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# *The Role Of The Informal Sector In Income Generation In Madagascar: The Case Of The Fisheries Sector In The Urban District Of Toliara*

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***Abstract*— The purpose of our article is to analyse the informal sector in Madagascar, in order to understand whether it is really a source of income. To do this, we carried out a representative survey of the fishing industry in the urban district of Toliara. The fishing industry has gradually taken its place in the overall economic organisation, and has now become an element of balance and a factor in social stability, and the basis of a territorial dynamic. On a national scale, it accounts for 7 per cent of gross domestic product, provides around 1.5 million direct and indirect jobs, and accounts for 6.6 per cent of exports, making it a fundamental sector of the economy. The main objective of this article is to provide, through various theoretical and empirical tests and analyses, some answers as to the real contribution of the informal sector to the financial integration of fishing households, in Madagascar in general and in the Urban Commune of Toliara in particular. The results of research among a sample of 250 fishermen in this capital of the Atsimo-Andrefana region confirmed that the informal sector offers stable financial resources.**

***Keywords* — Income, Employment, Fishing, Informal sector, Toliara.**

## I. INTRODUCTION

Informal economies have grown rapidly in recent decades, particularly in urban areas (Berrou & Eekhout, 2019). In this context, they "constitute ways of life and survival for most of the population" (Hugon, 2007), contribute 25% to 65% of GDP in sub-Saharan African countries(International Monetary Fund, 2017), and produced 7,472 billion Ariary of goods and services and 4,842 billion Ariary of added value in Madagascar(INSTAT, 2013b, 2013a).

According to Madagascar's National Statistics Institute, the informal sector is defined as "any income-generating activity that has neither an identification number nor a statistical number" (Andriamanampisoa, 2015). A priori, the subject appears to be of an economic nature, given the most well-known or visible aspects. Moreover, most of the existing works and theories fall into this category (see Azzabi & al., 1991; Charmes, 1987; De Almeida Vasconcelos, 1985).

To the legal (Benjamin and Mbaye, 2012; Morisson and Mead, 1996; Charmes, 1993) and administrative (Lachaud and Penouil, 1985; Rakotomanana, 2011) parameters, the criterion of flexible internal organisation is added (Andriamanampisoa, ibid). Although some units are listed by the State, they present criteria of informality that escape State control. These include recruitment without an employment contract, the involvement of family members in various tasks, the absence of an account book, a statistical number, social security contributions[1] and a bank account (Lautier, 1994; Rakotomanana, ibid; Hussmanns,

[1] In Madagascar, this is the Caisse Nationale de la Prévoyance Sociale (CnaPS).

2001, Charmes, 2009, OECD, 2009).

Poorly exploited, the informal economy leads to a deterioration in state coffers (Bela et al., 2020). Its predominance reduces a country's ability to mobilise the budgetary resources needed to stimulate economic activity in times of crisis, implement effective macroeconomic policies and build the human capital essential for long-term development (Ohnsorge & Yu, 2022). However, 90% of the Malagasy population receives income from this sector (Bela et al., ibid.). Given this reality, what role does informal fishing play in household finance? The aim of this research is therefore to understand the real contribution of the informal sector to income generation.

The informal economy is multidimensional: job creation, trade, family savings, exploitation of natural resources, etc. Like all activities in the informal sector, the fishing industry, despite its low level of technology, occupies an increasingly important place among economic activities in Madagascar. It now plays an important income-generating role in Madagascar's coastal areas, especially in the urban commune of Toliara. For this reason, it is assumed here that income from informal fishing provides for the daily expenses of fishing families.

The hypothetico-deductive methodology adopted here requires meticulous steps. Documentary research was carried out in order to obtain information on the Malagasy fishing industry and the study area, as well as the extent of the informal sector. A semi-directive interview was also scheduled to obtain information on the opinions of local community leaders regarding the precariousness of jobs and the potential of fishing in the study area. A questionnaire survey was then carried out to gather quantifiable data on the situation of informal fishermen. These data were then processed and analysed using statistical tests to verify the validity of the hypothesis.

## II. MATERIALS AND METHODS

### 2.1 Concept

The notion of the 'informal sector' was first proposed 50 years ago by the anthropologist Keith Hart (Hart, 1973, 1972), in his study of the income-generating activities of poor households in Accra (Ghana). At the time, the term was used to describe the 'activities' of the working poor, which were unregulated and offered no social security or employment protection (Fourie, 2017). Since then, the study of this phenomenon has become widely popularised and numerous terms and definitions have emerged. In terms of terminology, we might mention, for example, "informal economy", "underground", "parallel" and "invisible",

"(Lautier, 2004). There are long-standing debates in the scientific community. However, there is now a certain consensus on the informal economy as a set of income-generating activities carried out, to a greater or lesser extent (to varying degrees), outside institutional rules or the framework of state regulations (criminal, social or tax legislation, national accounting) (Biles, 2009; De Soto, 1994; Feige, 1990; Portes & al., 1989; William & Nadin, 2010; Williams, 2006).

In 1993, at the 15th International Conference of Labour Statisticians (ICLS), the International Labour Office (ILO) adopted a new, more precise and illustrative definition: "A set of units producing goods or services with the principal aim of creating employment and income for the persons concerned. These units, having a low level of organisation, operate on a small scale and in a specific manner, with little or no division between labour and capital as factors of production. Employment relationships, where they exist, are based primarily on casual employment, kinship ties or personal and social relationships rather than on contractual agreements with formal guarantees" (ILO, 2013, p.16.).

The International Labour Office (ILO) emphasises the positive aspects of an economy that is profitable, productive and creative (Pesqueux, 2014). The perception of the informal economy has therefore evolved over time. The equivalence of 'formal inertia' has led to the duality of 'informal - flexibility', where the informal economy is seen as a dynamic and spontaneous form of social regulation (Deffourney, 1994). We are therefore currently witnessing a legitimisation of the informal economy, despite its illegal nature, with regard to logics such as the learning that takes place there, and the creativity and networks that thrive there (Pesqueux, 2014).

Several theories have been developed as part of the dynamic view of the informal economy as an income generator, including:

(i) Models of mobility and labour market dynamics which, starting w i t h a representative individual employed in a rural area, consider his or her expectation, in the probabilistic sense of the term, of joining the formal urban sector by

comparing his or her certain rural income with an expected urban income. This income is evaluated on the basis of the weighted sum of a formal wage assigned a probability of entry into this sector and a replacement income obtained in the event of failure in the search (Gupta, 1993; Stark, 1982; Steel, 1978; Todaro, 1969).

(ii) Intersectoral and dynamic models of the goods market in which an exogenous shock affecting the modern sector can, under certain conditions, have repercussions in the informal economy.

(iii) The integrated and dynamic models of the informal economy, the first of which, purely liberal, considers an articulation between sectors based on the choice of agents (Yamada, 1996) and the second, in which the lack of employment in the formal sector feeds the informal economy, is inspired by the structuralist tradition (Kelley, 1994). The third model proposes a synthesis of the previous two (Cogneau & al., 1996).

The informal economy is also in duality with the failings of the State, which promulgates and establishes control mechanisms without having the capacity to implement them, both in terms of levying taxes and ensuring compliance with the general standards by which society operates (property rights, working conditions, sanitary conditions, product quality, etc.) and the provision of the services for which it is responsible (infrastructure, security, etc.). This is why it is common to separate formal and informal activities based solely on the criterion of payment of taxes and, by extension, registration with the authorities (particularly the tax authorities) (Pesqueux, 2014).

### 2.2 Study area

The choice of the urban commune of Toli ara as the study area is justified by the fact that this area has a very slow rate of economic development, which is often explained by the geographical context of the area.

Toliara is the largest city in southern Madagascar. It is the capital of the Atsimo-Andrefana region (south-west), having previously been the capital of the province of Toliara. The port is 540km from Fianarantsoa and 951km from the capital, Antananarivo, on the RN7 national road. The population of its urban area was estimated at over 250,000 in 2014. It lies on the Mozambique Channel and close to the Tropic of Capricorn. Toliara has around 19,500 fishermen with 15,000 canoes (FAD, 2005).

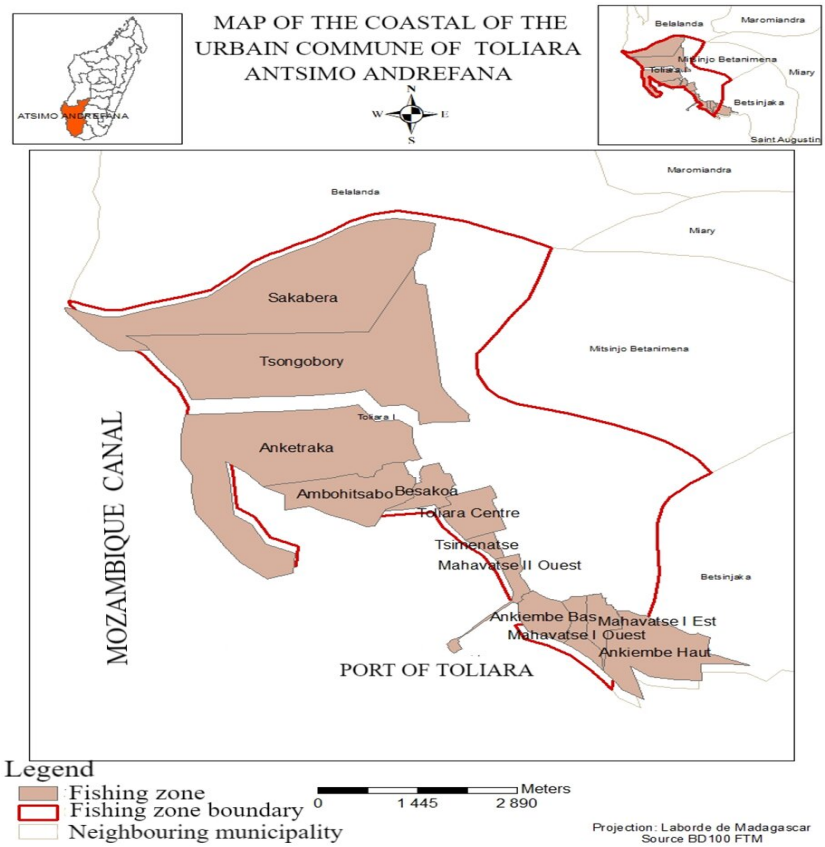


**Figure 1. Map of the coastal fishing zone in the urban district of Toliara**

### 2.3 Data collection and processing

As well as making it easier to ensure the external validity of the results, the quantitative approach generally makes the results less subjective. This advantage is due in particular to the rigour of the statistical processing, as the objective of a quantitative study is often to deduce conclusions that can be measured statistically, unlike a qualitative study.

We opted for a survey, Likert-type scales (Likert, 1932), a study technique using a questionnaire to collect data in the study area. In this study, the scales consisted of a precise and nuanced assessment of the opinion of fishermen on the informality of their activity and their financial situation. The scales offer a set of response options to a closed question. These options are formulated in numerical form. The aim here is to collect quantifiable data. We have chosen to use a comparative approach, a rational and scientific approach, which presents in this study: a comparative analysis of the financial situation at time $t_0$ compared with time $t_1$ in order to ensure the quality and relevance of the information obtained from the survey. However, it should be noted that it was impossible to carry out the survey among the study population, which is very large and beyond our human, financial and time resources. Therefore, the survey itself was limited to a sample of 250 fishermen in the urban commune of Toliara, as shown in the table below.

**Table 1: Breakdown of anglers by zone**

| Survey location/gender | Men | | Woman | | TOTAL | |
|---|---|---|---|---|---|---|
| **Sakabera** | 9 | 3.6% | 0 | 0.0% | 9 | 3.6% |
| **Anketraka** | 22 | 8.8% | 0 | 0.0% | 22 | 8.8% |
| **Tongobory** | 7 | 2.8% | 0 | 0.0% | 7 | 2.8% |
| **Ambohitsabo** | 20 | 8.0% | 0 | 0.0% | 20 | 8.0% |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Besakoa** | 21 | 8.4% | 0 | 0.0% | 21 | 8.4% |
| **Toliara Centre** | 1 | 0.4% | 0 | 0.0% | 1 | 0.4% |
| **Tsimenatse** | 9 | 3.6% | 0 | 0.0% | 9 | 3.6% |
| **Mahavatse** | 64 | 25.6% | 1 | 0.4% | 65 | 26.0% |
| **Ankiambe** | 95 | 38.0% | 1 | 0.4% | 96 | 38.4% |
| **TOTAL** | **248** | **99.2%** | **2** | **0.8%** | **250** | **100.0%** |

The data collected is then processed using statistical data processing software. Sphinx was useful for entering data and observations, as well as for descriptive statistics. Statistical tests, correlation analyses and econometric modelling were then carried out using SPSS software. These statistical software packages were chosen from among the others because they are the most widely used internationally for data analysis, but above all the results obtained are very useful very reliable and considerable. It should be noted that these two software packages each have their own specific features.

## III. RESULTS

### 3.2. Evaluation of income generated by informal fishing

#### 3.2.1. The benefits of fishing

A source of income for almost 1.5 million Malagasy, the fishing sector accounted for almost 7% of national GDP and 6.6% of exports (World Bank, 2020). The results of our analyses corroborate the World Bank's assessment, highlighting that, regardless of age, fishing remains the main source of income for informal fishing households. 98% of respondents confirm this. This assessment is reinforced by the graph resulting from the factorial correspondence analysis of the significance of the dependence of the opinions of fishermen segmented by age on the usefulness of fishing [2]. The agglomeration of all age groups of anglers with the modality as the main source of income from fishing validates our assertion.

[2] Dependence is not significant. chi2 = 23.77, ddl = 8, 1-p = 99.75%.

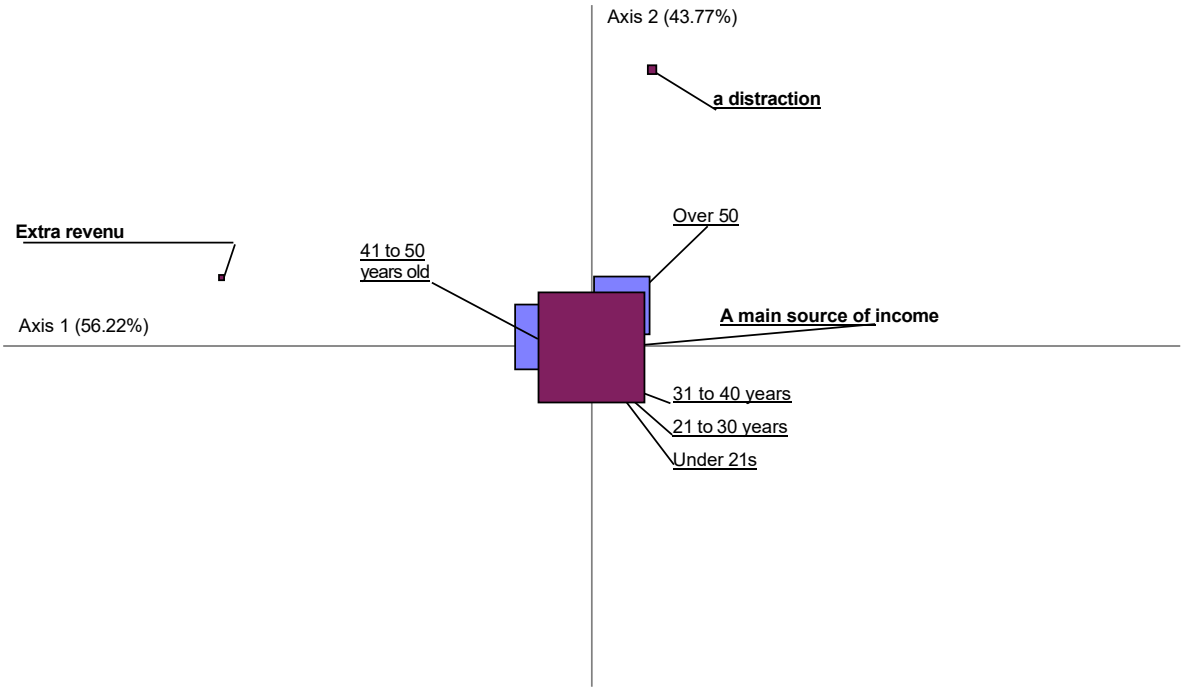


**Figure.2 Usefulness of fishing by age group surveyed**

Nevertheless, although fishing is the main source of income for the coastal population of the urban commune of Toliara, the statistics in the table below show that fishing is not the only source of income. Below, respondents to our surveys, regardless of how long they have been in the sector, fully disclose that just over half of informal sector fishermen claim that their fishing income has stagnated or evolved slowly [3]. Just under 25% of fishermen reported that their income had evolved rapidly, with the exception of those who had been in the sector for less than 5 years, where just 10.3% reported active growth in their remuneration.

**Table 2: Length of time in fishing and change in income**

| Change in income<br>Length of time fishing | Reduced rapidly | Reduce slowly | Stagnating, Evolving slowly | Evolved rapidly | TOTAL |
|---|---|---|---|---|---|
| **Less than 5 years** | 13,0% | 19,6% | 57,1% | 10,3% | 100% |
| **5 to 10 years** | 4,7% | 14,3% | 56,4% | 24,6% | 100% |
| **10 to 15 years** | 1,7% | 17,4% | 57,4% | 23,5% | 100% |
| **Over 15 years** | 9,4% | 17,5% | 58,8% | 24,3% | 100% |

### 3.2.1. Profitability of fishing activities

Traditional informal fishing is a profitable activity for fishermen in the coastal area of the urban commune of Toliara. 91.6% of respondents confirm that this is a godsend. 69.5% say that they have benefited from the satisfaction of their basic needs, 70.0%

[3] Dependence is highly significant. $Chi^2 = 31.59$, ddl = 9, 1-p = 99.98%.

perceive that they have often or always been lucky in terms of the evolution of their income and 77.4% recognise as often or always the advantage of the importance of investment in the sector when they entered the informal fishing sector.

**Table 3: Fishermen's views on the profitability of their trade**

| Opinions Profitability of fishing in terms of | Very rarely | Rarely | Often | Always | TOTAL |
|---|---|---|---|---|---|
| **Fishing as an activity** | 1.0% | 2.2% | 5.2% | 91.6% | 100% |
| **Meeting needs** | 1.4% | 1.2% | 27.9% | 69.5% | 100% |
| **Income trend** | 5.4% | 16.6% | 55.6% | 22.4% | 100% |
| **Size of investment** | 10.0% | 11.6% | 34.2% | 44.2% | 100% |

The chi-square statistical test on the independence of two variables, namely fishermen's opinions on the profitability of informal fishing, reinforces the trend opinions mentioned above[4]. The factorial map resulting from the factorial correspondence analysis of the modalities of the two characteristics studied clearly illustrates the particularities of the profitability of this type of fishing.

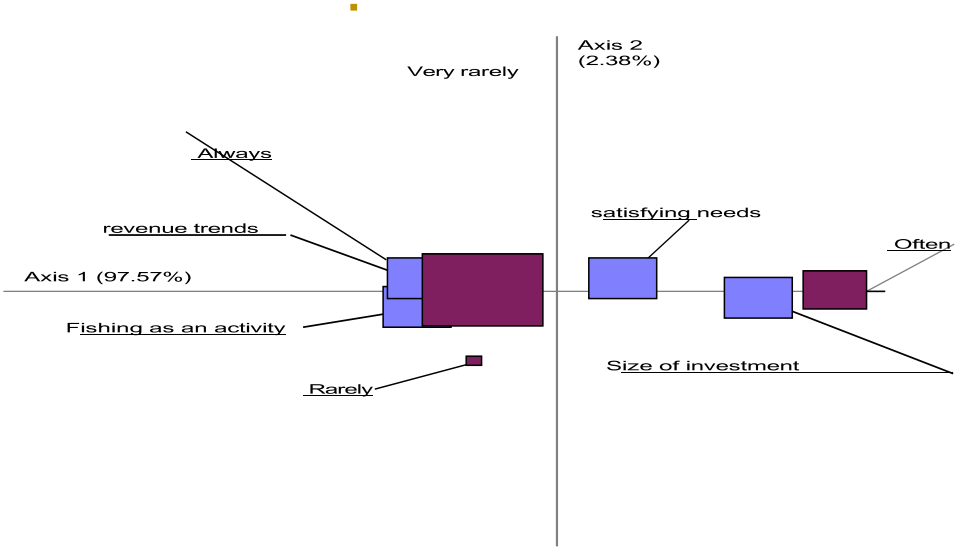


**Figure 3. Factor map of the profitability of informal fishing**

On the other hand, the income of traditional fishermen varies greatly, depending on the products targeted, the number of fishermen in the village, the presence and number of collectors and the existence of means of transport. Depending on these parameters, the selling price at the fisherman's level of the product on the beach can vary by a factor of ten. Apart from a few one-off studies carried out in well-defined areas or on specific products, there is no up-to-date information on the incomes of traditional maritime fishermen. For a household in a fishing village near the town of Toliara, owning a pirogue operated by two members of the family and with one additional person fishing on foot, net income is estimated at 58,000 Ar/month; for this household, if the wife also acts as a fishmonger, this income increases to 6,2600 Ar/month (MAEP UPDR- OCÉAN CONSULTANT, 2004).

Our survey confirms these findings. According to the statistics in our analysis of the table of estimates of monthly income, based on the respondents' perception of the usefulness of fishing, overall, just over half of them, i.e. 57.2%, stated that their monthly income varied between 100,000Ar and 200,000Ar. 64.2% of those who considered fishing as a distraction and 57.6%

[4] Dependence is highly significant. $Chi^2 = 167.04$, ddl = 9, 1-p = >99.99%. The null hypothesis of independence of the two characteristics is rejected.

who declared it as their main source of income also discovered this estimate of monthly income. At the same time, the situation is rather critical for fishermen who engage in this activity just to supplement their income, as almost all of those surveyed in this category, i.e. 98%, report that they do not earn more than 100,000Ar per month[5].

**Table 4: Usefulness of fishing and estimated monthly revenue**

| Estimated monthly income<br>Usefulness of fishing | Less than 100,000 Ar | From 100,000 Ar to 200,000 Ar | From 300,000 Ar to 400,000 Ar | 400,000 Ar and more | TOTAL |
|---|---|---|---|---|---|
| **Additional income** | 98% | 2.0% | 1.0% | 1.0% | 100% |
| **A distraction** | 30.0% | 64.2% | 1.3% | 2.5% | 100% |
| **A main source of income** | 18.4% | 57.6% | 14.3% | 9.8% | 100% |
| **TOTAL** | 19.2% | 57.2% | 14.0% | 9.6% | 100% |

The variation in fishermen's opinions on the estimated monthly income was, however, found to be quite significantly different depending on whether they considered the usefulness of fishing as a supplement to income or as a distraction, or even as their main source of income. The analysis of variance table or ANOVA below shows a p-value of 0.092, below the 10% risk of error, and evokes this analysis finding.

**Table 5: ANOVA comparing fishermen's opinions on revenue estimates depending on the usefulness of the fishing**

| 53- How much do you estimate your monthly income to be? | | | | | |
|---|---|---|---|---|---|
| **Sum of squares** | **ddl** | **Medium square** | **F** | **Sig.** | **Sum of squares** |
| **Intergroups** | 3.327 | 2 | 1.664 | 2.406 | 0.092 |
| **Intragroup** | 170.773 | 247 | 0.691 | | |
| **Total** | 174.100 | 249 | | | |

By comparing the estimates of monthly income declared by the fishermen according to their perception of the usefulness of the activity, the Tamhane test associated with the ANOVA shows from the sig of the differences in the mean scores associated with the breakdowns of the headings of the approximations of daily profits that only the differences in the estimates of income are significant for the respondents who consider fishing to be their main source of income and those who consider it to be an income supplement[6]. The negative mean score difference of -1.155 predicts that fishing yields less for those who do it as an income supplement than for those who adopt it as their main source of income. The financial product resulting from fishing then remains identical for fishermen who consider it as a distraction and an income supplement or as a distraction and a main source of income[7].

[5] The dependence of anglers' opinions on the 2 characteristics studied according to the chi-square test is not very significant. chi2 = 9.60, ddl = 6, 1-p = 85.75%.
[6] The sig of 0.000 in Tamhane's table confirms this.
[7] The sig values of 0.456 and 0.625 are all less than 0.05 and therefore not significant.

**Table 6: Tamhane's multiple comparisons of monthly revenues by utility fishing**

| Dependent variable: 53- How much do you estimate your monthly revenue to be? | | | | | | |
|---|---|---|---|---|---|---|
| **Tamhane** | | | | | | |
| **(I) 33- Fishing is it for you** | **(J) 33- Fishing is it for you?** | **Difference average (I-J)** | **Error standard** | **Sig.** | **Confidence interval to 95** | |
| | | | | | **Terminal lower** | **Terminal superior** |
| **Additional income** | **A distraction** | -0.667 | 0.333 | 0.456 | -3.19 | 1.86 |
| | **A main source of income** | -1.155* | 0.053 | 0.000 | -1.28 | -1.03 |
| **A distraction** | **A main source of income** | -0.488 | 0.338 | 0.625 | -2.87 | 1.90 |

***. The average difference is significant at the 0.05 level.**

As a gesture of solidarity, fishermen often give the proceeds of their catch to their wives. The income from trading in fresh or braised fish enables women to provide for the family and be less vulnerable. Women's role as fishmongers increases household income by up to 62,600 Ar/month (MAEP UPDR - OCÉAN CONSULTANT, op. cit.). Fishing thus contributes considerably to the economic advancement of fishermen and fish vendors in the urban district of Toliara. It is the main source of income for 86% of fishermen and, as mentioned above, the gross monthly income per fisherman varies between 100,000 and 200,000 Ar on average.

Although these results show the profitability of informal fishing for those who see it as their main source of income, there is no doubt that, according to the scoring of responses in the table below, for those fishermen who see their work as a distraction or their main source of income, the mode of scores for opinions equal to 5 means that the respondents often or always admit the assertion put to them, which for them means that fishing is both a profitable activity and one that often or always requires considerable investment. This situation is less intense for those who fish to supplement their income, if we look at the mode and average scores ranging from 3.5 to 4. They see less profitability in fishing and less need for major investment[8].

**Table 7: Distribution of average scores for fishermen's opinions on profitability and investment according to the usefulness of the fishery**

| Statistics | | | |
|---|---|---|---|
| **33- Is fishing for you?** | | **35- In your opinion, is fishing an activity profitable?** | **38- Does fishing require a major investment?** |
| **Additional income** | **Average score** | 3.50 | 4.00 |
| | **Mode** | 4 | 4 |
| | **Standard deviation** | 0.707 | 0.000 |
| **A distraction** | **Average score** | 5.00 | 4.67 |
| | **Mode** | 5 | 5 |
| | **Standard deviation** | 0.000 | 0.577 |
| | **Asymmetry** | | -1.732 |
| **A major source of income** | **Average score** | 4.89 | 4.53 |
| | **Mode** | 5 | 5 |
| | **Standard deviation** | 0.391 | 0.532 |
| | **Asymmetry** | -3.861 | -0.446 |

[8] The non-disparity of respondents' answers is judged by the standard deviation values, which are all lower than the mean score values.

### 3.2 Importance of income from fishing

#### 3.2.1. Allocation of fishing income

As for the allocation of income, the majority of respondents (63%) said that income from fishing often enabled them to meet their basic needs. However, according to at least three out of four respondents (over 75%), this income rarely enables them to save or buy equipment, tools or property, or to make new investments.

**Table 8: Breakdown of fishermen's opinions on income affection**

| Opinions / Income allocation | Never | Rarely | Often | Always | TOTAL |
|---|---|---|---|---|---|
| **Meeting needs** | 3.0% | 4.0% | 63.0% | 30.0% | 100% |
| **Savings opportunities** | 2.4% | 94.0% | 1.2% | 2.4% | 100% |
| **Purchase of equipment and tools** | 2.0% | 77.0% | 2.4% | 18.6% | 100% |
| **Buying a property** | 4.4% | 76.4% | 15.8% | 3.4% | 100% |
| **New investments** | 2.8% | 83.6% | 12.4% | 1.2% | 100% |

This significant trend in fishermen's opinions on the allocation of their income is highlighted on the perceptual map produced by correspondence factor analysis[9].

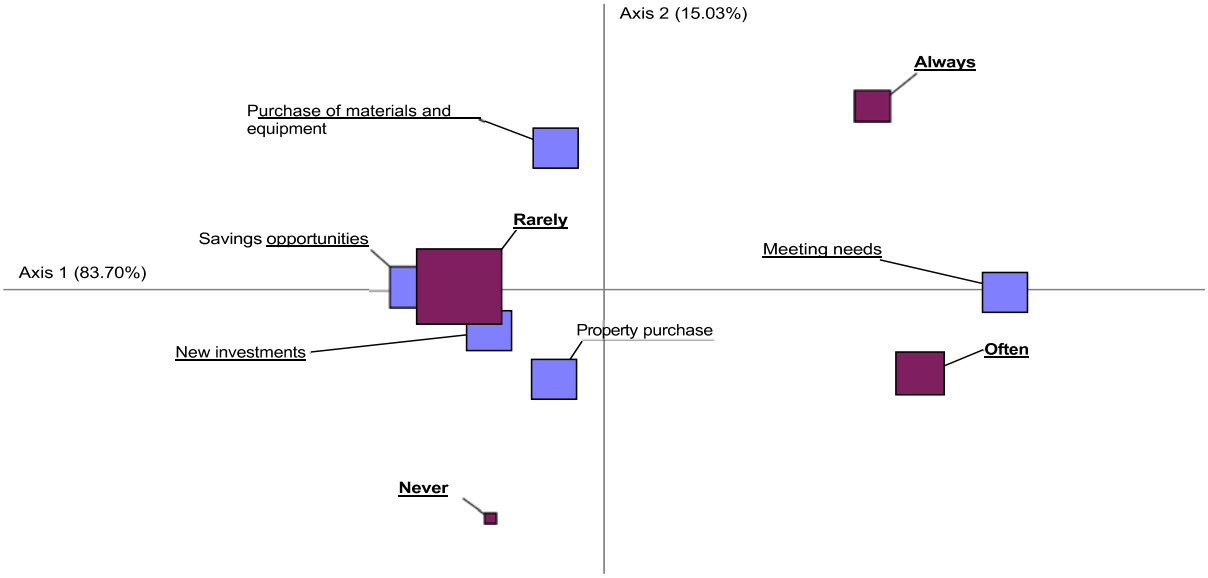


**Figure 4. Illustration of fishermen's opinions on the state of their income**

#### 3.2.2. Access to basic needs thanks to income from fishing

At the same time, it is clear from our analyses that at time $t_1$, when the unemployed had become fishermen, they still often stated that they had access to essential needs. More than 75% even confirm that they are still able to feed their family, educate and look after their children and also have housing thanks to the income earned from informal fishing. This is objective evidence of just how important traditional fishing is, absorbing the labour of illiterate unskilled people excluded from formal society, and consequently improving their lives on this coast of the Toliara

[9] The dependence of researchers' opinions on the allocation of their income is highly significant according to the of chi-square. Chi2 = 752.58, ddl = 12, 1-p = >99.99%.

Urban Commune [10] .

**Table 9: Frequency distribution of fishermen's opinions on access to needs essential to time 1 for the unemployed**

| Opinions/Access basic needs | Never | Very rarely | Rarely | Often | Always | TOTAL |
|---|---|---|---|---|---|---|
| **34-Access to food time 1** | 2.1% | 3.4% | 1.6% | 10.2% | 82.7% | 100% |
| **35- Access to education time 1** | 3.4% | 2.8% | 3.6% | 10.5% | 79.6% | 100% |
| **36- Access to health time 1** | 2.0% | 3.2% | 4.0% | 13.4% | 77.4% | 100% |
| **37-Housing access time 1** | 4.4% | 2.4% | 4.0% | 10.8% | 78.4% | 100% |

## IV. DISCUSSIONS

Sea fishing is one of the informal activities in Madagascar. This result is confirmed by Blanchard et *al.* (2011), based on similar surveys carried out in the *Gestion durable des pêcheries côtières en Guyane* (Sustainable management of coastal fisheries in French Guiana). In their words, *"The rate of informality remains high in this fishery, with operators who do not fully declare their activity"* (p.45.). Despite its informality, Malagasy sea fishing recruits a significant proportion of the population in the coastal regions. In fishing areas and on local, communal and regional markets, it provides the bulk of marine and coastal products, thereby ensuring the availability of protein products on the markets.

Income from informal fishing provides for the daily expenses of fishing families. ¼ of the species caught are destined for self-consumption by the family, and the leftovers are sold to make up their monthly income (see previous section). Despite their similarities, the latter are well below the minimum monthly remuneration, including the minimum wage and all wage accessories, set at 250,000 Ar as of 1 January 2023 (decree no. 2023-563)[11] in Madagascar.

Unemployment in any form leads to financial vulnerability. However, the results discussed in the previous section show that income from informal fishing enables those involved to meet their basic needs, and sometimes even to save and make micro-investments.

The existence of foreign multinational companies reinforces the opportunities offered by the informal fishing sector. Since the 1990s, the shark fishing is gaining ground on Madagascar's south-western coast, a development that is "largely the result of intervention external agencies" (McVean and *al*., 2006 cited by Grenier, 2013). This development encouraged the distribution of modern fishing gear in villages, at a time when the world was already experiencing overfishing of sharks due to a booming Chinese market. The south-west coast of Madagascar, with waters rich in sharks and fishermen equipped with *jarifa* nets, saw an influx of collectors from West Africa and the Sino-Malagasy community. Many fishermen gave up their traditional opportunism in fishing to specialise in this fishery, which is reputed to be unpredictable but where they can earn significant sums compared with local incomes and the other species marketed (Pascal, 2004, 2008; Ramananjatovo, 2004; and McVean et al., 2006 cited by Grenier, *ibid*.).

On the other hand, there is no doubt that financial expenses could vary according to the fisherman's status. The results of the chi-square test of independence of two characteristics, in this case the opinions of fishermen in the informal sector according to their marital status, show us by the value of the p-value equal to 0.0237 below the risk of error of 0.05 the significance of this correspondence.

[10] The dependence of fishermen's opinions on their access to basic needs at time 1 is highly significant. Chi2 = 1.9343, ddl = 12, 1-p = 99.05%.

[11] See the country's leading national daily newspaper, *Midi Madagasikara*, no. 12068 of Friday 16 June 2023, www.midi-madagasikara.mg

**Table 10: Independence chi-square of informal sector fishermen's opinions on access to basic needs according to their marital status**

| | |
|---|---|
| **Chi-square (Observed value)** | 10.0226 |
| **DF** | 6 |
| **p-value** | 0.0237 |
| **alpha** | 0.05 |

The graphical summary of these opinions shows that, whatever the fisherman's marital status, his opinion score exceeds "4", which shows that at least they often manage to meet their basic needs.

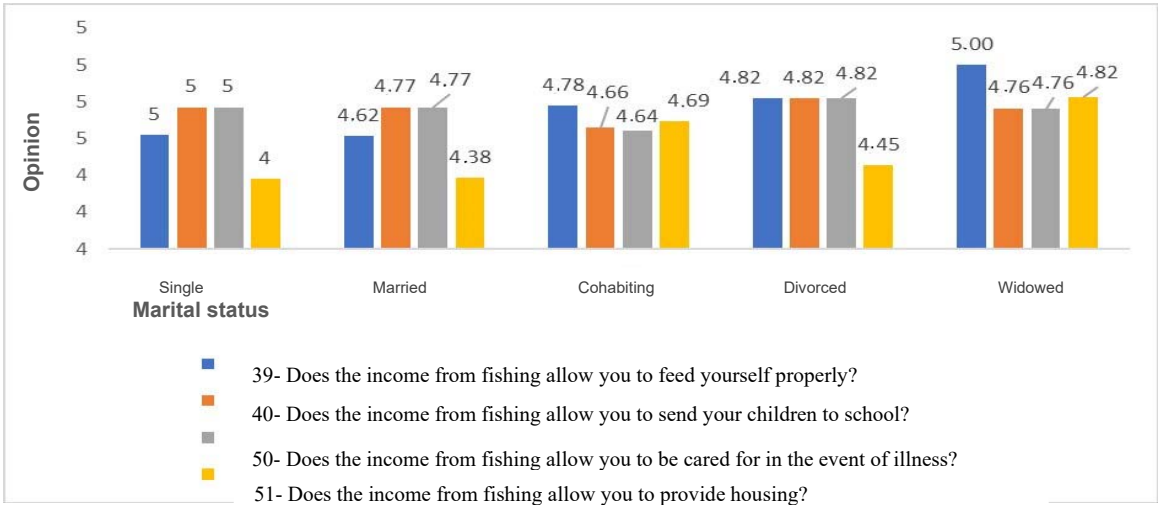


**Figure 5. Histogram of access to basic needs by marital status of fishermen**

Clearly, the satisfaction of fishermen's needs comes from their income. This state of satisfaction, according to the results of our analyses, is confirmed by the chi- square test of independence of two characteristics, namely the opinions of respondents according to their status on the contribution of income to the satisfaction of needs[12]. The perceptual map below, drawn up following factorial correspondence analysis of these two characteristics, shows that married or cohabiting fishermen, as well as divorcees and widowers, are always satisfied with the contribution their income makes to meeting their needs. This income-generating opportunity often appears in the case of single people.

[12] Dependence is significant. Chi2 = 14.456, ddl = 8, 1-p = 98.74%.

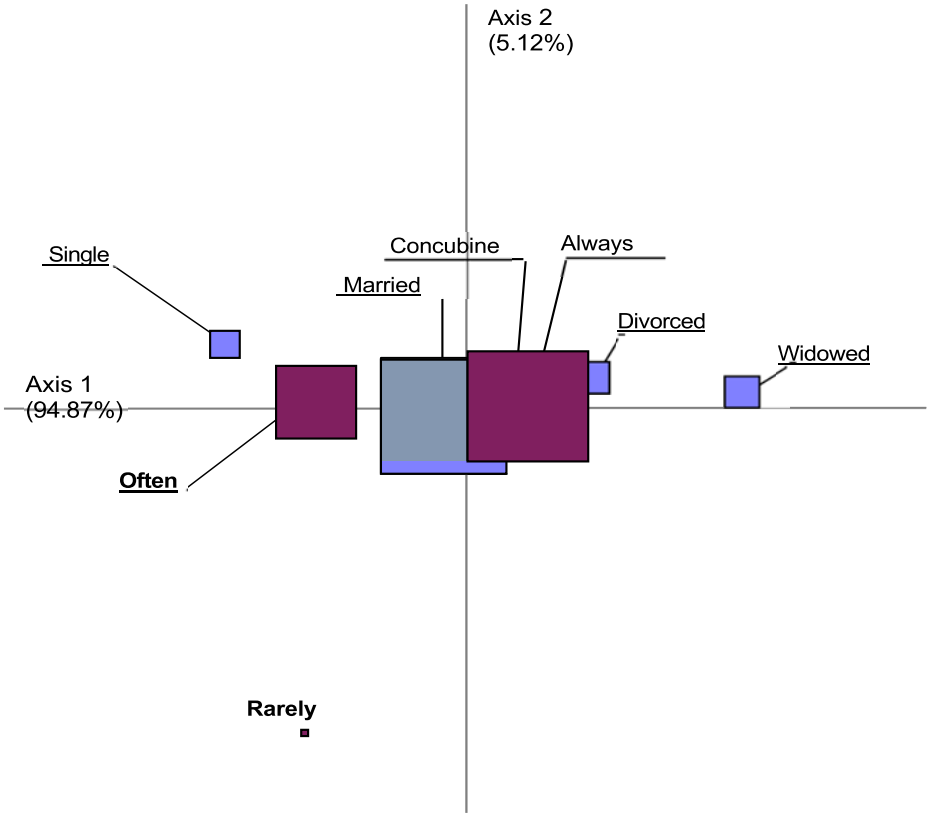


**Figure 6. Factor map of marital status and satisfaction of needs**

After all, the correlation analysis on the accessibility to the essential needs of the fishermen before and their situation of informality show in a significant way, considering the sig values all lower than 0,05 on the one hand and on the other hand by the positive values of the correlation coefficients all close to 1, a clear improvement of the accessibility to the vital needs of the unemployed who converted in the informal sector of fishing.

**Table 11: Correlation of opinions between accessibility to basic needs for fishers before and after their informal situation (time 0 and time 1)**

| | 39- Does the income from fishing allow you to to feed you properly? | 40-Does the income from fishing allow you to send your children to school? children at school? | 41-Income from fishing make it possible to take care of you in the event of illness? | 42-Income from fishing allow you to provide accommodation ? |
|---|---|---|---|---|
| **Time 0 _ Time 1 Correlation of Pearson** | 0.724 | 0.887 | 0.778 | 0.878 |
| **Sig (bilateral)** | 0.002 | 0.025 | 0.017 | 0.042 |

These various findings confirm the fact that the informal sector provides financial and jobs surety for its members, given the stability of their trade and the income that enables them to meet at least their basic needs. This

hypothesis is confirmed by Pesqueux (2014): *"The informal economy makes it possible to alleviate poverty because it constitutes a means of increasing household income while providing activities with flexible schedules that make it possible to combine activities of a different nature, making it possible to "multiply one's means of existence and make one's life an entity rich in meaning and interest*" (pp.10-11).), and by Azzabi & al (1991): *"The informal sector is presented as a non-negligible source of income for a large number of individuals in society"* (p.20.).

## V. Conclusion

The proliferation of informal fishing activities in the urban commune of Toliara raises questions about the real contribution of the informal sector to income generation. An analysis of the results of a study carried out among a sample of 250 fishermen in the urban commune of Toliara confirmed that the informal economy is indeed presented as a non-negligible financial source for the region's fishermen. These results will shed light on the capacity of the informal sector to supplement or reinforce the formal household economy in terms of income generation.

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