

# Assessment Of The Level Of Awareness In Occupational Safety And Health Among Rice Mill Workers In Central Kenya (Mwea)

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**Abstract:** Rice milling involves removal of the husk and bran layer, a process which causes emission of inorganic dust and synthetic chemicals that have adverse effects on respiratory health, eyes and skin of exposed workers. Further, rice husk is known to have high silica content which may cause pulmonary disease resembling asbestosis and possibly bronchogenic carcinoma. It is estimated that most workers spend a third of their time at work hence the need for positive occupational risk perception through awareness which has a significant impact on safe behaviour at work. This study assessed the level of awareness on occupational safety and health among rice mill workers in central Kenya (Mwea). Four out of the seven large scale mills were selected at random for the purpose of this study. The study population was 400 and the sample size was 196. Cross sectional survey study design was adopted and structured questionnaires were administered. The level of training (21%) and knowledge (24%) of safety and health at workplace was low. The supervisors' awareness was also low (33%) across the sampled mills. The respondents' perception of the positive safety climate was (53%) disagree while the managers' measure of importance of health and safety in the workplace on a scale of 1 to 10 was at an average of 4.5. There was no significant association between safety awareness and age ( $p=0.919$ ) and the cross tabulation between level of education and safety awareness was  $p=0.98$ . None of the selected mills had registered their premises as a workplace or formed safety and health committee. The study concluded that the level of awareness on safety and health was low among the workers and occupiers of the workplaces in the selected rice mills. The government should deal with the abysmal registration of workplaces for improved level of awareness, workers enlightenment of legal rights and reduced workplace hazards, injuries and accidents.

**Keywords:** workplace, occupational, awareness, safety, health, hazards

## I. BACKGROUND OF THE STUDY

Rice is a swamp grass which is widely cultivated as a source of food, especially in Asia and it belongs to the seed of the grass species *Oryza Sativa* (Asian rice) or *Oryza glaberrima* (African rice). According to Food and Agriculture Organization (FAO) (2017), rice is the agricultural commodity with the third highest world-wide production (rice, 741.5 million tonnes in 2014), after sugarcane (1.9 billion tonnes) and maize (1.0 billion tonnes). Rice cultivation was introduced in Kenya in 1907 from Asia (Ministry of Agriculture, 2009). It is currently the third most important cereal crop after maize and wheat. It is grown mainly by small-scale farmers as a commercial and food crop. About 80% of the rice grown in

Kenya is from irrigation schemes established by Government while the remaining 20% is produced under rain-fed conditions. Globally rice is one of the most important food crops in the fight against hunger (Ministry of Agriculture, 2009).

According to the Ministry of Agriculture National Rice Development Strategy (NRDS), (2009), rice production in Kenya is by small-scale farmers in Central (Mwea), Western (Bunyala), Coast (Tana delta, Msambweni) and Nyanza provinces (Ahero, West Kano, Migori and Kuria). About 300,000 rice farmers provide labour and also earn their livelihood out of the crop's production. There are four major rice mills spread across the country with varying capacities. This includes the Lake Basin Development Authority (LBDA)

with a milling capacity of 3.5 metric tons, Mwea NIB 24 metric tons, Western Kenya Rice mills 3 metric tons and Tana Delta with 3 metric tons per hour. Additionally, there are several small privately owned ones especially in Mwea irrigation scheme. The scheme produces over 50% of all the rice in Kenya making Wanguru town an important commercial centre with numerous rice stores and several rice mills (Oyuke, 2010). Mwea is in Kirinyaga County and it is located in the central highlands of Kenya in the former Central Province and lies between latitudes  $0^{\circ} 42' 0''$  South of Equator and  $37^{\circ} 22' 0''$  East.

Milling is a crucial step in post-production of rice and the basic objective of rice milling system is to remove the husk and the bran layers, and produce an edible, white rice kernel that is sufficiently milled and free of impurities (Agropedia, 2012). The milling process causes emissions of dust and the work environment is typically filled with fine and coarse dust which is detrimental to the respiratory system and skin of exposed workers. This not only affects the workers but also the community living in nearby areas breathe air mixed with dust every day. This causes air pollution to the local community and reduces quality of life. (Kiattisak et al, 2011). The other occupational health hazards that the rice mill workers are vulnerable to are; ergonomic-workplace/job/task design, uncomfortable workstation height, and poor body positioning (Tirthankar et al, 2017). Eye injuries, respiratory tract infections, physical injuries like bruises, wounds and amputations are also evident (Oginyi et al, 2017). A study by Ahinsa et al, (2019) on haematological disorders in rice mill workers in Pradesh concluded that rice husk dust causes deterioration of haematological parameters in subjects working at rice mills. In another study by Razlan et al, (2000) on respiratory health of rice millers in Kelantan, Malaysia it was found out that chest tightness was among the common symptoms i.e. (34.9%) of workers complained. In India, which is one of the largest producer of rice in the world, there is high prevalence of respiratory morbidity (42.66%) among rice mill workers. Further, there was statistically significant relationship between duration (years) of working and respiratory morbid condition (Seema et al, 2010).

According to a study by Prasanna et al, (2008), the noise from machines in the rice mills was found to be the major occupational hazard for the rice mill workers. About 25% of the total workers were found to be exposed to higher levels of noise than 85dBA in the locations where workers were engaged for most of the time. In a study on occupational exposure to airborne fungi among rice mill workers with a special influence to aflatoxin producing A flavours strains, conducted at National Institute of occupational health, Meghani Nagar, Bawla Town India by Desai et al, (2003) it was found out that there was highly significant total and respirable dust concentration in the workplace ( $p < 0.01$ ). This study concluded that the rice mill workers are occupationally exposed to airborne aflatoxin producing strains of A flavus. Safety awareness and positive perception of risk exposure cannot be over emphasized.

In a study conducted by Leiter et al (2009) in the Italian printing industry on occupational risk perception a structured equation analysis confirmed a model of risk perception on the basis of employees' evaluation of the prevalence and

lethality of hazards as well as the control over hazards they gain from training. The number of injuries sustained was positively related to the perception of risk exposure and negatively related to the evaluations about the safety training. The study concluded that if the workers increase the adoption of safety procedures the injuries will be prevented.

The major job component in the rice mills is heavy lifting and carrying of grain filled sacks on the backs and shoulders by workers. This causes one of the most common work related injuries referred to as musculoskeletal disorders. In Karimnagar India, musculoskeletal complaints (45.7%) in rice mill workers were significantly associated with duration of work in years (Mohan, et al, 2016). In spite of the various hazards that the workers in the mills are exposed to, in Kenya, there is inadequate registration of workplaces by Directorate of Occupational Safety and Health Services (DOSHS) which according to Auditor General's report, (2018) is at 0.6%. Further, the report points out that this inadequacy means that there is minimal information about the workplaces which makes it difficult for DOSHS to plan and follow up on safety and health issues; minimal adherence to safety and health standards at workplaces which in turn has led to increased risk of occupational hazards/injuries; and inadequate investigation of accidents and diseases due to minimal and late notifications of accidents which is caused by non-enforcement of the OSH Act, 2007 and lack of awareness among employees. In neighbouring countries like Uganda, registration of workplaces is at 0.1% according to Auditor General's report, (2016). This was attributed to lack of awareness by the respective occupiers of workplaces, inadequate system/mechanism to monitor compliance, manual registration system rather than an online one so as to encourage registration, and non-punitive penalties for non-compliance. The biggest worry for the emerging economies is a huge working population with low literacy rates and abysmal awareness of occupational health hazard (Meswani, 2008), the need of the hour should therefore be to spread the awareness of occupational hazards to the large work population. In developing countries, work related research, education and training have not been widely recognised as the most important factor for sustainable workplace improvement (Ahasan and Imbeau, 2003). This is despite the World Health Organization (WHO) strategy on occupational health for all which stresses effective transmission of data and raising of public awareness through public information as one of its priority objectives (WHO, 1995).

Per capita, consumption growth of rice is 12% per annum as compared to 1% for maize and 4% for wheat (Wanjogu, 2017). The NRDS (2008-2018) blue print and vision 2030 initiative is to increase the rice production from the current 178,580 metric tonnes to 300,000 metric tonnes by 2022. This projected increase in production will cause an upsurge of rice mills in rice growing areas and the number of workers exposed to occupational hazards will increase exponentially. It has been established from other studies that exposure of rice mill workers to high levels of rice mill dust which constitutes of organic and inorganic dusts and synthetic chemicals may have adverse effects on their respiratory health and various organs such as eyes, and skin (Tirthankar, et al, 2017). To reduce the level of exposure both to workers and the

environment, it is important that the workers are aware of workplace health and safety and the importance of obeying the safety and health rules and regulations in the workplace. As provided for in the Occupational Safety and Health (OSH) Act, (2007), employees have a legal right to expect a safe and healthy work environment. Further, when employees are aware of safety procedure, it will help the employers to reduce their legal liability which often occurs when employees or customers are injured in the course of regular business (Kimberlee, 2018). Thus, it is important to establish the level of OSH awareness among rice mill workers in central Kenya (Mwea) for reduced accidents, deaths, injuries and ill health in the workplace and improved notifications of work related accidents by employers and employees.

The first objective of the current study was to assess the level of awareness in Occupational Safety and Health (OHS) among rice mills workers in central Kenya (Mwea). The second one was to determine the association between OSH awareness and selected demographic variables. The findings of this study provide a basis for policy makers in the Ministry of Labour to enforce registration of all rice mills as workplaces as provided for in section 44 of Occupational Safety and Health Act, 2007. This will ensure that workers are aware of OSH through training for improved workplace safety, health and welfare.

## II. MATERIALS AND METHODS

The study area was Mwea irrigation scheme in central Kenya, Kirinyaga County which produces 50% of all the rice in Kenya and consequently has the largest number of rice mills compared with other rice growing zones in Kenya. Out of the current seven large scale mills four were selected at random for the purpose of this study. The study population (400) consisted of all the permanent staff working in the mills. The sample size (n= 196) was randomly selected. Cross sectional survey study design was adopted and structured questionnaires were administered after obtaining local ethical approval to conduct the study from the authorized personnel in the mills. Data was analysed using frequency counts and percentages and was presented using statistical tables and charts.

## III. RESULTS AND DISCUSSION

### A. RESPONDENTS' SOCIAL DEMOGRAPHIC PROFILE

The social demographic profile indicated that the respondents' gender was 74% male and 26% female, while 69 % were married and 31% single. The respondents' level of education was 78% secondary, 16% primary and 6% university. Most (74%) of them were 45 years and below and 66% worked as mill loaders while 17% worked in the offices and 17% worked as machine operators.

### B. RESPONDENTS' SAFETY AND HEALTH AWARENESS (TRAINING FOR THE SAFETY OF WORKERS)

The results indicated that the level of training on safety and health in the workplace across all the selected mills was low (21%). Health and safety awareness is dependent on the level of training and plays a role in the safe use of plant, machinery and equipment and how workers respond in case of an emergency.

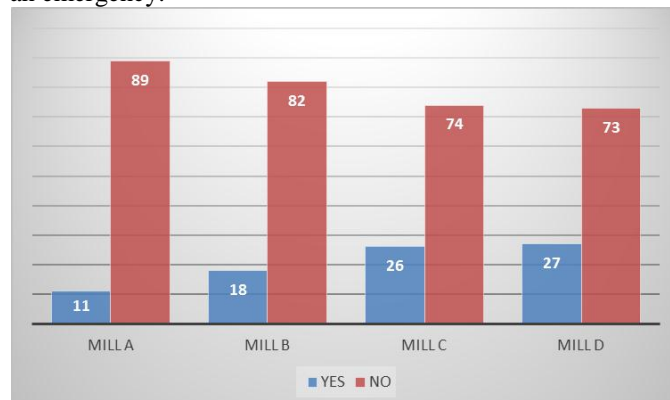


Figure 1: Respondents' level of training in the respective mills

As pointed out by Meswani, (2008), the biggest worry for the emerging economies is a huge working population with low literacy rates and abysmal awareness of occupational health hazard, the need of the hour therefore being to spread the awareness of occupational hazards to the large work population. In developing countries, work related research, education and training have not been widely recognised as the most important factor for sustainable workplace improvement (Ahasan and Imbeau, 2003). This is despite the World Health Organization (WHO) strategy on occupational health for all which stresses effective transmission of data and raising of public awareness through public information as one of its priority objectives (WHO, 1995).

### C. EVALUATION OF WORKERS' KNOWLEDGE ON SAFETY AND HEALTH AT WORK

This evaluation was carried out using the following questions under the section on workers' knowledge on safety and health at work: "is your safety and that of your colleague your responsibility"; "Do you always wear your PPE while performing your work"; would you instruct your colleague if you found him performing unsafe act"; "does your knowledge of safety increase with time"; Do you know safety and health committee members in your mill"; "have you been trained on basics of first aid"; are you aware of factories and other places of work rules and regulations". The response to these questions across the selected mills were 24% yes and 76% no indicating that knowledge on safety and health at work was very low.

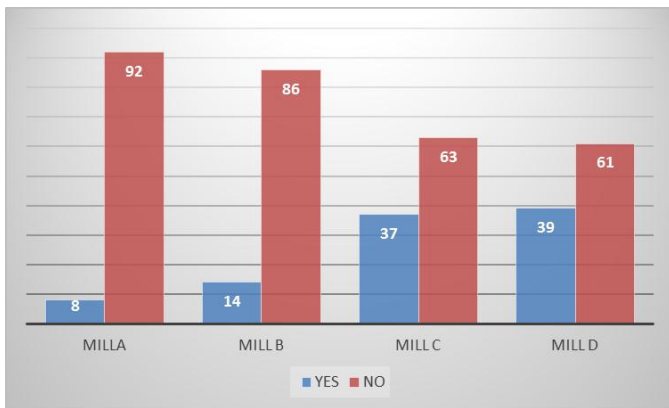


Figure 2: Respondents' knowledge on safety and health at work

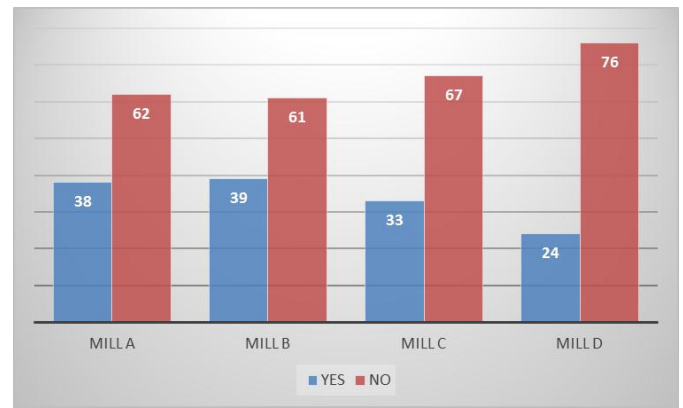


Figure 3: supervisor's awareness on safety and health in the workplace

These results were in agreement with a study by Pilusa *et al*, (2018) which found out that workers' knowledge of occupational legislation and related health and safety benefits was at 16.36%. The low level of knowledge was despite the legislation's accrued benefits of ensured safety, rights of workers, ensured compensation for occupational injuries and illness, and provided guidance in the prevention of occupational injuries and illness. In another study by Nasab *et al*, (2009) on evaluation of knowledge, attitude and behaviour of workers towards occupational health and safety, it was found out that the level of knowledge was 52% low, 36.7% moderate and 10.5% high. It is important for employers to design and implement programs aimed at promoting knowledge, attitude and safety culture in the workplace. It is generally accepted that 80-90% of accidents are due to human error (Salminen, 2017). Workers should have the right knowledge, attitude and behaviour otherwise effort put towards having accident free workplace will be in vain.

#### D. SUPERVISOR'S AWARENESS ON SAFETY AND HEALTH IN THE WORKPLACE

The results indicated that the supervisor's awareness on safety and health in the workplace was low (33%) across the sampled mills. This meant that workers were not adequately protected against exposure to workplace hazards through enforcement of OHS policies and procedures; awareness of OHS rights and responsibilities and workplace culture that encourages worker participation and safety. According to Yanar *et al*, (2018), OHS vulnerability and lack of supervisor support independently increased the likelihood of physical injuries at work. The Occupational Health and Safety Act (OHSA) defines a supervisor as a person who has charge of a workplace or authority over a worker. Supervisors are responsible for a great deal of what goes on day to day in the workplace. Workers must be able to report unsafe or unhealthful workplace conditions or hazards to a supervisor without fear of reprisal. The Occupational Safety and Health (OSH) Act, 2007 requires supervision of apprentices, indentured learners and inexperienced workers as indicated in section 98 and 99(1). The enforcement of the Act was a challenge where supervisor's awareness on safety and health in the workplace was low as shown in the figure below:

The importance of supervisor's awareness on safety and health is further stressed by Safety and Health in Agriculture Convention, 2001 (No. 184) article 7(b) which holds that the employer shall ensure that adequate and appropriate training and comprehensive instructions on safety and health and any necessary guidance or supervision are provided to workers in agriculture, including information on the hazards and risks associated with their work and the action to be taken for their protection taking into account their level of education and difference in language.

#### E. WORKERS SAFETY AND HEALTH CLIMATE- THE ENVIRONMENT

The results indicated that the respondents' perception of positive safety climate in the selected mills was 53% disagree, 41% agree and 6% strongly agree in all the selected mills. According to Workplace Health and Safety Queensland, (2017) safety climate is the perceived value placed on safety in an organisation at a particular point in time.

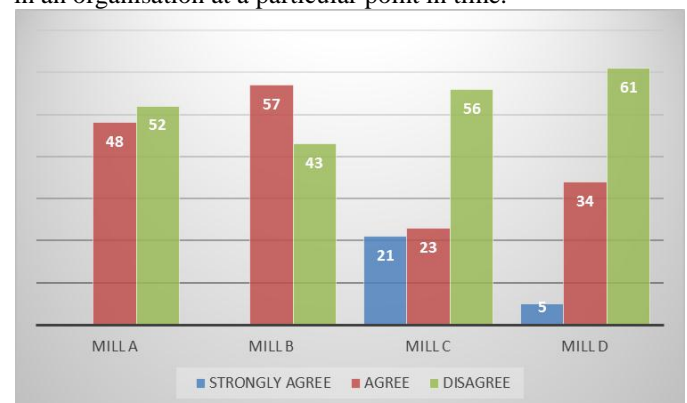


Figure 4: Workplace health and safety: the environment (workers' health and safety climate)

There is need for the mills management to improve the safety climate in the workplace in order to motivate the employees to behave safely and improve their uptake of health and safety related policies and programs for reduced work related injury rates and improved production. Good safety culture should lead to good safety climate (Talabi *et al*, 2015) where workers are encouraged to, report unsafe conditions to their supervisors; wear any safety gear required to do the job; follow the safety rules and procedures; ask questions when not sure and ask for help if needed.

## F. MANAGERS' AWARENESS ON HEALTH AND SAFETY IN THE WORKPLACE

The mill managers' awareness on safety and health in the workplace was assessed by asking the following questions in the questionnaire; "using a scale of 1 to 10 please indicate how important health and safety at work is in your mill; is the mill registered as a workplace with the Ministry of Labour; how do you capture statistics of accidents at the workplace; what is the fraction of the budget that addresses health and safety in your mill; does the mill under your management have a functional health and safety committee". The results indicated that out of the four selected mills, mill B had the highest scale (6) out of 10 on the importance of health and safety, while mill C had the lowest (3). On average, the scale was at (4.5) with a standard deviation of 1.12 which was considered low. This brought it to light that managers in the selected mills did not consider health and safety in the workplace as important. According to Health and Safety Authority, (2019), a safety and health management system is a necessary tool in an organisation to ensure, health and safety work organisation and policy in a company; planning process for accidents and ill-health prevention; good practices, procedures and resources for developing and implementing, reviewing and maintaining the occupational safety and health policy. The outcomes of good health and safety management system are reduced accidents and ill health cases; promoted business efficiency and productivity; provided safety, health and welfare at work as provided for in the Factories Act cap (254) and allocated resources in the budget for safety and health. Further, where health and safety is regarded highly, Safety and Health in Agriculture Convention, 2001 (No.184) will be fully adopted. The convention charges the employer to ensure that workers receive and understand the safety and health information supplied by manufacturers, importers and suppliers of machinery, tools and equipment as well as be informed and consulted on safety and health matters including risks from new technologies.

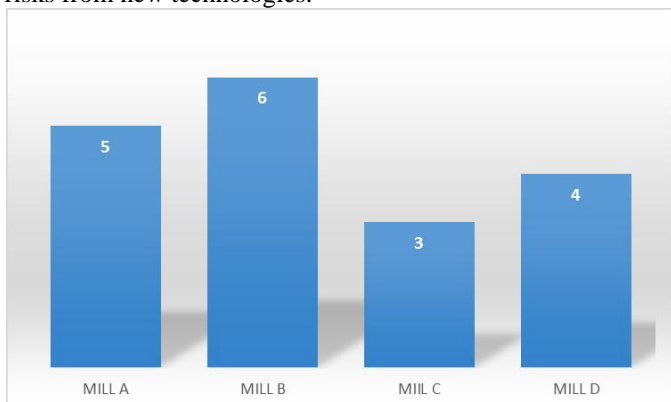


Figure: 5 Importance of health and safety at work in a scale of 1 to 10

The study also sought to establish whether the selected mills were registered as a workplace with the Ministry of labour, a legal requirement under OSH Act (2007) section 44 (1) which provides that before any person occupies or uses any premises as a workplace, he shall apply for the registration of the premises by sending to the Director a written notice containing the particulars set in the Fourth Schedule of the

Act. Section 45 (6) of the same Act requires that an occupier shall renew the certificate of registration annually. It was observed from the results that none of the selected mills had adhered to this legal requirement. This case of non-registration was in support of Auditor General's report (2018) Kenya, which observed that there was inadequate registration of workplaces by Directorate of Occupational Safety and Health Services (DOSHS) which was 0.6% of the 1,700,000 workplaces in Kenya. Further, the report points out that this inadequacy is an indication that there is minimal information about the workplaces which makes it difficult for DOSHS to plan and follow up on safety and health issues; minimal adherence to safety and health standards at workplaces which in turn has led to increased risk of occupational hazards/injuries; and inadequate investigation of accidents and diseases due to minimal and late notifications of accidents which is caused by non-enforcement of the Act and lack of awareness among employees. In neighbouring countries like Uganda, registration of workplaces is at 0.1% according to Auditor General's report, (2016). This was attributed to lack of awareness by the respective occupiers of workplaces, inadequate system/mechanism to monitor compliance, manual registration system rather than an online one so as to encourage registration, and non-punitive penalties for non-compliance.

To further assess the managers' awareness on health and safety in the workplace, the study sought to know if in the selected mills there were functional safety and health committees. The results indicated that none of them had formed the committee in their respective mills. Formation of safety and health committee by the occupier of every factory and other places of work is domiciled under the Legal Notice of Kenya No. 30, (2004). The committee is responsible for all health and safety issues of the enterprise including undertaking safety audits. The study observed that this could be blamed on the managers' low level of health and safety awareness. It was also observed from the results that the management in the mills did not have any method of capturing statistics of accidents at the workplace and that the fraction of the budget that addressed health and safety was minimal and in some cases none at all.

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