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A Survey of Musculoskeletal Disorder Prevalence in the Kiln Brick Moulding Industry in Botswana

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Abstract

Musculoskeletal disorders are reported to occur as a result of jobs that put muscles under unnecessary physical demand. Most tasks performed in the Kiln brick moulding may expose workers to musculoskeletal disorder risks factors that involve manual material handling. Although data from elsewhere exist about these conditions, scanty epidemiological studies concerning workers in the Kiln brick moulding industry in the New Emerging Economies (NEE) exist. The aim of this study was to investigate the prevalence of musculoskeletal disorders in the Kiln brick moulding industry in Botswana for purposes of understanding the effects of these on productivity so that proper intervention strategies can be developed to aid workers. The Body Map Diagram was used to collect data on the severity of the condition of workers in one brick moulding factory in Gaborone. The results showed that the prevalence of MSDs in this plant stood generally at 75% with back pain, shoulder pain and wrist pain accounting for the worst cases of pain. Furthermore, there was no sufficient evidence to suggest that having worked before had a bearing on the severity of MSDs bringing another dimension that workers could be bringing such condition to the work environment, therefore challenging employers to conduct medical examinations as a prerequisite for employment in the brick moulding industry.

Keywords: Musculoskeletal disorders; Kiln brick moulding industry; Botswana

Introduction

One of the greatest challenges facing New Emerging Economies (NEE) such as Botswana is the need to invest in Human Resource Development (HRD). This is because in the NEE, issues of population growth and the requirement to have economic alternatives to accommodate such a growth are sizeable [1,2]. However, unlike in other NEE for example India, Pakistan, Bangladesh etc., population growth in Botswana is not yet much of a great challenge for promoting the drive for economic alternatives, but despite this there has been a need for the government to move away from an economy driven by diamond mining to that which is driven by manufacturing because diamonds as a natural resource is not sustainable to address challenges emanating from population growth in the future. As a consequence, manufacturing and service industry have been identified as areas that can create employment and also drive Botswana's economy in a more sustainable fashion [3]. However, the manufacturing sector in Botswana remains undeveloped but where there has been notable advancement, the tendency has always been for the sector to concentrate more on the construction sector, with Kiln brick moulding accounting for a significant stake. Nonetheless, though the physical activities associated with working in a kiln plant and their effects have generally been noted to present the greatest ergonomic challenges on workers [3]. In Botswana the ergonomic challenges associated with the Kiln brick moulding industry is a scantily studied area.

Brick Moulding and the prevalence of MSD

Kiln Brick moulding involves a very wide range of physical activity from positions and postures that present workers with the risks of developing Musculoskeletal Disorders [4]. In this type of brick moulding for example, it has been observed that workers are exposed to ergonomic challenges encompassing Manual Material Handling (MMH) activities such as pulling, pushing, lowering, walking, carrying mining, preparation of clay, lifting, bending, stretching, drying bricks, burning bricks etc. These activities have been observed to expose workers to several ergonomic risk factors such as excessive force, repetition, awkward posture, static postures and heat exhaustion. The presence of these risk factors is accredited to increasing the potential for occurrence of injuries and illnesses, particularly, Musculoskeletal Disorders (MSDs) leading to poor health and consequently to low productivity on the part of the workers [6].

In brick moulding, workers always remain under pressure to meet targets and their working conditions and habits are usually devoid of any ergonomics values [3]. The situation appears to be even worse in the New Emerging Economies (NEE) where ergonomics in industry is notably very expensive and sometimes regarded as a luxury rather than a necessity [7,8,9].

While incidents of MSDs in the brick moulding industry in Botswana are sparsely reported, the severe exposure to MSD risk circumstances and their matching consequences have been observed in many brick moulding industries elsewhere. In India, for example, Manoharan et al. [4] investigated the physical risk factors for MSDs injuries among two hundred and sixty four (N=264) brick Kiln workers using psycho-physiological study method. Their study revealed that workers in clay and mould process were significantly exposed to high physical risk as compared to workers engaged in

rimming and a clay making process which generally affected worker productivity. The study showed that 12.5% per 100 workers in the kiln manufacturing sector experience MSDs injuries as a result of exposure to ergonomic risk aspects.

In Nigeria, Ferraira and Tracy [5] compared workers from two factories involved in Kiln brick moulding and generally found MSDs to be very high among brick moulding personnel from both factories, particularly the back, shoulders and wrist with the back accounting for more illnesses. However, the researchers found difference in work organization and methods of handling influencing the injury rates, describing workers in the plant with more injuries, as having handling techniques and work organization which were characterized by lack of variety, whereas the other plant, which had a less MSDs illnesses, was characterized by versatility, and used a wide variety of handling techniques [5].

Travelyan and Haslam [8] conducted a study on female workers in the unorganised sector of the manual brick manufacturing units in India using both the modified Nordic Questionnaire and the Body Part Discomfort (BPD) Scale to identify MSDs and the zones of discomfort in different body parts. They found that the zones of maximal discomfort for the female moulder were low back followed by calf muscles, trunk, ankle and wrist. They concluded that immediate ergonomics interventions were needed to prevent MSDs by correcting the harmful working postures and reduce their stress.

Zia-ur-Rahnam [10] also report that in Pakistan, brick moulders have the highest percentage problems of back aches, leg aches, joint pains due to the posture required for brick moulding.

In South Africa, Ndivhudzannyi [9] carried out a study among brick moulding workers in the sorting section to identify specific ergonomics risk factors for development of MSDs. Using the Logical Approach where subjective pain/discomfort on regions and psychosocial situation which brick sorters perceived as contributing factors to MSDs, the researchers found that the body parts most commonly affected were lower back, followed by wrist/hands, shoulders, neck and upper back. In this study, frequent twisting and bending of the trunk were found to be the leading cause of pain/ discomfort on the back.

In a study conducted by [12], among small micro enterprises in Botswana, it was found that 65.4% of the enterprises did not consider health and safety issues as a priority area in their business. Botswana does not have a national occupational health and safety policy in place and this makes enforcement to be weak. The regulations which cover brick moulding follow under the mines, quarries works and machinery act of parliament. The act regulates safety, health and welfare in workplaces. However, an inspector is not empowered to summarily close to the operations of a factory/workplace that is deemed to have dangerous working conditions that pose imminent danger to employees. A court order must be obtained to do so. The Division of Occupational Health and Safety has been mandated to enforce this act. This renders the regulatory authority weak and finds it difficult to implement the act effectively.

Zia-ur- Rahman [10] argues that a safe and healthy workplace has fewer risks for injuries or damage to property and less incidents of disability in the workforce. A healthy and motivated workforce is a key to both productivity and economic prosperity [11].

It is evident from these studies that back pain is the most prevalent condition amongst workers in the brick moulding industry with the wrist, shoulders and neck also reported to be common among kiln brick moulders. Given this scenario and the poor working conditions that kiln brick moulders encounter in Botswana, it is reasonable to assume that such a challenge does also exist in Botswana and therefore, it must be confronted head on before it goes out of control to compete for the same resources with other unrelenting diseases such as HIV/ AIDS.

One of the four pillars of Botswana's long term Vision 2016, is to have a Healthy and Safe Nation. But judging by the poor working conditions and the ergonomic challenges in the manufacturing sector, apparently made worse by lack of interventions to correct the many harmful working conditions in this sector, reaching this vision could be difficult to realise.

Objective of the study

The objective of this study was to establish whether there are any MSDs related sickness and injuries in the brick moulding Industry in Botswana and whether these sicknesses and injuries are similar to those reported elsewhere. Furthermore, the study sought to generate possible ergonomics intervention programmes needed to reverse the prevalence trend. To achieve these objectives the following questions had to be answered. These were;

1. How many workers in this plant reported MSD symptoms?
2. Which body part has the least/most number of workers complaining of?
3. Is there a difference in MSD prevalence among workers with a working experience of one year and below and those who have worked in the plant for a period of 1 year plus?

Subjects

In total 72 participants (N=72) from a brick moulding plant in Botswana took part in the study. Participants worked in 9 various sections of the plant as follows; Skenkil, Stacking, De-stacking, Pay loader operator, Dry line assistant, Pallet Repair, Tyre repair, Trapper and Extruder. However, similar operations were unificated as shown in Table 1 below:

Operators	**Fork loader**	**Pay loader**	**Extruder**	
Maintenance personnel	Electrical, Fitter	Pallet repair	Tyre repair	Welding
Administration	She rep	Store keeper	Lab assistant	Officer
Skentil	-	-	-	-
Starkers	Stacking	Destarking	Strappers	

Table 1: Arrangement of sections

Table 1 show that the five sections emerged from the union. These are; Operators, Maintenance personnel, Administration, Skentil and Starkers.

In this plant, 98.5% of the participants worked for a total of 9hrs for five working days a week, while only 1.5% worked for 10 hours for the same number of working days. All worked during the day shift. Their years of work experience ranged from 1 year to 12 years, with 46% reporting to have worked for two years or less while 44% had a working experience of 3-12 years. In addition, 29 workers or 40.5%

reported to have worked at another job before, for a period ranging from 1 to 3 years. The majority of these participants worked in the kiln yard section of the plant (59.7%), followed by workers in the maintenance department whose number stood at 12.5%. 21 (29%) of the participants had worked in a third job. 17% of which had worked in this job for 1month to a year, while only 9 (13%) had worked in this third job for a period of 2-3 years. Therefore, the study comprised participants who had worked in three different jobs within the plant and their working experienced ranged from 1 month to 12 years.

Nature of the tasks

Participants were engaged in tasks that required lifting, pushing, bending, repetitive work and the use of excessive force. For example, in a skenkil setting process, workers created a foundation from a cover stock (under fired bricks) and build and covered it with coal before the stacking of bricks can take place. To perform this task worker have to engage in lifting of stock bricks and lay them down to build the kiln. The skenkil setting team consisted of 26 workers who achieve a minimum of 15 pallets stacked per person. However, during the stacking process one team of twenty workers was required to stack dried bricks into kilns.

In the de-stacking process, three teams of fifteen workers were required to de-stack fully burnt bricks from kilns. These bricks were then stacked in pallets of 500 bricks and then strapped to prevent falling during loading and transportation. Stacking is carried out twice, i.e., during skenkil setting and after the bricks have cooled and dried as these are then stacked into pallets. Each brick weighed an average 2.8 kg and measured 220 mm by 100 mm by 70 mm. Each pallet consists of 500 bricks and each worker has to produce five pallets a day. This means that the task is repeated 5000 times (500 by 5x2) in a day for both the stacking and de-stacking process.

Following the de-stacking process is the work of a pay loader operator who works during the cleaning process. A pay loader operator is required to scrap the waste bricks thrown around the kilns. Thereafter, the same operator is then expected to load and dispose the waste as brick heap. The same operator is also responsible for mixing raw materials according to a mix design. The mix is then loaded into box feeders at the clay plant where extrusion of green bricks takes place which would then be followed by dry line activities. At this point of production, the dry line assistant task is to cover green bricks with black plastic so that they can dry up without being damaged by rain. These workers uncover green bricks when there is no rain so that the sun can dry them up for a period of four weeks. The team consisted a maximum of four members.

During maintenance, a team of three employees called pallet repairers are required to repair worn out wooden pallets. They use hand saws and claw hammers to carry out their tasks.

Tyre repairers fix damaged or worn tyres and change tyres on the vehicles by lifting vehicles off the ground using a hydraulic jack, tyres are removed from the rim using tyre levers.

In addition to these challenges, some participants when performing their daily tasks were being exposed to heat from both the sun and from the burning coal powered kilns. Moving vehicles also exposed workers to noise and dust. All in all workers were exposed to a series of ergonomics risks factors which ranged from, among others; bending, asymmetric lifting, use of force, vibrations, heat and dust all of which may result in MSDs development.

Methods and Tools

A preliminary visit was made prior to the start of the research mainly for familiarization purposes. Thereafter, participants were informed about the study and consent sought from them. Participants were, on a set date, given the Modified Collet Bishop Body map rating scale where they were asked to accordingly rate their level of pain or discomfort. The Collet Bishop Body map rating scale is a subjective scale ranging from 0-10 (0 = no pain, 10 = worst pain). In addition, participants were observed while performing their daily tasks. A total of 100 questionnaires were distributed and 72 (72%) were returned after which the data was then entered into the Statistics Package for Social Scientists (SPSS) for analysis purposes.

Results

To determine the number of workers in the plant who suffered from MSD symptoms, the following question was asked; i.e. when performing your task, did you at any given time feel pain or discomfort over the last month? Table 2 below shows participants responses to the question.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	13	18.1	18.1	18.1
	yes	56	77.8	77.8	95.8
	yes2	3	4.2	4.2	100.0
	Total	72	100.0	100.0	

Table 2: Pain and discomfort over the last month

Table 2 shows that 18% of participants reported feeling no pain or discomfort over the last month when performing their tasks, while 79% reported feeling pain or discomfort over the same period, suggesting that more than half of the workers reported MSD symptoms over this period in this plant.

However, to determine the body part that had the most workers complaining of, we observed frequency tables and percentages on responses of feeling the worst pain on that body part during the last 12 months. Table 3 below shows the body part most workers complained of feeling the worst pain during the last twelve months.

	No pain		Little pain		Average pain		Lot of pain		Worst	
	N	%	N	%	N	%	N	%	N	%
Neck	26	36.1	14	19.4	6	8.3	13	18.1	13	18.1
Left Shoulder	16	22.2	10	13.9	14	19.4	10	13.9	22	30.6

Left elbow forearm	32	44.4	8	11.1	17	23.6	8	11.1	7	9.7
Left wrist hand	28	38.9	13	18.1	11	15.3	6	8.3	14	19.4
Left hip thigh buttock	35	48.6	13	18.1	7	9.7	8	11.1	9	12.5
Left Knee	30	41.7	8	11.1	9	12.5	15	20.8	10	13.9
Left hand foot	38	53.5	10	14.1	4	5.6	10	14.1	9	12.7
Upper back	16	22.2	5	6.9	15	20.,8	10	13.9	26	36.1
Right Shoulder	16	22.2	8	11.1	13	18.1	10	13.9	25	34.7
Right elbow forearm	27	37.5	8	11.1	13	18.1	12	16.7	12	16.7
Lower back	15	20.8	8	11.1	12	16.7	11	15.3	26	36.1
Right hand wrist	30	41.7	10	13.9	9	12.5	7	9.7	16	22.2
Right hip thigh buttock	31	43.1	10	13.9	8	11.1	9	12.5	14	19.4
Right knee	31	43.1	7	9.7	7	9.7	14	19.4	13	18.1
Right ankle foot	36	50.0	13	18.1	5	6.9	9	12.5	9	12.5

Table 3: Worst pain during last twelve months

From Table 3, it is evident that Lower back (36%) upper back (36%), right shoulder (34%) and left shoulder (30%) were the body parts which workers complained of feeling the worst pain. Other body parts such as right hand wrist (22%), neck (18%), left wrist (19%), left knee (14%), right elbow, forearm (17%), right hip, thigh/ buttock (19%), right knee (18%) and right ankle/foot (12.5%) were also observed to be affected. The least number of worst pain cases recorded was on the left elbow as only 9.7% worst pain cases were recorded. It can, therefore, be said that at this plant lower back, upper back as well as right shoulder and left shoulders were the body areas where participants recorded the worst Musculoskeletal Disorder symptoms.

The next stage was to determine whether there were any worst pain differences between workers with 1 year or less experience and those who have been working in this company for more than a year. The results of this exercise are shown in Table 4 and 5.

	No pain		**Little pain**		**Average pain**		**Lot of pain**		**Worst**	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Neck	12	31,6	9	23,7	3	7,9	7	18,4	7	18,4
Left Shoulder	7	18,4	5	13,2	9	23,7	8	21,1	9	23,7
Left elbow forearm	15	39,5	5	13,2	9	23,7	6	15,8	3	7,9
Left wrist hand	14	36,8	7	18,4	6	15,8	4	10,5	7	18,4
Left hip thigh buttock	19	50,0	9	23,7	3	7,9	4	10,5	3	7,9
Left Knee	15	39,5	6	15,8	4	10,5	8	21,1	5	13,2
Left hand foot	24	63,2	5	13,2	2	5,3	5	13,2	2	5,3
Upper back	9	23,7	2	5,3	8	21,1	7	18,4	12	31,6
Right Shoulder	7	18,4	4	10,5	9	23,7	7	18,4	11	28,9
Right elbow fore arm	13	34,2	4	10,5	10	26,3	7	18,4	4	10,5
Lower back	9	23,7	3	7,9	7	18,4	4	10,5	15	39,5
Right hand wrist	16	42,1	7	18,4	4	10,5	5	13,2	6	15,8
Right hip thigh buttock	19	50,0	5	13,2	6	15,8	3	7,9	5	13,2
Right knee	17	44,7	4	10,5	2	5,3	8	21,1	7	18,4

Right ankle foot	21	55,3	9	23,7	1	2,6	5	13,2	2	5,3

Table 4: Years of experience: Under one year

Table 4 shows that lower back pain (39.5%) and upper back pain (31.6%) are the most prevalent MSD symptoms followed by left shoulder (23.7%) and right shoulder (28.9%) with right ankle foot recording 5.3% of feeling the worst pain during the last twelve months.

Table 5 illustrates MSDs symptoms as reported by participants with one year plus experience.

	No pain		**Little pain**		**Average pain**		**Lot of pain**		**Worst**	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Neck	14	41.2	5	14.7	3	8.8	6	17.6	6	17.6
Left Shoulder	9	26.5	5	14.7	5	14.7	2	5.9	13	38.2
Left elbow forearm	17	50.0	3	8.8	8	23.5	2	5.9	4	11.8
Left wrist hand	14	41.2	6	17.6	5	14.7	2	5.9	7	20.6
Left hip thigh buttock	16	47.1	4	11.8	4	11.8	4	11.8	6	17.6
Left Knee	15	44.1	2	5.9	5	14.7	7	20.6	5	14.7
Left hand foot	14	42.4	5	15.2	2	6.1	5	15.2	7	21.2
Upper back	7	20.6	3	8.8	7	20.6	3	8.8	14	41.2
Right Shoulder	9	26.5	4	11.8	4	11.8	3	8.8	14	41.2
Right elbow fore arm	14	41.2	4	11.8	3	8.8	5	14.7	8	23.5
Lower back	6	17.6	5	14.7	5	14.7	7	20.6	11	32.4
Right hand wrist	14	41.2	3	8.8	5	14.7	2	5.9	10	29.4
Right hip thigh buttock	12	35.3	5	14.7	2	5.9	6	17.6	9	26.5
Right knee	14	41.2	3	8.8	5	14.7	6	17.6	6	17.6
Right ankle foot	15	44.1	4	11.8	4	11.8	4	11.8	7	20.6

Table 5: Years of experience- One year or more

It can be seen from table 5 that lower back (43%), upper back (46%) and right shoulder (32%) carry the worst pain recorded cases for workers with one year plus. In this regard, there is strong evidence to suggest that workers with one year and above, experience more symptoms of the worst pain in this industry than those with less than one year working experience in the plant.

However, to ascertain whether working before could have been a factor in the development of MSDs, we observed whether there were any differences between workers who have had another job before and those who had not worked before. Table 6 show MSD reported cases of people who had worked before.

	No pain		**Little pain**		**Average pain**		**Lot of pain**		**Worst**	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Neck	18	51.4	5	14.3	2	5.7	6	17.1	4	11.4
Left Shoulder	14	40.0	2	5.7	5	14.3	4	11.4	10	28.6
Left elbow forearm	18	51.4	4	11.4	6	17.1	3	8.6	4	11.4
Left wrist hand	18	51.4	4	11.4	4	11.4	3	8.6	6	17.1
Left hip thigh buttock	20	57.1	4	11.4	2	5.7	4	11.4	5	14.3
Left Knee	18	51.4	2	5.7	5	14.3	7	20.0	3	8.6
Left hand foot	18	52.9	4	11.8	2	5.9	5	14.7	5	14.7

Upper back	13	37.1	2	5.7	7	20.0	4	11.4	9	25.7
Right Shoulder	13	37.1	2	5.7	6	17.1	5	14.3	9	25.7
Right elbow fore arm	17	48.6	4	11.4	2	5.7	6	17.1	6	17.1
Lower back	8	22.9	6	17.1	6	17.1	5	14.3	10	28.6
Right hand wrist	17	48.6	3	8.6	5	14.3	2	5.7	8	22.9
Right hip thigh buttock	16	45.7	6	17.1	3	8.6	5	14.3	5	14.3
Right knee	18	51.4	2	5.7	6	17.1	5	14.3	4	11.4
Right ankle foot	18	51.4	4	11.4	3	8.6	4	11.4	6	17.1

Table 6: Have you worked before- Has worked before

Table 7 demonstrates that lower back (28.6%), upper back (25.7%) still recorded a high percentage of worst pain cases. However, it is evident that people who had worked before also experience worst pain in the shoulders (right shoulder 25.5% and left shoulder 28.6%) in this plant.

	No pain		**Little pain**		**Average pain**		**Lot of pain**		**Worst**	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Neck	8	21.6	9	24.3	4	10.8	7	18.9	9	24.3
Left Shoulder	2	5.4	8	21.6	9	24.3	6	16.2	12	32.4
Left elbow forearm	14	37.8	4	10.8	11	29.7	5	13.5	3	8.1
Left wrist hand	10	27.0	9	24.3	7	18.9	3	8.1	8	21.6
Left hip thigh buttock	15	40.5	9	24.3	5	13.5	4	10.8	4	10.8
Left Knee	12	32.4	6	16.2	4	10.8	8	21.6	7	18.9
Left hand foot	20	54.1	6	16.2	2	5.4	5	13.5	4	10.8
Upper back	3	8.1	3	8.1	8	21.6	6	16.2	17	45.9
Right Shoulder	3	8.1	6	16.2	7	18.9	5	13.5	16	43.2
Right elbow fore arm	10	27.0	4	10.8	11	29.7	6	16.2	6	16.2
Lower back	7	18.9	2	5.4	6	16.2	6	16.2	16	43.2
Right hand wrist	13	35.1	7	18.9	4	10.8	5	13.5	8	21.6
Right hip thigh buttock	15	40.5	4	10.8	5	13.5	4	10.8	9	24.3
Right knee	13	35.1	5	13.5	1	2.7	9	24.3	9	24.3
Right ankle foot	18	48.6	9	24.3	2	5.4	5	13.5	3	8.1

Table 7: Have you worked before- Has not worked before

From Table 7, it is evident that people who had not worked before still complain about the worst pain in the upper back (46%), lower back (43%), left shoulder (32%) right shoulder (43%) and right hand wrist (22%) regions. In addition, we note that there are also worst pain cases in other body regions such as the neck (24%) and the right knee (24) right hip thigh (24%). In this particular case, we see the percentage of worst pain complaints slightly increasing, particularly at the neck, knees and hips with worst pain cases at the upper back, lower back remaining almost the same when compared with people who has worked before. This is interesting because one would assume that previous work would have worst pain cases of MSD symptoms than those who had not worked before, particularly at the most vulnerable regions of the body such as the back and shoulders.

Discussions

Musculoskeletal Disorders are reported to occur as a result of the presence of several risk factors, including force, repetition, contact stress, vibrations and a whole range of jobs that put muscles under unnecessary physical demand. There is no doubt that most tasks performed at this brick moulding plant, exposed workers to MSD risk factors that involved manual material handling. This is a scenario that is common to brick moulding plants from other countries such as

India [8], Pakistan [11] and the Republic of South Africa [8]. In these countries MSDs were indeed reported to be prevalent. In our study, we found that 75% of workers had MSD symptoms. Back pain, particularly, lower back pain and upper back were the most prevalent MSDs complaints amongst brick moulding workers. In addition, shoulder pain remains the second most prevalent MSDs complaint amongst workers in this brick moulding plant. This is consistent with the Zia-ur-Rahman et al. [10] study, which revealed similar findings, where for example back pain accounted for most complaints. Other studies show that the least prevalent MSD complaints amongst brick moulding worker is elbow pain and our study revealed similar findings. Poor lifting techniques and prolonged bending are often cited as causes. In this study, we found workers lifting bricks without proper lifting techniques and often with no previous training regarding lifting. For example, in the skenkel workers would build the kiln firing foundation and the actual kiln manually stacking bricks and sometimes using just their bare hands and occasionally working under direct sunlight where temperatures can sometimes reach 41 Degrees Celsius.

It is assumed that the more people stay in the same job, the more likely that they will develop MSDs symptoms particularly when their job involves manual material handling. This is true when we consider that MSDs are cumulative and occur over a long period of exposure to the risks. However, we found in our study that there is no sufficient evidence to suggest that workers who had not worked before experience less MSDs symptoms. This is interesting because it is generally presumed that having worked before influence the development of MSD symptoms. In this particular study, we found no evidence to support such a claim because in our study, worst pain cases remained almost unchanged in the most vulnerable regions of the body, namely lower back, upper back and shoulders. This led to one interesting conclusion that the issue of MSD development is not only restricted to work, but other factors as we were in this study unable to determine whether having worked before was responsible for these symptoms. One may therefore begin to consider factors surrounding our traditional lifestyles in Botswana and the way people change jobs frequently looking for better paying jobs with employers not taking keen interest to determine the health status of the potential worker largely due to inadequacy of Botswana's Factories Act which does not recognise ergonomics.

Most people in Botswana are still poor and rely on government to provide the basic needs such as food [3]. Furthermore, the majority of people still practice subsistence agriculture and use tools and processes that are devoid of ergonomics. For example, in the developed countries the use of mechanised systems is used to eliminate lifting, carrying, pushing. In addition, many of Botswana's traditional village activities involve manual material handling. For example, the use of large pots to cook seswaa (pounded meat) and porridge. Activities such as winnowing, where people lift buckets full of maize above shoulder height and fill the same buckets with maize from the positions below knee level outside the safe lifting zones. Today, the kgotla (traditional) meetings are still held, where local issues are debated. The kgotla also acts as a court where the chief and village elders mediate between the aggrieved. However, such meetings can go on and on for hours with men sitting on ill designed traditional chairs and women sitting on the floor without interrupting the setting of fatigue. Figure 1 and 2 shows a kgotla setting.

Figure 1: Kgotla meeting

Figure 2: Traditional sitting

We argue that such traditional activities can expose potential workers to MSDs risks before they can even start formal employment such as brick moulding.

Conclusion

The relationship between MSDs and the workers workstation configuration is multifactorial. While postures and the fit between the worker and workstation may be associated with MSDs, other variables need to be explored to better understand the phenomenon. In developing countries the source of exposure to MSDs risks seem to be severe mainly because of the lifestyles adopted, and made worse by poverty and the need for employment. Our conclusion therefore is that, though studies elsewhere have shown a significant correlation between manual labour and MSDs, in developing countries, people are exposed even before they are recruited to new jobs. In this regard, there is a need for medical examination as a prerequisite for new jobs. Furthermore, workers should be trained on manual material handling and general ergonomics and workplace design. However, such efforts cannot exist without the presence of proper occupational health and safety laws or Acts to guide and support policies designed to improve the wellbeing of these workers. This study involved a small population to draw conclusions that are far more convincing. However, through

the study we are able to appreciate the plight of workers in the brick moulding industry where another study involving a large number of workers is needed.

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