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Occupational Health Factors Associated with Quality of Life among Small-Scale Fishermen in Malaysia

Haspinor Teh^{1,*}, Adel Gohari², Nur Hafizah Ramli³, Olakunle Oloruntobi⁴

¹ Faculty of Fisheries and Aquaculture Sciences, Universiti Malaysia Terengganu (UMT), 21020, Kuala Nerus, Terengganu, Malaysia

² Faculty of Maritime Studies, Universiti Malaysia Terengganu (UMT), 21020, Kuala Nerus, Terengganu, Malaysia

³ Faculty of Bioresources and Food Industry, Universiti Sultan Zainal Abidin (UniSZA), Kampus Besut, Jalan Tembila, 22200, Besut, Terengganu, Malaysia

⁴ Faculty of Management & Technology, Capital College of the Arts, Management and Technology, Singapore

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ABSTRACT

Fishermen are exposed to demanding occupational conditions that may adversely affect their health and quality of life. Occupational health and socioeconomic conditions are therefore important in understanding the well-being of small-scale fishing communities. This study examined the association between occupational health factors and quality of life among 86 small-scale fishermen in Malaysia. Data were collected using a structured questionnaire covering socio-demographic characteristics, financial assets, human assets, physical assets, and social assets, and were analysed using descriptive statistics and binary logistic regression. The findings showed that income (odds ratio [OR] = 234.640, $p < 0.001$), savings (OR = 1.644, $p < 0.01$), health status (OR = 1.021, $p < 0.01$), and household relationships (OR = 3.405, $p < 0.001$) were positively associated with quality of life. Having a loan (OR = 0.081, $p < 0.01$) was negatively associated with quality of life, while household expenses (OR = 3.600, $p < 0.01$) were also significantly associated with quality of life. The model explained 50.6% of the variation in quality of life (Cox & Snell $R^2 = 0.506$). The findings highlight the importance of strengthening occupational health programmes, improving access to healthcare services, and supporting the socioeconomic well-being of fishing communities to enhance fishermen's quality of life.

1. Introduction

Fishing is widely recognised as a hazardous occupation, with fishermen exposed to various health-related challenges [1]. These occupational conditions may also affect job satisfaction and well-being among fishing communities [2]. Occupational health and workplace safety are therefore important considerations in protecting fishermen's health [3]. Small-scale fishing communities may additionally experience socioeconomic vulnerabilities that affect their livelihoods [4]. These occupational challenges increase the risk of accidents and illnesses and may affect fishermen's ability to maintain

* Corresponding author.

E-mail address: haspinor.teh@umt.edu.my

productive livelihoods and overall well-being. Occupational health is therefore an important public health concern with implications for the sustainability of fishing communities.

Small-scale fisheries contribute to poverty reduction and support the livelihoods of fishing communities, particularly in developing countries [5]. Their contribution to sustainable livelihoods also extends beyond income generation by supporting broader livelihood assets and development outcomes [6]. Fish plays an important role in global food and nutrition security as a source of essential nutrients [7]. At the global level, fisheries and aquaculture continue to make substantial contributions to food security, nutrition, employment, and livelihoods [8]. In Malaysia, fish remains an essential component of the national diet, with per capita fish consumption reaching 44.7 kg in 2023 [9]. Sustaining fish production therefore depends not only on marine resources but also on the health and work capacity of fishermen. Poor occupational health may reduce fishing productivity, disrupt household income, affect quality of life (QoL), and ultimately weaken the resilience of coastal communities.

The fisheries sector remains important for sustainable food production and livelihoods at the global level [10]. In Malaysia, fisheries continue to contribute to the national fisheries sector and coastal livelihoods [11]. Malaysian fishermen are also required to adapt to climate-related changes that may affect their fishing activities and livelihoods [12]. More broadly, marine fisheries provide substantial employment opportunities worldwide [13]. Repetitive manual work, prolonged exposure to harsh weather, inadequate use of personal protective equipment, and insufficient safety training may further increase the likelihood of work-related health problems. These occupational risks can impair physical functioning, reduce work performance, and consequently affect QoL.

Socioeconomic conditions and community environments can influence the well-being of coastal communities [14]. Among small-scale fishermen, QoL may be influenced by income, occupational health, working conditions, family support, healthcare accessibility, and community resources. The Sustainable Livelihoods Framework provides a useful perspective for understanding these relationships because human, financial, physical, and social capital collectively contribute to livelihood sustainability and overall well-being. Within the Sustainable Livelihoods Framework adopted in this study, health constitutes an important component of human capital because the ability to work and maintain a livelihood depends partly on an individual's physical and health condition. Fishermen are exposed to ergonomic risks associated with physically demanding work aboard fishing vessels [15]. Barriers to healthcare access may further affect the ability of individuals to obtain appropriate healthcare services [16]. In addition, occupational diseases represent an important health concern among fishermen due to the nature of their working environment [17].

Previous research has demonstrated that fishermen are exposed to various occupational health and safety risks associated with their working conditions [18]. Climate change may further intensify occupational safety and health hazards through increasing environmental exposure and extreme weather conditions [19]. Broader pressures on global food supply and demand also have important implications for food security [20]. In addition, health outcomes are shaped by wider social and socioeconomic determinants, highlighting the importance of considering the conditions in which individuals live and work [21]. While these studies provide important evidence on occupational health and safety, climate-related risks, food security, and the social determinants of health, less attention has been given to how occupational health and related socioeconomic factors are associated with fishermen's QoL. In particular, evidence integrating health status with financial, human, physical, and social dimensions of fishermen's livelihoods remains limited. This limits understanding of how health and socioeconomic conditions interact in shaping the well-being of small-scale fishing households.

Addressing this gap is important because occupational health is closely connected to fishermen's ability to work, generate income, and sustain their households. Improvements in health and workplace safety may reduce work-related risks, support fishing productivity, strengthen livelihood resilience, and contribute to the sustainability of fishing communities. Examining occupational health together with socioeconomic conditions may therefore provide a more comprehensive understanding of the factors associated with fishermen's QoL.

Accordingly, this study addresses the limited empirical evidence integrating occupational health and socioeconomic dimensions in explaining QoL among small-scale fishermen in Malaysia. The study aims to identify the occupational health and selected socioeconomic factors associated with fishermen's QoL. By examining financial, human, physical, and social dimensions together with health-related factors, the study provides empirical evidence that can support occupational health policies, improve healthcare accessibility, strengthen workplace safety programmes, and promote more sustainable livelihoods among small-scale fishing communities.

2. Methodology

2.1 Study Area and Data Collection

This study was conducted in Pulau Langkawi, Kedah, Malaysia. A total of 86 small-scale fishermen were randomly selected from the registered list provided by the Malaysian Fisheries Development Authority (Lembaga Kemajuan Ikan Malaysia, LKIM), Pulau Langkawi Branch. The respondents comprised Zone A fishermen operating in coastal waters using traditional fishing methods.

Primary data were collected through a structured questionnaire administered during face-to-face interviews. The questionnaire consisted of five sections covering respondents' demographic characteristics, financial assets, human assets, physical assets, and social assets. In particular, the demographic section collected information on the fishermen's background, including age, fishing experience, and the types of fishing gear used. Human assets were assessed through two main dimensions: education and health. The education component examined fishermen's level of educational attainment, while the health component assessed overall health status, occupational risks encountered during fishing activities, and health conditions experienced in relation to work in the fisheries sector. Moreover, the physical assets section examined the productive and household assets owned by the fishermen. Finally, social assets were assessed by examining fishermen's relationships with family members and interactions with the surrounding community.

Additionally, secondary data from LKIM and the Department of Fisheries Malaysia complemented and supported the primary data collected through the questionnaire.

Figure 1 illustrates the conceptual framework adopted in this study based on the Sustainable Livelihoods Framework. The framework considers four livelihood assets, namely human, financial, physical, and social assets, as key determinants of livelihood outcomes and QoL. In this study, occupational health was regarded as a major component of human capital, while financial, physical, and social assets were incorporated as supporting factors to examine associations with the QoL of small-scale fishermen.

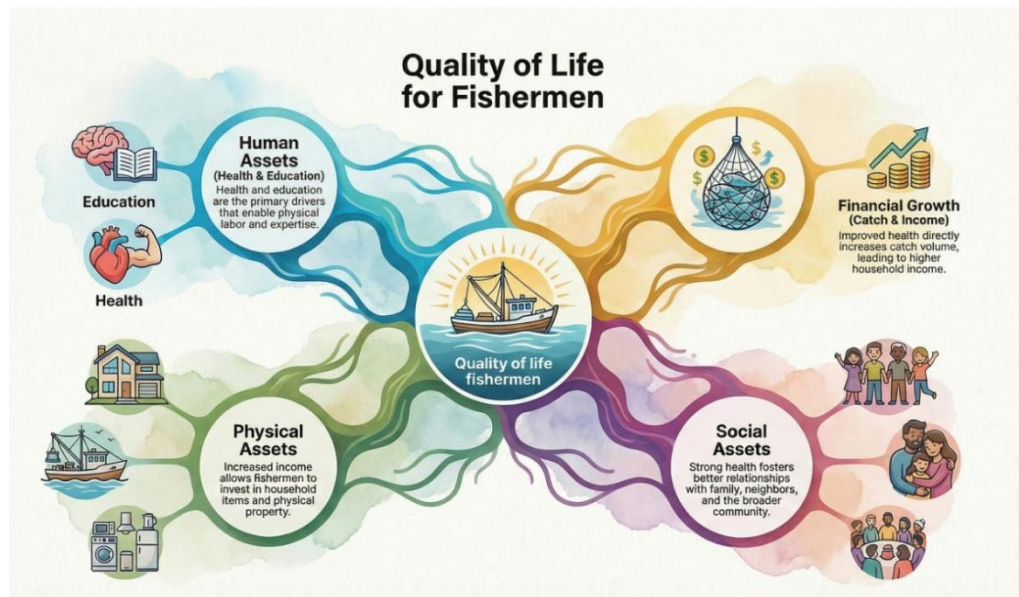


Fig. 1. QoL of fishermen

2.2 Data Analysis

The collected data were analysed using descriptive statistics and binary logistic regression analysis. Descriptive statistics were used to summarise respondents' socio-demographic characteristics and their financial, human, physical, and social assets. Binary logistic regression was subsequently employed to identify factors associated with fishermen's QoL. The dependent variable was QoL, while occupational health indicators and selected socioeconomic variables representing human, financial, physical, and social assets were included as explanatory variables. Statistical significance was determined at the 5% significance level ($p < 0.05$).

Table 1 summarises the variables included in this study and corresponding measurement scales. Guided by the Sustainable Livelihoods Framework, the independent variables were categorised into four livelihood asset components: financial, human, physical, and social assets. Financial assets included savings, loan status, monthly income, and household expenditure. Human assets comprised respondents' education level and self-perceived health status. Physical assets referred to the ownership of productive and household assets, while social assets assessed respondents' satisfaction with community relationships and relationships within the household. The dependent variable was fishermen's QoL.

To examine factors associated with fishermen's QoL, a binary logistic regression model was employed. Notably, the explanatory variables were derived from four livelihood asset dimensions: financial, human, physical, and social assets. Financial assets comprised savings, loans, income, and expenses; human assets comprised education and health; physical assets were represented by ownership of physical assets; and social assets comprised social satisfaction and relationships with household members. The model was specified as follows:

$$QoL = \log_i = (A_Financial_i) + (A_Physical_i) + (A_Human_i) + (A_Social_i). \quad (1)$$

$$A_Financial_i = (Savings_i, Loan_i, Income_i, Expenses_i),$$

$$A_Human_i = (Education_i, Health_i),$$

$$A_Physical_i = (Physical_Assets_i),$$

$$A_Social_i = (Social_Satisfaction_i, Household_Relationships_i),$$

$$\ln(1 - \pi_i / \pi_i) = \beta_0 + \beta_1 Savings_i + \beta_2 Loan_i + \beta_3 Income_i + \beta_4 Expenses_i + \beta_5 Education_i + \beta_6 Health_i + \beta_7 Physical_Assets_i + \beta_8 Social_Satisfaction_i + \beta_9 Household_Relationships_i + \epsilon, \quad (2)$$

where:

$P_i = \Pr(QoLi=1),$
and
 $1-P_i = \Pr(QoLi=0).$

Table 1
Variables and measurements

Variables	Measurements
Financial Asset	
Savings	Total savings of fishermen, considering all factors such as the percentage saved and types of savings. For questions related to savings: 1 = Yes (has savings), 2 = No (does not have savings). Total savings in Malaysian Ringgit (RM) per month.
Loan	Total loans taken by fishermen follow the same coding as savings-related questions: 1 = Yes (fishermen have loans), 2 = No (no loans).
Income	Total income of fishermen in Malaysian Ringgit (RM).
Expenses	Total household expenditure of fishermen in Malaysian Ringgit (RM) per month.
Human Asset	
Education	The education level of fishermen is coded as follows: 1 = No formal education, 2 = UPSR (Primary School Certificate), 3 = Lower Secondary School, 4 = Upper Secondary School, 5 = College/University.
Health	Health level of fishermen is measured on a scale of: 1 = Very unhealthy, 2 = Unhealthy, 3 = Not sure, 4 = Healthy, 5 = Very healthy. Types of health conditions experienced: Risk 1 = Very low risk, 2 = Low risk, 3 = Moderate risk, 4 = High risk, 5 = Very high risk.
Physical Asset	
Physical Assets	Physical facilities owned by fishermen are counted as: 1 = Yes (owns assets such as houses, vehicles, land, agriculture, livestock, etc.), 2 = No (does not own any assets).
Social Asset	
Level of Social Satisfaction	Fishermen's relationships with the community are evaluated on a 5-level scale: 1 = Very dissatisfied, 2 = Dissatisfied, 3 = Not sure, 4 = Satisfied, 5 = Very satisfied.
Relationships Household members	Fishermen's relationships with household members are also evaluated on a 5-level scale: 1 = Very dissatisfied, 2 = Dissatisfied, 3 = Not sure, 4 = Satisfied, 5 = Very satisfied.

3. Results

3.1 Demographic Characteristics of Fishermen

Table 2 presents the socio-demographic characteristics of the 86 fishermen who participated in this study. The respondents were predominantly young, with 75.6% aged below 40 years, including 43.0% who were below 29 years of age. In terms of fishing experience, 46.5% had less than 10 years of experience, while 15.1% had 40 years or more. Most respondents had received formal education, with secondary education representing the largest educational category (29.1%), followed by primary education (27.9%) and upper secondary education (24.4%). The majority of respondents were

married (83.7%). Overall, the demographic profile indicates a relatively young fishing community, with almost half of the respondents having less than 10 years of fishing experience.

Table 2
Socio-demographic characteristics of the fishermen

Characteristics	Category	Frequency (n)	Percentage (%)
Age (years)	Below 29	37	43.0
	30–39	28	32.6
	40–49	6	7.0
	50–59	11	12.8
	≥60	4	4.7
Fishing experience (years)	<10	40	46.5
	10–19	25	29.1
	20–29	7	8.1
	30–39	1	1.2
	≥40	13	15.1
Education level	No formal education	12	14.0
	Primary education	24	27.9
	Secondary education	25	29.1
	Upper secondary education	21	24.4
	College/University	4	4.7
Marital status	Married	72	83.7
	Unmarried	14	16.3

3.2 Health Status of Fishermen

Regarding the prevalence of health conditions, 36 respondents (41.9%) reported having one to two health conditions, followed by 30 respondents (34.9%) with three to four conditions. Meanwhile, 15 respondents (17.4%) reported having no medical conditions, while five respondents (5.8%) reported five or more health conditions. Overall, the findings indicate that a substantial proportion of the fishermen experienced multiple health conditions.

Regarding self-perceived health satisfaction, dissatisfaction was the most frequently reported category, with 34 respondents (39.5%) indicating that they were dissatisfied with their health. This was followed by 20 respondents (23.3%) who reported moderate satisfaction and another 20 respondents (23.3%) who were satisfied. Seven respondents (8.1%) reported being very satisfied, while five respondents (5.8%) were very dissatisfied. Overall, the findings indicate that dissatisfaction with health was relatively common among the fishermen.

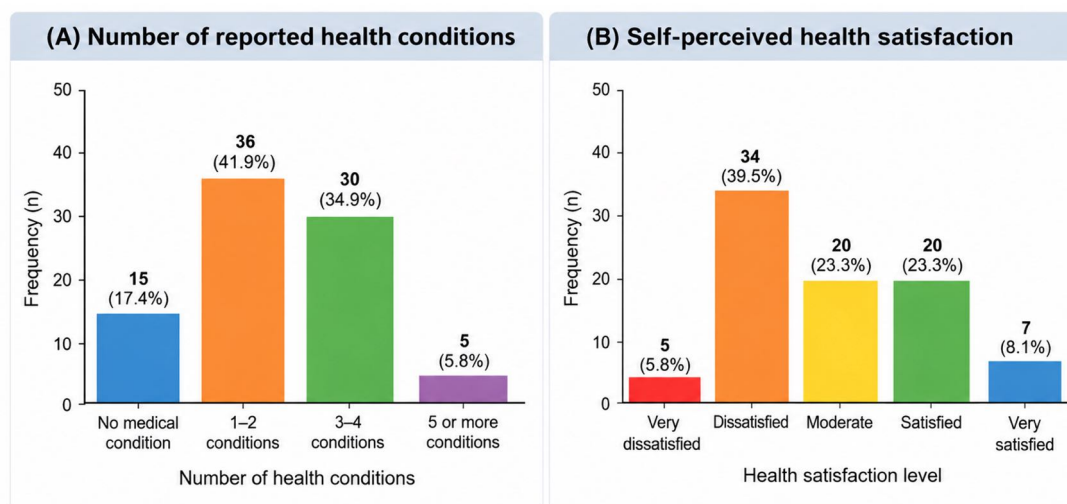


Fig. 2. Health status of fishermen

3.3 Sea Safety and Emergency Preparedness

Figure 3 presents the occupational health and safety conditions reported by the fishermen. The findings were categorised into four themes: occupational health and physical safety; sea safety; training and emergency preparedness; and boat and equipment safety. More than half of the respondents reported experiencing at least one occupational accident while fishing. The most frequently reported incidents included injuries from fish hooks, slips and falls on wet boat surfaces, and other work-related injuries sustained during fishing activities. In addition, 86% of the fishermen reported that they did not wear life jackets while fishing.

The findings also revealed that many respondents continued fishing despite fatigue, dehydration, or other work-related health symptoms. Skin-related disorders were also highly prevalent, with 95% of respondents reporting at least one condition, including skin itchiness, redness, dry skin, or nail discolorations following prolonged exposure to seawater and sunlight.

Regarding sea safety, most fishermen relied on mobile phones as their primary communication device. They depended largely on personal experience and information shared by fellow fishermen when making decisions related to fishing activities. Similarly, weather conditions were identified as the main consideration before going to sea, with 91% of respondents reporting that they suspended fishing activities during adverse weather conditions.

The findings further noted limited emergency preparedness among the respondents. More than 80% had never received formal first aid or emergency response training. Likewise, routine safety inspections of boats and fishing equipment were uncommon, and most fishing vessels lacked essential emergency equipment such as fire extinguishers and first-aid kits.



Fig. 3. Risk in health and hazard: A safety assessment

3.4 Factors Associated with Quality of Life among Fishermen

Table 3 presents the results of the binary logistic regression analysis examining the factors associated with QoL among small-scale fishermen. The model identified significant associations between QoL and variables representing financial, human, and social assets.

Among the financial asset variables, monthly income was the strongest predictor of QoL (OR = 234.640, $p < 0.001$). Savings were also positively and significantly associated with QoL (OR = 1.644, $p < 0.01$). Loan status was negatively and significantly associated with QoL (OR = 0.081, $p < 0.01$), while household expenditure was significantly associated with QoL (OR = 3.600, $p < 0.01$).

Among the human asset variables, self-perceived health status was positively and significantly associated with QoL (OR = 1.021, $p < 0.01$), whereas education level was not significantly associated with QoL. Regarding social assets, satisfaction with household relationships was positively and significantly associated with QoL (OR = 3.405, $p < 0.001$). In contrast, physical assets and community relationships were not significantly associated with QoL.

Overall, the binary logistic regression model explained 50.6% of the variation in fishermen's QoL (Cox and Snell $R^2 = 0.506$).

Table 3
Factors associated with the QoL of fishermen

Variable	Parameter	Standard Error (SE)	Exp (B) Odds Ratio
Constant	1.670	3.919	5.315
Financial Asset			
Savings	0.497	.210	1.644.*
Loan	-2.512	.841	0.081***
Income	5.458	1.295	234.640***
Expenses	1.281	.413	3.600***
Human Asset			
Education	0.193	1.043	1.213
Health	0.020	.010	1.021*
Physical Asset			
Physical Assets	0.365	.847	1.441
Social Asset			
Level of Social Satisfaction	-.024	1.043	.976
Relationships with household members	1.225	.306	3.405***
Log likelihood = 18.986a -2			
Cox & Snell R Square = 0.506			

4. Discussion

4.1 Health Status and Occupational Safety

The findings demonstrate that occupational health and safety remain important concerns among small-scale fishermen, alongside socioeconomic factors associated with QoL. Moreover, the high prevalence of chronic diseases and widespread dissatisfaction with health status among the respondents suggest that occupational health remains a major challenge within small-scale fishing communities. At the same time, prolonged exposure to physically demanding work, hazardous marine environments, and limited opportunities to access healthcare may collectively contribute to poorer health outcomes and reduced work capacity.

These findings are consistent with previous research documenting substantial occupational risks in the fishing industry. Jensen et al. reported trends in fatal accident incidence in fishing [29], while Lincoln and Lucas documented occupational fatalities in the United States commercial fishing industry [30]. Kincl *et al.*, [31] further demonstrated that personal, situational, and environmental factors were associated with injury experience among commercial fishermen. Earlier research also documented occupational accidents in the fishing industry [35], while Lucas and Case subsequently examined work-related mortality among fishing workers [36].

The findings also indicate inadequate compliance with personal protective equipment use, particularly life jackets, despite fishermen's awareness of occupational risks. Many respondents perceived life jackets as uncomfortable during prolonged exposure to hot weather or believed their swimming ability reduced the need for protective equipment. Together, these perceptions, combined with financial constraints and limited occupational safety awareness, may contribute to unsafe working practices among small-scale fishermen. These behavioural factors may increase fishermen's vulnerability to occupational injuries, as previous research has shown that personal, situational, and environmental factors are associated with injury experience in commercial fishing [31]. Another important concern is the tendency among fishermen to delay seeking medical

treatment despite experiencing health problems. Respondents reported postponing healthcare visits because attending health clinics or hospitals could result in the loss of daily income due to long waiting times and an inability to continue fishing activities. This behaviour reflects the economic vulnerability of small-scale fishermen, whose dependence on daily earnings may compel them to prioritise livelihood needs over timely healthcare utilisation. Occupational risks and health challenges are well documented among seafarers [33]. From a broader livelihood perspective, socioeconomic vulnerability can also affect the well-being of small-scale fishing communities [37].

The combined effects of poor health, occupational injuries, unsafe working practices, and delayed healthcare utilisation may extend beyond health outcomes to affect fishermen's livelihoods and household well-being. Reduced work capacity, interruptions to fishing activities, increased healthcare expenditure, and temporary or permanent income loss may weaken household financial security and livelihood resilience, consistent with the broader livelihood perspective described by Ellis [46]. Healthcare accessibility represents an additional concern, as barriers to healthcare may restrict access to appropriate health services [16]. The Sustainable Livelihoods Framework further identifies health as a key component of human capital that supports productive livelihoods and strengthens household resilience. Deterioration in health and occupational safety may therefore cascade to other livelihood assets and ultimately affect fishermen's QoL.

From a public health perspective, the findings highlight the need for an integrated approach that addresses both healthcare accessibility and occupational safety within small-scale fishing communities. Occupational health and safety risks among fishermen have been documented across various working conditions [18]. Climate-related hazards may further intensify occupational safety and health risks associated with changing environmental conditions [19]. Occupational risks associated with seafaring also highlight the importance of appropriate preventive and safety measures [33]. In this context, community-based healthcare services, mobile health clinics, and regular health screening programmes could facilitate the early detection and management of chronic diseases while reducing barriers to healthcare utilisation. Occupational safety education, improved compliance with personal protective equipment, first-aid training, routine safety inspections of fishing vessels and equipment, and access to affordable safety equipment should also be strengthened. Integrating occupational health initiatives into fisheries management policies through collaboration among fisheries agencies, healthcare providers, and local fishing communities could reduce preventable injuries, improve health outcomes and work capacity, and strengthen the long-term resilience of small-scale fishing households.

4.2 Occupational Health and Quality of Life of Fishermen

Beyond the occupational health and safety concerns discussed above, the regression findings demonstrate a significant association between self-perceived health status and QoL among small-scale fishermen. This association highlights the importance of health as a component of human capital in sustaining livelihoods and overall well-being. This finding is supported by the descriptive results, which revealed that most respondents reported having at least one chronic disease, particularly diabetes mellitus and hypertension. Additionally, the high prevalence of chronic diseases suggests that prolonged exposure to physically demanding work, hazardous marine environments, and limited access to healthcare may adversely affect fishermen's health and daily functioning.

Previous research has documented occupational health challenges among seafarers [33]. Health-related concerns have also been identified specifically within the fishing sector [34]. These occupational and health challenges may become particularly important when healthcare utilisation is delayed, potentially affecting the management of existing health conditions.

These findings are consistent with the concept of the social determinants of health, which recognises that health outcomes are influenced by socioeconomic conditions, occupational environments, and access to healthcare services [21]. Within the context of small-scale fisheries, the physically demanding nature of fishing, coupled with income uncertainty and limited healthcare accessibility, may increase the risk of adverse health outcomes and ultimately reduce QoL. The findings are also consistent with a livelihood perspective, in which health and the capacity to work are important for sustaining livelihood activities and household well-being [46]. The Sustainable Livelihoods Framework further recognises health as an important component of human capital that supports productive livelihoods and overall well-being.

From a public health perspective, the findings emphasise the need to strengthen occupational health interventions within fishing communities. Expanding access to regular health screening programmes, mobile healthcare services, and community-based health promotion initiatives would facilitate early detection and management of chronic diseases while reducing barriers to healthcare utilisation. Strengthening occupational health policies and improving healthcare accessibility are consequently essential strategies to enhance fishermen's QoL, sustain labour productivity, and promote the long-term resilience of small-scale fishing communities.

4.3 Sea Safety and Emergency Preparedness

The present study demonstrates that sea safety remains a critical component of occupational health among small-scale fishermen. The findings indicate that most respondents relied primarily on personal experience, mobile phones, and information shared by fellow fishermen when making navigation and safety decisions at sea. Furthermore, most respondents had never received formal emergency response or first-aid training, reflecting limited preparedness to manage accidents and emergencies during fishing operations.

Limited access to communication and navigation equipment, along with inadequate emergency preparedness, may increase fishermen's vulnerability to occupational accidents, particularly during adverse weather or unexpected incidents at sea. Although practical experience remains an important source of knowledge for decision-making, reliance on experiential knowledge alone may be insufficient to manage increasingly complex maritime hazards. Previous research has documented substantial fatal accident risks within the fishing industry [29]. Occupational risks associated with the broader seafaring environment have also been highlighted, reinforcing the importance of appropriate safety and preventive measures [33].

Environmental uncertainty further compounds these occupational risks. Although most respondents reported that weather conditions strongly influenced fishing decisions, increasingly unpredictable weather patterns and climate variability continue to expose fishermen to substantial occupational and livelihood challenges. Climate variability and change have been associated with increased vulnerability of fishery-based livelihoods [47]. Broader evidence also demonstrates an association between climate variability and well-being [48]. These findings are consistent with the Sustainable Livelihoods Framework, whereby environmental shocks and limited access to protective resources may reduce the resilience of livelihood assets and compromise long-term well-being.

From a public health and occupational safety perspective, the findings highlight the need to strengthen emergency preparedness in small-scale fishing communities. Expanding access to emergency response and first-aid training, improving the availability of navigation and communication equipment, and enhancing the dissemination of real-time weather forecasts and early warning systems should be prioritised. Likewise, strengthening collaboration among fisheries agencies, maritime authorities, healthcare providers, and local fishing communities would further

improve occupational safety and disaster preparedness. Integrating sea safety initiatives into fisheries management policies is also essential to reduce preventable occupational injuries and fatalities, strengthen livelihood resilience, and promote the long-term sustainability of small-scale fisheries.

4.4 Health and Social Capital Associated Quality of Life

Beyond occupational health and sea safety, the findings also highlight the combined importance of human and social capital in understanding the QoL of small-scale fishermen. Moreover, the binary logistic regression analysis indicated that fishermen with better self-perceived health and stronger household relationships were more likely to report a higher QoL. In contrast, education level was not significantly associated with the outcome. Overall, these findings suggest that good health and strong family support may influence fishermen's well-being more directly than formal educational attainment.

From the perspective of the Sustainable Livelihoods Framework, health represents a fundamental component of human capital because good health supports participation in productive activities and the sustainability of livelihood outcomes. Poor health may reduce physical functioning, limit work capacity, and disrupt fishing activities, thereby affecting household income and overall well-being. A broader capability perspective emphasises the importance of human capabilities in supporting well-being and development [25]. From a livelihood perspective, the capacity to engage in productive activities is also important for sustaining livelihood outcomes [46]. For small-scale fishermen, whose livelihoods depend primarily on physical labour, maintaining good health is therefore essential for sustaining both employment and QoL.

The findings also demonstrate the multidimensional nature of well-being, encompassing health, psychological functioning, and social dimensions. The social context represents an important component in understanding well-being [32]. Although the WHOQOL framework was not used as the measurement instrument in this study, the relationship between health and QoL provides a useful perspective for interpreting the findings. Health may influence not only physical functioning but also broader dimensions of well-being. Previous research on subjective well-being has highlighted the importance of multiple factors in shaping overall well-being [38].

In addition to health, household relationships emerged as an important element of social capital influencing fishermen's QoL. Supportive family relationships may provide emotional support, strengthen coping mechanisms, and enhance household resilience during periods of occupational stress, financial uncertainty, and health-related challenges. Previous research has highlighted the broader relationship between economic conditions and well-being [23]. Social capital has also been recognised as an important dimension of well-being [24]. Within small-scale fisheries, well-being has been examined through a broader perspective that incorporates social and livelihood dimensions [37]. These findings reinforce the importance of social capital as a resource that complements human capital in strengthening livelihood resilience.

Overall, the findings demonstrate the interconnected roles of health and social well-being in shaping the QoL of small-scale fishermen. Human and social capital therefore provide complementary dimensions for understanding livelihood resilience and well-being within small-scale fishing communities.

5. Policy Implications

The findings of this study provide important implications for public health and fisheries policies aimed at improving the QoL of small-scale fishermen in Malaysia. The significant associations between health status, financial factors, household relationships, and QoL demonstrate that occupational health should be recognised as an integral component of sustainable fisheries development rather than being addressed solely as a workplace safety issue. Consequently, policy interventions should adopt a multisectoral approach involving the fisheries, healthcare, labour, and social welfare sectors.

Improving healthcare accessibility should be a key policy priority, particularly for fishing communities that experience financial and geographical barriers to healthcare utilisation. Thus, expanding community-based healthcare services, including mobile health clinics, periodic health screening programmes, and occupational health outreach services, would facilitate early detection and management of chronic diseases while reducing delays in seeking medical treatment. Such initiatives are particularly crucial for small-scale fishermen whose livelihoods depend on daily earnings and who often postpone healthcare due to economic constraints.

The findings also highlight the need to strengthen occupational health and safety management within the fisheries sector. For example, integrating occupational safety education, emergency preparedness, first-aid training, routine vessel safety inspections, and greater compliance with personal protective equipment into existing fisheries extension programmes would enhance fishermen's capacity to prevent and respond to occupational hazards. On a similar note, improving access to affordable safety equipment and reliable communication technologies would further reduce occupational risks and strengthen resilience during emergencies at sea.

Given the close relationship between financial security and health-seeking behaviour, livelihood-sensitive policies should also be considered. Temporary income support, medical assistance schemes, or compensation mechanisms during periods of illness could reduce the financial burden of healthcare utilisation and encourage earlier treatment. This ultimately improves long-term health outcomes while protecting household livelihoods.

Beyond health and financial support, the significant contribution of household relationships to QoL underscores the importance of strengthening social capital within fishing communities. Policies that encourage community participation, family-centred health promotion, fishermen's cooperatives, and local support networks may enhance psychological well-being, strengthen social resilience, and improve communities' capacity to cope with occupational and economic challenges.

In general, improving the QoL of small-scale fishermen requires an integrated policy framework that combines occupational health, accessible healthcare services, occupational safety, livelihood protection, and social support. Such an approach would improve individual health and well-being, strengthen livelihood resilience, support sustainable fisheries development, and contribute to Malaysia's long-term food security objectives.

6. Conclusions

This study demonstrates that occupational health is significantly associated with QoL among small-scale fishermen in Malaysia, highlighting the important role of human capital in sustaining livelihoods and overall well-being. The findings further indicate that occupational health challenges, including chronic health conditions, workplace hazards, and barriers to healthcare accessibility, are important considerations in understanding fishermen's work capacity, livelihood resilience, and QoL.

In addition, supportive household relationships emerged as an important component of social capital, reinforcing the role of family support in fishermen's resilience and overall well-being.

Guided by the Sustainable Livelihoods Framework, this study provides a comprehensive understanding of how human, financial, and social assets interact to influence the QoL of small-scale fishermen. By integrating occupational health within a broader livelihood perspective, the study extends existing fisheries research in Malaysia, which has traditionally focused on fisheries resource management and socioeconomic performance. At the same time, it provides empirical evidence on the association between occupational health and sustainable livelihood outcomes.

The findings emphasise that improving fishermen's QoL requires integrated strategies that strengthen occupational health and safety, expand healthcare accessibility, enhance livelihood security, and reinforce social support systems. Such a holistic approach would improve individual health and well-being, strengthen livelihood resilience, support sustainable fisheries development, and contribute to Malaysia's long-term food security and national development goals.

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