

Occupation-related health problems among fishermen in the Hikkaduwa fisheries harbour

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ABSTRACT

Introduction: Fishing is recognised as one of the hazardous occupations in the world with risks including accidental and environmental injuries, non-communicable diseases (NCDs), and psychosocial stressors. Despite the cultural and economic importance, there is limited research on fishermen in Sri Lanka. This study aimed to assess the occupation-related health problems among fishermen registered in the Hikkaduwa fisheries harbour, Galle, Sri Lanka.

Methods: A community-based descriptive cross-sectional study was conducted among 244 registered fishermen, selected by convenience sampling. Data were collected using a self-administered questionnaire assessing socio-demographic details, occupational characteristics, injuries, NCDs, risk behaviours, preventive practices and psychosocial burden. Data were analysed using SPSS™ version 26.0, applying descriptive statistics and Chi-square tests ($p < 0.05$).

Results: All participants were male ($n=244$), with the majority (43.9%) aged between 46-60 years, engaged in multiday fishing (88.9%), and having over 20 years of experience (43.9%). Occupational injuries were reported by 76.2%; majority belonged to the category of sharp injuries (64.5%). Visual impairment was common (77.7%), and 68.9% has had injuries from oceanic creatures, predominantly jellyfish (74.0%). The most prevalent symptom among them was back pain (65.2%). Diabetes mellitus (15.2%), and hypertension (11.5%) were the common NCDs identified. Risk behaviours were frequent; alcohol use (75.8%) and smoking (74.2%). Formal safety training significantly reduced injury occurrence ($\chi^2=28.3$, $p<0.001$). Majority (65.3%) of them experienced moderate psychosocial burden.

Conclusions and recommendations: The prevalence of accidental and environmental injuries, alcohol consumption, smoking, and back pain were high among fishermen. A formal training in safety significantly reduced injury occurrence. If proper health promotional and better screening methods had been provided, many of the conditions could have been prevented. Future research should assess psychosocial burden using more descriptive and validated tool.

Keywords: *Fishermen, Injury prevention, Non-communicable diseases, Occupational health, Psychosocial stress.*

Introduction

Fishing is one of the world's oldest and most hazardous occupations. Evidence of utilization of fish resources have history over 500,000 years, from the early periods of human evolution, indicating the long-standing role and importance of fishing in human nutrition, economy, and social structure (1). In addition to its historical importance and contribution to national economies, fishing is a high-risk occupation (2). Since ancient times, the occupation has been associated with a high risk of occupation-related health problems, mostly traumatic injuries (2). High rate of injury and frailty was reported globally related to fishing, making it one of the most dangerous occupations in the world (3,4).

Fishermen face numerous risks in their work environment due to changes of the weather, dynamic non-industrial and non-routine work environment, changes of their crew and fisheries policies (2). These factors contribute to a high burden of various occupation-related health problems, including musculoskeletal disorders (MSDs), non-communicable diseases (NCDs), and environmental or sensory hazards, which may affect their physical health and mental well-being.

Both national and international research consistently show the negative impact on fishermen's health across several sub categories. Musculoskeletal disorders (MSDs) and occupation-related injuries are among the most prevalent health issues (13). Fishermen are highly active physically and injuries (direct or indirect) and musculoskeletal disorders are due to the physically demanding nature of the occupation. Some postures, repetitive heavy weightlifting, and prolonged working hours significantly contribute to these disorders. Lower back and shoulder pain were the most commonly reported symptoms by fishermen (5,6). In addition to their chronic strain, the space-limited and unsafe work environment contributes to a high prevalence and incidence of acute injuries and trauma (2-4).

Fishermen commonly suffer from non-communicable diseases (NCDs) such as hypertension, diabetes, and cardiovascular diseases. These NCDs also pose a serious threat to fishermen's health (7,8). These conditions sometimes contribute

to the development of occupation-related stress and unhealthy lifestyle practices, such as alcohol intake, smoking and psychoactive substance use. Several regional studies have revealed alarmingly high levels of alcohol consumption and tobacco use among fishing communities, which are also risk factors for NCDs (7-10). Obesity is another major health concern, with studies identifying it as a significant risk among fishing community and seafarers (11). In addition to that, the demanding nature of the occupation, their financial instability and social isolation, leads to elevated levels of psychosocial stress, which further worsen the threat of chronic diseases (2,12).

In addition to the established occupational hazards, information regarding the health problems of fishermen in Sri Lanka is rare. Due to the frequent exposure to several environmental hazards, fishermen are prone to additional health problems linked to their occupation. A study done in the Kalpitiya area confirmed the presence of musculoskeletal disorders, dermatological conditions and visual impairment among them (13). Prolonged exposure to loud engine noise increases the risk of hearing impairment, while continuous exposure to sunlight and solar radiation leads to visual impairment and other eye disorders (2, 13). Continuous and prolonged contact with sea water, ultraviolet radiation, and some oceanic creatures predispose them to various dermatological conditions, including contact dermatitis, dermatological infections and traumatic injuries caused by them (2,13). The multiple occupational health issues faced by fishermen, highlight the urgent need for the introduction of targeted preventive measures and health promotion measures.

This study aimed to address the knowledge gap by assessing the prevalence of occupation-related injuries and health problems, risk factors for non-communicable diseases such as smoking and alcohol consumption, and treatment-seeking behaviour among a selected group of fishermen in the Hikkaduwa area. The findings are expected to use to generate a new and target population-specific insights that will be useful to guide public health policy and practice in the Southern coastal region of Sri Lanka.

The data gathered from this study is expected to serve several important purposes. Firstly, to support the development of targeted interventions by designing fishing community-specific screening programmes, such as health promoting campaigns targeting non-communicable diseases (NCDs) including visual and auditory impairments; and substance use (9,10). Secondly, the results will promote occupational safety by providing evidence-based recommendations for practical safety measures and infrastructure modifications targeted at reducing the burden of injuries and disorders especially musculoskeletal (6). Thirdly, it will enhance the understanding of health-seeking behaviour within this community, helping to identify and address barriers to healthcare access. All these outcomes will contribute to the improvement of the overall health, safety, and quality of life of fishermen in the Hikkaduwa area.

Methods

A community-based, descriptive cross-sectional study was conducted at Hikkaduwa fisheries harbour to investigate the occupational health risks, safety practices, and psychosocial problems among registered fishermen under Hikkaduwa fisheries harbour, Hikkaduwa, Galle, Sri Lanka. Ethical approval was obtained from the Ethics Review Committee, Faculty of Medicine, University of Ruhuna, Galle (Reference Number: 2022.P.050 [19.05.2022])

There were 1050 registered fishermen in the Hikkaduwa fisheries harbour; the target population. The required sample size was calculated using Slovin's formula (14), with a 5% margin of error, requiring a minimum of 286 participants. A convenience sampling technique was used to recruit a final sample of 244 fishermen from the Hikkaduwa fisheries harbour.

Data were collected using a self-administered questionnaire, which was developed through a literature review and validated via expert opinion to ensure judgmental validity. The questionnaire was available in Sinhala, Tamil and English. It assessed demographic characteristics, occupational factors, injuries (accidental injuries, indirect injuries, injuries due to oceanic creatures), self-reported chronic diseases and risk factors, and psychosocial impact due to the occupation.

Participants were recruited voluntarily at the Hikkaduwa fisheries harbour. Each potential participant was given a detailed research information sheet outlining the study's purpose, procedures, risks, and benefits. Also, the research team verbally explained the study, ensuring participants understood their right to ask questions, decline participation, and withdraw at any point without penalty. Informed written consent was then formally granted by all selected fishermen prior to data collection.

The perceived psychosocial impact was estimated using a validated four-item Likert scale, with a pre-defined total score cut-off used to ascertain the presence or absence of significant impact. The scoring system including four questions; each question carried marks from 0 - 4 and therefore, total maximum score obtainable was 16. The final total score was calculated for each person and based on the final score; the psychosocial burden was categorized to three groups: low, moderate and high. In the process of this categorization into three groups, cut-off values for the Likert score were determined depending on the sample mean and standard deviation (15-17). Scores lying above mean +1 SD were considered as having high psychosocial burden level, scores lying below mean -1 SD were considered as having a low burden level and scores lying in between mean +1 SD and mean -1 SD were considered as having a moderate level of burden.

Collected data were analyzed using the *Statistical Package for the Social Sciences (SPSS™)* Version 26.0. Descriptive statistics (frequencies, proportions, and means) were calculated. The Chi-square test (χ^2) was used to determine the statistical significance of associations between variables, with a level of significance set at $p < 0.05$.

Results

Characteristics of the study participants:

A total of 244 fishermen participated in the study and all the participants were male (n=244, 100%). The majority were in the 46–60-year age group (43.9%, n=107). The major ethnic group in the study population was Sinhalese (99.6%, n=243) followed by Muslims (0.4%, n=01). Almost all participants (99.6%, n=243) were conversant in

the Sinhala language. The majority of the sample (59%, n=144) had received education up to grades 6 - 10. Most of fishermen were married (88.5%, n=216)

Majority of fishermen engaged in multiday fishing (88.9%, n=217), followed by one-day fishing (7.8%, n=19). The reason behind choosing the profession was their personal choice (69.7%, n=170), followed by due to their family background (27%, n=66), and only 3.3% (n=8) of the sample is involved in fishing as a temporary occupation. The majority of the sample had experience of more than 20 years (43.9%, n=107) and the least experience was between 1–5-years which was reported in 4.5% (n=11) of the sample. The large majority of the fishing community (97.1%, n=237) engage in fishing as their sole source of income. A minority of participants were working part-time as labourers (1.2%, n=3), masons (0.4%, n=1), carpenters (0.4%, n=1) and other occupations (0.8%, n=2). Basic demographic characteristics of the sample is summarized in Table 1.

Occupation-related health problems

Accidental and Environmental Injuries: A total of 186 (76.2%) fishermen reported experiencing at least one accidental injury while fishing. Most common type of injuries were sharp injuries (64.5%, n=156), followed by falls (49.2%, n=119), dry burns (26.9%, n=65), and wet burns (22.3%, n=54).

Regarding non-accidental injuries caused by the hazardous environmental exposure; visual impairment probably due to prolonged exposure to sunlight were reported by 188 (77.7%) fishermen and it was the most common, followed by excessive heat (57.9%, n=140) and injuries caused by sea water (51.7%, n=125).

There were 168 (68.9%) fishermen had experienced at least one injury by oceanic creatures. Out of these 168, majority were injured by jellyfish (74.01%, n=123), followed by sea urchins (3.0%, n=5) and some had experienced injuries by both jellyfish and sea urchins (22.9%, n=38). Regarding the knowledge about the creatures, a large majority of the fishermen (95.5%, n=233) were confident in identifying the injurious sea creatures correctly.

Table 1: Characteristics of the Study Participants (n=244)

Variable	Frequency	Percentage (%)
<i>Gender</i>		
Male	244	100
<i>Age in Years</i>		
15 - 30	17	7.0
31 - 45	91	37.3
46 - 60	107	43.9
> 60	29	11.9
<i>Educational Level</i>		
No Schooling	6	2.5
Grade 1-5	42	17.2
Grade 6-11	144	59.0
Up to O/L	44	18.0
Up to A/L	8	3.3
<i>Religion</i>		
Buddhism	243	99.6
Islam	1	0.4
<i>Language</i>		
Sinhala	243	99.6
Tamil	1	0.4
<i>Marital Status</i>		
Single	19	7.8
Married	216	88.5
Divorced	2	0.8
Widowed	7	2.9
<i>Fishing Group (Day Basis)</i>		
One-day fishing	19	7.8
Multiday fishing	217	88.9
Seasonal	2	0.8
All	6	2.5
<i>Choice of Profession</i>		
Family background	66	27.0
Temporary	8	3.3
Personal choice	170	69.7
<i>Experience of Fishing</i>		
Below one year	14	5.7
1 - 5 years	11	4.5
6 - 10 years	34	13.9
11 - 15 years	31	12.7
16 - 20 years	47	19.3
> 20 years	107	43.9

Occupation related other health issues experienced during fishing: During the period of fishing, vomiting was experienced by 33 fishermen (13.6%, n=33), followed by “faintishness” (13.2%, n=32) and diarrhoea (6.6%, n=16). Occupation related health problems are summarized in Table 2.

Non-communicable diseases and risk behaviours:

In the sample, most of the fishermen (71.7%, n=175) was suffering from at least one NCD. Back pain was the most prevalent symptom (65.2%, n=159) among them. Hypertension (11.5%, n=28), diabetes mellitus (15.2%, n=37) dyslipidemia (5.7%, n=14), ischemic heart disease (3.7%, n=9), and external herniae (10.7%, n=26) were the NCDs identified among them.

Most of the fishermen (75.8%, n=175) consumed alcohol while fishing and 19 (7.8%) of them were daily drinkers. Majority (34.4%, n=84) of fishermen consumed quarter a bottle of alcohol closely followed by half a bottle per day in 31.6% (n=77).

Smoking was also common; 74.2% (n=181) being current smokers. Among all fishermen, majority (25.0%, n=61) smoked 6 -10 cigarettes per day while fishing.

Treatment-seeking behaviour: Moreover, fishermen's health-seeking nature, indicates that 175 (71.7%) individuals of the sample have sought some form of medical help for various health issues. Most preferred was Western medical care (52.9%, n=129), while a few opted for Ayurvedic treatment (2.9%, n=7), or they have taken self-medications (44.2%, n=108).

Preventive measures for injuries: Formal safety training for fishing was taken by minority of fishermen (29.8%, n=72). While fishing, safety clothes were worn by majority (70.2%, n=170) of the fishermen (Table 3).

Fishermen who had no safety training had more injuries than those who had safety training (Table 4).

Table 2: Occupation Related Health Problems (n=244)

Category	Variable	Frequency	Percentage (%)
Accidental Injuries	Electrical Injuries	22	9.1
	Fire/ Smoke inhalation	40	16.5
	Wet burns	54	22.3
	Dry burns	65	26.9
	Sharp injuries	156	64.5
	Falls	119	49.2
	Other	39	16.1
Non-accidental Injuries	Visual Impairment due to exposure to sunlight	188	77.7
	Excessive heat exposure	140	57.4
	Noise-induced hearing impairment	1	0.4
Occupation Related Other Health Issues	Faintishness	32	13.2
	Vomiting	33	13.6
	Diarrhoea	16	6.6
Injuries due to Oceanic creatures	Any injury	166	68.9

Table 3: Preventive Measures Practiced by Fishermen (n=244)

Variable	Frequency	Percentage (%)
Safety training received	72	29.8
Use of safety clothing	170	70.2
Never fish alone	210	86.8
Avoid dangerous spots	220	90.9
Other preventive measures	4	1.7

Table 4: Association between safety training vs injuries

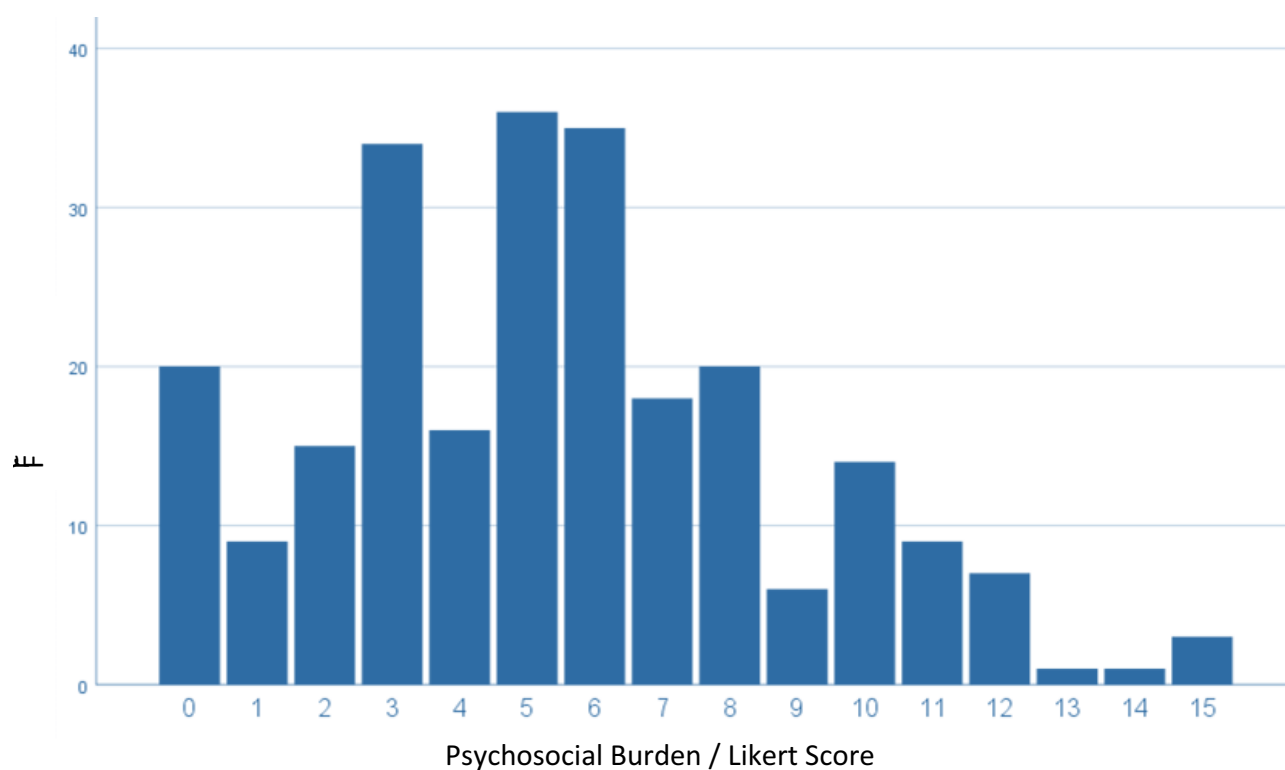
		Safety Training		Total
		Yes	No	
Injury while fishing	Yes	39	146	185
	No	33	24	57
Total		72	170	242

The association between receiving formal safety training and experiencing any type of injury (accidental, non-accidental and injuries due to oceanic creatures) during fishing, was statistically significant, ($\chi^2(1, N=242) = 28.3, p < 0.001$).

The psychosocial burden of fishermen

The results of the psychosocial burden measured by analysis of validated four-item Likert-scale type questions and the total scores arranged in ascending order is shown in Figure 1.

The mean (SD) psychological burden of the sample was 5.45 (3.35). According to this scoring system, 16.7% (n=41) faced a high, 65.3% (n=159) faced moderate and 18% (n=44) faced a low level of psychosocial burden.

**Figure 1:** Psychosocial burden of fisherman in the study group measured by Likert scale

Discussion

Characteristics of the study participants:

The total sample consisted of only males. It was due to the traditional background of only males engaging in fishing in Sri Lanka (7). The majority of the fishermen belonged to the 46 to 60-year age group and majority of the sample had an experience in fishing of more than 20 years. A large majority had chosen fishing as their occupation by personal choice. Though considerable number of fishermen had completed GCE OL and a small percentage had completed AL, they still chose fishing as their occupation. This choice of fishing as the occupation should be explored further in subsequent research to find out the factors attracting them for fishing especially from a socio-economic perspective.

Occupation related health problems

Accidental and Environmental Injuries:

The present study revealed that most fishermen experienced at least one accidental injury while fishing. The most common type of accidental injuries were sharp injuries followed by falls. A study conducted in Kalpitiya, Sri Lanka reported that the prevalence of injury over a 6-month period being 19.6% which is considerably low when compared to the present study (13). The higher prevalence in our study may be attributed to the longer recall period (lifetime) when compared to the six months in the Kalpitiya study and variation in the fishing methods, sea conditions in Kalpitiya peninsular and monsoon patterns experienced by them (13).

Visual impairment that could be due to prolonged exposure to sunlight was the most common non-accidental health effect caused by the hazardous environmental exposure. Another study conducted in Kalpitiya, Sri Lanka had reported that prevalence of visual symptoms being 39% (7). The higher value in this study may be due to non-exploration the visual impairment in detail and it was simply based on what the individual experience. A further detailed objective assessment of visual impairment is warranted in future research.

Of the 244 fishermen, 168 were experienced at least one injury by oceanic creatures which is a higher number. Among them nearly seventy percent

were injured by jellyfish followed by sea urchins. Research based on biological hazards experienced by fishermen are sparse in literature (2). In the present study, large majority of the fishermen were confident in identifying injuring sea creatures correctly. This ability may have developed by the prolonged exposure to marine environments though they have not received any special training on this (2).

Occupation-related other health issues:

During the period of fishing, vomiting faintishness and diarrhoea were the common symptoms experience by the fishermen. This is also described in other fishing communities as an adaptation to ocean (2). But the exact causes of vomiting and diarrhoea need detailed examination in future studies, considering factors such as alcohol use and duration of marine exposure.

Non-communicable diseases and risk behaviours:

The most prevalent symptom related to NCD was back pain experienced by nearly sixty five percent of the fisherman, indicating musculoskeletal disorders were common among them. A study done in Kalpitiya, Sri Lanka reported that back pain was the commonest symptom (7) and a study carried out among fishermen in North Carolina, USA had shown that the prevalence of musculoskeletal symptoms including back pain causing work interference in the last 12 months was 38.5% (2). The higher prevalence observed in our study may be partly due to differences in assessment criteria (this study did not evaluate work interference) and different fishing practices / automation etc. Other detected NCDs included hypertension, diabetes mellitus dyslipidemia ischemic heart disease, and external hernia.

Nearly 75% of the fishermen consumed alcohol while fishing and nearly 8% of them consumed on a daily basis. The prevalence of alcohol use among fishermen was reported as 61% in Kalpitiya (9), and 61.4% in Kovalam, Tamil Nadu, India (18). This indicates that alcohol as a social habit is closely linked to the occupation.

In the present study the prevalence of smoking was high. In another study conducted in Sri Lanka,

it revealed that the prevalence of overall, urban and rural smoking among general population were 18.3%, 17.2% and 18.5% respectively (19). Consistent to our findings the study conducted in Kalpitiya, Sri Lanka reported 56.8% smokers among fishermen (13) whereas in Kovalam, Tamil Nadu reported 17.1% smokers among fishermen (18).

Treatment-seeking behaviour:

Most fishermen had sought some kind of medical care for various health issues and among them and most preferred Western medical care and few used Ayurvedic care or have taken self-treatment. Targeted health education and health promotion programs could improve treatment seeking behaviour, because alcohol consumption and smoking which is prevalent in the community increases the risk for non-communicable diseases. The trust in Ayurveda treatment was observed to be low in the studied setting.

Preventive measures for injuries:

The study revealed that getting formal safety training significantly reduces the risk of injury. This result suggests that formal safety education will have a considerable impact on their protection.

The psychosocial burden of fishermen

In this study, perceived psychosocial burden was assessed and more than sixty percent of the sample faced moderate level of psychosocial burden. Among others nearly sixteen percent faced high psychosocial burden and eighteen percent faced low psychosocial burden. Another regional research done in Australia, Asia-Oceania reported 53.1% of Australian fishermen had low psychological distress, 24.0% had moderate distress and 16.5% faced high psychological distress, using K10 score (21). As the present study used a simple tool to measure psychosocial impact it is less descriptive. Future studies should use more descriptive and validated tools to assess psychosocial burden. Unfortunately, this topic has been underexplored in Sri Lankan literature.

The role of fishermen demands both time and energy. Their working environment can be uncomfortable most of the time. They have to stay for long trips at sea and open air, isolated locations, long working hours, little rest, congested working area, crowded with fishing gear and equipment, constantly moving boats/ ships, making the job of fishermen more difficult exposing them to both physical and psychological stress.

Limitations

The study assessed the life-long experiences of fishermen, exposure to hazards and social habits. Therefore, some amount of recall bias is inevitable. Some of the questions in the questionnaire had to be removed in the analysis because their reluctance to respond and the non-specific nature of responding e.g. questions related to monthly income. Since the study was done in one geographic area; the Hikkaduwa fisheries harbour in Galle district, the results may not be generalized to the general population or other fishing communities of Sri Lanka. Though the calculated sample size was 286, we were able to collect only 244 fully completed questionnaires during the study.

Conclusions and recommendations

In conclusion, the prevalence of accidental and environmental injuries, alcohol consumption, smoking, and back pain were high among fishermen in the studied group. A formal safety education will have a considerable impact on their protection. If proper health promotional and better screening methods have been provided many of the conditions could have been prevented. Future research needs to assess psychosocial burden using more descriptive and validated tools.

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