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CASE REPORT

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Does the Prevailing Awareness Reflect on Hygiene Practices for Handling Fish in Zanzibar?

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ABSTRACT

Risky practices among food handlers are a major contributing factor to food contamination with resultant morbidities and mortalities among food consumers. This study aimed at investigating awareness on marine fish associated diseases and risk practices among marine fish value chain actors in Zanzibar (fishermen, vendors and consumers) and witness if they could contribute on marine food contamination.

This was a cross-sectional research study conducted to asses awareness on marine fish associated diseases and risk practices between February and March 2019. The study utilized structured questionnaire that were administered to 256 respondents. Stratified random sampling was used to select 8 out of 207 fish landing sites from five Zanzibar regions followed by random selection of twenty-four villages, three from each fish landing sites. Pilot study yielded Cronbach's alpha value of > 0.755 for validity and reliability on questions of awareness and practices. Risk practices assessed were- handwashing after toilet, consumption of spoiled fish, health checkup as well as information sharing practice. Scores of respondents' answers were summed up and cut off mean was calculated. The results were then used to calculate chi-square and *p*-values. Odds ratio was also calculated to asses likelihood of association between variables. Data was processed by SPSS version 6.0. Statistical significance was determined at a probability of $p \leq 0.05$.

Majority (92%) of the population under study had access to mobile phones. 64.1% were aware and 35.8%) males were 1.6 times more aware than females ($p<0.05$). 30-39 age group and Secondary school group were 3 times more aware than 20-29 group and Primary school group respectively. 74% of the population find it worth sharing information with others ($p<0.001$).

Only 50%) of fishermen had regular health checkup compared with 72% of fish vendors and 85% of fish restaurant workers. Majority (64.7%) of fishermen admitted washing hands overboard without soap or any washing facility and differed significantly with other ways of relieving themselves after toilet ($p<0.01$). Restaurants are 10 times and 2.4 times more likely to AVOID sell of spoiled fish than fishermen and vendors respectively. Greed for money was pointed as reason for selling spoiled fish by 40% of respondents. 28% of fish consumers regularly consume spoiled fish.

Malpractices investigated in this study may all contribute to health risks. High awareness and knowledge on marine fish associated diseases in Zanzibar community were not interpreted into appropriate food handling behavior. Factors that could contribute to the risky practice could include negligence, optimistic bias and illusion of control. Results of this study entail that it is critical for any food safety training conducted in Zanzibar to incorporate behavior-based training that will improve food handling practices throughout the food value chain.

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Introduction

The annual world fatality toll due to consumption of contaminated foods is estimated to be 420,000 which is equivalent to the loss of 33 million healthy life years [1]. Zanzibar referral Hospital receives around 500 food poisoning and 54,000 children diarrhea cases annually [2]. The extent of food poisoning cases could be a reflection on bad practices of food handling at home and food service establishments [3]. Bad food handling practices is known to be a major risk factor for food borne diseases world-wide and studies have proved that it contributes to over three-quarters of food poisoning cases [4,5].

Fishing is one of the main income-generating activities after tourism and agriculture contributing to 6.1% of the Zanzibar GDP [6]. Moreover, the fish sector employs 86,000 full time fishermen and more than 12% of the Zanzibar populations are

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employed by fish sector indirectly [7]. Many studies have been conducted worldwide to explore knowledge, attitudes and practices (KAP) and their impact on food safety and how the three dependent variables relate to food contamination and associated public health risks [8-10]. However, few studies have been done in Zanzibar in this field especially on fish foods. Rabia *et al* (2017) [11] reported high bacterial contamination in marine fish foods especially in recreation grounds, despite the high knowledge on hygiene and fish associated diseases among the fish stakeholder actors. It is therefore doubtful if high knowledge on food handling hygiene had any positive impact on practices.

The need for extensive studies in this area in Zanzibar need not be overemphasized bearing in mind that marine fish foods are regularly consumed by 95% of the Zanzibar population [12]. This research study has attempted to analyze some of the influencing factors on marine fish contamination in Zanzibar, results of which will help launching corresponding mitigation measures.

Objective

To investigate awareness on marine fish associated diseases and risk practices among marine fish value chain actors (fishermen, vendors and consumers) and observe if they could contribute on marine food contamination.

Materials and Methods

The research was a cross-sectional study conducted between February and March 2019 that utilized structured questionnaire. Questionnaires were administered to 256 respondents with the assistance of field staff of the Zanzibar Ministry of Livestock and Fisheries and State University of Zanzibar staff. Individuals interviewed for assessment of risk practices comprised of fish consumers, vendors, restaurant owners and fishermen. A multistage sampling approach was used. In the first phase, a random stratified sampling was used to select 8 out of 207 fish landing sites from Zanzibar regions. In the second phase, twenty-four villages were randomly selected, three from each fish landing sites.

The conceptual framework developed assessed awareness on marine foods 'associated diseases and risk practices. Before field administration 30 questionnaires were subjected to pilot trial after which some changes in the style of questioning were made. Cronbach's alpha evaluation for validity and reliability of the questionnaire on questions of awareness and practices yielded a value of > 0.755.

Sessions of around 2 hours were held with the Livestock and Fish Ministry staff to facilitate deep understanding of the questionnaire before being administered in the field.

Part of the questionnaire dealt with attitudes and practices; 'in case of disease outbreaks associated with marine food consumption what steps will be taken? How to avoid marine food associated infection? With whom the message of disease outbreak will be shared? What type of message will be shared?

Information on practices that increased risks of contracting marine foods' associated diseases was obtained in the last portion of the questionnaire. Risk practices assessed were- handwashing after toilet, consumption of spoiled fish and health checkup. Information sharing practice was also investigated in this study.

Scores of respondents' answers were summed up and cut off mean was calculated. The results were then used to calculate chi-square and *p*-values. Odds ratio was also calculated to asses likelihood of association between variables. Data was processed by SPSS version 6.0. Statistical significance was determined at a probability of $p \leq 0.05$

Results

Socio-demographic information of the respondent

Total of 265 randomly chosen individuals participated in this study (Table 1); 199 were males (74.9%) and 66 (24.1%) were females**;** a significant gender difference ($p<0.01$**)** indicating that fish business is male dominated.

Respondents comprised of 260 participants; 81 were fishermen, 58 fish mongers, 45 restaurant stakeholders and 76 consumers. The ages of respondents ranged from 20 years to 75 years. The age distributions can be seen in Table1. Total of 221 (85%) were married, 16(6%) unmarried and 23(9%) widowed.

Illiterate respondents were 47(18%); 13(5%) had informal education; 81(31%) had primary education; 109(41%) had secondary education and 10(4%) had tertiary education (Diploma or Degree).

Majority (92%) (Percentages were not quoted in Tables) of the population under study had access to mobile phones. Radio scored highest as tool of getting information and therefore access to knowledge. Most people accessed information through radio ($p<0.0001$) compared to television, newspaper or internet (Table 2).

Table 1: Socio-demographic information of the respondents.

Variable	Characteristics	Count	Percentage
Gender	Males	199	75
	Female	99	25
	Total	260	100
Age	20-29	23	9
	30-39	73	28
	40-49	94	39
	50 and above	70	27
	Total	260	100
Level of education	Illiterate	47	18
	Informal	13	5
	Primary	81	31
	Secondary	109	42
	Tertiary	10	4
	Total	260	100
Marital status	Married	221	85
	Unmarried	16	6
	Widow	23	9
	Total	260	100

Awareness

Out of 260 respondents on awareness (Table 2) of marine food associated diseases 167 (64.1%) were aware and 93 (35.8%) have never heard on marine food diseases affecting humans, the difference is highly significant ($p<0.05$).

Significance difference on awareness with respect to gender was observed in this study; males were 1.6 times more aware on marine food associated diseases than females ($p<0.05$).

Table 2: Awareness and Sharing of information.

Variable		Yes	No	χ^2	*p*- value	ODD ratio	Remarks
Awareness							
Information tool mostly used to raise awareness							
Radio		178	82	391.115	<0.00001	15.4665.95% CI: 9.8310 to 24.3324 P<0.0001	Respondents were 24 times more likely to use radio than Television
Television		32	228				
Newspaper		15	245				
Villagers		30	230				
Internet		5	255				
Awareness on marine food associated diseases	Male Female	104 60	49 47	8.658	<0.05	1.6626. 95% CI 0.9974 to 2.7714 P = 0.0512	Males were 1.6 times more aware than females
Awareness among age groups	20-29	12	11	27.314	<0.0001	3.0196. 95%CI:1.1312 to 8.0602, P = 0.0274	30-39 age group more aware than rest of the age groups. They were 3 times more aware than 20-29 group
	30-39	56	17				
	40-49	44	50				
	≥50	41	29				
Awareness among education groups	Illiterate	16	31	146.354	<0.0001	3.0196. 95% CI:1.1312 to 8.0602, P = 0.0274	Secondary school group was more aware than other groups. They were 3 times more aware than Primary school group
	Informal	5	8				
	Primary	45	36				
	Secondary	82	27				
	Tertiary	5	5				
Information Sharing							
Gender	Male female	162 30	32 36	36.917	<0.0001	6.075. 95%CI 3.2836 to 11.2394 p<0.0001	Males were 6 times more likely to share information than females
Information sharing among age groups	20-29	13	10	36.917	<0.0001	13.2692; 95% CI:3.6083 to 48.7963 p=0.0001 for 30-39 and 20-29 age group; 13.3443 95% CI:4.4986 to 39.5833 p<0.0001for 30-39 and 40-49 age groups	30 -39 age groups were more likely to share information than rest of the groups
	30-39	69	4				
	40-49	53	41				
	≥50	57	13				
Information sharing among education groups	Illiterate	21	26	137.115	<0.0001	2.6966. 95% CI:0.3312 to 21.9529 p=0.3538	Information share is highly significant but don't differ significantly among groups
	Informal	12	1				
	Primary	64	17				
	Secondary	89	20				
	Tertiary	6	4				

Table 3: Risky Practices.

Variable	Yes	No	Chi-square	p-value	ODD ratio	Remarks
Health Checkup						
Fishermen						
Motorboats	22	28	0.605	>0.05	1.1932; 95%CI-0.4856 to 2.9315 p=0.7002	Traditional dhows fishermen are slightly more likely to do health checkup that motorboats
Traditional dhows	15	16				
Vendors						
Motorcycles	11	9	11.655	0.00064	3.6234; 95%CI-1.0874 to 12.0742 p=0.0360	Bicycle owners are 3.6 times more likely to do health checkup that motorcycle owners
Bicycles	31	7				
Restaurant staff	36	6	-	-	7.7297. 95% CI-2.9469 to 20.2750 P<0.0001; restaurants vs fishermen 2.4762. 95% CI-0.8800 to 6.9677 P = 0.0858-restaurants vs vendors	Restaurants are 7 times and 2.4 times more likely to do health checkup than fishermen and vendors respectively
Hand hygiene Hand washing after toilet	28	53	7.716	0.00547	-	Most of fishermen don't observe proper hand hygiene
Sell of spoiled fish Restaurants	42	3	Question: Do you AVOID sell/ consumption of spoiled fish?		10.1277; 95% CI 2.8967 to 35.4087 P = 0.0003-restaurants vs Fishermen; 2.24; 95% CI 0.5585 to 8.9833 P = 0.2551-	Restaurants are 10 times and 2.4 times more likely to AVOID sell of spoiled fish than fishermen and vendors respectively
Fishermen	47	34				
Vendors	50	8				
Consumption of spoiled fish	55	21	-	-	-	28% of consumers eat spoiled fish

Significant differences on awareness were also observed among age groups (p<0.0001); 30-39 age group were 3 times more aware than 20-29 group. Further, Secondary school group was 3 times more aware than Primary school group.

So as to avoid threat of disease spread 74% of the population find it worth sharing information with others (p<0.001). Sharing information practice was significantly observed among males and 30-39 age group (p<0.0001) but didn't differ significantly among education groups (OD 2.6966. 95% CI: 0.3312 to 21.9529 p=0.3538) (Table 2).

Behavior, Risk practices and attitude

Only slightly more than half (50.3%) of fishermen who responded had regular health checkup, the difference was not significant (p>0.05) (Table 3). Traditional dhow owners were 1.19 more likely to practice health checkup than motor boats. Seventy two percent of fishmongers performed annual health checkup. Bicycle owners were 3.6 times likely to do health checkup than motor cycle owners (p<0.05).

Compulsory health checkup was practiced by 85% of restaurant workers that differed significantly with fishermen (p< 0.0001) but non-significantly with vendors (p=0.0858); restaurant staff were 7 times and 2.4 times more likely to do health checkup than fishermen and vendors respectively.

Majority (64.7%) of fishermen said they washed hands overboard without soap or any washing facility and differed significantly with other ways of relieving themselves after toilet (p<0.01).

Thirty eight percent of fishermen agreed that they have at least once caught dead fish. Selling of spoiled fish was practiced by 41.6% of fishermen, 16% of fish mongers and 7% of restaurants. Restaurants are 10 times and 2.4 times more likely to AVOID sell of spoiled fish than fishermen and vendors respectively. Greed for money was the reason for selling spoiled fish (39%), but other reasons were carelessness (30%), poverty (23%) and market availability (8%) of spoiled fish.

At least 28% of consumers regularly consume spoiled fish. Only 4.2% of fishermen and 5% of fishmongers have had complaints from their customers after consuming their product.

Discussion

Accessibility of radio and possession of mobile phones certainly have contributed on increasing knowledge and sharing of information among respondents. The 30-39 yrs. age groups seem to be more aware on marine foods associated diseases than the younger 20-29yrs age group probably due to their long exposure to information. This in parallel with findings in this study that the middle age groups are more radio users compared with other age groups. This is no surprise because Green (2007) [13] also reported that older workers and managers had better practices on food handling practices.

This study revealed that secondary school leavers are the mostly involved in the fishing sector which could be the reason for being more aware on marine associated food diseases. This stresses the need to advance the blue economy in Zanzibar by targeting secondary school leavers to improve their fishing skills.

Men are more aware than women because of their direct engagement in the fishing sector as a means of earning income. Additionally, Zanzibar women spend most of their day time attending domestic matters at home rather than socializing with their colleagues.

Information sharing in communities is very important in raising awareness, raising education and knowledge and for rapid disaster response. The age group 30-39yrs was more ready to share information than the rest of the age groups.

Malpractices investigated in this study may all contribute to health risks. Several factors could be attributed to risk practices including lack of knowledge on food safety, negligence, optimistic bias which is the tendency for individuals to believe that they are less likely to experience negative events. Another reason for persistence of risk practices could be illusion of control that is defined as the tendency to believe that they can control outcomes that they demonstrably have no influence over them [3].

Only half of fishermen had regular health checkup; slightly more so with owners of traditional dhows. Restaurant owners are more likely to do health checkup most probably due to restrictions imposed by authorities that require them to do compulsory health checkup.

It is alarming to learn that majority (64.7%, p>0.05) of fishermen don't carry out proper hand hygiene, a habit that is against health norms and may pre dispose to many disease risks [14]and from this fact it is very possible that fishermen and consumers who suffer diarrhea could be more than what is reported in Zanzibar.

The practice of selling spoiled fish is rampant especially among fishermen and fish vendors. It is very possible that figures of those who catch and sell spoiled fish could be even higher; feeling of guilt could have deterred some respondents from admitting the malpractice. Sell of spoiled fish gives a picture of the extent of the risk practice and its possible public health consequences. Results of this study reveal that one of main reasons for this habit is greed for money. Fishermen need to be educated and cautioned that priority needs to be given to health of their customers rather than money gain. Further, results of this study entail that it is critical for any food safety training conducted in Zanzibar to incorporate behavior-based training that will improve food handling practices throughout the food value chain.

Conclusion

The results from this study imply that despite of high awareness on the marine food associated diseases among Zanzibar marine fish stakeholders, there is negative attitudes toward safety handling of fish among actors; fishermen, vendors and consumers. Ignoring of safety practices in handing fish foods put people's lives at risks and there is need of proactive strategies to rescue the situation. The government should invest in fishing industry, provision of necessary infrastructures in public places; develop standards and guidelines for safely handling and processing of the fish and fish products.

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