

# An overview of adoption of hygienic practices by fish marketing personnel in selected fish markets of Port Blair city, Andaman and Nicobar Islands

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## Abstract

**Objectives:** To analyze the extent of adoption of hygienic fish handling practices by marketing personnels in selected fish markets of Port Blair city of Andaman and Nicobar Islands.

**Methods/Statistical analysis:** Around 20 fish marketing personnel's each randomly selected from the major fish markets. A pre-tested semi-structured interview schedule and observation method is used for the collection of information. The adequacy index of infrastructure facility, extent of adoption of hygienic measures, adoption measure for improved marketing practices by marketing personnel were analysed through the statistical tools like percentage, mean SD, F test, Correlation and regression were used by using statistical package Minitab 17.

**Findings:** The 'F' value analyzed for the socio-economic variables shows significant difference among the marketing personnels of the three selected markets. Overall availability index in all three markets shows high infrastructure availability in proper shed (90.55±13.41), transportation facility (86.10±15.38), cemented floor (82.77±14.68), clean ground condition (76.66±20.73) whereas, a very less availability index in clean water (55.11±20.30), drainage system (50.55±18.18), waste disposable facility (40.55±9.09), hygienic toilet (33.88±7.45) and electricity (57.22±14.88). Among all the seven hygienic practices measured, personal hygiene (77.77±19.93), clean container for storage of fish (74.99±19.96), clean polyethene for consumer (58.33±19.83), hygienic sorting of fish (57.22±22.19) and use of ice to prevent spoilage (52.77±16.88) were found adopted by majority of fish marketing personnel's while practices such as washing of fish with clean water (41.66±14.23) and waste disposal (36.11±9.04) are found less adopted. The value R<sup>2</sup> shows if all variable taken together will cause 0.89 % of the variation in the adoption level. The major constraint responded is the cost of ice (76.66%) followed by the insufficient space in the marketplace (73.33%).

**Application/Improvements:** A training and awareness programmes needs to be conducted by extension agencies, research organizations and Andaman and Nicobar Islands Fisheries department for increasing the knowledge about a hygienic condition and hygienic handling of fish in a fish market. Assistance by providing sufficient infrastructure by Fisheries department and maintenance of cold chain will help to improve extent of adoption of fish handling by marketing personnels.

**Keywords:** Adoption, Hygienic Practices, Marketing Personnel's, Fish Markets.

## 1. Introduction

The Andaman and Nicobar islands blessed with extensive coastal and marine resources are important in both ecological and livelihoods related contexts. The fishing industry supports a major portion of the economy of these islands. The total marine fish production during the year 2014-15 is 36980 t out of which 24037 t as fresh, 5547 t frozen and 7396 t as salting and drying disposed respectively [1]. Andaman and Nicobar Islands consist of 5 major fish landing centers and 46 fish landing points [1, 2]. The major types of fishing crafts are

plank built country craft ranging in size 5.5 to 7.5 m and motorized dugout canoe of 7.7 to 15 m fitted with the inboard motor. In addition, few mechanized crafts also operated in this islands [1, 3].

Port Blair is the municipal council in the southern part of Andaman. It lies on the east coast of South Andaman Island and is the main entry point to the islands [4]. Traditional fish marketing in Port Blair holds a huge potential and is highly unorganised and unregulated and forms the major platform for the domestic fish marketing. Jungalighat, the major landing centre provides the principal share to the fish marketing network of Port Blair along with small landing points such as Dignabaad, Wandoor, Chidiyutapu, Burma Nallah, Dandoos point.

Fish is a highly perishable commodity and if not meant for immediate consumption, requires proper post-harvest management and refrigeration, or ice to improve and maintain its safety and quality [5]. Fish and fishery products are among the most traded food commodities worldwide. The share of total production that is exported increased significantly from 25 percent in the mid-1970s to nearly 37 percent in 2012, reflecting the sector's growing degree of integration in the global economy [6]. Meanwhile, 30 percent of a total fish catch is lost through poor post-harvest handling around the globe, which reduces fish supplies for both domestic and the export markets [7]. Hence a proper hygienic practice has to be popularised among the marketers in order to deliver safe and quality fish and fishery products.

The post-harvest handling of a catch is the most important step in the production of a high quality finished product [8]. Many factors affect the quality of fish sold in a market such as cleanliness of the market and storage place, quality and quantity of water used, temperature at which fish is maintained, the general handling practices adopted, cleanliness of the utensils used by fish handlers [9]. The desired hygienic practices include hand washing before food is touched, cleaning and sanitizing work surfaces and equipment, and sterilization to remove or destroy spoilage and pathogenic microbes [10]. These hygienic measures aim at preventing or reducing fish contamination and microbial growth. Most of the intermediaries involved in the marketing of fish are unaware that they are potential carriers of pathogenic microorganism and poor personnel hygienic make the fish unsafe for human consumption [11].

The fish markets are often characterized by wet and slimy flooring, foul smell, deposits of fish wastages, improper drainage, a presence of flies, dogs etc. High levels of noise and cacophony are symbolic of a fish market [12]. Personal hygiene is utmost important in fish handling. The body of the fish retailer/handling persons is still prone to various types of contamination and a sure source of different kinds of bacteria of public health significance [13]. It is necessary to study the awareness and adoption of hygienic fish handling practices adopted by the fish marketing personnel and the impact of the adoption on the livelihood of fisher folk. In this backdrop, the current study is designed with the following objectives.

1. To determine the socio-economic characters of the fish marketing personnel's.
2. To assess the awareness and extent of adoption of hygienic fish handling.
3. To determine the correlation and regression of socio-economic status and adoption level of hygienic practices by fish Marketing personnel.
4. To identify constraints and problems encountered by fish Marketing personnel in an adoption of hygienic fish handling practices.

## 2. Materials and methods

Around 20 fish marketing personnel's each were randomly selected from the major fish markets viz., Bathu Basthi Junglighat and Mohanpura of Port Blair city of Andaman and Nicobar Islands. A pre-tested semi-structured interview schedule, as well as observation methods, is used for the collection of information from the marketing personnels. Along with that, discussions were carried out with wholesalers, stakeholders and middleman for more information to support the study.

The data was collected during the months of January - December 2016. The adequacy index of infrastructure facility was calculated on three-point rating scale viz., adequate, partially adequate and not adequate, with the scoring pattern of 3, 2 and 1 respectively. The extent of adoption of hygienic measures was measured by assessing seven hygienic practices viz. use of clean water, maintenance of personnel cleanliness, waste disposal, use of ice, hygienic sorting of the fish, use of clean containers and use of clean polyethene for a consumer. The adoption measure for improved marketing practices by marketing personnel was calculated on three-point

rating scale viz., adequate, partially adequate and not adequate, with the scoring pattern of 3, 2 and 1 respectively. For the analysis of data, the statistical tools like percentage, mean SD, F test, Correlation and regression were used by using statistical package Minitab 17.

### 3. Results and discussion

The socio-economic status of fish marketing personnel's of Port Blair city is given in Table 1. The overall average age and experience in fish marketing of marketers are found to be 43.34 and 12.33 years respectively, which clearly indicates that the maximum marketing personnel's are of middle age group and engaged in fish marketing at a very young age. The fish market Bathu Basthi is found to have higher average age and experience of fish marketing (46.40 and 15.80 years) than the other two markets Mohanpura (43.30 and 12.10 years) and Junglighat (40.60 and 9.10 years). The education status is found to be very poor among all the marketing personnel with an average education level of upper primary (6.16). The Mohanpura fish market is observed to be having the high average education (7.35) followed by Bathu Basthi (6.650 and Junglighat 4.50). The result shows that there is a great need for awareness about the education among the women of fishermen family. The average investment for all marketing personnel's is found to be ₹ 52033 with an average annual income of ₹ 121833. The fish marketing personnel's of Bathu Basthi fish market are found to be investing more (₹ 57850) compared to other two fish markets, i.e. ₹ 57850 with an annual income of ₹ 134000. The minimum investment (₹ 46250) and annual income (₹ 110250) was observed among the Mohanpura fish marketing personnels. The average working days for all marketing personnel's in a week are 6.25 days. The details regarding the species handled in the markets revealed that a very lesser number (four) of species are there on an average. The frequency of fish collection is found to be seven times on a weekly average whereas the average quantity handled by fish marketing personnel's is 35.75 kg in a week. The study assessed an average family size of six in the study area. The 'F' value shows significant difference among the marketing personnel's of the three selected markets for the variable studied viz. age, education, experience, investment, species handled, a frequency of collection, family size and annual income.

Table 1. Socio-economic status of fish marketing personnel's of port blair city (n=60)

Variable	Bathu Basthi Mean±StDev (n=20)	Junglighat Mean±StDev (n=20)	Mohanpura Mean±StDev (n=20)	Overall Mean±St Dev (n=60)	'F'
Age (Years)	46.40±8.34	40.60±4.84	43.30±6.40	43.433±6.988	3.77**
Education	6.650±3.133	4.500±3.301	7.350±2.601	6.167±3.216	4.82**
Experience (in Years)	15.80±8.32	9.100±3.007	12.10±7.74	12.333±7.220	4.89**
Investment (Rs.)	57850±11184	52000±6959	46250±9301	52033±10322	7.76*
Working days in a week	6.400±0.754	6.250±0.550	6.100±0.718	6.2500± 0.6796	0.79
Species handled (Nos.)	4.300±1.031	4.300±0.657	4.100±1.021	4.233±0.909	0.32
Frequency of collection (per month)	7.900±1.518	6.800±1.399	6.900±1.071	7.200±1.412	4.10**
Avg. quantity handled each day (Kg.)	36.00±6.20	39.25±9.50	31.95±6.13	35.73±7.91	4.83**
Family Size	5.250±1.773	6.400±2.162	7.000±1.556	6.217±1.958	4.63**
Annual income (Rs.)	134000±26238	121250±18416	110250±25260	121833±25143	5.09**

\*Significant at 0.01 level \*\*significant at 0.05

While working on the adoption of hygienic practices in fish market of Tripura reported overall mean age of the respondents was 37.81. The average number of working days in a year was 330 with an average annual income of ₹ 39 000. The 'F' value showed highly significant differences among the marketing personnel of the four selected markets on the variables such as age, experience, investment and annual income [14]. The observed values show a related findings with present study.

Table 2. Availability index of infrastructure facility in different fish market of port Blair city

Infrastructure facility	Bathu Basthi Mean±StDev (n=20)	Junglighat Mean±StDev (n=20)	Mohanpura Mean±StDev (n=20)	Overall Mean±StDev (n=60)	'F'
Cemented floor	91.66±14.81	84.99±17.01	71.66±12.21	82.77±14.68	9.46*
Clean water	63.33±28.41	56.66±15.67	45.00±16.31	55.11±20.30	3.92**
Drainage channel	53.33±16.75	38.33±12.21	59.99±25.59	50.55±18.18	6.81 *
Waste disposal facility	36.66±10.26	51.66±17.01	33.33±0.00	40.55±9.09	14.50*
Clean ground condition	68.33±25.30	81.66±20.16	79.99±16.75	76.66±20.73	2.39
Transportation facility	76.66±15.67	91.66±14.81	89.99±15.67	86.10±15.38	5.71**
Icing facility	56.66±15.67	53.33±19.94	74.99±23.88	61.66±19.83	6.73**
Hygienic toilet	33.33±0.00	35.00±7.45	33.33±0.00	33.88±7.45	1.00
Electricity	56.66±15.67	53.33±16.75	61.66±12.21	57.22±14.88	1.56
Proper Shed	83.33±17.10	98.32±7.45	89.99±15.67	90.55±13.41	5.71*
Overall	68.09±14.40	64.50±14.85	63.69±13.83	65.43±14.36	5.78*

\*Significant at 0.01 level \*\*significant at 0.05

The analyses of infrastructure facilities for the market studied are featured in Table 2. The highest availability index is found in Bathu Basthi fish market (68.09±14.40) followed by Junglighat (64.50±14.85) and Mohanpura (63.69±13.83) with the overall availability index for all the three being 65.43±14.36. The observed value shows that there is the lack of infrastructure facilities in all the three markets. The availability index shows the need of establishment or improvement of the infrastructure facilities available in all the three market studied. Overall availability index in all three markets shows high infrastructure availability in proper shed (90.55±13.41), transportation facility (86.10±15.38), Cemented floor (82.77±14.68), clean ground condition (76.66±20.73) but have very less availability index in clean water (55.11±20.30), drainage system (50.55±18.18), waste disposable facility (40.55±9.09), Hygienic toilet (33.88±7.45) and Electricity (57.22±14.88). Among all three markets, the Bathu Basthi fish markets stand to be having developed infrastructure facilities followed by Junglighat and Mohanpura fish market. In [13] 2 found overall availability index for the infrastructural facilities was 76.87%, and among various infrastructural facilities, icing (70.28%) and waste disposal facilities (71.66%) were reported to be scarce than other facilities.

The study indicates the need for awareness about improved hygienic infrastructure facilities for increasing shelf life and quality of fish. The underdeveloped infrastructure facilities in the markets are analysed in the study. The results necessitate the need of cold storage or icing facility to prevent spoilage of fish and to increase the shelf life in the markets. The 'F' value shows there is a significant difference in availability of infrastructure facility in all three fish market studied.

Table 3. Extent of adoption of hygienic practices among different fish marketing personnel

Hygienic practices	Bathu Basthi Mean±StDev (n=20)	Junglighat Mean±StDev (n=20)	Mohanpura Mean±StDev (n=20)	Overall Mean±StDev (n=60)	'F'
Washing of fish with clean water	36.66±10.26	49.99±20.23	38.33±12.21	41.66±14.23	4.77**
Maintenance of personnel hygiene	68.33±22.88	84.99±20.16	79.99 ±16.75	77.77±19.93	3.63**
Waste disposal	38.33±12.21	36.66±14.91	33.33±0.000	36.11±9.04	1.05
Use of ice to prevent spoilage of fish	41.66±14.81	49.99±17.10	66.66±18.73	52.77±16.88	11.27*
Hygienic Sorting of fish	53.33±22.68	61.66±24.84	56.66±19.04	57.22±22.19	0.71
Clean containers for storage of fish	69.99±18.42	76.66±21.90	78.33±19.57	74.99±19.96	0.97
Clean polythene for consumer	88.32±16.31	41.66±18.34	45.00±24.84	58.33±19.83	33.35*
Overall	56.66±16.80	57.37±19.64	56.90± 15.88	56.98±17.44	7.96*

\*Significant at 0.01 level \*\*significant at 0.05

The extent of adoption of hygienic practices among all the marketing personnel's of the selected fish markets is presented in Table 3. The overall extent of adoption of seven hygienic practices was measured as 56.98±17.44 for all the three fish markets. Among all the seven hygienic practices measured the practices such as personnel hygiene (77.77±19.93), clean container for storage of fish (74.99±19.96), clean polythene for consumer (58.33±19.83), hygienic sorting of fish (57.22±22.19) and use of ice to prevent spoilage (52.77±16.88)

were found adopted by the majority of fish marketing personnel's but practices such as washing of fish with clean water ( $41.66 \pm 14.23$ ) and waste disposal ( $36.11 \pm 9.04$ ) shows very less adoption. Among all the three markets, the extent of adoption was found high in Junglighat fish market ( $57.37 \pm 19.64$ ) followed by Mohanpura ( $56.90 \pm 15.88$ ) and Bathu Basthi ( $56.66 \pm 16.80$ ). The 'F' value indicates the significant difference in the adoption of hygienic practices viz., washing of fish with clean water, maintenance of personnel hygiene, use of ice to prevent spoilage and use of polyethene for a consumer. There is great need of establishment of the waste disposal facility and proper supply of fresh water in order to increase hygiene also need of facilities like cold storage and ice making plant is the foremost requirement in all three markets. The role of extension agencies is also very important to increase the extent of adoption by marketing personnel by organising awareness camps and training programmes. The result of study adoption of hygienic practices in fish landing centre and markets of selected districts of Kerala [8], also reported related findings to the result obtained in the present study.

Table 4. Correlation and Regression Analysis between the socio economic variables and adoption scores among the marketing personnel (n=60)

Variable	Correlation coefficient 'r'	Regression coefficient 'b'	SE of 'b'	't'
Age (Years)	-0.170	-0.0309	0.0236	-1.31
Education	0.096	0.0382	0.0518	0.74
Experience (in Years)	-0.030	-0.0053	0.0232	-0.23
Investment (Rs.)	0.030	Negligible	0.0000	0.23
Working days in a week	-0.166	-0.312	0.243	-1.28
Species handled (Nos.)	-0.110	0.122	0.183	-0.84
Frequency of collection (per month)	-0.053	-0.048	0.118	-0.40
Avg. quantity handled each day (Kg.)	0.036	0.0058	0.0211	0.27
Family Size	-0.045	-0.0290	0.0854	-0.34
Annual income (Rs.)	0.057	Negligible	0.0000	0.44

\*Significant at 0.01 level \*\*significant at 0.05,  $R^2=0.089$

Among the entire socio-economic variable for all marketing personnel's studies the variable such as age, experience, working days in a week, species handled, a frequency of collection and family size does not have any association with the hygienic practices. The variable education, investment and average quantity handle show very less change in adoption behavior of marketing personnel. The value  $R^2$  shows if all variable taken together will cause 0.089 % of the variation in the adoption level (Table 4). The constraints and problem faced by the fish marketing personnel are in an adoption of hygienic fish handling practices are described in Table 5. The major constraints responded by the marketing personnel's is the cost of ice (76.66%) followed by the insufficient space in the marketplace (73.33%), lack of cold storage facility (53.33%), lack of fish handling facilities at market (60%), lack of technical guidance (51.66%) and irregular market structure (26.66%).

Table 5. Constraints and problems perceived by the fish marketing personnel in adoption of hygienic fish handling practices

Constraints/ Problem	Bathu Basthi n=20	Junglighat n=20	Mohanpura n=20	Total n=60	Percentage %
Cost of ice	13	15	18	46	76.66
Lack of technical guidance	9	12	10	31	51.66
Insufficient space in marketplace	19	14	11	44	73.33
lack of fish handling facilities at market	11	9	16	36	60
Irregular market structure	7	5	4	16	26.66
lack of cold storage facility	11	8	13	32	53.33

#### 4. Conclusion

Maintaining the hygienic environment in fish markets is highly significant for the proper marketing of high quality and safe fish and fishery products. Hence, creating awareness and education among the fish marketing personnel's about a hygienic condition in a fish market and hygienic handling of fish at marketplace role of extension agencies is utmost important. Extension agencies can provide new innovations and technologies through short-term training programmes, technical guidance and awareness campaigns for the marketing

personnels. Tours to the organized retail fish outlets; mass media exposure will also help marketing personnel's to improve adoption hygienic practices in fish markets. Proper training is required to the personnel's on maintenance of equipment cleanliness in the market, regular cleaning, and regular operation of chilled storage, toilets etc. A manager or a supervisor has to be appointed for daily management of the fish market. Managers and supervisors of a fish market should have the necessary knowledge of fish hygiene principles and practices to be able to judge potential risks and take the necessary action to remedy deficiencies. The members of the management committee must be well trained on maintenance of hygienic fish market, food safety and general health consideration. The assistance of the Central Inland Agriculture Research Institute can be recommended for selecting resource persons. A trainers training programme can be arranged to train all fisheries officers who in turn, may train the marketers. All personnel handling fish in the markets should be trained in all aspects of food safety and hygienic fish handling practices.

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