

Occupational Hazards and Injuries Associated with Fish Processing in Nigeria

OLAOYE. O. J.^{1,*}, ODEBIYI. O. C.², ABIMBOLA. O. T.²

¹Agricultural Media Resources and Extension Centre University of Agriculture, P.M.B 2240, Abeokuta, Ogun State, Nigeria

²Department of Aquaculture and Fisheries Management University of Agriculture, P.M.B 2240, Abeokuta, Ogun State, Nigeria

*Corresponding author: olaoyejacob@yahoo.co.nz

Received September 18, 2014; Revised February 10, 2015; Accepted March 02, 2015

Abstract Fish processing, the activities associated with fish and fish products between the time fish are caught or harvested, and the time the final product is delivered to the customer; is fraught with potential hazards and risks which are categorized into occupational, environmental, food safety and public health. This paper reviewed major hazards, injuries and risks associated with the fish processing industry in Nigeria. It further proffered strategies for their management and control. Fish industry stakeholders should therefore ensure that guidelines and policies which promote an environmentally friendly and sustainable industry are instituted and enforced.

Keywords: fish, injuries, occupational, processing

Cite This Article: OLAOYE. O. J., ODEBIYI. O. C., and ABIMBOLA. O. T., "Occupational Hazards and Injuries Associated with Fish Processing in Nigeria." *Journal of Aquatic Science*, vol. 3, no. 1 (2015): 1-5. doi: 10.12691/jas-3-1-1.

1. Introduction

Fish is on high demand by most people, not only because of its wide availability, but because it is known as a cheap and safest source of animal protein (FAO, 2012). Its amino acid profile, low cholesterol content, high vitamins and minerals content as well as fatty acid profile makes it stand out among sources of animal protein (FAO, 2012). According to the FAO, a fishery is typically defined in terms of the "people involved, species or the type of fish, area of water, method of fishing, class of boats, and purpose of the activities or a combination of the foregoing features. Fisheries may involve captured of wild fish (captured fishery) or raising fish through fish farming or aquaculture (culture fisheries). A variety of methods are used in this harvest, ranging from the hook and line by the small time fishers to the use of mechanized seines using big vessels like purse seiners, long liners, driftnets and other nets, captured fisheries can be broadly classified as industrial/commercial scale, small scale or artisanal, and recreational. Close to 90% of the world's fishery catches come from oceans and seas, as opposed to inland waters (Omotayo *et al.*, 2006). Fishing is done on a continuous basis in riverine communities in Nigeria with a bumper harvest mostly during dry seasons. Fish harvested from its natural environment is highly susceptible to deterioration without any preservation or processing measures (Okonta and Ekelemu, 2005). Immediately fish dies a number of physiological and microbial deterioration sets in and thereby degrades quality of fish which makes post-harvest losses to be high during cloudy and rainy periods.

Fish processing involves all activities associated with fish and fish products between the time fish are caught or harvested, and the time the final product is delivered to the consumer. A central concern of fish processing is to prevent fish from deteriorating (even when excess fish are caught in times of abundance "Peak Period"), and this remains an underlying concern during other processing operations. Fish processing highly involves very strict controls and measurements in order to ensure that all processing stages have been carried out hygienically.

2. Fish Processing Methods in Nigeria

The processing methods are smoking, frying, boiling and fermentation. These methods do not include technologies which are more appropriate for capital-intensive medium and large-scale processing plants. Canning is a processing method but expensive and highly technical.

Smoking which is the oldest, convectional and most common methods (curing process) used where the heat from the fire dries the fish while chemicals from the smoke impregnate the flesh. It could be a Hot-smoking which reduces microbiological growth and increase the shelf life or preserve the fish, operate at high temperature (between 65°C and 120°C) and the antiseptic components of smoke hinder deterioration or cold smoking process in which the temperature of the smoke is between 29°C and 35°C allow the fish not to be well cooked but add flavor to the fish or Smoke drying (the product first not smoke). Cooked and dried with temperature between 45°C and 85°C. This is commonly done using a traditional/local fish smoking drum (drum full or half drum "Figure 1"), fish

smoking mud “Figure 2”, Tripod fire place, oven (mid, box oven-wooden, steel, mud, blocks) imbided with wasteful of fuel, usually firewood that has become both scarce and expensive or modern or improved equipment (NIOMR kiln “Figure 3”, Chorkor oven, Kanji kiln) (Omotayo *et al.*, 2006).



Figure 1. Traditional fish smoking drum



Figure 2. Fish smoking mud



Figure 3. NIOMR Smoking kiln

Frying: is another means of processing fish and is the act of introducing fish into a hot oil to cook and remove its water content. Frying is mainly used to alter the taste

and eating quality of fish. It also has a preservative effect as the heat destroys micro-organisms and enzymes and the surface of the fish dried out. The shelf life of fried fish is mostly determined by the moisture content after frying and storage techniques.



Figure 4. Local fish frying

Drying: sun-drying is another popular way of processing fish and it involves the use of solar energy (sun), drying decreases the water activity level of the fish to minimize microbial growth, Drying processes can range from solar drying to temperature - and humidity - controlled drying rooms. Dried fish typically has a moisture content of between 38 and 48 percent, depending on the product (FAO, 2012).

3. Hazards and Risks

Various hazards has 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.

The occupational hazards, safety concerns and risks to health in the fish processing industry are based on the types of operation, scale of production and the specific species of interest. Hazards are defined as the presence of a material or conditions that has the potential for causing loss or harm or a combination of the severity of consequences and likelihood of occurrence of undesired outcomes. Fish processing workers are susceptible to many physical hazards in the course of their work as noise, injuries, sting from fish spines, cuts, sprain, fracture and snake bites. Also, Hazard is a biological, chemical or physical agent with the potential to cause an adverse health effect (Zakia *et al.*, 2012).

3.1. Occupational Risks and Hazards

Fish processing industry has diverse occupational risks and hazards which can be categorized into physical, chemical and biological.

3.2. Physical Hazards

Minor cuts and Scrapes: Minor cuts and scrapes are experienced in fish processing that involved the use of knives and other sharp tools for cutting fish and other thing and also cuts from sharp edges on process equipment such as stainless steel basins. This injury is simple and mostly non-fatal. When they occur, they do not

lead to prolonged loss of work (Udolisia *et al.*, 2013). Improper treatment of cut and scrapes areas open a gateway to many viruses, diseases, infections and whitlow. So care must be taken when using sharp object to prevent cuts. Thus all cut and scrapes, even minor ones, should receive attention immediately. Delay increases the risk of infection. Cover with a dressing (sterilized or adhesive) as soon as possible. Do not touch the part of a dressing which is to cover the wound. If it is necessary to clean the wound, avoid washing the actual wound because this can wash germ into it. But if the injury becomes inflamed, or painful, seek medical attention immediately (Health and Safety agency, 1982).

Falls Injury: This is caused by slippery floors and stairs when carrying loads and materials during fish processing. Sprain and fracture could arise due to slippery floor.



Figure 5. Bruise from fall

Source: www.ibtimes.com

Sting from fish spines: This arises during fish handling without appropriate safety devices. It may cause severe pains and can result to tetanus infection or whitlow. Some fish when they sting they release poison into the body like Sea bass and red snapper, others release Ciguatere poisoning. Tuna, Mackerel, Mahimahi and Albaeore release Scombroid poisoning. Tetraodontidae species (Puffer fish) releases Tetraodotoxin and also *Chrysichthys auratus* is dangerous when they stings. So fish should be handled carefully to avoid sting from them.



Figure 6. Whitlow (finger infection)

Source: www.emedicinehealth.com/fingerinfection/articleem.htm

Whitlow: Whitlow is a bacterial or fungal infection of the tip of the finger. It can be intensely painful, and it can feel as if the area infected is squashed, pinched, and about to burst. For youth fish processor, it can be very hard to calm their pain. This is a serious infection—treatment should be sought immediately upon noticing the infection or severe damage can result to the finger, even loss of the finger, nail or hand. The common symptoms are swelling around the fingernail, redness, a rash, a pus-filled white

or off-white blister or abscess forms next to the fingernail, tenderness, pain is noticeable, with increases in intensity if left untreated and fever or chills may also be present (<http://www.emedicinehealth.com/paronychianailinfection/page4em.htm>). Whitlow is also known as paronychia. It can also infect the toe. The herpetic whitlow is caused by a viral infection, not a bacterial or fungal source (<http://www.emedicinehealth.com/fingerinfection/articleem.htm>).

Exposure to heat and cold: These occur especially during smoking and frying, heat could lead to increase in body temperature and headache could result. Also low temperature of work environment and frequent contact with iced fish makes the workers suffer from many other morbidities including frequent respiratory irritation (frequent sneezing and/or coughing) at work and blanching of hand, so using of gloves when dealing with ice and protective cloth against heat or cold should be worn during work.

Eye Hazard and Eye Injury (Red eyes): Eye redness is due to swollen of the eye which causes the surface of the eye to look red or bloodshot, and this is due to the direct smoke contact with the eye when smoking fish especially with local smoking kiln that make use of wood. Red eye (Figure 6) sometimes causes itching, mucus discharge, pain, or vision problem (blurred vision). So, eye protective is put on during work to prevent smoke contacting the eye or flushing of the eye with clean water or sterilized cotton wool moistened with water to reduce pain (Health and Safety agency 1982).



Figure 7. Red eye injury

Source: www.letsgohealthy.blogspot.com



Figure 8. Burn injuries

Source: www.elginburninjurylawyer.co

Burns Injury: Most of the fish processors suffer burns (Figure 6, Figure 7 & Figure 8) because they are exposed to naked flames when processing fish especially when smoking fish and most burns affect only the skin (epidermal tissue “Figure 6, Figure 7 & Figure 8”). Burns

should be treated by flushing the affected part with plenty of clean cool water before applying a sterilized dressing or a clean towel. Where the burn is large or deep, simply apply a sterilized dressing. Do not burst blisters or remove clothing sticking to the burn.



Figure 9. Hand and leg burn

Source: www.besthealthybodycare.com

Minor Head injury: Some fish processors experience minor head injury when carrying their instrument and when the head strikes any object and this did not break the skull. Head injury also result from falls. So, care must be taking to prevent head injury.

Bruising: Bruising is a very general term for a condition in which blood leaks out of the blood vessels into the tissues of the skin (Figure 9), mucus membrane or other organs, including muscles and bones as a result of a blow to the skin (be it bumping against something or hitting oneself with anything of weight). Bruising also result from falls or accident.



Figure 10. Bruising

Excessive noise and vibration: Some fish processors are exposed to noise and vibration at landing sites that can cause temporary or permanent hearing damage depending on noise level and how long people are exposed to the noise, daily and a number of years.

Exposure to aggressive or violent patients and customer: Violence and aggression exposed to by fish processors includes harassment from customer which may cause physical injury or personal discomfort, physiological imbalances or disturbances, substance misuse or abuse, intoxication, acute and chronic mental health conditions and distress or frustration.

3.3. Biological Hazards

Parasites: Examples include leeches in ponds which attack individuals that get in contact with them

unprotected. Also nematode, cestodes and other parasites are hazards.

Pathogens: Risk of fungal and other pathogenic infections such as vibrio has a high likelihood in intensively manure ponds. Charmish (1996) observed that individuals pricked by spines of *Tilapia* sp infected by *Vibrio vulnificus* caused amputation of fingers.

3.4. Chemicals Hazards

Smoke: Smoke inhaled by processors smoking fish and fryers is of serious health risks as it can cause asthma and other respiratory ailments. Also workers could be exposed to smoke particles that contain potential or confirmed carcinogens such as polycyclic aromatic hydrocarbons (PAHs). So, the use of nose protector is advisable.

Disinfectant: Some of the disinfectants used by fish processors to disinfect equipment and holding unit like formalin, Gamalin 20 are harmful if it gets contact with the body and if the chemical touches the fish and consumed will affect the consumers' health because of residual effect.

3.5. Ergonomic Hazards

Internal injuries: Internal injuries, especially those involving the liver, spleen, stomach, colon, pancreas and blood vessels can be caused by motor vehicle accidents, blunt trauma or penetrating injuries. For example, the blunt, shearing force of striking the steer wheel in a motor vehicle accident leads to a significant amount of traumatic internal injuries. Other causes for traumatic internal, abdominal injury includes falls, striking injuries to the abdomen and penetrating wounds such as gunshots and stabbings

Broken bone or dislocation - A dislocation is a displacement of one or more bones at a joint or when a joint (connection of two bones) is disrupted (one a bone has slipped out of joint) due to accidental incident like falls and sudden hit from any weight objects and instruments. Dislocations are usually recognizable, most frequently happens at the shoulder, elbow, thumb, finger or jaw. Some signs of dislocation are swelling, deformed look, pain and tenderness, possible discoloration of the affected area and also fraction (broken or cracked bone) can occur during falls and hitting of any part of the body with any object during processing of fish, some signs of fracture are pain and tenderness, difficult in moving and breathing, swelling or bruising and also discoloration of the skin. Unless the casualty is in a position which exposes him or her to further danger, do not attempt to move a casualty with suspected broken bone or injured joints until the injured parts have been supported. Secure so that the injured parts cannot move (Health and Safety agency, 1982).

Back Strain and Sprain: The most common major injury. A strain is an injury to either a muscle or tendon while sprain is the stretching or tearing of a ligament. With a back strain, the muscles and tendons that support the spine are twisted, pulled, or torn. It can also be caused by a single instance of improper lifting or by overstressing the back muscles. A sprain often results from a fall or sudden twist, or a blow to the body that forces a joint out of its normal position. All of these conditions stretch one or more ligaments beyond their normal range of

movement, causing injury. In addition, there are several factors that put a person at greater risk for a back strain or sprain, including excessively curving the lower back, being overweight, having weak back or abdominal muscles, and/or tight hamstrings (muscles in the back of the thighs).

Symptoms of a strain or sprain include Pain that worsens with movement, muscle cramping or spasms (sudden uncontrollable muscle contractions), decreased function and/or range of motion of the joint (difficulty walking, bending forward or sideways, or standing straight). In some cases, the person may feel a pop or tear at the time of the injury (Cleveland, 2008).

3.6. Psychosocial Hazards

Prolonged work: 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. Several studies suggest loss of appetite, disturbed sleep, constantly sulking, fatigue (muscle fatigue) or loss of energy; indecisiveness and poor concentration are some of the symptoms of prolonged work.

Mental demand - The Mental Demand is the potent force in achievement. The attitude of the mind affects the expression of the face, determines action, changes our physical condition and regulates our lives. Hazard is a biological, chemical, Psychological or physical agent with the potential to cause an adverse health effect (Zakia *et al.*, 2012).

4. Conclusion

Hazards and risks have the potential of affecting people and all human activities. Fish processing is no exception. However, available information is largely on hazards and risks in developed countries. Unfortunately, in the developing countries several stakeholders such as workers, employers, government and consumers have tended to ignore policies (where present), which could ensure safe fish processing practice. It is our view fish industry stakeholders should work in unison to provide guideline and policies that would promote an environmentally friendly and sustainable industry.

Recommendations

Based on the aforementioned the following are recommended:

1. All fish processors should be well-informed and trained on the associated risks and hazards of their vocation.
2. There should be a re-orientation of fish processors so as to inculcate safety consciousness.
3. Personal protective wears should be used by the fish processors and enforced to reduce risks of accidents or other workplace hazards.
4. There should be the provision of first aid kits at all fish processing zones with adequate instructions on their usage.

References

- [1] CHARMISH, B. (1996). Vibrio hits Israel; tilapia sales. *Fish Farmer*, 10 (5): 17.
- [2] FAO, (2012). The prevention of losses In cured fish. *FAO Fish Tech. Paper.*, (219): 87 p. ILOI Government of Norway (1984) Zmprousd Village Technology for Women's Activities-Q Manual for West Africa.
- [3] HEALTH AND SAFETY AGENCY FOR NORTHERN IRELAND, Canada House in conjunction with the Department of Agriculture for Northern Ireland, Dunitis, (1982). *First Aid in Agriculture*, 1-13 pp.
- [4] http://www.emedicinehealth.com/paronychia_nail_infection/page4_em.htm: Emedicinehealth, When to see medical care,
- [5] <http://www.emedicinehealth.com/fingerinfection/articleem.htm>: Emedicinehealth, Finger Infection,
- [6] OKONTA, A. A. AND EKELEMU, J. K. (2005). A Preliminary Study of Micro-Organism Associated With Fish Spoilage in Asaba, Southern Nigeria, *Proceedings of the 20th Annual Conference of the Fisheries Society of Nigeria (FISON)*, Port Harcourt, 14th-18th November, 2005. 557-760 pp.
- [7] UDOLIZA, R. E. K., AKINYEMI, A. A. AND OLAOYE, O. J. (2013). Occupational and Health Hazards in Nigeria Coastal Artisanal Fisheries. *Journal of Fisheries and Aquatic Science*, 8: 14-20.
- [8] OMOTAYO, A. M., AKEGBEJO-SAMSONS, Y. AND OLAOYE, O. J. (2006). Fish production, Preservation, Processing and Storage. *Training Manual for the joint AMREC/BATN Foundation Workshop for Fish Farmers in Epe, Lagos state, November 2006*, 35-44 pp.
- [9] ZAKIA, A.M., AHMED, M., I. DOSOKI AND SHAIMAA ABO A. NASR (2012). Review Article; Occupational Hazards in Fish Industry. *World Journal of Fish and Marine Sciences* 4 (2): 201-210, 2012.