

Performance in tuna and other fishery resources use in southwestern Côte d'Ivoire: a case study stating implications for fishers' settlement and employment generated by the marine artisanal fishing sector

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Abstract

Gathered facts about the marine artisanal fishery located at Sassandra, southwestern Côte d'Ivoire are provided, talking about commercial species that are targeted by that fishery, addressing the types of jobs generated and stating the prominent role of women, especially that of fishers' wives, in post-harvesting tasks and related activities. Therefore, interviews were carried out in February, March and July 2021, within the fishers' community, at dockside and marketplaces. The results indicated that the fishing sector generated a large number of professionals (250 respondents, of whom 76 men and 174 women) who were associated with fifteen types of jobs listed among managers appointed by the Government and privately employed professionals. In addition, socio-economic characteristics that were focused on indicated that the highest percentage of active persons (38.4%) was recorded within the age bracket of 35-45. More than half of respondents had no schooling. Tunas and other species landed, depending on fishing seasons, made up a large part of the fish consumed. Daily fish-consumption varied depending on household numbers, with consumption between 1.0 and 1.5 Kg/d or 2.0 and 2.5 Kg/d being the commonest. This study really shows that the local fishery is of vital importance to the whole community.

Keywords: Artisanal Fishery; Fisheries Employment; Fishery Products; Tuna Resources Use; Value Chain Agents.

1. Introduction

Worldwide, many jobs are believed to play key roles in various areas of people's lives to such an extent that they would not worry about their basic needs. Fishing is suchlike one, as it supplies people's needs for cheaper proteins. Fishing also acts as a key factor to food security and prominently helps alleviate the burden of unemployment and poverty, especially in developing countries. No doubt, world summit held at Rio de Janeiro in 1992 made a start, for since then fishing has scheduled the agenda for international meetings, even socially, economically and politically shaping to some extent people's circumstances nationwide. As Bjorndal et al. [1] put it, no definitive statistics exist; yet, the small-scale sector employs 90 percent of the world's fishers, producing almost half of world fish production and supplying most of the fish consumed in the developing world [2]. Additionally, Teh and Sumaila [3] estimated that 260 ± 6 million people are involved in global marine fisheries, acknowledging that fisheries employment is unevenly distributed around the world, with a high proportion concentrated in developing countries.

Okafor-Yarwood and Pigeon [4] noted the role and importance of marine artisanal fishing in some West African countries of the Gulf of Guinea region. For instance, in Nigeria, artisanal fishing accounts for 80% of national fish production [5], 71% in Cameroun [6], more than 70% in Ghana and 49% in Angola [7]. Marine fishery products are believed to be the main source of vital, affordable and high-quality protein providers for more than 2.6 billion people worldwide [8, 9, 10]. According to Delgado et al. [11], fishing surely is one of the oldest sources of livelihood, yet recognition of fish as important components of the diets of the majority of the world's people – especially those living in developing countries – date back to recent time. In Côte d'Ivoire, fishing and aquaculture are believed to generate roughly 70000 direct jobs while more than 400000 people would mainly make a livelihood with artisanal fishing and processing of fishery products [12].

Production, processing, marketing and distribution of fish or other fishery products in West Africa have more than societal dimension, in such a way that they would deserve research interest. The overall objective of the current study was to show how the tuna catch and processing as well as the catch and processing of Sardinellas or other fishery products (cuttlefish, Royal spiny lobster) proved to be the driving force behind the jobs generated by the artisanal fishery located at Sassandra. A specific goal was to study the relationships between the professionals through the description of their activity as value chain agents and to shed light on their daily fish-consumption.

2. Materials and methods

2.1. Carrying out interviews

Individual interviews were made in order to collect information on fishers' activity and on the activity of any other persons who were potential agents supposed to be on duty for the benefit of the fishing sector. Frequently asked questions were the ones having connection with respondents' activities and daily life conditions. A short hand for each question was written on duly designed sheets of paper, which served for enquiry sheets. Interviewers were required to commence conversation with tenderness, in a way that people, especially fishers or fishers' wives, would feel honoured with their presence, so that they may easily have their attention and get a hearing. For example, interviewers were to address them as "brother" or "sister", just as if they were familiar with each other. In addition, we believed we could be more effective if we started conversation with respondents' wishes - another way to show that we cared about them. Therefore, interviews were conducted as an informal discussion in which the interviewer commenced with a description of the reason for the interview, and then asked a series of questions. Each interview took about half an hour, while answers were taken in note form. Socio-economic characteristics we focused on included (but were not limited to) educational status, type of fishery-related activities, marital status, year of experience in connection with the type of activity carried out, household numbers, age and households' fish-consumption habits.

2.2. Data analysis

A total of 250 respondents, who ranged considerably in age and experience, were surveyed in this fashion. All the data collected were registered in an Excel file, which enabled us to process the data, expressing them as percentages where necessary. Therefore, the different jobs were listed in a single column while the responses obtained from the respondents were listed in other columns. For the analysis, simple counts were used and salient points were brought out using figures.

3. Results

3.1. The local artisanal fishing sector: its structure and organization

Fifteen types of jobs were found to be fishery-related ones and considered as such to be on duty for the benefit of the fishing sector, based partly on its organization and functioning. Fig. 1 shows a three-fold organization: (i) an institutional system, (ii) the heart of the artisanal fishery and (iii) services of various types.

The first level draws its usefulness from its role as a mean for carrying out governmental objectives. It provides fishers with administrative and technical guidance or assistance and it sees to it that compliance with gear regulations is strictly observed. It also encourages the use of gears with size-selective efficiency. Such a system comprised the local Office for Aquaculture and Fisheries Statistics (BAP/Sassandra), which is an extension of state controls over the fishing activity, and the sales and production cooperatives, which represent the private sector. Fishers and fishers' wives are at the heart of the artisanal fishery, for their continuous activities open the way for the very reason why all other fishery-related activities should be maintained. Finally, the third level in the organization is made up primarily of diverse services. First-type services are provided by some professionals whose activities are quite essential to fishers. For, in fact, an outboard-motor failure or a fuel shortage might be major delaying factors that can make fishers postpone a fishing trip until later. Second-type services contribute to the satisfaction of final consumers and fishery product purchasers, as they aim to facilitating the preservation of those fishery products and working at their transportation or distribution on local markets and beyond for retail trade.

3.2. The professionals of the artisanal fishery at Sassandra: a description of their activities

The six persons who are on the staff of the local Office for Aquaculture and Fisheries Statistics (BAP/Sassandra) work as field observers, with a clerical staff of three and a team composed of three persons who are permanently present at the landing sites and collaborate with the artisanal fishers in order to collect the data and gather information of various types. The information generally comprised the quality and kind of species landed and the quantity in connection with landing sites. Workers at the BAP/Sassandra make a point of seeing that the gear regulations are strictly observed, as they are committed to providing the support and advice the artisanal fishers need most to comply with the rules governing the fishing activity. The fishery statistics they permanently keep accurate enable them to estimate the annual production.

Production cooperatives such as COPESAS and CODAPÊCHE normally make sure that fishers' interests conform to governmental objectives, so that they may negotiate for fishing licence or for subsidized oil on their behalf. As for other women and fishers' wives, they are organized into sales cooperatives (e.g. AMPHFS, AFP and Nyame Na Akyedzi) whose adherents we interviewed. Those cooperatives, which are ethnic-oriented, take into account the adherents' nationality to promote mutual assistance in order to help one another.

Fishers and fishers' wives are at the heart of the fishery. People of fishers' households can amount to 6 persons on average, of which at least two assets (generally the fisher and his spouse or spouses, besides their relatives). Fishers' households of Ghanaian-origin accounted for more than three-quarters of total households. All fishers generally accept to sell a large proportion of the catch for noble fish and Royal spiny lobsters *Panulirus regius* de Brito Capello, 1864 (not less than 100%) to female and male wholesalers. Fishes other than noble fish such as tunas (e.g. little tunny *Euthynnus alletteratus* (Rafinesque, 1810), frigate tuna *Auxis thazard* (Lacepède, 1800), West African Spanish mackerel *Scomberomorus tritor* (Cuvier, 1831), the Atlantic chub mackerel *Scomber colias* Gmelin, 1789, and yellowfin tuna *Thunnus albacares* (Bonnaterrre, 1788)) or the Sardinellas (e.g. *Sardinella aurita* Valenciennes, 1847 and *S. maderensis* (Lowé, 1839)) are preferably and exclusively lent by fishers to their own spouses who in turn sell the fish to wholesalers and retailers.

There are three pumping stations for subsidized oil and each of them belongs to the production cooperatives mentioned above (e.g. the SCOPELIS, COPESAS and CODAPÊCHE cooperatives). They do exist thanks to the perfect collaboration of the production coopera-

tives with the Government. For the production cooperatives negotiate for subsidized oil, which the Government places at their disposal via the pumping stations (e.g. Pétro-Ivoire and Ivoire Pétrolium) they became affiliated.

Canoes' outboard-motor menders are fishers' technical-assistance providers, since they act as a maintenance team when failure of outboard-motors occurs. Almost all of them are Ghanaians. Those professionals and the fishers expressed their desire to see people on the premises who trade in outboard-motors settle at Sassandra, so that they may no longer worry about the difficulties facing them when such equipments shortage occurs.

Canoe makers' perfect collaboration with fishers can be considered to be crucial in priming the viability of the fishing activity. All canoe makers we interviewed are Ghanaians. Some said they have been on duty for the benefit of the fishery for at least 40 years.

Strictly speaking, workers at cold stores are not dependent on the ups and downs of the fishing activity that take place at Sassandra. The cold stores diversified their activity, even trading in imported fish and meat. However, the cold stores would at times be of precious help to wholesalers and to retailers when it comes to preserving the fishery products they buy from the fishers or from fishers' wives.

Male and female wholesalers are middle-agents in the fishery industry; they usually buy the fishery products (e.g. noble fish, Royal spiny lobsters, crabs, or others) from the fishers or from fishers' wives in order to retail them to other persons or to supermarkets or still to rich customers from large cities such as Abidjan, Yamoussoukro and Bouaké. Fishers' wives can be likened to wholesalers, since they almost proceed the same way.

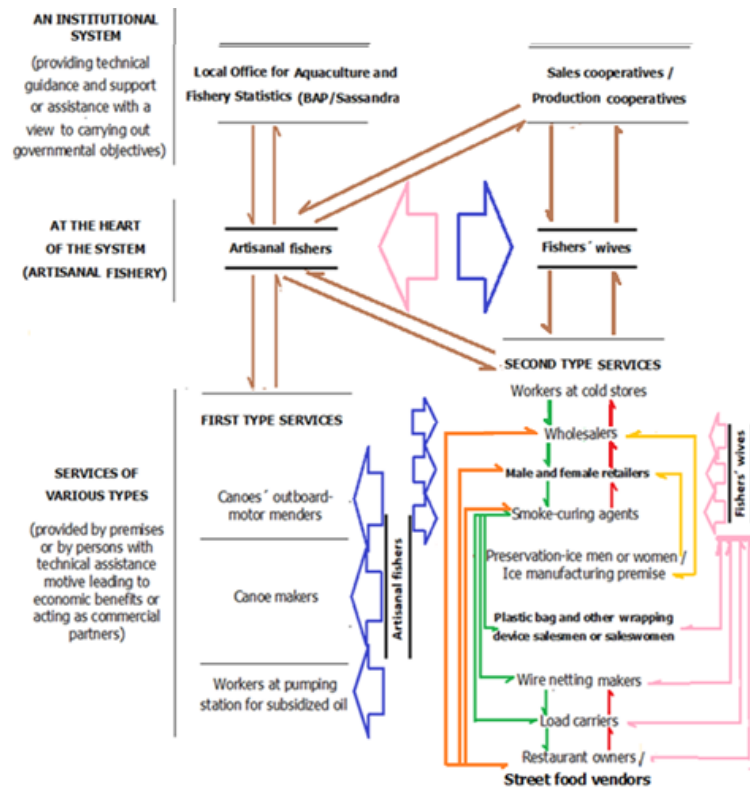


Fig. 1: Simplified Representation of the Relationships between the Professionals Working for the Benefit of the Marine Artisan Fishery Located at Sassandra (Southwestern Côte d'Ivoire). Note: Dealings Among the Professionals are Indicated by Coloured Solid Lines and Arrows.

Male and female retailers mainly buy the fish from fishers' wives or occasionally from other wholesalers. However, retailers would at times buy the fish from the fishers at a different landing site, without fishers' wives notice (especially when those wives fall short of fishers' trust or when fishers are suspicious of their spouses, even sometimes showing a tendency to accuse them of hiding a portion of the returns).

All smoke-curing agents exclusively are women. The extent of their activity is strongly dependent on variation in abundance and availability of the fishery products (especially fish and crabs), which changes often from high to low levels in an unpredictable way. A large number of smoke-curing agents are either fishers' wives or retailers. Fish were normally sold daily in fresh form by these women. As a remaining portion would stay unsold at the end of the day, these smoke-curing agents display the fish on wire nettings that are placed over appropriate ovens, a handling that results in the fish being well-preserved when treated with wood smoke.

Preservation-ice men or women play a key role, as they ensure the quality of the product, enabling wholesalers and retailers to preserve wholly or partly the fish or crabs or still the Royal spiny lobsters when ordered. This role has however been replaced by that of the Japanese Ice manufacturing premise of the JICA Project that took the lead since 2020. This situation made the usefulness of preservation-ice men or women less perceptible.

Plastic bag and other wrapping device salesmen or saleswomen found an ingenious idea to wrap the fishery products using appropriate materials and devices in order to facilitate the transportation. This ingenious solution to the permanent concerns over how to find the appropriate container resulted in the ordered-products reaching final destination safely, for they do arrive intact. Most of wrapping device saleswomen are Ivoirians.

Wire netting makers are of extreme usefulness to smoke-curing agents. For a large majority of smoke-curing agents purchase and use the wire nettings made by these men. Almost all wire netting makers generally work on their own. Some said that this job enables them to make both ends meet and afford to pay for their children's schooling.

The quantity of fishery products that are meant to be transported is so important that it frequently generates heavy loads that need be carried. Load carriers include young men working on their own, carrying loads on head, and men driving vehicles of various types (e.g. taxi-drivers, drivers of vehicles covered with tarpaulin, small van drivers, and tricycle drivers). However, when heavy loads are to be

transported far from Sassandra to other cities such as Abidjan or to neighboring countries such as Ghana and Burkina Faso, appropriate vehicles covered with tarpaulin are solicited.

Restaurant owners and street food vendors may be viewed as persons whose activity has no direct link with fishing activity. However, when you realize that restaurant owners need at least fish to make dishes, then you will believe that fishers and restaurant owners do have well-established relationships. For restaurant owners and street food vendors meet all the other professionals' needs for food at their work place. In addition, street food vendors normally sell delicacies made up of fish or crabs, hawking when in search for buyers.

3.3. The professionals of the marine artisanal fishing sector of Sassandra: some social characteristics

Fig. 2 shows two facets of social conditions of the professionals who were engaged in fishery-related activities at Sassandra, southwestern Côte d'Ivoire. People within the age bracket of 30-55 were the most numerous, accounting for 76.4% of the respondents, with the highest percentage of active persons (38.4%) recorded within the age bracket of 35-45 (Fig. 2A). That group comprised all types of professionals. However, people under 30 or above 54 years of age were fewer, making up to 10% and 13.6% of respondents, respectively. Individuals under 30 were mostly apprentices and young smoked-fish vendors with few years of experience. Some of those youths were generally engaged in fisheries activities in order to serve for a helping hand to their parents, as their taking part in selling fish, for instance, was on a part-time-job basis. In stark contrast, individuals above 54 years of age mainly comprised experienced men and women having knowledge and skill acquired through constant involvement in their activities over a period of at least 40 years. However, a decreasing trend of active participation in fisheries activities was equally observed as the age of men and women of this group advanced, with the lowest in professionals above 65 years old. Within that latter group are wholesalers and retailers of long experience, besides former fishers. At the question about their daily consumption of fish, respondents gave divergent answers, depending on household numbers (Fig. 2B). Overall, fish consumption varied between 0.5 and 1.0 kg/d (for households of 2-4 people) or between 4.0 and 4.5 Kg/d (for households of more than 6 people on average). Households in which fish consumption varied between 1.0 and 1.5 Kg/d or 2.0 and 2.5 Kg/d were more numerous (22% and 21.2% of respondents, respectively). In contrast, households in which fish consumption was supposed to be 3.5-4.0 Kg/d or 4.0-4.5 Kg/d were fewer (5.2% and 5.6% of respondents, respectively). Various kinds of species are consumed by the households, depending on fishing seasons. People generally thrive on tunas, though some small pelagic species (e.g. *Sardinella aurita*, *S. maderensis*, West African Ilisha *Ilisha africana*, Bonga shad *Ethmalosa fimbriata* (Bowdich, 1825), Cunene horse mackerel *Trachurus trecae* Cadenat, 1949) and some other species (largehead hairtail *Trichiurus lepturus* Linnaeus, 1758 and Atlantic bigeye *Priacanthus arenatus* Cuvier, 1829) would constitute a part of their diets. Tuna species comprised little tunny *Euthynnus alletteratus*, frigate tuna *Auxis thazard*, West African Spanish mackerel *Scomberomorus tritor*, the Atlantic chub mackerel *Scomber colias*, and yellowfin tuna *Thunnus albacares*. Of all fish consumed, only the Sardinellas (*Sardinella aurita* and *S. maderensis*) occur throughout the year. The other species generally do not occur as often as Sardinellas do, except from August to October when there is plenty of fish, mainly because of food availability and cooling conditions that come along with the priming of the ecosystem productivity.

Fig. 3 shows the educational status and marital status of people who were engaged in fishery-related activities at Sassandra. Truly, some professionals were required to have a certain educational knowledge before they would be engaged in some activities, which acted in their favour in terms of easy understanding of the rules governing the fishing activity. In contrast, for some other activities, no educational knowledge was required. Fig. 3A shows that more than half of the respondents (135 out of 250) had no schooling, of whom 19.6% were men and 34.4% women. Furthermore, few women (0.4%) and few men (2.4%) reached tertiary or higher education. Fig. 3B shows a large number of married people (181 out of 250) with active participation in fisheries activities, of whom 24.8% were men and 47.6% women. In addition, more unmarried women (16.4%) were engaged in fisheries activities than unmarried men (4.4%) were.

4. Discussion

Professionals of the artisanal fishing sector at Sassandra, southwestern Côte d'Ivoire, are engaged in various types of fishery-related activities whose interconnectivity actually established the dependence of some professionals in relation to other professionals, just as if working on the production line where each person deserve their position and importance, thereby maintaining the perfect functioning of the fishery. The number of people involved in the structure, functioning and organization of the local artisanal fishing sector may come to an impressive total when added up. However, no definitive statistics would exist as a result [1]. For a large majority of people we interviewed remained evasive; being unable to give a direct answer to the question about how many people they were within their corporations. Instead, we estimated that number at the lowest possible count of 1520 people, adding up the average numbers obtained within the professionals' respective corporations, based on the respondents' answers. In fact, accessibility and availability of the exploitable fishery resources serve for the driving force behind the maintainability of a variety of jobs. For instance, the subsector of fishing for the small pelagic species, of which the sardinellas make a part, was reported to generate cumulatively up to 160000 jobs in Gambia, Bissau Guinea, Mauritania and Senegal, with 17500 jobs derived from the artisanal fishing sector [13]. The transboundary and migratory nature of certain species such as tunas and the sardinellas plays a key role in fishers' settlement in some West African countries. Normally, fishers do settle for a long time in areas where fishery resources abound and are permanent, at least depending on season. According to Belhabib [13], the round sardinella (*Sardinella aurita*) and flat sardinella (*Sardinella maderensis*) are emblematical transboundary species in West Africa. Sardinellas are believed to account for an important portion of animal proteins derived from West African populations' fish consumption, particularly, yet not solely, in coastal areas [13].

A close observation of the type of activities carried out in connection with fishing at Sassandra made it possible to notice that a large number of the professionals were Ghanaians, most of whom were fishers. How did they get there to establish such flourishing fishery-related activities, getting along with the Ivoirians? Well, at least four factors could be considered as the main reasons for fishers' tendency to settle in a given area: (i) historical events, (ii) the lack of competitive spirit between fisheries opposed to each other, (iii) the abundance and availability of fishery resources, and (iv) permanent or increasing demand for fishery products.

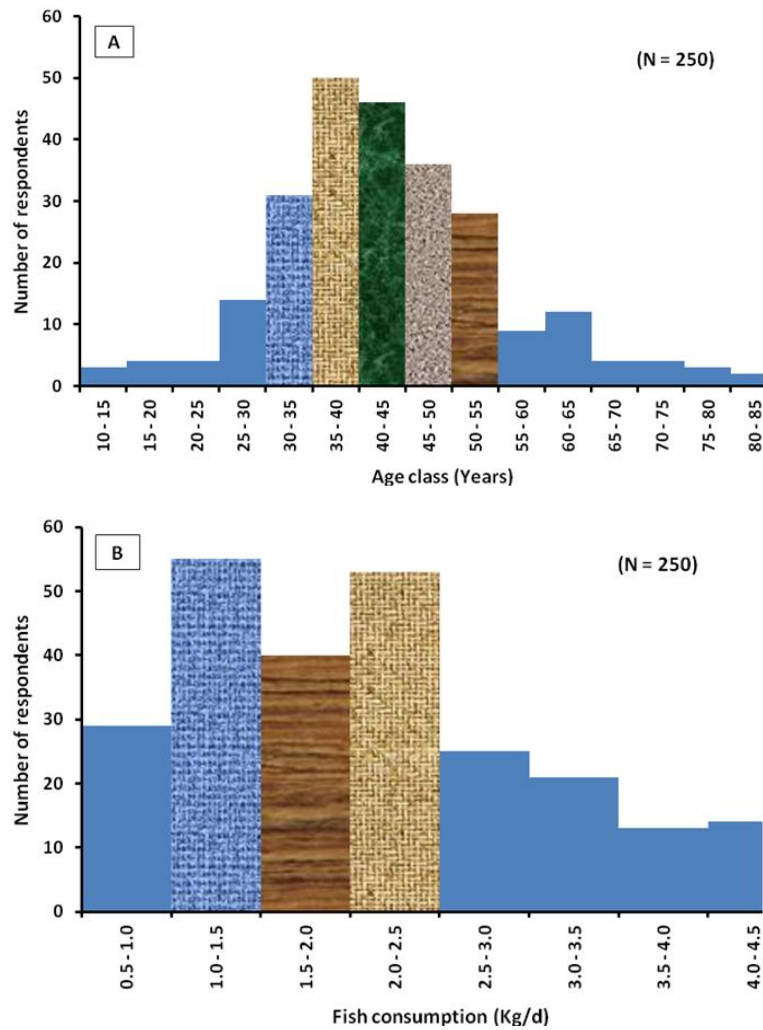
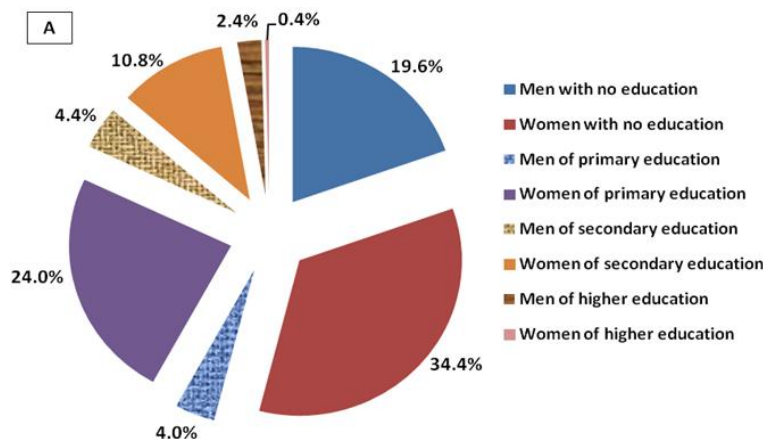


Fig. 2: Age Distribution (A) and Daily Fish-Consumption (B) of the Professionals of the Marine Artisanal Fishing Sector at Sassandra, Southwestern Côte d’Ivoire.

In general, in West Africa, settlement of migrant fishers occurred prior to the days of political independence of most of the member-states. According to Gruvel [14], such a vast pan-African event relating to permanent settlement or temporary settlement of artisanal fishers was preceded at the start by no large scale yet migratory-like settlements of seasonal importance, along the seashores of the former Gold Coast (present-day Ghana) and Ivory Coast (Côte d’Ivoire). However, Gobert [15] noted that those settlements took up a regional scale, starting shortly after the days of second world war, when almost all the countries, from Bissau Guinea to Congo, were affected, either as country of origin or as reception country for artisanal fishers. In Côte d’Ivoire, Chauveau et al. [16] made it clear that settlement of the Fante and Nzema people (who are of Ghanaian origin) as migrant fishers was noted in the early nineteenth century, on the mid-eastern part of Ivoirian coastline, as those authors reported on these people’s commercial activities relating to rubber trade (exploitation), by the end of that century. That is the reason why Delaunay [17] states that fishing was not solely the cause for migrant Ghanaian fishers’ settlement along the coastline of Côte d’Ivoire, though it did bear migration patterns relating to fishing, but their dealing in rubber trade in which some communities such as the Fante, Apollonians and Ashanti people became prominent. After the rough patch the rubber exploitation sector went through, the Fante people switched to fishing activities, with the backing of official statement issued in 1893 by the then ruling colonial authorities. The first close-knit fishing community of Ghanaian origin was then established at Sassandra in 1893 as a result [18, 19]. Therefore, Delaunay [17] acknowledged that settlement of migrant fishers of Ghanaian origin at Sassandra (southwestern Côte d’Ivoire) derived from colonial decision.



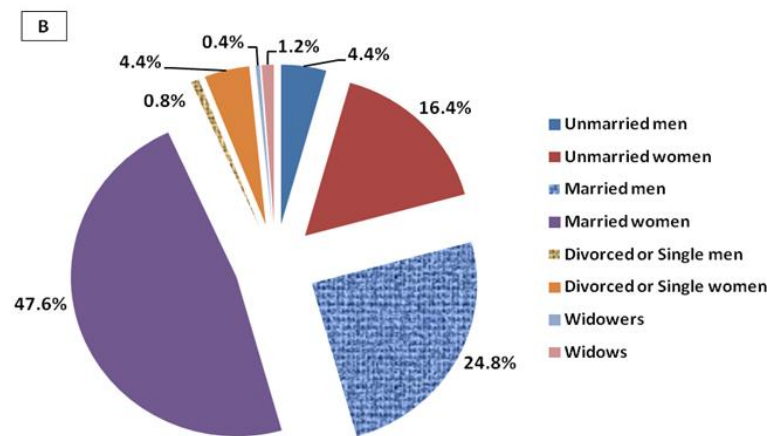


Fig. 3: Education Status (A) and Marital Status (B) of the Professionals of the Marine Artisanal Fishing Sector at Sassandra, Southwestern Côte d'Ivoire.

It turned out that in the early 1970s, the competitive spirit over the use of *Sardinellas* stocks, which occurred between the artisanal fishery and the then fresh-created industrial fishery located in Abidjan, forced a large number of the artisanal fishers to migrate to the southwestern part of Ivoirian coastline and settle at Sassandra and San-Pédro [20]. Cormier [21] found that creation of a new fishing port at San-Pédro was however additional reason for Ghanaian migrant fishers' settlement in southwestern Côte d'Ivoire.

The abundance and availability of fishery resources have long been considered as an indicator for the viability of fishing activities. However, today, fishery resources can actually be available to some extent but not that abundant as they formerly used to be. Therefore, the complexity of fishery resources, characterized as they are by constant change in abundance and availability in an unpredictable way, requires that exploitation and harvesting process be made with closer observance of sustainable practices and with regard for the properties of the fish stocks; otherwise the fishery may be viewed to be falling short of specifics.

Almost everywhere in the world, there is permanent and increasing demand for fishery products, especially for fish, either as a way to meet peoples' needs for food or to produce income on an economical performance scale. In Côte d'Ivoire, fish consumption is viewed as the first and foremost way that provides up to 50% of animal proteins to consumers, which accounts for about 15-16 Kg of fish per capita [22]. Therefore, there is an increase in fish import, which cannot compensate for the scarceness of local or national fish production.

Truthfully, women do not participate in the production process (i.e. fishing, which is carried out by men); yet, they do contribute to further the fishery's activities in ways that are unmanly, according to traditional perceptions of masculinity. In fact, artisanal fisheries are believed to employ more than 90% of fishers in the world while about half of 85 million people who are engaged in post-harvesting activities are women [23]. Whether married or not, single or not, widows or not, the women mentioned in the current study were conspicuous by their active involvement in fisheries activities. Such an active participation, especially in artisanal processing or in fish trading and retailing, seems to be commonest worldwide. In Western Africa and Asia [23], as much as 60 percent of seafood is marketed by women. According to WWF-UK [24], women also play a critical and significant role in small-scale fisheries, even performing many of the pre-harvesting and most of the post-harvesting tasks. For instance, marketing and processing (i.e. smoking) of the fish that are landed by Benin migrant fishers settled at Pointe-Noire, Congo, are essentially carried out, at least in part, by fishers' wives before they sell the fish to retailers [15]. In that case, as in the case of Côte d'Ivoire, a large part of the fishery's workforce rest on family circle and women prominently stand alone in carrying out post-harvesting tasks.

5. Conclusion

This work emphasizes that the artisanal fishing sector can be regarded as a mean to contribute to provision of fishery resources such as food while being at the same time employment provider. The study also points out the relevance of true collaboration between agents appointed by the Government and privately employed professionals in their efforts to support strategic fishery resource management in order to maximize fishery yields. Aiming to preserve the local artisanal fishery's capability to support people's increasing demand for fish, measures for sustainable management of fishery resources should be reinforced by the Government. Such measures can benefit local fishers by enhancing quality and availability of the target species and by tackling ecosystem-scale as well as long term changes that could negatively affect fishery yields. Furthermore, though not participating in the production process, women do contribute to post-harvesting tasks in ways that could surpass men's ability, have men ever had any occasion to get involved, which deserves acknowledgement. Finally, the study also shows that women contribution to the furtherer of the fishery's activities is plainly valued and made visible, as women are able to speak up and be heard through their sales cooperatives, which shows they could likely influence fishery-oriented policies and choices in the area that will make addressing the challenges women face possible.

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