Scientific Research Publishing

Open Journal of Preventive Medicine, 2023, 13, 199-212
https://www.scirp.org/journal/ojpm
ISSN Online: 2162-2485
ISSN Print: 2162-2477

Scale and Associated Factors of Using Pyrethroid-Impregnated Mosquito Nets as Fishing Tools on Nokoué Lake within Sô-Ava Municipality in Benin, 2020

Nicolas Ayokpon Hondo[1], Horace Degnonvi[2], Rodrigue Landeou[3], Franck Zinsou Mignanwande[2], Zoulkifl Salou Bachirou[2], Roch Christian Johnson[2], Ghislain Emmanuel Sopoh[1]

[1]Regional Public Health Institute, University of Abomey-Calavi, Atlantique, Benin
[2]Interfaculty Center for Training and Research in Environment for Sustainable Development, University of Abomey-Calavi, Atlantique, Benin
[3]Department of Geography and Regional Planning, University of Abomey-Calavi, Atlantique, Benin
Email: ayonic@yahoo.fr

How to cite this paper: Hondo, N.A., Degnonvi, H., Landeou, R., Mignanwande, F.Z., Bachirou, Z.S., Johnson, R.C. and Sopoh, G.E. (2023) Scale and Associated Factors of Using Pyrethroid-Impregnated Mosquito Nets as Fishing Tools on Nokoué Lake within Sô-Ava Municipality in Benin, 2020. *Open Journal of Preventive Medicine*, **13**, 199-212.
https://doi.org/10.4236/ojpm.2023.136013

Received: April 18, 2023
Accepted: June 24, 2023
Published: June 27, 2023

Abstract

Background: In lacustrine communities, whether in Benin or elsewhere, populations use impregnated mosquito nets (IMNs) as fishing nets. This depletes the lake of its fishery resources, which in turn are contaminated by the pyrethroids impregnated in the nets. This study aims to determine the scale and factors associated with the use of pyrethroid-impregnated mosquito nets as fishing tools in the municipality of Sô-Ava in Benin. **Methods:** This is a cross-sectional and analytical study with two components. First, a quantitative component was made up of 280 volunteers who were interviewed in the seven districts of the city. Data collection was done in two phases: the first from September to October 2020, and the second in August 2022. Data were analyzed with Stata and logistic regression was used. Another qualitative component was made up of forty participants chosen by reasoned choice, of which 32 were split into four focus groups of eight members each, and the rest participated in semi-structured interviews. Triangulation of the different sources was used to analyze the data. **Results:** Around 67% of the population reported using impregnated mosquito nets as fishing tools and 33% exclusively for malaria. Seasonal fishermen (ORa = 2.03, CI = 1.35 - 4.97, P = 0.004) and years of professional experience (ORa = 1.53, CI = 1.00 - 2.05, P = 0.021) increase the risk of using these nets as fishing tools. The use of insecticide-treated mosquito nets against mosquitoes causes skin scratching and impairs breathing because of the impregnation products, as reported by respondents. **Conclusion:** A high prevalence of inappropriate use of impreg-

nated mosquito nets in fishing practices is highlighted in this study. Interviews in the field revealed that nets are diverted for fishing purposes to increase the volume of catches. Consequently, it will be appropriate to assess the pyrethroid content in water and fishery products.

Keywords

Associated Factor, Impregnated Mosquito Nets, Pyrethroids, Fishing Tools, Sô-Ava

1. Introduction

The usage of impregnated mosquito nets (IMNs), whether new or second-hand, for fishing purposes has nowadays become a common practice observed in lake communities elsewhere and in Benin. It poses a great danger to the aquatic ecosystem, thus creating its depletion in fishery resources because eggs, larvae, fry, juveniles and adults are all caught in their path. As for the insecticides used for the impregnation of these nets, they are mainly pyrethroid molecules such as deltamethrin and permethrin, which have no direct harmful influence on humans but are toxic to fish, amphibians and freshwater invertebrates [1].

In Benin, the government, through the National Malaria Control Program (NMCP), promotes the use of Long-Lasting Insecticidal Nets (LLINs) through periodic mass distribution and routine distribution strategy during prenatal consultations and vaccination. Due to socio-cultural and economic considerations, the beneficiary populations divert the nets received for other uses in order to meet their needs [2].

This misappropriation of mosquito nets can be observed in Sô-Ava, in the south of Benin, where malaria prevalence is still very high in spite of the efforts made by the government through vast LLIN distribution campaigns [3]. These nets are subject to inappropriate use, such as trap nets, in prohibited fishing practices, so as to increase the size of the catches of the fishery products [4]. This represents a very harmful practice to public health with many social and economic consequences [5]. However, there is no evidence on the extent of this practice. The objective of this study is to determine the scale and factors associated with the use of impregnated mosquito nets as fishing tools in the municipality of Sô-Ava in southern Benin.

2. Framework and Study Design

The study was held in the municipality of Sô-Ava, which is located in the Atlantic Department in southern Benin (**Figure 1**).

This municipality was chosen mainly because it is a lake area where malaria prevalence is still high despite the efforts made by the government for the distribution of impregnated mosquito nets [3].

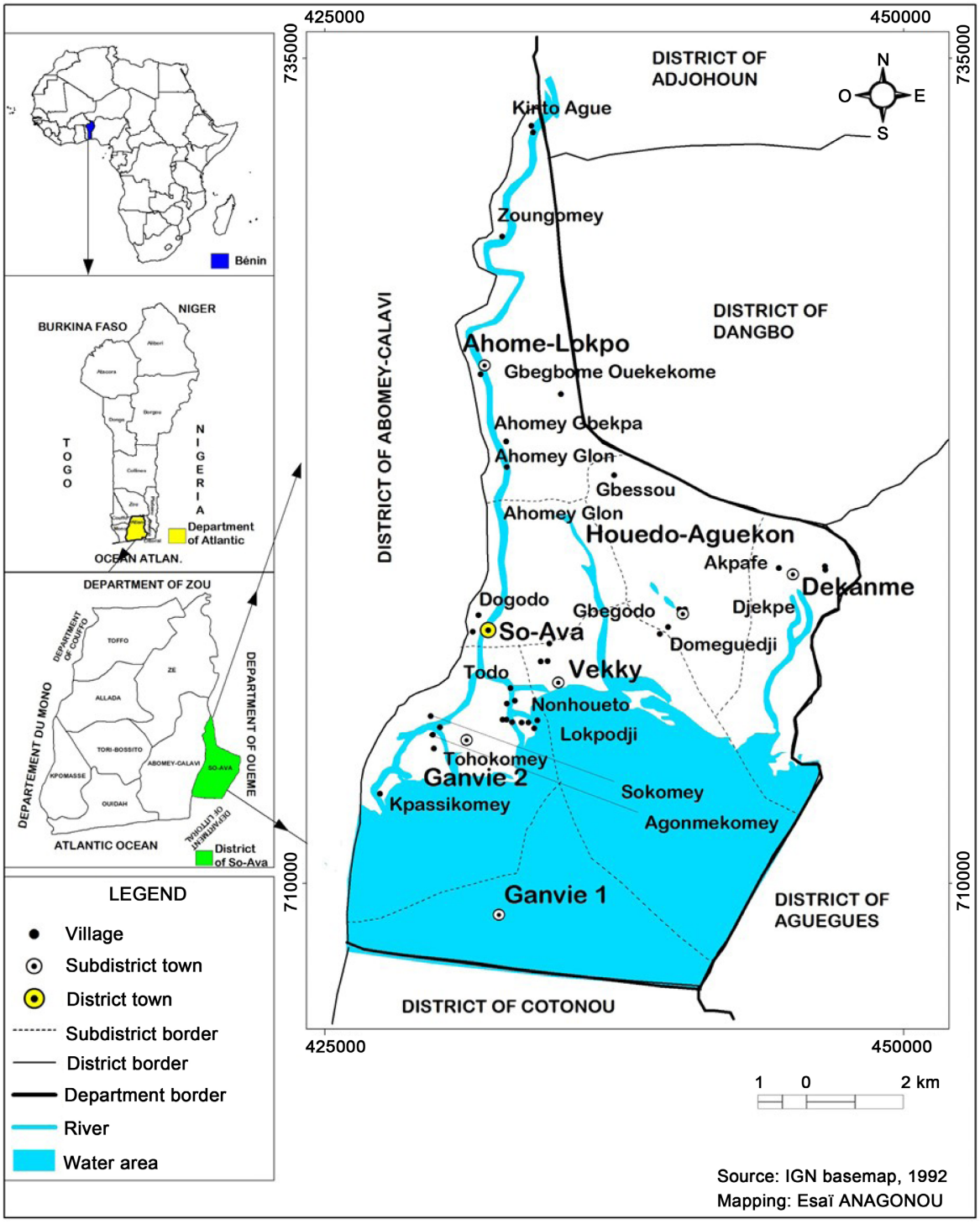

Figure 1. Geographical location of Sô-Ava.

This was a cross-sectional analytical study with two components: a quantitative and a qualitative component.

2.1. Quantitative Component

Data collection took place from September to October 2020.

During this study, we interviewed the inhabitants of the seven districts of the commune of Sô-Ava. The sample size was calculated using the Schwartz formula adapted to cross-sectional studies [6]: $N = (Z)^2 \times p \times (1 - p)/d^2$.

The confidence interval for Z is 95% and the margin of error is 5%. According to the Communal Development Plan [7], the value of p (proportion of the population of fishermen using prohibited techniques) is estimated to be 76%. The corresponding N value was 280 volunteer inhabitants.

Subjects between the ages of 18 and 60 years, having an income-generating activity and having freely accepted to participate in the study, were included in the study. Those who could not meet any of these inclusion criteria were not included in our study. The random selection procedure for our study was adapted from WHO field survey methods [8]. The two-stage cluster survey was adopted on the assumption that the study population is homogeneous. The sampling frame was made up of the lists of the 7 districts and 69 villages of the municipality.

The data collection focused on three groups of variables, namely

- Socio-demographic and economic variables: age, level of education, district of residence, ethnicity, religion, type of housing,
- occupational variables: main current activities, years of experience,
- Behavioral variables: net use for fishing, source of nets, types of nets used, number of fishermen using nets for fishing, number of people using acadja, nets, hooks.

Data were collected by a group of four interviewers. An individual form was used. The questions were designed on the basis of the different variables listed above. A translation of the questionnaire was made into the local language "*Fongbé*" for the participants who are mostly uneducated. This questionnaire was tested in Sotchanhoué, a lake locality whose populations have similar practices to those of the Sô-Ava populations. The necessary corrections were then made and the questionnaire was validated.

Several steps were taken to process the data. All data recorded on the collection forms were checked and corrected. They were then entered into Excel 2013 and analyzed using XLSTAT 2021.1.1 and Stata/SE 11.0 statistical analysis software (Stata Corporation, College Station, USA). The study population was described according to sociodemographic, behavioral, and occupational characteristics. Categorical variables were described using proportions. To identify factors associated with the use of impregnated mosquito nets as fishing tools, a univariate analysis followed by a multivariate analysis was performed.

- **Univariate analysis**

Univariate analyses were performed between each of the independent variables and the dependent variable. Proportions were compared using the Pearson chi-square test or the Fisher exact test, as appropriate. This analysis allowed us to select the variables with a p-value less than or equal to 20% for inclusion in the multivariate analysis model.

- **Multivariate analysis**

We introduced the variables thus retained in the univariate analysis into a logistic regression model using a "stepwise descending" approach. Independent variables with a p-value above the 5% significance level were eliminated to obtain the final model.

The goodness-of-fit of the model was tested using the Hosmer and Lemeshow test.

2.2. Qualitative Component

Data collection for this component of the study took place in August 2022. This allowed an inventory of the perceptions that the populations of Sô-Ava have on the social uses of impregnated mosquito nets in order to identify the determinants that underlie the detour of these nets to fishing practices.

To better understand the phenomenon and gather reliable information, we interviewed forty (40) social actors selected in a reasoned manner. Four focus groups composed of eight (08) people each (women mothers or guardians of children aged 0 to 5 years, community relays, elders and notables and fishermen) were conducted. The rest of the respondents composed of resource persons (health agents and municipal agents) participated in individual semi-directive interviews. The collection tools were an interview guide and a tape recorder. The empirical data collected were interpreted using theoretical models such as Boudon's methodological individualism [9], and the comprehensive theory of Weber [10]. Given that social life for Weber and Boudon starts from individual actions embedded in the field of an environment dominated by a permanent competition for survival, we have been able to position ourselves in relation to individual actions in order to achieve a holistic analysis of these social and sociological realities.

The data were manually processed and entered into Word version 10 and analyzed by triangulating the information by source.

3. Results

3.1. Quantitative Component

3.1.1. Extent of Net Use in Fishing Practice

Among the respondents, 66.78% used mosquito nets as fishing tools (**Figure 2**) against 33.22% using them as protection from malaria.

3.1.2. Sociodemographic Features of Targets

The socio-demographic and economic features of the respondents are presented in **Table 1**. Among those surveyed, 42.14% belonged to the Tofin ethnic group and 68.57% were not educated. The housing built by these respondents is 95% made of precarious materials. About 53% of the respondents were over 35 years old and 54.64% were Catholics. Half of the respondents (50%) come from the municipality of Sô-Ava.

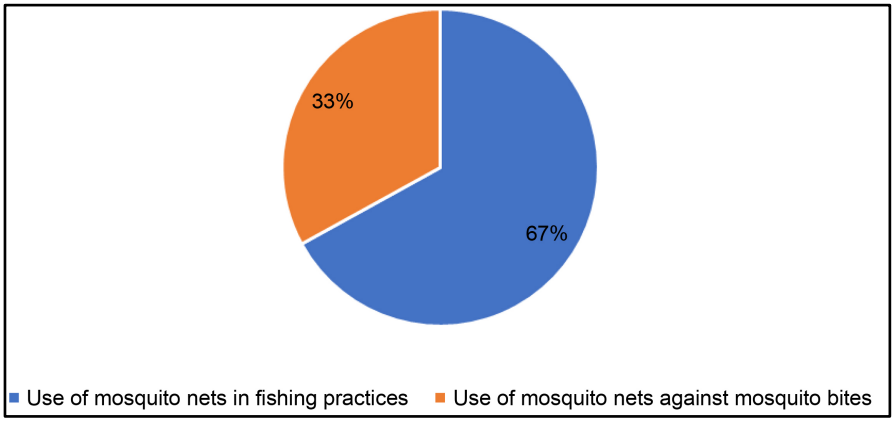

Figure 2. Extent of net use in fishing practices.

Table 1. Socio-demographic features of respondents in the municipality of Sô-Ava in 2020.

Variables	Modalities	Headcounts	Frequency (%)	CI 95%
District of residence	Vekky	44	15.71	11.45 - 19.98
	Ganvié 1	32	11.43	7.70 - 15.16
	Sô-Ava	140	50	40.14 - 55.86
	Others	64	22.86	17.94 - 27.78
Ethnicity	Aizo	55	19.64	15.32 - 23.11
	Tofin	118	42.14	38.14 - 44.20
	Wémè	83	29.64	26.12 - 34.13
	Others	24	8.58	4.95 - 12.40
Religion	Celestial	78	27.86	24.02 - 31.80
	Catholic	153	54.64	50.32 - 57.26
	Others	49	17.50	14.34 - 21.98
Age	≤35 years	132	47.31	41.45 - 53.17
	>35 years	147	52.69	45.83 - 58.55
Education level	Educated	88	31.43	27.44 - 34.22
	No education	192	68.57	64.14 - 72.15
Type of housing	Permanent materials	13	4.64	1.36 - 7.49
	Precarious materials	267	95.36	92.02 - 99.27

Shot: Ayokpon N. 2020.

3.1.3. Professional and Behavioral Features of Targets

Results in Table 2 show that fishing is the main activity of 64.29% of respondents in the community. Similarly, 61.80% of all nets used in the area come from the health facilities.

3.1.4. Univariate Analysis of Factors Associated with the Use of Treated Nets in Fishing Practices

Table 3 reports the outcomes of the univariate analysis regarding factors associated with the use of nets as a fishing tool in Sô-Ava commune. The analysis of

Table 2. Professional and behavioral features of respondents in the Sô-Ava municipality in 2020.

Variables	Modalities	Headcounts	Frequency (%)	CI 95%
Main activity	Fishermen	180	64.29	61.64 - 72.64
	Farmer	35	12.5	10.19 - 18.38
	Trader	31	11.07	6.49 - 13.51
	Other	34	12.14	5.29 - 14.85
Number of years of experience	≤35 Years	148	52.69	45.83 - 58.55
	>35 Years	132	47.31	41.45 - 53.17
Use of mosquito net for fishing	Yes	187	66.78	61.64 - 72.64
	No	93	33.22	27.36 - 38.36
Use of acadja for fishing	Yes	134	47.85	41.17 - 54.03
	No	146	52.15	45.26 - 59.53
Use of fishing hooks	Yes	69	24.64	16.37 - 31.26
	No	211	75.36	68.44 - 82.27
Use of fishing net	Yes	182	65	59.07 - 72.31
	No	98	35	28.79 - 41.27
Source of net supply	Health facilities	173	61.80	58.99 - 95.29
	Elsewhere	107	38.20	30.71 - 41.01

Shot: Ayokpon N. 2020.

Table 3 shows that out of a total of 93 people who do not use impregnated mosquito nets for fishing practices, 73 (78.49%) reside in the Sô-Ava district. On the other hand, in the six other districts of the municipality, only 20 people (21.51%) were counted. In addition, out of 187 people who declared that they use mosquito nets for fishing practices, 84 (44.92%) said that their nets come from the health centers of the municipality.

From the same table, it also appears that professional fishermen (OR = 0.2, CI = 0.10 - 0.40, P < 0.001), as well as populations living in Sô-Ava (OR = 0.4, CI = 0.24 - 0.66, P < 0.001) use less impregnated mosquito nets as fishing tools, compared to seasonal fishermen (farmers) and populations living in another area, respectively.

3.1.5. Multivariate Analysis of Factors Associated with the Use of Treated Nets in Fishing Practices

Table 4 shows results of the multivariate analysis of factors associated with the use of treated nets as fishing tools.

From the analysis of this table, it appears that a professional fisherman (ORa = 0.2, CI = 0.06 - 0.36, P < 0.001) living in Sô-Ava (ORa = 0.3, CI = 0.15 - 0.52, P < 0.001) uses less impregnated mosquito nets as fishing tools compared to a seasonal

Table 3. Univariate analysis of factors associated with the use of nets as a fishing tool in the municipality of Sô-Ava in 2020.

	Usage of mosquito netting for fishing (n = 187)	No usage of mosquito netting for fishing (n = 93)	OR	CI 95%	*p*
District of residence					
Vekky	40 (21.39%)	4 (4.30%)	1.5	0.66 - 3.57	0.318
Ganvié 1	23 (12.30%)	9 (9.68%)	-	-	-
Sô-Ava	67 (35.82%)	73 (78.49%)	0.4	0.24 - 0.66	0.000*
Others	57 (30.49%)	7 (7.53%)	1.9	0.27 - 6.56	0.214
Main activities					
Fishermen	89 (47.59%)	91 (97.85%)	0.2	0.10 - 0.40	0.000*
Farmer	33 (17.65%)	2 (2.15%)	5.2	1.80 - 5.13	0.002*
Trader	31 (16.58%)	-	-	-	-
Other	34 (18.18%)	-	-	-	-
Number of years of experience					
≤35 years	80 (42.78%)	68 (73.12%)	1.01	0.9 - 1.14	0.10
>35 years	107 (57.22%)	25 (26.88%)	1.7	1.00 - 2.04	0.040*
Source of net supply					
Health facilities	84 (44.92%)	89 (95.70%)	0.9	0.10 - 1.04	0.058
Elsewhere	103 (55.08%)	4 (4.30%)	3.8	1.21 - 8.52	0.004*

OR = odds ratio, CI = Confidence interval, *: significant p-value. Shot: Ayokpon N. 2020.

Table 4. Multivariate analysis of factors associated with the use of nets as a fishing tool in the municipality of Sô-Ava in 2020.

	ORa	CI 95%	*p*
District of Sô-Ava	0.3	0.15 - 0.52	0.000*
Fisherman	0.2	0.06 - 0.36	0.000*
Seasonal fishermen (farmer)	2.03	1.35 - 4.97	0.004*
Number of years of work experience (>35 years)	1.53	1.00 - 2.05	0.021*
Supply of mosquito nets to the health center	0.9	0.20 - 4.35	0.919

ORa = adjusted odds ratio, CI = Confidence interval, *: significant p-value. Shot: Ayokpon N. 2020.

fisherman (farmer) living in another town. The practice of professional fishing and residency in the district is therefore the main protective factors against the use of impregnated mosquito nets as fishing tools.

On the other hand, being a seasonal fisherman, having agriculture as a main activity (ORa = 2.03, CI = 1.35 - 4.97, P = 0.004), and having more than 35 years of professional experience in fishing practices (ORa = 1.53, CI = 1.00 - 2.05, P = 0.021) increase the risk of using impregnated mosquito nets as fishing tools. The main risk factors associated with the use of impregnated mosquito nets as fishing tools were seasonal fishing practice and having more than 30 years of work experience in fishing practices.

3.2. Qualitative Component

3.2.1. Social Determinants Related to the Use of Pyrethroid-Treated Nets as Fishing Tools in Sô-Ava

Social determinants related to the use of pyrethroid-treated nets as fishing tools in the Sô-Ava commune

Most of the respondents reported that impregnated mosquito nets are used for fishing activities in order to increase the volume of catches and to raise fry (**Figure 3**). They are also used in the construction of houses on stilts by serving as a rope to attach wood, as well as in market gardening activities to protect crops. In the field of animal husbandry, they are used as shelters or as protective barriers for chicken coops. These assertions are confirmed by some of the verbatims below:

"*We use the impregnated nets most often for fishing, especially in combination with the acadja* (**Figure 4**). *It is thanks to the impregnated nets that we manage to catch a lot of fish, including fry. If someone has enough impregnated mosquito nets, we buy some from them for our activity*" (*Focus group fishermen's association*, Sô-*Ava*, *August* 2022).

"*We often cut mosquito nets into ropes that we also use to build houses because they are more resistant than the ropes sold at the market. In addition, we use it to surround our crops so that mice and rats do not destroy them*" (*Focus group Elders and Notables*, Sô-*Ava*, *August* 2022).

Figure 3. Uses of impregnated mosquito nets in the municipality of Sô-Ava. Shot: Ayokpon N. 2020.

(a) (b)

Figure 4. Different fishing practices on Lake Nokoué (a) Fishing practice with acadja surrounded by nets; (b) Fishing practice with gillnets respecting the standards. Shot: Ayokpon N. 2020.

3.2.2. Social Determinants of Low Prevalence of Malaria Net Use

Social determinants of low prevalence of malaria net use.

Interviewees said that impregnated nets can cause skin scratching and facial swelling as a result of the chemicals they contain. Some of the following verbatim statements corroborate the reasons given for not using IMNs in the fight against malaria.

"*The nets contain a drug and before putting them on, they must be exposed to the shade so that the effect of the drug diminishes before starting to use them. But when people took the nets, they started using it at the same time as it was removed from the package. This made some people sick and others had swollen faces, which scared other community members*" (*Focus group community relay*, Sô-*Ava*, *August* 2022).

"*The nets that are sent to our community are insufficient. You can't have ten, eight or six people in a household and take two nets. That is why others prefer to leave their nets. I don't use the net, I can put it on the floor, under the bed, or sell it. I can't sleep under a net and let my children sleep without a net. You will hear that some people take the nets to fish for fish because they are angry and the nets are much more useful to us than our fishing nets*" (*Focus group Elders and Notables*, Sô-*Ava*, *August* 2022).

"*We have not been educated with this transparent net, once in bed with your husband, the children can see us easily, which is not good. The net that our parents used was not so transparent. Moreover, when we are inside these nets, we are suffocated*" (*Focus group pregnant women and mothers of children*, Sô-*Ava*, *August* 2022).

"*Among the users of our health center, many say that the white people put products in the nets to kill us and shorten our life span. When you sleep under these nets, the next day you don't feel comfortable and you will only scratch your body. I don't think I will sleep under a net anymore. However, I will take some and use it as a screen for doors and windows*" (*Focus group health workers*, Sô-*Ava*, *August* 2022).

4. Discussion

This research has helped to characterize the extent of IMNs use as a fishing tool and to identify factors associated with this practice.

4.1. Extent of Impregnated Mosquito Nets Use in Fishing Practices

The results of our study reveal that fishing is the main activity of the people of Sô-Ava. It occupies 64.29% of the respondents, followed by agriculture (12.50%) and trade (11.07%). These results are similar to those found in a study in 2012 which reported that fishing is the activity most practiced by the natives while agriculture is practiced by lake dwellers [7].

Another study carried out in an area with the same topography showed that all the inhabitants practiced fishing, and of these 80% combined it with other activities [11]. This might be explained by the geographical location of the inhabitants of these localities, which divine providence wanted to settle in predominantly lake environments, with water bodies rich in fish products. The fishing contributes then to provide for the vital needs of the majority of these inhabitants. In order to increase the volume of catches, the fishermen of the Sô-Ava municipality used to use different practices commonly known as acadja (parks made of branches stuck in the bottom of the lake to serve as traps for fish) and still nets that do not respect the regulatory norms. This situation would be at the origin of the rarefaction of the halieutic species as reported in a study on the overuse of fisheries resources by the populations [12]. Our results also show that fishermen, in search of finer mesh nets to catch more fish and raise fry in the lake, resort to using nets. In spite of all the sensitization campaigns carried out by the State and non-governmental organizations on mosquito control measures, 67% of nets are used for fishing practices. These findings are similar to those found in a study conducted in a community of fishermen of the lake and rivers of the Congo Basin where the majority of impregnated mosquito nets distributed by international organizations within the framework of the National Malaria Control Program are used in the form of beach seines with mosquito nets to capture fish products [1]. In Sô-Ava, there is a serious public health problem linked to the detour of impregnated mosquito nets intended for the fight against malaria to fishing practices. However, local health agents supported by community relays should increase the awareness of the population on the benefits of the appropriate use of mosquito nets against mosquito bites.

4.2. Factors Associated with the Use of Impregnated Mosquito Nets in Fishing Practices

Fishing as a main professional activity and residency in the Sô-Ava area reduce the risk of using IMNs as fishing tools. The professional fishermen would therefore use less impregnated mosquito nets as fishing tools compared to the other trades. This attitude could be explained by the fact that professional fishermen have adequate fishing tools and techniques to increase the volume of their

catches, compared to occasional fishermen for example. In fact, professional fishermen buy large areas of water on which they install acadja systems in order to increase their income [13].

Within the municipality of Sô-Ava, the township of Sô-Ava is home to the town hall as well as most of the socio-community and administrative infrastructures. With these assets that make it one of the most frequented districts, it also receives many tourists. This would explain the position of the communal authorities who reprimand the fishermen who engage in such practices.

The practice of seasonal fishing by farmers and the fact of having more than 35 years of professional experience in fishing practices are the main risk factors associated with the use of impregnated mosquito nets as fishing tools in the commune of Sô-Ava. In fact, farmers who also fish take advantage of the lean season to use the treated nets received during the distribution campaigns for fishing.

In addition, individuals who have lived in the community for several years are much more likely to copy the poor fishing practices observed, in response to the diminishing yields, as described elsewhere [14]. However, the consequences of the pollution of the lake by LLINs do not spare any of the districts of the commune and could also impact all the surrounding communes through which the lake passes, since the lake is a continuum. As a proof, the fish which are caught there are consumed by the populations of the locality and elsewhere. We therefore recommend that the political and administrative authorities extend repressive measures to the entire commune in order to force occasional fishermen to stop this bad practice. As these fishermen and women are of a slightly advanced age, it would also be desirable that technical and financial partners or non-governmental organizations contribute to help them retrain in other sectors of income-generating activities during the lean season so that they can continue to meet their vital needs.

4.3. Social Determinants of Impregnated Mosquito Nets Use in Fishing Practices

Several historical reasons could explain the low frequency of the use of impregnated mosquito nets against malaria in the municipality of Sô-Ava. According to some participants in the various focus groups, impregnated nets allegedly contain substances that are harmful to human health. The respondents reported having experienced eye and skin irritations as well as breathing complaints following the use of these nets. The toxicity of impregnated nets for children has been described [15]. Similarly, it has been reported that IMNs make it difficult to breathe and make people feel hot at night [16].

The translucency of the new nets, compared to the old ones, was also mentioned as a reason for their non-use against mosquitoes, thus explaining the low frequency of 33% of net use against malaria in the commune of Sô-Ava, as also observed in the municipality of Abomey-Calavi, still in Benin 38.69%. In the

same municipality, 47.62% of the respondents considered that the insecticide-treated net interfered with breathing and 16.67% considered it to be like a shroud [15]. Thus, a connection exists between the reasons given by the various social actors for the detour of LLINs to fishing and the non-use of LLINs against malaria in the area. The distribution of nets in the commune should be equitable, taking into account the size of each household during distribution. People selling their nets for profit should also be informed of the possible repressive measures they may face. Last but not least, health workers should inform the population about the need to spread the nets in the shade for the required time before use, to avoid skin and eye irritation issues faced by net users.

5. Limitations of the Study

The study determined the extent of and factors associated with the use of pyrethroid-impregnated nets as fishing tools in the municipality of Sô-Ava, but a limitation was noted. In fact, only the pyrethroids contained in the nets were incriminated, whereas in the environment, several chemical families of pesticides, including pyrethroids, are used in agricultural practices, potential sources of chemical pollution of the lake.

6. Conclusion

The prevalence of impregnated mosquito nets used in fishing practices is high on Lake Nokoué in Sô-Ava in southern Benin. Seasonal fishing by farmers with more than 35 years of professional experience increases the risk. The practice of professional fishing by residents of the central district of Sô-Ava is found to be at lower risk. Major public health phenomena such as the resurgence of severe malaria cases in the locality on the one hand and the occurrence later in the population of diseases possibly related to the consumption of fish products contaminated by pyrethroids, on the other hand, could therefore occur. It will therefore be opportune to evaluate the pyrethroid content in the lake water and fishery resources.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] Micha, J.-C. (2019) La pêche continentale malade du paludisme en Afrique centrale. *Tropicultura*, **37**, 1-3. https://popups.uliege.be/2295-8010/index.php?id=266

[2] OMS (2019) Rapport de la soixante-neuvième session du Comité régional de l'OMS pour l'Afrique. Organisation mondiale de la Santé, Bureau régional de l'Afrique. https://www.afro.who.int/fr/about-us/governance/sessions/soixante-neuvieme-session-du-comite-regional-de-loms-pour-lafrique

[3] Accrombessi, M.M.K. (2018) Survenue du paludisme pendant la grossesse et retard de croissance intra-utérin en Afrique. Ph.D. Thesis, Université de Sorbonne, Paris.

[4] Gnimassou, M.E.F. (2021) Changements climatiques: impact des inondations sur le bien-être des personnes handicapées et les stratégies d'adaptation dans la commune de Sô-Ava, République du Bénin. Master's Thesis, Université d'Abomey-Calavi, Bénin.

[5] Yao, K.S., Trokourey, A. and Atse, B.C. (2020) Evaluation de l'impact de la contamination aux pesticides des eaux, sur les poissons et la santé de l'Homme, des secteurs IV et V de la lagune Ebrié (Côte d'Ivoire). *Sciences des Structures et de la Matière*, **2**, 59-74.

[6] Hsieh, F.Y., Bloch, D.A. and Larsen, M.D. (1998) A Simple Method of Sample Size Calculation for Linear and Logistic Regression. *Statistics in Medicine*, **17**, 1623-1634. https://doi.org/10.1002/(SICI)1097-0258(19980730)17:14<1623::AID-SIM871>3.0.CO;2-S

[7] COSMOS Consulting (2015) Plan de dévéloppement communal de Sô-Ava 2015-2020. Mairie de Sô-Ava.

[8] Degnonvi, H., Fleuret, S., Coudereau, C., Gnimavo, R., Giffon, S., Yeramian, E., Johson, R.C. and Marion, E. (2019) Effect of Well Drilling on Buruli Ulcer Incidence in Benin: A Case-Control, Quantitative Survey. *The Lancet Planetary Health*, **3**, 349-356. https://doi.org/10.1016/S2542-5196(19)30110-X

[9] Bronner, G. (2019) La théorie boudonienne des croyances. *Revue Européenne des sciences socials*, **57**, 159-179. https://doi.org/10.4000/ress.5187

[10] Zoltán, O.S. (2021) Max Weber's Way from Social Economics to Sociology. *Studia Universitatis Babes-Bolyai*, **66**, 75-92. https://doi.org/10.2478/subbs-2021-0004

[11] N'dri, K.M., Diaby, M., Yao, K. and Ibo, G.J. (2020) La peche continentale au lac de Songori (region du Gontougo; Nord-Est de la Cote d'Ivoire). *Agronomie Africaine*, **32**, 353-363.

[12] Allagbe, E.O., Yabi, I. and Yabi, F.B. (2020) Caracterisation des activites de peches dans la Commune de Adjojoun au sud-est du Benin. *Agronomie Africaine*, **32**, 375-388.

[13] Sohou, Z., Houedjissin, R. and Ahoyo, N. (2009) La pisciculture au Bénin: De la tradition à la modernisation. Bulletin de la Recherche Agronomique du Bénin, Numéro 66. http://nodc-benin.odinafrica.org/benin2016/images/Benin_NODC/Documents/Pisciculture_Benin_tradition_modernisation.pdf

[14] Kutshukina, F.L. and Micha, J.-C. (2013) Analysis of Exploitation Means of Lake Mai-Ndombe Fisheries Resources in Congo Democratic Republic. *Geo-Eco-Trop*, **37**, 273-284.

[15] Ministère de la Santé (2020) Annuaire des statistiques sanitaires de la zone sanitaire Abomey-Calavi-Sô-Ava. République du Bénin.

[16] Sangaré, M. (2013) Stratégie de lutte contre le paludisme: Utilisation des moustiquaires imprégnées d'insecticide au sein des ménages de Samé en commune III du district de Bamako. Ph.D. Thesis, University of BAMAKO, Mali.