NAMIBIA FISH CONSUMPTION NATIONAL HOUSEHOLD SURVEY 2023 REPORT

Prepared for:

NAMIBIA FISH CONSUMPTION PROMOTION TRUST

Prepared by the University of Namibia, through Sam Nujoma Marine and Coastal Resources Centre (SANUMARC) and the Centre for Research Services (CRS)

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EXECUTIVE SUMMARY

Namibia Fish Consumption Promotion Trust (NFCPT) was established in 2001 to promote the consumption of fish throughout Namibia by improving distribution, and by educating and empowering citizens concerning the best ways to prepare different cuisines of fish and the health benefits derived from fish consumption. Specific objectives of NFCPT are to promote fish consumption by making fish more accessible and affordable throughout the country. In an effort to assess the per capita fish consumption at the Regional and National levels, the NFCPT sourced the services of the University of Namibia, through the Sam Nujoma Marine and Coastal Resources Research Centre (SANUMARC) in collaboration with the Multidisciplinary Research Division (MRC), to conduct a Nation-wide survey on fish consumption. The survey ran for fourteen days (09 to 23 June 2023).

The key findings of the Namibia Fish Consumption Promotion Trust (NFCPT) Survey 2023 point to the following: Rising per capita consumption - Namibia has experienced a significant increase in per capita fish consumption, reflecting a growing preference for fish as a primary protein source among its population. The increase from 16.59 kg in 2021 to 18.07 kg in 2023 suggests a changing dietary pattern. Economic factors - the growth in per capita fish consumption could be partly attributable to Namibia's improving economic conditions during the period, although fish is still regarded as expensive but also not accessible especially to rural communities. As disposable incomes rise, more citizens can afford a diverse and protein-rich diet, including seafood. The survey also revealed the most preferred fish as horse mackerel and hake. Health awareness - an increased awareness of the health benefits associated with fish consumption, such as omega-3 fatty acids and high-quality protein, has contributed to the dietary shift. Most respondents preferred boiled fish as part of their meals than other methods of preparation such as grilling and frying. NFCPT health initiatives and awareness campaigns may have played a role in educating the public about the health benefits of eating fish. Diversified products - the availability of a wider range of processed and value-added fish products, including fillets, canned fish, and ready-to-cook options, has made fish consumption more convenient and appealing to Namibian consumers. Most respondents purchased from local vendors especially in Omusati (55.5%), Khomas (51.7%), //Kharas (48.6%) and Otjozondjupa (41.4%). In Kavango east, most respondents purchased fish from private fish shops (72.5%). Supermarket is the

common source in Kunene (75.4%), Hardap (58.1%) Otjozondjupa (54.4%) and Omusati regions (50%) while NFCPT fish is a common source in Kavango West (58.9%), Oshana (50.2%) and Kavango East (49.7%). Respondents preserve fish mainly by freezing (50.3%) and drying (29.5%). Freezing is mainly common in Erongo (75%), Kavango East (70.5%), Zambezi (62%), Otjozondjupa (59.6%), Omaheke (56.4%) and Oshikoto (54.9%). Drying of fish is common in Oshana (63%), and Ohangwena (62.3%). Most respondents prefer eating fish with pap (84.5%) followed by rice (4.8%) and other side dishes (4.5%). Eating fish with pap is common in all the regions while some respondents in the Kunene were fond of rice (11.6%) and vegetables (12.5%) in the //Kharas regions.

Some implications include but not limited to: Economic opportunities, with the rise in fish consumption presents opportunities for the Namibian fishing industry and local subsistence fishermen. Increased demand can stimulate production, job creation, and export potential, contributing to economic growth. Sustainability challenges - meeting the growing demand for fish while maintaining sustainable fishing practices is crucial. Overfishing and environmental concerns must be addressed to ensure the long-term viability of the fish-based protein diets in Namibia. Market diversification - Namibia may consider diversifying its fish products and exploring new local markets to capitalize on the increased consumption domestically and internationally. Infrastructure investment in processing, storage, and distribution infrastructure will be essential to meet rising consumer expectations and maintain product quality throughout the country.

Global fish consumption is expected to increase over the next decade, reaching 21.2 kg per capita in 2032, up from an average of 20.4 kg per capita in 2020-22. The current per capita fish consumption in Africa is 10.5 kg. Apart from population growth, other factors such as decline in catches, IUU (Illegal, unreported, and unregulated) fishing, underdeveloped aquaculture industry, large postharvest losses, climate change, policy, and lack of good landing, road, and market infrastructure can also impact fish availability, demand, and consumption. The SADC per capita fish consumption stood at in 2016, while Namibia's per capita fish consumption stood at 11.4 kg per person per year, which was way above the SADC's per capita fish consumption of 11.3 kg. This study found that the per capita fish consumption increased to 18.07 kg in 2023. However, there is a need to increase the percentage fish supply to reach the global recommended per capita consumption of

19 kg by 2025. The Global recommended target can be easily reached with increased effort to increase fish availability and affordability in all communities in Namibia.

In conclusion, Namibia's increase in per capita fish consumption from 16.59 kg in 2021 to 18.07 kg in 2023 signifies a shift in dietary preferences and may reflect improved economic conditions and health awareness. Horse mackerel and hake remain the most preferred fish in Namibia. While this presents economic opportunities for the fishing industry, sustainability and infrastructure development are essential to ensure long-term success. Addressing these challenges will be critical in harnessing the benefits of this dietary transformation for Namibia's economy and its citizens' well-being.

ACKNOWLEDGEMENTS

We would like to acknowledge the Namibia Fish Consumption Promotion Trust (NFCPT) for the sole funding of this entire National survey and the continued support throughout the project life cycle. Secondly, we would like to appreciate the assistance rendered by the Namibia Statistics Agency (NSA) for the provision of the Primary Sampling Units (PSUs), PSU Maps, Enumeration Areas (EAs), and the methods for first stage weighting of data. Thirdly, to all the participants in this survey in all 14 regions, you were awesome, and you consented to provide your honest responses and information, a very big thank you. Fourth, to all the Regional and Local Authorities, Constituencies and Traditional Authorities, thank you for allowing us to work within your respective jurisdictions. Fifth, our appreciation goes to all the Field Assistants/ Enumerators and their Field Supervisors for a job well done, without you this survey would not have been possible. Sixth, to the Data Analysts, thank you for your efforts in running the statistics and organizing the data into meaningful information packages. Last but not least, we would like to acknowledge UNAM for all the support through all the support staff (Grants Management, Finance, Computer Centre) to the project, and for allowing us to work on the project. Finally, we acknowledge the stakeholders commitment to attending the regional validation workshops, we value your inputs.

DISCLAIMER

This Report is based on the Namibia Fish Consumption Survey 2023, and responses given here are a true reflection of the respondents. The results herein are based on the real sample data that was weighted accordingly.

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ACRONYMS/ABBREVIATIONS

NFCT	Namibia Fish Consumption Promotion Trust
UNAM	University of Namibia
SANUMARC	Sam Nujoma Marine and Coastal Resources Research Centre
SNC	Sam Nujoma Campus
FAO	Food and Agriculture Organisation
UN	United Nations
SDG	Sustainable Development Goals
MFMR	Ministry of Fisheries and Marine Resources
NSA	Namibia Statistics Agency
GDP	Growth Domestic Product
WHO	World Health Organisation
PSU	Primary Sampling Unit
EA	Enumeration Area

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1. INTRODUCTION

Namibia is one of the few countries endowed with a plethora of natural resources inclusive of fisheries resources. The fishery sector employs over 16,000 (sixteen thousand) Namibians directly and indirectly as well as supporting other sectors of the economy (MFMR Newsletter, 2022). It is the third largest contributor to Namibia's Gross Domestic Product (GDP), contributing 4.5% (NSA, 2022). Using a web-based survey among 2 481 respondents in Namibia, Erasmus et al. (2021) reported that 97.9% of the respondents of the survey were aware of the importance of fish in the human diet, hence its health benefits. A significant number of respondents indicated to prefer hake (Merluccius capensis and M. paradoxus) (31.5%) and Cape horse mackerel (*Trachurus capensis*) (21.7%). Factors affecting marine fish affordability in Namibia were explained with a Logit Model, with age, education, gender, monthly income, and region of residence as explanatory variables. Responses regarding fish affordability were principally driven by age, education, and monthly income (Erasmus et al., 2021). Over 60% of respondents were poor fish consumers, consuming fish once a week or once a month. Those who claimed to have consumed fish once a week or once a month reported that they mostly purchased marine fish from retail fish shops (50.7%), wholesale fish companies (18.8%), and the Namibian Fish Consumption Promotion Trust (NFCPT) (17.4%).

NFCPT was established in 2001 to promote the consumption of fish throughout Namibia by improving distribution, and by educating and empowering citizens concerning the best ways to prepare different cuisines of fish and the health benefits derived from fish consumption. Specific objectives of NFCPT were to promote fish consumption by making fish more accessible and affordable throughout the country. This was expected to be achieved by setting up fish shops and conducting monthly regional fish promotions to entice the populace on the health benefits of fish. As of 2021, NFCPT owns and operates 18 fish shops in all 14 Regions of the country. These fish shops are in the Regional Capitals and serve as retail distribution for quality and affordable frozen fish and fish products at the regional level. NFCPT provides employment to 149 people of which 48% are women and 52% are men.

According to the NFCPT website, in 2001 the company distributed 500MT which as of March 2021 the distribution amount stands at 10 000MT. NFCPT further reports that per capita fish consumption has drastically increased from 4kg at independence to 16.59kg per capita in March 2021. It is based on the above milestones that NFCPT finds it necessary to undertake a national study to determine the current fish consumption, accessibility and affordability in the country.

The University of Namibia (UNAM) as a national university with a robust human capital, infrastructural capacity and technical know-how responded to the NFCPT call that potential research institutions should apply for the tender to carry out the study on national fish consumption, accessibility and affordability by the Namibian people. UNAM is an academic institution with an international profile ranking for research outputs that include successful consultancy projects. As such, UNAM constituted a team of experts from various faculties in line with the requirement of the terms of references of the consultancy. Through the leadership and co-ordination of UNAM's SANUMARC, the constituted team will implement the planned national fish consumption, accessibility, and affordability study to determine the per capita fish consumption at both Regional and National Levels.

The main objective of this study was to determine the regional as well as national fish consumption rate. Specific objectives are:

1. To determine per capita fish consumption per region and nationally
2. To determine the preferred fish species by people per region and nationally.
3. To determine the main source/supplier of fish

2. LITERATURE REVIEW

The association between a fish-rich diet and human health benefits is well recognized (Erasmus et al., 2021), especially in infants, young children, and pregnant women. Desiere et al. (2018) indicated that owing to its significant implication for human health, food security and the environment, trends in meat and fish consumption have been extensively studied. Chan et al. (2019) and Tamiru et al. (2023) reported that 19% of animal protein intake in Africa is provided by fish and continued to argue that fish plays a unique role in

providing a range of micronutrients and essential fatty acids that cannot easily be substituted by other food commodities. Although there is variation in nutritional profile among various fish species, generally, fish is the most important animal-source protein in the human diet. Fish is a primary source of protein and is recommended as an essential part of a healthy, balanced diet. A 100g portion of fish supplies the human body with a third to half of your daily protein needs (NFCPT, 2022).

Apart from protein, fish is also packed with essential amino acids, unsaturated fatty acids, vitamins such as B-vitamins and macro-minerals such as calcium and trace elements such as iron and zinc. Oil-rich fish, such as salmon, trout, horse mackerel, herring, and sardines, are an excellent source of Omega-3 fatty acids, necessary for preventing and managing heart diseases. Omega-3 fatty acids cannot be manufactured by the body, so it is important that humans bring them into their diet by eating oil-rich fish. All of these are vital for good health and the optimum functioning of the body (NFCPT, 2022). According to the World Health Organization (WHO), it is recommended that a person eats 1-2 portions of fish per week. This is because Omega 3 fatty acids in fish provide many health benefits, including curing several diseases. Several recent studies revealed that fish consumption aids in stopping various health diseases, including bacterial infections, Alzheimer's diseases, metabolic disorders, protein-calorie malnutrition, high blood pressure, cardiovascular and coronary heart diseases (Rahman and Islam, 2020). Moreover, fish is easy to digest because of the absence of conjunctive tissue.

As an important part of the African agri-food system, fish has significant potential to contribute to the reduction in food and nutrient insecurity in Africa. For example, indigenous small fish, such as Dagaa from Lake Victoria and Kapenda in southern Africa are pivotal sources of micronutrients in the traditional diet (Chan et al., 2019). Fish is also a significant contributor to other development goals such as socioeconomic growth, poverty alleviation and the general improvement of the livelihood of marginalized communities. Chan et al. (2019) reported that the sector supported 12.3 million people of which more than one-fourth are female who are often considered the most poor and marginalized sector of the society. Han et al. (2022) reported that of late the world has witnessed a rapid growth in seafood consumption at the rate of 2.53% from 34 777 million tons in 1970 to 113 452 million

tons in 2017. This according to Chan et al.(2019) is attributed to population and income growth, increasing appreciation for the health benefits of fish consumption as well as changes in lifestyles and preferences associated with rapid urbanization and globalization.

Han et al. (2022) argued that seafood serves consumers as one of the main sources of nutritional supply and food diversity, and at the same time it serves producers as a major source of income. According to Tamiru et al. (2023), food preferences and consumption habits are impacted by several factors. Those include consumer and fish related factors. Consumer related factors include gender, education, nutritional understanding, and culture, while freshness, taste and smell constitute fish related factors. Additionally, frequency and preference of non-sensory factors such as risk perception, behavior personal attributes and beliefs may influence food preference including fish.

Chan et al. (2019) argues that despite the immense potential of African fisheries and aquaculture, Africa lags behind other regions in developing its share in global fish production, consumption, and trade. Fisheries and aquaculture in Africa face enormous challenges, which are compromising achieving the sector's sustainability and profitability. Major constraints in achieving stronger aquaculture growth in Africa include: a lack of improved fish breeds, feeds and technical training; weak research capacity; inadequate human and financial resources; poor market infrastructure and access; and weak governance and regulation (Chan et al., 2019). Fish post-harvest losses and waste in Africa pose another serious challenge to African governments' efforts to reduce food insecurity. Slightly over a quarter of the fish harvest is lost post-harvest in Sub-Saharan Africa, with underdeveloped cold chains being recognized as a key area of intervention to increase resource use efficiency and profits for value chain actors. Compared with aquaculture producing countries in Asia, the African aquaculture sector, particularly commercial aquaculture, is still in its infancy though Egypt and Nigeria are notable exceptions.

3. SURVEY DESCRIPTION AND METHODOLOGY

The survey was carried out in all the 14 regions of Namibia. The study employed a quantitative method of data collection using a questionnaire. For the quantitative approach, the client drafted the research instrument which was discussed and reviewed with the research team. The team comprising of researchers and enumerators met to deliberate and finalize research instruments. Regional councillors and traditional authorities were informed in advance about the survey to sensitize their communities.

The focus group discussions in four regions, namely; Oshana, Khomas, //Kharas and Zambezi were conducted with key informants to validate the data/results emanating from the survey. Constructive inputs from focus group discussions were incorporated into the final report.

3.1 Selection and training of the enumerators

Experienced enumerators including graduates and non-graduates were selected from the UNAM Research Assistant Database. Enumerators were recruited from the fourteen regions of the country considering local language proficiency and different cultural practices. To ensure ethical principles, enumerators signed an agreement/contract with UNAM to guarantee quality and confidentiality. The following criteria served as the basis for selection:

- Minimum grade 12 (post-matriculation qualification advantageous)
- Data collection experience
- Proficiency in the local language of the region allocated
- Proficiency in English
- Basic computer skills

A three days training workshop was conducted in Windhoek for both enumerators and supervisors before the survey. The training was conducted by the UNAM research team. The

focus of the training was to impart knowledge about the project and skills to capture data (tools and methods), research ethics and confidentiality.

3.2 Sample design and selection

3.2.1 Sampling frame

The sampling frame/Area frame is a list of sampling units referred to as Primary Sampling Units (PSU). The sampling frame for this study was based on the 2021 Census Mapping data from the Namibia Statistics Agency (NSA). The sampling frame serves as a starting point for selecting samples. The sample frame was stratified by region, urban and rural.

3.2.2 Sample design and selection procedures

A stratified two-stage cluster sample design was adopted for this survey. The sample size was adjusted to cover for loss in precision due to clustering and stratification. In determining the sample size, the following requirements were taken into consideration;

- Estimates were required at the regional and national level;
- The population (N) of 2 147 776 – thus, one year and above as per the 2021 Population Projections as this was assumed to at least consume fish adequately;
- The margin of error (E) considered was three percent (3%);
- The confidence level was taken as ninety-five percent (95%), where the critical K value = 2.17 (see Annexure 1);
- Since the value of the proportion (p) under study was not known, it was assumed to be 0.5, so that the sample size was maximized for desired precision.
- The Finite Population Correction factor was ignored since the sampling rate (n/N) was greater than 0.05.

- Compensation for design effect (deff) was set at two (2).
- $\boldsymbol{n = \frac{k^2pq}{E^2}}$ where n is the sample size, k is the critical value, E is the margin of error, p is the proportion of characteristic of interest and q = 1- p
- Not all sampling units responded, the non-response rate assumed was expected to be around fifteen percent (15%).
- The national average (Namibia) household size as per the 2021 Population projections and 2021 Census Mapping households is 3.5 persons per household.
- The number of households to be randomly selected per PSU is fifteen households (15).
- The final distribution of the sample by region is given in Table 1.

Enumeration areas (EAs) were accurately identified together with the number of households from the sampling frame. Within each stratum and each domain, the designated number of samples EAs were selected systematically with probability proportional to size (PPS); and with the measure of size based on the approximate number of households from the census mapping operation. The process of selecting EAs, was performed in PyCharm Sampling Module in Python and the selected sample of EAs is stored in both EXCEL and SPSS files.

3.2.3 The selection of sample enumeration areas within each stratum

The following steps were followed to select enumeration areas;

a) Households from the pre-census cartographic operation. It is assumed that the EAs are numbered serially in a serpentine manner within each hierarchical level.

b) Obtain the cumulated measure of size by adding the number of households down the list of EAs within the substratum.

c) Determine the sampling interval for the substratum (I_h) by dividing the total number of households (final cumulated measure of size), M_h, by the number of sample EAs allocated to the substratum, n_h.

d) Select a random number between 0 and I_h, which will be the random start (R_h) for the systematic PPS selection of EAs.

e) Determine the selected EAs from the selection numbers, calculated as follows:

- $S_{hi} = R_h + [I_h * (i-1)]$, rounded up to the next integer, where i = 1, 2, ..., n_h
- The i^{th} sample EA in the h^{th} stratum is the one with the cumulated measure of size closest to S_{hi} without exceeding it.

Table 1. Selected Enumeration Areas.

EA No.	Estimated Number of Households	Cumulated Number of Households (Range)	Selected EA (S)
1	141	0001 – 0141	
2	188	0142 – 0329	
3	217	0330 – 0546	S
4	148	0547 – 0694	
5	199	0695 – 0893	
6	218	0894 – 1111	S
7	129	1112 – 1240	
8	207	1241 – 1447	
9	142	1448 – 1589	
10	136	1590 – 1725	S
11	220	1726 – 1945	
12	147	1946 – 2092	
13	163	2093 – 2255	
14	209	2256 – 2464	S
15	138	2465 - 2602	

The selection of the EAs in the urban and rural parts of each region was carried out independently using the methodology outlined in this section. That is, by following steps **a**

through **e** to select separately the urban and rural EAs that make up the sample size in a region.

An example showing how EAs were selected is provided below.

Example: A stratum has the following frame of EAs:

Cumulated Measure of Size (Mh)	2602
Number of Sample EAs to be Selected (nh)	4
Sampling Interval (Ih)	650.5
Random Number (Rh)	376.38

Sample EA No.	[Ih * (i-1)]	Shi
1	376.38	377
2	1026.88	1027
3	1677.38	1678
4	2327.88	2328

Table 2. The distribution of the NFCT 2023 Survey sample for Namibia (source: NSA, 2023).

	PSU Type		
Region	**Rural**	**Urban**	**Total**
||Kharas	1	2	3
Erongo	1	5	6
Hardap	1	2	3
Kavango East	1	2	3
Kavango West	1	1	2
Khomas	1	11	12
Kunene	1	1	2
Ohangwena	4	1	5
Omaheke	1	1	2
Omusati	5	1	6
Oshana	2	2	4
Oshikoto	4	1	5
Otjozondjupa	1	3	4
Zambezi	2	1	3
Total	26	34	60

3.2.4. Description of the PSU

The survey covered all 60 PSUs in 14 regions and 58 constituencies (Figure 1) in Namibia. The PSUs were selected from the sampling frame which is maintained by the Namibia Statistics Agency (NSA). About 60 PSUs, 26 Rural and 34 Urban were selected for this study. This translates in 60 enumeration areas (EAs).

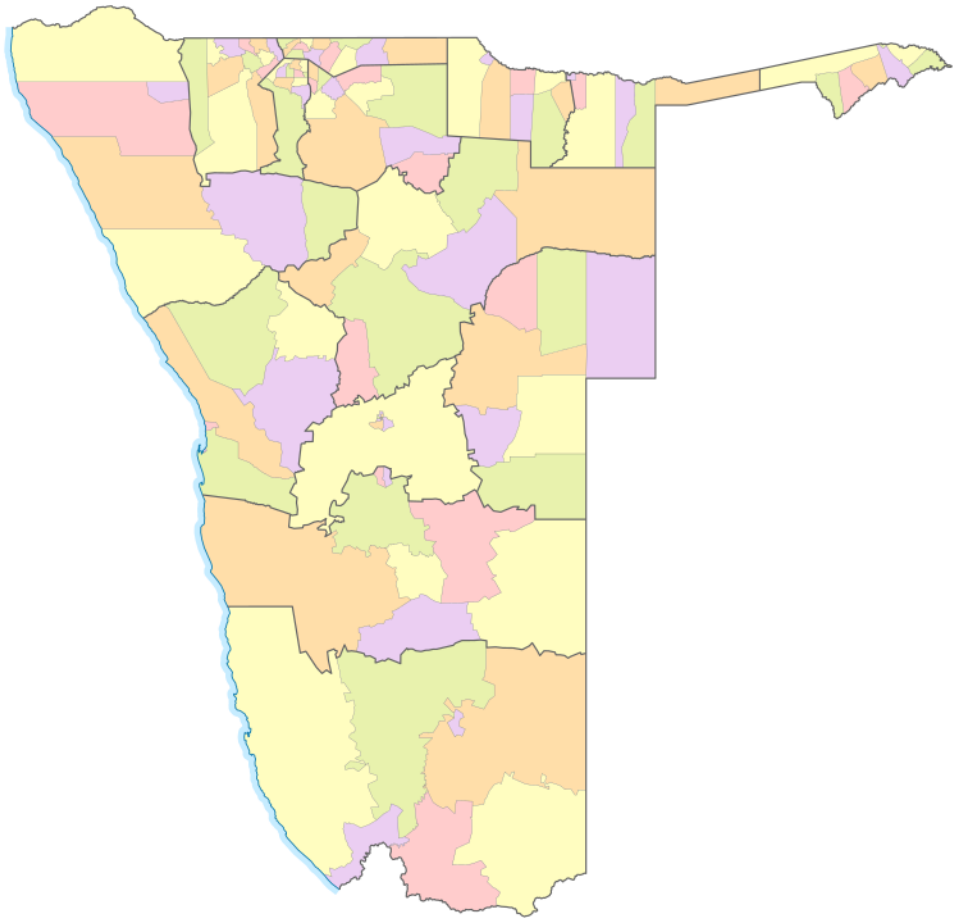

Figure 1 Map showing all the Constituencies in Namibia's 14 Regions, 2023

The sampling frame consists of PSUs classified by regions and constituencies. This frame was stratified by urban and rural areas within regions (Table 1). The PSUs in the urban areas were further stratified into high, middle or low levels of living according to the geographical location and the standard of housing. In the rural areas, the PSUs were grouped according to villages, settlements, communal and commercial areas. This extensive stratification of the sampling frame enhanced the representation of different types of sub-population groups in the sample. The actual sample size was calculated in consultation with the NSA

and envisaged to be representative at 5% level of significance. For the purpose of this study the target population of the study was household members aged 18 years and above.

The PSUs (Table 3) were randomly selected with help of the Namibia Statistics Agency (NSA). Based on the PSUs selected, the maps were printed for each PSU, with clear boundaries to help the field workers identify households within the PSU. Systematic sampling procedure and the random walk method was used to select and identify the respondents for interviews.

Table 3. Enumeration areas by regions and constituencies (urban and rural)

	region_c_1	ea_number	ea_type_1	constitue	reg_name	hh_sum	cum_HH
41	1	10601041	Urban	Keetmanshoop Urban	!Karas	104	3845
143	1	10501003	Urban	Keetmanshoop Rural	!Karas	82	13441
231	1	10499045	Rural	Karasburg West	!Karas	63	1806
506	2	20601128	Urban	Walvis Bay Rural	Erongo	100	8620
635	2	20401024	Urban	Omaruru	Erongo	91	20914
761	2	20101044	Urban	Arandis	Erongo	101	33236
887	2	20501183	Urban	Swakopmund	Erongo	106	45608
1012	2	20701056	Urban	Walvis Bay Urban	Erongo	81	57838
1063	2	20299006	Rural	Daures	Erongo	87	1229
1204	3	30601018	Urban	Rehoboth East Urban	Hardap	99	1377
1301	3	30101008	Urban	Aranos	Hardap	72	10581
1411	3	30799029	Rural	Rehoboth Rural	Hardap	51	1372
1634	4	40601047	Urban	Rundu Urban	Kavango East	84	4673
1747	4	40601165	Urban	Rundu Urban	Kavango East	93	15163
1830	4	40299027	Rural	Mukwe	Kavango East	71	1618
2000	5	50701017	Urban	Nkurenkuru	Kavango West	99	1152
2029	5	50899007	Rural	Tondoro	Kavango West	83	1779
2254	6	60201056	Urban	Katutura Central	Khomas	86	5384
2384	6	61001140	Urban	Windhoek West	Khomas	83	17650
2517	6	60701090	Urban	Tobias Hainyeko	Khomas	96	29895
2652	6	60401137	Urban	Khomasdal	Khomas	94	42100
2802	6	60501026	Urban	Moses//Garoeb	Khomas	100	54417
2927	6	60501123	Urban	Moses//Garoeb	Khomas	98	66657
3055	6	60601022	Urban	Samora Machel	Khomas	83	78900
3188	6	60601189	Urban	Samora Machel	Khomas	104	91131
3320	6	60301003	Urban	Katutura East	Khomas	91	103401
3446	6	61001056	Urban	Windhoek West	Khomas	97	115613
3570	6	60101001	Urban	John Pandeni	Khomas	85	127898
3647	6	60999038	Rural	Windhoek Rural	Khomas	60	238
3811	7	70501035	Urban	Opuwo Urban	Kunene	79	9203
3863	7	70499030	Rural	Opuwo Rural	Kunene	85	1962
4094	8	81101020	Urban	Oshikango	Ohangwena	93	1508
4234	8	80799020	Rural	Omulonga	Ohangwena	83	1550
4404	8	80299013	Rural	Endola	Ohangwena	81	15371
4570	8	81099001	Rural	Ongenga	Ohangwena	81	29116
4737	8	80199067	Rural	Eenhana	Ohangwena	84	42823
4896	9	90301005	Urban	Gobabis	Omaheke	94	876
5062	9	90199038	Rural	Aminius	Omaheke	74	1991
5296	10	100501008	Urban	Okahao	Omusati	108	1025
5409	10	100299009	Rural	Elim	Omusati	82	1488
5570	10	100599044	Rural	Okahao	Omusati	81	14724
5731	10	100399047	Rural	Etayi	Omusati	84	27964
5887	10	101199085	Rural	Ruacana	Omusati	84	41217
6060	10	100499009	Rural	Ogongo	Omusati	77	54470
6296	11	110601089	Urban	Ondangwa Urban	Oshana	91	8083
6456	11	110901003	Urban	Oshakati West	Oshana	90	23145
6549	11	110599030	Rural	Ondangwa Rural	Oshana	84	1599
6717	11	110199048	Rural	Okaku	Oshana	73	15218
6878	12	120901067	Urban	Oniipa	Oshikoto	99	1492
7011	12	120999016	Rural	Oniipa	Oshikoto	87	1470
7165	12	120699067	Rural	Omuntele	Oshikoto	80	14058
7314	12	120599006	Rural	Olukonda	Oshikoto	104	26608
7470	12	120899041	Rural	Onayena	Oshikoto	80	39186
7611	13	130201094	Urban	Okahandja	Otjozondjupa	91	300
7729	13	130601052	Urban	Otjiwarongo	Otjozondjupa	91	11099
7847	13	130201100	Urban	Okahandja	Otjozondjupa	91	21898
7988	13	130399028	Rural	Okakarara	Otjozondjupa	64	2099
8309	14	140501086	Urban	Katima Mulilo Urban	Zambezi	99	9220
8351	14	140299020	Rural	Kabbe North	Zambezi	84	1393
8494	14	140899051	Rural	Sibbinda	Zambezi	62	13542

3.4. Ethical consideration

An informed consent form including maintenance of the confidentiality of personal data, and the possibility to refuse the consent without having to justify the refusal, was obtained from all participants prior to responding to any survey questions and discussions.

3.5 Survey pilot testing

A pre-testing of the questionnaire was carried out in Windhoek after the training of supervisors and enumerators. This exercise served as an exposure of the supervisors and enumerators to the household sampling, selection methodology and completion of the questionnaire. The piloting further tested the validity and reliability of the research instrument.

3.6 Survey tool and administration

The survey questionnaire was developed and loaded on the Samsung A7 Tablets, which were given to each enumerator and supervisors for the purpose of data collection. The Tablets were loaded with the software called `Surveys`, with an integrated system which allowed for working offline, and it automatically synched the responses captured once connected to internet. Each team was provided with a pocket Wi-fi, with about 30 gigabytes of data loaded on it to sync the questionnaire responses daily. For identification purposes, a questionnaire consisted of the Enumerator's name, date, region, constituency, and PSU number.

3.7 Data capturing and collating

A data entry module was prepared in Statistical Package for Social Sciences (SPSS; software version 29) and the data collected was entered or electronically synched by the enumerators. Data entered in the database was verified and cleaned and weighted as per the NSA methods of first stage weighting, before analysis. The tabulation plan, tables and graphs are presented as part of the report. In the same vein, text data was transcribed

from the focus group discussions and entered into the Atlas.*ti* for analysis. Survey data was archived and accessible to only the research team and those approved by the research team.

3.8 Data Analysis

The Statistical software package SPSS version 29 was used to analyse the survey data. The following statistical methods were used to analyze data:

a) Descriptive statistics: This method involves calculating basic statistics such as mean, median, and standard deviation to describe the fish consumption patterns in the surveyed households.

b) Regression analysis: This method was used to explore the relationship between fish consumption and various factors such as income, age, education level, etc. Multiple regression analysis was used to identify the most important predictors of fish consumption.

c) Analysis of variance (ANOVA): This method was used to test the differences in fish consumption between different demographic groups (e.g., age groups, income levels, etc.) or geographic regions.

d) Factor analysis: This method was used to identify underlying factors that influence fish consumption behavior in the surveyed households. For example, factors such as taste preference, health benefits, and cultural traditions were identified and analyzed.

e) Chi-square test: was used to test for significant relationships between stratum (rural and urban) and the fish consumption.

With the combination of all these methods, the research team was able to get robust and meaningful results that unravel the current per capita fish consumption in Namibia.

Furthermore, the per capita fish consumption was calculated following the steps below:

a) Determine the total amount of fish consumed in a given period, such as a month, or year. This can be measured in weight, such as grams, kilograms.

b) Determine the total population that consumed the fish during that period. This can be measured in individuals or households.

c) Then, the total amount of fish consumed was divided by the total population that consumed the fish to get the per capita fish consumption. This then, gives the average amount of fish consumed per person during a given period.

The equation: **Per Capita Fish Consumption is equals to the weight of fish consumed (over a specific period) divided by the population of people that consumed the fish (see equation below)**. For example, if 5,000 kg of fish were consumed by a population of 1,000 people over the course of a year, the per capita fish consumption would be 5 kg per person per year.

$$Per\ Capita\ Fish\ Consumption\ = \frac{Weight\ of\ fish\ consumed\ (over\ a\ specific\ period)}{Population\ of\ people\ that\ consumed\ the\ fish}$$

3.9 Detailed Sampling Procedure

In this section, we provide a detailed description of the sampling procedure used to obtain regional, urban, and rural estimates in Namibia. The process involves a multi-stage stratified sampling approach, ensuring the representation of different geographical and population strata.

3.9.1. Stratification:

- The initial step in our sampling procedure involved the stratification of the population into two primary strata: urban and rural. This division was based on the participants' residence, categorizing them as either residing in urban or rural areas.
- Within each of these primary strata, a secondary stratification was performed based on the 14 regions of Namibia. This further division was essential to ensure representation from each region within the urban and rural areas.

3.9.2. First Stage – Selection of Primary Sampling Units (PSUs)

The first stage of our sampling process involved selecting Primary Sampling Units (PSUs). A PSU is defined as an enumeration area or cluster. These PSUs were selected randomly from each stratum (urban and rural) and each regional stratum, obtained from the sampling frame based on the 2019 – 2021 Namibia census mapping framework.

- The selection of PSUs was performed using a probability proportional to size (PPS) technique. This means that the probability of a PSU being selected was directly proportional to its population size within the respective stratum. In regions with larger populations, more PSUs were selected, and in regions with smaller populations, fewer PSUs were chosen. This approach ensured that the larger regions had a greater representation in our sample.

3.9.3. Second Stage – Selection of Households:

- Within each selected PSU, households were chosen for data collection. This selection was carried out using a systematic random sampling technique.
- The number of households selected in each PSU was determined proportionally based on the PSU's population size. This ensured that larger PSUs contributed more households to the sample.

3.9.4. Data Collection:

- In each selected household, data were collected using structured surveys or interviews. The collected data included demographic information, socio-economic variables, fish consumption, fish knowledge and perception.

3.9.5. Weighting:

- To account for the complex sampling design, weights were assigned to the collected data. These weights were calculated by considering the probabilities of selection at each stage. In the current study, weights were obtained from the Namibia Statistics Agency (NSA).

- The weights were used in the analysis phase to produce unbiased estimates for the various regions, urban and rural strata, and any other specific groupings required in the research.

By following this multi-stage stratified sampling procedure, we aimed to ensure that our research obtained representative samples from different regions, urban and rural areas, allowing us to generate reliable estimates for the study in Namibia. The use of probability sampling methods and appropriate weighting helped minimize bias and ensure the validity of our estimates.

4. RESULTS/FINDINGS AND DISCUSSION.

The results and discussion are divided into four (4) sections for ease results display and discussions. Section 1 deals with the demographic characteristics of the sample population; Section 2 deals with fish consumption; Section 3 deals with the knowledge of people about fish, and fish advertisement; and lastly Section 4 for perceptions of fish consumption in Namibia.

Section 1: Demographic characteristics

Response rate

Table 4 provides a comprehensive distribution of respondents by region before and after accounting for designed weights. This weighting approach allows for a more accurate representation of the population, considering the survey's complex design.

Table 4 Weighed and Unweighted number of interviewed households

Region	Weighted (f)	Weighted %	SE	95 % CI		Unweighted (f)
				Lower	Upper	
||Kharas	265	5.0	0.8	3.7	6.8	253
Erongo	503	9.5	0.2	9.2	9.9	576
Hardap	212	4.0	0.1	3.9	4.2	224
Kavango East	265	5.0	0.1	4.8	5.2	257
Kavango West	127	2.4	0.0	2.3	2.5	193
Khomas	938	17.7	0.4	17.0	18.5	1060
Kunene	196	3.7	0.1	3.6	3.8	164
Ohangwena	472	8.9	0.3	8.4	9.4	425
Omaheke	207	3.9	0.1	3.8	4.0	167
Omusati	556	10.5	0.7	9.2	12.1	536
Oshana	424	8.0	0.4	7.3	8.8	360
Oshikoto	440	8.3	0.2	7.9	8.7	454
Otjozondjupa	387	7.3	0.6	6.1	8.6	338
Zambezi	302	5.7	0.4	5.0	6.6	292
Total	5299	100.0	0.0	100.0	100.0	5299

The detailed interpretation of the results is as follows:

Region Distribution: The table lists various regions of Namibia, and for each region, it presents the "Weighted frequencies (f)" and "Weighted percentages (%)" columns. "Weighted (f)" represents the number of respondents from each region after applying the design weights, while "Weighted %" shows the percentage of respondents from that region relative to the total sample.

Weighted Percentage Variation: The weighted percentages range from 2.4% in Kavango West to 17.7% in Khomas. This variation suggests substantial differences in the representation of regions within the survey. Khomas, the capital region, has the highest representation, likely due to its higher population density and urbanization.

Standard Error (SE): The SE values are relatively low for most regions, indicating that the survey results are likely to be precise and reliable. However, higher SE values, such as in the Omusati region, suggest more variability in the estimates due to the survey's design.

Confidence Intervals (95% CI): The 95% confidence intervals provide a range of reasonable confidence that the true population percentages fall. For instance, in the Khomas region, the 95% CI ranges from 17.0% to 18.5%. Wider confidence intervals, like those in the Omusati region, imply more uncertainty in the estimates.

Unweighted Counts: The "Unweighted (f)" column presents the raw, unweighted counts of respondents from each region, without considering the survey's design. These counts are useful for understanding the survey's initial data distribution.

Total: The "Total" row summarizes the entire dataset, with a weighted sample size of 5 299 respondents. This weighted total is crucial for making population-level inferences based on the survey.

Sample strata (Urban and rural)

The area status of the survey (weighted vs unweighted data) is presented in Table 5. **Area Status Distribution**: The survey encompassed two distinct area statuses: "Rural" and "Urban." After applying the design weights to ensure representative sampling, the following results were obtained:

Rural: 50.4% of respondents hailed from rural areas, with a weighted count of 2671 individuals. The 95% confidence interval for this category ranges from 48.9% to 51.9%, indicating a degree of certainty in this estimate. The standard error (SE) associated with this percentage is 0.7, signifying a relatively low level of variability due to sampling.

Urban: Conversely, urban areas accounted for 49.6% of the survey respondents, representing 2628 individuals after adjusting for design weights. The 95% confidence interval for this category spans from 48.1% to 51.1%, with a standard error (SE) of 0.7, similar to the rural category.

Unweighted Counts: The unweighted counts, which provide the raw distribution of respondents before incorporating design weights is 2220 respondents in the rural area and 3079 respondents in the urban area.

Total Sample: The total weighted sample size for the survey stands at 5299 respondents, with each area status contributing proportionally. The weighted percentages for rural and urban areas sum up to 100%, indicating that our design weights have effectively balanced the sample to be representative of the population.

Table 5 The area status the survey (weighted vs unweighted data)

Area status	Weighted (f)	Weighted (%)	SE	95 % CI		Unweighted (f)
				Lower	Upper	
Rural	2671	50.4	0.7	48.9	51.9	2220
Urban	2628	49.6	0.7	48.1	51.1	3079
Total	5299	100.0	0.0	100.0	100.0	5299

These findings elucidate the distribution of respondents across rural and urban areas in Namibia and offer a foundation for understanding the regional nuances in fish consumption patterns. Such insights are invaluable for tailoring targeted interventions and policy measures to promote sustainable and healthy dietary habits in both rural and urban settings within the country.

Percentage of respondents by regions and stratum (Rural and Urban) is presented in Table 6. This information provides insights into the distribution of respondents in different regions based on whether they reside in rural or urban areas.

Rural: The percentage values under the "Rural" column indicate the proportion of respondents within each region who reside in rural areas. For example, in the Kunene region, 59.4% of respondents were from rural areas.

Urban: Conversely, the percentages in the "Urban" column represent the proportion of respondents in each region residing in urban areas. For instance, in the Khomas region, 97.5% of respondents were from urban areas.

Total: The "Total" row at the bottom sums up the percentages for each region, indicating the overall distribution of respondents between rural and urban areas. In this case, 50.4% of respondents were from rural areas, while 49.6% were from urban areas, highlighting a nearly balanced representation in the survey.

Table 6 Percentage of respondents by regions and stratum (Rural and Urban) (N= 5299).

	Rural/Urban		
Region	**Rural**	**Urban**	**Total**
||Kharas	57.6	42.4	100
Erongo	15.1	84.9	100
Hardap	41.4	58.6	100
Kavango East	50.5	49.5	100
Kavango West	89.0	11.0	100
Khomas	2.5	97.5	100
Kunene	59.4	40.6	100
Ohangwena	81.0	19.0	100
Omaheke	56.4	43.6	100
Omusati	90.7	9.3	100
Oshana	50.2	49.8	100
Oshikoto	77.8	22.2	100
Otjozondjupa	48.1	51.9	100
Zambezi	72.7	27.3	100
Total	50.4	49.6	100

Key observations from the results:

Regional Variations: There are notable variations in the distribution of respondents between rural and urban areas across the country. Some regions, like Kavango West, Omusati, and Ohangwena, have a predominantly rural population, with more than 80% of respondents residing in rural areas. Conversely, regions like Khomas and Erongo had a predominantly urban population, with over 85% of respondents living in urban areas.

Balanced Representation: The "Total" row indicates that the survey achieved a reasonably balanced representation of rural and urban respondents at the national level, with a slight tilt towards rural areas (50.4% rural vs. 49.6% urban).

These findings highlight the importance of considering regional and area-specific characteristics when analyzing the survey data, especially when investigating factors related to fish consumption. It underscores the need for region-specific policy interventions

to promote sustainable and healthy dietary habits based on the unique demographics of each region.

The survey managed to interview a total of 5299 households, of which 2671 (50.4%) were rural households and 2628 (49.6 %) were households in urban areas (Table 4). The target number of households was 5184, and the survey managed to capture more households (5299), which was 102%. This shows that the coverage was good and robust enough to yield reliable data.

The household population by sex and strata is shown in Table 7, with more males (54.2%) than females 45.8%) in the regions.

Table 7 Household population by sex and strata (Urban and rural).

Rural/Urban	**Percentage (%)**		
	Male	**Female**	**Total**
Rural	53.8	46.2	100
Urban	54.6	45.4	100
Total	54.2	45.8	100

Household population by sex and region is presented in Table 8. The results show that over 60% were male respondents in Omaheke and //Kharas, whereas Oshana, Kavango West, Kavango East and Otjozondjupa had over 50% female respondents.

Table 8 Household population by sex and region.

Region	Percentage (%)		
	Male	Female	Total
||Kharas	60.6	39.4	100
Erongo	59.0	41.0	100
Hardap	54.6	45.4	100
Kavango East	47.5	52.5	100
Kavango West	46.2	53.8	100
Khomas	57.4	42.6	100
Kunene	53.8	46.2	100
Ohangwena	50.3	49.7	100
Omaheke	66.4	33.6	100
Omusati	53.0	47.0	100
Oshana	44.1	55.9	100
Oshikoto	55.0	45.0	100
Otjozondjupa	49.5	50.5	100
Zambezi	58.9	41.1	100
Total	54.2	45.8	100

The interviewed households displayed a population pyramid with a cone-shape (with a bottom heavy and tapered end). There were more children (0 – 17 years old) in these households, with a fair number of youth (18 – 34 years old) (Fig. 2 and Table 9). Results shows that there are variations in terms of percentage of male and females in various age groups in the two stratum, however, the there are more females than males in both rural and urban areas.

Table 9 Percentage of household population by age (0 – 80+), sex and stratum (Rural and Urban.

	Male			Female		
Age groups	Rural	Urban	Total	Rural	Urban	Total
0-4	53.02	46.98	100	62.33	37.67	100
5-9	46.65	53.35	100	54.52	45.48	100
10-14	56.44	43.56	100	64.28	35.72	100
15-19	57.65	42.35	100	55.30	44.70	100
20-24	40.96	59.04	100	47.45	52.55	100
25-29	41.46	58.54	100	45.36	54.64	100
30-34	41.02	58.98	100	48.24	51.76	100
35-39	47.62	52.38	100	45.95	54.05	100
40-44	39.64	60.36	100	48.95	51.05	100
45-49	51.03	48.97	100	57.19	42.81	100
50-54	62.56	37.44	100	62.98	37.02	100
55-59	33.84	66.16	100	61.26	38.74	100
60-64	62.83	37.17	100	64.91	35.09	100
65-69	52.51	47.49	100	65.72	34.28	100
70-74	58.78	41.22	100	71.33	28.67	100
75-79	53.80	46.20	100	90.32	9.68	100
80+	73.61	26.39	100	89.87	10.13	100
Total	47.09	52.91	100	53.26	46.74	100

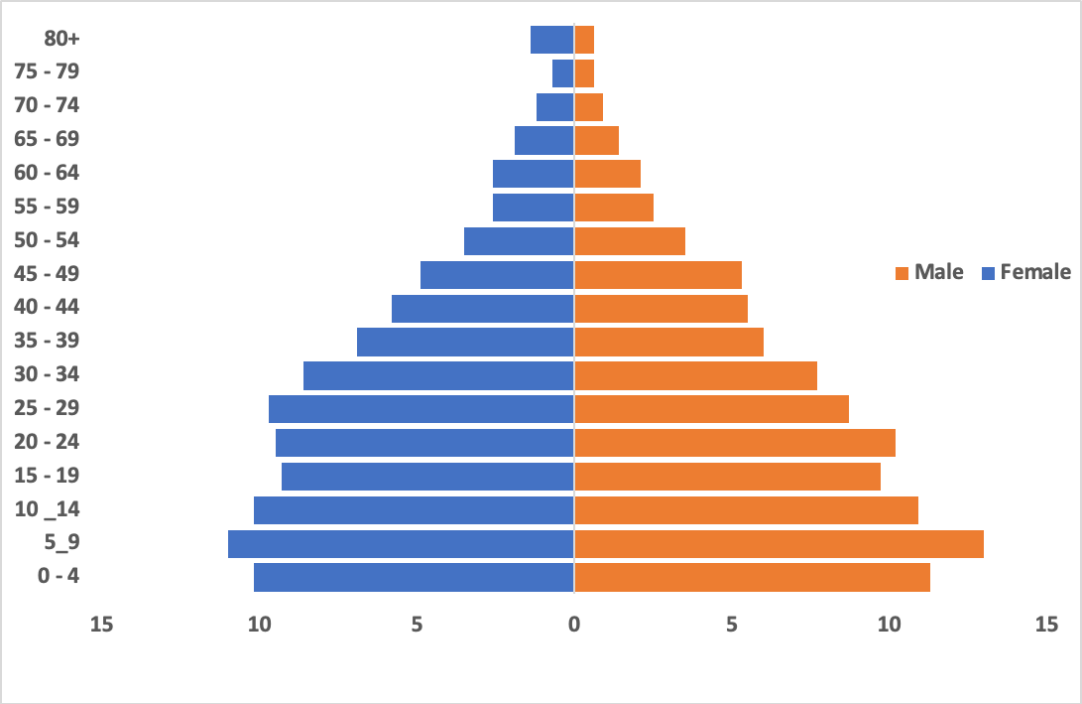

Figure 2. Percentage of households population by sex and age.

Education level

The results show that most of the household had at least secondary education (37.1 %), followed by non formal education 17.6%, junior secondary education at 15.5% and senior Primary Education 13.4% while about 12% had tertiary education. The least education level among the households was Junior Primary (4.5%) (Fig. 3 and Table 10).

Figure 3. Household population education levels.

As observed in Table 10, half of respondents in the //Kharas (50.5%) had secondary education, followed by Erongo (49.8%), Khomas (49.6%) and Oshikoto (43.9%). Significantly, the Kunene region had the highest number of respondents with no formal education (42.9%) while Khomas had the highest number of respondents with tertiary education (18.6%). Overall, the survey population had individuals with some level of formal education, thus could contribute to the quality of responses of this survey (Sauer et al., 2011).

Table 10 Education level by region.

Region	Junior primary (Pre-primary & Grade 1-3)	Senior primary (Grade 4 – 7)	Junior secondary (Grade 8 – 9)	Senior secondary (Grade 10 – 12)	Tertiary education	No formal education	Total
//Kharas	1.7	14.1	22.8	50.5	6.8	4.1	100
Erongo	2.6	11.3	17.0	49.8	10.0	9.3	100
Hardap	8.1	28.2	26.6	26.5	2.7	7.9	100
Kavango East	2.9	11.8	14.2	32.7	14.8	23.7	100
Kavango West	.1	6.3	17.5	34.0	17.3	24.8	100
Khomas	1.9	10.7	13.3	49.6	18.6	5.9	100
Kunene	.7	8.9	11.0	25.5	10.9	42.9	100
Ohangwena	6.0	13.9	12.8	24.1	9.2	33.9	100
Omaheke	3.7	13.8	19.6	20.7	8.9	33.4	100
Omusati	9.7	12.2	12.8	22.6	7.5	35.3	100
Oshana	5.7	17.8	14.7	39.4	9.6	12.8	100
Oshikoto	4.8	17.6	14.1	43.9	13.4	6.3	100
Otjozondjupa	7.1	9.1	21.0	31.8	16.1	15.0	100
Zambezi	3.5	15.0	10.5	37.6	14.0	19.4	100
Total	4.5	13.4	15.5	37.1	12.0	17.6	100

Employment status

Table 11 shows the employment status of respondents in the survey. A sizeable proportion of respondents (44.3%) were employed/self-employed while 30.6% were unemployed and 21.8% were pensioner/retired.

Regionally, the highest number of respondents who were either employed or self-employed were found in Kharas (61.2%); Erongo (57.6%); Otjozondjupa (55%); Khomas (54.7%) and Oshikoto (50.2%). In addition, Kunene had the highest number of respondents who were unemployment (60.7%) while pensioners were relatively higher in the following regions: Omusati (39.8%); Hardap (35.8%); Ohangwena (33.7%) and Oshana (33.4%). Although the study showed that most respondents had some form of formal education, it did not earn them employment.

Table 11 Employment status by region.

Region	Employment status in percentage						
	Employed/ self employed	Unemployed	Student	Learner	Pensioner/ Retired	Unemployed (health resaons/ disbility)	Total
||Kharas	61.2	25.8	.2		12.4	.2	100
Erongo	57.6	25.3	5.9		10.6	.5	100
Hardap	32.2	28.5	.3		35.8	3.2	100
Kavango East	34.1	47.8	.3	.3	15.0	2.4	100
Kavango West	23.0	41.5	3.9	.2	30.2	1.2	100
Khomas	54.7	31.5	3.2		10.0	.6	100
Kunene	24.8	60.7	1.1	1.1	12.4		100
Ohangwena	35.6	27.8	.9		33.7	2.0	100
Omaheke	44.5	28.9	.5		25.2	.9	100
Omusati	32.2	25.6	.3		39.8	1.9	100
Oshana	34.8	29.0	1.7	.9	33.4	.3	100
Oshikoto	50.2	24.0	2.0	.4	22.2	1.3	100
Otjozondjupa	55.0	23.2	1.5		20.0	.2	100
Zambezi	41.4	40.7	1.9		13.9	2.1	100
Total	44.3	30.6	1.9	.2	21.8	1.1	100

Decision making in households

Table 12 illustrates the gender of the main decision-maker in households per the categorised areas: rural and urban. In the rural area, female (51.9%) were the main decision makers over their male counterparts (49.7%). However, in the urban area, male (50.3%) were the main decision makers than female (48.1%). Also, incidences of both male and female as decision makers was prevalent in urban areas (53.2%) than in rural areas (46.8%).

Table 12 Main decision-maker in the households by strata and gender.

Area	Gender of the main decision-maker in HH					
	Frequency (n)	Male (%)	Frequency (n)	Female (%)	Frequency (n)	Both (%)
Rural	1228	49.7	1217	51.9	227	46.8
Urban	1243	50.3	1127	48.1	257	53.2
Total	2471	100	2344	100	484	100

Furthermore, Table 13 shows the distribution of the gender of the main decision-maker in households, categorised as male, female and both by region. The summary of findings per region is as follows:

In the Kharas region, the main decision maker in predominantly male (5.8%) and then the female (4.6%). A small percentage (3.0%) showed both male and female as decision makers. Significantly, in the Erongo region, the main decision makers were male (11.1%) followed by the female (8.4%) and only 6.9% of the people allow decision making by both male and female. Interestingly, decision makers in the Hardap region were both male and female (4.9%) than male (4.2%) and female (3.7%). The female (4.6%) in the Kavango east region were regarded as decision maker. Only 4.6 % of the male maker decisions and 3.6% of both male and female decide on household issues. Likewise, females (2.7%) in the Kavango West region were decision makers than their male counterparts (2.2 %). Only 1.5% of both male and female made decisions. Evidently, Khomas had the highest percentage of both male and female (26.8%) as decision makers, followed by male (18.2%) and then female (15.4%). In the Kunene region, male was stated as decision makers (4.0%), followed by female (3.8%). In rare cases, both male and female made decisions. This pattern was also observed in the //Kharas region. In Ohangwena region, females (10.0%) were the decision maker than their counterpart male (8.7%). About 4.3% of both male and female made decisions. Male (5.4%) were said to be the decision makers in Omaheke region than female (3.0%). A small fraction of 0.4% of both male and female made decisions. In the Omusati region, both male and female (13.3%) made decisions than female (11.2%) and

men (9.5%) as single entities. In Oshana region, female (10.0) were the decision makers followed by both male and female (6.6%). A few male (6.6%) were decision makers. A significant percentage of both male and female (14.4%) were decision makers in Oshikoto. Comparatively, more females (8.4%) were decision makers than their male (7.0%) counterparts. In Otjozondjupa slightly more female (7.9%) were decision makers than male (7.3%). A few of both male and female were (3.9%) were decision makers. In the Zambezi region, a higher percentage of both male and female (9.2%) were decision makers. Furthermore, slightly more male were considered decision makers than their female (5.0%) counterparts.

Table 13 Gender of main decision maker of household by region.

Region	Gender of the main decision-maker in HH					
	Frequency (n)	Male (%)	Frequency (n)	Female (%)	Frequency (n)	Both (%)
//Kharas	143	5.8	108	4.6	15	3.0
Erongo	274	11.1	197	8.4	33	6.9
Hardap	104	4.2	87	3.7	24	4.9
Kavango East	114	4.6	134	5.7	17	3.6
Kavango West	54	2.2	63	2.7	7	1.5
Khomas	450	18.2	361	15.4	130	26.8
Kunene	99	4.0	89	3.8	6	1.2
Ohangwena	215	8.7	234	10.0	21	4.3
Omaheke	133	5.4	70	3.0	2	0.4
Omusati	235	9.5	263	11.2	64	13.3
Oshana	156	6.3	234	10.0	32	6.6
Oshikoto	173	7.0	197	8.4	70	14.4
Otjozondjupa	180	7.3	185	7.9	19	3.9
Zambezi	141	5.7	117	5.0	45	9.2
Total	2471		2344		484	

Maposa et al. (2013) argued that socio-economic factors such as location (urban or rural), sex of household head, income, education, age well as language significantly influence decision making at household level and livelihoods. Regions which are patriarchal dominated such as Omaheke, Kunene and Zambezi men dominate in decision making. However, after independence, rural-urban migration increased, bolstering urban growth (World fact sheet, 2024), women emancipation in economic activities might have contribute to both male and female making decisions together as observed in the Khomas region.

Marital status

Table 14 provides the marital status of the head of household in rural and urban areas. The marital status of the head of household in the rural area was predominantly widowed (75.7%) than in urban area (24.3%). More than half of the respondents in the rural area were married (54.9%) than in the urban area (45.1%). In addition, the divorced respondents were higher in rural (53.0%) than in urban (47%). However, in the urban area more head of households were either living together (55.5%) or single (56.0%) than their counterpart in rural areas (44.5% and 44%, respectively).

Table 14 Marital status of the Head of Household by strata.

Rural/Urban			4. Marital status of the Head of Household.					
			Single	Married (certificate / traditional)	Living together	Divorced	Widowed	Total
Rural	% within 4. Marital status of the Head of Household.	Estimate	44.0%	54.9%	44.5%	53.0%	75.7%	50.4%
		Unweighted Count	870	723	255	65	307	2220
Urban	% within 4. Marital status of the Head of Household.	Estimate	56.0%	45.1%	55.5%	47.0%	24.3%	49.6%
		Unweighted Count	1584	813	461	78	143	3079
Total	% within 4. Marital status of the Head of Household.	Estimate	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		Unweighted Count	2454	1536	716	143	450	5299

Table 15 shows the marital status of the head of households per region. In the **//Kharas region**, more head of households were living together (8.1%) than they were single (5.8%), widowed (3.6%), married (3.2%) or divorced (2.1%). In the **Erongo region**, more head of households were single (13.0%) than living together (9.3%) or divorced (8.3%). Some head of households were married (6.8%) and a few were widowed (1.7%). In the **Hardap region**, more head of households were widowed (7.3%) than they were living together (4.9%). A marginally less were divorced (4.8%) and a few married (3.0%). Interestingly in the **Kavango East**, more head of households were divorced (11.2%). Some were living together (7.8%) and widowed (5.3%). A few were married than they were single (4.0%). The **Kavango West** had equal number of head of households who were married (2.6%) and widowed (2.6%).

Some head of households were single (2.3%) and others living together (2.0%) with a few who were divorced (1.9%). **Khomas region** had the highest number of head of household living together (21.0%), single (18.9%) and divorced (18.3%). Some head of households were married (17.2%) and a far more less widowed (8.5%).. In the **Kunene region**, about 5.0% of the head of households were married, and some single (4.3%). About 3.2% were divorced and far less widowed (1.1%) and living together (0.6%). Notably, Kunene had the lowest number of head of households living together than all the other regions. **Ohangwena region** had the highest number of head of households who were widowed (14.3%) and also significantly a high number of head of households who were divorced (13.1%). Some head of households were single (9.2%), married (7.8%) and living together (5.6%). Some head of households in the **Omaheke region** were living together (7.3%) than they were single (3.7%) or married (3.5%). A few head of households were widowed (2.1%) and others divorced (1.8%). Evidently, head of households in the **Omusati region** were widowed (22.7%), living together (12.5%) than they were married (11,4%). Some were single (7.4%) while others were divorced (3.8%). **Oshana region** had about 10.7% widowed head of households, single (8.7%), married (7.5%), divorced (7.0%) and those living together (5.1%). More head of households in the **Oshikoto region** were married (11.0%), some head of households were single (8.3%) and slightly less were widowed (8.1%). Some head of householdss were divorced (7.1%) and far less living together (2.8%). Interestingly, **Otjozondjupa region** had about 7.9%of the head of householdsliving together while the same number of head of households in the three categories showed the same percentage as follows: single (7.2%), married (7.2%) and divorced (7.2%). About 7.0% of the head of householdswere widowed. In the **Zambezi region**, about 10.3% of the head of householdswere divorced while 8.4% were married as opposed to living together (5.1%). A few more were either widowed (4.9%) or single (4.1%).

Table 15 Marital status of the head of household by region.

Region	Marital status of the Head of Household									
	Frequency (n)	Single (%)	Frequency (n)	Married (%)	Frequency (n)	Living together (%)	Frequency (n)	Divorced	Frequency (n)	Widowed
//Kharas	142	5.8	49	3.2	58	8.1	3	2.1	16	3.6
Erongo	319	13.0	104	6.8	67	9.3	12	8.3	8	1.7
Hardap	74	3.0	63	4.1	35	4.9	7	4.8	33	7.3
Kavango East	98	4.0	69	4.5	56	7.8	16	11.2	24	5.3
Kavango West	56	2.3	40	2.6	14	2.0	3	1.9	12	2.6
Khomas	464	18.9	264	17.2	150	21.0	26	18.3	38	8.5
Kunene	106	4.3	77	5.0	4	0.6	5	3.2	5	1.1
Ohangwena	226	9.2	120	7.8	40	5.6	19	13.1	64	14.3
Omaheke	91	3.7	54	3.5	52	7.3	3	1.8	9	2.1
Omusati	182	7.4	175	11.4	90	12.5	5	3.8	102	22.7
Oshana	213	8.7	115	7.5	37	5.1	10	7.0	48	10.7
Oshikoto	204	8.3	169	11.0	20	2.8	10	7.1	36	8.1
Otjozondjupa	177	7.2	111	7.2	57	7.9	10	7.2	32	7.0
Zambezi	101	4.1	129	8.4	37	5.1	15	10.3	22	4.9
Total	2454	100	1536	100	716	100	143	100	450	100

Overall, Khomas had the highest number of head of households who were living together, single, married and divorced in that sequence. The findings of this survey is in line with that of Pazvakawambwa, Indongo, and Kazembe (2013) on marital patterns and dynamics in Namibia in that there is decreasing proportions of marriage, increased levels of divorce and co-habitation, reasons for these changes remain unexplained. In addition, Musaba and Namukwambi (2011) argue that marital status has an influence on the purchaser either positively or negatively in their fish purchase decision.

Sources of household income

Sources of household income by regions are shown in Table 16. Formal employment is the main source of income across the regions with exception of Omusati region. Social grants emerged as the second highest source of income across the regions with exception of Omusati region where social grants and casual work are the main source of income. Informal business as source of income in mainly in Oshana, Oshikoto and Kavango East; whereas, farming as a source of income was prominent in Omusati and Kunene regions; and fishing in the Zambezi. Remittance featured strongly in the Oshikoto region (7.9%) while social safety net was prominent in Omusati (33.2%); Omaheke (19.2%); Kavango West (17.6%); Kunene (17.1%); Erongo (14.8%); Khomas (10.8%) and Oshanna (10.3%).

Table 16 Sources of household income by region.

Region	Formal employment	Casual/ seasonal work	Informal trading/ business	Formal business	Farming (crop and/or livestock)	Fishing	Retirement pension	State social grants	Rent	Remittances (cash or food)	Relying on social safety nets	Other
||Kharas	65.2	18.2	7.9	1.6	.8	.4	5.5	27.3	.0	2.4	.4	.4
Erongo	56.4	12.4	7.0	3.0	1.0	.2	2.6	11.3	1.2	.7	14.8	1.2
Hardap	38.4	21.9	11.6	.9	4.9	.4	7.6	34.8	1.3	4.0	.9	3.1
Kavango East	37.7	30.4	24.9	6.6	10.5	1.2	2.3	28.8	1.9	1.6	1.6	.0
Kavango West	28.0	14.5	16.6	3.1	9.8	.0	2.6	26.9	7.8	3.6	17.6	.0
Khomas	56.1	18.8	21.7	2.9	1.2	.0	4.0	12.6	2.8	.8	10.8	1.1
Kunene	28.0	6.1	17.1	3.7	23.8	.0	1.2	20.1	.0	.0	17.1	.0
Ohangwena	24.5	14.1	20.0	4.9	16.9	1.6	4.7	34.1	.7	1.6	6.8	3.8
Omaheke	37.1	16.2	7.8	.6	5.4	.0	3.6	34.1	.0	.6	19.2	.6
Omusati	20.3	46.6	11.9	2.1	29.3	.6	5.4	47.0	.7	.7	33.2	.0
Oshana	29.2	7.2	27.8	3.6	1.7	.3	10.3	26.9	.3	1.4	10.3	.0
Oshikoto	46.9	18.5	26.0	3.7	1.1	.0	4.6	26.2	1.1	7.9	4.4	.9
Otjozondjupa	47.6	10.4	18.0	2.4	1.8	.0	3.0	23.7	.9	.9	4.7	1.5
Zambezi	27.4	36.6	13.0	1.7	12.0	4.5	2.1	24.3	.7	2.7	7.9	.0

Household could mention more than one source
Percentages are based on number of households

Although the sources of income varies across regions, it seems like household members are not geared toward taking up initiatives that generates sources of income therefore relying on formal employment and government support such as social grants and social safety nets. Further the World bank (2023) stress that lagging human capital, and poor access to basic services especially in rural areas, are interrelated problems and may affect income generation.

Section 2: Fish Consumption

This section presents fish consumption results based on the weighted data. The measurement for the per capita fish consumption must be anchored on a specific time, where in this case we used the past 30 days, as the most realistic period of time to be considered and can easily be converted and raised to a year. The amount of fish consumed by the household was expressed in kilograms, which formed part of the calculations for the per capita fish consumption of households at regional and national levels. For purposes of comparison, we used the socio-economic relationship between the rural and urban components to understand the fish consumption.

2.1. Households fish consumption

Overall, the survey revealed that at least 55.9% of the households consumed fish or fish products in the past 30 days whereas 44.1% did not consume fish or fish products in the same period (Figure 4).

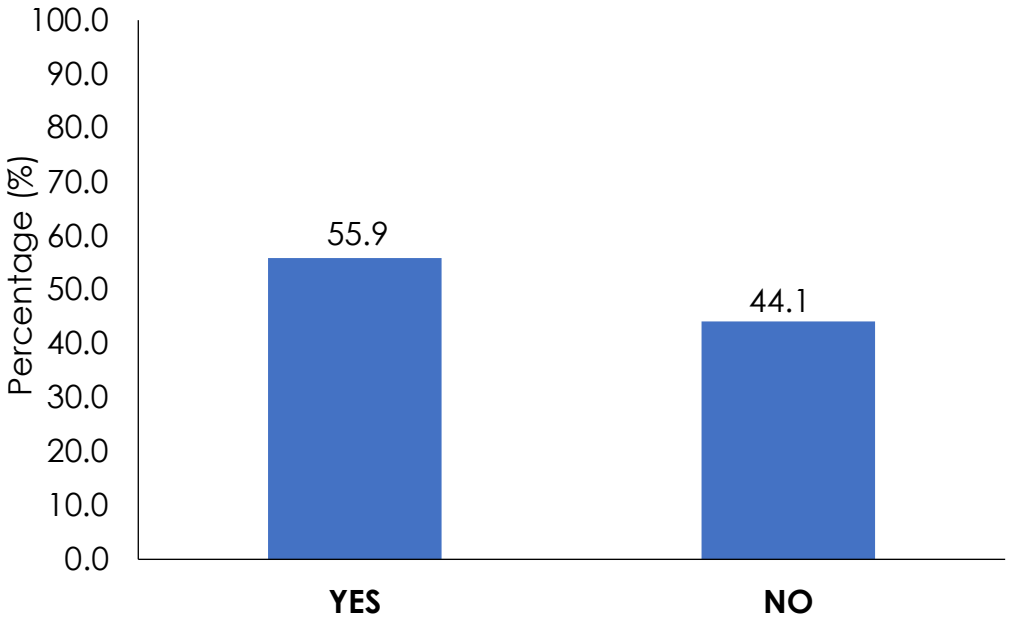

Figure 4. Household fish or fish products consumption in the past 30 days.

Table 17 compares fish consumption in rural and urban settings. More people (53.9%) in the urban areas have consumed fish in the past 30 days than in rural areas (46.1%). It could be deduced that rural communities in Namibia as well as Sub-Saharan Africa are generally poorer than the national averages affecting their fish consumption. Seemingly, rural

communities intensify individual fishing efforts with subsequent overcapitalization and overexploitation of capture fisheries with possibilities to encourage upward pressure on fish prices and consequently decrease fish consumption in rural areas (Gordon at el., 2013).

Table 17 Fish consumption in the past 30 days by strata.

Area	Consumed Fish in the past 30 days			
	Yes		No	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Rural	1365	46.1	1300	55.6
Urban	1596	53.9	1038	44.4
Total	2961	100	2338	100

Table 18 shows the households fish or fish products consumption in the past 30 days by region. Fish consumption was highest in the Khomas region (20.7%). Ohangwena (11.6%) emerged as the region with the second highest fish consumption while other regions scored in the following order: Erongo (9.9%), Oshikoto (9%), Oshana (8.8%), Omusati (8.1%), Otjozondjupa (6.4%), //Kharas (5.6%), Kavango East (5.4%), Zambezi (4.6%), Kavango West (3.5%) and Kunene (2.8%). However, Hardap (2.0 %) and Omaheke regions (1.6%) had the least fish consumption rate. The highest consumption of fish in the Khomas region is consistent with Erasmus et al. (2021), who reported that most marine fish were purchased in the Khomas region compared to other regions. This could be attributed to regional population density, with Khomas being having the highest population density (NSA, 2017). Furthermore, it could also be that Khomas is predominately a commercial region with higher employment opportunities and health awareness, hence a high fish consumption rate. Although Erongo and //Kharas regions are in close proximity to the sea-ports, their fish consumption was lower compared to Khomas. Erasmus et al. (2021) reported that regional differences in fish consumption reflect variations in fish affordability, accessibility, availability, cultural food preferences, and social behaviour in Namibia.

Table 18 Household fish or fish products consumption in the past 30 days by region.

Region	HH consumed fish or fish products in the past 30 days			
	Yes		No	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
//Kharas	166	5.6	103	4.4
Erongo	293	9.9	213	9.1
Hardap	59	2.0	152	6.5
Kavango East	160	5.4	105	4.5
Kavango West	104	3.5	23	1.0
Khomas	613	20.7	330	14.1
Kunene	83	2.8	112	4.8
Ohangwena	343	11.6	131	5.6
Omaheke	47	1.6	157	6.7
Omusati	240	8.1	316	13.5
Oshana	261	8.8	164	7.0
Oshikoto	266	9.0	173	7.4
Otjozondjupa	190	6.4	194	8.3
Zambezi	136	4.6	168	7.2
Total	2961		2338	

2.3. Reasons for not consuming fish

Disentangling the main reasons for the households who did not consume fish in the past 30 days in the rural and urban areas (Table 19), the study found that in the rural areas the reasons were availability (71.7%); storage challenges (51.4%), expensive (46%), taste (42%), not interested (37.7%), health reasons (33.3%) and difficult to prepare (30.2%). Respondents in the urban areas indicated that the major reasons were culture (80.1%), difficult to prepare (69.8%); health reasons (66.7%), not interested (62.3%), taste (58%), expensive (54%) and storage challenges (48.6%). Concurring, Erasmus et al. (2021) reported that the most important factors influencing domestic fish consumption in Namibia were affordability, accessibility, health reasons, cultural values, and fish taste. Mvodo, Mbulle, and Likowo (2018) affirms that food consumption is variably affected by a whole range of factors

including food availability, accessibility and choice, which in turn may be influenced by geography, demography, disposable income, urbanization, globalization, marketing, religion, culture and consumer's attitudes. Moreso, the urban dwellers depend on the level of income, the taste and the price of fish species while in the rural locality, fish consumption depends on the availability and affordability of consumers living there as their revenue levels are usually meagre and erratic. Other reasons stated to justify some low frequencies included: being bothered by too many fish bones, lack of fish cooking skills and health concerns (Erasmus et al., 2021).

The primary reasons for not eating fish were high prices (expensive) and non-availability. This follows the economic dynamics of the market, the scarce resources tend to be expensive when the demand is high.

Table 19 Reasons why people do not eat fish in the rural and urban areas of Namibia.

	Rural	**Urban**	**Total**
Freq. (n)	500	586	1086
Expensive (%)	46	54	100
Freq. (n)	657	259	916
Availability (%)	71.7	28.3	100
Freq. (n)	7	10	17
Taste (%)	42	58	100
Freq. (n)	8	17	25
Difficult to prepare (%)	30.2	69.8	100
Freq. (n)	13	27	40
Health reasons (%)	33.3	66.7	100
Freq. (n)	2	8	10
Culture (%)	19.9	80.1	100
Freq. (n)	17	17	34
Storage challenges (%)	51.4	48.6	100
Freq. (n)	79	131	210
Not interested at all (%)	37.7	62.3	100

The reasons for not consuming fish also varied across regions (Table 20). High price (expensive) as a deterred for eating fish featured most in Khomas, Omusati, Oshana and Erongo regions while availability was prominent in Omusati, Hardap, Omaheke and Erongo. Interestingly, it seems like even fish epi-centre regions such as Erongo region fish availability

to the local market is an issue. Sizeable number of respondents in Khomas and Otjozondjupa indicated that they were not interesting in eating fish.

Table 20. Reasons for not consuming fish or fish product in the last 30 days in the 14 regions of Namibia.

Region	Freq. (n)	Expensive (%)	Freq. (n)	Availability (%)	Freq. (n)	Taste (%)	Freq. (n)	Difficult to prepare (%)	Freq. (n)	Health reasons (%)	Freq. (n)	Culture (%)	Freq. (n)	Storage challenges (%)	Freq. (n)	Not interested at all (%)
||Karas	63	5.8	30	3.3	1	4.9	0	0	1	3.4	2	19.9	4	11.3	3	1.3
Erongo	111	10.2	77	8.4	0	0	3	11.1	2	4.4	0	0	1	2.7	19	9.1
Hardap	61	5.6	81	8.8	0	0	0	0	0	0	0	0	0	0	7	3.3
Kavango East	25	2.3	63	6.9	0	0	3	10.2	5	13.3	0	0	0	0	8	3.8
Kavango West	15	1.4	3	0.3	1	8.6	0	0.6	0	0.7	0	1.5	2	7.2	2	0.8
Khomas	173	15.9	72	7.9	5	32.2	10	39.9	11	27.2	5	52.7	2	6.5	57	27.3
Kunene	40	3.7	60	6.6	0	0	1	4.4	0	0	0	0	1	3.2	7	3.3
Ohangwena	72	6.6	37	4	2	13.7	1	5	7	17.6	0	0	6	17.5	9	4.1
Omaheke	49	4.5	79	8.6	2	9.8	2	7.1	1	2.5	0	0	7	21.5	16	7.6
Omusati	159	14.6	140	15.3	1	3.8	4	14.5	2	4.7	1	7.2	2	7.2	5	2.2
Oshana	124	11.4	29	3.2	2	13.8	0	0	4	9.2	0	0	0	0	8	4
Oshikoto	96	8.8	52	5.7	0	0	1	3.7	1	2.4	0	0	3	9.6	21	10.1
Otjozondjupa	78	7.2	64	7	1	4.9	1	3.6	2	4.4	2	18.6	2	6.4	46	21.8
Zambezi	23	2.1	128	14	1	8.2	0	0	4	10.2	0	0	2	7	3	1.2
Total	1086	100	916	100	17	100	25	100	40	100	10	100	34	100	210	100

2.4. Types of fish consumed

Table 21 represents the most consumed type by region. Most consumed fish is horse mackerel, hake and pilchard. Other fish types such as tilapia, snoek, angelfish and catfish were also consumed in high percentages compared to others. Horse mackerel is popular in many regions, with particularly significant percentages in Oshana (94.50%), Ohangwena (92.80%), Kavango West (91.80%), Oshikoto (89%), Kavango East (85.6%)and Omusati (84.4%). Hake is most popular in Kharas (53.50%) and Khomas (52.6%). Pilchard is popular in Hardap (75.00%) and has a notable presence in Kunene(66.7%) and Otjozondjupa (50.6%). Tilapia stands out in the Zambezi region (64.20%) and Kavango East (52.10%), representing the popular fish types consumed in those regions. Snoek is somehow evenly distributed, with the highest consumption percentage in Hardap (18.80%) and //Kharas (12.5%)regions. Angelfish is prominent in //Kharas (17.40%) and Otjozondjupa. Catfish is relatively consumed in Zambezi (25.5%), Omusati (12.4), Oshikoto (10.6%) as well as in Kharas (9.7%) and Ohangwena (9.2%) but not popular in other regions. Other fish types such as Reds Dentex, Kabeljou, Galjoen, Zambezi Bream and others also featured in a minute proportion across the regions.

Onumah et al. (2020) confirms that small pelagic fish species such as mackerel, sardinella, and anchovies are commonly consumed compared to large pelagic and farmed fish species, due to prices. In the same vein, Gordonet al (2013) reported that fish consumption is defined by fish imports which are dominated by small pelagics, including anchovies, herrings, mackerels, and sardines. Particularly, Namibia's exports are mainly small pelagics, most of which are destined for South Africa, particularly canned pilchards and anchovy meal or oil; while 70% of its horse mackerel to the DRC (MFMR, 2022). These could be the reason why horse mackerel, hake and pilchard were most consumed.

Table 21. Type of fish consumed within regions.

Regions / Fish types	||Kharas	Erongo	Hardap	Kavango East	Kavango West	Khomas	Kunene	Ohangwena	Omaheke	Omusati	Oshana	Oshikoto	Otjozondjupa	Zambezi	Total
	Percentages %														
Horse mackerel	32.60	47.50	21.90	85.60	91.80	69.50	17.40	92.80	41.00	84.40	94.50	89.00	52.00	56.90	2078
Hake	53.50	34.30	39.10	46.10	17.10	52.60	43.50	32.80	25.60	36.90	24.70	31.10	34.50	4.40	1096
Monkfish	0.70	0.60	0.00	0.00	0.00	0.40	0.00	2.30	2.60	0.00	1.40	0.40	0.00	0.00	18
Pilchard	22.20	19.10	75.00	24.00	6.80	24.50	66.70	4.30	38.50	2.70	5.90	13.20	50.60	19.70	600
Catfish	9.70	3.10	0.00	8.40	2.70	2.20	1.40	9.20	2.60	12.40	6.40	10.60	2.30	25.50	197
Tilapia	6.90	1.90	4.70	52.10	18.50	4.20	13.00	2.60	2.60	2.20	7.80	5.10	2.30	64.20	307
Snoek	12.50	10.50	18.80	9.60	0.70	10.80	2.90	6.20	2.60	4.90	1.40	8.40	10.50	2.20	234
Galjoen	2.10	2.50	3.10	0.00	0.00	1.30	1.40	0.30	0.00	3.60	0.50	0.70	0.60	0.00	36
Kingklip	1.40	0.90	0.00	0.60	0.00	1.50	0.00	1.00	0.00	0.10	0.00	0.70	0.60	0.00	23
Kabeljou	2.10	4.30	3.10	1.80	0.00	1.20	0.00	1.00	20.50	1.30	0.00	1.10	2.90	0.00	52
Angelfish	17.40	8.00	4.70	3.00	0.70	8.80	0.00	9.50	10.30	0.40	4.10	5.90	14.00	0.70	203
Reds dentex	6.30	1.20	0.00	4.80	10.30	3.30	0.00	0.00	0.00	0.40	1.80	0.70	0.00	2.20	68
Zambezi bream	0.00	0.00	0.00	0.00	0.00	0.30	0.00	0.00	0.00	0.00	0.00	0.40	0.60	16.80	27
Other	18.80	3.70	1.60	1.20	0.70	3.60	0.00	2.00	7.70	1.80	6.40	2.20	1.20	10.20	116
Total	144	324	64	167	146	673	69	305	39	225	219	273	171	137	2956

Table 22 depicts the consumed fish type across the different regions of Namibia**.** Horse mackerel is quite popular across the board, but it shows a strong presence in regions such as Khomas (22.50%), Ohangwena (13.60%), and Oshikoto (11.70%). Hake is also a prominent choice, with high consumption percentages in Khomas (32.30%), Oshana (7.80%), and //Kharas (7.00%). Monkfish, although less popular overall, is notably consumed in Ohangwena (38.90%) and Khomas (16.70%). Pilchard finds favor in Khomas (27.50%), Kunene (14.50%), and Hardap (8.00%). Catfish shows significant popularity in Ohangwena (14.70%) and Kunene (14.20%). Tilapia has a remarkable presence in Kavango East (28.30%) and also in Khomas (9.10%). Snoek is preferred in regions like Khomas (32.10%) and Erongo (14.50%). Galjoen stands out in Erongo (22.20%) and Khomas (25.00%). Kingklip is notably more popular in Khomas (43.50%) and Erongo (13.00%). Kabeljou has a strong presence in regions like Erongo (26.90%) and Khomas (15.40%). Angelfish is well-received in Khomas (29.10%) and Ohangwena (14.30%). Reds Dentex is highly favored in Khomas (32.40%) and Oshana (22.10%). Zambezi Bream is significant in the Zambezi region (85.20%). The "Other" category shows diversity in preferences, with Khomas (20.70%) and Ohangwena (12.10%) showing notable percentages.

Table 22. Consumed fish type across the different regions of Namibia.

Region	//Kharas	Erongo	Hardap	Kavango East	Kavango West	Khomas	Kunene	Ohangwena	Omaheke	Omusati	Oshana	Oshikoto	Otjozondjupa	Zambezi	
Fish types	**Percentage %**														**Total**
Horse mackerel	2.30	7.40	0.70	6.90	6.40	22.50	0.60	13.60	0.80	9.10	10.00	11.70	4.30	3.80	2078
Hake	7.00	10.10	2.30	7.00	2.30	32.30	2.70	9.10	0.90	7.60	4.90	7.80	5.40	0.50	1096
Monkfish	5.60	11.10	0.00	0.00	0.00	16.70	0.00	38.90	5.60	0.00	16.70	5.60	0.00	0.00	18
Pilchard	5.30	10.30	8.00	6.70	1.70	27.50	7.70	2.20	2.50	1.00	2.20	6.00	14.50	4.50	600
Catfish	7.10	5.10	0.00	7.10	8.00	7.60	0.50	14.20	0.50	14.20	7.10	14.70	2.00	17.80	197
Tilapia	3.30	2.00	1.00	28.30	8.80	9.10	2.90	2.60	0.30	1.60	5.50	4.60	1.30	28.70	307
Snoek	7.70	14.50	5.10	6.80	0.40	32.10	0.90	8.10	0.40	4.70	1.30	9.80	7.70	1.30	234
Galjoen	8.30	22.20	5.60	0.00	0.00	25.00	2.80	2.80	0.00	22.20	2.80	5.60	2.80	0.00	36
Kingklip	8.70	13.00	0.00	4.30	0.00	43.50	0.00	13.00	0.00	4.30	0.00	8.70	4.30	0.00	23
Kabeljou	5.80	26.90	3.80	5.80	0.00	15.40	0.00	5.80	15.40	5.80	0.00	5.80	9.60	0.00	52
Angelfish	12.30	12.80	1.50	2.50	0.50	29.10	0.00	14.30	2.00	0.50	4.40	7.90	11.80	0.50	203
Reds dentex	13.20	5.90	0.00	11.80	22.10	32.40	0.00	0.00	0.00	1.50	5.90	2.90	0.00	4.40	68
Zambezi bream	0.00	0.00	0.00	0.00	0.00	7.40	0.00	0.00	0.00	0.00	0.00	3.70	3.70	85.20	27
Other	23.30	10.30	0.90	1.70	0.90	20.70	0.00	5.20	2.60	3.40	12.10	5.20	1.70	12.10	116
Total	144	324	64	167	146	673	69	305	39	225	219	273	171	137	2956

Fish type popularity within the rural and urban stratum across Namibia is presented in Table 23. Horse mackerel is the most popular fish type in both rural (75.0%) and urban (67.4%) areas. Hake is the second most popular fish type in both rural (26.5%) and urban (43.6%) areas. Pilchard is a notable choice in both rural (19.1%) and urban (21.0%) areas, making it a well-received fish type in both settings. Tilapia is more popular in rural areas (11.6%) compared to urban areas (9.6%). Catfish is more popular in rural areas (11.2%) compared to urban areas (3.8%). Snoek has a higher preference in urban areas (10.1%) compared to rural areas (4.4%). Angelfish is more popular in urban areas (9.0%) compared to rural areas (3.5%). Other fish types such as Reds Dentex, Kabeljou, Galjoen, Kingklip, Zambezi Bream and others also featured in a minute proportion across the regions.

Table 23. Fish type popularity within the rural and urban stratum across Namibia.

	Rural and urban strata				Total
	Rural		Urban		
Fish types	**Frequency**	**%**	**Frequency**	**%**	**Frequency**
Horse mackerel	847	75.0	1231	67.4	2078
Hake	300	26.5	796	43.6	1096
Monkfish	2	0.2	16	0.9	18
Pilchard	216	19.1	384	21.0	600
Catfish	127	11.2	70	3.8	197
Tilapia	131	11.6	176	9.6	307
Snoek	50	4.4	184	10.1	234
Galjoen	6	0.5	30	1.6	36
Kingklip	2	0.2	21	1.2	23
Kabeljou	8	0.7	44	2.4	52
Angelfish	39	3.5	164	9.0	203
Reds dentex	17	1.5	51	2.8	68
Zambezi bream	13	1.2	14	0.8	27
Other	46	4.1	70	3.8	116
Total	1130		1826		2956

Weighted percentages and totals are based on respondents.

Table 24 provides a comparison of fish type popularity between urban and rural areas. Horse mackerel is more popular in urban areas (59.2%) compared to rural areas (40.8%). Despite this, it remains a widely favored fish type in both settings. Hake is significantly more popular in urban areas (72.6%) than in rural areas (27.4%). It's a clear urban-oriented fish type. Monkfish is much more popular in urban areas (88.9%) than in rural areas (11.1%). Pilchard is preferred in both urban (64.0%) and rural (36.0%) areas, but urban areas show a higher preference. Catfish is notably more popular in rural areas (64.5%) compared to urban areas (35.5%). Tilapia is more popular in rural areas (57.3%) compared to urban areas (42.7%). Snoek is preferred in urban areas (78.6%) compared to rural areas (21.4%). Galjoen is much more popular in urban areas (83.3%) than in rural areas (16.7%). Kingklip is also more popular in urban areas (91.3%) compared to rural areas (8.7%). Kabeljou is significantly more popular in urban areas (84.6%) than in rural areas (15.4%). Angelfish is notably more popular in urban areas (80.8%) compared to rural areas (19.2%). Reds Dentex is more popular in urban areas (75.0%) compared to rural areas (25.0%). Zambezi Bream is significantly more popular in rural areas (48.1%) compared to urban areas (51.9%). The "Other" category has a higher preference in urban areas (60.3%) compared to rural areas (39.7%).

Table 24. Fish type popularity between rural and urban strata across Namibia.

Fish types	Rural and urban strata				Total Frequency
	Rural		Urban		
	Frequency	%	Frequency	%	
Horse mackerel	847	40.8	1231	59.2	2078
Hake	300	27.4	796	72.6	1096
Monkfish	2	11.1	16	88.9	18
Pilchard	216	36.0	384	64.0	600
Catfish	127	64.5	70	35.5	197
Tilapia	131	42.7	176	57.3	307
Snoek	50	21.4	184	78.6	234
Galjoen	6	16.7	30	83.3	36
Kingklip	2	8.7	21	91.3	23
Kabeljou	8	15.4	44	84.6	52
Angelfish	39	19.2	164	80.8	203
Reds dentex	17	25.0	51	75.0	68
Zambezi bream	13	48.1	14	51.9	27
Other	46	39.7	70	60.3	116
Total	1130		1826		2956

Weighted percentages and totals are based on respondents.

2.4. Fish type preference

Table 25 shows fish type preference across Namibia aggregated by region. Horse mackerel is a popular favourite fish across various regions, with the highest preferences in Ohangwena (19.5%), Khomas (18.8%), Omusati (14.0%), Oshana (11.5%) and Oshikoto (10.0%) regions. Hake is another favourite, with a significant presence in regions like Khomas (28.8%), Erongo (12.9%) and Oshikoto (10.9%). Monkfish is most favoured in Erongo, where a substantial 64.6% of respondents prefer it as their favourite. It has limited popularity in other regions. Pilchard has notable preferences in regions likeOtjondjozupa (24.8%), Khomas (20.0%), Kunene (13.9) and Erongo (12.2%). Catfish is more popular in Omusati (17.2%), //Kharas (15.7%), Oshikoto (14.4%) and has some presence in Erongo (13.4%). Tilapia is

preferred in Zambezi (43.2%) and Kavango East (22.3%). Snoek is quite popular in Khomas (27.0%) and Erongo (19.6%). Galjoen is notably favored in Erongo (35.8%) and Khomas (29.8%). Kabeljou is a favourite in Erongo (33.0% and Omaheke (32.7%). Kingklip has a preferred in Khomas (39.4%) and is liked in Erongo (31.3%). Rock lobster is favored in Ohangwena (53.5%) and Khomas (46.5%) but it's not popular in other regions. Crab preferences are concentrated in Omusati (55.1%) and Oshikoto (44.9). The "Other" category is popular in Khomas (18.3%), Erongo (15.6) and Oshana (14.7%).

The table highlights the diversity in favourite fish preferences across the regions of Namibia

Table 25. Fish type preference across Namibia aggregated by region.

Region	Horse Mackerel	Hake	Monkfish	Pilchard	Catfish	Tilapia	Snoek	Galjoen	Kabeljou	Kingklip	Rock lobster	Crab	Other
							Percentages (%)						
//Kharas	2.3	9.6		4.1	15.7	2.5	8.9	9.2	7.2	10.2			10.4
Erongo	5.1	12.9	64.6	12.2	13.4	1.5	19.6	35.8	33.0	31.3			15.6
Hardap	0.5	2.4		8.9			8.6	6.6					0.2
Kavango East	7.1	2.2		1.3	5.1	22.3	0.6						2.6
Kavango West	5.7	1.2		0.1		5.2	0.9						3.2
Khomas	18.8	28.8		20.0	6.8	10.2	27.0	29.8	19.0	39.4	46.5		18.3
Kunene	0.2	5.3		13.9	2.3	6.2							0.3
Ohangwena	19.5	5.9	17.3	1.3	7.3		6.6				53.5		8.9
Omaheke	0.9	2.0		4.6			0.6		32.7	6.7			0.7
Omusati	14.0	4.9		2.1	17.2	0.7	4.8	7.2				55.1	0.5
Oshana	11.5	7.2		0.9	2.5	1.4	6.0						14.7
Oshikoto	10.0	10.9	18.1	5.5	14.4	3.5	10.1			12.4		44.9	6.9
Otjozondjupa	2.7	6.3		24.8	3.7	3.4	4.7	11.4	8.1				9.4
Zambezi	1.7	0.3		0.5	11.6	43.2	1.4						8.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 26 shows the relationship between favourite fish types and geographical location. The results shows that there is a significant association between the variables "Household's favourite fish" and "Rural/Urban (p=0.00)." In other words, the choice of favourite fish varies significantly between rural and urban households. In summary, these results suggest that there is a strong and significant association between "Household's favourite fish" and place of their residence (Rural/Urban).

Table 26. Relationship between favourite fish type and geographical location.

		Chi-Square	Adjusted F	df1	df2	Sig.
Household's favourite fish	Pearson	2065.806	16.380	16.910	541.111	.000
	Likelihood Ratio	1596.219	12.656	16.910	541.111	.000
Rural/Urban * Household's favourite fish	Pearson	142.874	10.726	6.543	209.382	.000
	Likelihood Ratio	155.102	11.644	6.543	209.382	.000

The comparison of preferred fish types between rural and urban stratum in Namibia is presented in Table 27. Horse Mackerel is most preferred in rural areas (52.9%) than urban areas (47.1%). Hake is significantly more preferred in the urban stratum (66.4%) compared to the rural stratum (33.6%). Monkfish is overwhelmingly preferred in the urban stratum (81.9%), while it has limited popularity in the rural stratum (18.1%). The preference of pilchard is 51.5% in rural and 48.5% in urban. Catfish is highly favoured in the rural stratum (68.9%) but less so in the urban stratum (31.1%). Tilapia is more popular in the rural stratum (61.3%) compared to the urban stratum (38.7%). Snoek is more favoured in the urban stratum (66.5%) than in the rural stratum (33.5%). Galjoen is significantly more popular in the urban stratum (80.8%) compared to the rural stratum (19.2%). Kabeljou is preferred in urban areas only (100%). Kingklip is highly popular in the urban stratum (94.2%) but less so in the rural stratum (5.8%). Rock lobster is liked by a similar percentage of respondents in both strata. Crab is more favored in the rural stratum (55.1%) compared to the urban stratum (44.9%). The "Other" category is more popular in the urban stratum (60.9%) compared to the rural stratum (39.1%). These comparisons demonstrate distinct variations in favourite fish

preferences between the Rural and Urban strata, reflecting the influence of geographical and lifestyle factors on fish consumption choices.

In summary, Horse Mackerel, catfish, tilapia, Rock lobster, crabs and pilchard are most preferred in rural areas whereas, hake, monk, snoek, and Galjoen are most preferred in urban areas. Freshwater fish such as catfish and tilapia are mainly preferred in the rural areas particularly in the Northern regions because of large freshwater bodies such as rivers and dams or /and flood water.

Table 27. Comparison of preferred fish type between rural and urban stratum in Namibia.

Strata	**Rural**	**Urban**
Fish type	**Weighted percentage**	
Horse Mackerel	52.9	47.1
Hake	33.6	66.4
Monk	18.1	81.9
Pilchard	51.5	48.5
Catfish	68.9	31.1
Tilapia	61.3	38.7
Snoek	33.5	66.5
Galjoen	19.2	80.8
Kabeljou		100.0
Kingklip	5.8	94.2
Rock lobster	53.5	46.5
Crab	55.1	44.9
Other	39.1	60.9
Total	46.1	53.9

2.5. Frequency of fish consumption

Figure 5 provides an overview of fish consumption frequency in Namibia. Overall, 34.9% participants indicated that they consume fish once a week, 28.5% indicated others "varying habits", 21.3% once a month and only 15.3% of participants consume fish every day. This implies that fish is not the main source of protein in the households. However the daily (15.3%) and weekly fish consumption (34.9%) symbolizes a positive impact of NFCPT in promoting fish consumption across the country.

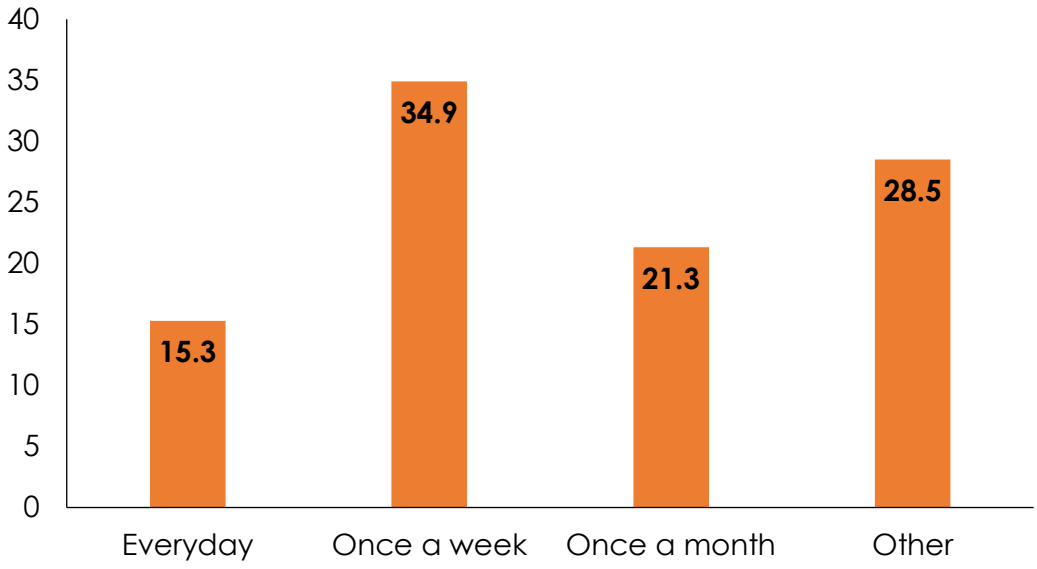

Figure 5. The frequency of fish consumptions among households.

Table 28 shows how often fish is consumed in households by region, categorized as "Every day," "Once a week," "Once a month," and "Other." The fish consumptions varies across regions. A big proportion of fish consumers are in the Khomas region, with 24.6% of households eating fish daily and 20.9% once a week. Erongo had the highest proportion of households consuming fish once a month at 19.2%. Additionally, the "Other" category which represents varying consumption patterns, Khomas region had the highest percentage (23.4%), indicating diverse fish consumption habits. Overall, there is variation in fish consumption across different regions, with Khomas having a high fish consumption frequency as demonstrated by their consumption patterns. The frequency of fish

consumption is lower in Omaheke, Hardap and Kunene regions as compared to other regions.

Table 28. The frequency of fish consumptions by regions.

	How often a House hold consumes fish				
Regions	**Everyday**	**Once a week**	**Once a month**	**Other**	**Total**
//Kharas	2.2	6.6	9.6	3.1	5.6
Erongo	9.6	7.3	19.2	6.3	9.9
Hardap	0.5	2.1	4.3	1.1	2.0
Kavango East	7.4	6.5	2.9	4.9	5.4
Kavango West	2.2	2.8	2.7	5.8	3.5
Khomas	24.6	20.9	14.1	23.4	20.7
Kunene	1.6	2.7	5.7	1.3	2.8
Ohangwena	16.8	11.6	4.8	13.8	11.6
Omaheke	1.1	1.7	2.0	1.4	1.6
Omusati	8.0	10.0	7.2	6.6	8.1
Oshana	8.2	11.7	4.8	8.6	8.8
Oshikoto	12.9	6.8	4.0	13.4	9.0
Otjozondjupa	2.0	5.5	11.6	6.0	6.4
Zambezi	3.0	3.9	7.1	4.3	4.6
Total	100.0	100.0	100.0	100.0	100.0

Fish consumption frequency among households within each region is shown in Table 29. Overall, the results indicates variation in fish consumption patterns among households within each region. Over 40% of households in Oshana, Omusati, Kavango East and //Kharas consumed fish once a month. Furthermore, over 40% of households in Hardap, Kunene and Erongo consumed fish once a month. The "Other" category, indicating varying habits of

fish consumption featured prominently, with above 40% of the households in Kavango West and Oshikoto indicating other category. Daily consumption of fish was not common as only above 20% of households in Ohangwena, Oshikoto and Kavango East eat fish were reported.

Table 29. Fish consumption frequency within each region of Namibia.

	How often a House hold consumes fish			
Region	**Everyday**	**Once a week**	**Once a month**	**Other**
//Kharas	5.9	41.3	36.9	15.9
Erongo	14.9	25.6	41.3	18.2
Hardap	3.8	36.2	44.5	15.5
Kavango East	20.8	42.0	11.3	25.8
Kavango West	9.3	27.5	16.4	46.8
Khomas	18.1	35.2	14.5	32.2
Kunene	8.8	34.2	43.6	13.4
Ohangwena	22.2	34.9	8.9	34.0
Omaheke	10.4	37.2	27.2	25.2
Omusati	15.1	43.1	18.8	23.1
Oshana	14.3	46.3	11.6	27.7
Oshikoto	21.9	26.4	9.5	42.2
Otjozondjupa	4.8	29.8	38.6	26.8
Zambezi	10.0	29.6	33.3	27.2
Total	15.3	34.9	21.3	28.5

Table 30 presents the results of an analysis examining the relationship between fish consumption frequency and geographical location. The Pearson and Likelihood Ratio chi-square statistics for the interaction between "Region" and "How often HH consumes fish" indicate a highly significant association, with p-values of .000. However, in the case of the interaction between "Rural/Urban" and "How often HH consumes fish," neither the Pearson nor the Likelihood Ratio chi-square statistics show a significant relationship, with p-values of

.427 and .425, respectively. The results suggest that fish consumption frequency is significantly associated with the region of residence, but not with the rural or urban status of households. The adjusted F statistic, a variant of the second-order Rao-Scott adjusted chi-square, underscores the significance of the findings.

Table 30. Relationship between fish consumption frequency and geographical location.

		Chi-Square	Adjusted F	df1	df2	Sig.
Region * How often HH consumes fish	Pearson	387.755	7.147	10.805	345.751	.000
	Likelihood Ratio	384.862	7.093	10.805	345.751	.000
Rural/Urban * How often HH consumes fish	Pearson	5.748	.818	1.658	53.041	.427
	Likelihood Ratio	5.775	.822	1.658	53.041	.425

The adjusted F is a variant of the second-order Rao-Scott adjusted chi-square statistic. Significance is based on the adjusted F and its degrees of freedom.

2.6. Per Capita Fish Consumption

The mean monthly per capita fish consumption is presented in Table 31.

The results show the mean monthly per capita fish consumption in Namibia is 1.42 kg per person (this study). The mean monthly per capita fish consumption in rural areas above 2 kilograms was reported in Erongo (2.42 kg) and Oshikoto (2.39 kg) regions. In the urban area, Oshikoto (3.20 kg), Kavango West (2.75 kg), Erongo (2.63 kg), Ohangwena (2.60) and Oshana (2.32 kg) regions had a mean monthly per capital fish consumption of above 2 kg. The lowest mean monthly per capita fish consumption in rural area was 0.21 kgs reported in Khomas region, whereas in urban areas it was Otjozondjupa region with 0.64 kgs.

Table 31. Monthly per capita fish consumption in kilograms by region and cluster.

Region	Cluster	Mean	Standard Error	Coefficient of Variation
//Kharas	Rural	1.15	.00	.00
	Urban	.87	.06	.06
Erongo	Rural	2.42	.00	.00
	Urban	2.63	.30	.11
Hardap	Rural	1.13	.00	.00
	Urban	.96	.19	.20
Kavango East	Rural	1.04	.00	.00
	Urban	1.50	.03	.02
Kavango West	Rural	1.05	.00	.00
	Urban	2.75	.00	.00
Khomas	Rural	.21	.00	.00
	Urban	1.12	.10	.09
Kunene	Rural	1.35	.00	.00
	Urban	1.61	.00	.00
Ohangwena	Rural	1.46	.26	.18
	Urban	2.66	.00	.00
Omaheke	Rural	1.17	.00	.00
	Urban	.71	.00	.00
Omusati	Rural	.88	.19	.22
	Urban	1.01	.00	.00
Oshana	Rural	1.01	.32	.32
	Urban	2.32	.00	.00
Oshikoto	Rural	2.39	.17	.07
	Urban	3.20	.00	.00
Otjozondjupa	Rural	.99	.00	.00
	Urban	.64	.03	.04
Zambezi	Rural	1.13	.01	.01
	Urban	.81	.00	.00

The yearly per capita fish consumption in Namibia is presented in Table 32. On average the yearly per capita fish consumption is 18.07 kilograms with a standard error is 0.62, and a positive coefficient of of 0.34, suggesting some low variability in the data.

Table 32. Yearly per capita fish consumption in kilograms in Namibia.

		Mean	Standard Error	Coefficient of Variation
Mean	Kilograms consumed per person/year	18.071986	.6152396	.034

The yearly per capita fish consumption by regions is presented in Table 33.

In summary, the results shows that the yearly per capital fish consumption of above the national average (18.07 kg) in rural area is recorded in the Erongo (29.05 kg) and Oshikoto (28.73 kg), whereas in urban areas its reported in Oshikoto (33.73 kg), Kavango West (33 kg), Ohangwena (31.88 kg), Erongo (31.56 kg), Oshana (27.8 kg) and Kunene (19.36 kg) regions. Other regions reported the yearly per capital fish consumption below the national average, with the lowest of 2.55 kg in Khomas-rural and 7.66 kg in Otjozondjupa-urban.

The results shows an increase in the per capita fish consumption from 16.59 kg in 2021 (NFCPT, 2023) to 18.07 kg in 2023, possibly due to the promotion of fish consumption by NFCPT. This trend is similar to the pattern observed in Eastern Africa. The Eastern Africa region is projected to realize increased fish consumption from 4.80 kg in 2013 to 5.49 kg by 2022 due to increase in fish imports and growing of fish supply from aquaculture (Obiero et al., 2019).

The production of fish and fisheries worldwide is approximately 154 million tons per year, and their consumption is 18.5 per capita per year (World fish, 2023). Global fish consumption is expected to increase over the next decade, reaching 21.2 kg per capita in 2032, up from an average of 20.4 kg per capita in 2020-22 (OECD/FAO, 2023). The current per capita fish consumption in Africa is 10.5 kg (Asiedu et al., 2023). Apart from population growth, other factors such as decline in catches, IUU (Illegal, unreported, and unregulated) fishing, underdeveloped aquaculture industry, large postharvest losses, climate change, policy, and lack of good landing, road, and market infrastructure can also impact fish availability, demand, and consumption (Gordon & Pulis, 2012; Asiedu et al., 2023). The SADC per capita

fish consumption stood at in 2016, while Namibia's per capita fish consumption stood at 11.4 kg per person per year, which was way above the SADC's per capita fish consumption of 11.3 kg (SADC, 2019). This study found that the per capita fish consumption increased to 18.07 kg in 2023. However, there is a need to increase the percentage fish supply to reach the global recommended per capita consumption of 19 kg by 2025 (SADC, 2019). The Global recommended target can be easily reached with increased effort to increase fish availability and affordability in all communities in Namibia.

Table 33. Yearly per capita fish consumption in kilograms for each Region and strata.

Region	Cluster	Mean	Standard Error	Coefficient of Variation
//Kharas	Rural	13.82	.00	.00
	Urban	10.43	.67	.06
Erongo	Rural	29.05	.00	.00
	Urban	31.56	3.59	.11
Hardap	Rural	13.51	.00	.00
	Urban	11.50	2.26	.20
Kavango East	Rural	12.45	.00	.00
	Urban	.03	.41	.02
Kavango West	Rural	12.60	.00	.00
	Urban	33.00	.00	.00
Khomas	Rural	2.55	.00	.00
	Urban	13.46	1.16	.09
Kunene	Rural	16.23	.00	.00
	Urban	19.36	.00	.00
Ohangwena	Rural	17.55	3.17	.18
	Urban	31.88	.00	.00
Omaheke	Rural	14.07	.00	.00
	Urban	8.50	.00	.00
Omusati	Rural	10.58	2.30	.22
	Urban	12.15	.00	.00
Oshana	Rural	12.07	3.82	.32
	Urban	27.80	.01	.00
Oshikoto	Rural	28.73	2.08	.07
	Urban	38.37	.00	.00
Otjozondjupa	Rural	11.87	.00	.00
	Urban	7.66	.31	.04
Zambezi	Rural	13.56	.14	.01
	Urban	9.71	.00	.00

2.7. Average price of fish

The average price of fish across the regions vary considerably as shown in Table 34. The highest average fish price per kg in rural areas was reported in Kunene (N$122.63), whereas in urban areas the highest was reported in Hardap (N$103.35). The lowest average fish price

in rural areas was reported in Ohangwena (N$27.17)) whereas in urban areas the lowest was reported in Ohangwena (N$29.78). There is a wide range between the lowest and the highest average prices possibly due to difference in sources of fish, availability, fish type, transportation, storage facilities and culture among other factors. Furthermore, the substitution effects between fish and other type of meat also affect the price. For instance the recent price spike in the beef industry could result in the increase of fish price. For instance, beef prices is approximately N$ 110/kg.

The mean expenditure on fish consumption per week is estimated to be GHS 31.15 (Euro 4.94 ≅ 0.16) (Onumah et al., 2020), converted to NAD 48.94 (30 October 2023), in the range of the price of fish in some of the regions in Namibia. Arguably, fish is not affordable in Namibia (Erasmus et al., 2021).

Table 34. Fish price per kilogram across different regions in Namibia.

Region	Cluster	Average	Standard Error	Coefficient of Variation
||Kharas	Rural	77.92	.00	.00
	Urban	81.22	3.88	.05
Erongo	Rural	107.22	.00	.00
	Urban	51.59	4.68	.09
Hardap	Rural	114.69	.00	.00
	Urban	103.35	4.35	.04
Kavango East	Rural	37.91	.00	.00
	Urban	39.08	5.20	.13
Kavango West	Rural	29.79	.00	.00
	Urban	33.23	.00	.00
Khomas	Rural	70.17	.00	.00
	Urban	62.48	6.94	.11
Kunene	Rural	122.63	.00	.00
	Urban	76.34	.00	.00
Ohangwena	Rural	27.17	2.32	.09
	Urban	29.78	.00	.00
Omaheke	Rural	56.41	.00	.00
	Urban	60.61	.00	.00
Omusati	Rural	70.20	5.31	.08
	Urban	91.92	.00	.00
Oshana	Rural	48.96	3.71	.08
	Urban	42.38	2.21	.05
Oshikoto	Rural	37.71	3.60	.10
	Urban	32.41	.00	.00
Otjozondjupa	Rural	87.75	.00	.00
	Urban	63.64	6.30	.10
Zambezi	Rural	74.37	8.45	.11
	Urban	58.63	.00	.00

2.7. Sources of fish

Table 35 presents sources of fish across regions in Namibia. There are variations in the sources of fish in the regions, with supermarkets, local vendors, NFCPT fish shops and private fish shops being the major sources.

Supermarkets are a popular source for fish in Khomas (22.51%). Local Vendor and private shops are also popular sources of fish in Khomas region, with 31.61% and 21.56%, respectively. . This results is in consistent with Ayuya et al. (2021) who observed an increase in local vendor to meet consumer demand for fish in Kenya. The NFCPT fish shops are a common source in Khomas (16.58%) and Oshana (14.59%) among other regions (12.47%) while in others, their use is minimal, especially in Hardap.

Fish farmers are prominent in Zambezi with a notable percentage of people acquire fish directly from fish farmers (22.58%) but they are also common in Ohangwena (16.13%) although it's not the most common source, fish farmers in those regions catch fish from fresh water bodies making it an integral part of their diets.

Kazembe et al. (2022) found that supermarkets were mostly found in higher income areas and a few located in the informal settlements in Windhoek and that they were progressively dominating the food system. It's worth noting that in the Erongo region, 42.19% of people receive fish as donations, possibly due to fish companies social responsibility programmes. In Kavango East and Zambezi, a substantial 25% and 23.81% of the population, respectively relies on their own catches, due to their geographic location. Fish Truck Sales is more prominent in Khomas (28.30%) and Omusati (20.75%) Certain regions, such as Erongo and Oshana (25%) and Kavango East (16.67), depend on food banks for fish, while in some regions, it plays a negligible role. "Others" category represents unspecified sources of fish procurement and the percentages reflect the diversity of sources across the regions, especially in Erongo (31.21%) and Zambezi (19.86%).

Table 35. Sources of fish by region in Namibia.

Region	Local vendor	Private Fish Shop	Fish Farmer	Supermarket	Donation	Own catches	Fish Truck Sales	NFCPT Fish Shop	Food Bank	Others
||Kharas	6.36	3.68	3.23	3.61	0.00	8.33	3.77	2.65	0.00	7.09
Erongo	5.09	10.37	6.45	7.56	42.19	7.14	18.87	7.69	25.00	31.21
Hardap	1.73	2.05	3.23	3.09	6.25	0.00	0.00	0.00	0.00	4.96
Kavango East	4.09	16.51	6.45	6.53	0.00	25.00	3.77	11.01	16.67	1.42
Kavango West	0.64	2.73	6.45	6.19	1.56	19.05	0.94	11.41	8.33	0.71
Khomas	31.61	21.56	9.68	22.51	9.38	2.38	28.30	16.58	0.00	10.64
Kunene	0.82	0.27	3.23	4.47	6.25	1.19	2.83	1.19	8.33	0.00
Ohangwena	9.99	7.78	16.13	11.94	0.00	4.76	6.60	12.47	0.00	13.48
Omaheke	1.00	0.00	3.23	0.95	6.25	0.00	6.60	1.19	0.00	0.00
Omusati	11.44	10.91	6.45	9.71	12.50	7.14	20.75	3.32	8.33	0.71
Oshana	6.36	9.28	6.45	3.69	1.56	0.00	2.83	14.59	25.00	2.84
Oshikoto	9.63	13.78	6.45	7.90	10.94	1.19	1.89	11.41	0.00	2.84
Otjozondjupa	6.36	0.68	0.00	7.90	1.56	0.00	2.83	2.12	0.00	4.26
Zambezi	4.90	0.41	22.58	3.95	1.56	23.81	0.00	4.38	8.33	19.86
Total	1101	733	31	1164	64	84	106	754	12	141

2.7.1. Preferred source of fish.

Table 36 shows the preferred sources of fish in rural and urban areas. The results indicates that 39% of respondents in both rural and urban areas purchase fish from supermarkets. Local vendors are also preferred source of fish in both rural and urban areas, with 42.5% and 34.1%, respectively. The NFCPT fish shops serve as a preferred source in urban areas, with 28.6% of respondents, compared to in rural areas (20.5%). Private fish shops are another significant source of fish, with 21.6% in rural and 26.8% in urban areas. Other sources (specified and unspecified) featured as preferred sources in minute proportions.

Table 36. Distribution of Fish Sources by rural and urban cluster.

Source of fish	Cluster				Total Frequency
	Rural		Urban		
	Frequency	%	Frequency	%	
Local vendor	479	42.5	622	34.1	1101
Private Fish Shop	244	21.6	489	26.8	733
Fish Farmer	14	1.2	17	0.9	31
Supermarket	441	39.1	723	39.6	1164
Donation	47	4.2	17	0.9	64
Own catches	67	5.9	17	0.9	84
Fish Truck Sales	35	3.1	71	3.9	106
NFCPT Fish Shop	231	20.5	523	28.6	754
Food Bank	8	0.7	4	0.2	12
Others	50	4.4	91	5.0	141
Total	1128		1826		2954

Percentages and totals are based on respondents.

2.7.2. Reason for preferred source of fish

Table 37 provides reasons that influence people's choice of fish sources in both rural and urban areas. Overall the main reason is affordability followed by distance, availability, quality, variety and then other reasons. The affordability of fish is a major reason for many respondents, with 52.0% from rural areas and 66.0% from urban areas. The distance to the fish source is a significant factor in both rural and urban areas, with 53.1% from rural areas and 44.2% from urban areas. The availability of fish is also a critical factor, with 32.7% from rural areas and 25.4% from urban areas. Quality is a also concern, with 10.4% from rural areas and 14.4% from urban areas. Varieties of fish available influence 4.4% from rural areas

and 6.6% from urban. Other reasons account to 4.5% are from rural areas, and 2.5% are from urban areas.

In summary, there are diverse factors influencing people's choices of fish sources in Namibia. The data underscores the importance of considering factors such as affordability, distance, availability, quality and varieties in fisheries management and food security strategies. This finding affirms that proximity to local market, and city of residence have a positive and significant influence on fish expenditure (Onumah et al., 2020).

Table 37. Reasons for Fish Source Selection by rural and urban cluster.

	Cluster				
	Rural		Urban		Total
Reasons	Frequency	%	Frequency	%	Frequency
Distance	600	53.1	809	44.2	1409
Affordability	588	52.0	1207	66.0	1795
Varieties	50	4.4	120	6.6	170
Availability	370	32.7	464	25.4	834
Quality	118	10.4	264	14.4	382
Other	51	4.5	46	2.5	97
Total	1131		1830		2961

Percentages and totals are based on respondents.

Table 38 provides a comprehensive breakdown of the reasons influencing individuals proffered sources by regions.

In the **//Kharas region**, respondents cite affordability (61.8%) as the primary reason for selecting their preferred fish source. Distance (42.4%) and quality (10.4%) are also significant factors, with other reasons like varieties and availability being less emphasized. In **Erongo,** affordability (61.0%) is a major reason for choosing a fish source, followed by distance (38.7%). Availability and quality also play a role, while other reasons are less prominent.

Respondents in **Hardap** show a strong preference due to distance (50.0%) , affordability (48.4%) and availability (26.6%) are other important factors, while varieties and quality are less emphasized. In **Kavango East**, affordability (79.6%) is the most crucial factor, followed by availability (47.3%). Distance, quality, and other factors also influence source selection. Respondents in **Kavango West** prioritize affordability (73.3%) and distance (43.2%) in their choice of fish sources. Availability (27.4%) is also important but other factors, including quality and varieties, are less significant. In **Khomas**, affordability (60.5%) and distance (56.2%) are the primary reasons for selecting fish sources. Quality (17.8%) is also important, while varieties and other factors are less emphasized. Respondents in **Kunene** value affordability (63.8%) and distance (44.9%) in their choice of fish sources. Availability (15.9%) also plays a role, while quality, varieties and other reasons are less significant. Distance (48.5%) and affordability (47.5%) are the main factors influencing fish source selection in **Ohangwena**. Availability (34.1%) and quality (16.1%) also play a role. In **Omaheke**, distance (41.0%) and affordability (38.5%) are important factors. Other respondents emphasize availability (30.8%), while quality, varieties and other factors are less significant. Respondents in **Omusati** prioritize distance (64.6%) and affordability as well as availability (46.5%) in their choice of fish sources. Varieties are also important, while other factors are less prominent. In **Oshana**, affordability (66.7%) and distance (45.7%) are significant factors influencing fish source selection. Quality (24.7%) and availability (12.8%) are also important, while varieties and other reasons are less emphasized. Respondents in **Oshikoto** value affordability (62.8%) and distance (50.0%) in their choice of fish sources. Availability (29.9%) are also influential, while quality, varieties and other factors are less prominent. Affordability (64.3%) and distance (45.6%) are important factors for respondents in **Otjozondjupa**. Availability (32.7%) is also significant in Otjozondjupa. In the **Zambezi region**, affordability (66.4%) and availability (41.6%) are the primary reasons for choosing fish sources. Distance (27.7%) is also significant, while other factors are less prominent.

In summary, most of the regions indicated affordability as the main reason with highest percentages from Kavango East (79.6%) and Kavango West (73.3%). The distance to the sources was also the reason for the preferred sources mainly on Omusati (64.1%), Khomas (56.2%) and Hardap (50%). Availability was indicated in some regions especially in Kavango East (47.3%) and Omusati (46.5%). Varieties and quality were less prominent.

Table 38. Reasons for preferred chosen Fish Sources by Region.

Region	Preferred source reason percentage					
	Distance	Affordability	Varieties	Availability	Quality	Other
||Kharas	42.4	61.8	6.9	20.8	10.4	4.9
Erongo	38.7	61.0	1.8	16.9	6.1	6.1
Hardap	50.0	48.4	0.0	26.6	3.1	0.0
Kavango East	32.3	79.6	1.2	47.3	21.6	1.8
Kavango West	43.2	73.3	2.1	27.4	8.9	2.1
Khomas	56.2	60.5	8.9	23.4	17.8	1.6
Kunene	44.9	63.8	1.4	15.9	5.8	4.3
Ohangwena	48.5	47.5	5.2	34.1	16.1	1.3
Omaheke	41.0	38.5	0.0	30.8	10.3	12.8
Omusati	64.6	46.5	11.9	46.5	8.8	0.0
Oshana	45.7	66.7	7.3	12.8	24.7	1.4
Oshikoto	50.0	62.8	7.7	29.9	9.1	5.1
Otjozondjupa	45.6	64.3	2.3	32.7	5.8	5.3
Zambezi	27.7	66.4	2.9	41.6	7.3	10.9
Total	1409	1795	170	834	382	97

Percentages and totals are based on respondents.

Overall, the preferred sources of fish were supermarkets, local vendors, NFCPT fish shops and private fish shops due to affordability, distance, availability, quality and varieties of fish. Erasmus et al. (2021) confirm that affordability and accessibility of marine fish were found to be critical constraints. Furthermore, Erasmus et al. (2021) reported that people mostly purchase marine fish from retail fish shops, and less from wholesale fish companies, and the Namibian Fish Consumption Promotion Trust. Kazembe et al. (2022) found that supermarkets were mostly found in higher income areas and a few located in the informal settlements in

Windhoek and that they were progressively dominating the food system. Moreover, Kazembe et al. (2022) stress low rates of purchase of unhealthy food in the informal settlements, as a result of the city's open market policy which has improved accessibility to informal markets, including local vendors.

2.8. Fish Preparation Methods

Table 39 shows fish preparation methods by region. Methods of fish preparation varies across regions. Khomas used most of the methods of fish preparations. Fried fish was common in Khomas (29.8%) and Erongo (14.5%). Grilled/braai was common in Khomas (36.4%) and Erongo (13.0%) while baked is highly preferred in //Kharas (30.4%) and Khomas (26.8%). Notably, boiling as a method of fish preparation was commonly used in the north central regions, namely; Ohangwena (17.4%), Oshana (13.6%), Oshikoto (12.3%) and Omusati (12.1%); and in the Khomas region (14.4%). This result could be attributed to traditional practices of food preparation where boiling of fish is commonly used in communities to serve as a relish to eat with porridge as a staple food. Agyei-Mensah et al. (2023) reported that boiling was commonly used in Ghana because of taste, low cost and tradition.

Table 39. Fish Preparation Methods by Region.

Regions	Fried	Grilled/Braai	Baked	Boiled	Other
||Kharas	5.9	4.7	30.4	2.5	
Erongo	14.5	13.0	17.9	6.5	6.5
Hardap	4.7	2.2	7.1	.1	
Kavango East	5.7	3.2	.8	6.2	
Kavango West	2.7	.2		4.8	
Khomas	29.8	36.4	26.8	14.4	15.1
Kunene	3.4	7.5	2.1	2.3	1.6
Ohangwena	3.8	7.9	2.2	17.4	
Omaheke	4.4		.8	.4	2.6
Omusati	2.3	1.8	1.9	12.1	13.5
Oshana	2.9		1.1	13.6	2.1
Oshikoto	3.6	1.4		12.3	40.1
Otjozondjupa	7.7	21.1	9.0	4.0	17.2
Zambezi	8.8	.6		3.5	1.3
Total	100.0	100.0	100.0	100.0	100.0

2.9. The form of fish purchased

Table 40 presents the forms in which fish is purchased. Forms of fish purchased by households varies across regions. Fresh fish was purchased commonly in the Khomas (18.20%), Zambezi (14.82%), Erongo (10.64%) and Oshana (10.53%). Frozen fish was purchased in Khomas (22.11%), Ohangwena (14.38%), Oshikoto (10.50%) as well as in Oshana (9.91%) and Omusati (9.16%). Canned fish is common in Khomas (20.13%),Otjozondjupa (19.40%), Erongo (14.93%) and Kunene (14.23%). Cooked fish is common in Erongo (44.57%) and Khomas (26.45%). Dried fish is purchased in Zambezi (34.22%), //Kharas (27.07%), Omusati (18.72%) as well as in Oshikoto (10.65%). Interestingly, smoked fish was only purchased in the Erongo region while salted fish was purchased

commonly in Omusati (52.95%), Oshikoto (23.10%) as well as in Ohangwena (14.09%). It was observed that the high purchase of dried fish was due to lack of facilities such as refrigerator to preserve fresh fish especially in rural areas. Adeyeye and Oyewole (2016) affirms that rural communities in many African countries have inadequate storage facilities affecting the form in which fish is purchased. It was not surprising that smoked fish was found in Erongo which could be due to the geographical location and traditional practices of smoking fish among communities.

Table 40. Form in which fish is purchased by Region.

Region	Fresh %	Frozen %	Canned %	Cooked %	Smoked %	Salted %	Dried %
||Kharas	5.03	4.85	7.04	1.98			27.07
Erongo	10.64	8.60	14.93	44.57	100.00		
Hardap	.80	.87	12.46	1.98			
Kavango East	9.00	5.34	.29				2.52
Kavango West	4.14	4.11					
Khomas	18.20	22.11	20.13	26.45			5.08
Kunene	.66	1.78	14.23				
Ohangwena	9.47	14.38	.78			14.09	1.75
Omaheke	.46	1.35	5.18	5.00			
Omusati	6.33	9.16	1.48	6.89		52.95	18.72
Oshana	10.53	9.91	.77	7.04			
Oshikoto	7.56	10.50	2.40			23.10	10.65
Otjozondjupa	2.36	5.79	19.40	6.09		9.85	
Zambezi	14.82	1.25	.91				34.22
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00

2.10. Methods used to preserve fish

Table 41 provides an insight into the methods employed by households in different regions of Namibia to preserve fish. Although different methods are used to preserve fish, freezing and drying are the common methods of preservation. In the rural areas, freezing was common in Oshikoto (22.38%), Ohangwena (15.82%), Omusati (12.02%) and Otjozondjupa (10.04%). Drying was common in Ohangwena (29.31%), Omusati (20.06%), Oshikoto (14.67%) and Oshana (12. 18%). Preservation by salting was common in Omusati (38.17%), Kavango West (22.47%), Otjozondjupa (11.39%) and //Kharas (10.12%). While lack of electricity could be the limiting factor of freezing fish in the rural areas, some fish types taste better when dried for instance catfish, which is considered as a delicacy in the northern Namibia (Gabriel, Gabriel and Shikesho, 2023).

In urban areas, freezing was common in Khomas (31.11%) and Erongo (21.75%). Drying was common in Khomas (41.45%) and Oshana (25.80%). Preservation by salting was done commonly in Khomas (38.21%), Otjozondjupa (36.04%), Ohangwena (14.01%) and Erongo (11.74%). Over 60% respondents in the Khomas region did not preserve fish. This could be attributed to the fact that a large proportion of the sample was from informal settlements where access to electricity is limited. Therefore they only purchased for their daily consumption.

Okeyo (2000) reported that preservation by sun drying, salting, frying and smoking are common in inland Namibia. About 57% of the Namibian population resides in rural areas with limited electricity, hence a lack of freezers to keep fish fresh, especially in remote areas(Erasmus et al., 2021).

Table 41. Methods Used to Preserve Fish in Various Namibian Regions by strata.

	Clusters									
	Rural					Urban				
	Methods used to preserve fish					Methods used to preserve fish				
Region	**Freeze**	**Dry**	**Salt**	**None**	**Other**	**Freeze**	**Dry**	**Salt**	**None**	**Other**
||Kharas	7.64	5.94	10.12	12.25	7.80	4.30	.40		5.89	
Erongo	2.62	.13	4.80	10.59	18.48	21.75	5.53	11.74	4.29	12.10
Hardap	1.95	.26		5.31		1.25	.48		8.62	2.08
Kavango East	2.36	5.63		1.72		9.46	4.60		.65	2.78
Kavango West	4.08	3.35	22.47	20.81	2.89	.93	.25		.05	
Khomas	.31			1.75		31.11	41.45	38.21	61.43	20.08
Kunene	2.64	2.42		5.61	9.09	1.91	2.51		2.68	13.00
Ohangwena	15.82	29.31	6.77	4.31	2.55	4.24	9.87	14.01	1.82	
Omaheke	1.18	.52		4.66	3.60	1.91	.30		2.17	
Omusati	12.02	20.06	38.17	12.39	12.46	1.48	1.60		.24	2.07
Oshana	8.08	12.81		1.46		5.58	25.80		.88	7.47
Oshikoto	22.38	14.67	6.27	3.68	13.75	4.77	4.15		.34	8.60
Otjozondjupa	10.04	1.27	11.39	7.30	21.94	7.01	1.80	36.04	9.38	26.55
Zambezi	8.89	3.61		8.17	7.45	4.30	1.27		1.55	5.27
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

2.11. Reasons for consuming fish

Table 42 highlights the reasons why individuals in various regions of Namibia choose to consume fish. The reasons for eating fish varied per region, however the main reasons were health reasons, affordability, availability, taste and easy to prepare among other reasons. Majority of respondents in Kunene (81.16%) highlighted health as a reason for eating fish followed by Otjozondjupa (73.78%), //Kharas (72.92%), Khomas (64.99%) and Erongo (57.98%), with the highest as affordability in Kavango East (71.86%), Oshikoto (69.6%), Ohangwena (69.41%) and Oshana (63.47%) regions while respondents in Omusati region (67.7%) also stated availability of fish as a major reason. Among other reasons, taste and easy to prepare as reasons for eating fish featured mostly in Kavango East (41.92%) and //Kharas (40.28%), while ease to prepare was indicated in Otjozondjupa (33.33%).

This finding is consistent with Bose and Brown (2000) that experience with seafood, perception of taste, ease of preparation, adding variety to diet, health and nutrition matters. Can, Günlü, and Can (2015) stressed on the nutritional value of fish and its importance in human diet in preventing cardiovascular diseases, high blood pressure, cholesterol. In addition, the results showed variation on culture as a factor affecting fish consumption especially in Omusati and Kavango East regions, is no surprising as most Namibians which is predominantly meat-cereal based. In fact, a meal of meat is more appreciated than that of fish (Masaba and Namukwambi, 2011).

SMoreover, dietary patterns in Windhoek vary according to ethnic group and culture (Kazembe, Nickanor and Crush, 2022) influencing reasons of fish consumption among communities. In addition, preference to fish consumption may be influenced by the presence of children in the household. However, Masaba and Namukwabi (2011) refuted this finding that in Namibia, the presence of the children was found to be not significant as a factor in purchasing of fish.

Table 42. Reasons for Eating Fish in Different Namibian Regions.

	Reasons for eating fish								
Region	**Affordability**	**Availability**	**Taste**	**Preparation**	**Preference**	**Culture**	**Health reasons**	**Easy to prepare**	**Other**
||Kharas	36.81	7.64	40.28	5.56	4.86	2.78	72.92	6.25	1.39
Erongo	38.04	23.62	29.75	1.84	.92	3.07	57.98	11.35	2.15
Hardap	28.13	14.06	37.50	.00	3.13	4.69	34.38	6.25	1.56
Kavango East	71.86	40.12	41.92	3.59	5.39	21.56	40.72	14.97	1.20
Kavango West	57.53	43.84	14.38	3.42	14.38	.68	43.84	9.59	.68
Khomas	50.74	28.34	33.23	3.12	16.02	5.19	64.99	24.33	.59
Kunene	11.59	8.70	17.39	2.90	7.25	1.45	81.16	5.80	1.45
Ohangwena	69.41	43.09	20.07	2.96	7.57	2.96	43.75	10.86	.66
Omaheke	18.42	10.53	15.79	.00	34.21	2.63	42.11	7.89	2.63
Omusati	48.67	67.70	19.03	7.08	20.35	31.42	43.36	18.58	.88
Oshana	63.47	20.55	6.85	.00	6.85	.46	50.23	12.79	.91
Oshikoto	69.60	42.12	13.92	2.93	4.40	.73	41.39	4.03	.37
Otjozondjupa	44.44	14.62	26.90	14.04	3.51	.58	73.68	33.33	2.34
Zambezi	32.35	31.62	22.06	.00	5.88	15.44	53.68	18.38	14.71
Total	1526	941	745	105	278	196	1611	456	50

Percentages and totals are based on respondents. Total is total frequency.

2.12. Preferred side dish with fish

Table 43 provides insights into the preferred side dishes accompanying fish consumption in various regions of Namibia. Overall, the main popular side dish was pap (84.97%) because pap is a staple food in Namibia. Rice (4.60%), vegetable (3.22%) pasta (2.96%) and other side dishes (4.26%) were also used as side dishes in a small percentage. Although in minute proportions, vegetables as a side dishes was reported in the Hardap region (13.87%) while rice featured in the Kunene region (11.28%). Pasta was reported in the Omaheke (9.16%) and Hardap (8.02%). The fact that over 90% of respondents from North-based regions preferred pap as a side dish this implies that pap is an integral part of their diets.

Table 43. Preferred Side Dishes with Fish in Different Namibian Regions.

	Preferred side dish					
Region	**Pap**	**Pasta**	**Vegetable**	**Rice**	**Other**	**Total**
||Kharas	77.50	2.88	7.88	3.57	8.17	100.00
Erongo	81.47	3.92	3.29	6.60	4.72	100.00
Hardap	57.48	8.02	13.87	3.66	16.97	100.00
Kavango East	91.99	2.97	2.08	2.96		100.00
Kavango West	96.47	1.51	.13	1.77	.13	100.00
Khomas	77.53	4.12	6.48	5.88	5.98	100.00
Kunene	79.13	7.10	1.24	11.28	1.24	100.00
Ohangwena	92.39	1.83	.35	4.45	.98	100.00
Omaheke	66.91	9.16		7.08	16.85	100.00
Omusati	93.83	.74		3.26	2.17	100.00
Oshana	91.05	1.35	1.79	5.37	.45	100.00
Oshikoto	91.01	1.43	1.47	1.74	4.35	100.00
Otjozondjupa	75.05	4.94	3.62	6.26	10.14	100.00
Zambezi	95.85		2.52		1.63	100.00
Total	84.97	2.96	3.22	4.60	4.26	100.00

Table 44 shows households preference of types of meat in restaurants/takeaway/roadside stands. Fish was preferred (39.0%) over beef (28.9%) and chicken (27.5%). Evidently, respondents in Omusati (64.7%), followed by Ohangwena and Kavango East each with 52.4% and Zambezi (50.4%) prefer fish at eating outlets. Beef was preferred Kunene (61.5%) and Kavango West (52.5%) while chicken was preferred in //Kharas (41.8%). Overall, the results shows that there is relatively high preference of fish in restaurants/takeaway/roadside stands. In agreement, Thong and Solgaard (2016) found that people prefer fish over beef and chicken although fish comes at high cost especially in restaurants.

Table 44. Household's preference in a restaurant/takeaway/roadside stand by region.

Region	What would your household's preference be in a restaurant/takeaway/roadside stand?				
	Beef	Fish	Chicken	Other	Total
||Kharas	21.1	33.1	41.8	4.1	100
Erongo	38.9	24.5	31.4	5.2	100
Hardap	28.2	23.2	41.1	7.5	100
Kavango East	18.9	52.4	27.7	1.0	100
Kavango West	52.5	18.5	26.4	2.5	100
Khomas	29.9	28.3	38.2	3.6	100
Kunene	61.5	25.1	13.4		100
Ohangwena	20.6	52.4	21.0	6.0	100
Omaheke	33.7	25.2	20.1	21.0	100
Omusati	13.3	64.7	19.7	2.2	100
Oshana	33.5	48.5	16.7	1.3	100
Oshikoto	23.5	42.1	23.1	11.3	100
Otjozondjupa	35.8	33.4	27.8	3.0	100
Zambezi	26.6	50.4	17.5	5.6	100
Total	28.9	39.0	27.5	4.6	100

The main dish at meals in households is presented in Table 45. Overall 37% of respondents indicated that their main dishes at meal is fish, whereas only 19.9 % and 18.4% of respondents indicated beef and chicken, respectively.

Table 45. Main dish at meal.

Region	Beef	Goat Meat	Lamb	Chicken	Fish	Vegetables	Other	Total
||Kharas	13.2	3.5	19.4	42.4	16.0	1.4	4.2	100
Erongo	24.5	5.8	4.0	23.9	35.0	2.1	4.6	100
Hardap	17.2	7.8	17.2	40.6	7.8	.0	9.4	100
Kavango East	15.6	.6	.6	8.4	47.9	25.1	1.8	100
Kavango West	26.0	.0	.0	9.6	43.2	20.5	.7	100
Khomas	25.7	1.9	2.4	23.9	24.5	10.5	11.1	100
Kunene	37.7	26.1	1.4	14.5	20.3	.0	.0	100
Ohangwena	7.5	3.9	.3	11.8	50.5	24.3	1.6	100
Omaheke	23.1	5.1	10.3	28.2	23.1	.0	10.3	100
Omusati	4.0	2.2	.0	11.1	50.0	25.2	7.5	100
Oshana	16.0	2.7	.9	19.6	38.4	20.5	1.8	100
Oshikoto	11.7	1.5	.0	8.8	59.0	13.2	5.9	100
Otjozondjupa	38.0	1.8	1.8	21.1	19.9	7.0	10.5	100
Zambezi	31.4	.0	.7	4.4	54.7	7.3	1.5	100
Total	19.9	3.1	2.7	18.4	37.0	13.0	5.8	100

Section 3: Fish knowledge

This section presents results on the respondents' knowledge and the mode of advertisement about fish in Namibia. The results in Table 46 shows that 76% respondents agreed (44.6% strongly agree and 31.8% agree) that fish was rich in Omega 3. Concurring, Erasmus et al. (2021) reported that most participants (97.9%) agreed that fish is important in a human diet. This result could be attributed to education level of respondents, NFCPT campaigns for promoting fish consumption and other health awareness programmes by the government. Regionally, more than 50% of respondents in Erongo, Ohangwena, Otjozondjupa, Oshana and Omusati strongly agreed that fish is rich in Omega 3. However, more than 30% of the respondents in Zambezi and Hardap region were not aware of the fact that fish contained Omega 3, implying the need of strengthening information sharing/awareness to impart knowledge about the nutritional health benefits of fish.

Table 46. Fish is rich in Omega 3 – knowledge about fish.

Regions	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Don't know
||Kharas	42.21	35.10	2.33	.78		19.57
Erongo	60.04	28.30	2.05	.67	.69	8.25
Hardap	20.57	33.20	3.86	5.37	.30	36.70
Kavango East	22.04	44.52	12.73	1.35	.32	19.03
Kavango West	51.44	40.36	3.69	.21		4.30
Khomas	42.15	36.44	4.69	1.88	.38	14.46
Kunene	27.56	39.28	3.49	1.03	5.00	23.63
Ohangwena	59.10	28.22	3.95	.45		8.28
Omaheke	35.08	26.17	6.21	.78	2.94	28.81
Omusati	51.44	28.74	12.34			7.48
Oshana	53.17	27.65	1.06	1.15	.30	16.67
Oshikoto	44.36	31.80	2.55	.91	.65	19.72
Otjozondjupa	57.88	22.96	.64	.21	.64	17.68
Zambezi	16.58	32.05	8.30	3.65	.92	38.49
Total	44.62	31.81	4.86	1.23	.64	16.85

Seventy two percent of respondents agreed (35.8% strongly agree and 36.3% agree) that fish is cheaper than other meat products (Table 47). Although responses varied between regions, Kavango region had the highest number of respondents (56.86%) who strongly agreed that fish is cheaper than other meat products followed by Ohangwena region

(50.89%). However, respondents mainly from Omaheke, Zambezi, Hardap and Otjozondjupa region do not agree that fish is cheaper than other meat products. For instance, in Omaheke region 34.83% of respondents (20.79% disagree and 14.04% strongly disagree) that fish is cheaper than meat products.

Table 47. Fish is cheaper than other meat products – Knowledge about fish.

Region	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
//Kharas	37.74	49.70	3.31	5.83	2.22
Erongo	44.93	37.93	4.42	4.59	6.77
Hardap	8.74	46.85	11.86	18.94	7.75
Kavango East	34.85	47.17	11.50	2.02	2.78
Kavango West	56.86	34.53	3.90	2.36	1.23
Khomas	28.78	48.30	5.65	8.85	6.23
Kunene	18.01	37.27	11.39	6.72	12.50
Ohangwena	50.89	30.93	5.40	8.22	2.92
Omaheke	31.03	12.04	10.86	20.79	14.04
Omusati	45.54	23.84	21.02	4.32	3.98
Oshana	41.67	19.73	18.05	11.05	9.19
Oshikoto	42.60	32.48	5.71	8.94	8.75
Otjozondjupa	29.22	36.15	3.96	16.74	8.22
Zambezi	14.54	44.41	7.83	18.49	10.64
Total	35.75	36.30	8.93	9.37	6.70

Majority (84.3%) of the respondents agreed (37.6 strongly agree and 46.7% agree) that fish is nutritious for children (Table 48). However, about 22% of the respondents in Kunene did not know the benefits of fish consumption to children. The nutritional benefits of fish consumption in children has been documented (Hasselberg et al., 2020; Maulu et al., 2021).

Table 48. Fish is nutritious for children – Knowledge about fish.

Region	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Don't know	Total
||Kharas	43.7	50.5	.2	2.2	1.3	2.0	100.0
Erongo	39.0	50.0	5.8	1.7	1.2	2.3	100.0
Hardap	24.2	60.6	5.7	5.5	1.0	3.0	100.0
Kavango East	18.5	60.3	13.3	2.7		5.2	100.0
Kavango West	37.2	55.0	2.5	.1	1.0	4.2	100.0
Khomas	35.4	53.4	3.8	2.8	.6	3.9	100.0
Kunene	20.1	39.1	14.9	.5	3.5	21.9	100.0
Ohangwena	47.0	41.9	4.9	1.3	.4	4.4	100.0
Omaheke	36.3	41.6	3.3	1.6	.5	16.8	100.0
Omusati	44.3	31.0	17.4	.8	1.0	5.4	100.0
Oshana	50.0	41.5	3.6	1.9	.3	2.7	100.0
Oshikoto	41.7	38.7	4.0	2.3	1.2	12.2	100.0
Otjozondjupa	43.8	42.0	1.6	4.1	.9	7.5	100.0
Zambezi	17.3	60.7	6.7	1.8	1.4	12.1	100.0
Total	37.6	46.7	6.3	2.2	.9	6.4	100.0

Table 49 reveals that the majority (82.3%) of the respondents disputed (53.0% strongly disagree and 29.3 % disagree) that fish was only for rich people. However, the few respondents who agreed (8.6%) that fish was for rich people featured in Kavango West with 17.7% (11.7 strongly agree and 6.0% agree), Oshana with 16.7 % (5.4 strongly agree and 11.3% agree) and Oshikoto with 14.7 (6.2 strongly agree and 8.5% agree), possibly due to affordability.

Table 50 shows an overwhelming majority of respondents (78.9%) agreed (34.5% strongly agree and 44.4% agree) that fish help maintain a healthy weight. However, some respondents in Omaheke region (32.4%) and Ohangwena (19.4%) had no idea of the effect of eating fish on weight. Fish helps to maintain a healthy weight due to its low calories and a rich source of protein (Pawar and Sonawane, 2013),

Table 49. Fish is only for rich people – Knowledge about fish.

Region	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Don't know
‖Kharas	.2	3.6	.9	51.8	42.8	.7
Erongo	6.6	4.8	6.9	16.4	62.6	2.6
Hardap	1.5	2.4	3.6	31.1	60.6	.7
Kavango East	.9	2.2	4.5	26.8	60.4	5.2
Kavango West	11.7	6.0	5.7	27.3	49.2	
Khomas	1.3	3.3	2.3	46.0	45.7	1.4
Kunene	3.8	4.9	3.1	12.1	65.7	10.4
Ohangwena	4.6	7.9	8.0	29.4	41.4	8.8
Omaheke	4.8	8.2	4.1	32.1	41.8	9.0
Omusati	3.4	1.9	16.8	14.5	59.0	4.5
Oshana	5.4	11.3	7.6	16.3	58.5	.8
Oshikoto	6.2	8.5	5.2	15.3	62.5	2.4
Otjozondjupa	1.7	1.6	1.7	42.3	48.5	4.3
Zambezi	.9	6.6	1.9	39.9	50.0	.7
Total	3.5	5.1	5.6	29.3	53.0	3.4

Table 50. Fish help maintain a healthy weight – Knowledge about fish.

Region	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Don't know
||Kharas	23.5	69.7	3.0	1.1	.2	2.5
Erongo	50.2	40.6	2.8	1.2	2.6	2.5
Hardap	49.5	36.8	5.1	4.0		4.6
Kavango East	11.4	58.4	15.4	3.8	1.1	9.9
Kavango West	21.2	65.3	7.3	2.3	1.4	2.5
Khomas	39.1	49.6	4.4	2.0	1.5	3.4
Kunene	23.9	56.4	2.9	1.2	1.9	13.6
Ohangwena	34.2	35.6	3.6	4.0	3.3	19.4
Omaheke	28.9	31.4	5.0	.9	1.4	32.4
Omusati	25.6	22.4	37.8	3.2	5.6	5.4
Oshana	30.3	47.2	7.8	2.2	5.6	7.0
Oshikoto	41.1	34.9	6.9	1.3	3.4	12.3
Otjozondjupa	46.6	42.7	.7	1.7	3.2	5.2
Zambezi	11.5	62.1	6.5	3.7	1.7	14.5
Total	33.6	44.3	8.6	2.3	2.7	8.6

3.1. Fish advertisements

It is evident from Table 51 that the majority of respondents (68 – 91.8%) have not seen/heard/read an advert about fish in the last 30 days in their vicinity. Only about 30% of respondents in Otjozondjupa and 28.7% in //Kharas who have seen/heard/read fish adverts. This suggest that more advocacy of fish consumption is required in various regions.

Table 51. Seem/heard/read any advertisement about fish in the past 30 days?

Region		Estimate (%)
||Kharas	Yes	28.7
	No	71.3
Erongo	Yes	15.7
	No	84.3
Hardap	Yes	17.0
	No	83.0
Kavango East	Yes	25.6
	No	74.4
Kavango West	Yes	8.2
	No	91.8
Khomas	Yes	21.2
	No	78.8
Kunene	Yes	18.5
	No	81.5
Ohangwena	Yes	17.8
	No	82.2
Omaheke	Yes	12.7
	No	87.3
Omusati	Yes	24.2
	No	75.8
Oshana	Yes	18.9
	No	81.1
Oshikoto	Yes	19.3
	No	80.7
Otjozondjupa	Yes	31.7
	No	68.3
Zambezi	Yes	11.5
	No	88.5

The few respondents who happened to see/hear/read fish advertisements get information from different sources as presented in Table 52. Radio is the most common source of advertisement, followed by television, fish shop posters and NFCPT that were seen/ heard/ read in the last 30 days before the survey. The source of advertisement from the radio was more prominent in Omusati (71%), Ohangwena (70.1%), Kunene (67.7%) and Oshana (64.7%) while television was more common in the Kunene region (67.7%). Fish shop posters and NFCPT as sources of advertisement was common in the Kavango East region with 48.6% and 33.3%, respectively, possibly due to effort by NFCPT to promote fish consumption in Namibia. Billboards, newspapers, social medias also featured as a source of fish adverts in small percentage. Very few respondents mentioned road shows and Expos as source of fish adverts. Overall, radio is considered the most effective information disseminating channel especially in the rural areas because of high coverage of radios signals in rural areas, hence a significant number of rural households own radios.

Table 52. Source of advertisements about fish in the past 30 days.

Region	Television	Billboards	Radio	Newspaper	Social Media	Road Shows	Expos	NFCPT	Fish shop Posters	Other
||Kharas	38.8	9.0	20.9	13.4	13.4	1.5	.0	7.5	9.0	7.5
Erongo	27.8	13.3	24.4	10.0	24.4	1.1	2.2	3.3	3.3	4.4
Hardap	48.6	5.4	27.0	2.7	5.4	.0	.0	.0	10.8	.0
Kavango East	16.7	8.3	44.4	18.1	26.4	.0	2.8	33.3	48.6	12.5
Kavango West	20.0	16.0	16.0	4.0	32.0	.0	.0	16.0	20.0	.0
Khomas	25.7	9.3	35.0	13.7	15.0	2.7	1.8	5.3	19.0	5.8
Kunene	67.7	.0	67.7	29.0	.0	.0	6.5	3.2	.0	.0
Ohangwena	6.5	6.5	70.1	3.9	9.1	.0	.0	.0	11.7	5.2
Omaheke	22.7	.0	59.1	.0	9.1	.0	9.1	.0	4.5	4.5
Omusati	2.3	4.6	71.0	6.1	11.5	2.3	1.5	16.8	12.2	.8
Oshana	4.4	13.2	64.7	2.9	4.4	4.4	1.5	13.2	27.9	1.5
Oshikoto	19.3	8.0	47.7	9.1	17.0	10.2	1.1	9.1	17.0	10.2
Otjozondjupa	33.6	15.9	36.4	8.4	6.5	1.9	3.7	3.7	2.8	12.1
Zambezi	32.4	5.9	47.1	11.8	5.9	11.8	.0	.0	14.7	5.9

Percentages and totals are based on respondents.

With regards to social media, Facebook, WhatsApp and Instagram were the most social media platforms used by the respondents as presented in Table 53. The use of social media platform as a source of advertisements was common in Khomas region. Interesting, respondents in the Kunene region did not use any social media. Twitter and Google+ were not used in other regions except in Kavango West and Kavango East, respectively.

Table 53. Social media platform used by Region.

Region	Facebook	LinkedIn	WhatsApp	Instagram	SMS	Twitter	Google+
||Kharas	8.33	100.00	.00	.00	50.00	.00	.00
Erongo	15.74	.00	6.38	16.67	.00	.00	.00
Hardap	.93	.00	2.13	.00	.00	.00	.00
Kavango East	12.96	.00	23.40	13.33	50.00	.00	100.00
Kavango West	7.41	.00	6.38	13.33	.00	100.00	.00
Khomas	18.52	.00	21.28	23.33	.00	.00	.00
Ohangwena	3.70	.00	6.38	.00	.00	.00	.00
Omaheke	1.85	.00	.00	.00	.00	.00	.00
Omusati	12.96	.00	8.51	13.33	.00	.00	.00
Oshana	2.78	.00	4.26	.00	.00	.00	.00
Oshikoto	10.19	.00	8.51	13.33	.00	.00	.00
Otjozondjupa	4.63	.00	8.51	3.33	.00	.00	.00
Zambezi	.00	.00	4.26	3.33	.00	.00	.00

Percentages and totals are based on respondents.

Knowledge about fish

Consumer knowledge is an important factor in the consumer decision-making process, such as which product to purchase. Previous studies (Pieniak et al., 2010; Hebsale Mallappa et al., 2023) reported that knowledge is a relevant determinant of fish consumption whereby consumers with a higher level of knowledge about fish were found to eat fish more frequently. In this study, the overall knowledge regarding fish consumption was good. It can be deduced that respondents possessed knowledge about fish intake as well as its benefits. For instance about 76% of respondents were aware of omega 3 in fish. This finding is supported with the fact that fish intake was generally accepted as "healthy" in some European countries despite the differences in the depth of knowledge about the nutritional values of fish (Pieniak et al., 2008). It should be noted that this study did not pursue the depth of knowledge of the nutritional values of fish intake among the respondents. Chen et al. (2022) stressed that fish is enriched with Omega 3-fatty acids and Vitamins D and B2 to improving its antioxidants, and anti-inflammatory properties. Thus, eating fish comes with benefits of treating many anti-inflammatory associated conditions such as cardiovascular disease, ulcerative colitis and hyperlipidemia. However, fried fish consumption is associated with an increased risk of cardiovascular events (Krittanawong, 2021). Notably, most fish and seafood are low in cholesterol with the exception of crab, lobster, shrimp and oyster. This finding is also affirming that fish is widely recognised as a rich source in essential fatty acids, especially, docosahexaenoic acid (DHA), minerals, vitamins, and essential amino acids, required for improved health in supporting physical and mental development and functioning (Obiero et al., 2019). As a highly nutritious food, fish consumption is highly recommended for children and expectant mothers for normal growth and development (Maulu et al., 2021). It's a valuable source of essential amino acids and polyunsaturated fatty acids (PUFAs) that play an important physiological role in the growth and development of fetuses, newborns, and children's brains. Moreover, fish is tender and easily digested than meat, hence an excellent source of calcium and fluorine essential for the development of strong bones and teeth for the children. It is also essential for optimal development of the brain and neural system of the children, as omega-3 fatty acids in the form of docosahexaenoic (DHA) rather than alpha-linoleic acid (ALA) are required for

optimal brain development (Hasselberg et al., 2020; Maulu et al., 2021) and neurodevelopment in children (Ali et al., 2022). Furthermore, Hasselberg et al. (2020) reported that utilizing fish in the diet of young children is essential to counteract the multiple forms of malnutrition due to its nutritional value (Maulu et al., 2021). Fish helps to maintain a healthy weight (Pawar and Sonawane, 2013).

Most respondents agreed that fish is cheaper than other meat products, although responses varied between regions. For instance in Omaheke region about 21% disagree and 14% strongly disagree that fish is cheaper that other meat products. This finding was not surprising as Omaheke is termed as a 'cattle country' and the majority of people prefer meat over fish consumption as a cultural practice. Concurring with this study, numerous studies reported that fish is low-cost dietary sources of animal protein for most people worldwide (Maulu et al., 2021), it is relatively cheaper. It is often referred to as "rich food for poor people" (Sujatha et al., 2013) provides essential nourishment especially proteins of high biological values and fat. Although fish is cheaper than other meat products it might still not be affordable to many people, hence low consumption as reported by Erasmus et al. (2021). Consumption of meat and fish is strongly associated with income. York and Gossard (2004) did not find the effects of meat consumption and the effects of fish consumption significant. Notwithstanding, outcome may be influenced by ecological and social factors such as resource availability and climate, important factors to consider when deciding on sustainable food production and distribution systems (Gossard, 2004; Desiere, 2018).

Advertisement on fish consumption is not a practice in all regions despite the fact that people use almost all social media platforms and effort by NFCPT to promote fish consumption in Namibia. This is contrary to the notion that getting the message of the benefits of fish consumption to consumers is an important endeavor Raatz et al. (2013). Few respondents that are exposed to advertisement about fish get information mainly from Radio, Television and NFCPT posters. Radio is considered the most effective information disseminating tool especially in the rural areas because a significant number of rural households owned radio, whereas television is common in urban areas in addition to radio. Noting that people in the Kunene region did not know the benefits of fish consumption to children. A public health education program is required to provide the public with the

message of fish consumption for health via all media platforms, especially radio, Facebook and Instagram. Overall fish consumption promotion should be intensified across Namibia.

Section 4: Perceptions of fish consumption

This section presents the perceptions of fish consumption. Figure 6 shows that 49.8% of respondents indicated that people eat more fish than other types of sources of proteins, while 38% of respondents reported that people eat less fish. Only 11.93% of respondents, confirmed that people eat fish and other types of meat in equal portions. The large proportion of respondents indicating that people eat more fish than other types of meat could be attributed to the affordability of fish price across the country, and the awareness of health benefits associated with fish as part of households diet. Additionally, this could also reflect the effectiveness of fish consumption promoted by NFCPT. Namibians have been encouraged to eat more fish so that they reap health benefits accrued from fish consumption.

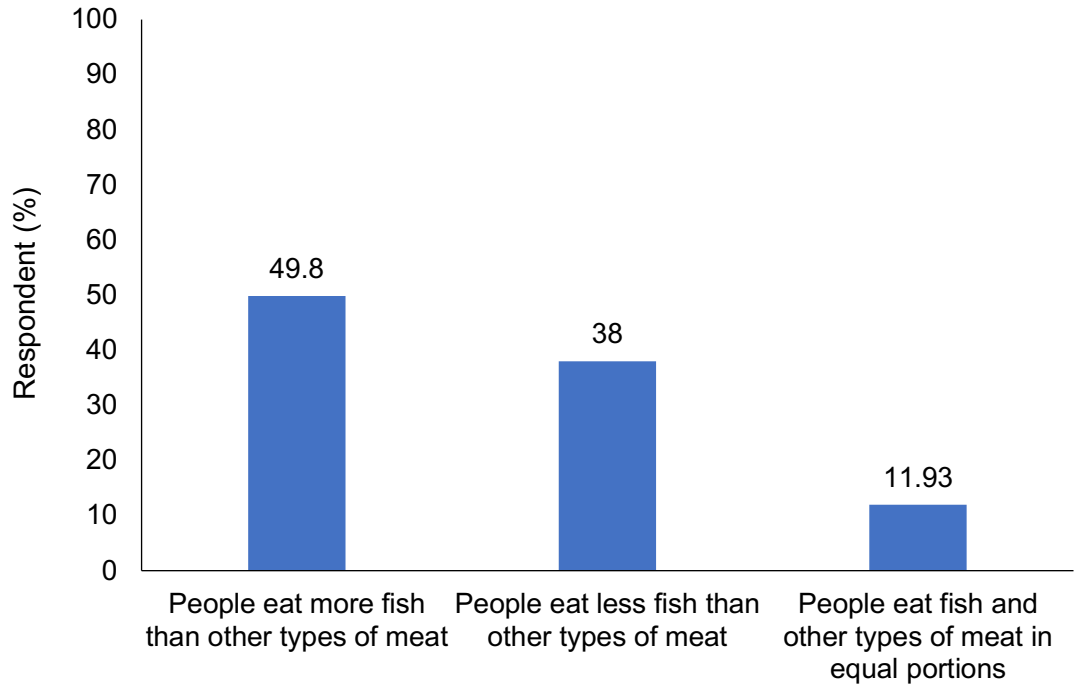

Figure 6. Public perception of fish consumption.

The regional analysis revealed that Kavango West (93.12), Ohangwena (71.78%) and Oshana (70.25%) are the regions with the highest number of respondents indicating that people eat more fish than other meat types (Table 54). The highest consumption of fish in Kavango West suggests the importance of fresh water fish to this riparian population. The finding is consistent with Dieckmann et al. (2014) who reported that fish are an important source of protein for people living close to the Okavango River. Omaheke (8.59) and Hardap (11.32) were the regions with least respondents who eat more fish than other types of meat. This could be attributed to the fact that these are predominantly large and small stock producing regions, meaning consumers in those regions prefer red meat over fish. A few respondents that indicated that people eat fish and other types of meat in equal portions were from //Kharas region (25.07%), followed by Otjozondjupa (21.13%).

Table 54. Perception of fish consumption by region.

Region	People eat more fish than other types of meat	People eat less fish than other types of meat	Eat fish and other types of meat in equal portions	Total
||Kharas	42.93	32.00	25.07	100
Erongo	53.13	33.39	13.48	100
Hardap	11.32	83.54	5.14	100
Kavango East	54.72	35.18	10.10	100
Kavango West	93.12	3.48	3.39	100
Khomas	52.40	36.82	10.78	100
Kunene	28.52	65.79	5.70	100
Ohangwena	71.78	18.86	9.35	100
Omaheke	8.59	87.09	4.32	100
Omusati	43.58	45.39	11.03	100
Oshana	70.25	23.74	6.01	100
Oshikoto	56.30	28.16	15.53	100
Otjozondjupa	35.68	43.20	21.13	100
Zambezi	28.10	54.39	17.51	100
Total	48.77	39.30	11.93	100

The occasion on which fish is mostly part of the menu/eaten is presented in Figure 7. Overall, 74.26% of respondents indicated that people eat fish as an ordinary meal at home. A few respondents indicated that fish is part of the menu at vendors (10.85%), special event (7.75%), restaurants (3.46%) and others (3.67%).

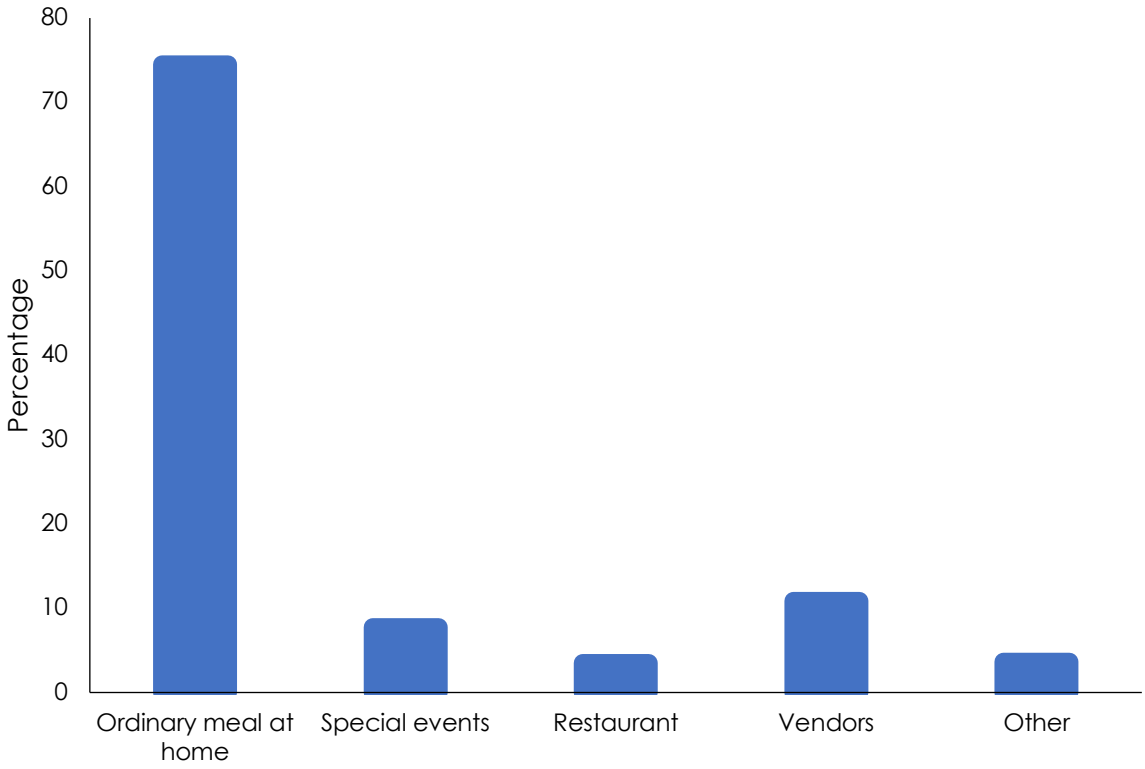

Figure 7. Occasion on which fish is mostly part of the menu/eaten.

Regionally, over 70% of respondents in all regions usually consumed fish as ordinary meals at home apart from Omaheke with 46.35% of respondents indicating that fish was mostly eaten from vendors (Table 55). This finding resonates with Boo, Chan, and Fatimah (2008) who stress that fish is mostly eaten with chips and/ or as part of crispy seafood platter which are unhealthy.

They also emphasise that in the fast-food sector, the number of healthy items offered is limited raising questions of whether consumers do not want to practice healthy eating when they eat out or whether it is a question of simply not being offered with a sufficient healthy menu.

Table 55. Occasion on which fish is mostly part of the menu/eaten by region.

Region	Ordinary meal at home	Special events	Restaurant	Vendors	Other	Total
||Kharas	81.51	9.47	3.05	4.82	1.13	100
Erongo	86.06	6.27	1.43	4.19	2.05	100
Hardap	41.31	29.50	4.76	8.06	16.38	100
Kavango East	78.29	12.68	1.44	7.60		100
Kavango West	99.48	.21	.21	.10		100
Khomas	75.14	7.73	6.24	8.14	2.75	100
Kunene	79.79	7.79	3.78	6.58	2.06	100
Ohangwena	80.36	.65	1.38	17.36	.25	100
Omaheke	14.45	20.17	1.25	46.35	17.77	100
Omusati	74.12	.20	2.84	22.83		100
Oshana	88.13	1.34	2.68	6.06	1.79	100
Oshikoto	86.19		1.46	11.31	1.05	100
Otjozondjupa	54.78	26.72	10.25	5.26	2.99	100
Zambezi	70.52	4.99	1.84	4.60	18.05	100
Total	74.26	7.75	3.46	10.85	3.67	100

Fish Consumption Campaigns

Respondents were asked if there is a need for increasing fish consumption campaigns in their area. Overall, 89.1% of respondents indicated that there is a need for increasing fish consumption campaigns in their respective areas. However, only 65.3% of respondent from Erongo region indicated the need for increasing fish consumption campaigns in their area in comparison to other regions with over 85% (Table 56). It is not surprising for Erongo to have few respondents indicating the need of increasing fish consumption campaigns given that Erongo is the major coastal region producing fish in the country. Therefore it is expected that the community is more aware about the fish consumption in the area.

Table 56. The need for increasing Fish Consumption Campaigns by region.

Region	Do you think there is a need for increasing Fish Consumption Campaigns in your area?		
	Yes	No	Total
||Kharas	94.7	5.3	100
Erongo	65.3	34.7	100
Hardap	99.1	.9	100
Kavango East	85.9	14.1	100
KavangoWest	92.1	7.9	100
Khomas	89.8	10.2	100
Kunene	93.1	6.9	100
Ohangwena	90.4	9.6	100
Omaheke	89.1	10.9	100
Omusati	95.9	4.1	100
Oshana	91.3	8.7	100
Oshikoto	89.7	10.3	100
Otjozondjupa	95.4	4.6	100
Zambezi	96.1	3.9	100
Total	89.6	10.4	100

Table 57 shows suggestions made by respondents to increase fish consumption campaigns. 'Increase in fish shops' emerged as the main suggestion of increasing fish consumption followed by 'decrease in fish price' and 'creating awareness'. Increasing fish shops particularly in remote areas will allow competitiveness in price and reduce transport cost for consumers. The decrease in fish price could allow more consumers to afford fish. Effective awareness through health educational programmes focusing on nutritional values and different recipes could enhance knowledge, attitude and skills with respect to fish consumption. Promotional materials on fish consumption should be made available in various media and shopping centres to entice communities.

Mobile fish trucks were recommended as a mode of supply to remote areas to increase availability to consumers. In addition, respondents requested to be

supplied with fish of reasonable sizes, good quality and varieties in their areas. Some respondents alluded that the sizes of the horse mackerels and hakes that were sold at outlets in their vicinities were too small claiming that "they get lost in the pot" [meaning that the fish dissolve into the soup]. Supermarkets availability could supply fish in a hygienic environment. Other suggestions such as fish donations, promotion of entrepreneurship and aquaculture, lifting of moratorium to mention but a few were suggested.

This finding resonates with that of Che et al. (2022) who concluded that it is imperative for governments to be communicating and raising awareness more among consumers on the nutritional value and health benefits of fish consumption and support suppliers through cost reduction measures for the fishermen. In addition, they have indicated the need for a robust logistics system as an effort to support, supply timely and keep good appearance and freshness of fish for the consumers benefit.

Table 57. Suggested options of increasing fish consumption campaign in the regions.

Suggestions	%
Increase fish shops	47.5
Decrease fish price	27.5
Create awareness	26.4
Mobile fish trucks	7.6
Availability (Quantity)	5.7
Varieties	3.8
Increase supermarkets	3.7
Donations	2.8
Promote entrepreneurship	2
Promote aquaculture	1.8
Quality	1.7
Lifting of moratorium	1
Other suggestions	1
Don't know	0.9

Table 58 present the reasons provided by few respondents who indicated that there is no need for increasing fish consumption campaigns. Some respondents indicated that there is no need for increasing fish consumption campaigns because people are already aware and more campaigns will not increase fish consumption unless fish is affordable for all (fish is expensive) and its available to all by opening fish outlets in different areas. Furthermore, some respondents indicated that fish is already available to everyone. Some respondents indicated that people don't like or consume fish as they prefer meat over fish .

Table 58. Reason for not needing more Fish Consumption Campaigns in the regions.

Reason	Percent
No need for more campaigns, people are aware already	23.7
More campaigns will not increase fish consumption unless fish is affordable for all (fish is expensive)	16.5
Fish is already available to everyone	12.7
Don't like/ consume fish; not interested; prefer meat over fish	9.9
No use for more campaigns to increase consumption unless fish is made available to all (open fish outlets in area)	9.0
People already consume (a lot of) fish here	5.7
Need more awareness campaigns, advertisements	2.3
More campaigns will not increase fish consumption because there are no storage facilities (need electricity)	1.1
It is pointless to give comments, it won't change anything (no improvement)	1.1
People should be allowed to catch their own fish	.7
Other	.9
Don't know	16.3
Total	100.0

A further thematic Analysis was performed on the responses: Reasons why people do not want fish consumption campaigns to increase.

1. Sufficient Awareness: No need for more campaigns, people are aware already
2. Existing Availability: Fish is already available to everyone
3. Current Consumption Levels: People already consume (a lot of) fish here

4. Personal Preference: Don't like/consume fish; not interested; prefer meat over fish
5. Affordability Barrier: More campaigns will not increase fish consumption unless fish is affordable for all (fish is expensive)
6. Accessibility Issue: No use for more campaigns to increase consumption unless fish is made available to all (open fish outlets in area)
7. Infrastructure Limitations: More campaigns will not increase fish consumption because there are no storage facilities (need electricity)
8. Advocating for Fishing Rights: People should be allowed to catch their own fish
9. Lack of Awareness Campaigns: Need more awareness campaigns, advertisements
10. Skepticism and Indifference: It is pointless to give comments, it won't change anything (no improvement)
11. Uncertainty: Don't know

The Synthesis

This study assessed the fish consumption in Namibia. The study revealed that 55.9% of the respondents confirmed to have consumed fish or fish products 30 days before the survey date due to health reasons, affordability, availability, taste and easy to prepare among other reasons. To that effect the study revealed that the annual per capita fish consumption in Namibia is estimated to be 18.07kg with a regional variation. The results are lower than the global fish consumption of 20.4 kg/person per year in 2020-2022 as reported by FAO (2023) but comparable to 19kg reported by Chan et al. (2019). It further means that Namibia is fare welling compared to her sister countries such as Ethiopia who has fish consumption per capita of 0.541kg per person per year as reported by Tamiru et al. (2023). This result reflects positive development for the country in terms of responding to SDGs namely goal 1& 2 which deal with eradication of poverty and hunger.

The fish consumption varies in the country, with 15.3% eating fish daily, 34.9% eating fish once a week and 21.3% once a month. About 53.9% of respondents in the urban consume fish as compared to rural areas (46.1%). Some respondents (44.1%) did not consume fish mainly because of affordability (expensive) and availability.

Horse Mackerel, hake and pilchard are the most consumed fish across the country, and consequently the most preferred species. Regions with freshwater fisheries such as the two Kavangos (East and West) and Zambezi region freshwater fish (Tilapia and Zambezi bream) dominates the preferences in those regions.

The study revealed there exist a huge variation in the average fish price across regions, with Kunene region being the most expensive (N$ 122.63/kg) and the cheapest (N$ 27.17/kg) in Ohangwena region. The variation in fish prices

could be due to sources of fish, availability, fish type, transportation, storage facilities and culture among other factors.

Supermarkets, local fish vendors, NFCPT shops and private fish shops were the main sources of fish. Supermarkets and local vendors were the most preferred sources because of affordability, distance, availability, quality and varieties among other reasons. Notably, supermarkets are mostly found in affluent communities. Fish is mostly purchased fresh, frozen and dried, and it is mainly prepared by boiling especially in the north central regions. On the contrary, respondents in //Kharas preferred baked fish. For preservation, freezing and drying were the common methods. Most respondents ate fish with pap, which is a staple food. In eating outlets, fish was preferred over beef and chicken. Most respondents were knowledgeable about the nutritional values of fish and they acknowledged that fish was cheaper than other meat products. Fish advertisements are less common across the country, with few respondents getting information from radio and television, hence the demand for intensifying fish consumption campaigns. Half of respondents stated that people in their area eat more fish than other types of meat as ordinary meal at home.

Fish consumption campaigns could include the following; increasing fish shops, decreasing fish prices, creating awareness, mobile fish trucks, supply of sizeable good quality and varieties of fish among others.

RECOMMENDATIONS

1. The annual per capita fish consumption in Namibia is estimated to be 18.07kg which is slightly below the global fish consumption of 20.4 kg/person per year. In addition, only 56 respondents have consumed fish 30 days before the survey date. Therefore, a target fish consumption programme is required especially in the rural areas to meet the global consumption rate.
2. A public health education program is required to provide the public with the knowledge of fish consumption for health purposes. Therefore, NFCPT should consult the Ministry of health and social services to enhance the health education programmes with a specific focus on fish consumption and associated health benefits.
3. This study served as a baseline survey, therefore there is a need to conduct longitudinal studies at the interval of 5 years to establish a reliable pattern of fish consumption in the country. This will enable the development of the national fish consumption database.
4. NFCPT should revise the current fish promotion program to increase visibility and advertisement through radio, television, billboards, social media, expos, roadshows, shopping centre stands, preferably in local languages given the diverse language use across the country.
5. Since boiling of fish is highly common in some regions, there is a need to educate communities on different ways of preparing fish and recipes.
6. NFCPT should ensure that the consignment of fish distributed in regional shops are of good quality, sizeable and different varieties.
7. Although fish was said to be relatively cheaper than beef and chicken, it is recommended that fish price should be reduced to increase consumption.
8. NFCPT should establish a surveillance system to respond fish price signals in the market, since they were the third preferred source of fish.
9. NFCPT should consider increasing their fish shops per region.

10. Robust projection models are needed to understand fish demand and supply projections beyond the year 2030, considering the region's population growth.

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ANNEXURES

Annexure: I

Confidence Level	z
0.70	1.04
0.75	1.15
0.80	1.28
0.85	1.44
0.90	1.645
0.92	1.75
0.95	1.96
0.96	2.05
0.97	2.17
0.98	2.33
0.99	2.58

ANNEXURE 2: NAMIBIA FISH CONSUMPTION AND PROMOTION SURVEY VALIDATION WORKSHOP

The Regional Validation Workshops were conducted in the four regions: Oshana, Khomas, //Karas, and Zambezi region. The objective here was two-fold: firstly to share the survey results, and secondly, validate the results and solicit inputs into the report. The regional workshops were conducted from the 11 March to 15 March 2024, at various intervals. The Stakeholder's comments are listed below according to the region.

STAKEHOLDER COMMENTS

Oshana comments:

Stakeholders validated the results from the NFC survey and acknowledged that it presented the data/information needed for their planning.

The following comments were raised:

1. In the introduction, the bullet about "*As of 2021, NFCPT owns and operates 18 fish shops in all 14 regions of the country*", the team was informed that NFCPT does not own all the 18 shops, but some shops are rented i.e. in Katima and Nkurenkuru.
2. People have no knowledge of fish, so there is a need for promotion and education, especially about different types of fish.
3. It is important to make fish available to the people
4. It was also noted that the harvest of fish is not regular, resulting in a short supply at the distribution points.
5. NFCPT needs to change the mandate to take over the value chain to cut costs, for instance, the harvesting of fish, storage and distribution through contractors result in increased fish prices.
6. The possibility of having fish containers at constituency offices was also raised to increase distribution/supply of fish in remote areas, but security needs to be increased at those offices.
7. Mobile fish trucks need to be reconsidered

//Kharas comments:

About 25 people attended the stakeholders meeting and the following points were raised:

1. Generally, the availability of fish is a concern in the region and mechanisms to increase fish consumption should be explored.
2. The determinants of fish price should be explained to the mass or the nation at large as it affects the pricing and potentially negatively affecting fish availability.
3. The quality of fish was also raised by way of asking what happens to the fish after its expiry date.
4. Collaboration between the Ministry of Health and NFCPT should be encouraged to promote fish consumption as a health benefit. It was suggested that UNAM could assist with conducting content analysis or any other methodology to find out the gaps that may exist with respect to fish consumption in the Health Promotion programme by the Ministry of Health. This could allow the NFCPT to incorporate some necessary content targeted at increasing fish consumption.
5. There was a request to review the mandate of the NFCPT to allow for:
    a. increase the fish quotas to the NFCPT
    b. Increased collaboration between the Ministry of Fisheries and Marine Resources on allowing own catches, vessels and storage facilities to increase fish availability and affordability.

Khomas comments

The following comments were captured:

1. The presentation did not display the study limitations. These, however, are included in the report.
2. What was the reasons stated for the respondents (44%) that did not consume fish?
3. The issue of fish prices was also highlighted. What was the mean pricing of fish in rural and urban areas? Although NFC survey report presented

some information about fish prices, stakeholders highlighted that there is a need for further studies on fish pricing in Namibia.

4. What was the demography of the age group? It would be interesting to run an analysis between income and age groups and those that consumed fish in the last 30 days.
5. What were the reasons for eating fish? Is there anything the NFCPT can do to increase fish consumption?
6. The adverts on fish consumption must consider translation in the sign language for those with hearing disability or any other form.
7. It will be interesting to run a cross tabulation between the price of fish and the type of fish to determine the mean price. In addition, information on prices for fish can be obtained from the Ministry of Fisheries.
8. Stakeholders echoed the need to promote aquaculture in Namibia.
9. The literature should draw references to countries along the coast. Thus, referencing Ethiopia as a benchmark may not be relevant. This idea was countered that it may be relevant as an example of the countries with the lowest fish consumption per capita on the continent. Examples of other countries are referenced in the report. Regarding fish consumption per capita, comparison between Namibia and neighboring countries such as South Africa, Angola and Zambia is needed in addition to global and East Africa fish consumption per capita presented in the report.
10. Were there any cultural issues observed with fish consumption? Further studies on impact of culture on fish consumption, and issues of health concerns are needed
11. Why was the data collected in June? Is it about peak season? Stakeholders were informed that the study period was 09 to 23 June 2023 but the measurement for the per capita fish consumption was anchored on a specific time (past 30 days) before the date of data collection, therefore the month had nothing to do with peak season, but it was randomly done.

Zambezi comments:

In the Zambezi, the meeting also took place at 14h30 in AK 1 Hall at Katima Campus with the attendance of **52** People.

The discourse in Zambezi squarely revolved on the Trust's mandate and fish price.

The meeting believed fish in Zambezi was expensive, defeating the initial mandate of the Trust to make fish affordable and accessible. They gave an example that 10kg of fish was going for over N$ 245.00. Regarding fish price the meeting wanted to know whether a comparison study was done on fish price between Namibia and Angola and the answer was given that that was beyond the study of the current study. Suggestion was made to consider coming up with fish price formula that accommodate people from lowest segment of the population so that no one should feel left out from eating fish.

Furthermore, the meeting felt that the Trust is drifting away from its initial mandate to make fish available and affordable to be a business-oriented entity. A question was posed as to who determines fish price in the fish shop. The answer was that the Trust suggest the price adjustment in tandem with prevailing economic condition to the MFMR for approval.

There was also a question of fish size offered and the answer was provided as the comments I made above. The was also a clarification on fish consumption in the past 30 days where the meeting suggested that consumption should not be viewed in the specific area only as once could consume fish while in another region for example while in Whk not while in Zambezi.

Some of the meeting participants felt that for the Trust to survive it needed to run its affairs on a commercial basis hence that should affect prices.