarily the poorest of the poor in monetary terms, but may, instead, be amongst the most vulnerable socioeconomic groups due to the sensitivity of their livelihood system to risks and their (lack of) ability to cope with external shocks. To explore these statements, this study analyzes and compares the monetary poverty and the economic vulnerability of fishing and non-fishing households of a coastal community in the Caribbean region, based on the Foster-Greer-Thorbecke (FGT) poverty measure and the vulnerability index proposed by Bené (2009). Furthermore, the study delves into the community’s income diversity, using monthly data collected over a one-year period, to show how income from fishing activity might lead to poverty prevention and to reduce households’ vulnerability. The results seek to draw attention to poverty alleviation strategies which must consider two types of groups, the poor and the vulnerable, and to recognize the relative importance of fishing as a strategy to cope with poverty and the vulnerability associated to it.

Introduction

In developing countries, small-scale fisheries have been reported to exhibit high levels of poverty and deprivation. However, the relationship between fishing and poverty is rather unclear. Bené (2004) suggests this relation could be better understood by digging into the role of fishing as a subsistence activity and the high-income dependency on open access resources. In this regard, poverty and vulnerability are highly related given the high exposure of fishers to natural and economic shocks (Allison et al., 2006). Vulnerability can be understood as an expanded poverty concept that contributes to measure the risk of being in poverty and to understand how a variety of shocks may be intrinsically more detrimental to the poor (Morduch, 1994).

The objective of this research is to contribute to the analysis of poverty and vulnerability of small-scale fisheries, a topic that has been scarcely studied in developing countries, in Colombia, to the best of our knowledge, there is not as detailed longitudinal data for fishing households as the one presented in this study. To accomplish the objective, this research applies the Foster-Greer-Thorbecke (FGT) poverty measure and the vulnerability index proposed by Bené (2009), with a modification for panel data, to the Barú fishing community in the Colombian Caribbean.

Our results indicate that, in this case, fishers are not the poorest, although 27 percent of their income depends on fishing, mainly from fish sale. Furthermore, in poor fishing households the poverty gap is not as large as the one of non-fishing households. Regarding economic vulnerability, fishing households present a broader diversification of income and less dependency on the main economic activity when compared to their counterparts. The vulnerability index is lower for fishing households, particularly those in the higher income quintiles, and this is explained mainly because of the ability of these households to diversify their income sources and reduce their income dependency from only one economic activity. These results highlight the importance of income diversification as a strategy to reduce income dependency on the main activity, decrease economic vulnerability and prevent poverty in contexts where economic activities rely on open-access natural resources.

Data and methodology

The data for this analysis comes from primary information collected from households settled in Barú village; 97 fishing households and 187 non-fishing households were surveyed in Barú every month from September 2018 to October 2019. The surveyed sample is representative of the Barú population. The data collected includes demographic information about the households and detailed information on household income, income sources (labor, non-labor and non-monetary) and spending.

To measure poverty levels we use the Foster-Greer-Thorbecke (FGT) poverty measures, which lead to three types of indexes: 1. The headcount index ($\alpha = 0$); 2. The poverty gap index ($\alpha = 1$), and 3. The severity of poverty ($\alpha = 2$). As to vulnerability, we apply the measure proposed by Bené (2009), which incorporates measures of income variation (CV), dependency on the main activity (Dep), number of economic activities of the household (A) and a poverty indicator ($Pov_i = \frac{\text{poverty line}}{\text{per capita income}_i}$). Since we have panel data at a household level, we compute the coefficient of variation within households:

$$V_i = CV_i + \frac{Dep_i}{A_i(1-Dep_i)} Pov_i$$

For the analysis we used the extreme poverty and poverty lines established by the Colombian bureau of statistics (DANE) in 2018: 80 \$ USD PPP and 176 \$ USD PPP per month per person, respectively. These measures are above the ones proposed by the World Bank of 1.90 \$ USD and 3.22 \$ USD per person per day in developing countries, for extreme poverty and poverty, respectively. We divide our results between fishing and non-fishing households to better understand, how the fishing activity interacts with poverty in this context.

Results

Our data sample shows that, contrary to most literature, fishing households in Barú have a greater monthly per capita income than non-fishing ones (327 vs. 202 \$ USD PPP). The total household income is computed as the sum of labor income, non labor income (remittances, subsidies, interests, etc.), and non-monetary income from fishing (fish for household consumption, fish gifted to others and fish received as a gift by the household). Figures 1 and 2 show the per capita income distribution by type of household and the different sources of income. These results remark that per capita income is greater for fishing households than for non-fishing ones, and that a considerable part of the distribution for both groups is below the poverty line. As to Figure 2, we point out that income derived from fishing activity represents around 27% of the income for fishing households and 1% for non-fishing households. Fishing households self-consume and gift 13% of the expected income they get from their catch, while the rest is sold in the market. Fishers in Barú are integrated into the market, which allows them to sell their catch and acquire other goods and services in the market. These results contrast with those found by Garaway (2005) in Lao PRDR, where three fourths of the captured fish are self-consumed, and are similar to the ones reported in Papua New Guinea by Friedman et al. (2008).

Figure 1. Per capita income distribution by type of household

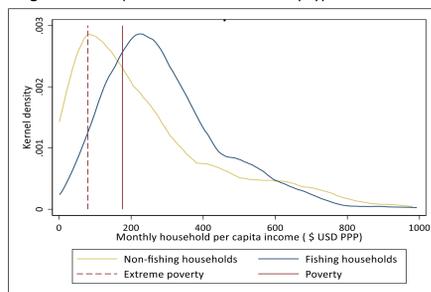
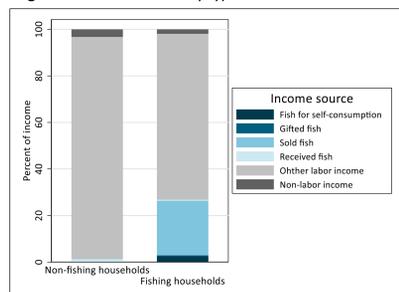


Figure 2. Income sources by type of household



Results

The FGT poverty measures are presented in Table 1. Consistent with the per-capita income results, the FGT for non-fishing households is greater in the first two dimensions. This indicates that: i) the proportion of non-fishing households below the poverty line is greater than the proportion of fishing ones; ii) the income gap of non-fishing households is, on average, greater than that of fishing households. As to the third dimension of the FGT measure, the severity of poverty is low (less than 1%), which implies the income differences among poor households are small. The headcount index, compared to the national, 27%, is above for fishing and non-fishing household, which suggests that the population in Barú is poorer, at least in monetary terms, than the average citizen.

Table 1. Foster-Greer-Thorbecke poverty measures

Sample	Headcount index ($\alpha = 0$)	Poverty gap index ($\alpha = 1$)	Poverty severity ($\alpha = 2$)
Fishing Households	0.2930	0.1008	0.0001
Non-fishing Households	0.5227	0.2663	0.0001
Total sample	0.4207	0.1928	0.0000

Notes: Total sample is composed of 2,475 household observations; the non-fishing sample is composed of 1,451 and the fishing household of 1,024. The data in this table was collected between September 2018 and July 2019.

To better understand the relation between vulnerability and poverty we compute the vulnerability index between the two household groups. Table 2 displays the mean by variable for each group and a mean comparison test. These results indicate that fishing households have less relative variance on their income, a greater number of economic activities and lower dependency on the main economic activity when compared to non-fishing households. The outcome of the vulnerability index is that non-fishing households are, on average, more vulnerable than fishing ones.

Table 2. Vulnerability Index variables and results

Variable	Fishing Mean (SD)	Non-fishing Mean (SD)	T-test Difference (SE)
Coefficient of variation by household	0.451 (0.229)	0.606 (0.229)	-0.155 (0.011)***
Number of economic activities	1.996 (0.882)	1.62 (0.882)	0.376 (0.037)***
Proportion of income from main activity	0.746 (0.214)	0.855 (0.214)	-0.109 (0.009)***
Vulnerability Index	0.702 (0.023)	0.9 (0.702)	-0.197 (0.033)***

Notes: Total sample is composed of 2,475 household observations; the non-fishing sample is composed of 999 and the fishing household of 993. The data in this table was collected between September 2018 and July 2019. Only households that reported an economic activity or receiving non-labor income and participated in the survey six or more times were included. (* p<0.10, ** p<0.05, *** p<0.01)

To dig into these results, Figure 3 displays how the vulnerability index varies across income quintiles and household types. This figure evidences that the level of vulnerability of households in the first two quintiles are equally vulnerable when comparing fishing and non fishing households. In terms of vulnerability, for both groups, the first quintile doubles the rest; after the second quintile, fishing households are significantly less vulnerable than non-fishing ones. To better understand the reasons behind these results Figure 4 shows that the number of economic activities increase and the dependency on the main activity decreases as the income quintile rises. These dynamics are more marked in fishing households and could contribute to explain why the higher quintiles of income (3, 4 and 5) achieve a reduction on their vulnerability level when compared to non-fishing households.

Figure 3. Vulnerability by quintile

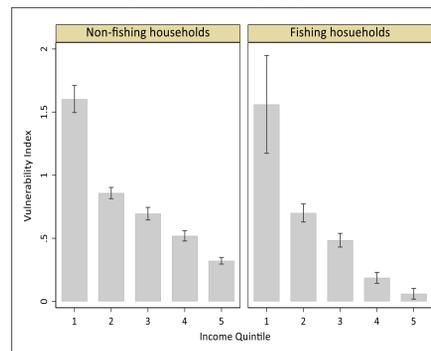
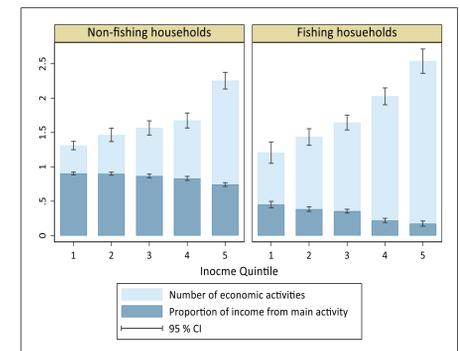


Figure 4. Income diversification and dependency by quintile



Conclusions

This research studies the interaction between fishing, economic vulnerability and monetary poverty in Barú, Colombia. Our results point out that, in this study case, fishing households are not as poor or as vulnerable as non-fishing ones and this may be related to their capacity to diversify their income sources and reduce dependency on income from their main economic activity. These findings are similar to those reported for rural households in Sub-Saharan Africa, where extreme rainfall events are positively associated with livelihood diversity as a strategy to increase household welfare (Asfaw et al., 2019). In Colombia, income diversity has shown to be a strategy to increase income of poor rural households. Nevertheless, as households become wealthier, income specialization leads to higher returns (Arguello & Poveda, 2016).

In this situation, the volatility and risk associated to fishing may lead fishing households to seek for alternative income sources in order to assure the household income, giving them a comparative advantage regarding non-fishing households. More in depth studies about fishing activity and its relationship with income diversification should be carried out to confirm this hypothesis. Besides, the reliance of fishing households on open-access natural resources may be a source of latent vulnerability, as the resource may degrade over time or suffer from natural disasters and shocks. Our measure of economic vulnerability cannot capture such risks of the fishing activity.

Policy recommendations for Barú should consider the characteristics of the fishing and non-fishing population and the different sources of their vulnerability as well as the importance of the fishing resource as a source of income for the entire community. The apparent success of fishing as a livelihood strategy may eventually result in an increase in the number of fishers, which could lead to a quicker depletion of the fishing resource, monitoring the state of the resource is encouraged, so that the current demand for the resource does not affect the future benefit the community can receive from it. As to the role of income diversification, and although more research should be done about this topic, it is important to consider that this may be an internal response to external shocks on household income combined with other factors such as barriers in access to land, financial assets and education.

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