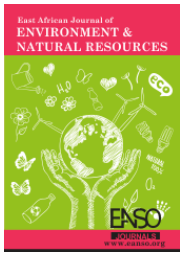

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Original Article

Medical Conditions Associated with Mining and Fishing Activities in Migori County: A Comparative Study

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ABSTRACT

The purpose of this research study was to do a comparative study on medical conditions that are associated with fishing and mining occupations in Migori County, Kenya. The study was shaped by three main objectives; to determine medical conditions associated with miners in Migori County, to identify medical conditions experienced by fishermen in Migori County and to establish the differences in medical conditions among miners and fishermen in Migori County. The study employed both quantitative and qualitative designs. It was carried out in the Nyatike Sub-County of Migori County. The target population of the study included miners from 25 sampled mining sites and fishermen from Mugabo BMU (Beach Management Unit) in the Nyatike sub-county. A sample of 400 participants participated in this study where Mugabo BMU was allocated 200 participants and other selected 25 mining sites allocated 8 each. The study used random sampling to generate its sample size. The data collection exercise used a visualisation semi-structured interview where a checklist was used together with probing, observation, and a questionnaire. The data was later ranked and scored through simple ranking, pairwise ranking, proportional pilling and matrix scoring. The data was presented by mapping, paragraphing and use of tables and other quantitative methods. The study established that infectious diseases are still the main cause of ill health among people practising mining and fishing occupations, besides rampant injuries. Clinical syndromes like stomach aches, coughs, and allied diseases, physical injuries were very common in the two occupations. The study, therefore, recommends the provision and use of Personal Protective Equipment (PPE) to reduce the number of injuries as well as support various amenity services, security, and proper regulations.

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INTRODUCTION

Mining might well have been the second earliest of human endeavours, granted that agriculture was the first. The two industries ranked together as the primary or basic industries of early civilisation (Hartman & Mutmansky, 2002). According to Global Mining, mining refers to the process, activity, industry, and occupation concerned with the extraction of minerals and metals (World Bank, 2001). Some of the ores excavated during mining exercises are coal, oil shale, gemstones, limestones, chalk, dimension stone, rock salt, potash, gravel, and clay. It is done to acquire any resource that cannot be grown or fabricated through artificial means. More specifically, mining is used to extract non-renewable resources like fossil fuels, minerals and even water.

Minerals and metals are the building blocks of the computers and smartphones we rely on, of the vehicles and public transit that get us places, of the buildings where we live and work, and of green technologies that help make the world a more sustainable place. Moreover, mined materials are needed to construct roads and hospitals, make satellites, generate electricity, and provide the many other goods and services that consumers enjoy.

Mining is economically important in providing employment, dividends, and taxes. The mining industry produces a trained workforce and small businesses that can service communities and may initiate related businesses. Mining also yields foreign exchange and accounts for a significant portion of gross domestic product, fosters a number of associated activities, such as the manufacturing of mining equipment, provision of engineering and environmental services, and the development of world-class universities in the fields of geology, mining engineering, and metallurgy. The economic opportunities and wealth generated by mining for many producing countries are substantial (The National Academies Press, 2017).

In contrast, miners are exposed to various potentially toxic or harmful materials or agents, including, but not limited to, fuels, reagents, solvents, detergents, chemicals, coal dust, silica dust, diesel particulate matter (DPM), asbestos, noise, welding fumes, poisonous plants, trona dust, and metal dust and other biological agents (Grayson & Watzman, 2001). Miners are at risk of health problems which include decreased life expectancy; increased frequency of cancer of the trachea, bronchus, lung, stomach, and liver; increased frequency of pulmonary tuberculosis (PTB), silicosis, and pleural diseases (Eisler, 2003) Insect-borne diseases, such as malaria and dengue fever; noise-induced hearing loss; the increased prevalence of certain bacterial and viral diseases; and diseases of the blood, skin, and musculoskeletal

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system (Centre for Disease Control, 2010). The total number of fishermen and fish farmers is estimated to be 38 million (FAO, 2021). Fisheries and aquaculture provide direct and indirect employment to over 500 million people in the world. In 2005, the worldwide per capita consumption of fish captured from wild fisheries was 14.4 kilograms, with an additional 7.4 kilograms harvested from fish. There are a lot of medical complications arising from the activity including respiratory tract infections, STIs, hearing loss, skin diseases etc.

This study examines and determines the disease patterns and variations in gold mining and fishing in Migori County. Although there are rare studies of this kind, the study will focus on the direct participatory comparison of major diseases causing deaths among miners and agriculturalists.

METHODOLOGY

Study Area and Data Sources

The study was carried out in the Nyatike Sub-County of Migori County. The study area has a population of 176,162. (Republic of Kenya, 2012) The inhabitants are mainly Suba-Luos, Luos, Kuria, Abagusii, Luhya, and Somalis.

The study sites were Nyatike and Mikei which are known as Kenya's major mining sites and Nyatike is the only sub-county in Migori where fishing takes place and hosts two major Islands, Mgingo and Ugingo, which are the leading producers of fish in the lake.

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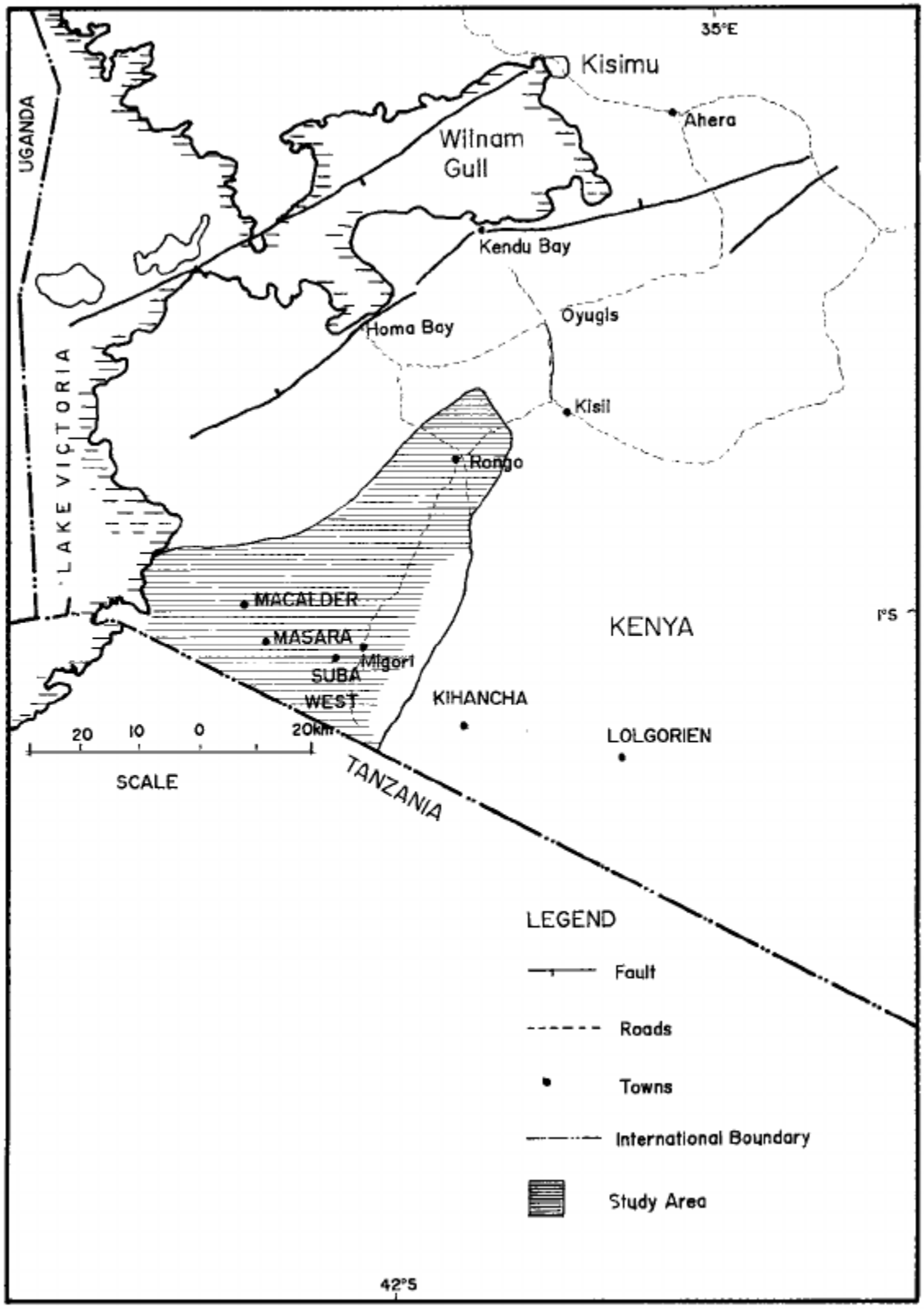
Figure 1: A map showing gold mining sites in Migori County



Source: (Adapted from Migori County Government)

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Study Design

The study used a cross-sectional descriptive study, employing both qualitative and quantitative methods. The data was generated from two main sources; primary and secondary data. Primary data was first-hand information observed from the environment and the feedback received from the participants including the experts' opinions. On the other hand, secondary data was collected by reviewing the hospital reports and existing documents like journals and other publications done by different individuals on the same subject.

Qualitative methodology was chosen as the major design because it provides much-needed in-depth information. The method is concerned with attempting to accurately describe, decode, and interpret the meanings of phenomena occurring in their normal social contexts.

Study Population

The target population of the study included persons who are engaged in mining and fishing activities.

Fishermen in this context referred to only persons who are engaged in fishing activities as a main source of livelihood, whereas miners meant persons who engage in the extraction of metals, preparation, and processing for commercial and personal reasons.

Inclusion and Exclusion Criteria

Inclusion Criteria

- Persons who engage in fishing activity in and along the lake
- All persons who extract from underground, prepare, and process metals
- Other sampled and selected persons who do not engage in the above activities (a, b)

Exclusion Criteria

- All buyers and distributors of fish and gold, and other metals
- All persons consuming the aforementioned food and materials
- All other persons who are neither selected nor sampled.

Sample Size Determination

A **sample** is a selection of respondents chosen in such a way that they represent the total population as well as possible. The sample size was 383, calculated at a 5% margin of error with a 95% confidence level (*Table 1*). This, however, was rounded off to 400 households to pave the way for an equal number which was shared by both fishermen and miners in the ratio of 1:1 and compensated for the spoilt questionnaires.

Table 1: Showing Sample Size Calculation, Developed by Nithya Gotay

Population size	Confidence level = 95%			Confidence level = 99%		
	Margin of error			Margin of error		
	5%	2.50%	1%	5%	2.50%	1%
100	80	94	475	87	96	99
500	217	377	475	285	421	485
1,000	278	606	906	399	727	943
10,000	370	1,332	4,899	622	2,098	6,239
100,000	383	1,513	8,762	659	2,585	14,227
500,000	384	1,532	9,423	663	2,640	16,055
1,000,000	384	1,534	9,512	663	2,647	16,317

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Sampling Techniques

Sampling is the inclusion or exclusion criteria for certain components of a population. The sampling was two folds; sampling of fishermen and miners. The general sample size sampled was 400 households.

Miners Sampling

This category was allocated a sample size of 200 miners who were sampled. A computer-generated system was used to generate random numbers for the 54 mining sites in the sub-county. The sites were later arranged in ascending order to identify the first 25 cluster mining sites, which gave us 8 persons to be sampled. The questionnaire was then administered to all 8 persons in each of the 25 sites.

Fishermen Sampling

The category was also allocated 200 fishermen to be sampled. Random sampling was carried out to identify one Beach Management Unit (in this case, Mugabo with 800 fishermen) from which the questionnaire was admitted to participants. Systematic random sampling was later introduced to pick every 4th fisherman from a row of 800 people. The assumption was that every unit under observation carried the traits of the population from which it was drawn so much that decisive conclusions could be made from samples.

Data Collection

The following tools were used during the study;

Visualisation Tools

The visualisation tool includes seasonal calendars. A seasonal calendar, based on traditional knowledge of ecological indicators, seasonal variations and associated activities, can provide a baseline for understanding the practices of indigenous along with climatic variation. (Yang. 2019)

Participatory mapping (Once a map has been drawn, it can be used to show the location of disease outbreaks, the spread of disease through an area over time and risk factors for disease occurrence or spread.), timelines (A timeline is a useful tool for exploring the frequency of key disease events and patterns over time), Transect walk.

The term "transect" is used in a broad sense to mean a path (usually linear) through an area along which data are collected (Caddy-Retalic et al., 2017)

Semi-Structured Interview

The checklist highlighted important points and exercises to be covered, probing asking detailed questions and observations etc

Ranking and Scoring

This involved arranging subjects in order of choice and included; simple ranking, pairwise ranking, proportional pilling and matrix scoring.

Validation and Reliability Processes.

The data collection tools were pre-tested at the same sites of the study to ensure validity and reliability. A group of five fishermen and five miners were asked to fill out the questionnaire and areas that had problems were identified and improved.

Data Management and Analysis

The study applied qualitative and quantitative analysis. This involved grouping and categorising answers to various questions as answered by the respondents. A questionnaire, a master roll, was developed from where the data collected was entered for tabulation. The data was ranked thereafter according to its scores from the most to the least conditions affecting the respondents, as shown in *Table 2*. Computer application SPSS was used during the analysis in analysing and presenting quantitative data. Data presentation was done through charts, graphs, mapping, paragraphing, and the use of tables.

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Table 2: How a dummy table was used in analysing data

Medical condition	Mining		Fishing	
	f (n)	(%)	f (n)	(%)
Injuries due to accidents	A	A%	I	I%
STIs	B	B%	J	J%
Dermatitis	C	C%	K	K%
Malaria	D	D%	M	M%
Totals	A+B+C+D	A+B+C+D%	I+J+K+M	I+J+K+M%

Ethical consideration

The researcher was given an introductory letter from the Ethical Research Committee and the University to enable him to interact with the respective personnel for authorisation. The questionnaires were supplied to respondents to fill in, and the researcher applied the drop-and-pick method to collect questionnaires filled in to get the required information.

RESULTS

Demographic Characteristics of Respondents

Out of all the respondents, 171(85.50%) of those practising fishing were men, and 29(14.50%) were female. Among miners, 165(82.50%) were male while 35(17.50%) were female. 70(35%) of the respondents were reported to have an approximate family size of between 1 and 2, those having an approximate family size of between 3 to 4 were 31(15.5%), while 99(49.5%) had an approximate family size of 5 and above. Those practising mining with family sizes between 1 and 2 were 19(9.50%), those with an approximate family size of between 3 to 4 were 44(22.50%), and those with an approximate family size of 5+ were 137(68.5%). 141(70.5%) of fishermen were aged <=40 years, 59(29.5%) were aged above 40 years. Among miners, 131(65.5%) were aged <=40 years while 69(34.5%) were aged above 40 years. Most fishermen were household heads 169(84.5%), spouse were 21(10.5%) while other family members were 10(5%). Those practising mining had 148(74%) household heads, 42(21%) spouse and 10(5%) other family members. Among those practising fishing (8, 4%) had no education, 164(82%) had a primary level of education, 27(13.5%) had a secondary level of education and 1(0.5%) had a tertiary level of education. Those practising mining had 14(7%) respondents with no education, 102(51%) with primary education, 68(34%) with secondary education and 16(8%) with tertiary education. 2(1%) of fishermen were single, 147(73.5%) were married, 48(24%) were divorced while 3(1.5%) were widowed. Among the miners, 36(18%) were single, 153(76.5%) were married, 1(0.5%) were divorced while 10(5%) were widowed. 184 (92%) of fishermen were Christian, 10(5%) were Muslim while 6(3%) belonged to other religion. Of those practising mining, 198(99%) were Christian, 2(1%) were Muslim and 0 (0%) belonged to other religions (*Table 3*).

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Table 3: Socio-demographic characteristics

Variables		Mining n (%)	Fishing n (%)
Religion	Christian	198(99)	184(92)
	Muslim	2(1)	10(5)
	Other		6(3)
Family Size	1 to 2	19(9.5)	70(35)
	3 to 4	44(22)	31(15.5)
	5+	137(68.5)	99(49.5)
Age Category	<= 40	131(65.5)	141(70.5)
	> 40	69(34.5)	59(29.5)
Marital Status	Divorced	1(0.5)	48(24)
	Married	153(76.5)	147(73.5)
	Single	36(18)	2(1)
	Widowed	10(5)	3(1.5)
Education Level	None	14(7)	8(4)
	Primary	102(51)	164(82)
	Secondary	68(34)	27(13.5)
	Tertiary	16(8)	1(0.5)
Relationship with HH	Self	148(74)	169(84.5)
	Spouse	42(21)	21(10.5)
	Other	10(5)	10(5)

Medical Conditions Associated with Miners

Table 4 shows the prevalence of medical conditions among miners in Migori county, where the majority of the respondents had injuries on their bodies 193(96.5%). The general body symptoms like headache, fever, chills, and body weakness had a high proportion of 72.40%, where 140 respondents were affected. The proportions of respondents that had experience headache, fever, chills, and general body weakness are 67.50%, 36.00%, 14.50% and 16.5%, respectively.

The respiratory illness consisted of coughing, chest pain, pneumonia, and flu, where their proportions are 32.0%, 23.50%, 1.50% and 3.00%, respectively. The prevalence of respiratory illness was 33.20%. Respiratory illness was among the major medical conditions that were affecting miners in Migori County

Gastrointestinal tract infection (GITI) was found to be one of the serious medical conditions among the miners in Migori County. Out of 200 miners, 14(7.00%) had suffered from (GITI). GITI had clinical symptoms like stomach ache, abdominal pain and diarrhoea in which their proportions were 7%, 0.5% and 1.00%, respectively. *Table 4* below also shows the proportion of miners who had different skin infections, where 5(2.50%) out of 200 were affected.

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Table 4: Medical conditions associated with Miners in Migori County

Medical Conditions	Mining activity	
	n (%)	95% CI
General symptoms	159(79.50)	(0.73-0.85)
• Headache	135(67.50)	(0.61-0.74)
• Fever	72(36.00)	(0.30 - 043)
• Chills	29(14.50)	(0.10-0.20)
• Body weakness	33(16.5)	(0.12-0.22)
Respiratory illness	98(49.00)	(0.42-0.56)
• Coughing	64(32.0)	(0.26-0.39)
• Chest pain	47(23.50)	(0.18-0.30)
• Pneumonia	3(1.50)	(0.00-0.05)
• Flu	6(3.00)	(0.01-0.07)
Gastro Intestinal Tract Infection (GITI)	14(7.00)	(0.04-0.12)
• Stomach ache	14(7.00)	(0.04-0.12)
• Abdominal pain	1(0.50)	(0.00-0.04)
• Diarrhoea	2(1.00)	(0.00-0.04)
Skin infection	5(2.50)	(0.01-0.06)
Accidental/Injuries	193(96.5)	(0.93-0.98)

Medical Conditions Associated with Fishermen

The health conditions associated with fishing conditions are general body illnesses that include headache, fever, chills, and body weakness (*Table 5*). General body weaknesses had a prevalence of 88.50% among the respondents. Out of the 200 respondents, the proportion portion of those who had a headache, fever, chills, and body weakness were 78.50%, 68.00%, 16.00% and 10.50%, respectively.

Table 5 indicates that respiratory illness was one of the major medical conditions among the fishermen in Migori County, where the proportion was 25.00%. Out of the 200 respondents, 9(4.50%) were coughing, 46(23.00%), 2(1.00) had pneumonia and 3(1.50%) had flu. Our results also show that Gastrointestinal infection

Table 5: Medical conditions experienced by fishermen in Migori County

Medical Conditions	Fishing activity	
	n (%)	95% CI
General symptoms	177(88.50)	0.83 – 0.92
• Headache	157(78.50)	0.16-0.27
• Fever	136(68.00)	0.611 – 0.74
• Chills	32(16.00)	0.16 – 0.22
• Body weakness	21(10.5)	0.69 – 0.16
Respiratory illness	50(25.00)	0.19 -0.32
• Coughing	9(4.50)	0.02 – 0.08
• Chest pain	46(23.00)	0.17 – 0.29
• Pneumonia	2(1.00)	0.00-0.40
• Flu	3(1.50)	0.00 – 0.46

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Medical Conditions	Fishing activity	
	n (%)	95% CI
Gastrointestinal Tract Infection (GITI)	140(70.00)	0.63 – 0.76
• Stomach ache	121(60.50)	0.54 – 0.67
• Abdominal pain	33(16.50)	0.12 – 0.22
• Diarrhoea	18(9.00)	0.57 – 0.14
Skin infection	14(7.00)	0.42 – 0.12
Accidental/Injuries	200(100.00)	-

Differences in Medical Conditions Associated with Mining and Fishing

The prevalence of headaches was higher among fishermen, 88.5% than among miners 67.5%. Similarly, the prevalence of chest pain was lower among fishermen than miners (23% vs 23.5%) (see *Tables 4* & *5*). Abdominal pain prevalence was higher among fishermen than miners (16.5% vs 0.5%). The prevalence of cough was observed to be lower among fishermen than miners (4.5% vs 32%). Stomach ache prevalence was higher among fishermen than miners (60.5% vs 7%). Fever was observed to be more prevalent among fishermen (68%) than miners (36%). Chills prevalence was more prevalent among fishermen than miners (16% vs 14.5%) (see *Tables 4* & *5*). Body weakness was observed to be more prevalent among miners than Fishermen (16.5% vs 10.5%). Pneumonia on the other hand was observed to be prevalent among miners as compared to fishermen (1.5% vs 1%). Flue prevalence was higher among miners 3% than among fishermen 1.5%. Diarrhoea on the other hand was more prevalent among fishermen as compared to miners (9% vs 1%). Skin infection prevalence was higher among Fishermen than miners (7% vs 2.5%). The prevalence of injury was higher among Fishermen (100%) than miners (96.5%) (see *Tables 4* & *5*).

Association between Medical Conditions and Occupation

In *Table 6*, it is found that Fishermen were 1.98 times more likely to experience general medical conditions compared to Miners also, Fishermen had a 1.76 times greater chance of getting headaches as compared to those who did mining and on the same note, Fishermen were 3.78 times more likely to have fever as compared to Miners. Also, Miners were found to be 3.04 times more likely to experience the respiratory medical condition as compared to Fishermen. Coughing was found to be in Miners with an Odds ratio of 9.99 as compared to Fishermen. The study also found out that Fishermen were 31 times more likely to have GITI as compared to Miners, Fishermen were 20.35 times more likely to experience stomach ache compared to miners, Fishermen were 39.32 times more likely to experience abdominal pain as compared to miners, Fishermen were 9.79 times more likely to have diarrhoea as compared to Miners and lastly, the skin infection was found to be 2.94 times more common in Fishermen than in Miners. These results had a significant p-value ($p<0.05$).

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Table 6: Association between Medical Conditions and Occupation

Variables		Odds Ratio	95% CI		P-Value
			Lower	Upper	
General symptoms	Fishermen	1.98	1.14	3.45	0.015
	Miners	0.5	0.29	0.87	
• Head	Fishermen	1.76	1.12	2.75	0.014
	Miners	0.57	0.36	0.89	
• Fever	Fishermen	3.78	2.5	5.72	<0.0001
	Miners	0.26	0.17	0.4	
• Chills	Fishermen	1.12	0.65	1.94	0.677
	Miners	0.89	0.52	1.54	
• Body weakness	Fishermen	0.59	0.33	1.07	0.081
	Miners	1.68	0.94	3.03	
Respiratory illness	Fishermen	0.33	0.21	0.5	<0.0001
	Miners	3.04	1.99	4.66	
• Coughing	Fishermen	0.1	0.05	0.21	<0.0001
	Miners	9.99	4.81	20.76	
• Chest Pain	Fishermen	0.97	0.61	1.55	0.906
	Miners	1.03	0.65	1.64	
• Pneumonia	Fishermen	0.66	0.11	4.01	0.655
	Miners	1.51	0.25	9.12	
• Flu	Fishermen	0.49	0.12	2	0.321
	Miners	2.03	0.5	8.24	
GITI	Fishermen	31	16.65	57.72	<0.0001
	Miners	0.03	0.02	0.06	
• Stomach ache	Fishermen	20.35	11.03	37.55	<0.0001
	Miners	0.05	0.03	0.09	
• Abdominal Pain	Fishermen	39.32	5.32	290.58	<0.0001
	Miners	0.03	0	0.19	
• Diarrhoea	Fishermen	9.79	2.24	42.78	0.002
	Miners	0.1	0.02	0.45	
Skin Infection	Fishermen	2.94	1.04	8.31	0.043
	Miners	0.34	0.12	0.96	

Factors Associated with Medical Conditions of Miners and Fishermen

Miners with primary level had 0.19 less chance of being infected by Gastro Intestinal Tract Infection (GITI), (OR=0.19;95%CI= (0.05-0.76) P-Value=0.019) and on the same comparison, the secondary level was 0.19 less likely to get infected by GITI (OR=0.19;95% CI= (0.04-0.85). Spouse of the household head had 4.18 times greater chance to develop fever compared to other related to the household head OR=4.18; 95% CI= (1.04-16.85) P-value=0.04). The household head was 6.3 times more likely to develop headaches compared to other relationships to the household head among the miners OR=6.3; 95% CI= (2.14-18.57) P-value=0.001) (see *Table 7*).

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Table 7: Factors associated with medical conditions of miners

		Respiratory		GITI		Fever		Headache	
		OR (95% CI)	P- value	OR (95% CI)	P-value	OR (95% CI)	P-value	OR (95% CI)	P-value
Religion	Christian	0.96(0.06-15.57)	0.977	-	-	-	-	2.09(0.13-34.01)	0.603
	Muslim	Ref		Ref		Ref		Ref	
Family Size	1 to 2	1.38(0.46-4.07)	0.565	0.9(0.11-7.59)	0.92	1.82(0.69-4.76)	0.225	0.96(0.34-2.69)	0.935
	3 to 4	1.36(0.51-3.58)	0.539	2.07(0.64-6.68)	0.225	0.48(0.22-1.05)	0.067	0.7(0.35-1.42)	0.327
	5+	Ref		Ref		Ref		Ref	
Age category	<= 40	Ref		Ref		Ref		Ref	
	> 40	0.93(0.52-1.67)	0.81	1.46(0.49-4.4)	0.497	1.48(0.81-2.71)	0.198	1.16(0.62-2.17)	0.651
Marital Status	Divorced	1(0-0)	-	-	-	1(0-0)	-	1(0-0)	-
	Married	4.38(0.9-21.31)	0.067	-	-	1.17(0.29-4.7)	0.828	0.81(0.2-3.26)	0.765
	Single	3.2(0.59-17.22)	0.176	-	-	2.33(0.52-10.48)	0.269	1.29(0.27-6.05)	0.75
	Widowed	Ref		Ref		Ref		Ref	
Education Level	None	Ref		Ref		Ref		Ref	
	Primary	0.96(0.31-2.94)	0.945	0.19(0.05-0.76)	0.019	0.46(0.15-1.41)	0.174	1.71(0.52-5.58)	0.373
	Secondary	1.13(0.36-3.56)	0.841	0.19(0.04-0.85)	0.031	0.66(0.21-2.09)	0.478	0.7(0.21-2.32)	0.564
	Tertiary	0.45(0.1-2.01)	0.299	1(0-0)		0.6(0.14-2.58)	0.492	1.22(0.27-5.59)	0.796
Relationship with HH	Self	2.15(0.54-8.64)	0.28	-	-	0.72 (0.34-1.52)	0.384	6.3(2.14-18.57)	0.001
	Spouse	3.11(0.71-13.72)	0.134	-	-	4.18(1.04-16.85)	0.044	2.65(0.54-12.93)	0.228
	Other	Ref		Ref		Ref		Ref	

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Table 8: Factors associated with medical conditions of fishermen in Migori County

		Respiratory		GITI		Fever		Headache	
		OR (95% CI)	**P-value**	**OR (95% CI)**	**P-value**	**OR (95% CI)**	**P-value**	**OR (95% CI)**	**P-value**
Religion	Muslim	3.49(0.96-12.64)	0.057	4.69(0.83-26.37)	0.079	1.03(0.18-5.8)	0.97	1.92(0.34-10.88)	0.461
	Other	1.74(0.31-9.86)	0.529	18(1.24-260.92)	0.034	2(0.2-19.91)	0.554	1.17 (0.13-10.22)	0.889
No of family	Less than 3	0.83(0.41-1.7)	0.614	0.92(0.47-1.8)	0.809	1.11(0.57-2.16)	0.749	0.65 (0.3-1.38)	0.258
	3 to 4	0.67(0.25-1.83)	0.438	0.72(0.3-1.69)	0.446	0.87(0.37-2.03)	0.744	0.51(0.2-1.29)	0.154
Age category	> 40	0.64(0.3-1.37)	0.254	0.62(0.33-1.18)	0.147	0.28(0.15-0.52)	<0.001	0.73(0.35-1.49)	0.383
Marital status	Married	1.09(0.5-2.36)	0.825	1.37(0.69-2.74)	0.371	1(0.49-2.02)	0.996	1.48(0.68-3.22)	0.32
	Divorced	3.36(0.19-58.29)	0.405	1		0.45(0.03-7.77)	0.586	1	
	Widowed	1		1.1(0.09-13)	0.942	0.23(0.02-2.71)	0.241	0.17(0.01-2.01)	0.158
Educational level	None	1.47(0.23-9.53)	0.688	2.4(0.41-14.11)	0.333	0.12(0.02-0.72)	0.02	0.53(0.06-4.42)	0.555
	Primary	1.47(0.52-4.12)	0.468	2.12(0.92-4.87)	0.078	0.78(0.31-1.95)	0.589	0.41(0.04-3.93)	0.438
	Tertiary	1		1		1		1	
Relationship to head	Self	1.12(0.23-5.51)	0.888	1.68(0.45-6.22)	0.437	0.94(0.23-3.77)	0.928	0.92(0.19-4.54)	0.922
	Spouse	3(0.51-17.69)	0.225	1.08(0.23-5.06)	0.919	0.7(0.14-3.5)	0.66	0.8(0.13-5.07)	0.813

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Those from other religions are 18 times more likely to develop Gastrointestinal Tract infections as compared to Christians (OR=18;95%CI= [1.24:260.92] p-value=0.034. Compared to those with age bracket <=40, those with age bracket compared to those who attained secondary level (OR=0.12;95%CI= [0.02:0.72]; p-value=0.02 (see *Table 8*).

DISCUSSION

Medical Conditions Associated with Fishing

The study sought to examine the medical conditions associated with fishing activities. The study found that headache, chest pain and fever were significantly associated with fishing activities. This study indicates that the head of the household was more likely to develop a headache and less likely to develop chest pain than other relationships. The study also indicates that fishermen aged 40 years and below were more likely to suffer from fever than those with age bracket <=40; those with age bracket >40 were 0.28 times less likely to develop Fever (OR=0.28;95%CI= [0.15:0.52]; p-value <=0.001. This study however contradicts a study conducted on the occupational health of Turkish Aegean small-scale fishermen, which indicated a higher prevalence of medical conditions among fishermen aged above 40 years (Percin et al., 2011). This study also contradicts a study conducted in the UK which indicated that an increase in age was associated with an increase in ill health among fishermen in the catching sector of the fishing industry (Matheson et al., 2001). An increase in daily income was associated with a decrease in the odds of chest pain development. This is concurrent with a study conducted on compensation for occupational injuries and diseases among fishermen which indicated that fishers in the highest income categories were more likely to be insured and hence obtain medical care and compensation than those in the lowest income category hence reduce their risks of being infected with diseases (Kim et al. 2017)

>40 were 0.28 times less likely to develop Fever (OR=0.28;95%CI= [0.15:0.52]; p-value <=0.001. Those with no education were 0.12 times less likely to develop fever as

Medical Conditions Associated with Mining

This study showed a higher prevalence of headaches and injuries among miners. This finding is concurrent with a study carried out in Gypsum mines in India which indicated higher incidences of morbidity among miners than among control subjects (Nandi et al., 2009). Miners aged 40 years and below were more likely to be injured while mining than miners who were aged above 40 years. This is concurrent with a study conducted in Ghana on Gold mining which showed a higher distribution of injuries among miners aged below 40 years (Kyerematen-Amoah & Clarke, 2015). The findings from this study indicate that males were not significantly less likely to suffer from injuries during mining than their female counterparts. This is, however, contracted with a study on injuries in gold mining communities in Ghana which showed that the male sex was significantly more likely to suffer from injuries during mining than females (Long, Sun, & Neitzel, 2015).

Comparison of Differences in Medical Conditions Associated with Mining and Fishing

According to the findings obtained from this study, miners are less likely to suffer from injuries than fishermen. This is in agreement with a study carried out about the most dangerous jobs by Oxford university that indicated that fishermen were more likely to die while working than other jobs like mining (BBC, 2002). This is also concurrent with a study carried out by (Smith, 2019), which indicated that mining has the second highest fatal injury rate behind agriculture, forestry, hunting sector and fishing.

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CONCLUSIONS

Fishing Activities

Working as a fisherman along Lake Victoria in the Nyatike sub-county is a dangerous occupation with the risk of contracting infectious diseases, cardiovascular diseases and injuries. This is due to contamination of water sources, especially for infectious diseases and also improper settlements without proper sanitation. Furthermore, fishing activities are strongly associated with permanent disabilities where limbs and organs are completely lost. This is due to rampant attacks by foreign authorities and robbers; thus, they are three times more vulnerable to disabilities than their counterparts in the mining sector.

Mining Activities

Mining activities boost the country's economy; however, infection-causing diseases have taken over the industry rendering miners not very productive. Many times, they suffer from chest infections associated with coughs as a result of the dusty nature of their works stations with less or incomplete PPEs. Therefore, a person practising mining is two times more vulnerable to coughs and allied diseases than their colleagues in the fishing sector. In addition, they also suffer more injuries than their counterparts in the fishing sector. This is due to weak rocks falling on them, especially on areas expanded using explosives or heavy downpours of rain.

Recommendations:

Government, Community and Support Groups.

Provide and ensure the use of PPEs, enact proper regulation, provide social, facilitate continuously and establish and equip medical facilities to help during emergency cases. I recommend a cohort study design for future research.

Proposed Area for Further Research

This research study proposes a cohort study design to address any vital information that may have been left out within the period of the study as a result of the respondents' behaviour.

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