

Dryfish Diversity of Veraval Dish Market, Gir Somnath, Gujarat

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Abstract: *The present investigation was conducted to find the diversity and price of dry fish from the Veraval fish market. The market operates actively during the fishing season. The data collection was done by preparing a data collection sheet. Several species of coastal and marine dried fish like bangara, бага, mendali, khoti-kati, dhoma, bumla, and lal machala were commonly available. The market channel involves fish processors, merchants, wholesalers, retailers etc. The price of marine fish varies with the fish species' size, availability, and quality. The price of dry fish was noted during the intensive survey. Transport, labour and availability of fresh fish played a significant role in determining the selling price. The marketing system is associated with a good employment generation involving men and women. The main barrier to the market's sustainable development is lack of infrastructure facilities and poor market conditions*

Keywords: Fish processors, merchants, wholesalers, retailers

I. INTRODUCTION

Fish is sometimes referred to as "a rich lunch for impoverished people" since it provides essential nutrients, especially lipids and proteins with a high biological value. Fish is a nutrient-dense diet that delivers high-quality protein as well as a wide range of vitamins and minerals, including vitamins A and D, magnesium, and phosphorus. Fish is superior to other animal protein sources because of the micro and macronutrients it contains [1]. Apart from being a source of food, fish also serves to protect humans from a range of diseases around the world [2]. Fish have a protein content of 15–20% of their total body weight. The necessary amino acids included in fish protein increase the overall nutritional quality of a varied diet [3,1].

A portion of 140gm fish can fulfil roughly 50–60% of an adult human's daily protein requirements. Micronutrients found in fish are more readily available than those found in plant meals [4]. Fishes are a rich source of protein and have a high amount of omega-3 long-chain polyunsaturated fatty acids when compared to land animals [5].

Nearly one-third of the food produced for human consumption was wasted from the entire production-to-consumption system according to FAO[6] and the major losses were attributed to improper storage and untimely processing including drying the foodstuff [7]. India lacks adequate post-harvest infrastructure facilities to process and store dry fish. There is a huge landing of undersized and low-market value fish such as bycatch, which are mostly discarded at sea during peak fishing seasons. During lean fishing seasons, these fishes are brought to the fish landing centres by the fishermen, due to demand from the dry fish enterprise. Drying is a method of food preservation that works by removing water from the food, which inhibits the growth of microorganisms. Open air-drying using sun and wind has been practised since ancient times to preserve food.

Water is usually removed by evaporation (air drying, sun drying, smoking or wind drying) but, in the case of freeze-drying, food is first frozen and then the water is removed by sublimation. Bacteria, yeasts and moulds need the water in the food to grow and drying effectively prevents them from surviving in the food.

Dry fish can be transported to areas where these fishes have good market potential. Dry fish attract greater demand during fishing ban period when the availability of fresh fish in the market is low[8]. Dry fish has a higher concentration of protein (in terms of weight) as compared to wet-weight fish and therefore is a cheap source of animal protein. Hence,

dry fish production provides employment opportunities, especially to women who generate income for the fishers, in addition to contributing towards the nutritional security of the poor, [7]. As per CMFRI,2010 females are more actively involved in curing/processing as well as the marketing of dry fish [9]. Drying fish was a well-known method of fish preservation before the introduction of canning and freezing.

Chilled and dried fish are also marketed nowadays in large quantities in towns and cities. Utilization and marketing distribution of fish is around 70% fresh fish, 25% dried and the other forms of locally processed fish include fermented products and frozen products [10]. Out of the total fish produced in the country, 75.07% of the fish is marketed fresh, 13.80% is frozen mainly for export, and only 4.20% is utilized for drying [11]. Dry fish marketing operates through a vast network in the country and Kerala, Tamil Nadu, Andhra Pradesh, Maharashtra and Gujarat are prominent dry fish-producing states in the country, which are marketed throughout India.

The Jagi Road fish market located at Assam is the largest dry fish market in Asia and transactions worth more than 40 crores take place annually in this market tonnes of dry fish, especially from Andhra Pradesh arrive at Jagi Road market daily [12]. Among the dry fish-producing states, Andhra Pradesh in the East and Gujarat in the West Coast are major states. Nakapalli which is located at Visakhapatnam in Andhra Pradesh is a dominant dry fish trading center [8]. Gujarat coast is another major hub where dry fish gets processed in large quantities. Apart from Bombay duck, croaker, grouper, cobia, ribbon fish, shrimp, catfish, leather jacket, silver bellies, anchovies, soles and horse mackerel are processed as dry fish in Gujarat [13]. Veraval and Porbandar are the two big landing centres in Gujarat. The general fish quality management standard of the state was not up to the standards in almost all landing centres and harbours [14]. Dried fish processing is a common practice in Gujarat's coastal region. About 20 percent of the fish harvest is being processed regularly for domestic and overseas consumption. 11 export units and 350 domestic dried fish units are involved in dried fish processing in Gujarat state. The state accounts for about 80 per cent of total dried fish exports from India per season [15].

In Gujarat, the Saurashtra coastal belt is replete with fisheries activity related to marine fish capture, mostly by the fisher community living on fish and fisheries activity [16]. Veraval, Okha, Jafrabad, Navabandar and Porbandar are big landing centres for dried fish in Gujarat. Veraval is a very big fish harbour in Gujarat state. Hence, the present study attempted to address dry fish production, its financial feasibility and diversity. Fresh fish rapidly deteriorates unless some way can be found to preserve it.

II. METHODOLOGY

2.1 STUDY AREA

The area selected for the study was the Kharakuva fish market. This market is located in Sagar Bhuvan, Krishna Nagar of Veraval taluka of Gir Somnath district, Gujarat. Veraval is located in 20.9°N 70.37°E (Plate I) (Lat 20.902687°, Long 70.364532°). It is also known as the hub of the fishing industry. Veraval have one of the largest fishing ports in India. The kharakuva fish marketing involves a long marketing channel system starting from the fish processors wholesalers to retailers and consumers.

2.2 DATA COLLECTION

Wholesale and retail dry fish markets were chosen for the data gathering. The dealers of dried fish were approached and persuaded to take part in the study.

2.3 IDENTIFICATION OF DRIED FISH

The fish were recognised using their common names as well as fish traits including body form, length, depth, mouth, and the type of spines and scales on the fish, among other things. Fishermen's and traders' common names were recorded, and their scientific names were determined using standard literature [17,18,19]

III. RESULT AND DISCUSSION

In the Veraval Kharakuva fish market, fish were sold through wholesale and retail fish markets. These two markets played an important role in marketing (fig. 1 & fig.2). There were various fishing activities including fresh fish and dried fish selling, filleting, preparing chunks of different fish, etc. The market was very unhygienic in condition. Different

species of fish were dried in different styles. Some were dried whole while some were dressed properly before drying. Many fisherwomen were involved in the drying and selling practices of fish products.

The fish that were dried included croaker, grouper, cobia, catfish, eels, spadenose sharks, mackerel, shrimp, etc. Those women sorted their dry goods by size, quantity, quality etc. Prices for the dried shrimp were determined after size-based sorting. As many of the fish were not accessible in Veraval, these women had to purchase them from fish markets in Jafrabad, Okha, Porbandar etc.

Fishes including Bombay duck, anchovies, and other species were not found in Veraval. Fish including the silver pomfret, black pomfret, hilsa, jawla, seer fish, perches, etc. were being dried and sold by some of the women's sellers. The pomfrets were quite tiny. The fishermen revealed that selling dry fish brought in more money than selling fresh. Fish of various kinds were adorned in various ways, including headless, butterfly, chunked, filleted, entire, etc. Jawla shrimp, Bombay duck, sole fish, horse mackerel, and others produced from sharks and rays are in high demand worldwide. Several methods were used to dry this fish.

It was observed that fish were washed and cleaned after it was obtained from the fish producer. Fillet, chunk, headless, or complete processing options were available after preprocessing. Sun drying of processed fish, which typically took 14 to 18 hours, was done on racks, poles, platforms, or mats. The drying yards were where dried fish were sorted and kept before being transported (Fig. 3 to fig. 6).

Veraval produces 3.18 lakh tonnes of fish annually, making it one of Gujarat's top fish producers. In this coastal location, good marine fish landings have been seen. 25 species of dried fish were found in the fish market of Kharakuva fish market, Veraval. Among them most commonly available dried fish were silver croaker, catfish, groupers, ribbonfish, lizardfish, mackerels, tuna, shrimp, etc. The availability of different species changed by season as per the survey. The major dried fish that were recorded in the studied market are presented in Table 1.

Different order-wise observations of fishes in the Veraval fish market revealed that Perciformes were the most abundant, accounting for 40%, followed by 12% Clupeiformes, Decapoda accounting to 12%, Aulopiformes 4%, Carcharhiniformes 4%, Lampriformes 4%, Scombriformes 4%, Pleuronectiformes 4%, Carangiformes 4%, Anguilliformes 4%, Rhinopristiformes 4%, Siluriformes 4%.

In the Veraval fish market, fish belonging to different family were sold. The contribution was 12% from Carangidae, 12% from Sciaenidae, Chirocentridae 4%, Synodontidae 4%, Carcharhinidae 4%, Trachipteridae 4%, Stromateidae 4%, Cynoglossidae 4%, Engraulidae 4%, Penaeidae 4%, Serranidae 4%, Clupeidae 4%, Muraenesocidae 4%, Solenoceridae 4%, Sergestidae 4%, Lethrinidae 4%, Terapontidae 4%, Rhinidae 4%, Ariidae 4% and Lactariidae 4%. Some dominant dry fish species from different families are shown in Fig7 to 21







Table 1: Dried fish diversity in Veraval fish market











Sr.No	Local name	Common name	Scientific name	Family	Order
1	Malbari	Indian Mackerel	Rastrelliger kanagurta	Scombridae	Perciformes
2	Dai	Silver bar	Chirocentrus dorab	Chirocentrida	Clupeiformes
3	Dataniya Bumbla	Bombay duck	Harpodon nehereus	Synodontidae	Aulopiformes
4	Sandhi	Indian dog shark	Scoliodon laticaudus	Carcharhinidae	Carcharhiniformes
5	Chapri	Queen fish	Scomberoides commersonianus	carangidae	Perciformes
6	Baaga	Ribbon fish	Lepturacanthus savala	Trachipteridae	Lampriformes
7	Paplet	Silver pomfret	Pampus argenteus	Stromateidae	Scombriforme
8	Jeebh	Sole fish	Cynoglossus lingua	Cynoglossidae	Pleuronectiformes
9	Mendali	Anchovy	Coilia dussumieri	Engraulidae	Clupeiformes
10	Tiny	Kiddi shrimp	Parapenaeopsis styliifera	Penaeidae	Decapoda
11	Vekhli	Reef cod	Epinephelus tauvina	Serranidae	Perciformes
12	Dhoma	Croaker	Otolithes cuvieri	Sciaenidae	Perciformes
13	Mati	Oil sardine	Sardinella longiceps	Clupeidae	Clupeiformes
14	Adadiyo	Black pomfret	Parastromateus niger	Carangidae	Carangiformes

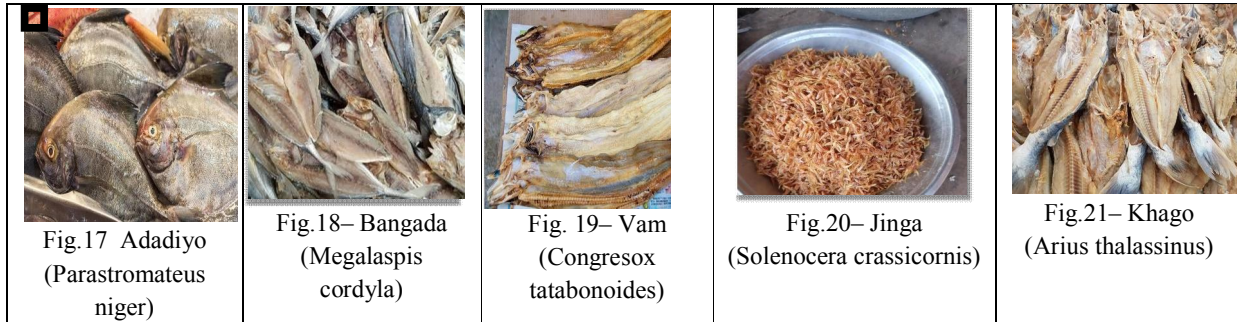
15	Bangada	Horse mackerel	Megalaspis cordyla	Carangidae	Perciformes
16	Vam	Eel	Congresox tatabonoides	Muraenesocidae	Anguilliformes
17	Jinga	Mud shrimp	Solenocera crassicornis	Solenoceridae	Decapoda
18	Jawla	Jawla shrimp	Acetes indicus	Sergestidae	Decapoda
19	Dhamil	Ornate emperor	Lethrinus ornatus	Lethrinidae	Perciformes
20	Hajamro	Tiger bass	Terapon jarbua	Terapontidae	Perciformes
21	Ghol	Jew Fish	Protonibea diacanthus	Sciaenidae	Perciformes
22	Dhoma	Tiger Tooth Crocker	Otolithes ruber	Sciaenidae	Perciformes
23	Bhuthar	Guitar Fish	Rhynchobatus djiddensis	Rhinidae	Rhinopristiformes
24	Khago	Giant Catfish	Arius thalassinus	Ariidae	Siluriformes
25	Khetli	White Fish	actarius lactarius	Lactariidae	Perciformes

Table 2: Pricelist of dried fish sold in Veraval fish market

Sr No	Local name	Common name	Scientific name	Wet fish price(Rs)	Dried fish price(Rs)
1	Malbari	Indian Mackerel	Rastrelliger kanagurta	50-70/kg	100-120/kg
2	Dai	Silver bar	Chirocentrus dorab	80-90/kg	30/Piece
3	Dataniya Bumbla	Bombay duck	Harpodon nehereus	70/kg	400/kg
4	Sandhi	Indian dog shark	Scoliodon laticaudus	80-90/kg	800/kg
5	Chapri	Queen fish	Scomberoides commersonianus	30-40/kg	30/Piece
6	Baaga	Ribbon fish	Lepturacanthus savala	150/kg	200-260/kg
7	Paplet	Silver pomfret	Pampus argenteus	130/kg	200-245/kg
8	Jeebh	Sole fish	Cynoglossus lingua	30-50/kg	20/Piece
9	Mendali	Anchovy	Coilia dussumieri	40-60/kg	200-250/kg
10	Tiny	Kiddi shrimp	Parapenaeopsis stylifera	120-170/kg	400-450/kg
11	Vekhli	Reef cod	Epinephelus tauvina	100-200/kg	350/kg
12	Dhoma	Croaker	Otolithes cuvieri	100-150/kg	450/kg
13	Mati	Oil sardine	Sardinella longiceps	100/kg	230-250/kg
14	Adadiyo	Black pomfret	Parastromateus niger	200/kg	320/kg
15	Bangada	Horse mackerel	Megalaspis cordyla	20-30/kg	20-35/Piece
16	Vam	Eel	Congresox tatabonoides	20-40/kg	15-25/Piece
17	Jinga	Mud shrimp	Solenocera crassicornis	200/kg	400/kg
18	Jawla	Jawla shrimp	Acetes indicus	175/kg	250/kg
19	Dhamil	Ornate emperor	Lethrinus ornatus	200/kg	250-350/kg
20	Hajamro	Tiger bass	Terapon jarbua	150/kg	300/kg
21	Ghol	Jew Fish	Protonibea diacanthus	250/kg	400/kg
22	Dhoma	Tiger Tooth Crocker	Otolithes ruber	150-180/kg	450/kg
23	Bhuthar	Guitar Fish	Rhynchobatus djiddensis	200-250/kg	500/kg
24	Khago	Giant Catfish	Arius thalassinus	200-250/kg	500/kg
25	Khetli	White Fish	actarius lactarius	150/kg	300/kg

		
Fig.1- Wholesale fish market	Fig.2- Retail fish market	Fig.3- Mat drying
		
Fig. 4- Rack drying	Fig.5- Platform drying	Fig.6- Pole drying

				
Fig.7–Malbari (<i>Rastrelliger kanagurta</i>)	Fig. 8 – Dai (<i>Chirocentrus dorab</i>)	Fig. 9 – Dataniya bumbala (<i>Harpodon nehereus</i>)	Fig.10 Chapri(<i>Scomberoides commersonianus</i>)	Fig.11– Baaga (<i>Lepturacanthus savala</i>)
				
Fig.12– Paplet (<i>Pampus argenteus</i>)	Fig.13– Jeebh (<i>Cynoglossus lingua</i>)	Fig. 14– Mendali (<i>Coilia dussumieri</i>)	Fig.15– Dhoma (<i>Otolithes cuvieri</i>)	Fig.16 Matis (<i>Sardinella longiceps</i>)



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REFERENCES

- [1] Sujatha.K, A.A. Joice, and P.S Kumaar. Total protein and lipid content in edible tissues of fishes from Kasimodu fish landing centre, Chennai, Tamilnadu. *European Journal of Experimental Biology*, 2013. Vol 3(5):252-257
- [2] Abraham , B., H. Admassu, A. Mahmud, N. Tsighe, X.W. Shui, and Y. Fang.. “Effect of processing methods on nutritional and physico-chemical composition of fish: a review”, *MOJ Food Processing & Technology*, 2018,Vol. 6(4): 376–382.
- [3] Mohanty, B.P. “Nutritional value of food fish”. Central Inland Fisheries Research Institute Barrackpore, Kolkata, (2015).
- [4] Lilly, T.T., J.K. Immaculate, and P. Jamila. “Macro and micronutrients of selected marine fishes in Tuticorin”, South East coast of India, 2017
- [5] Tacon, A.G.T., and M. Metian. “Fish Matters: Importance of Aquatic Foods in Human Nutrition and Global Food Supply”, *Reviews in Fisheries Science*, 2013, 21(1): 22–38
- [6] FAO Global Aquaculture Production Statistics for the year. [www.fao.org/http://www.fishbase.Org/](http://www.fishbase.Org/),2014
- [7] Kallon, A., Lebbie, A., Sturm, B., Garnett, T. and Wadsworth, R. Comparative studies of fish smoking and solar drying in the Sierra Leone artisanal fishing industry. *J. Stored Prod. Postharvest Res.*, 2017, 8(3): 40-48
- [8] Das, M., Rohit, P., Maheswarudu, G., Dash, B. and Ramana, P. V. Overview of dry fish landings and trade at Visakhapatnam Fishing Harbour. *Mar. Fish. Infor. Ser. T&E Ser.*, 2013,215: 3-7
- [9] CMFRI. Marine Fisheries Census, Central Marine Fisheries Research Institute, Kochi , 2010
- [10] Islam, M. R. Managing Diverse Land Uses in Coastal Bangladesh: Institutional Approaches, in *Environment and Livelihoods in Tropical Coastal Zones*, C.T. Hoanh, T.P. Tuong, J.W. Growing and B Hardy (Eds.). CAB International. 2006, 237-248
- [11] Anon , Handbook on Fisheries Statistics of India. Fisheries Statistics Division, Department of Fisheries, Ministry of Fisheries, Animal Husbandry & Dairying, Government of India: New Delhi, India, 2020
- [12] Anon, Annual Report 2002. ICAR Central Institute of Fisheries Technology, Cochin, India, 2002
- [13] Fofandi, D., Poojaben, T., Yagnesh, M.,Rajkumar, D. and Agiya, A, Dry fish market survey of Veraval, *J. Entomol. Zool. Study*,2020, 8: 686-688
- [14] Khileri, R. A., Lende, S. R. and Deshmukh, P. G, Analyzing Potential of Kharakuva Fish Market on the Coastal Region of Saurashtra, Gujarat. *Adv. Econ. Bus. Manag.*,2014,1(3): 259- 264
- [15] Johnson, D. S., Biswal, R., & Sathyapalan, J., History and Social Difference in Arguments for the Societal Values of Small-Scale Fisheries in Gujarat, India. In *Social Wellbeing and the Values of Small-Scale Fisheries*,2018,(pp. 267-291).Springer, Cham.
- [16] Gohel J, Solanki J.B, Zofair SM, Parmar H.L, Dodia A.R. Maikulap, The most favourite dish of Saurashtra coast, particularly among fisher community. *Fishing Chimes.*,2012, 32(2):34-35
- [17] Day F., The fishes of India being a natural history of the fishes known to inhabit the seas and freshwater of India, Burma and Ceylon, Vol. I & II, William Dawson and Sons Ltd., London, ,1978,pp. 20- 77

[18] Talwar P.K. and A.K. Jhingran . Inland fishes of India and adjacent countries. Vol. 1. A.A. Balkema/Rotterdam.,1992 1177p.

[19] Jayaram K.C., The freshwater fishes of the Indian region. Narendra Publishing House,1999

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