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# Occupational Health Hazards Associated with Nigerian Fisheries

*Olalekan Jacob Olaoye and Wahab Gbenga Ojebiyi*

## Abstract

Fisheries constitute an important component of Nigeria's agriculture sector contributing meaningfully to the socio-economic development of the nation in terms of employment generation, source of high quality animal protein, and foreign exchange earnings. Despite its significance, fisheries like other agricultural-related activities are not without inherent occupational hazards. The aim of the authors was to review literature on the occupational health hazards associated with the Nigerian fisheries. This was done by specifically reviewing literatures on the linkages between occupational health and sustainable development, overview of occupational hazards, fisheries in Nigeria, and occupational hazards in fisheries with empirical evidences from Nigeria. Based on our review, it was concluded that fisheries like other components of agriculture is a very risky venture which can lead to severe injuries and eventual death if workers' health is not protected and promoted within the industry. It was recommended that occupational health and safety should be promoted within the different value chains of fisheries.

**Keywords:** aquaculture, fisheries, fish processing, occupational health, occupational hazard, sustainable development

## 1. Introduction

Nigeria is an oil producing nation. Yet, the nation's economy strongly relies on the agriculture sector. In fact, the nation's economy was described as agrarian before and the first decade after independence. During these periods, the contribution of agriculture was noticed through self-sufficiency from the production of food crops by local farmers making use of crude implements; source of job opportunities especially to unskilled labour in rural areas; exportation of major cash crops such as groundnut, cocoa, kola, etc.; and most importantly meaningful contribution to the country's gross domestic product (GDP). Fisheries, which may be cultured (aquaculture) or captured from either fresh (rivers and lakes) or marine (seas and oceans) water, is one of the subsectors that have been contributing meaningfully to the social and economic development of individuals and the nation at large through agriculture as it serves as the primary means of livelihood to rural dwellers especially those in the riverine areas; and the major source of relatively cheap but quality animal protein in the diets of the people.

Working in the agricultural sector by rural farmers is associated with numerous occupational hazards which were categorized into seven by a combination of authors [1–4] as: (i) Climate: dehydration, heat cramps, heat exhaustion, heat stroke, and skin cancer; (ii) Snakes and insects: injurious bites and stings;

(iii) Tools and farm equipment: Injuries, cuts, and hearing impairment; (iv) Physical labour: musculoskeletal disorders, e.g. pain and fatigue; (v) Pesticides: poisonings, neurotoxicity, reproductive effects, and cancer; (vi) Dusts, fumes, gases, particulates: Irritation, respiratory tract, allergic reactions, respiratory diseases such as asthma, chronic obstructive pulmonary disease, and hypersensitivity pneumonitis, and (vii) Biological agents and vectors of disease: Skin diseases, fungal infections, allergic reactions, malaria, schistosomiasis, sleeping sickness, leishmaniasis, ascariasis, and hookworm.

Work has both social and economic importance because work is done in any society primarily to produce and distribute goods and services that are needed by people in the society [5]. WHO [5] further explains that work plays a psychological role in the formation of self-esteem, a sense of order, and in the shaping of a person's self-identity. Work and sound health are highly and positively correlated in the sense that the more healthy a worker is, the more likely he is to work both effectively and efficiently while an ill-health person is positively correlated in the sense that the more healthy a worker is, the more likely he is to work both effectively and efficiently while an ill-health person may likely work effectively and efficiently. Egbetokun [6] reported that a 1% improvement in farmers' health condition will lead to a 21 percent increase in work efficiency. On the other hand, poor farmers' health will reduce income, efficiency and productivity [7]. Hence, for one to work optimally, it is important to keep and maintain sound health especially at the workplace. Like every other work or means of survival and livelihood, the fisheries sector is not without some work-related hazards and risks. In fact, like other agriculture-related works, fisheries have been recognized as one of the riskiest work in the world [8, 9]. Injuries and illnesses are among the health-related factors limiting the productivity from fisheries. According to the Global Burden Disease [10], approximately 2.78 million deaths that occur annually are associated with work-related hazards. The World Health Organization also noted that between 20 and 50 per cents of workers; especially in developing countries like Nigeria are suffering from occupational risks [5].

In Nigeria, fisheries supply and its products come from two broad sources viz. – importation of fish and fisheries products, and local fish production. With the nation's increasing human population, most of whom are youths within the economically active age groups, the nation's expenditure on fish importation is too high enough to put tangible developmental projects to the nation. This is despite the natural resources which favour fisheries production from both aquaculture and wild capture sources. For the purpose of this chapter, the authors are interested in the domestic fish sources which come from aquaculture, artisanal fishing and industrial fishing. All these sources are with their unique work-related hazards which affect the health and general wellbeing of those who take part in them. As hazards can occur during the different stages of the fisheries value chain (production, processing, handling, storage and transportation), occupational hazards is treated in this chapter in totality as it affects all the value chain actors in the Nigerian fisheries sector.

The remaining of this chapter is structured under the preceding headings: overview of occupational hazards, classification of occupational hazards, fisheries in Nigeria, occupational hazards in fisheries, and empirical evidence of occupational hazards in fisheries in Nigeria.

## **2. Methods**

Information used in this chapter was obtained through the desk review of published journals, conference proceedings and books as well as personal experiences

of the authors with fish farmers, fishers and fish processors over time. The published materials were mainly sourced from the internet. While review studies from year 2000 were considered, only recent materials from Nigeria between 2011 and 2020 utilized in providing empirical evidences of occupational hazards in fisheries.

### **3. Linking occupational health to sustainable development**

In this section, the authors first reviewed different literatures on the definition of health, occupation and occupational health. Occupational hazard was also defined as a concept and different categories were later identified and presented.

#### **3.1 Definition of occupational health**

Health is defined as a condition of complete physical, mental and social well-being which does not mean the mere absence of disease and infirmity. Health is associated to the physical conditions of both mind and body, of all people at the workplace including the workers, contractors and visitors, and their protection from harm in the form of injury or disease [11]. Occupational health is a branch of medicine concerned with the prevention and treatment/control of job-related injuries and illnesses. It is closely linked to public health and health systems development. According to WHO [12], occupational health is a multidisciplinary field of healthcare which deals with all aspects of health and safety, in order to enable a worker to discharge their occupational responsibilities, in a way that causes least harm to their health. This is achieved through the prevention of hazards.

According to the definition jointly provided by International Labour Organization and World Health Organization [13], the aims of occupational health include promoting and maintaining the highest level of physical, mental and social well-being of workers in all occupations; preventing amongst workers of departures from health caused by their working conditions; protecting the workers in their employment from risks resulting from factors adverse to health; the placing and maintenance of the worker in an occupational environment adapted to his physiological and psychological capabilities; and, above all, the adaptation of work to man and of each man to his job.

#### **3.2 Health, work and sustainable development**

Health is central to the sustainable development of nations globally, hence ensuring healthy living and promoting wellbeing of people has been included as a whole goal in the sustainable development agenda [14]. According to Alamu [15], sustainable development is the organizing principle for meeting human development goals while at the same time sustaining the ability of natural systems to provide the natural resources and ecosystems services upon which the economy and society depends. WHO [16] defined sustainable development as a strategy for meeting the present generation's needs without compromising the future generation's ability of meeting their needs. This implies that globally, human health is recognized as a prerequisite for the attainment of sustainable and productive economy.

In terms of occupational health, the attainment of sustainable development implies the satisfaction of material needs through work and other production processes without causing danger to one's health, environment, as well as the community resource base in both short and long terms. Occupational health is a basic element and constitutes a social and health dimension of the principle of sustainable development.



It could be summarized that unsafe and unhealthy workplace environment, especially in terms of poor ventilation, inappropriate lighting, excessive noise among others, affect workers performance [17].

#### **4. Overview of occupational hazards**

Before proceeding, it is important to define and/or explain some key terms such as occupation, and hazard. According to Dictionary.com, occupation refers to any activity or vocation in which a person is engaged. It also means a person's usual work or business which serves as a means of earning a living. Hazards refer to anything that has the potential of causing harm to people, environment and/or properties. A hazard is an unpleasant or undesirable event, situation or condition that takes place and has adverse effects on people. That is, any event that poses some level of potential threat or risk to life, health, property and the environment. While hazard is something that can cause harm, a risk is the chance that a hazard could harm somebody. To Ahmed, Dosoki and Nasr [18], hazard refers to the presence of materials or conditions that have the tendency to cause loss or harm or a combination of the severity of consequences and likelihood of occurrence of undesired outcomes. Based on this background, Breeding [19] defined occupational hazards as risks, illnesses or accidents that take place in the workplace. That is, unpleasant situations experienced by workers while doing their job. While making their contribution on the subject, Ford and Tetrick [20] described occupational hazard as an aspect of one's occupation-specific context that increases one's risk of injury. Any working condition that can lead to illness or death is an occupational hazard [21].

Hazards can occur at any time and at any place depending on the complexities of the work situation, environment and equipment used. Occupational hazards could result from the nature of materials/equipment being used, environment under which work is being done as well as the people involved in specific activities. Sadullah and Kantan [22] also classified the causes of occupational hazards into unsafe work conditions and unsafe behaviors. The fisheries industry like other agricultural activities especially in the developing countries is one that involves people of different age categories such as children and adults. Hazards are likely to occur more with children as they are not physically and psychologically matured enough to take part in fisheries operations. The use of inappropriate equipment by workers in the fisheries industry could even make adults vulnerable to occupational hazards. In fisheries, hazards could occur during harvesting/fish capture, processing, and handling and even during transportation of fish.

In relation to occupational health and safety, primary categories of hazards have been identified by authors as physical, chemical, biological, ergonomic and behavioural hazards [23–24].

##### **4.1 Physical hazards**

**Physical hazards** are materials, substances or activities that threaten a worker's physical safety. According to Harwood [25], physical hazards involve environmental hazards that can cause harm with or without contact. They are injuries that occur on one's body parts such as hands, eyes, legs, etc. They are often the most common in any workplace. They include noise, heat and cold stress, bruises from fall, illumination, vibration, and electromagnetic radiation.

Some of the physical hazards are pictorially shown in **Figures 1–5** below.



**Figure 1.**  
*Bruise from fall. Source: [www.ibtimes.com](http://www.ibtimes.com) cited in Olaoye et al. [26].*



**Figure 2.**  
*Whitlow (finger infection). Source: [www.emedicinehealth.com/fingerinfection/articleem.htm](http://www.emedicinehealth.com/fingerinfection/articleem.htm) cited in Olaoye et al. [26].*



**Figure 3.**  
*Burn injuries. Source: [www.elginburninjurylawyer.co](http://www.elginburninjurylawyer.co) cited in Olaoye et al. [26].*

## 4.2 Chemical hazards

These are subtype of occupational hazards resulting from exposure to harmful and dangerous chemical compounds. Chemicals in the form of solids, liquids, gases, fumes, dusts, mists and vapour could have toxic effects on workers if inhaled through breathing, direct contact with the skin (absorption), or ingested by eating or drinking [5]. Hazardous chemicals include neurotoxins, immune agents, dermatologic toxins, systemic toxins, pneumoconiotic agents, and sensitizers.

## 4.3 Biological hazards

These are hazards in the workplace caused by biological agents such as micro-organisms and toxins produced by living organisms [26]. They exist in exposure to bacteria, virus, fungi and other living organisms. Fisheries and other occupations



**Figure 4.**  
*Red eye injury. Source: [www.letsgohealthy.blogspot.com](http://www.letsgohealthy.blogspot.com) cited in Olaoye et al. [26].*



**Figure 5.**  
*Hand and leg burn. Source: [www.besthealthybodycare.com](http://www.besthealthybodycare.com) cited in Olaoye et al. [26].*

that expose workers to plants and animals or their products are prone to biological hazards. Examples of biological hazards include bites and stings from snakes, insects, scorpions and spiders.

#### 4.4 Psychosocial/behaviour hazards

As the name implies, psychosocial hazards are a subtype of occupational hazards which affects a person's social life or psychological health. These include occupational burnout, and occupational stress. It could be manifested from boredom, production pressure, repetitive tasks, and low pay.

#### 4.5 Ergonomic hazard

The science of fitting jobs to workers instead of trying to get the worker to fit the job is known as ergonomics. The occupational hazards resulting from the workstation design and tools are ergonomic hazards. These include fatigue and injury, extreme temperature, discomfort, and pain. It could ultimately lead to musculoskeletal disorder.

## 5. Fisheries in Nigeria

Fisheries refers to the science of producing fish and other aquatic resources for the purpose of providing food for humans and livestock, recreational fishing, and obtaining ornamental fish or fish products such as fish oil [27]. This definition refers to the production of fish and other living organisms in water bodies for the benefit of mankind through consumption, commercial or recreational purposes. In Nigeria, fisheries as a concept is divided into capture and culture fisheries with the capture fisheries further divided into artisanal and industrial fisheries. Artisanal fishery is to the harvesting or capturing of fishes from natural water bodies and ponds by small scale fisher folks using primarily the traditional fishing gears [28]. Some authors [29, 30] regarded it as a nonindustrial fishery covering the activities of small-scale canoes operating in the coastal areas, creeks, lagoons, inshore water, and the inland rivers. The artisanal fishery, though involves the use of crude implements, with little or no access to credit, and subsistence level of operation, contributes the bulkiest proportion up to 90 percent of domestic fish production in Nigeria [31–33].

The industrial fisheries are a higher and mechanized level of fish production, which relies heavily on the use of trawling vessels for fishing and shrimping in the territorial and offshore waters [34]. By this definition, it could be implied that industrial fishery is highly capital intensive and involves the use of advanced technologies. As such, it could only be practiced by insignificantly few people. No wonder, Moses [35] submitted that artisanal fishery employs 18 times more fishermen than the industrial fishery. Aquaculture has been defined as the rearing of aquatic organisms (e.g. fish, insects, bivalves, mollusks, crustaceans, and aquatic plants) under controlled or semi-controlled environments (such as ponds, pens, raceways and cages) for the social and economic benefits of mankind and livestock [36, 37].

In Nigeria, although domestic fish production is on the increase, the ever-increasing population of the country makes the country a net importer of fish and fish products despite the contribution of both the aquaculture and artisanal fisheries components. Despite the fact that artisanal fishery contributes more to local fish production, one could summarize from different Nigerian fisheries statistics that while production from the capture fisheries is relatively on the decline, production from aquaculture remains on the increase. This was supported by FAO [38] that aquaculture production has been on the increase since 1995. This is why Olaoye et al. [39] regarded aquaculture as the fastest growing livestock production sector in Nigeria. Supporting this claim, Giwa et al. [40] while investigating the trends of fish production in Nigeria submitted that artisanal fishery contributed 77.95 percent of the domestic fish production and that aquaculture maintains the highest growth rate of 12.53 percent.

The fisheries sub-sector has been recognized as a major economic component, with an estimate of employing more than 8.6 million people directly and additional 19.6 million indirectly [41].

## 6. Occupational hazards in fisheries: Empirical evidences from Nigeria

Although occupational health, hazards and safety are the concern of many government agencies and international organizations such as the World Health Organization – WHO, Food and Agriculture Organization - FAO and the International Labour Organization- ILO especially with respect to working in the agriculture sector, little empirical evidences abound on the prevalence of



occupational hazards in Nigeria. Where available, data are mostly not disaggregated by subsectors. More importantly, there is dearth of information on occupational hazards associated with the fisheries industry. Apart from the general hazards associated with the agriculture sector, workers in the fishery subsector are exposed to other numerous hazards related to water impoundments, transportation, shift and night-time work and offshore operations [42].

### 6.1 Occupational hazards in aquaculture

According to Erundu and Anyanwu [24], hazards in aquaculture can be classified into physical, chemical and biological. Physical risk factors in the aquaculture industry include injuries such as stings from fish spines, cuts, sprains, fractures, asthma and rhinitis, snake bites, crab crawling and bites from fish as well as mechanical injuries associated with laboratories. Physical hazards in the aquaculture industry could mainly be in form of noise, injuries and asthma [24].

The use of locally fabricated equipment/machines in most of the feedmills in Nigeria exposes the workers to excessive noise which results in loss of hearing and mental fatigue. Some fish species such as *Clarias gariepinus*, *Protopterus aethiopicus*, *Barbus intermedius*, *Oreochromis niloticus*, *Baringoensis* and *Lado cylindricus* have fins which can prick fish farmers and their workers if not handled with care [26]. According to Dorooshi [43], Catfish species have strong pectoral fins with spines which are capable of pricking fish farmers as well as sharp teeth used in biting workers during sorting and harvesting in the aquaculture industry. The biting and pricking caused by fish spines and sharp teeth could lead to injuries which are mainly non-fatal but according to Olaoye [26], can lead to amputation of fingers if exposed to viral and bacterial infections. Cuts resulting from the use of sharp objects such as knives and oyster shell are additional causes of injuries [24]. Erundu and Anyanwu [24] also noted that needle stick injury could result among hatchery workers. Aquaculture workers in the feedmill are also prone to asthma caused by dusts from the mixture of different food particles including flour. According to Karkkainen [44], dust released from flour and animal feedmill is the second most common cause of asthma.

Aquaculture workers are also exposed to chemical hazards as a result of inorganic fertilizers, lime, pesticides and formaldehyde in fish ponds; acute and chronic pollution of water ways; flocculants, and disinfectants. The biological hazards in aquaculture include parasitic infestation and pathogenic infections.

### 6.2 Occupational hazards in artisanal fishing

Like the aquaculture component, the artisanal fishery is also inherently associated with numerous hazards. In fact, fishing seems to be riskier than aquaculture. According to Oyediran *et al.* [45], fishers are vulnerable due to depleting stock arising from over fishing and excessive pressures on available resources, environmental degradation due to flooding, deforestation and menace of water hyacinth. Industrial activities such as oil spillage, canalization, construction of hydroelectric dams also destabilize ecosystems and fishing activities thereby posing serious occupational hazards to fishers.

Just like with the workers in the aquaculture industry, fisherfolks in the artisanal fishery sector are exposed to injuries caused by bites and pricks from sharp fish spines and fins [9, 45]. Additionally, most if not all the fishermen in Nigeria still makes use of hook and line or longline. The fisherfolks can also sustain injuries when trying to remove the hooks from harvested fish and when attaching baits onto the hooks [46]. The tasks of the workers in artisanal fishery include repetitive

lifting and pulling of heavy fish loads into fishing vessels, and offloading [8, 47]. These result into musculoskeletal injuries [10].

Fisherfolks mostly work under harsh conditions of either extreme hot or cold weather. Working under hot weather conditions exposes the fisherfolks to sun radiation from the sun thereby causing skin burn. According to Kennedy *et al.* [48] and Coups *et al.* [49], exposure to sun rays causes skin cancer. Working under extremely cold condition on rainy days could result into respiratory problems such as sneezing and coughing.

Since artisanal fishery is attributed with the use of obnoxious fishing methods such as the use of chemicals and explosives, water bodies are both polluted and destroyed thereby affecting artisanal fishing. According to their findings, Oyediran *et al.* [50] identified flood disasters, physical injuries, stings and bites, cuts and wounds, and leach attack as the most common occupational health hazards in artisanal fish production. According to them, considerable income and man-days are lost as a result of occupational health hazards. Udolisa *et al.* [9] also researched into the occupational and health hazards in Nigerian coastal fisheries while using the mixed method of data collection. The authors summarized that coastal artisanal fisheries in Nigeria is associated with body injuries such as cuts, fish bites, fire injuries, and foundering.

### 6.3 Occupational hazards in fish processing

Fish processing is a phase/stage in the fish value chain associated with fish and fish products between the time of harvest and the time of delivering the final product to the consumer [51]. Fish processing includes smoking, chilling and freezing, canning, and the production of other value-added products [23–24, 52–53]. Apart from minimizing postharvest losses of fish, fish processing adds to the nutritive value of the fish [54].

Various hazards have been reported in fish processing industry which ranges from redness/swelling of the eye (which is the commonest) to mechanical and electrical accidents, bacterial and parasitic infections, noise induced hearing loss, allergic respiratory diseases and stress related health problems. Processors and other workers in the fish processing industry are susceptible to many hazards while doing their work [26]. Following the review of previous literatures [23], occupational hazards in fish processing are discussed under physical, chemical, biological, ergonomic, and psychosocial hazards.

Physical hazards in fish processing include minor cuts and scrapes resulting from the use of knives and other sharp tools, falls caused by slippery floors, burns, hypertension, eye disease, stings from fish spines arising when one is handling fish without the use of appropriate safety devices, whitlow resulting from bacterial or fungal infection of the tip of one's finger and/or toe, exposure to heat and cold leading to headache, sneezing and/or coughing, eye injury such as redness of the eye, burns, head injury, and bruising [54]. Redness of the eye results when the eye have direct contact with the smoke especially during smoking or frying fish with local/traditional kilns that make use of fuel woods thereby leading to the eye surface being red [23]. It is associated with itching, mucus discharge, pain or even blurred vision.

According to Norwegian Labor Inspection Authority [55], sprain and fracture could be caused by slippery floors and stairs when carrying loads and materials while processing fish. Although Udolisa *et al.* [9] noted that injuries from minor cuts and scrapes due to their non-fatal nature does not lead to prolonged loss of work, it is important to treat cuts and wounds so as not to expose them to infections. Stings from fish can sometimes be poisonous and cause severe pains especially when exposed to tetanus infection [23].

Handling of fish in preparation for processing involves the dipping of hands in cold water even on rainy days for a long time resulting in respiratory irritation such as sneezing and coughing, blanching and sores in the hands which could lead to whitlow on the tips of the fingers and at times, toes [23]. According to authors [26, 56–57], whitlow is a serious fungal or bacterial infection which is very painful and can result to amputation of the finger, toe or nail. Headache, fatigue and general weakness of the body could also be the consequences under the sun, in extreme heat or with cold water for too long.

In Nigeria, fish processing is characterized with low level of mechanization which involves the use of fuel woods for smoking and/or frying of fish [51, 58]. The implication includes that the fish processors and their workers spend reasonably long duration (mostly from morning till night) in the open under the radiation from sunlight. Since smoking is the commonest method of processing fish in Nigeria [39, 51], the fish processors are highly exposed to smoke fire/naked flame of extremely high temperature which has adverse effect on the health of the fish processors [59]. The report of Adei *et al.* [59] submitted that work-related injuries and diseases resulted in the loss of 7% of the total annual income of the fish processors in 2016. Noise and/or vibration is another important physical hazards associated with fish processing as fish processors are frequently exposed to noise and vibrations at landing sites. This has the tendency to cause either temporary or permanent hearing impairment depending on the level of exposure [9].

Biological hazards that fish processors are exposed to especially while harvesting fish from ponds without wearing protective clothing include parasites (leeches, nematodes, cestodes) and pathogenic infections such as *Vibrio vulnificus* [59]. According to Kolndadacha *et al.* [60], infectious diseases caused by virus, fungi, bacteria and even protozoa can be transmitted by farmers as a result of handling fish or eating improperly cooked fish.

The chemical hazards associated with fish processing include principally the inhalation of smoke which can cause asthma and other respiratory ailments. Fish processors could also be exposed to smoke particles that contain potential or confirmed carcinogens such as polycyclic aromatic hydrocarbons – PAHs [61]. The use of disinfectants such as formalin and Gamalin 20 also poses health hazards to consumers of fish because of residual effect [23]. Ergonomic hazards associated with fish processing include internal injuries of the liver, spleen, stomach, colon, pancreas and blood vessels which can be caused by motor vehicle accidents, blunt trauma or penetrating injuries [62]. Broken bone/dislocation, back strain and sprain are additional ergonomic hazards faced by fish processors.

In fish processing, psychosocial hazards result from prolonged work and mental demand. According to the review made by Mshelia *et al.* [23], extra hours of work might put fish processors at a greater risk of depression. Handling an insane amount of workload lately is definitely an act of inching towards depression which gives room for the occurrence of other hazards. Studies have suggested the symptoms of prolonged work to include appetite loss, disturbed sleep, constantly sulking, muscle fatigue, loss of energy, indecisiveness, and poor concentration at work [63]. The mental demand is the potent force in achievement as the attitude of the mind affects the expression of the face, determines action, changes our physical condition and regulates our lives [64].

An empirical evidence of hazards associated with fish processing was provided through a study by Olaoye *et al.* [54], whose findings revealed that the working condition of artisanal fish processors was generally poor as majority of the fish processors reported that they worked frequently with poorly designed equipment, poorly maintained facilities, poorly constructed equipment, under constrained neck posture, and with poor hand tools. The most common category of the hazards

Occupational hazards	Artisanal fishing	Aquaculture	Fish processing
Noise/vibration	Common	Common	Common
Stings/bites from fish	Common	Common	Common
Cuts from knives and other sharp objects	Not common	Common	Common
Wounds from fishing gears (longlines, hook and line)	Common	Not common	Not common
Asthma	Not common	Common	Common
Musculoskeletal injuries	Common	Common	Common
Skin cancer	Common	Not common	Common
Redness of eye	Not common	Not common	Common
Respiratory problems (sneezing, coughing)	Common	Common	Common
Skin burns	Not common	Not common	Common
Chemical hazards	Common	Common	Common
Biological hazards	Common	Common	Not common
Psychosocial hazards	Common	Common	Common

**Table 1.**  
*Summary of occupational hazards in artisanal fishing, aquaculture and fish processing.*

associated with fish smoking, according to Olaoye *et al.* [54] is the chemical hazards (exposure to smoke, fumes and gases). From one of the studies of Dhakal and Nayak [65], musculoskeletal symptoms were reportedly experienced by majority of the fish processors, and that musculoskeletal problems were promoted by faulty body posture, repetitive activity, and poor condition of the work environment.

To Ibrahim *et al.* [66], the major occupational hazards among fish processors in Nassarawa State, Nigeria were redness and/or swelling of the eye. In supporting this report, Olopade [67] reported skin rashes and redness of the eye as the major occupational hazards among small scale women fish processors around Asejire Dam of Oyo State, Nigeria.

Occupational hazards common in artisanal fisheries, aquaculture and fish processing were compared in terms of prevalence as summarized in **Table 1**.

## 7. Conclusions

Review of literature on occupational hazards associated with fisheries has shown that fisheries like other components of agriculture is a very risky venture which can lead to severe injuries and eventual death if workers' health is not protected and promoted within the industry. It further indicated that although the different value chains are affected by different hazards at varying levels depending on level of exposure and scale of operation as well as the adherence to safety in the workplace, the fisheries industry is vulnerable to physical, chemical, biological, ergonomic and psychosocial hazards. Occupational hazards generally have negative effects on the level of production of fish, revenue from fisheries, and loss of man-days. The authors recommend that:

1. Awareness should be raised among workers and employees in the fisheries industry on occupational safety and health. The awareness should focus on the associated risks and hazards;



2. Stakeholders (fish farmers, fishermen, fish processors, etc) should be encouraged to make available and use personal protective gears while working. Employers in the industry should be compelled to make protective gears available to their employees, and enforce the use of such gears in order to reduce accidents;
3. First aid kits should be a prerequisite in all landing sites, aquaculture facilities, and processing plants. The workers should also be educated on the proper use of the first aid kits in case of accidents in the course of working.
4. Obnoxious fishing methods should be discouraged by strictly sanctioning defaulters;
5. Researchers should delve into studies on occupational health hazards in aquaculture, artisanal fishing, industrial fishing, fish processing, and even fish marketing. These researches, if well conducted, reported and disseminated, will provide an update on the different categories of health hazards in fisheries especially with Nigeria in focus.

### Conflicts of interest

The authors hereby declare that there is no conflict of interest in this chapter preparation.

### Author details

Olalekan Jacob Olaoye<sup>1</sup> and Wahab Gbenga Ojebiyi<sup>2\*</sup>

1 Agricultural Media Resources and Extension Center, Federal University of Agriculture, Abeokuta, Nigeria

2 Department of Agricultural Extension and Rural Development, Federal University of Agriculture, Abeokuta, Nigeria

\*Address all correspondence to: oluwagbemiga2013@gmail.com

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