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Consumption behavior and pattern of fish consumption among university students: A case study from university of Ruhuna, Sri Lanka

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Abstract

In the present study fish consumption pattern of undergraduates in University of Ruhuna was studied. Self-administrated questionnaire was prepared and information was collected from 120 students in faculty of Fisheries and Marine Sciences and Technology, Faculty of Management and Finance, Faculty of Humanities and Social Sciences, and Faculty of Science. No association was found between the socio demographic factors and fish consumption pattern among the students. Out of the various fish species *Katsuwonus pelamis* (87.27%) and *Thunnus albacares* (86.36%) were most preferred fish. Tilapia and exotic Carps were the most preferable inland fish species. Nutritional value (69.09%) and the taste of the fish (23.64%) are most important factors in consuming fish. In inland sector easy availability and the lower price is governing factors for fish consumption. However remarkable portion of individuals (75.51%) do not consume inland fish due to lower taste and odor. Significant impact by the religion towards not to eating fish was also understood. It was revealed that most preferable fish post-harvest products are the dried fish (98.18%) and the Maldives fish (96.36%). However data revealed that easiness to prepare is most important character in consuming the fish post-harvest products among university students. Further questions regarding state of knowledge over fish consumption revealed that, there is significantly low knowledge in Quality Index Method (QIM) over identification of right fish for consumption.

Keywords: Fish consumption, University students, Inland fish, Socio-economics, Quality Index Method (QIM)

1. Introduction

Consumption of fish is one of the paramount importance in human diet in various aspects. Being particularly valuable and having specific, unique nutritive values, fish occupy a special position in a human diet (Lebiedzińska *et al.*, 2006) [15]. In this context number of health benefits are attributed to the omega-3 long-chain polyunsaturated fatty acids (LCPUFA) present in fish (De Groot *et al.*, 2012) [8]. Protein profile of fish contains up to 22 of the essential amino acids in a well-balanced ration (Adeniyi *et al.*, 2012; FAO, 2014) [1, 11]. In addition to this fish has low cholesterol level compared to red meat and is easily digestible due to its high soft tissue. As its high nutritional value, fish is highly recommended as a dietary component for both the young and the old (Eyo 2001) [10]. It has been noted that populations who consume large amounts of oily fish in their diet tend to have lower rates of coronary heart disease (CHD) and sudden cardiac death (SCD) (Begg 2012) [5]. High habitual fish consumption was associated with a lower prevalence of asymptomatic carotid atherosclerosis (Buscemi *et al.*, 2014) [6].

Sri Lanka being an island, is having strong potential in consumption of fresh fish. Ministry of Fisheries and Aquatic resources (2014) [16] stated that in year 2011 per capita household consumption of fish in Sri Lanka was 10.8kg/year. However fish forms the most important source of animal protein in diets of Sri Lankans and about 70% of the animal proteins consumed by Sri Lankan people coming from fish. (Amarasinghe, 1988; Sugathapala *et al.*, 2012) [2, 23] Various studies are being conducted on the fish consumption of numerous social groups by different authors. Lebiedzińska *et al.*, (2006) [15] conducted research over the preferences, consumption and choice factors of fish and shell fish among university students in Norway and observed that students' consumption of fish is significantly lower and it is needed

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to increase the fish and shell fish consumption among students. De Groot *et al.*, (2012) [8] found that higher fish consumption is associated with better vocabulary scores as well as better academic achievement in a study to find out correlation in academic achievement and cognitive performance with fish consumption in Netherlands.

Young adults aged between 18 and 24 years are in a stage of life which often leads the first chance to make their own food choices. In Sri Lanka, this is the age at which many students commence tertiary education by entering university (Perera and Madujith, 2012) [21]. University Students are considered as a group characterized with a specific lifestyle that results from number factors, such as leaving the family home, academic activities, situation of the campus and dormitory and restricted budget (Wądołowska *et al.*, 1998) [24]. These factors may be governing factors in the process of alteration of their foods. Moreover students in the university are the pioneers in the development of country in future. Proper wellbeing of them undoubtedly beneficial to the future of country as well. In that scenario university is the place for addressing, educating young generation as in whole over their nutritional education. Considering with those factors the main objective of the study was to find out the fish consumption pattern of undergraduate students in university of Ruhuna.

2. Methodology

Self-administrated questionnaires were distributed among the individuals representing Faculty of Science, Faculty of Humanities and Social Sciences, Faculty of Fisheries and Marine Sciences and Technology and Faculty of Management and Finance. The present study was conducted during the period from 15 August 2014 to 20 August 2014. From each faculty 30 individuals were selected by using judgment sampling method. Systematic sampling method was followed as described by Perera and Madujith (2012) [21]. Questionnaire was based upon the socio-demographic aspects, pattern of fish consumption, orientation towards the inland fish consumption, state of knowledge over fish consumption, and questions over the consumption of post-harvest fish product. Data collected from the questionnaires was analyzed for descriptive statistics and inferential statistics using Chi square test (χ^2) by using IBM SPSS statistical package version 17. Data were considered to be significant at the level of 0.05.

3. Results

Socio-demographic characteristics

Table 1 describes the summary of socio demographic features in the studied population. Age composition of the population revealed that 39.17% respondents consisted with the age group 20-21 years. 38.33% of the population were in the age group 22-23 years. Least percentage (24.17%) is represented by the age group 24-25 years. Gender composition of respondents revealed that majority of studied population (60%) was females. Most of the undergraduates were Buddhists (92.50%). Hindu, Catholic and Muslim religions represented by the 1.67%, 5% and 0.83% respectively. The sample represented all four levels of the academic levels. Majority of the respondents (46.67%) stated that their parental income exceeds the level of Rs. 25, 000 per month and 23.33% were belongs to those who have income level below Rs. 15,000 per month.

Table 1: Summary of socio-demographic characters in studied population of undergraduates at University of Ruhuna

| Variable | Category | Number | Percentage |
|---------------------------|---------------|--------|------------|
| Age | 20-21 | 47 | 39.17 |
| | 22-23 | 46 | 38.33 |
| | 24-25 | 29 | 24.17 |
| | >25 | 0 | 0 |
| Sex | Male | 48 | 40 |
| | Female | 72 | 60 |
| Religion | Buddhism | 111 | 92.50 |
| | Hindu | 2 | 1.67 |
| | Catholic | 6 | 5.00 |
| | Muslim | 1 | 0.83 |
| Level of study | I | 38 | 31.67 |
| | II | 40 | 33.33 |
| | III | 26 | 21.67 |
| | IV | 16 | 13.33 |
| Monthly income of Parents | <15,000 | 28 | 23.33 |
| | 15,000-20,000 | 36 | 30.00 |
| | >25,000 | 56 | 46.67 |

Pattern of fish consumption

The present results revealed that 91.67% of studied population consume fish. Majority of the students (44%) consume fish 2-3 times per week and one fourth (25%) of the studied population consume fish once a week meanwhile 18% of the students eat fish more than 4 times per week and 23% of students eat fish 4 times per week (figure 1)

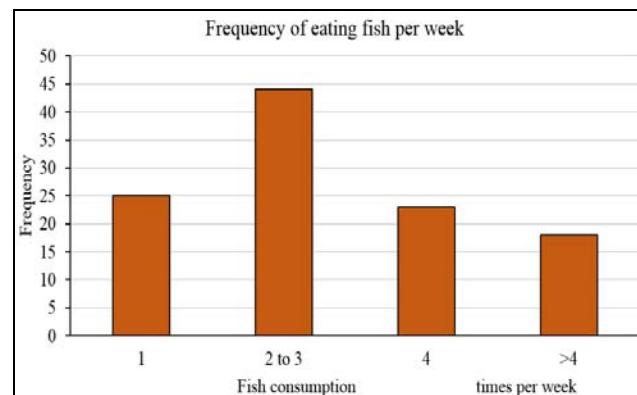
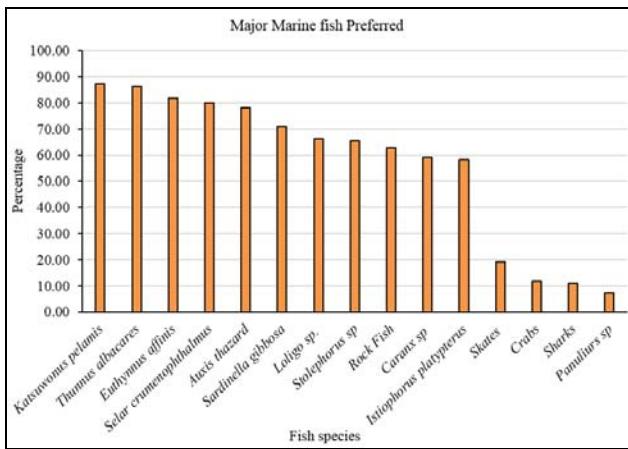


Fig 1: Frequency of fish consumption among university students

Preference for fish species

List of common fish species found in southern area of Sri Lanka were given in the questionnaire and, most of the students prefer to consume *Katsuwonus pelamis* (87.27%) and *Thunnus albacares* (86.36%) which belong to Tuna fish group. This illustrated that students consume Tuna fishes primarily. In addition to that students consume small fishes mainly obtained by shore seining as well. This was exemplify by consumption of *Selar crumenophthalmus* (80%), *Sardinella gibbosa* (70.91%) and *Stolephorus* sp (65.45%). Students also prefer the *Loligo* sp. (66.36%). Consumption of Rock fish particularly higher among the students which was 62.73%. Low consumption was recorded in *Panulirus* sp (7.27%), Skates (19.09%) and Sharks (10.91%) respectively (figure 2).

**Fig 2:** students' preference over the various fish types

Association between fish consumption and socio demographic factors

Inferential statistics revealed that there was no significant association between the fish consumption and socio demographic factors. For example there were no any significant associations between age group and the fish consumption ($\chi^2 = 0.471$, $p = 0.790$); gender and fish consumption ($\chi^2 = 0.992$, $p = 0.319$); Parent's monthly income and the fish consumption ($\chi^2 = 3.210$, $p = 0.201$). As well as that, it was noted that every student who do not consume fish belongs to the religion group of Buddhism.

Reasons for consuming fish

Out of the 110 students who were consuming fish, 69.09% stated that consumption of fish is mainly because of concerning nutritional value. Meanwhile 23.64% stated that consumption is primarily due to taste of the fish. 7.27% of students had no definitive reason to consume the fish. None of the students mentioned that they eat fish due to peer reviews (Table 2).

Table 2: Reason for consumption of fish

| Reason | Frequency | Percentage |
|----------------------|-----------|------------|
| Nutritional value | 76 | 69.09 |
| Taste of fish | 26 | 23.64 |
| Peer reviews | 0 | 0 |
| No definitive reason | 8 | 7.27 |

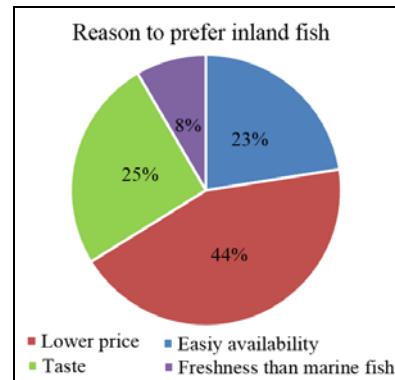
Reasons for not consuming fish

Among the 10 students, who were not consuming fish, 60% stated that their decision is based upon the religious views and 20% due to antipathy to kill the animals. It was revealed that students who do not consume fish belongs to the religious group of Buddhism. Higher fish price (10%) and unavailability of quality fish (10%) were also became a factors for not to eat fish.

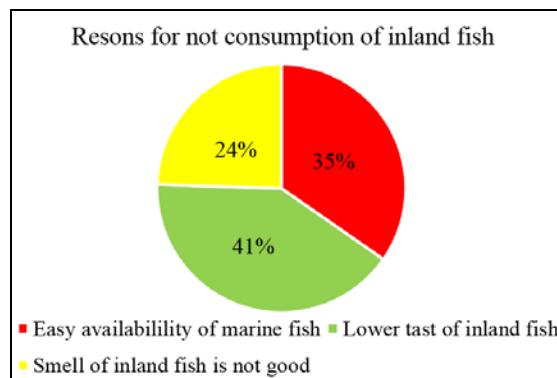
Orientation towards the inland fish consumption

More than half of the group (59.17%) out of 110 stated that they consume inland fish. Meanwhile 40.83% stated that they do not like to consume inland fish. Preference for inland fish was assessed by four criterions i.e. Easy availability based on proximity, lower price, taste, and freshness than marine fish. Lower price of inland fish direct 43.66% of the respondents to consume inland fish while 22.54% students prefer inland fish based upon the easy availability. 25.35% of students consider

the taste of fish as a factor in consuming inland fish. A small percentage (8.45%) of students stated that freshness than marine fish was the governing factor for consumption of inland fish (figure 3).

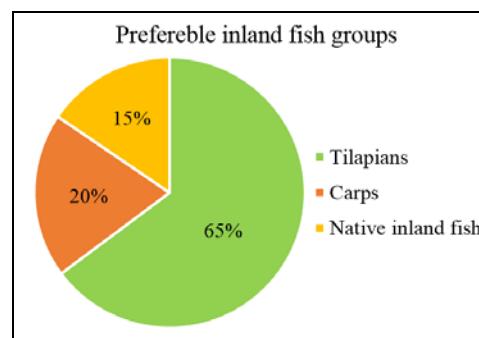
**Fig 3:** Reasons to prefer inland fish

However 40.83% students out of the 110 students, dislike eating inland fish. The reasons for not consuming inland fish were, easy availability of marine fish than inland fish (34.69%), lower taste of inland fish (40.82%) and smell of inland fish (24.49%). (Figure 4).

**Fig 4:** Reasons for non-consumption of inland fish

Preferable fish species over inland fish consumption

Considering the inland fish species in Sri Lanka, Tilapia, Chinese and Indian carps represent the major portion. Tilapia (64.79%) gains the dominant portion in consumption among University students. For Chinese and Indian carps preference value was 19.72%. Apart from that preference towards the other inland fish including native inland fish bears the value of 15.49% (Figure 5).

**Fig 5:** Preferable inland fish groups

State of knowledge over fish consumption

85.83% of students stated that they are aware that number of fish post-harvest products are available in the market. 65.83% of students acknowledge that they are aware of fish occupied with micro nutrients and 40.83% respondents aware that fish associated omega-3 fatty acids helpful in good cardiovascular function. However only limited amount of respondents (10.83%) have knowledge over the Quality Index Method (QIM) over the selection of right fish for consumption (Table 3).

Table 3: State of knowledge over fish consumption*

| Statement | Frequency | Percentage |
|--|-----------|------------|
| I am aware that healthy fish can be identified by QIM | 13 | 10.83 |
| Omega 3 fatty acid in fish helpful in good cardiovascular function | 49 | 40.83 |
| Fish contained with micro nutrients | 79 | 65.83 |
| Number of post-harvest products for consumption are available | 103 | 85.83 |

* Multiple responses were evaluated

Consumption of fish post-harvest product

Fish post-harvest product consumption results indicated that students consume Maldives fish (96.36%), dried fish (98.18%) and Tinned/ canned fish (87.27%) in significant portions. Preference in Jaadi was 7.2% in whole population. Conspicuously lower portion of students consumed Marinade fish (2.73%), processed shrimp/ crab meat (3.64%), and smoked fish (4.55%) respectively (Table 4).

Table 4: Familiar post-harvest products among students

| Post-Harvest product | Percentage consumption |
|-----------------------------|------------------------|
| Maldives fish | 96.36% |
| Dried fish | 98.18% |
| Tinned/ canned fish | 87.27% |
| Jaadi | 7.27% |
| Marinade fish | 2.73% |
| Processed shrimp/ crab meat | 3.64% |
| Smoked fish | 4.55% |

Reasons for consumption of fish post-harvest product

Easiness to prepare (44.17%) was the main governing factor for prefer in consuming fish post-harvest product. Improved, taste, odor and color are the significant governing factors (19.19%) for consumption of the fish post-harvest products also. From health perspective some respondents (13.33%) stated that improved health status and nutritional aspects are govern for consumption for fish. This figure was much similar to the respondents response which is using post-harvest product is much cleaner from buying fish directly from market (12.50%). Nearly ten percent (9.17%) respondents use fish post-harvest product due to unavailability of fresh fish all over the year. However 1.67% of the students stated that there were no definitive reason for consumption of fish post-harvest product (Table 5).

Table 5: Reasons for consumption of fish post-harvest products

| Reason | Percentage consumption |
|--|------------------------|
| Easiness to prepare | 44.17% |
| Improved, taste, odor and color | 19.19% |
| Improved health status and nutritional aspects | 13.33% |
| Cleaner than buying directly from market | 12.50% |
| Unavailability of fresh fish all over the year | 9.17% |
| No definitive reason | 1.67% |

Discussion

Inferential statistics revealed that there was no significant relationship between the fish consumption and the socio demographic factors. Similar results were recorded by Obiero *et al.*, (2014)^[19] in a study to identify the consumer preference over Nile Tilapia and African catfish in Kenya. However majority of the university students consume fish 2-3 times per week and this will be a promising factor for good health as stated by the American Heart Association (2014)^[3] as its minimum recommendation is to consumption of fish, two times per week.

Students' preference in Tuna and other fish that caught from shore seine gears correlated with higher availability of those fishes in Sri Lankan markets. Ceylon Chamber of Commerce (2011)^[7] stated that Skipjack tuna (Balaya), Yellow fin tuna (Kelawalla) and shore seine varieties (small fish) were the dominant species comprising 62% of the total marine fish production. The share of shore seine varieties alone was 25% and that comes from the coastal fishery. The shares of Skipjack (Balaya), and Yellow fin tuna (Kelawalla) were 21% and 16% respectively. However it was evident that there was low consumption of *Panulirus* sp. among the university students. National Aquatic Resources and Research Authority (2009)^[18] stated that lower consumption of lobster species among Sri Lankans may be due to higher price of them and the average prices of local live lobster vary between Rs. 1000 to Rs. 4500 per kg.

Out of the various reasons for consumption of the fish, students stated that they willing to eat fish primarily due to higher nutritional values in fishes. Kinnucan *et al.*, (1993)^[13] stated that education may play an important role in fish consumption. This might be the major governing factor for consumption of fish among University students. As well as that taste of fish would be another factor in governing fish consumption among the University students which exemplify by the figure 23.64% out of total respondents. Onurlubas (2013)^[20] also pointed out that fish consumption is greatly depending upon the taste, in a study to identify factors affecting fish consumption in Bulgaria. Data revealed that there were number of reasons for deterring the fish consumption among the university students also. 60% of students who do not eat fish, stated that primary reason is religious views. This was significant furthermore that every student who does not eat fish is being Buddhist. In addition to that 20% does not eat fish due to their antipathy to kill animals. Sri Lanka being a country where major religion is Buddhism have strong effect over the animal killing and eating (De Silva *et al.*, 2010)^[9]. According to him religious concern is one of the important factors in determining purchasing of meat.

Data on orientation of the inland fish consumption revealed that students eat inland fish because of their easy availability (23%), lower price (44%). As well although there are number of post harvesting products are available, students believes inland fish has higher freshness (8%) than marine fish, as it is directly catch from reservoir/water body and within shortest time available for purchasing and Consumption. 23% of the respondents stated that taste is major governing factor for inland fish consumption which is differ from the marine fish.

Respondents who do not eat inland fish revealed that basic reason for not eating the inland fish is its' bad odor (24%), and low taste (41%). However 25% of students stated that easy availability of marine fish is governing factor for non-consumption of inland fish. Lakshmi, Prassanna and

Edirisinghe (2011) [14] also stated that consumption of inland fish species particularly Tilapia is restricted due to its muddy flavor and color. Murray *et al.*, (1998) [17] argues that this kind of lower consumer preference could be occur in inland Tilapias due to its dark coloration, slimy appearance, and muddy, soapy taste. However in contrast to that among the preferable inland fish species, Tilapia gains a significant portion representing 65%. The basic reason for this would be the less diversification of inland fish apart from principally available species like Tilapia and Carps in Sri Lanka. However 15% of the respondents also stated that their preference also based upon the native inland fish. In that perspective, inland fish such as *Channa striatus* can be successfully introduced to the consumers as its superior taste, lack of bones, good handling qualities and the attribution of various medicinal properties (Murray *et al.*, 1998) [17]. Minor cyprinids in Sri Lankan reservoir can also be used for that purpose.

The state of knowledge over fish consumption among university students revealed that students' knowledge about Quality Index Method (QIM) over healthy and fresh fish identification remains in lower position. QIM is a scaling method that establishes robust data reflecting the different quality levels of fish in a simple and well-documented way (Hyldig *et. al.*, 2004) [12]. Educating the students on the QIM method for fresh fish identification would be beneficial as it would greatly influences on them for quality fish purchasing and consumption as it includes simple steps. Students' awareness about the health aspects of consumption fish remain a reasonable level by over the responses in fish occupied with micro nutrients and their awareness over consumption of fish beneficial for good cardiovascular function.

Consumption of the fish post-harvest products revealed that students are most familiar with the dried fish, Maldives fish and Tinned canned fish. The reason for this kind of trend would be higher availability of them in market than other post-harvest products. Consumption of other fish post-harvest products remains very low among the students. However Jaadi or the fermented fish product consumption among the students show positive outlook in promoting them among university students. Higher price in proceeds shrimp products may deter the Students' consumption of them. However marinade fish and smoking fish products popularization among students may gain significant benefits to the students. This was evident in fish smoking, as smoke contains many chemicals such as phenols, organic acids, alcohol, carbonyl compounds, and gases and it adds unique taste and color to the fish flesh and thereby increase consumer preference (Sugathapala *et al.*, 2011) [22].

Easiness for prepare is the major rationale for consumption of post-harvest product among the university students. In their busy University schedule students have limited time. In that context easiness to prepare is key component that they expect. In similar research Arulogun and Owolabi (2011) [4] stated that there was higher fast food consumption among University students. Improved odor, color and the nutritional value is another important factor for purchasing a quality post-harvest product.

4. Conclusion

Finally findings of this study may be much useful in understanding the fish consumption behavior of Sri Lankan University students. Findings from this research may be useful in proper planning of nutritional programs towards the younger generation in Universities and boosting their

nutritional status and knowledge. As well as that product diversification particularly very much important so as to avoid the biased consumption of easy available fish types in market.

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