ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/IJISRT24SEP203

Fight against Food Insecurity by Extending Fish Farming in the Extra-Customary Center of Yakoma

Bemanza J.C.[1]; Zua T.[1]; Nyongombe N.[2]; Tshimbalanga D.[6]; Komba M[2]; Bembiade A.[3]; Ebwa J.[4]; Mosala F.[1,4,5].
[1.] Yakoma Higher Pedagogical Institute (Yakoma HPI)
[2.] National Pedagogical University (NPU)
[3.] Gemena Higher Pedagogical Institute (Gemena HPI)
[4.] Yangambi Faculty Institute of Agronomic Sciences (Yangambi FIA)
[5.] National Institute of Biomedical Research (NIBR)
[6.] African Parks Congo, Parc National de la Garamba

***Corresponding Author: Mosala, F.**
National Institute for Biomedical Research (INRB), B.P 1197, Kinshasa 1, DRC

Abstract:- Freshwater fish farming has developed considerably in many parts of the world in recent years, but the situation is not the same in the extra-customary center of Yakoma, in order to help combat food insecurity. The aim of this study is to contribute to the fight against food insecurity, while identifying the factors hindering the expansion of fish farming in the extra-customary center of Yakoma. To this end, 120 fish farmers were selected by multi-stage random sampling in the 10 neighborhoods of Yakoma, and surveyed in two stages in their households. Over 60.8% of respondents cited lack of technical support as the main obstacle to expanding fish farming. Cases of theft, low income and others were not very alarming. Ultimately, the extension of fish farming would promote the availability of foodstuffs, job creation and household stability; hence the fight against the circle of poverty and food insecurity.

Keywords:- *Fight, Food Insecurity, Extension, Fish Farming, Extra-Customary, Yakoma*

I. INTRODUCTION

The concept of food security can be seen as a state in which an individual has access at all times, in dignity, to sufficient food to lead a healthy and active life. This concept not only concerns the satisfaction of needs, but also includes the concept of food autonomy. Food insecurity exists when the availability of healthy, nutritionally adequate food, or the ability to acquire personally satisfying food through socially acceptable means, is limited or uncertain (Blanchet & Rochette, 2011).

Food security and its corollary, the fight against food insecurity, are a major issue for societies and a worrying challenge for the governments concerned. For a long time, it has mainly concerned poor countries with cereal or food deficits, little economic manoeuvre and severely constrained (food imports, external financial flows), before acquiring a new social, political and geopolitical dimension with the global food crisis of 2007-2008 (Janin, 2010). Today, food security remains a concern in every country in the world.

A few years ago, the FAO published its global report on food insecurity according to which, out of 840 million malnourished people; 95% were from developing countries, 4% from countries in transition; and 1% from industrialized or wealthy countries (FAO, 2016). If this trend is not quickly reversed, it will not be possible to halve the number of undernourished people in the world. This is why, in developing countries, integrating fish farming into the development program is a decisive tool in devising strategies to combat malnutrition.

In a study conducted in Quebec during the CoVid-19 pandemic, the latest population data on nutrition indicate that adults living in moderately or severely food-insecure households skip meals more often and have lower intakes of many nutrients (Plante et al., 2021). In Senegal, Sané (2020) asserts that vulnerability factors in food consumption are related to socio-economic and socio-demographic situation. These factors can keep households food insecure. Consequently, food security requires a sound policy focused in particular on increasing agricultural productivity, but also on non-agricultural income opportunities.

In the eastern part of the Democratic Republic of Congo, there is a high level of food insecurity, a consequence of the many successive wars that have arisen in recent decades and which have meant that the public authorities have been unable to properly implement an agricultural development policy. Faced to this situation, several non-governmental organizations, both national and international, are intervening to enable the local population to combat food insecurity (Fataki & Bashagaluke, 2016).

The extra-customary center of Yakoma is located in the province of Nord-Ubangi, an entity with few economic resources. It borders CAR, and has been used to host Central African refugees fleeing Mbororo and Seleka militiamen's attacks. Despite road constraints that make difficult to supply the town with food and non-food items, the growing population is contributing to food insecurity.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/IJISRT24SEP203

The challenge is to reduce hunger and malnutrition as quickly as possible. Among the recommended ways of ensuring food security for its inhabitants, livestock, fishing, hunting and fish farming are in an ideal position (Garcia & Rosenberg, 2010). Thus, giving priority to fish farming and breeding of all these aforementioned activities, would constitute a necessary source of production and income with a view to improving the population's level of nutrition; and finally, create jobs with a view to avoiding and curbing rural exodus with all its social consequences (Abbani et al., 2014).

In this respect, fish farming and breeding have an important role to play, providing a range of products and by-products. These include a variety of freshwater products, generally rich in proteins, essential fatty acids, vitamins and minerals, which create jobs and sources of income. They can be of great interest to poor farmers who depend on traditional livestock farming and artisanal fishing for their livelihoods. This is borne out by Félix & Joseph-Pierre (2014) in Côte d'Ivoire, where lagoon fish farming has kept many people busy and made a major contribution to supplying people with fish. But for more than a decade, it has been recording a repetition of abandonment of large breeding structures. This has led to a fall in national fish production, rising youth unemployment and the risk of food insecurity for the ever-growing coastal population.

However, while Courtejoie, Joeffrey (s. d.) assert that freshwater fish farming has undergone considerable development in many parts of the world over the last thirty years, the situation is not the same in the extra-customary center of Yakoma. The population rarely eats meat, due to economic and socio-cultural constraints. As a result, many families and households remain malnourished.

That's why, in order to help meet this challenge, this study attempts to contribute to the fight against this insecurity while identifying the factors that hinder the extension of fish farming in the extra-customary center of Yakoma.

II. MATERIAL AND METHOD

➢ *Study Environment*

This study was carried out in the city of Yakoma, in the province of Nord-Ubangi, in the Democratic Republic of Congo. This entity is located in the north of the country, and is experiencing supply difficulties due to the advanced bad state of roads.

➢ *Data Collection*

To collect the data for this study, surveys were carried out among heads of fish-farming households. A total of 120 fish farmers were selected from the ten districts that constitute the city of Yakoma, using multi-stage random sampling. The surveys were carried out in two stages: the first consisted in identifying different neighborhoods where farmers were located, in order to create the sampling frame. The second consisted of interviews which enabled us to categorize farmers by gender, age and fish species. Particular emphasis was placed on the vicissitudes hindering the development of their farms, in order to guarantee food security.

➢ *Data Analysis*

The data collected were compiled in Excel and analyzed using R software. In order to estimate the level of each problem related to fish farm extension, we used the logistic model. The Odd Ratio was applied to determine associations. A multiple linear model was used to correlate socio-demographic parameters with age.

III. RESULTS

➢ *Socio-Demographic Parameters*

The fight against food insecurity requires participation of several actors; this favors the mobilization of several resources to achieve some relief, if not significant, but considerable, especially in landlocked areas such as the extra-customary center of Yakoma. Table I below gives a socio-demographic description of people who took part in these surveys. The proposed modelling helps to quantify the influence of sociodemographic variables on the age of respondents.

Table I: Proportion and Socio-Demographic Modeling as a Function of Respondent Age using the Multiple Linear Model

Variables	Frequency	Proportion(%)	P-value
Sex (Female)			
Female	19	15,8	
Male	101	84,2	0.738240
Education level (Primary)			
No instructed	7	5,8	0.497563
Primary	32	26,7	
Secondary	68	56,7	**0.000659**
Higher	13	10,8	**4.96e-05**
Fish species farmed (Clarias)			
Clarias	17	14,1	
Tilapia	56	46,7	0.252484
Mix/Others	47	39,2	0.393417

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/IJISRT24SEP203

The data in Table I show a high proportion of men (84.2%), but estimated model did not show that their average age was different. This can be explained by the fact that the extra-customary center of Yakoma is landlocked on the outskirts of DR Congo, and has no businesses to employ its inhabitants. The remunerative employment in the state is education. But also commercial activities and NGOs that accompany refugees who have fled militia atrocities in Central Africa. Unicef (2021) testifies that agriculture remains the main activity of North Ubangi populations; and confirms that in some areas, fishing is becoming the second most important sector of activity, followed by small-scale trade with the Central African Republic, livestock breeding, hunting and gathering. As a result, men spend more of their time looking after the family's livestock, while women devote themselves to the ongoing work in the fields. And it's mostly men who have opportunity to continue their studies locally, in order to keep their place in education sector.

For education level, more than average of our respondents have been in secondary school (56.7%), followed by primary school. This shows how difficult it is in this area to make progress in implementing strategies to combat food insecurity. Few people who have attended higher education are over 30 years old, benefiting of inconsistent state salaries (P-value < 0.05). The Venn diagram designed by Unicef (2021) for children, illustrating the overlap of deprivation between three dimensions, shows that in North Ubangi, children are deprived of nutrition, health and water. These results highlight the need to intervene jointly in several sectors linked to population survival, while delving deeper into the causes of deprivations occurring in isolation (Brown et al., 2013).

With regard to the fish species farmed by our respondents, the majority farm Tilapia (46.7%), followed by mixed farms (39.2%). Tilapia reproduction is easy to achieve under farming conditions. However, it is necessary to control their relationship in order to avoid the proliferation of fry; or to integrate Tilapia breeding with Clarias, which does not reproduce in the pond, but becomes cannibalistic once adult in order to regulate overpopulation. If these less significant efforts are accompanied, this breeding extension would contribute to the fight against food insecurity; as Félix & Joseph-Pierre (2014) testify. Richard et al. (2010) also assert that livestock farming is a production system that can help combat poverty and food insecurity at household level. It should be noted that the species of fish farmed bears no relation to age of the population surveyed.

➢ *Problems Linked to the Expansion of Fish Farming*

A number of studies carried out to combat food insecurity have described the various determinants linked to this situation, which jeopardize the efforts being made. This is the case of Désiré & Blaise (2023), who established main factors of food and nutritional insecurity in Burundi, notably soil infertility, low use of agricultural inputs, vulnerability to climatic hazards, insufficient water control, high demographic pressure, low private investment, lack of training and professional organizations. Some of the determinants pinpointed in their study were also identified by respondents interviewed in the extra-customary center of Yakoma (Table II). The only difference is that these authors limited themselves to surveying administrators in the agricultural and food production sector; whereas our study collected data from the actors themselves (the producers), in order to illustrate the determinants of one of the causes of food insecurity.

Table 2 : Occurrence of Determinants Hindering the Extension of Fish Farming Using the Logistic Model

Variables	Frequency	Proportion (%)	Odd Ratio	Ratio IC (95%)
Problems related to livestock development (Other)				
Theft	12	10	0.77	0.136- 3.794
Lack of technical support	73	60,8	1.21	0.429- 3.781
Low income	15	12,5	1.16	0.268- 4.976
Other	20	16,7		

In this table, 60.8% of respondents incriminated the lack of technical supervision as the main cause of obstacles to the extension of fish farming in the Yakoma extra-customary center. Cases of theft, low income and others were not very alarming. After analysis, the association between the respondents' technical knowledge and independent variables in a uni or multivariate model did not allow us to retain these factors as the causes linked to the hindrance of fish farming development in this environment (OR ≤ 1). This being the case, we need to go beyond the respondents' point of view and analyze the situation scientifically.

Indeed, fish farming situation in our area of study is very worrying; everything revolves around the supervision of farmers. Observing closely, we find that their ponds are not built to standard. This situation is almost similar to that found by Abbani et al. (2014) in southern Algeria, where they assert that breeding is carried out in irrigation water storage ponds and feed is, in most cases, prepared at farm level based on what is available. These authors assert that the success of fish farming depends on farmers training, and feeding remains a limiting factor for the success of this activity.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/IJISRT24SEP203

While Ntumba (2018) asserts that Nile tilapia is one of the freshwater fish species best suited to low-input fish farming in tropical climates to combat food insecurity, most of farmers surveyed who breed this species, do not have the means to do so. They lack material, financial and technical resources. This situation is justified by the precarious socio-economic conditions in Nord-Ubangi province in general, and in Yakoma territory in particular. In this extra-customary center, there is a marked isolation, with no roads allowing goods to move in and out. This perpetuates the circle of poverty, with very high prices for basic necessities, while agricultural product evacuation to urban centers remains a concern due to the bad state of roads. Mosala (2019) warns that this environment is dominated by a poor population with precarious hygiene measures.

IV. CONCLUSION

Regarding the issues raised and discussed above, introducing the inhabitants of Yakoma Extra-Customary Center to the practice of fish farming and breeding (small-scale breeding) by raising awareness and popularizing basic theories and modern techniques for building fish ponds could enable this population to improve their yields and increase their fish production in order to ensure the production of animal proteins. The extension of fish farming would promote the availability of foodstuffs, job creation and household stability, thereby combating the cycle of poverty and food insecurity.

REFERENCES

[1]. Abbani, D., Belarouci, M. E., Boumadda, A., & Kemassi, A. (2014). *Situation de la pisciculture au sud de l'Algérie.Cas des wilayas de Ouargla, Ghardaia et El Oued*.

[2]. Blanchet, C., & Rochette, L. (2011). *Sécurité et insécurité alimentaire chez les Québécois : Une analyse de la situation en lien avec leurs habitudes alimentaires*. Institut national de santé publique du Québec.

[3]. Brown, J., Cairncross, S., & Ensink, J. H. J. (2013). Water, sanitation, hygiene and enteric infections in children. *Archives of Disease in Childhood*, *98*(8), 629-634. https://doi.org/10.1136/archdischild-2011-301528

[4]. Courtejoie, Joeffrey, J., Brow. (s. d.). *Pisciculture Familiale : Bureau d'Etudes et de Recherche pour la Promotion de Santé »*.

[5]. Désiré, M. A., & Blaise, N. Y. H. (2023). *CAUSES ET CONSÉQUENCES DE L'INSÉCURITÉ ALIMENTAIRE ET NUTRITIONNELLE DES MÉNAGES AU BURUNDI : APPROCHE QUALITATIVE*. *04*(10).

[6]. FAO. (2016). *La situation mondiale des pêches et de l'agriculture*.

[7]. Fataki, D., & Bashagaluke, J. (2016). *APPORT DES ONG DANS L'AMELIORATION DE LA SECURITE ALIMENTAIRE DANS LE MILIEU RURAL DE MINOVA A L'EST DE LA REPUBLIQUE DEMOCRATIQUE DU*. *5*(01), 596-602.

[8]. Félix, K. N. K., & Joseph-Pierre, A.-K. (2014). *RÉCESSION DE L'AQUACULTURE LAGUNAIRE ET LUTTE CONTRE LA PAUVRETÉ ET L'INSÉCURITÉ ALIMENTAIRE EN CÔTE D'IVOIRE*.

[9]. Garcia, S. M., & Rosenberg, A. A. (2010). Food security and marine capture fisheries : Characteristics, trends, drivers and future perspectives. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *365*(1554), 2869-2880. https://doi.org/10.1098/rstb.2010.0171

[10]. Janin, P. (2010). La lutte contre l'insécurité alimentaire au Sahel : Permanence des questionnements et évolution des approches*. *Cahiers Agricultures*, *19*(3), 177-184. https://doi.org/10.1684/agr.2010.0393

[11]. Mosala, F. (2019). *Étude prospective sur les parasites gastro-intestinaux des ovins et la santé publique à Abuzi*.

[12]. Ntumba, A. T. (s. d.). *Contribution à la promotion de la pisciculture intégrée de tilapia du Nil (Oreochromis niloticus, Linnaeus, 1758) par la valorisation des sous-produits agro-industriels et l'utilisation rationnelle des fertilisants animaux en République Démocratique du Congo*.

[13]. Plante, C., Hamel, D., Rochette, L., Riopel Meunier, J., Larocque, I., & Dubé, È. (2021). Insécurité alimentaire en temps de pandémie de la COVID-19 et inégalités en alimentation au Québec. *Nutrition Science en évolution*, *18*(3), 9-15. https://doi.org/10.7202/1076355ar

[14]. Richard, Alary, Corniaux, Duteurtre, Lhoste, coord, D., V, C, G, P. (2010). *Dynamique des élevages pastoraux et agropastoraux en Afrique intertropicale* (Presses agronomiques). Quae CTA.

[15]. Sané, M. (2020). *1 ANALYSE EMPIRIQUES DES DETERMINANTS DE LA CONSOMMATION ALIMENTAIRE ET LEURS CORRELATIONS AVEC L'INSECURITE A*. *04*(1).

[16]. Unicef. (2021). *Pauvreté et privations de l'enfant en République Démocratique du Congo, Province du Nord-Ubangi* (p. 5). Unicef.