

ERGONOMICS STUDY FOR HANDLING OF CEREALS AND PULSES IN KEBBI STATE, NIGERIA

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ABSTRACT

Cereals and pulses are the most important agricultural products for food and source of income. The traditional method employed in handling these products put workers in ergonomics hazards, with reduced worker productivity. Therefore, it is important to proffer safe environment for handling; and to achieve and maintain high-level worker productivity. The research primarily studied methods of handling in Kebbi State, identify and assess musculoskeletal disorders (MSD) in handling. The survey questionnaire was used in data collection. The conventional methods of handling were; vans, trucks, tricycles, carts, wheelbarrows, and laborers. These available handling methods cause pains on back, neck, hand, wrist, and shoulder. To minimize MSD, lifting mechanisms should be used, and size of the packaging bags should be reduced to suit human physique.

Keywords: *Ergonomics hazards, MSD, handling, work productivity*

INTRODUCTION

Ergonomics as Greek word simply means *ergon* (work) and *nomos*, (laws) (Marti, 2006). Therefore, ergonomics is a managerial multidisciplinary science that creates the principles that need to be followed to ensure productivity and work efficiency (Naman *et al.*, 2015). Ergonomics deals with physical, cognitive, environmental, social, organizational, and any other relevant factors. Ergonomics shows the interaction among labor, machines and the environment. According to Naman *et al.* (2015) to facilitate efficient labor, certain physical and mental attributes must be considered, for example, respiration, circulation, skeletal and muscle systems. Ergonomics is concerned with the man, machine, and environment to be efficient, safe and comfortable as possible to the operator. To strike a balance between worker and activity, effective application of ergonomics in the workplace need to be encouraged. This can improve operator productivity; provide worker safety and physical and mental job satisfaction (Maheshkumar *et al.*, 2015).

Agricultural products are perishable in handling and cannot be stored indefinitely. The maximum storage duration of agricultural products varies and can be only a few days for some fruits and vegetables, a couple of months for most tubers and bulbs, and over a year for dried food grains (Inge, 2004). Cereals and pulses are the most produced products in Sub-Saharan African for food and source of income. To provide food for citizenry throughout the year, they have to be kept in a store (Turaki *et al.*, 2012). Cereal grains are edible seeds and, as such, would eventually be released from the plant when fully mature. Grains can be divided into three groups; cereals (maize, wheat, millet, rice, barley, sorghum, etc.), pulses (beans, peas, cowpeas, etc.), and oilseeds (groundnut, soybeans, sunflower, linseed, etc.).

Handling of agricultural products is an important part of post-production. It can be grouped into two, micro (on farm transport) and macro (off-farm transport). There are factors

that affect the handling of cereals and pulses like the mechanical bruise, moisture content, and temperature that pose a threat to the quality and quantity of the product. These threats are present not only during storage but during the whole processes of handling, food production to consumption or marketing. Each step (field operations, transport, storage, packaging, and marketing or consumption) can have an impact on the quality and quantity of the products (Inge, 2004).

According to CBHGroupandSouthEastPremiumWheatGrowersAssociation (SEPWG) (2006)cereal grain, a maximum moisture content(MC)of 12.5 % is accepted which conforms to the international shippingstandard of12% MC. Quality and quantity of agricultural products need to be protected as agricultural products life continues after harvest; that is all agricultural products respire (breathe). The products, therefore, become thinner, and they produce carbon dioxide and heat (CBHG & SEPWG, 2006). A mechanical injury incurred during harvest also affects the quality of the product. Poor handling, unsuitable packaging, and improper packaging during transportation are the causes of physical damage. MSDs are injuries and disorders of the soft tissues (muscles, tendons, ligaments, joints, and cartilage) and nervous system. These injuries develop gradually over weeks, months, and years. They can result in difficulty moving, stiff joints, and sometimes even paralysis. Parts of the body affected by MSDs are Arms, Back, Hands, Wrists, Fingers, Legs, Neck, and Shoulders. MSDs do not include injuries incurred from slips, trips, falls, or similar accidents.

The importance of Agriculture to Nigerian economy cannot be overemphasized more especially in the present economic crunch where all other sources of revenue have dwindled. Besides, agriculture is the only dependable activity that could guarantee food security apart from its economic benefits; hence, the Federal Government saw the need to diversify the economy with much priority to agriculture. With the shift, factors that affect production to consumption should not be overlooked. Small-scale farmers handled cereals and pulses traditionally in Nigeria. If human beings must depend strictly on their mental and physical strength to supply the bare necessities of handling,humans become beasts of burden and their civilization declines. Musculoskeletal Disorders (MSDs) or work-related diseases can become serious and can cause injuries to men that work every day.

OBJECTIVES

The objectives of the study are:

- i. To assess the current working conditions and
- ii. identify the types of work-related risk factorsin the handling of cereals and pulses
- iii. To assess the work-related risk factors in the handling of cereals and pulses
- iv. To compare the traditional methods with standards and proffer solutions

LITERATURE REVIEW

There have been anumber of studies with regards to ergonomics study in workplaces such as building constructions industries, engineering works,and so many others but there was no published work on thehandling of agricultural produces despite the injuries sustained by those involved. Tarwinder and Jaswinder (2012); Naman *et al.* (2015) carried out a retrospective study on Ergonomic evaluation of industrial task in Indian manufacturing industries. Janice and Gumasing (2014) conducted a research using a predictive model of theseverity of MSDs

among poultry layer workers. Vikram and Divalka (2017) studied ergonomic analysis of postures of building construction workers using RII and PATH methods.

METHODOLOGY

Area of Study

The study was conducted in the Central Markets of the four Emirates (Zuru, Yauri, Argungu, and Gwandu) of the State. The distance of each Emirate to the capital city, Birnin Kebbi is 225, 217, 55, and 58.1 km respectively.

Procedure for Data Collection

The procedure used was an interview. It was conducted on the market day, Saturday, November 12, 2016, for Zuru, November 14, 2016, for Yauri, November 18, 2016, for Argungu and February 19, 2016, for Gwandu. The camera was used in snapping workers during handling at various markets. Two survey questionnaires were used as given by Janice and Gumasing, 2014; Naman *et al.*, 2015 to collect data with regards MSD involve and percentage of the risk.

Methods used were:

- Nordic Musculoskeletal Questionnaire: this was used in determining the discomfort location and knowing the common types of MSDs among the workers
- Cornell Musculoskeletal Discomfort: assess the frequency and extent of pain felt in each body segment

These comprise questions like what method of handling is used, what symptoms of MSDs are observed in the handling. Individuals were asked at random with the help of the market vice chairman.

RESULTS AND DISCUSSIONS

The available methods of handling of cereals and pulses in Kebbi State are shown in figure 1 and 2.





Figure 1: Macro (to) handling of cereals and pulses (to the market)



Figure 2: Micro (within) handling of cereals and pulses

The results obtained from the field survey shows that the available handling methods are carried out by trucks, motor vehicles, tricycle, motorcycles, carts, wheelbarrow, and labourers.

Table 1 shows the results of the Nordic survey questionnaire. It was found that on an average lower back pain is the most frequent MSD workers are experiencing, followed by shoulders, wrist/hands, upper back, neck and elbow pain similar findings were also reported by Janice and Gumasing, 2014. Among the forty respondents, only two consult a medical doctor while the rest take self-medication.

Table 1: Nordic Musculoskeletal Questionnaire

Location	Before	During	After	Consulted a Doctor
Neck	14	29	30	0
Shoulders	25	32	36	0
Upper back	17	30	32	0
Elbows	12	28	28	0
Wrists/Hands	19	31	34	0
Lower back	29	39	37	2
Hips/thighs	7	20	22	0
Knees	9	23	7	0
Ankles/feet	4	19	10	0

Table 2 shows the results of Cornell survey questionnaire. It was found that on an average lower back pain is the highest risk with the percentage of 20.2 %, followed by wrist/hands, shoulders, upper back, neck and elbow pain similar findings was also reported by Janice and Gumasing, 2014. Among the forty respondents, only two consult a medical doctor while the rest take self-medication.

Table 2: Cornell survey Questionnaire

Location	Risk	Percent (%) Risk
Neck	16.3	15.0
Shoulder		
Right	17.7	16.6
Left	11.8	10.9
Upper Back	12.2	11.3
Upper Arm		
Right	9.4	8.4
Left	4.9	3.6
Forearm		
Right	4.5	4.1
Left	3.6	3.2
Wrist		
Right	20.6	19.1
Left	14.5	13.0
Lower back	25.5	20.2
Hips/buttocks	5.7	5.1
Thigh		
Right	4.2	3.9
Left	1.9	1.6
Knee		
Right	6.4	5.9
Left	1.5	1.5
Lower Leg		
Right	3.4	2.9
Left	1.5	1.3
Foot		
Right	9.2	8.8
Left	7.3	6.7



Works that most likely to pose ergonomics hazards are:

- Manual handling
- Heavy lifting
- Twisting movements, and
- Long hours of working in awkward positions

How do I know I have an MSD?

The following would be experienced:

- Numbness in your fingers
- Numbness in your thighs
- Difficulty moving finger
- Stiff joints or
- Back pain

Comparison of the local methods with the standard

Cereals and pulses are packaged by small-scale farmers using a bag with label 100 kg bags which contain about 70 - 75 modus (a unit of mass used in northern Nigeria). A mud is approximately 1.13 kg. Therefore, a bag is approximately 0.122 metric tonne(85 kg)which is too heavy for humans to carry in micro transport. It is labor intensive, and this affects human physique. Fig.4 gives the guideline weights at each part of the body. Working outside these guidelines is likely to increase the risk of injury. According to OSHA (2000), matching the requirements of a job with the capabilities of the worker is the approach to be adopted to reduce the risks of musculoskeletal injuries resulting from handling materials manually. Figure 3 shows the guidelines on weights recommended to lifting for men and women.

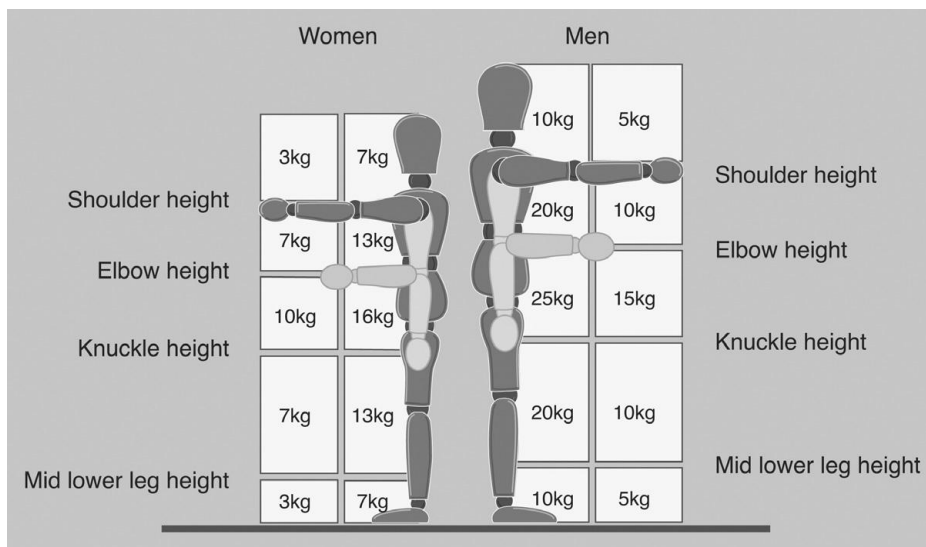


Figure 3: Guideline Weights
(Source: OSHA, 2000)

CONCLUSION

The study shows that cereals and pulses were. The handling methods were labourers, carts, wheelbarrows, trucks; motorcycles, vans, Lorries, pick-up trucks, tricycles. Loading and off-loading were done manually with no precautionary measures which may result in MSD. The available MSD found were lower back pain which is the highest risk with the percentage of 20.2 %, followed by wrist/hands, shoulders, upper back, neck and elbow pain. The traditional method is labor-intensive and time-consuming.

RECOMMENDATIONS

1. The size of bag should be reduced to 25 kg that is recommended per person to carry
2. Lifting device for loading and offloading bags should be employed
3. When lifting, upright position should be maintained and avoid bending and twisting
4. Overloading should be avoided exertion of excessive force
5. Static posture should be avoided during driving and pushers
6. Contact stress should be avoided through reduction in the loads carried in wheelbarrow and cart

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