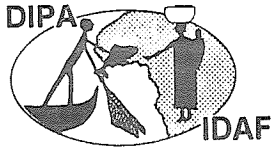
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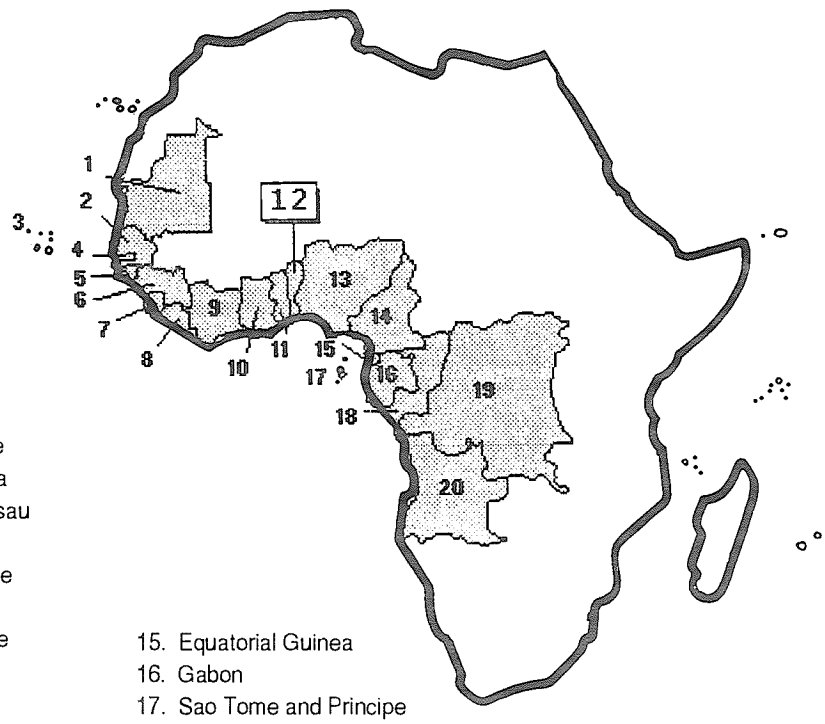


PROGRAMME FOR INTEGRATED DEVELOPMENT OF ARTISANAL FISHERIES IN WEST AFRICA

IDAF PROGRAMME

Technical Report N° 87 September 1996

Nutritional Condition, Food Security, Hygiene and Sanitation in the Fishing Community of Joal, Senegal



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DEPARTMENT OF INTERNATIONAL DEVELOPMENT COOPERATION OF DENMARK

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Technical Report N° 87 September 1996

Nutritional Condition, Food Security, Hygiene and Sanitation in the Fishing Community of Joal, Senegal

by

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
Cotonou, September 1996

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THE VISION FOR IDAF PHASE III

INTRODUCTION

Development strategy during the 1960 and 1970s was based on the philosophy that developing countries lacked improved technology and capital for speeding up their development.' Industrialization was promoted in order to capitalize on the abundant fish resources. However, the anticipated expansion of the economy did not happen and the development approach shifted towards an integrated rural strategy where emphasis is put on the community as a whole to upgrade incomes and the quality of life through technical assistance and the active participation of fisherfolk and the community.

In this context, emphasis was initially placed on the Community Fishery Centre (CFC) concept as a means of promoting artisanal fishery development. But it became apparent that the presence of a complex of facilities and services tailored to meet local needs was no guarantee that the structures/facilities would be used or that development would occur. The active participation of fisherfolk and the mobilisation of local and community resources was imperative in order to assure sustainability of initiatives undertaken by development projects and/or the community.

So far and in general terms, the IDAF Programme has worked under the context of abundant or seemingly adequate fishery resources with moderate population pressure. The scenario is however changing (and very fast for that matter) and we would soon face the triple constraints of reduced or depleting fish stocks, degrading environment and increasing population pressure. Like in other sectors, it must be anticipated that just to survive, parts of the population surplus in the fishing communities will enter the artisanal fisheries, which will increase the competition for the resources among the small scale fisherfolk in addition to the prevailing competition between the artisanal and industrial fisheries, with their attendant effect on the environment.

This scenario calls for a continuation of the integrated participatory strategy which remains relevant to the development of artisanal fisheries in West Africa. However, the emphasis needs to be placed on the elements and mechanisms that favour the sustainability of initiatives: responsible fishing, the empowerment processes that ensure the devolution of major resource management and development decisions to the local community, the strengthening of national human and institutional capacities at all levels for a sustainable and equitable fisheries resources management and development, as well as in the follow-up and consolidation of past achievements.

DEVELOPMENT OBJECTIVE

Thus the development objective of the Programme in the present phase III which started on 1 July 1994 is to ensure twenty coastal West African countries a sustainable development and management of their artisanal fisheries for maximum social and economic benefit of their fishing communities in terms of employment, proteins and earnings. This will be done through an integrated and participatory approach in which emphasis will be laid on equity, gender issues, the transfer of technology for development, environment protection, as well as the strengthening of human and institutional capacities.

The immediate objectives are:

1. To identify, assess and disseminate strategies and mechanisms for sustainable management and development of the artisanal fisheries in fishing communities;

2. To improve the competence of national Fisheries Departments staff in development and management planning of artisanal fisheries;

3. To enhance regional technical competence in the fisheries disciplines, particularly in fishing and fish technology;

4. To improve information and experience exchange related to artisanal fisheries within the region;

5. To promote regional and sub-regional collaboration for the development and management of artisanal fisheries

In this context, IDAF will among other things tackle the following major aspects in it's work :

- assisting in the elaboration and implementation of a clear and coherent national development policy for the artisanal fishery sector;
- providing advice on management and allocation of resources between artisanal and industrial fishing fleets, both national and foreign;
- involving users in the design and management of on shore infrastructures;
- monitoring the sector's evolution by the setting up of an economic indicator system for the sector adapted to the financial and human availabilities;
- improving fishing technologies in accordance with the available resources;
- increasing the final product's value by improvement in processing and marketing;
- promoting community development in accordance with the lessons learned from Phase I and II and oriented towards the sustainability of actions undertaken;
- reinforce the Programme's information/communication system.

It is anticipated that by the end of the third phase of the Project, the region will have a nucleus of field oriented experts capable to respond to the challenges of the artisanal fisheries sector and to spur development in their individual countries in keeping with the aspirations and needs of fisherfolk.

SUMMARY

Joal is one of the main fishing centres in Senegal. Covering an area of about 5,035 hectares, with a population of 24,100 and an annual rainfall of 200 - 400 mm as well as upwelling conditions, it has almost all the conditions favourable to artisanal fisheries. About 79% of the women in Joal are involved in fishing, particularly in the downstream activities of processing and fish mongering.

The main objectives of this study were the evaluation, on one hand, of the working conditions of women in this fishing community and, on the other hand, the nutritional condition in the homes of the women involved in these fishing activities.

The nutritional condition of women processors in our sample is considered satisfactory based on anthropometric data with 41% of normal nutritional condition and 23% at the preliminary stages of obesity. 7% of the women have an index below the critical ceiling, which is not excessive when compared with the national average which is 15% and therefore presents chronic energy deficiency.

This moderate malnutrition rate is justified by high fish protein consumption. The study is based on an active population which might bring us to conclude, in the first place, that revenue from their activity allows them to lead a correct nutritional life.

However, it was observed that more than 50% of the population sampled is anaemic, a situation which has serious consequences on health. The negative effects of anaemia, are physical reduction in effort, proneness to infections, increase in morbidity and foeto-maternal mortality.

Prevalence of nutritional conditions in children of zero to five years old, on the basis of slow growth in height and weight seem relatively low (2%). There is no significant difference in the three indexes according to age groups.

Joal is a town with no waste or used water drainage system, hence the precarious hygienic conditions. While 84% of waste water is emptied into the arm of the sea, the rest is dumped on public roads or disposed of by other means. Moreover, refuse is usually dumped all over the town, thus aggravating the degradation of the environment.

Twenty-four percent of the women fish processors have water taps in their houses/compounds. However the majority (52%) are served by public taps. Very few people use wells as their source of drinking water.

It was observed that 33% of the homes do not have latrines. The inhabitants either go to neighbouring houses with facilities, use public conveniences or go to uninhabited places, far from dwellings to relieve nature. Although there are not many latrine pits they do contaminate ground water. Since about 84% of waste/used water is emptied into the sea, and the beach is used not only to relieve nature but as refuse dump, it is quite possible that such water would also contaminate fish during landings. Furthermore, artisanal processing techniques as practised contribute to the degradation of sanitation and hygiene conditions.

Anaemia is a major nutritional problem in Joal. It is therefore advisable to combat it by increasing the consumption of vegetables that are rich in iron such as green vegetables and beans. Nutritional education of the entire population, with emphasis on mothers giving their children a varied and rich diet in an early stape, needs to be stressed. Women should also be discouraged to pay credence to food taboos and food prohibitions.

Public hygiene should also lay emphasis on pest control and eradication as well as the cleaning of the environment by improving the sanitary environment of the processing areas through the proper evacuation of waste and used water, and by giving women access to drinking water as well as adequate lavatories. Women processors should be helped through the provision of large capacity processing drying racks; and taught improved processing techniques to avoid risks of product alteration associated with storage on the drying racks.

The establishment of a nursery will permit women to carry out their activities with less pain.

On a long term basis, sensitization campaigns should be conducted on how to collect, conserve and treat drinking water. This exercise could be made more effective by using audiovisual techniques. Public awareness needs to be created on the pollution of the sea and its potential effects on product quality.

In addition, literacy courses in the official language will enable women processors to better communicate with their foreign commercial partners.

On the whole, appropriate measures should be taken to improve the working and nutritional conditions of the people, sanitation and hygiene practices both in the processing areas and in the household.

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All the people surveyed.

I. INTRODUCTION

Senegal has a 700 km maritime façade situated to the west of the country and subdivided into 5 zones from north to south (see map 1):

- "grande Côte"
- "Cap Vert"
- "Petite Côte"
- Sine Saloum
- Casamance

Fishing, the main activity of this maritime zone, has in 1994 contributed to the landing of 266,954 tons for artisanal fisheries and 79,458 tons for industrial fisheries.

In the primary sector, fishing is the first economic activity in Senegal. It contributed 11% of GNP (Gross National Product) of the primary sector in 1988 and 2.4% of the total GNP. It represents in value more than a quarter of Senegalese exportation.

The locality of this survey, Joal, is one of the principal fishing centres in Senegal. Fishing is practised there because of favourable natural conditions especially due to the consequences of a current movement known as "upwelling", which results in great planctonic abundance and remarkable fertility. These favourable conditions added to food habits in the neighbouring laye towns like Kaolack, Fatick and Thies place the Small Coast first in artisanal fisheries and fish processing (dried and smoked, salted dried, many dried variants) in Senegal.

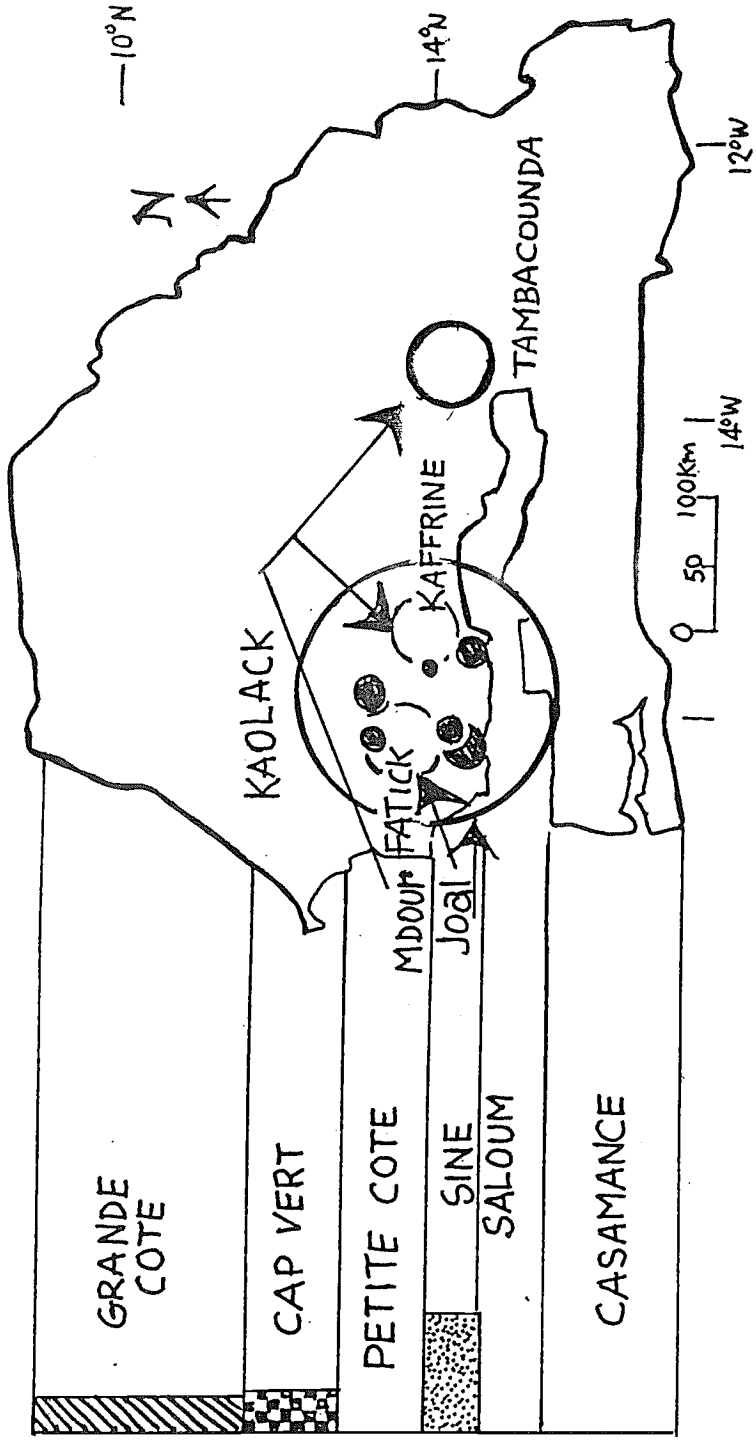
The abundance of fresh products and the non-existence of conservation methods explain the dynamism of the sector which occupies 78.5% of the female population in Joal.

In this zone, though artisanal, fishing ensures one third of total maritime production in Senegal; thus, two thirds of landings are carried out in the Thies region (Joal where this study was undertaken, is a commune in the Thies region). On the other hand, other activities like agriculture, husbandry and even market farming are hardly practised because of soil degradation and lack of water. Consequently, the main source of revenue for the Joal population comes from fish products.

The place of women in the fisheries sub-sector is characterised by their massive intervention in artisanal processing and micro-mongering of fish. At Joal, the proportion of women among processors is clearly dominant. In this locality, they represent 78.5% of the total population i.e. 612 processors identified in 1993 (M. DIONE, 1993). The number of women active in fisheries is estimated at a total of 780 (M. DIONE, 1993).

The choice of Joal for this survey is justified by the importance of fisheries and fish processing activities and IDAF's insistent willingness to work towards improving people's living conditions in West African fishing communities.

Map N° 1: Map of Senegal and its coastline.
(Arrows show markets for processed fish)



The documentary research lasted two weeks and resulted in the elaboration of the questionnaire based on the use of Surveys - Budget Consumption and surveys on evaluation of living conditions in Senegal.

The questionnaire, apart from generalities on identity and the educational level of the survey, has three important headings:

- consumption;
- hygiene;
- nutritional condition.

The main objectives of this study are the evaluation, on one hand, of the working conditions of women in this fishing community and, on the other hand, food and nutritional security in the homes of the women involved in these fishing activities.

Specifically, the purpose of this work, a follow-up of an initial study carried out in August 1995 (DIPA/WP/79), is the:

- evaluation of the nutritional condition of women processors and zero to five year old children;
- assessment of nutritional habits in the community;
- description of the different fish types used in nutrition and the source of these products;
- assessment of the direct and indirect role of fish in feeding;
- analysis of women's contribution as against men's in providing foodstuffs in the home;
- observation and description of hygiene practices in the community;
- evaluation of sanitation conditions in the community.

It should result in recommendations on appropriate measures for improving working conditions, nutritional condition of the people, sanitation and hygiene practices in processing zones and in the household.

Using the type and development approach, the main target of the study is women. The improvement of their working conditions and life style will surely influence the quality of life in their homes.

2. PHYSICAL FRAMEWORK

2.1 Physical environment

Joal-Fadiouth is a commune in the Thies region formerly known as the Small Coast (see map No. 1). It has an average annual rainfall of 200 to 400 mm. The rainy season lasts three months with the greatest precipitation in July - August and the remaining distributed equally between May - June and September - October.

The town of Joal spreads over a 5,035 ha area with 60% of flooded land.

Edaphically, Joal is made up of a mangrove-spot complex. The spot spreads behind mangrove vasiers, in the flood prone zone by spring tides; it is characterized by sandy-silty sediments, a strong salinity and the absence of vegetation.

2.2 Human environment

The population is estimated at 24.100 inhabitants according to the 1988 national census.

The population is made up of: Sereres (natives), Wollofs and emigrated Lebous, Maures, attracted by fishing. Very few Diolas and Bambaras can be found.

3. METHODOLOGY

3.1 Sampling

The study was conducted in March 1996 during the dry season through a cross survey on women fish processors in Joal.

The sampling was based on the polling zone lists of the census carried out by M. DIONE in 1993.

Consequently, 780 women were identified. Our sample involved 135 women randomly chosen. While reporting on the number of women recorded and the number of women to be surveyed, we obtained a sampling pace. After casting lots between Figure 1 and the sampling pace, the first figure taken out was our first woman interviewed.

The sampling unit retained is the woman owner of her processing grid.

A qualitative survey on the origin, role of fish in nutrition and the contribution of women as against men in providing foodstuffs to homes, was presented as a questionnaire. Hygiene conditions in the community and the population's access to good sanitation were treated.

This qualitative survey was jointly conducted with an anthropometric one on children of under five years living in homes of women surveyed and on these women themselves.

The PRA method (Participatory Rapid Appraisal) was used at the end of the survey to collect additional data from a group of women processors learning to read and write about their

nutritional habits (taboos and food diets). These 25 women were chosen due to their availability at the meeting.

During this meeting, a midwife and a nurse, the chief of station, were invited to give their opinions, taking into account what happens in their hospital environment.

3.2 Training of interviewers

Measurements were taken by a team comprising a doctor and two interviewers under the supervision of the IDAF nutrition consultant. They had a two-day training on the meaning of the objectives of the study and the questionnaire, as well as a mastery of the methodology and handling of materials. The measurements were standardized in such a way as to obtain good measuring precision.

The pilot survey, conducted in the preliminary phase, helped modify, even eliminate redundant questions.

It also enabled the interviewers to be familiar with the materials.

3.3 Anthropometric measurements

3.3.1 Weight

The Salter scales was used to weigh children of less than 15 kg. Adults and children of more than 15 kg were weighed with the electronic Tefal scales with a precision of 200g. Agitated children who did not want to be weighed were weighed with their mothers using the double weight method.

3.3.2 Height

Height was taken with a wooden mm. precision measuring apparatus for children younger than two years. This was taken lying down. The height of children order than two years was taken with a Harpenden-type anthropometric 1 mm precision measuring apparatus, standing with feet together and looking straight ahead.

3.3.3 Haemoglobin level

With regard to the interviewed female adults, the haemoglobin rate measurement is carried out with the help of a photometre. The photometre was calibrated at the time of manufacture using the haemoglobin cyanide method (HICN), which is the internationally recognized method for determining total haemoglobin concentration in the blood.

3.4 Survey procedure

3.4.1 Awareness campaign

Before each interview, an awareness campaign was undertaken among the women concerned by fully explaining to them the objective of our work in order to get their approval and membership.

3.4.2 Interview

The interview was held in Woloff (one of the most widely spoken languages in Senegal). The interviewers were people used to working with these women (Fisheries Agents).

3.4.3 Transportation of the materials

All the materials used were fragile and must have been transported by foot, carts or taxis. Interviews on the qualitative aspect were undertaken in processing zones to benefit from the light of the sun.

3.4.4 Anthropometric measurements

Anthropometric measurements were taken in the evening in the homes to allow for the measurement of children and women processors.

4. RESULTS

4.1 Identity of the interviewees

Of the 135 women interviewed, three had stopped working due to losses during the rainy season; 10 of them had travelled, two were in mourning and five others could practically not be found in their neighbourhoods. The unused questionnaires were set aside. Our survey therefore included 115 households as follows:

- 53.9% Sereres
- 30.4% Woloffs
- 5.3% Maures
- 4.3% Lebous

The remaining households consisted of other various ethnic groups in Senegal(Diolas, Bambara and Toucolors).

Two pregnant women were excluded from the nutritional analysis because the BMI (Body Mass Index) of the pregnant woman is unknown and the physiological value of the blood haemoglobin rate is temporarily low among pregnant women.

Weighing during pregnancy can lead to an anomaly in nutritional analysis. An anomaly can be observed because the haemoglobin rate of the pregnant woman is temporarily lowered by the presence of the foetus.

Level of education

In the fisheries sector, 77.4% of the women interviewed have never been to school. 13% did not complete their primary education while 7% did. Only 2.6% got to the secondary level. This illiteracy rate reflects the national average of women aged 15 years and above which was about 74% in 1992.

22% of women make Ketiakh (they are in the majority)
2.6% make Guedji
0.9% Tambadiang
Saly stands out apart from these three types of processing.
These Woloff words are explained in the annex.

4.2 Food consumption

4.2.1 Source and frequency of fish consumption

Of the 115 women interviewed, 112 eat fish several times a day. Fish is the main source of protein. In fact, these women only eat meat during ceremonies or annual feasts. Fish is eaten fresh in 75% of the homes. Guedji and Yet are eaten as condiments.

Nutritional habits vary according to ethnic groups:

- traditionally the Sereres eat fresh fish

- dried fish or Keithiakh is mostly eaten by the Woloffs and other ethnic groups from the hinterland where fish is scarce.

Sardinella is generally used and constitutes the greatest monthly tonnage with 5,897.6 tons on a total of 9,201.4 tons (March 1992).

Households eat fish according to the type of discharge.

At this time of the year, there was little quality fish and it was observed that even if quality fish is consumed, it is always associated with the cheaper sardinella.

80.9% of the fish consumed is not derived from their own catches while 19.1% does.

57.4% of the fish is bought primarily at the landing zones (60.7%), at the markets or in the two associated sites.

4.2.2 Nutritional habits

As mentioned earlier, nutritional habits vary according to ethnic groups. At Joal, the Serere ethnic group is dominant.

a) Number of meals:

It is estimated at three: breakfast, lunch and supper. Many of the women interviewed do not eat in the evenings, pleading tiredness.

b) Composition of the meals:

Other ethnic groups come from the hinterland bringing with them their nutritional habits which are modified by available food. During the PRA, Sereres affirm that they only eat dried fish when fresh fish is scarce. The other ethnic groups replace meat with dried fish in some meals.

The majority of the Sereres eat millet couscous with fresh fish at supper and frequently at breakfast. The other ethnic groups very rarely take millet couscous at breakfast. They take millet porridge or European style breakfast (bread, coffee, tea or Quinqueliba infusion, milk, sugar...).

For the evening meal, they eat dried fish sauces with millet couscous. Rice is used as basic food for lunch, and occasionally in the evenings by all the households because it is easy to cook.

At Joal, 96% of those interviewed eat fish many times a day. It was observed that feeding depends on resource availability in the locality.

4.2.3 Food taboos

At Joal, PRA helped to discover a number of taboos or food prohibitions, especially for pregnant women, new-borns and children:

- it was observed that a pregnant woman cannot eat braised meat because she may have, according to custom, heavy haemorrage during childbirth;

- a pregnant woman who eats tortoise can have a difficult labour because the child will imitate the animal by incessantly bringing in and bringing out his/her head;

- sharks are prohibited because the child may become wicked and bite his/her mother while breast feeding;

- it is the custom in Senegal for Moslems that the first liquid given to the baby must be water blessed by a marabout. According to the Moslem community, Joal women can face very serious problems before breastfeeding if the marabout is absent. This delay in initial suckling can have disastrous consequences on maternal milk by reducing the quantity of milk. WHO recommends exclusive breast feeding which is contrary to the custom in Joal;

- fish, the main source of protein in this area, is given in small quantities to children because some mothers think that fish gives worms;

- a child may not eat eggs because it is feared that he may not speak early or become a thief.

The PRA was followed by a nutritional counselling session by the IDAF consultant nutritionist.

Planning methods were treated at women's request. Generally, they think that the talisman or other remedies prescribed by the marabouts are more reliable and less restricting than modern medical methods. The invited midwife and nurse had to insist on the advantages and reliability of all the planning methods existing in Senegal.

4.3 Feeding expenses

The women interviewed considered rice, followed by oil and millet, as the most expensive foodstuffs. This is in line with the ESP study (Survey on priorities carried out in 1994) which showed that rice occupies the most important place in the monthly feeding expenses structure of the households in the rural area.

These two foodstuffs are bought either by the husband (40.4%), by the woman (27.3%) or by other people (30.4%) having close links with the woman (child, daughter-in-law and son-in-law, brothers, sisters). Old people are generally looked after by their children or close family. In cases where the husband is absent or short of money, the woman takes over to cover the expenses. In Senegal, tradition demands that men pay the "daily expenses", that is the necessary money to feed the family.

This amount is for buying rice, oil and other foodstuffs. Women complain about the inadequacy of this amount and are always obliged to "complete" it. This inadequacy is leading to increased contribution of women to the family's expenses.

4.4 Hygiene

4.4.1 Hygienic conditions

In Senegal, about 2/3 of rural households have no sanitation system as against only 15% in urban households. Only five towns have a dirty water drainage system with a connection rate of between 2 and 36%.

Joal is one of those towns with no dirty water drainage system. During the study, it was observed that dirty water is emptied into the sea (83.5%), the arm of the sea, on public roads (8.7%) and other places (7.8%).

In addition, the absence of a generalized system of collection and conditioning of household refuse is aggravating the degradation of the environment.

Collection by containers is difficult due to inadequate motor park and its state of disrepair.

Delays in evacuating the containers lead to "savage" dumps.

There are public rubbish bins or containers where rubbish bins can be emptied. The town council dumper lorry passes every morning on the 6 km long tarred road to collect refuse.

Those who live far from the tarred road or whose public bins are located far away, get rid of their refuse and dirty water as best as they can. It is the custom in Joal to throw household refuse into basins to later fill them up in order to create less flooded habitable places during the rainy season. Consequently, refuse is dumped all over the town. As a remedy, the commune's town council will distribute land in the interior of the commune so that each owner can supervise his own land.

4.4.2 Drinking water

According to the 1988 national census, 83% of the urban households have access to drinking water and 20% in the rural areas. Since 1991, street fountains have been privatized throughout Senegal. Consequently, households with no private tap have to pay for water at the street fountains.

In the rural area, three out of ten regions record equipment shortage with access rate to drinking water not exceeding 30%. This situation affects the health of people especially that of children and mothers who are the most vulnerable to the quality of water. In Joal, it was observed that, in homes of the women processors sampled, 23.5% have an inside tap, while the national average is 16.7%.

The 1988 general census recorded that households in Joal with outside taps numbered 2172, i.e. 16% of the population; the percentage of those with inside taps is lower.

However, most of the households in this study get their water from private outside taps (52.2%). Well water consumption as drinking water is very rare; it is used for other domestic purposes (7.8%). This rate is close to the general recording of the number of households (8.1%) who have (inside, outside) wells.

The number of women who get water from street fountains and from the well is estimated at 16.5%. However, some heads of families having an inside tap do not authorize their family to open it permanently (29.6%), thereby leading to storage practices hardly different from those of families who go to the street fountains.

Due to the savings which families want to have, the use of water is strictly controlled. Since the taps are padlocked, water for consumption is stored in jars. But 88.9% of these women living in households say that the quantity of water envisaged for the day is sufficient for their domestic activities.

4.4.3 Type of sanitation in the homes

Al the time of the survey, 33% of the homes did not have latrines. People are obliged to wait for nightfall to go to uninhabited places, far from dwellings to relieve nature.

During the day people can go to neighbouring houses with facilities or use public conveniences.

The general census study for settlement has shown that in Joal, 1024 households use public conveniences, i.e. 36.3% of the households; 743 use open space (nature), i.e. 26.3%.

Hidden pits number 131, i.e. 4.6%, consequently contaminating ground water.

Maintenance is done with detergent soap by 50% of the women in this study.

4.4.4 Hygiene in the processing zones and the landing port

In Joal, the population eliminate their waste by emptying them into the sea, thinking that salubrity will help to eliminate all the dangerous elements to good health, in particular micro-organisms. This is why liquid and solid wastes are emptied into the sea without prior treatment.

The beach is used to relieve nature, as refuse dumps but also as reception for sea products. Processors use sea water for their work. It is known that water which has been used for cleaning further contaminates fish.

Artisanal processing techniques used highlight this degradation of sanitation and hygiene conditions. Consequently:

- cement salting basins have cavities that are difficult to clean properly, hiding micro-organisms which contaminate the finished products hide;
- smoking is done on the ground, between refuse heaps and the fish covered with straw (see Photograph No. 2 annex 5). The result is real atmospheric pollution from the thick smoke;
- the finished product is kept on drying grids which are invaded by clouds of flies especially during the rainy season. This pollution has obvious repercussions on the hygiene of finished products;
- salt is kept on bare ground or in gunny bags of doubtful hygiene (see photograph No. 2 annex 5);
- fish to be processed are cleaned on the bare ground by labourers, beside vats and drying grids. The scales, gills and internal organs are strewn around on the ground or inside the processing area (see photograph No.3 annex 5);
- used water from pickling and soaking are poured near or in the processing areas.

4.5 Nutritional condition

4.5.1 Data and analysis

The children's nutritional condition was evaluated through anthropometry using the following nutritional indexes:

- height according to age.
- weight according to age,
- weight according to height.

These indexes were calculated, based on reference data.

The EPI-INFO anthropometric software was used to calculate nutritional indexes. The nutritional indexes were expressed in difference-type or in percentage.

The index ceiling retained to define malnutrition was -2 E.T. This ceiling was used to present prevalence figures.

Emaciation or thinness was defined by weight for inferior height at 2 E.T. below the reference average. It indicates a severe malnutrition condition.

Slow increase in weight or slow growth was defined by weight for inferior age at 2 E.T. below the reference average. Weight for age does not allow for differentiating the severe or chronic nature of malnutrition. On the other hand, it is a prognostic index of the mortality risk in pre-school children.

The nutritional condition of mothers was assessed through anthropometry, using the following nutritional index:

- weight on height squared (body mass index or Quetelet index (Body mass index or B.M.I.). The B.M.I. ceiling retained to define the malnutrition ceiling in adults is 18.5.

- anaemia is defined when the haemoglobine rate is lower than 12 g/dl for non-pregnant adult women. This ceiling used was defined based on WHO norms.

Statistical tests (Chi 2) were used.

4.5.2 Nutritional condition of women

Age	24 - 34 years		35 - 45 years N		46 years and plus N	
BMI < 18,5	(3,6)	4	(1,8)	2	(1,8)	2
BMI 18,5 - 24	(9,9)	11	(18)	20	(12,6)	14
BMI 24 - 27	(6,3)	7	(7,2)	8	(9,9)	11
BMI > 30	(4,5)	5	(9)	10	(15,3)	3
TOTAL	(24,3)	27	(36)	40	(39)	17

Malnutrition affects more of the women in the 24-34 age range with a 3.6% rate. That of the other two older groups is 1.8%.

Normal nutritional condition is mostly found in the 35-45 age range; the beginning of obesity and preponderant obesity in older groups (46 years and above).

Weight increases with age. Older people more often show signs of obesity.

The nutritional condition of women processors in our sample is considered satisfactory based on anthropometric data with 40.5% of normal nutritional condition and 23.4% of the beginning of obesity. 7.2% of the women have an index below the critical ceiling, which is not

excessive when compared with the national average which is 15%, and therefore presents chronic energy deficiency.

This moderate malnutrition rate is justified by the high protein consumption from fish. The study is based on an active population which might bring us to conclude, in the first place, that revenue from their activity allows them to lead a correct nutritional life.

4.5.3 Prevalence of haemoglobin

The final stage of iron deficiency is associated with a significant reduction in the circulating haemoglobin rate (11). Anaemia is normally defined when the haemoglobin rate decreases below a value defined according to age, sex and some physiological circumstances. The study shows that 68 of the women interviewed had a ceiling inferior to WHO norms (< 12 g/dl) and 42 are above the ceiling. Consequently, it was observed that more than 50% of the population sampled is anaemic, a situation which has serious consequences for health. These negative effects of anaemia are physical reduction in effort, proneness to infections, increase in morbidity and foeto-maternal mortality. These effects are plurifactorial. The figure of 68 anaemic women is quite paradoxal, knowing that high animal based iron consumption brings about an increased quantity of heminic iron which can be more easily absorbed by the body.

Prevalence of Women aneamia

	18 - 45 years	46 - 98 years	Total	Tests Statistics
	N = 66	N = 44	N = 110	
< 12 ghb/dl	66 %	54 %	61 %	NS
> 12 ghb/dl	34 %	45 %	39 %	NS

4.5.4 Children's nutritional condition

Prevalence of the nutritional condition in children of zero to five years old.

	N = 10 0 - 6 months	N = 25 7 - 11 months	N = 49 12-23 months	N = 49 24-36 months	N = 55 Plus to 36 months	Total N =159	Test Statistics
Weight /Age	%						
< - 2 ET	0	0	4	4,1	3,6	3,1	NS
> - 2 ET	100	100	96,0	96,0	96,4	96,9	
Weight for size							
< - 2 ET	0	0	4	2	1,8	1,9	
> - 2 ET	100	100	96	98	98,2	98,1	NS
Size for age							
< - 2 ET	0	0	4	2	1,8	1,9	
> - 2 ET	100	100	96	98	98,2	98,1	NS

Figures of the prevalence of slow height growth as well as slow growth seem relatively low.

There is no significant difference in the three indexes according to age groups.

Weight according to age

* The prevalence of low weight according to age (or ceiling of -2z scires) is 3.1% in the sample, reaching a peak of 4.1% from 24 to 36 months. At the national level, 20% of children suffer ponderal insufficiency.

Weight according to height

* The global prevalence of thinness is 1.9% with the majority in the 12 - 23 month age range. This is due to inappropriate feeding practices.

Height according to age.

* Slow growth affects 1.9% of the children in the sample reaching a peak in the 12-23 month age range.

4.3.3 Nutritional condition of the children according to sex

	Man	Girls	Total	Tests statistics
Size for age < 2 ET > 2 ET	 3,8% 96,2%	 3,6% 96,5%	 3,7% 96,3%	 NS
Weight for age	3,8% 96,2%	6% 94%	4,9% 95,1%	NS
Weight for Size	1,3% 98,7%	2,4% 97,6	1,9% 98,1%	NS

The average weight/height index is lower in boys than in girls.

The height/age index is not different in the sexes. On the other hand, weight/age is higher in girls (6%) than in boys (3.8%).

5. CONSTRAINTS

No nutritional study has yet been undertaken on women in the fishing environment. Because of ignorance of measurement instruments, a greater public awareness campaign was necessary. Generally however, there has practically been no refusal.

The working hours of women are difficult. Generally they leave home at 8H 30 in the morning: They come back around 23 H 00 at night. It was difficult therefore to find them at home. This is why most of the surveys were carried out from 19 H 00 to 23 H 00.

Surveys in the homes in the evening was a problem because some houses had no electricity and torch lights were inadequate.

We had been thinking of interviewing the women at their work place and then going to their homes during the day. We could not do this because many women wanted to be interviewed and if we went to the wrong house, it would be difficult for us to retrace our steps.

Transporting the materials during home visits and to processing zones was very difficult because we were not mobile. Renting cars for a month was very expensive. Since women processors live in neighbourhoods very far from one another, we had to walk around all the neighbourhoods of Joal.

6. RECOMMENDATIONS

6.1 Short term

Since anaemia is the greatest nutritional problem we encountered during this study, it would be good to dwell on these recommendations.

Apart from the additional and enriching measures, general measures need to be developed to ensure that iron-based foods will be better able to satisfy needs. These needs will aim at improving the nutritional and hygienic condition of women fish processors in Joal. They will aim at:

* increasing the consumption of vegetables very rich in iron such as green vegetables, and beans. Even if their absorption rate is slower than animal-based foods, they represent an important source of iron;

* increasing the consumption of foods rich in ascorbic acid, which facilitate the absorption of iron contained in meals;

* improving nutritional education of all the population and above all, teaching them to better use available resources, educating mothers to give a varied diet to their children early. It would be interesting to find out in another study if the children are as anaemic as women fish processors;

* another essential method against anaemia due to the shortage of iron, is the reduction of iron losses by fighting against parasites through sanitation measures and a well adapted health education. In the same light, the use of oral contraceptive in a family planning campaign will contribute to decreasing menstrual losses since the volume of periods decreases with the taking of oral contraceptives;

the development of processing zones implies the following:

* improving the sanitary environment of the processing zones through the proper evacuation of waste and used water;

- giving women access to drinking water as well as adequate lavatories to improve hygiene;

- providing appropriate materials while taking into account errors of previous projects such as the availability of bigger drying grids for women processors.

* sensitizing women involved in processing on the use of techniques allows them to obtain good chemical, bacteriological quality products and to avoid the risks of product alteration associated with storage on the drying grids.

It would be good to valorize waste from processing by the manufacture of fish powder and fertilizers.

After this study, it is important to make learning sessions available to women to explain to them the non-justification of some taboos and the advantages of family planning through appropriate methods. It would be good to include nutritional counselling sessions by a nutritionist.

The establishment of a nursery for those who have young children will enable such women to take part in this activity which is very time consuming. The main objective would be to motivate women with young children.

6.2 Medium and long terms

A sensitization campaign is necessary on how to collect and conserve water in order to drink pure. Consequently, visits to homes and group meetings are important. Practical solutions should be discussed with all the members of the family; relationships between bad hygienic practices and some diseases should be explained.

Audiovisual support during home visits and group meetings will be used to show current practices and those proposed.

Literacy in the official language will enable women processors to better communicate with their foreign commercial partners.

Sensitization on hygiene at the workplace will enable them to have quality products.

The women processors should be made aware of the environment, showing them that refuse thrown into the sea can reduce the quantity of fish.

The departments in charge of controlling the degree of pollution should be equipped to enable national structures to exercise efficient control over various pollutants thrown into the sea and vigorously apply the rules.

7. CONCLUSION

Artisanal fish processing is one of the major income generating activities in Joal. The sector which has hitherto been informal, is essentially monopolized by women; many development projects such as IDAF are interested in improving of living conditions of women fish processors.

In Joal, fish is the principal source of animal protein. Meat is eaten only during ceremonies or festivals. According to the ethnic groups, fish is eaten fresh or dried. The dominant Serere tribe only eats fresh fish. The study shows that the nutritional condition of children and women fish processors is satisfactory, based on anthropometric measurements.

Households eat fish more than twice daily (on the 115 households interviewed, 112 fall under this category). Sardinella is the main fish consumed. It was observed that home consumption depends on available local resources.

Rice, followed by oil and millet, occupies an important place in the home's feeding expenditure structure. These foodstuffs are either bought by the husband (40.4%), by the women (27.3%) or by other people having close ties with the woman.

On the other hand, despite this large consumption of animal protein, the level of anaemia is very high in adult women in this sample with a prevalence of 61%. This study made us realize that installations in homes are rudimentary. In Joal, there is no evacuation system for used water. It is thrown into the sea in 83.5% of the households interviewed.

The lack of a generalized household refuse collection and conditioning system worsens environmental degradation. This important fish processing activity provides work as well as income to these women and contributes to food self-sufficiency. However, it is a source of much waste at the processing and landing sites thereby negatively affecting the environment. A sensitization campaign must be undertaken for environmental awareness and hygiene in homes.

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ANNEXES

ANNEX 1:

TERMS OF REFERENCE

Under the supervision of the IDAF Programme Coordinator, the Associate-Staff will undertake the following duties:

- to describe the nutritional condition of the population;
- to assess the feeding habits of the different groups;
- to describe the fish products used in their nutrition and their source;
- to assess the direct and indirect role of fish in their nutrition;
- to assess the contribution of women, with regard to men, in the procurement of foodstuffs for the home;
- to observe and describe the communities' hygienic practices (in their daily family life);
- to assess the sanitation facilities in the communities and access to the population;
- to recommend the appropriate measures to improve the nutritional condition of women, as well as hygienic practices and sanitation facilities.

ANNEX 2: QUESTIONNAIRE

NUTRITIONAL/HYGIENE SURVEY

THIES/IDAF DEPARTMENT

Identification Number:

Name of the interviewer:

Head of the compound: Date of Visit:

Woman:

1) Ethnic group: Woloff 1 Serere 2 Others 9

2) Educational level:

No schooling 1, Incomplete primary education 2, Complete primary education 3, Secondary 4.

3) Activity within the fish sector:

Kethiakh 1, Guedji 2, Yet 3, Tambadiang 4, Salted 5 Others 9.

Name of the GIE:

Address at Joal:

I- Food consumption

1) In the previous week, how many times did you eat fish:

Many times/days 1, 2 times/day 2, between 3 and 6 times/week 3, less than 3 times/week 4, not at all 5.

1-2 In what form:

1 Fresh, 2 Dried

1-3 What type of fish:

1 Sardinella, 2 Caranx, 3 Ethmalose, 4 Grey mullet, 5 Courbine, 6 Machoiron, 9 Others

1-3 Is the product from your activity:

Yes 1, No 2, Others 9

1-4 Did you buy it:

Yes 1, No 2

1-5 If yes, where:

1 Market, 2 Landing site, 3 Processing zone, 9 Others

1-6 In your basket, what is most expensive for you:

1 Rice, 2 Oil, 3 Vegetables, 4 Millet, Maize, Sorghum, 5 Meat, 6 Dairy products, 9 Others

1-7 For these products, who does the buying:

Product	**Who buys**
1 Rice	1 Husband, 2 Wife, 3 Others
2 Oil	1 Husband, 2 Wife, 3 Others
3 Vegetables	1 Husband, 2 Wife, 3 Others
4 Millet, Maize, Sorghum	1 Husband, 2 Wife, 3 Others
5 Meat	1 Husband, 2 Wife, 3 Others
6 Dairy products	1 Husband, 2 Wife, 3 Others
9 Others	1 Husband, 2 Wife, 3 Others

II- Water supply

2.1 - Where do you get your drinking water:

1 Tap, 2 Public fountain, 3 Well

2.1.1 - If you have a personal tap, is it open at specific times:

1 Yes, 2 No

2.1.2 - Is the quantity sufficient for the day:

1 Yes, 2 No

III- Hygiene

3.1. Is there a refuse collection service:

1 Yes, 2 No

3.2. How do you get rid of your refuse:

1 Collection truck, 2 Dumping ground outside the village,
3 Dumping ground in the village, 9 Others

3.3. Evacuation method of dirty water:

1 On public road, 2 In a sewage opening, 3 Others

3.4. Do you have latrines at home:

1 Yes, 2 No

3.5. How do you maintain them:

1 Gresile, 2 Bleach, 3 Other disinfection products, 4 No disinfection

IV. Nutritional condition

Nutritional condition of the woman:

Weight (kg): Height (cm):

Date of birth: Age: Years:

NUTRITIONNEL STATE OF CHILDREN (0-5 YEARS)

N°	Name	Surname	Allerte children (1) Es (2) No	Bond of kinship with the women (1) Girls/son (2) Nephew/Niece (3) Small son/smoall girl (4) Other kinship (5) Child confided	Date of birth	Sex	Weight (Kg)	Size (cm)	Sick children during these 15 last days 1 Es 2 No

ANNEX 3: LIST OF PERSONS ENCOUNTERED

DILLON Jean Claude:	Directeur de Recherche à l'institut Français de Recherches Scientifiques et de Développement en Coopération
DHUR Agnés:	Chargé de Recherche à l'Institut Français de Recherches Scientifiques et de Développement en Coopération.
WONE Ly Coudy:	Nutritionniste à Basic Project Dakar - Sénégal
WETEHOSSOU Célestine:	Agro-économiste à la Direction de l'Agriculture au Sénégal
SECK Ibrahima:	Docteur Vétérinaire Océanographe, Inspecteur Régional des Pêches de Thiès
Dr NIAMADIO Ibrahima:	Docteur Vétérinaire, Bureau des Etudes DOPM
KANE Aboubakry:	Ingénieur Agronome, Chef du Bureau Statistiques DOPM
NDONG PAUL:	Maire de la commune de Joal-Fadiouth, région de Thiès
BASSE Abdou:	Chef de poste du poste de contrôle des pêches de Joal
DIONE Ibra:	Responsable du service des statistiques au niveau du poste de contrôle des pêches de Joal
SONKHO Sérigne B.:	Collecteur des données au niveau du poste de contrôle des pêches de Joal
NIANG Khala:	Responsable des aires de transformation à Joal
Dr Doudou Touty NDIAYE:	Médecin chef du dispensaire de Joal Fadiouth
Mme Sy Ndeye Amy SARR:	Sage femme du dispensaire de Joal Fadiouth
Mr Thiaba SOW:	Infirmiére d'état du dispensaire de Joal Fadiouth
Mme Séne Justine:	Sage femme au poste de santé de Joal Fadiouth
Dr Thierry FOUERE :	Allocataire de recherches à l'Institut Français de Recherches Scientifiques et de Développement

ANNEX 4:

FISH PROCESSING TECHNIQUES

Women in Joal mainly use four fish processing techniques:

- Guedji (fermented dried) is prepared from large-sized fish often from unsold stock. The fish is cut, placed in pickle to be fermented for 12 to 24 hours. Then, it is dried on grids for 2 to 5 days depending on the sun and the thickness of the product.

- Ketiakh (braised dried fish): this technique is mainly used for fresh sardinella. The fish is braised on the ground and then placed in an oven. After braising, the sardinalle are scaled and the heads removed. According to the taste of the buyers, they are salted or not and set to dry on grids.

- Saly (slated dried fish): Large-sized fish are used (mainly sharks and rays). They are disembowered and placed in salt. The salting lasts 3 to 4 days after which the fish is set to dry for 3 to 5 days.

- Tambadiang (whole dried fermented fish) mainly uses small-sized fish. Whole fish is left to pickle for 24 to 48 hours. Then it is washed in sea water and left to dry for 3 to 5 days.

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