



## PREVALENCE OF OCULAR HAZARD AMONG RICE MILL WORKERS IN KURA LOCAL GOVERNMENT AREA, KANO STATE

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### ABSTRACT

**Background:** Occupational health aims at the promotion and maintenance of the maximum degree of physical, mental and social well-being of workers in their employment from risk adverse to their health.

**Aim:** To determine the prevalence of ocular hazard among rice mill workers and the use of Personal Protective Equipment (PPE) by the participants.

**Methods:** This descriptive cross-sectional prospective study carried out on 235 workers in Kura community in Kano State. Participants who satisfied the inclusion criteria and gave their consent were included in the study. Instrument used were: Self-structured questionnaire and Pen torch. Participants were examined to detect a departure from normal status of the conjunctiva, cornea and ocular adnexa. Data were stored with Microsoft excel and analysed using Statistical Package for Social Sciences (SPSS) version 25. Chi-Square was used to test the relationship between wearability of PPE and ocular hazards with a P value set at less than 0.05 as statistically significant.

**Result:** The prevalence of ocular hazard was more in males 75.7% than in females 24.3%. The major ocular hazards suffered by workers were penetrating injury (12.1%), followed by foreign bodies (10.3%) while pterygium 39.0% was the commonest ocular disorders. Workers 60.34% were without knowledge of personal protective and only 18.7% made use of the personal protective equipment.

**Conclusion:** We therefore suggest that public and private sectors should provide adequate personal protective equipment for rice mill workers and enforce the wearing at work to reduce the burden of ocular hazards, affecting the wellbeing and socioeconomic situation of workers.

**Key words:** Prevalence, Hazards, injuries

### INTRODUCTION

Globally rice milling is a desirable means of livelihood and also in Nigeria. Rice is the staple food for most of the population in Nigeria particularly Kano State (Fatima *et al.*, 2016) established that rice millers are vulnerable to various occupational health hazards such as ocular, mental, physical or both, some maybe life threatening disorders. Rice processing operation includes parboiling (soaking and steaming), drying and milling. Rice millers are exposed to

organic and inorganic rice husk and synthetic chemicals that may have adverse effects on respiratory health of the workers (Razlan *et al.*, 2016)

According to occupational health and safety, there are six primary categories namely: Physical, chemical, biological, radiological, ergonomical and behavioral hazards. A chemical substance is a health hazards if it produces acute or chronic health effects if exposed to individuals.

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These include carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, hepatotoxins, nephrotoxins, neurotoxins and agents that damage the lungs, skin, eyes or mucous membranes. Ocular hazard is any situation or material that can cause injury to the eye and is classified into different categories; mechanical, chemical, thermal, electrical and radiation. Mechanical injuries can be grouped into four; retained extra-ocular foreign bodies, blunt trauma (contusion injuries), penetrating and perforating injuries and penetrating injuries with retained intraocular foreign bodies. Extra ocular foreign bodies are quite common in industrial and agricultural workers. A foreign body maybe lodged in the sulcus subtarsal, fornices or bulbar conjunctiva and usually embedded in the epithelium or superficial stroma.

Occupational health aims at the promotion and maintenance of the maximum degree of physical, mental and social well-being of workers in their employment from risk adverse to their health and to summarize the adaptation of “work to man” and “man to work” (Ghosh, 2014). Agricultural workers have been exposed to environmental conditions that pose a risk to eye health such as dust, airborne dust particulate, chemicals, radioactive, unintentional injuries and other agents due to harsh working conditions and lack of wearing adequate personal protective equipment (PPE). Farm workers spend a significant amount of time outdoors, exposing themselves to extreme amounts of ultraviolet light resulting in eye irritation, photosensitivity, pterygium, cataract formation and retinal damage (Threlfall, 1999). Exposure to pesticides and its residues on crops are responsible for irritated eyes (Quandt et al., 2001). Exposure to allergens such as pollen has the ability to cause allergic reactions or abrasion to the eyes (Lacey et al., 2007).

Agricultural accidents may arise from exposure to fertilizers, insecticides, toxins, vegetables, animal’s origin, lime, caustic potash, caustic soda, liquid ammonia (most

harmful), sulphuric acid, hydrochloric acid. The lids, conjunctiva and cornea may be affected by fire or hot fluid (thermal injuries). Electrical current passing through the eye area may cause congested conjunctiva, punctate cornea, diffuse interstitial opacities, inflamed iris and ciliary body. Electric cataract maybe developed after 2 – 4 months of accident. Retina may show multiple hemorrhages and the optic nerve may develop neuritis. Ultraviolet radiations can cause photo – ophthalmia and senile cataract. Infrared radiations may cause solar macular burns. Ionizing radiation may cause dermatitis of lids and radiation cataract (Khurana & Khurana, 2012).

Rice is usually harvested first, threshed and dried before other processes can commence. Paddy rice must be dried leaving not more than 18 percent moisture in it before parboiling (partial boiling). Rice milling is the process of removing the hard, rough and brittle husk that covers the rice grain and the cuticle. This is done primitively by threshing and winnowing or using technology passing the husk/ rough rice between millstones, separating the grains through a special machine called a “huller” (Ezekiel, 1990). This undergoes whitening, polishing, length grading, blending/mixing, weighing and bagging. The mill houses rice blowers, rice millers, rice blenders, rice destoners, dust/rice husk carriers, bag stitches, barrow pushers, loaders, off loaders and rice sellers. Milling is a process where in the rice grain is transformed into a form suitable for human consumption. However the workers who are involved in the production process are left with ocular and other hazards. Female workers are involved in carrying the dust or husk out, stitching the rice bags, blending the rice, destoning the rice, supplying water and host/ of others in Abakiliki rice mill with a capacity of 35,000 metric tons of quality paddies (Ezekiel, 1990). Despite the high risk of eye diseases and injuries that farm workers are exposed to, there is a paucity of knowledge on their ocular health status (Quandt et al., 2004).

The existence of these hazards underlines the reports that agricultural work is one of the riskiest occupations for the eyes (Frost et al., 2006). Quandt *et al.*, (2008) found that farm workers and rice millers may also suffer from corneal abrasions due to foreign bodies as well as injuries from thorns, stalks, vines and bushes. According to available data, Nigeria's rice production over the past 5 years has been at the highest since 1999. The country's rice production grew from 2 million metric tonnes in 2015 after the ban on rice importation to 9 million metric tonnes in 2021, this is according to a statement by the President of the Rice Farmers Association of Nigeria (RIFAN). With the Central Bank of Nigeria's Anchor Borrowers program, the country is working hard to achieve self-sufficiency in rice production. The position of high production of rice was attained due to steady demand by Nigerians for both domestic and commercial consumption. According to Agronigeria (2018), there is an annual growth rate of about five percent.

This study focused on rice milling and occupational ocular hazards workers are exposed to and the awareness of personal protective equipment and its wearability in Kano State Nigeria.

#### **MATERIALS AND METHODS**

This study was carried out in Kura, a suburban community located along Kano-Zaria express road in Kano State. More than 90% of the populations are Muslims, predominantly Hausa and a minority of Kanuri and Fulani among them. Farming is the main occupation hence the production of rice, wheat, maize, millet, guinea corn, beans, tomatoes, onions, sugar cane, cabbage and water melon. There are three wards that are extensively into rice farming namely Karfi, Dan Hassan and Kura. Kura is the major commercial hub and most popular. The Total number of subjects was two hundred and thirty five (235) persons.

The research was a cross-sectional prospective study on prevalence of ocular hazards among rice-mill workers in Kura local Government, Kano State, Nigeria. The

objectives used to accomplish this were to determine the extent of awareness regarding personal protective equipment and its wearability. The relationship between non-usage of personal protective equipment and ocular hazards among workers was established. Participants used were workers who satisfied the inclusion criteria and gave their consent through random sampling technique. Research Instrument was: Validated Self-structured questionnaire and Pen torch (Keeler).

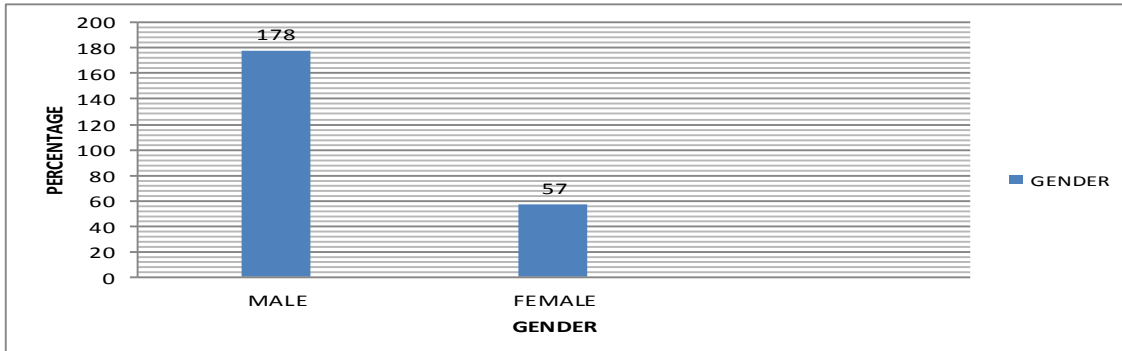
After obtaining informed consent from workers and ethical clearance from relevant authorities, participating workers were made to sit comfortably in an improvised examination chair, both eyes were carefully examined to detect a departure from normal status of the conjunctiva, cornea and ocular adnexa. Observations were noted and recorded. A structured and validated questionnaire was administered to the workers. The educated among them filled and returned their questionnaires while those not able to, were helped to fill when the questionnaire was read out in their local dialect by the researcher and their response recorded accordingly. Cochran's formula was used to calculate the sample size of 235 workers.

Data was collected from workers regarding age, gender, ocular hazards exposed to, marital status, educational status, number of years spent on the job, and properly recorded and stored. Workers were grouped aged 11 – 120 years and were grouped into males and females. Collected data was filtered using Microsoft excel and analysed using statistical package for social sciences (SPSS) version 25. Output was presented in form of tables, histograms and pie charts. Pearson's chi-square was used to find the relationship between non-wearability of personal protective equipped (PPE) and ocular hazard with P value less than 0.05 ( $P < 0.05$ ). A descriptive analysis was done to align the research with its objectives.

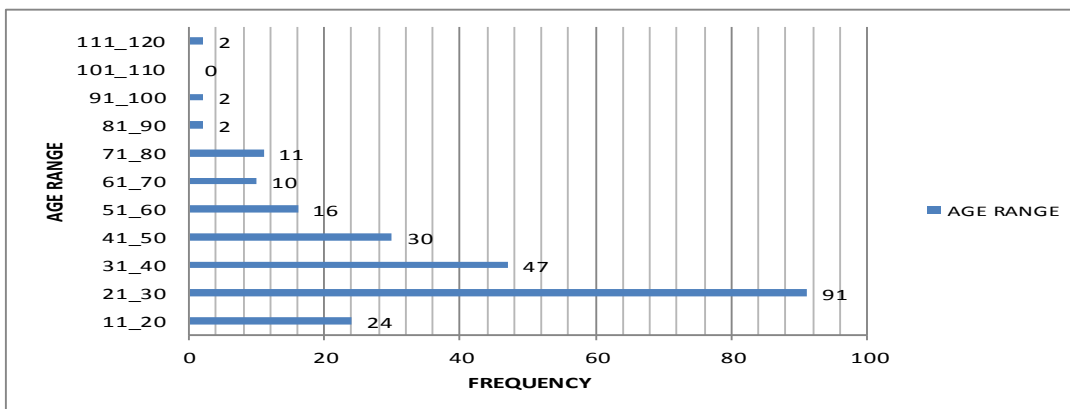
**RESULTS**

**Gender distribution of the workers**

**Fig 1.** Bar chart showing gender distribution of the workers. The total number of workers seen were two hundred and thirty five (235).of which 178 (75.7%) were males and 57 (24.3%) were females.

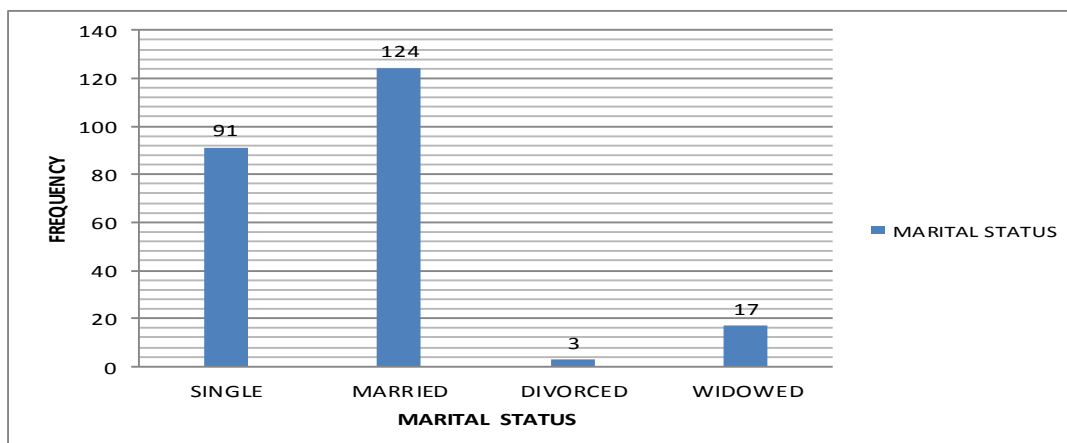


**Age distribution of the workers**



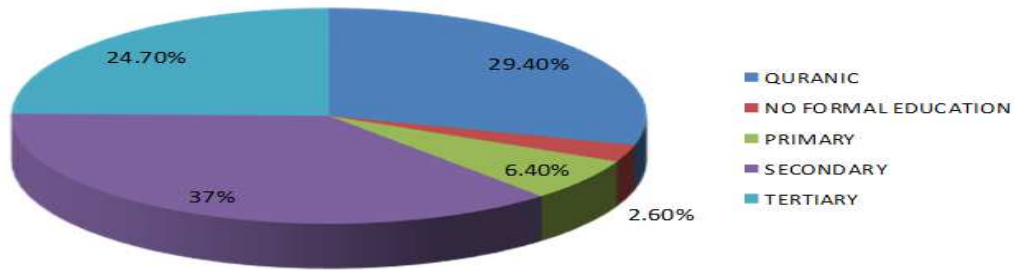
**Fig 2:** Shows the distribution of the age of study participants. Rice mill workers of age range 21-30 years had the highest population with 91(38.3%) workers.

**Marital status of the workers**



**Fig 3:** Shows the distribution of marital status of the participants. Married rice mill workers had the highest prevalence of 124(52.8%) while divorced workers had the lowest at 3 (1.3%)

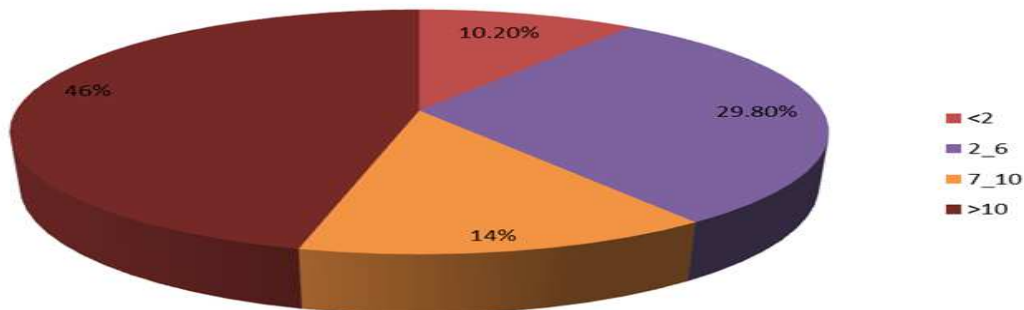
### EDUCATIONAL STATUS



**Figure 4: Educational status of the study participants.**

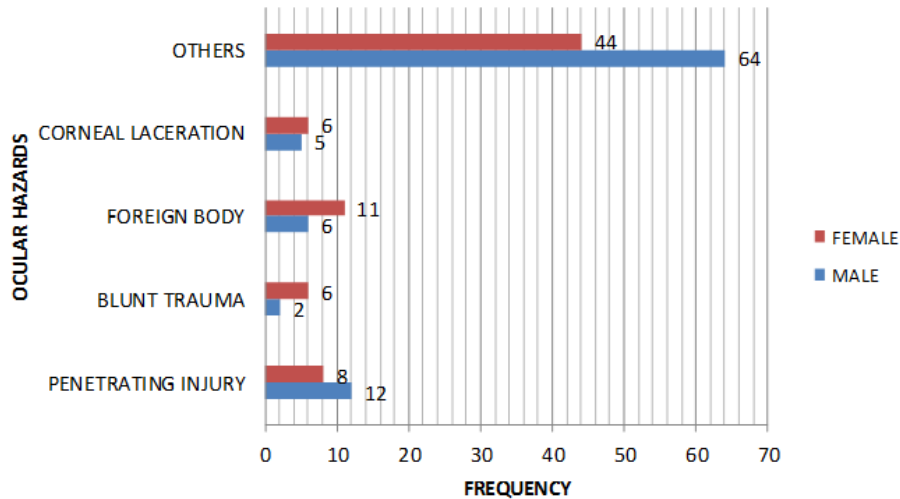
69(29.4%) of the study participants attended Quranic School, 15(6.4%) attended primary school, 87(37.0%) attended secondary school, 58(24.7%) attended tertiary school while 6(2.6%) had no formal education.

### Number of years of work as a rice mille



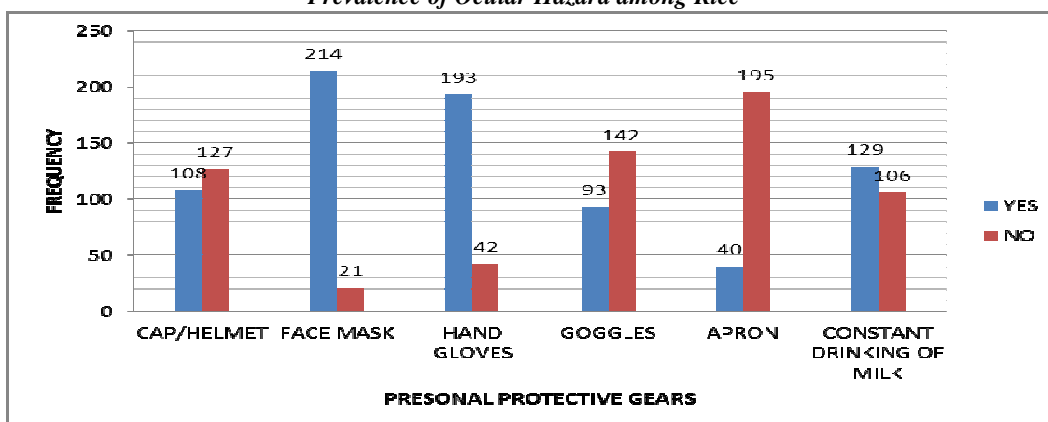
**Fig 5: Shows the service years put in by the workers in the rice mill.** 46.0% (108) of rice mill workers had put more years in the employment of the company.

### Prevalence of Ocular hazard in relation to gender



**Fig 6: Shows variation of ocular hazards with respect to gender.** Penetrating injury in 12(5.1%) was the most occurring ocular hazard among males is foreign body in 11 (4.6%) has the highest prevalence in females.. Males also has the highest prevalence in 64 (27.2%) of other ocular disorders (pterygium, pinguecula and conjunctivitis) detected. followed by foreign bodies 10.3%, corneal laceration 6.7% and trauma 4.8% respectively. Ocular disorders detected are pterygium 39.0% (64), pinguecula 24.3% (40) and conjunctivitis 2.4% (4).

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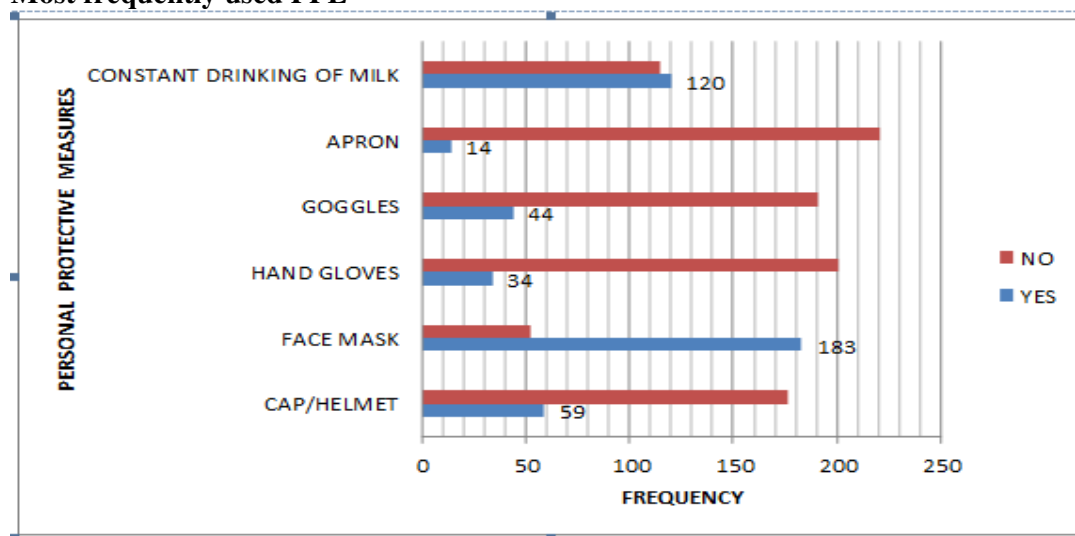


**Level of awareness of various types of PPE**

**Fig 7: Level of awareness of different types PPE by study participants**

F214 (91.1%) workers were aware of face masks as a type of a PPE while 195 (83.0%) of them do not consider aprons as a type of PPE had the highest level of awareness followed by safety goggles with 60.4%.

**Most frequently used PPE**



**Fig 8: Shows the most frequently used PPE among the workers. 183 (77.9%) of the workers wearing face mask and it was the most commonly used, followed by cap/ helmet at 59 (25.1%)workers while aprons are least used.**

**The wearability of PPE by study participants**

Face mask (183) had the highest wearability by study participants followed by cap/helmet(59) and safety goggles (44) while apron had the lowest with (14).

**Table 1: Distribution of the cause injury to study participants**

Variable	Frequency	Percentage
Rice husk	111	47.2
Sun	48	20.4
Machinery	23	9.8
Others	53	22.6
Total	235	100

Rice husk 47.2% (111) had more ocular injuries followed by Others 22.6% (53), Sun 20.4% (48) while Machinery accounted for 9.8% (23).

**Table 2: Distribution of wearability of (PPE) by the study participants**

Variable	Frequency (n)	Percentage (%)
<b>Wearability of PPE</b>		
Never	110	46.8
Sometimes	75	31.9
Always	50	21.3
<b>TOTAL</b>	<b>235</b>	<b>100</b>

21.3% (50) of the study participants wore PPE Always, 31.9% (75) Sometimes while 46.8% (110) Never used safety gears.

**Table 3: Person’s chi-square test of relationship between non-wearability of PPE and ocular hazards**

Variable	Value
<b>Pearson’s Chi-Square</b>	<b>351.263</b>
<b>Df</b>	<b>30</b>
<b>Significance</b>	<b>0.000</b>

Pearson’s chi-square ( $\chi^2$ ) = 351.263, DF = 30 and P – Value (0.000) is less than 0.05. Null hypothesis (Ho) was rejected. There is a significant relationship between non-wearability of personal protective equipment and ocular hazards.

**DISCUSSION**

Globally most activities of daily living in work environment require the human eyes hence exposing the apparatus to hazards. This study revealed a prevalence rate of 69.7% ocular hazard among rice mill workers in Kura Local Government area, Kano State. This study established that rice mill workers were predominantly male with 75.7% in agreement with Poonam et al., (2017) and Richard, (2019) findings of male workers dominance with 66.67% and 74.0%. This is not in agreement with the research of Oginyi et al., (2017) who identified that male involvement in rice mill processing was as low as 49.52% Tejpal, (2020) reported male dominance in rice mill processing with a prevalence rate of 81.29% while female involvement was 18.71%. Males’ dominance in rice milling in Kura in local government area reflects the community belief that rice processing is the sole responsibility of the male.

The age range of 21-30 years had majority with 38.7% and age range 31-40 years had 20.0% in corroboration with Rana et al.,(2018) scholarly studies that majority of the rice mill workers were less than 40 years. Rana et al., (2010) pointed out that

majority of their respondents were between 25 – 35 years. Poonam et al., (2017) is in agreement that majority of the study participants belonged to 26 – 35 years. The mean age of 37.37 years in this study was lower than what Musal et al, (2000) found earlier 40.17 years among their subjects. Married rice mill workers had the highest proportion with 52.8% which is consistent with the findings of Richard, (2019) that married rice mill workers dominated with 69.0%. In Abakiliki (Innocent et al., 2019) found married workers dominance, with 7.2% widowed from the study findings, married workers had the highest frequency and would be exposed to hazard.

This study reported 97.4% had one form of education in agreement with Innocent et al., (2019) and Tejpal et al., (2020) report that educated rice mill workers dominated. With this level of education and enlightenment, the workers will embrace changes and effectively integrate skills and technological innovations for modern rice mill processing. 24.7% of workers had tertiary education, an indication that more technically advance rice mill processing can be easily introduced.

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Majority of workers (46.0%), worked for less than 10 years similar to the result of Innocent et al., (2019) who reported that majority of the workers were in employment for less than 10 years with 84.9%. This implies that less than 10 years of employment is enough time for the workers to be exposed to ocular hazards and for it to manifest. This study established that penetrating injuries, foreign bodies, corneal laceration and blunt trauma were the most common ocular hazards observed among workers. This perhaps was attributable to most of the workers not been aware of personal protective equipment existence and when available unable to wear it. Those aware of the protective gear hardly wore them, claiming it is discomfiting and of no value. In the course of this research some ocular disorders were identified such as pterygium, pinguecula and conjunctivitis. These may have occurred due to exposure to dust, husk and outdoor work place without appropriate personal protective equipment. Rice husk injuries received the highest frequency of 41.2% followed by Others 22.6%, Sun 20.4% and SS Machinery 9.8% as the major causes of ocular hazard among rice mill workers in Kura Local Government Area, Kano State. Results indicated that caps, face masks, hand gloves, goggles, aprons and constant drinking of milk were measures taken against occupational health hazards among the rice mill workers. Hand gloves (14.5%) and goggles (18.7%) had the lowest dominance in this study as reported in Oginiyi et al., (2017, Innocent et al., (2019) and Tejpal et al., (2020). Face mask (77.9%) was widely used which disagrees with the work of Oginiyi, et al., (2017, Innocent et al., 2019 and Tejpal et al., (2020) that non-usage of face mask was reported. Rice mill workers who wore personal protective equipment were

insignificant due to claim of lack of awareness and availability. Karanikas et al., (2018) and Kulworawanichpong, (2011) pointed out that non-use of protective devices was a significant predictor of morbidity. This clearly indicated that workers at the rice mills were exposed to avoidable occupational health risks with a low level of safety gears knowledge. (Pilasa et al., 2018) found out that workers knowledge of occupational injuries and illnesses were low. The Pearson's Chi-Square ( $\chi^2$ ) test conducted showed that a significant relationship between non-wearability of Personal protective equipment and ocular health hazard existed.

### **CONCLUSION**

This study established that the prevalence of ocular hazard in rice mill workers of Kura Local Government Area, Kano State was 69.7%. The most common ocular hazards observed were penetrating injuries followed by foreign bodies, corneal laceration and blunt trauma. Rice husk, sun, machineries and others were the causes of injuries among the rice mill workers. These ocular hazards and injuries are preventable and avoidable with application of appropriate personal protective equipment and promotion of occupational health care. An unsafe work environment will lead to incidents and accidents hence affecting productivity while a safe work environment reduces the number of near misses and accidents hence increasing productivity. We therefore suggest that employers insist on quality health and safety environment policy in workplaces. Employees should be subjected to pre/post-employment annual medical (eye) examination and provided with personal protective equipment to be worn at work environment.



## REFERENCES

- Agronigeria, (2018). Rice Farming: What You Need To Know. From <https://www.agronigeria.com.ng/rice-farming-what-you-need-to-know/>
- Ezekiel, T.O., (1990). Rice Farming in Abakaliki. Introduction of New Crops. Ibadan: N.I.S.C.R.
- Fatima, S., Ghazala, Y., & Babra, I. (2016). Detection of VOC in blood of workers of a rice mill and their occupational health and safety condition. *Journal of Biodiversity and Environmental Sciences (JBES)*, 9(3), 102-111.
- Ghosh, T. S. (2014). Prevalence of respiratory symptoms and disorders among rice mill workers in India. *Environmental Health Preventive Medicine*, 3(9), 226-233.
- Innocent, A., Vivian, C., Kennedy, O., Ethelbert, O., Bukola, P., & Patricia, N. (2019). Work- Health Imbalance among Female Rice Mill Workers in Southeast Nigeria. *Anthropologist*, 35(1-3), 10-20.
- Izuora, C. (2002). State Basks in Rice Production as Nigerian Plans to Exit Imports by 2020. From <https://leadership.ng/2018/09/05/states-basks-in-rice-production-as-nigerian-plans-to-exit-import-by-2020>.
- Karanikas, N., Jose, M., and Kourousis, K. (2018). The balance between safety and productivity and its relationship with human factors and safety awareness and communication in aircraft manufacturing. *Safety and Health at Work*, 9, 257-264.
- Khurana, A. (2012). *Comprehensive Ophthalmology* (5th ed.). New Delhi: New Age International P Ltd.
- Lacey, S., Forst, L., Petrea, R., and Conroy, L. (2007). Eye injury in migrant farm workers and suggested hazard controls. *J AgricSaf Health*, 13, 256-274.
- Musal, R., Naing, I., Ahmadl, Z., and Kamarul, Y. (2000). Respiratory health of rice millers in Kelantan, Malaysia. *Southeast Asian Journal of Tropical and Medical Public Health*, 31, 575-578.
- Oginyi, R., Ofoke, S., Chris, O., and Ogen, N. (2017). Assessment of Occupational Health Hazard and the use of Safety Measures among Rice Mill Workers in Ebonyi State, Nigeria. *World Applied Sciences Journal*, 35(7), 1133-1141.
- Poonam, R., Abbay, S., and Peddi, M. (2017). Respiratory Morbidity and Peak Expiratory Flow Rate among Rice Mill Workers in a Rural of South India. *National Journal of Community Medicine*, 8(5), 246-249.
- Quandt, S., Arcury, T., Rao, P., and Al, E. (2004). Agricultural and residential pesticides in wipe samples from farm workers family residences in North Carolina. *Environ Health Perspect*, 112, 382-387.
- Quandt, S., Elmore, R., Arcury, T., and Norton, D. (2001). Eye symptoms and use of eye protection among seasonal and migrant farm workers. *South Med J.*, 94, 603-607.
- Quandt, S., Feldman, S., Vallejos, Q., and Al, E. (2008). Vision Problem, eye history, and Ocular protection among migrant farm workers. *Arch environ occup Health.*, 63, 13-16.
- Rana, M., Naska, S., Roy, R., Das, D., and Das, S. (2018). Respiratory morbidity among rice mill workers in an urban area of Burdhan District, West Bengal: A cross sectional study. *Indian Journal of Occupational and Environmental Medicine*, 22, 5-10.
- Razlan, M. Z. (2016). Respiratory health of rice millers in Kelantan, Malaysia. *Southeast Asian Journal of Tropic Medicine Public Health*, 3(31), 575-578.
- Richard, N. (2019). Assessment of The Level Of Awareness In Occupational Safety And Health Among Rice Mill Workers In Central Kenya (Mwea). *International Journal of Innovative Research and Advanced Studies(IJIRAS)*, 6(10), 24-29.
- Tejpal, A. (2020). Prevalence of Respiratory Problems and Musculoskeletal Disorders Among Rice Mill Workers In Karnal District of Haryana. *A Double Blind Peer Reviewed Journal of APG and ISPER India Indexed in Scopus*, 16, 15-27.