



ResearchPaper

## Analysis of the state of poverty of artisanal fishermen in the region of Poro (northernIvoryCoast)

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**ABSTRACT:** Various small fishing communities exploit the fishery resources of the region of Poro in northern Côte d'Ivoire for commercial purposes. However wherever they are established, their existence is marked by their apparent vulnerability. The aim of this contribution is to analyse the poverty level of fishermen exploiting the fishing resources of the region of Poro by studying some characteristics of their living conditions. To do so, this contribution is based on documentary research and a field survey. The article concludes that fishermen have low average monthly monetary incomes. 77.4% of the fishermen surveyed are not connected to the public electricity network and 88.7% to the public drinking water service. Their homes are mostly made of rudimentary materials.

**KEYWORDS:** Ivory Coast, artisanal fishermen, poverty, precariousness, Vulnerability

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### I. INTRODUCTION

Artisanal freshwater fisheries have lower estimated overall catches than coastal marine artisanal fisheries, but employ a slightly larger total overall labour force (production and post-production) than marine fisheries [11]. In the Ivorian context, this activity is also an essential component of the fisheries sector. In particular, it plays an important role in terms of its contribution to national fisheries production, providing a significant share of the volume of landings each year, albeit in constant fluctuation. A compilation of figures provided by various sources over the last few decades shows, for example, that it was 25.7% in 1991, 31.5% in 2003 and 14% in 2010 [7], [23]. It has also accounted for about 6 per cent of employment in this sector over the same period [9], [10], [21].

However, these relatively interesting figures conceal a more complex reality. In fact, at the national level, the activity is confronted with various problems, in particular the poverty of fishermen. In fact, the living and working conditions of these main actors in the activity are impacted at various levels of scale from national to local. For several decades now, various authors have been highlighting the vulnerability of their existence in various regions of the country, mainly by describing aspects of their habitat and living environment. For example, the Malian fishermen's installations in Dabou are described as summary camps [4]. As for the habitat of the Ewéfishermen exploiting the Comoé river, it is described as characterised by its isolation, modesty, poor appearance and precariousness despite the relative seniority (more than 30 years) of their presence [3], [24]. The dwellings of the fishermen of Assandré, on the shores of Lake Kossou, are rectangular straw huts built from branches and straw, raised on stilts [20]. Around Lake Buyo, the fishermen are settled in camps built around this lake in dwellings made of rudimentary nomadic materials [2]. The rare solid-looking huts of Malian freshwater fishermen in the western part of Côte d'Ivoire are half-timbered houses made of clay and wood [18]. The district of Cité-ouvrière in the city of Taabo, the main residence site of commercial fishermen in the sub-prefecture of Taabo, is characterised by many environmental problems [16].

The commercial exploitation of fishing resources in the region of Poro is carried out by various small fishing communities. As fishing is considered by the local population as a second best solution, these fishermen are essentially foreigners [5], [15], [17]. Wherever they live, their settlements and their living and working conditions are characterised by their apparent poverty. However, the real level of poverty in these fishing communities is still largely unknown. Thus, social sustainability, which concentrates all the indicators that can

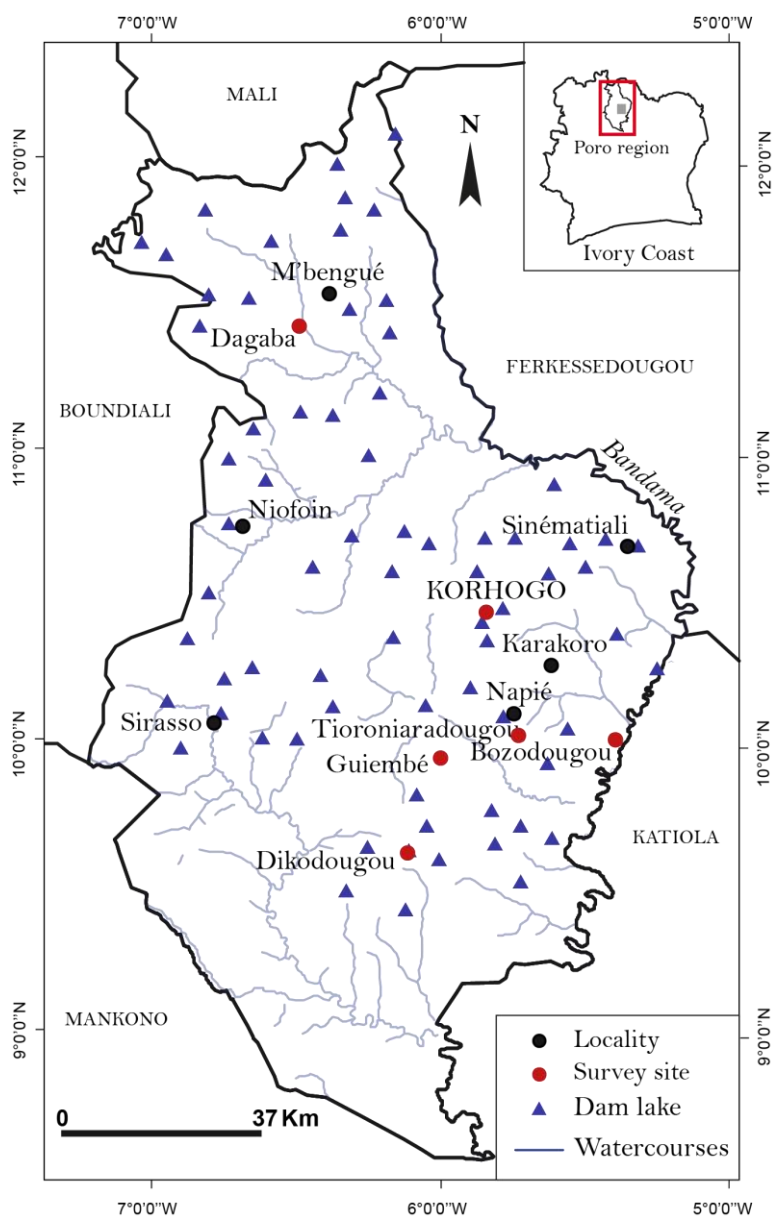
assess the impact of the activity on poverty reduction and the social development of the sector, is nowhere to be found in the statistics of the fishing sector [13]. There is therefore a need to clarify the real poverty level of these actors in this sub-sector of activity in the different areas of the country, which can vary greatly from one region to another. This is why this research is built around the following issue: how does poverty manifest itself in the fishing communities of the region of Poro?

The aim of this article is to highlight the poverty level of commercial fishermen exploiting the fishing resources of the region of Poro by studying some characteristics of their living conditions in order to better understand their level of vulnerability. It is assumed that commercial fishermen in the region of Poro live below the national poverty line.

## II. STUDY SITE AND METHOD

### 2.1. STUDY SITE

This research focuses on the region of Poro, one of the most important in northern Côte d'Ivoire. Its population has been estimated at 763,852 inhabitants in 2014 [14]. Due to this northern situation, it is, like all the regions in this zone, far from the main fish production centres of the country located in the southern part. However, it does have a significant hydrographic potential consisting of the Bandama River (one of the four largest in the country) and its main tributaries. There are also innumerable small rivers (permanent and intermittent) and several dozen dammed lakes for agriculture, pastoralism and the supply of drinking water for fishing (Figure 1).



**Fig.1:Location of the region of Poro and the main surveyed sites**

Several of these aquatic areas are home to small-scale commercial fishing. It has enabled the establishment of various small fishing communities whose residential sites are scattered around some of these aquatic spaces.

## **2.2. METHODOLOGICAL APPROACH**

Four techniques were used for data collection during this research: documentary research, direct observation of facts, interviews and questionnaire.

### **2.2.1. DATA COLLECTION**

The research consisted mainly of a survey of commercial fishermen operating in the Region of Poro, in several of their installation sites during the period from 01 December 2018 to 26 February 2019. However, this phase was preceded by a bibliographical research on the actors and the fishing activity. This showed that the fisheries production sector in this region is characterised by a virtual absence of figures. For example, the Regional Department of Fisheries has no data on the number of fishermen. In addition, we had to deal with three other major constraints: the fairly large size of the study area, the multiplicity of fishing areas and the dispersion of fishermen's residential sites.

The field survey was therefore conducted on the basis of a reasoned sampling. Five control sites: Korhogo, Dagaba (Tongon), Nambékaha (Guiembé), Tioroniaradougou, Bozodougou (Komborodougou), which constitute the spatial units of investigation, were chosen according to different criteria. The first relates to the typology of the fishing area. In fact, two types of production areas can generally be distinguished in the Region of Poro: river areas (Bandama river, rivers, and streams) and lake areas (agricultural and pastoral water reservoirs). The presence of each of these two types of aquatic spaces in our sample has therefore been taken into account.

The second criterion was the effectiveness of the exploitation of the fish resources of the aquatic area for commercial purposes. At this level, three variables were sought: the presence of commercial fishermen, the proximity of housing sites occupied by this type of fishermen, and the nationality of the occupants. The relevance of these variables is justified, among other things, by the fact that in the Region of Poro, commercial fishing is dominated by non-native fishermen whose housing sites are generally adjacent to the aquatic spaces. These criteria made it possible, on the one hand, to understand the reasons for these observations and, on the other hand, to make an analysis of the physical and environmental aspects of these sites.

Finally, we took into account the level of exploitation of the aquatic space. It is on the basis of these criteria that the localities of Dagaba (Tongon), Nambékaha (Guiembé), Tioroniaradougou (lake areas) and Komborodougou (river site) were selected. To these sites, whose choices were essentially guided by variables linked to the exploitation of the resource, we have added the town of Korhogo, home to several fishermen.

The low numbers of fishermen in the control sites led to the investigation of all those encountered there. The idea was to relate the variables relating to their nationality, socio-professional status and marital status to the characteristics of the inhabited areas, living and working conditions, the reasons for the choice of settlement sites and their importance in fishing activities. The table below summarises the number of fishermen surveyed per control site (Table 1).

**Table1.Number of fishermen surveyed per control site**

<b>Locality</b>	<b>Number of fishermen</b>
Korhogo	12
Tioroniaradougou	04
Dagaba (Tongon)	30
Nambékaha	09
Bozodougou(Komborodougou)	07
<b>Total</b>	<b>62</b>

**Source :** Field Survey, 2019

The works on the field began with semi-structured interviews with the Regional Director of the Ministry of Fisheries Resources and the heads of the fishing camps visited. These exchanges enabled us to understand the general situation of fishing in the region.

A questionnaire was then administered to the fishermen. It included questions relating to their socio-demographic and socio-economic characteristics, fishing seasons, income level, use of income, living and working conditions, and difficulties encountered in carrying out fishing activities.

The technique of direct observation of facts was also used during the field survey. It consisted in following the fishermen in their usual practices. It also made it possible to assess the typology and quality of production gear, the environmental aspects of residential sites, dwellings and landing areas. On the landing areas, the emphasis was on the level of salubrity, the boats and the catching gear. The spatial spread of their establishments, the layout of the concessions, the construction materials used, the equipment levels of the

dwellings were also observed. In the end, this technique made it possible to better appreciate the level of poverty of these artisanal fishermen.

Le revenu mensuel des pêcheurs a été déterminé. Pour ce faire, nous nous sommes principalement inspirés des travaux de C. T. Tioguét *et al.* (2016, p. 1029). Concrètement, nous nous sommes servis de cette formule : Revenu mensuel (FCFA) = Recette mensuelle (FCFA) – Charge totale (CT).

The monthly income of the fishermen was determined. In doing so, we drew mainly on the work of T. W. Tioguét *et al.* (2016, p. 1029). Concretely, we used this formula: Monthly income (FCFA) = Monthly income (FCFA) – Total weight (T. W.).

### 2.2.2. DATA TREATMENT

Qualitative and quantitative results are derived from the data collected from these surveys. Statistical processing of the collected information was carried out using the Sphinx Millenium 4.5 software. This allowed the production of tables and graphs.

The location map of the study area was produced with ArcGIS10.2.1 software and refined using Adobe Illustrator CC 2017.

Photographs were also used to capture some of the highlights.

In addition, the contents of the speeches resulting from the various interviews conducted with the administrative services and chiefdoms of the camps visited were analysed.

The results obtained following the various treatments were structured around four main points relating to the level of average monetary income, precarious living conditions, low levels of education and precarious working conditions.

## III. RESULTS

### 3.1. LOW MONETARY INCOME

The practice of commercial fishing provides income for the various fishermen. These earnings are almost daily and vary from one actor to another, in relation to the importance of his activity. Two main categories can thus be distinguished among these actors: professional fishermen or full-time fishermen and occasional or part-time fishermen. The former carry out the activity on a full-time basis and derive most of their income from it. The second are people who fish to solve a one-off financial problem. In this category, the majority of people are involved in an activity other than fishing as a bonus. They represented 79% and 21% respectively of the fishermen surveyed.

The differences within the two communities of actors (Ivorians and non-Ivorians) are even more pronounced. In fact, 90.4% of them work full time as opposed to 9.6% part time. Conversely, only 20% of Ivorians are professionals, compared with 80% of occasional fishermen. For the latter, the constraints linked to the practice of their main activities, agriculture and trade, do not allow them to practice fishing all year round, which is therefore of a secondary nature. As a result, they have very little control over fish production activities, which are mainly concentrated in the hands of non-nationals. This low interest also impacts their income levels, which are much lower than those of non-native fishers (Table 2).

**Table 2. Distribution of anglers by average monthly income**

Fishermen	Average monthly income in CFA francs (Euro) of fishermen					Rates(%)
	110 210 FCFA (168,01 €)		60 635 FCFA (92,44 €)		Total	
	Staff	Rates (%)	Staff	Rates (%)		
Non-natives	49	94,2	3	5,8	52	83,9
Ivorians	2	20	8	80	10	16,1
<b>Total</b>	<b>51</b>	<b>82,3</b>	<b>11</b>	<b>17,7</b>	<b>62</b>	<b>100</b>

Source : Field survey, 2019

In the analysis of Table 2, the average monthly earnings of fishers are not significant. It can be seen that 82.3% and 17.7% of fishermen earn respectively 110,210 CFA francs (€168.01) and 60,635 CFA francs (€92.44) on average per month, i.e. 1,322,520 CFA francs (€2016.17) and 727,620 CFA francs (€1109.25) per year. A more refined approach makes it possible to highlight, within each income level, sometimes very significant differences between the proportions of Ivorians and non-nationals. In this respect, our investigations reveal that the highest earnings bracket (110,210 CFA francs (€168.01)) is largely dominated by non-native fishermen with a rate of 96.1% compared to only 3.9% for Ivorians. This situation is linked to the level of technicality and know-how deployed by these non-native fishermen. Indeed, they are professional fishermen from ethnic groups with a recognised fishing tradition such as the Bozos and Somonons. They therefore use more sophisticated fishing strategies and a greater fishing effort, unlike Ivorians who are more farmers than fishermen. In any case, incomes fluctuate widely from one day to the next or according to the different periods of the year because of the uncertainty that governs this activity and the fishing seasons (good and bad).

### **3.2. FROM LIVING CONDITIONS TO ASPECTS OF OBVIOUS PRECARIOUSNESS**

#### **3.2.1. HOMES MADE OF RUDIMENTARY MATERIALS**

The proportions of commercial fishermen interviewed in the field surveys show that the majority are non-nationals. In fact, 93.5% of these actors are non-nationals (mainly Malians) against only 6.5% Ivoirians.

In urban localities, they can be found indiscriminately in the various disadvantaged neighbourhoods, as is the case in the town of Korhogo. In rural areas, national fishermen reside in the indigenous villages from which they generally come. Non-native fishermen, on the other hand, settle in camps or hamlets. They settle on the edges of the river and lake areas that they exploit. Their settlement may be permanent or just seasonal. These settlements are groups of family residences with mono-ethnic components. This means that the residents are most often members of the same family. Otherwise, they come from the same region. In addition, the settlement of non-native fishermen is subject to the prior approval of the chiefdoms of the native villages to which they are administratively attached.

Fishermen living in rural areas; as observed in the production areas of Tongon, Komborodougou and Guiembé are more affected by the precariousness of the habitat. This can be seen at several points. For example, banco and straw predominate in these localities. This is the case in Tongon, Komborodougou and plastic sheeting in Guiembé. Their installations are therefore characterised by their temporary aspects, which are reflected in the type of materials used for the construction of the dwellings. However, these aspects vary from one site to another according to a few indicators; the seasonal or permanent status of the occupants (Photo 1).



**Photo** :Koudou D., 2019

**Photo 1. Establishments of non-indigenous fishermen in the Region of Poro**

**A :Hut for seasonal Malian fishermen at Lake Solomougou**

**B :Dagaba, a hamlet of permanent migrants at Lake Tongon**

The images in photo 1 show the precarious nature of the living spaces of the non-native fishermen in this region. They show, among other things, the fragility of their dwellings made of materials that are not very durable, inexpensive or found in the immediate environment of the installation site. The hut shown in image A shelters half a dozen seasonal Malian fishermen during the annual fishing season. It is entirely made of a wooden frame covered with plastic sheeting held in place by fishing line. A mat hung at the entrance of the hut acts as a door. These types of makeshift constructions are just useful to satisfy the fishermen's most basic needs, i.e. to sleep, to protect their privacy and to shelter from the weather during their stay. As for image B, it shows a partial view of the Dagaba hamlet; located on the northern bank of the Tongon mining lake. This bank is home to a small colony of permanent Malian migrant fishermen. The cramped huts are made of mud bricks with straw roofs. This site is also marked by the presence of parabolic antennas of international television channels and a few solar panels, which are the power supply for some of the houses.

In both rural and urban areas; as in the observations made in Tioroniaradougou and Korhogo (in the Sonzoribougou, Mongaha, Haoussabou and Delafosse neighbourhoods, where the fishermen living in this town are mainly settled), their dwellings seem to be more downhill. Indeed, they are built in cement bricks with sheet metal roofs. In reality, the occupants are only tenants. This status concerned all the fishermen interviewed in these two localities during our investigations. This situation can certainly explain the insalubrity that nevertheless marks their residential environments in most cases.

On the whole, aspects of the fishermen's dwellings call comfort into question. Their surfaces are considerably reduced or even tiny in comparison to the number of people living there. For example, it has been observed that 62.9% of households included eight to ten people; particularly in the Korhogo and Tioroniaradougou areas. This observation is linked to the fact that in addition to members of their small

families, fishermen generally house several other people from the community or Helpers and/or Apprentices who support them in their activities.

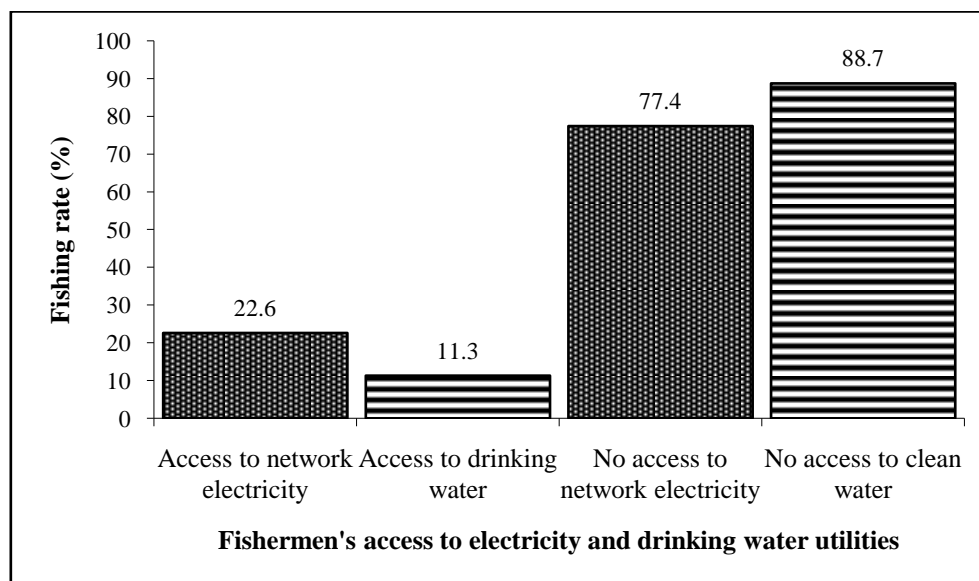
However, while a few of them live in two- or three-room houses on some sites, single-room dwellings predominate in all the localities visited. Two- and three-room houses concern respectively 16.1% and 6.5% of fishermen and are found only among fishermen living in rural (Tioroniaradougou) and urban (Korhogo) areas. The explanation that can be given for this observation is that most of the actors living in the localities concerned are in rented accommodation. Therefore, taking several one-room dwellings would cost them more than a two or three-room dwelling, especially as they are often polygamous families with several children. Hence the choice they make to live in houses with more than one room that can accommodate all family members.

Conversely, 77.4% of the fishermen interviewed live in one-room houses. Especially in rural areas where they own the dwellings they live in. This is the case in the localities of Tongon, Guiembé and Komborodougou.

In sum, the rudimentary state of these homes can be partly explained by the migratory status of their owners; as they are non-natives, land and property issues through modern housing construction are relegated to the background. Moreover, unlike native fishermen, non-natives are characterised by a high level of fishing mobility, which leads them to perpetual movements between different production areas both in the Region of Poro and in other parts of the country depending on the fishing seasons. They also make regular longer stays (especially for seasonal workers) in their country of origin. Their habitats in the region are therefore, overall, secondary places of residence. All these factors impact the spatial spread of their settlements, despite the fact that they have sometimes been in existence for a long time. In general, the latter generally extends very little over the years.

### **3.2.2. LOW RATES OF ACCESS TO VARIOUS SERVICES, SANITATION FACILITIES AND HOUSEHOLD AMENITIES**

Different modes are used by fishermen to light their homes. However, in general, the use of light bulbs is the most widespread in households. Whether they live in rural or urban areas, they find adequate strategies for lighting with electric lamps. This heterogeneity of situations is also reflected in their access to drinking water (Figure 2).



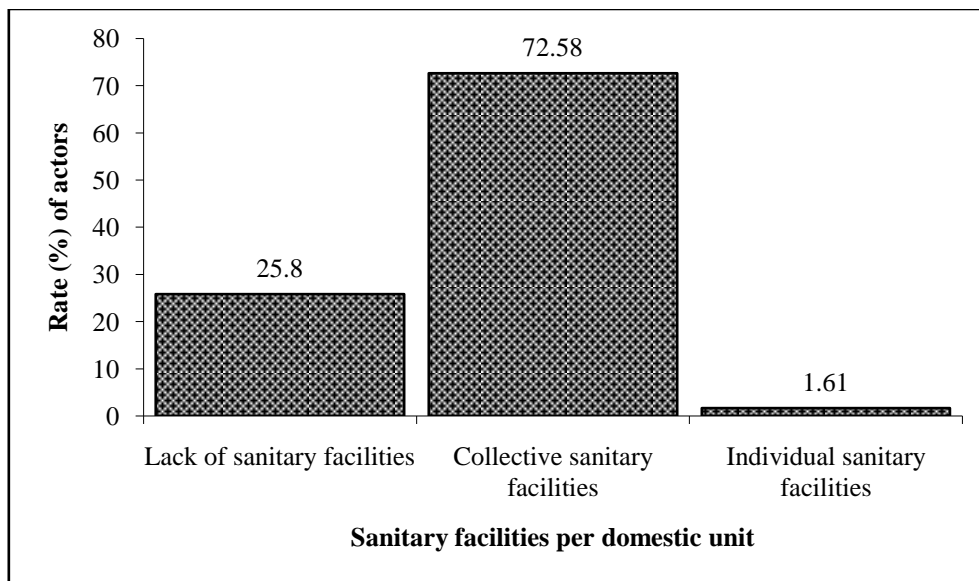
Source :Field survey, 2019

**Fig.2. Distribution of fishers by access to electricity and drinking water utilities**

Figure 2 highlights two almost identical situations in terms of fishermen's access to public drinking water and electricity services. For example, their high propensity (77.4%) to live in houses not connected to the public electricity grid. To do so, they use a variety of alternatives: solar energy, electric batteries, battery torches, storm lamps. The explanation for these observations is to be found in the geographical location of their places of residence, which are mostly remote and almost landlocked settlements located in rural areas. This is also the reason behind the low level of access to the public drinking water supply network. Indeed, Figure 2 also shows that 88.7% of fishermen are inaccessible to this service. Whether they live in rural or urban areas, traditional wells and community boreholes or village hydraulics are their main sources of water supply for domestic use.

More specifically, in the camps, particularly in Tongon, Komborodougou and Guiembé, households use water from dam lakes and rivers adjacent to their housing sites. In urban and rural areas, there is similarly a primacy of the use of water from traditional wells and community boreholes over tap water; 60% of the fishermen surveyed are concerned.

In urban areas, two main factors may explain this observation: the low level of income and the infrastructural problems of drinking water supply. In the first case, the low level of income does not allow them to subscribe to a subscription to the public drinking water service. Secondly, according to the fishermen interviewed in Korhogo, the wells were already present in the concessions when they entered them. They are therefore not necessarily their own initiatives, but rather those of the owners of the dwellings they rent. Moreover, they emphasise that this is a situation that is almost common to many concessions in the town because of the water problems it has experienced in previous decades. It is therefore a general situation from which the least financially well-off households in this locality, like their own, would not escape. In addition, there is a low level of equipment of household units with individual sanitation facilities and various other amenities (Figure 3).



Source :Field survey, 2019

**Fig.3 : Distribution of actors according to the type of sanitation present in domestic units**

Examination of Figure 3 shows that fishermen's dwellings are largely without internal sanitation facilities. For example, this situation is reflected in the absence of latrines and/or showers in the homes of 25.8% of the actors interviewed. Where they exist, toilets are fortunate facilities built outside the main house. Showers, which are generally rudimentary and common to several dwellings (66.08% of cases), are built with recycled materials, without roofs and in unhealthy environments. In general, they are made with plastic sheeting. In urban areas, especially for fishermen living in the town of Korhogo near the Koko dam lake, traditional roofless showers are the most commonly used. At this level, beyond the low level of income, the explanation can be sought in the relatively large number of people in the domestic units. In rural areas, toilet facilities are found in the bush close to inhabited sites. Their location in rural areas and the type of housing they occupy give some meaning to these observations. Moreover, it emerged from the interviews conducted with the camp leaders that the fishermen consider these elements to be superfluous or even ostentatious because of their fishing mobility; hence the rather undeveloped appearance of their facilities and, by extension, their living conditions.

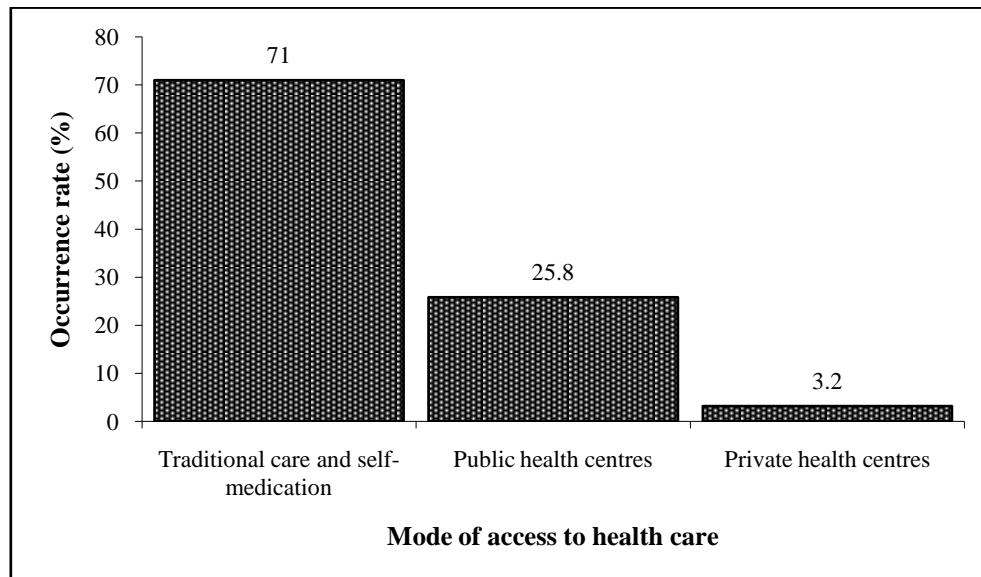
The presence of modern toilets was observed in only 8.08% of the households surveyed. In spite of the omnipresence of the indigent external appearances of inhabited places and dwellings, some homes are equipped with various household appliances and communication equipment (refrigerators, radios, televisions, etc.). This observation shows that fishermen engage in certain consumer spending. The levels of household provision of these amenities differ widely according to the living space (urban and rural) and from one actor to another. In fact, the homes of fishermen living in rural and urban areas are the most well-equipped.

Overall, this reality refers on the one hand to the level and mode of use of income. On the other hand, it also suggests a concern or even a desire to improve their living conditions. Observations have shown that they all own mobile phones regardless of their living environment (urban or rural). It is a multifunctional tool. They use it for communication on the one hand and as a valuable instrument in the smooth running of their various activities on the other. It enables them, for example, to have regular contact with the traders who distribute their

products. Among other things, this facilitates their commercial transactions and, in return, enables the wholesalers to maximise any possible trips to the production areas.

### **3.2.3. A MODE OF ACCESS TO HEALTH CARE DOMINATED BY TRADITIONAL MEDICINE AND SELF-MEDICATION**

Fishermen live in often cramped environments where there is certain promiscuity with aquatic spaces. In addition, they work long hours. Access to drinking water is also a problem. All these conditions can affect their well-being, especially in terms of health. Indeed, there is the question of their access to health care, the situation of which is shown in figure 5.



Source :Field survey, 2019

**Fig.4: Occurrences of fishermen's declarations regarding their mode of access to medical care**

An examination of Figure 4 highlights the importance of fishers' use of self-medication and traditional medicine (71%) as their main means of access to medical care. They therefore make less use of modern public (25.8%) and private (3.2%) health centres in the event of illness. One of the explanations is their distance from modern health centres and/or posts due to their residence in the camps. In fact, the majority of the non-indigenous fishermen surveyed stated that their first reflex in the event of illness is to turn to self-medication or traditional care. They only resort to modern medicine through public or private health centres, only in the case of very serious illness or for the delivery of women. Another explanation for these observations could lie in the costs of medical services, which they consider high in relation to their income.

### **3.3. LOW LITERACY AND SCHOOL ENROLMENT RATES**

In all the communities surveyed, the fishing population includes a high rate (74%) of actors who cannot read or write. However, a few have attended primary school (8%), 1% secondary school and 16% Koranic school. Moreover, by nationality, the same predominance of illiterate actors is observed: 77% of Ivorians and 75% of non-native speakers.

Identical to their parents, the enrolment rate for children is low (24.2%). At this level, the type of school (public or private) attended by the offspring was considered to be a significant indicator of the parents' standard of living. Indeed, in our view, it can provide information on the level of income; public schools are generally more expensive in terms of tuition fees than those in public schools. Thus, for fishermen who send their children to school, the choice of schools is different. It has been observed that 81% of children attending school are in public schools. This reality tends to confirm the low income levels of these actors as highlighted above. As public schools are covered by the state policy of "school for all", which advocates free access to public primary schools, school fees are almost non-existent and could therefore explain the choice of actors for this type of school.

On the other hand, 75.8% of fishermen do not send their offspring to school. The importance of this rate is partly due to the fact that non-native fishermen, who make up the bulk of the commercial fishermen's backbone, mainly reside with their families (women and children) in production camps where there are no schools. As a result, children are often helpers in the practice of the fishing activity, thus constituting a vector for the transmission of the fishing profession from father to son.



### 3.4. POOR WORKING CONDITIONS

Fishing activity in the Region of Poro is essentially artisanal. Fishermen use a variety of fishing gear in their daily practices, many of which are not very elaborate. These include gillnets, mesh and *papolo* pots, bamboo traps (Chinese bamboos), longlines, shore seines with different unit costs and life spans (Table 3).

**Table 3. Costs and lifespan of the types of fishing gear used in the Region of Poro**

Fishinggear	Cost range in FCFA (Euro)	Life span
Papolonasse	1 500 (2,29 €) - 3 000 (4,57 €)	6 mois à 1 an
Wire nasse	2 500 (3,81 €) - 3 000 (4,57 €)	3 à 6 mois
Palangre	7 500 (11,43 €) - 15 000 (22,87 €)	6 mois à 1 an
Sparrowhawk net	20 000 (30,49 €) - 30 000 (47,73 €)	1 an et plus
Gillnet	25 000 (38,11 €) - 30 000 ((47,73 €)	2 à 6 mois
Bambootraps	150 000 (228,67 €) - 200 000 (304,90 €)	1 an et plus
Shore seine net	450 000 (686,02 €) - 500 000 (762,24 €)	5 ans et plus

**Source :** Field survey, 2019

According to Table 3, the costs of acquiring fishing gear range from 1,500 FCFA (2.29 €) for *papolo* type pots to 500,000 FCFA (762.24 €) for shore seines. Apart from gillnets and shore seines, the other types of gear used by fishermen are home-made. Their proportions of use differ in the localities visited. For example, gillnets and traps (*papolo* and mesh) are used more by fishermen because of their efficiency and low cost, respectively. *Papolo* pots, for example, are used by almost all the fishermen surveyed. On the other hand, relatively expensive gear such as bamboo traps and shore seines are used very little.

The boats are locally made human-powered pirogues, none of which are motorised (Photo 2).



**Photo :** Koudou D., 2019

**Photo 2 :** A fisherman in his pirogue at Lake Sologo

In the different production sites visited, the pirogues are similar to the one in photo 2. They are all propelled by paddles, and therefore by the physical strength of the users, which adds to the arduousness of the activity. These are pirogues with frames, also called "bozo pirogues". They are generally made up of three planks linked together with iron nails; hence their nickname "three-plank pirogue". The caulking is made with cotton and candle wax. Its impermeability is reinforced by the swelling of the wood under the action of water. Their sizes vary from 3 to 6 m in length with 0.5 to 0.6 m in width. Their acquisition costs also differ according to the materials used for their construction and are on average between 25,000 CFA francs (38.11 €) and 50,000 CFA francs (76.22 €).

Moreover, none of the landing sites in the region are developed. They are all simple strandings with no equipment or infrastructure to facilitate the operations of unloading production, collecting statistics, control and/or fishing police.

#### **IV. DISCUSSION**

This research questioned the living conditions of commercial fishermen in the Region of Poro of northern Côte d'Ivoire through the analysis of a few variables. These include average monthly incomes, living conditions, literacy rates (proportion of people over 15 years old who can read and/or write), children's schooling and working conditions. The general observation that emerges is that the levels of these different characteristics are low.

An analysis of the average monthly monetary income of fishermen shows their low level. This finding was also highlighted for fishermen operating in Lake Taabo and gillnet fishermen operating in Lake Kossou in the centre of the country [16], [29], [8]. However, for 82.3% of these actors, the income is higher than the Ivorian minimum wage, which has been set at 60,000 CFA francs (€91.47) since 2013, and the average monthly per capita income, which was 80,000 CFA francs (€121.93) in 2017 [20]. Moreover, these incomes are well above the relative annual poverty and extreme poverty thresholds, which were respectively 269,075 CFA francs (€410.20) and 122,385 CFA francs (€186.57) per capita and per individual in 2015 in Côte d'Ivoire [26]. From the above it can be deduced that, based on purely monetary considerations, the fishermen of the Region of Poro are not poor.

A study of the characteristics of the fishermen's living spaces reveals, on the one hand, housing sites which are characterised by their situational originality. Indeed, driven by "the search for the ideal location to bring the habitat closer to the workplace" [19], they generally settle in the immediate vicinity of the aquatic spaces they exploit. This state of affairs explains why, apart from the fishermen established in the town of Korhogo, their establishments are most often located in rural areas, sometimes in remote or even landlocked zones. As a result, the regional landscape is dominated by traditional settlements or hamlets with "traditional huts grouped together and squeezed together in a disorganised manner without any prior land use plan" [19]. This observation fits in perfectly with that of the national framework according to which "village" and "permanent camp" type housing sites dominate in the majority of regions of the country and represent respectively 52% and 31% of all fishermen's housing sites" [23]. [23] In Côte d'Ivoire, the camp is a form of precarious housing, most often temporary, linked to the exploitation of a resource [1].

On the other hand, it underlines the rudimentary aspects and dominance of the construction materials of their dwellings, which underlines the low importance given to stable real estate constructions. The precariousness of housing also observed among fishermen in western Côte d'Ivoire is linked to the preponderance of foreigners in their numbers [18]. As is the case for fishermen in the area studied. For this author, this precariousness is desired and accepted by these populations, because they consider themselves to be transient people. Indeed, for most of the actors, the land on which they settle is nothing more and nothing less than a camp and therefore a temporary residence. Under these conditions, there is no interest in making major investments [1]. Comparable living conditions are described among migrant fishermen working on the Togolese coast [12]. They are also found in the description of the living spaces of fishermen in the Noya department of the Estuary province in Gabon [22]. The main reason for this precarious residential situation is the nomadic nature of the fishing industry, which motivates them and forces them to travel light [16]. This fragility of dwellings is also noted in other fish production areas in Côte d'Ivoire by other authors, notably in Taabo, in the departments of Danané and ZouanHounien, in Dabou and along the Comoé River [29], [30], [4], [3], [24]. Another explanation is put forward for the precarious living conditions. It emphasises that the local peasant populations are mystified by the fact that the fishermen from abroad mystify them by giving them the impression of the low profitability of the activity in order to remain the only ones to practice it [15]. In order to do this, they declare biased recipes or, through their accounts, render the activity tragic for the uninitiated.

The almost unjust isolation of the fishermen's settlement sites means that their habitats are devoid of infrastructure, equipment and basic social services (health, education, water supply, electricity, rural tracks, etc.). This state of affairs is partly responsible for the low rates of access to the public electricity network, the public drinking water service and the health centres observed in the study. On this last point, it should be emphasised that the rate of fishermen's housing sites in the former Savannah region (now the Poro, Bagoué and Tchologo regions) with on-site health centres/posts is less than 67% [23]. This situation also contributes to their preference for self-medication and traditional medicine to the detriment of modern medicine; the main reason given by the fishermen, apart from the high cost of consultations, is the availability or proximity of health centres. A similar observation is reported in a recent study that analysed the standard of living of Ivorian households in 2015. It notes that 43% of the people interviewed in their survey believe that consultations are too expensive, and this proportion rises to 52.1% for poor people. The availability or proximity of health centres is mentioned by only 10.5% of the people concerned [25].

The illiteracy rate (proportion of fishermen over 15 years old who cannot read or write) is 74% among the fishermen surveyed. This result is confirmed by data from the framework survey carried out in 2013 [23]. These data reveal that: "more than 50% of fishing professionals in the north of Côte d'Ivoire have no level of education". However, this proportion is much lower than that of all continental fishing professionals in Côte d'Ivoire, which is 38.04% [23]. It is also lower than that (55%) which prevails among the entire Ivorian population [25]. Moreover, the school enrolment rate for the children of fishermen in the region is low; the study estimated it at 24.2% compared with a national rate of 93.3% in 2018 according to UNESCO (2020).

The analysis of the working conditions of fishermen highlights the use of largely rudimentary equipment by fishing units. Indeed, the means of navigation are simple, handcrafted wooden pirogues, all propelled by paddles. Apart from gillnets and shore seines, this rudimentary character is also found in most catching gear. Papolo type pots (home-made) are a fishing gear widely used in the small dams of the region [27], [15]. All in all, these situations represent real constraints for increasing fishermen's fishing production. They affect the profitability of their activity and, by extension, the levels of their monetary income. Consequently, they contribute to the precariousness in which these fishermen work and the image of poverty that their living conditions express.

## V. CONCLUSION

The monetary income of commercial fishermen in the Region of Poro is low. However, for a significant majority of them, these incomes are above the national minimum wage, the average monthly per capita income, and well above the relative annual poverty and extreme poverty lines. They are therefore far from being poor from the point of view of purely monetary considerations.

The fishermen are mostly non-native people whose living sites adjacent to fishing grounds are dominated by settlements such as hamlets and campsites. These settlements, both seasonal and permanent, are landlocked and lack infrastructure, equipment and basic social services. These situations are partly the result of the low rates of access to the public electricity network, the public drinking water service, attendance at health centres and schooling of children observed in the study. In addition, their dwellings are characterised by their temporary nature, with the use of building materials that are not very durable, such as banco, straw and plastic sheeting. This poor external appearance of the housing sites and buildings is also observed in most of their homes, marked in particular by the absence of sanitary facilities and other domestic conveniences. The combination of different factors seems to motivate these fragile living conditions: the foreign status of the main actors, the fishing mobility that characterises them and their attitude to delude the local population.

Their working conditions are just as rudimentary, with the lack of development of landing sites, the use of non-motorised pirogues and fishing gear, and the use of inexpensive home-made equipment such as papolo pots.

In short, even if the level of income of the fishermen working in the Region of Poro seems to escape the poverty criterion, it is generally agreed that they are vulnerable because of their isolation, the precariousness of their living space, their low level of education and their poor access to basic social services, among other things.

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