Assessing the Adoption of Hygienic Fish Handling Practices by Fishermen of South Andaman District of A&N Islands

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ABSTRACT

Fish, being a highly perishable commodity, demands proper post-harvest management and refrigeration, or ice to improve and maintain its safety and quality. The study articulates the adoption level of hygienic practices of fishermen in selected fish landing centres of South Andaman district, Andaman and Nicobar Islands. The socioeconomic parameters publicize that the average age observed among the fishermen of south Andaman district as 41.18±7.080 years, education as6.68±2.898 class, experience in fishing as10.97±4.868 years, investment per voyage as Rs. 9705.6±726.3, number of working days per year as 308.22±18.57 days, family status as5.10±2.403 members and annual income as Rs. 89033±12683. The adoption of hygienic practices by fishermen was also determined by analysing the nine hygienic practices. The socio-economic profile of fishermen of the selected landing centre and their adoptionof hygienic practices was found out to have no correlation except in the investment per voyage and numberof working days. The 'F' value analysed in multiple regression analysis enunciate the overallsignificance of influence of nine independentvariables when taken together in explaining theextent of adoption of good hygienic practices by thefish marketing personnel. The R^2 value showedthat the nine variables selected together explained59per cent of variation in the adoption level.The major problems perceived by the fishermen were insufficient loan, lack of subsidy on fishing gear material and lack of subsidy on diesel.The study recommends the need for proper training on hygienic practices that have to be adopted by the fishermen.

Key words: *Fish handling practices; Fishermen; Hygiene; Cold storage; Andaman and Nicobar Island;*

Indian fisheries sector registered a sustainable growth over the years which is visible through the twelve-fold increase in fish production achieved by the country in six decades, from 0.75 million tonnes during 1950-51 to 10.16 million tonnes during 2014-15 (*CMFRI Annual Report, 2015-16*). The increased health consciousness among the people has brought anopinion in their consumption behaviour towards protein abundant food which in turn increased the demand for fish and fishery products, being the healthiest and cheapest food amongst animal protein substitutes. Fish is a highly perishable commodity and a rapid loss in quality can occur after catch, if not meant for immediate consumption (*FAO, 1996; Grant I food safety, 2003*). Otherwise, it requires proper post-harvest management and refrigeration, or ice to improve and maintain its safety and quality (*Khan and Khan, 2001; Musa et al., 2010; Dewi et al., 2011*).

Meanwhile, the freshness of the fish is very important and has become a major issue in the fisheries

sector. The quality of the product reaching the final consumer greatly depends on how the fish was handled in on-board vessel, how it was preserved, packaged and transported (*Jacky Singh et. al., 2012*).

With an estimated fishery resource potential of 36980 million tonnes, fishery sector provides a major share to the economy of Andaman and Nicobar Islands. The total fishermen population of 3,80,581 is spread in 46 fishing villages with five major fish landing centres and 46 fish landing points (*Fisheries Census, 2010; A & N Fisheries at a glance 2015; A & N Gazette, 2015*). 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 on-board motor. In addition, few mechanized crafts also operated in this islands (*Rajan, 2003; A & N Fisheries at a glance 2015*).

The production of safe and quality fish and fishery products requires effective hygienic practices through out the supply chain from fish harvest to consumption. To achieve this, it is important to popularize good hygienic practices. The post-harvest handling of catch is the most important step in the production of a high quality finished product (*Balasubramaniam et al., 2009*). Hence, much emphasis has to be given on hygienic handling of the fish right from catch in order to ensure good quality and long storage life. Primary responsibility for ensuring the quality of landed fish rests with those who handle it on-board.

This study attempts to analyse the hygienic practices adopted in the handling of fish by the fishermen of South Andaman district of Andaman and Nicobar Islands. It also analyses the relationship between socio-economic characteristics of fishermen and their adoption behaviour. The paper also attempts to identify the pros and cons in adoption of hygienic fish handling practices and tries to formulate suggestions or policies to overcome the same.

METHODOLOGY

The study was conducted during the January-December 2016 among the fishermen of selected landing centres of South Andaman district viz., Junglighat, Burma Nallahand Dignabaad. The data were collected from a random sample of 90 fishermen. The selected practices viz., cleaning of deck, cleaning of fish hold and accessories, washing of fish with fresh water, sorting of fish by size and weight, removal of viscera and blood of big fishes, packaging of fish, icing of fish, personal hygiene, hygienic handling of fish were carefully analysed.

Socio-economic profile of the fishermen viz., age, educational status, family status, annual income, experience in fishing, investment for every voyage, number of working days in a year and annual income were selected and analysed using mean and standard deviation (SD).

The extent of adoption of hygienic practices was calculated on a three point scale viz., adequate, partially adequate and not adequate with the scoring pattern 3, 2 and 1 respectively.

Index (Mean and Standard Deviation) score was calculated for each response score by the ratio of actual score obtained to the maximum score possible and expressed in percentage for each respondent (*Balsubramaniam et al., 2000; Brijmohan et al., 2003; Ponnusamy et al., 2004*).

The data were analysed using statistical methods like percentage analysis, mean, standard deviation, correlation and regression coefficient by using statistical software (*Mintab, 17*).

RESULTS AND DISCUSSION

The socio-economic profile of the fishermen is given in Table 1. The highest average age for fishermen was observed in Junglighat fish landing centre (43.23 years) followed by Dignabaad (40.10 years) and Burma Nallah (36.93years). The mean age of 41.18 years clearly indicates that most of the youth from fishermen families were engaged in fishery related jobs. The average experience in fishing was found to be 10.97 years and education status is still poor with average of 6.68 (between 6-7 standard). The educational status andfishing experience showed a negative correlation in all cases with a least value of 4.63 educational status and high average fishing experience of 13.33 years in Dignabaad fishermen community. The average investment per voyage was the highest for Junglighat fishermen (Rs. 10267) followed by Burma Nallah fishermen (Rs. 9750) and Dignabaad (Rs. 9517).

The family status analysed revealed that fishermen from Dignabaad had the highest average family

members of 7.53 followed by Burma Nallah (5.23). The average annual income of the Dignabaad fishermen was Rs. 91800 with a maximum number of fishing days of 315.07 per year followed by Junglighat (Rs. 86383) with 311.50 numbers of working days. The overall annual income of the fishermen from south Andaman was Rs. 89033 with average 308.22 fishing days in a year. The calculated F value confirms that a significant difference exists in the selected socio-economic variables among the fishermen from different landing centres. The highest variability was noted in the family structure and education. It is also noted that bigger the family size the mean education value is lowered.

The extent of adoption of hygienic practices among fishermen presented in Table 2 reveals that the fishermen are adopting hygienic practices such as cleaning of deck, cleaning of fish hold accessories, washing of fish and sorting of fish in a regular basis. Overall adoption index for examined practices is 66.29±20.25. Among them, the practice of icing the fish (87.40±20.34), cleaning of deck (87.03±19.15), cleaning of fish hold and accessories (81.10±22.92), hygienic handling of fish (78.14±21.87) and sorting of fish (71.47±23.20) were adopted by the most of the fishermen, while personal hygiene (64.44±21.08), washing of fish (52.22±21.81), evisceration and removal of blood and gill for big fishes (37.77±11.39) and packaging of fish (37.03±10.53) needed to be improved.

Table 1. Socio-economic profile of the fishermen (N=90)

Variables	Junglighat (n=30) Mean±SD	Burma Nallah (n=30) Mean±SD	Dignabaad (n=30) Mean±SD	Overall (n=90) Mean±SD	F value
Age	43.23±6.63	36.93±6.57	40.10±5.081	41.18±7.080	7.91 **
Education	7.10±3.23	8.40±2.372	4.63±3.828	6.68±2.898	10.72**
Experience in fishing (yrs.)	11.10±5.54	8.24±4.348	13.33±3.166	10.97±4.868	9.66**
Investment per voyage (Rs.)	10267±1244	9750±838	9517±594	9705.6±726.3	5.09*
Number Of working Days / Year	311.50±16.87	300.00±17.17	315.07±13.12	308.22±18.57	7.42**
Family status	3.97±1.299	5.23±2.239	7.53±3.104	5.10±2.403	18.01**
Annual income (Rs.)	86383±18213	81233±10944	91800±12078	89033±12683	4.21*

*significant at 0.05 level ** significant at 0.01 level

Table 2. Extent of adoption of hygienic practices among different fish marketing personnel (N=90)

Variables	Junglighat (n=30) Mean±SD	Burma Nallah (n=30) Mean±SD	Dignabaad (n=30) Mean±SD	Overall (n=90) Mean±SD	F value
Cleaning of deck	95.55±14.47	86.66±18.77	87.77±20.50	87.03±19.15	2.15
Cleaning of fish hold and accessories	92.21±14.34	84.44±20.96	74.44±25.79	81.10±22.92	5.46*
Washing of fish	62.22±28.68	53.33±24.13	49.99±16.95	52.22±21.81	2.12
Sorting of fish	84.44±16.91	59.99±18.36	94.43±12.63	71.47±23.20	36.10**
Evisceration and removal of blood and gills for big fishes	43.33±15.53	40.00±13.56	33.330±0.00	37.77±11.39	5.49*
Packaging of fish	44.44±15.98	38.88±12.63	33.330±0.000	37.03±10.53	6.69*
Icing of fish	95.55±11.52	85.55±22.63	91.10±14.99	87.40±20.34	2.60
Personal hygiene	85.55±16.80	66.66±21.44	59.99±20.34	64.44±21.08	13.68**
Hygienic handling of fish	89.99±15.53	86.66±16.61	61.11±21.59	78.14±21.87	22.86**
Overall	70.03±16.64	66.90±18.78	65.05±14.75	66.29±20.25	10.79**

*significant at 0.05 level ** significant at 0.01

Table 3. Correlation (r) and Regression (b) analysis between the socio economic variables and adoption scores among the fishermen (N=90)

Variables	(r)	(b)	SE of 'b'	't'
Age	-0.152	-1.056	0.7325	-1.44
Education	-0.026	-0.4413	1.810	-0.24
Experience in fishing	-0.138	-1.40	1.07	-1.31
Investment per voyage (Rs.)	0.1765*	0.01196	0.00711	1.68*
No. of working days / year	0.0053	0.014	0.283	0.05
Family status	-0.1428	-2.92	2.16	-1.35
Annual income	-0.1306	-0.000507	0.000410	-1.24

*significant at 0.05 level; ** significant at 0.01 level
R^2=0.59**, F=1.43

Table 4. Problems perceived by the fishermen (N=90)

Problems	No.	%
Lack of cold storage facility	56	62.22
Lack of subsidy on diesel	64	71.11
Lack of jetty for unloading fish	32	35.56
Lack of transportation facility	41	45.56
Insufficient loan	72	80.00
Lack of place for fish auctioning	29	32.22
Lack of subsidies on fishing gear material	66	73.33

Table 5. Measures suggested by the fishermen (N=90)

Problems	No.	%
Establishment of cold storage	86	95.56
Establishment of jetty for fish landing	35	38.89
Training for new fishing techniques	68	75.56

The analysis shows that there is a need to create awareness among the fishermen regarding the important of such practices and their role in improving quality of the fish.

The highest adoption index for all hygienic practices was seen in Junglighat (70.03±16.64) followed by Burma Nallah (66.90±18.78) and Dignabaad (65.05±14.75) villages. The F value (Table 2) shows the significant difference among the adoption of hygienic practices among the landing centres. The maximum variability was noted in sorting and hygienic handling of fish.

Among the socio-economic parameters, age, education, experience in fishing, family status and annual income of fishermen did not have any association with the adoption of hygienic practices (Table 3). Meanwhile, the variable investment per voyage and number of working days per year showed a positive correlation with the adoption of hygienic practices. R^2 value indicates that all the variables taken together accounted for 59 per cent variation in the adoption level. The significant 'F' value in regression analysis reveals the overall significance of all the nine practices taken together for the explanation of hygienic practices adopted by the fishermen.

The major problems perceived by the fishermen as furnished in Table 4 indicated the crisis of insufficient loan as the major problem according to the majority of the respondents (80%). Further, lack of subsidy on fishing gear material (73.33%), lack of subsidy on diesel (71.11%) and lack of cold storage facility (71.11%) were also pointed out as problems faced by the fishermen. The problem of lack of place for fish auction has been some what solved by the utilisation of the available infrastructure.

The measures for ameliorating the problems as suggested by the fishermen are given in Table 5. Most of them (95.56%) require a cold storage facility which may help to keep their fishes in good condition. The landing centres except the Junglighat are not having wharf facility for unloading of fishes as well as loading of ice and other resources required for the fishing. A round 75.56 per cent fishermen recommended the need for training on new fishing techniques.

CONCLUSION

The fishermen of the south Andaman district of Andaman and Nicobar Islands are found to be unaware of the importance of hygienic practices for providing better quality fish and hence, are following the traditional hygienic practices. Proper training and technical guidance over the adoption of hygienic practices has to be provided to uplift the socio-economic status of the fishermen as well. The study can be well used as a basis for the formulation and implementation of betterment policies further. The study also recommends the establishment of sufficient number of cold storages at the landing centres to avoid spoilage of fish. Establishment of auction halls at the landing centres will also be appreciated for the betterment of the post-harvest activities.

REFERENCES

Anonymous (2015). Fisheries in Andaman and Nicobar Islands. Directorate of Fisheries, Andaman and Nicobar Administration, Port Blair. 12p

Balasubramaniam, S., Jeeva, J.C. and Srinath, K. (2009). Adoption of hygienic practices at fish landing centres and markets. *Fishing Technologies,* **46** (2): 177-184.

Balasubramaniam, S.,; Pravin, P.; Sreevalsan, J.M.; Brajmohan and Singh, D.P. (2000). Adoption of improved practices and annual fish catches among mechanized boat owners. *Fishing Tech.*, **37** (2): 137-143

Brajmohan; Singh, D.P. and Thiagarajan, R. (2003). Technology gap in the adoption of post harvest technology. In: Seafood Safety (Surendran, P.K., Mathew, P.T., Thampuran, N., Nambiar, V.N., Joseph, J., Boopendranath, M.R., Lakhsmanan, P.T. and Nair, P.G.V., Eds), pp 580-588, Society of Fisheries Technologists (India), Cochin.

CMFRI (Central Marine Fisheries Research Institute) (2016). Annual Report 2015-16. Cochin.

Dewi, R.S., Nurul Huda, G. And Ahmad, R. (2011). Changes in the physicochemical properties, microstructure and sensory characteristics of shark dendeng using different drying methods, *American J. of food Tech.*, **6**: 149-157.

FAO. Expert consultation on Fish Technology in Africa. Fisheries Report No 574 6th Report and Proceedings. Kisumu, 1996: 27-30.

Grant I Food safety *http://www.mric.org/research/foodsafety.htm Accessed on 3/1/2003.*

Jackie Singh,Y.; Santhakumar.R.; Pandey. D. K.; Bharati, H., and debroy, P. (2012). Adoption of Hygienic Fish Handling Practices by Fishermen. *Indian Res. J. Ext. Edu.*, **12** (1) : 36-38.

Khan, M.A.A. and Khan, Y.S.A. (2001). Insect infestation and preventive measures in dry fish storage of Chittagong, Bangladesh, *Intl. J. of Biological Sci.*, **1**: 963 -965.

Marine fisheries census, 2010.Union territories of Andaman and Nicobar and Lakshadweep Islands. Deptt. of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture, New Delhi. Pp 1-147.

Musa, U.; Hati, S.S.; Adamu, Y.I. and Mustapha, A. (2010). Pesticides residues in smoked fish samples from North-Eastern Nigeria. *J. of Applied Sci.*, **10**: 975 - 980.

Ponnusamy, K.; Jayanthi, M.; Kumaran, M. and Thenmathi, N. (2004). Influence of socio-economic profile of shrimp farmers on the extent of adoption of shrimpculture technologies. *Fish. Tech.*, **42** (2): 226.

Rajan, P.T. (2003). A field guide in Marine food fishes of Andaman and Nicobar Islands: 1-260 (Published-Director, Zool. Surv. India., Kolkata).

Rajan, P. T, 2003. A field guide to Marine Food Fishes of Andaman and Nicobar Islands: 1-260 (Published- Director, Zool, Sur, India, Kolkata)

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