

**THE CORRELATION BETWEEN AGE, TENURE, AND HEIGHT  
WITH MUSCULOSKELETAL DISORDERS COMPLAINT  
(OBSERVATIONAL STUDY AMONG BRICK CRAFTSMAN  
IN LOK BUNTAR VILLAGE SUNGAI TABUK DISTRICT)**

**Ihya Hazairin Noor<sup>1</sup>, Zairin Noor Helmi<sup>2</sup>, Ratna Setyaningrum<sup>3</sup>**

*Public Health Study Program Medical Faculty Lambung Mangkurat University<sup>1</sup>*

*Orthopaedic and Traumatology Department Ulin General Hospital Medical Faculty  
Lambung Mangkurat University<sup>2</sup>*

*Occupational Health and Safety Department Public Health Study Program Medical Faculty  
Lambung Mangkurat University<sup>3</sup>*

*email: ratnasetyaningrum.rr@gmail.com*

**Abstract**

Based on research by the Center for Ecological Health Research and Development Department of Health in 2004 involving 800 people from 8 informal sector in Indonesia, brick craftsman are a group of workers who suffered most musculoskeletal disorders (MSDS) complaints. This research aims to determine correlation between age, tenure, and height with MSDS complaints among brick craftsman in Lok Buntar Village Sungai Tabuk District.

This is an observational analytic research with cross sectional approach. The population was the entire of brick craftsman in Lok Buntar Village with 37 samples. The research instrument was a sheet, microtoise and Nordic Body Map check list. The statistical test had been used chi-square test ( $\alpha = 0.05$ ).

The majority of respondents in aged  $\geq 35$  years (54.05 %) with work duration  $\geq 8$  years (56.76 %) and height  $< 151.3$  cm (67.57%). The results showed that there is a significant correlation between age with MSDS complaints with p-value of 0.001 and OR was 17,500, there is significant correlation between tenure with MSDS complaints with p-value 0.000 and OR was 26,000, but there is no significant correlation between height with MSDS complaints by p-value 0.353.

There is significant correlation between age and tenure with MSDS complaint, but there is no significant correlation between height with MSDS complaint. Therefore, brick craftsman is suggested to create an ergonomic work stations.

**Keywords:** musculoskeletal disorders complaints, age, tenure, height, brick craftsman

**A. Introduction**

Musculoskeletal disorders (MSDS) complaints are complaint in the skeletal muscles that felt by someone ranging from mild to very ill (1). Based on data from EODS (Eurostat Figures on Recognized Occupational Diseases) reported in Europe in 2005, MSDS complaint ranks first as an occupational disease. A survey was also conducted on workers in Europe stated that 24.7% of workers complain of back pain, muscle aches 22.8% and 45.5% complained of pain and fatigue (3).

Based on research by the Center for Ecological Health Research and Development Department of Health in 2004 involving 800 people from 8 informal sector in Indonesia, showed MSDS complaints affects about 31.6% of oil palm farmers in Riau, 21% puppet artisans in Yogyakarta, 18% onyx artisans in West Java, 16.4% of gold miners in West Kalimantan, 14.9% in Bogor shoemaker, and 8% in Central Java brass artisans. Brick craftsman in Lampung and Jakarta are fishing in a group of workers who suffered most MSDS complaints, each about

76.7% and 41.6%. All average workers complain of pain in the back, shoulders, and wrists (4).

One of the brick-making site that is popular in South Kalimantan is Lok Buntar Village Sungai Tabuk District. Based on preliminary surveys and information from Secretary of Sungai Tabuk District, Sungai Tabuk District has Small and Medium Enterprises (UKM) that produce more bricks than other villages in the district, such as Abumbun Jaya, Gudang Tengah, and Gudang Hirang. Lok Buntar village has 82 brick-making home-based business and printer 120 bricks. Brick making in Lok Buntar village is work done by women workers and the process is done manually, from the printing process until the drying process. When the process works, bending the body, the position of the head is bowed, sat bending, and lifting weights repeatedly without an ergonomic position. This conditions can increase the risk of MSDS complaints among the workers.

There are 3 factors as causes of MSDS complaints that are individual factors, occupational factors and environmental factors. Previous research on factors associated with MSDS complaints among furniture workers in Benda District of Tangerang City in 2011 states that there is a correlation between individual factors with MSDS complaints. Individual factors that influence the risk of MSDS complaints namely age, tenure and height (2.5).

MSDS complaints usually experienced at the age of 35 years and the level of complaints will increase with age, tenure for 8 years or more at risk of developing MSDS complaints compared tenure <8 years, in terms of height, the body generally frequent high had MSDS complaints (5). Therefore, researchers interested in conducting research to determine the correlation of age, tenure and height with MSDS complaints among brick craftsman in Lok Buntar village Sungai Tabuk District.

## B. Method

This is an observational analytic study with cross-sectional method. Research sample or respondents in this study using purposive

sampling technique as many as 37 brick craftsman with the inclusion criteria.

The data were obtained by filling a questionnaire to find out the identity of respondents, age and height of the respondents, sheets Nordic Body Map (NBM), which has been standardized to measure musculoskeletal disorders complaints and Visual Analogue Scale (VAS) to determine the subjective pain scale a little sore, sick and very ill at the brick craftsman.

Independent variable namely age, tenure, and height. Dependent variable is MSDS complaints. Data were analyzed using univariate analysis to look at the frequency distribution of each variable separately, both independent variables are age, tenure, height, and the dependent variable is the MSDS complaint. Bivariate analysis was used to analyze the correlation between ages, tenure, height with MSDS complaints using chi square test with a confidence level of 95%.

## C. Result and discussion

Lok Buntar Village located in Sungai Tabuk District South Kalimantan Province. This area is known for its small and medium-sized industrial area because there are a lot of brick-making home-based business.

The printing process begins of making bricks raw materials and raw materials put into place printing. After completion of the printing process, was appointed to the location of brick drying to dry. After drying or oven burnt bricks that reduced water content and the bricks become stronger. Work scorer brick work is done in an abnormal posture like that too bent backs, some tasks in the brick molding is done in a static position, and conducted several times repeated movement in a long time.

The activity is carried bricks printer raises the risk of MSDS complaints. Individual factors such as age, tenure and height is one of the few risk factors that influence the occurrence of MSDS complaints. Person's age affects bone degeneration, the older person has higher risk of decreased elasticity of the muscles and bones. MSDS complaints is a chronic disease that

takes a long time to develop, so the longer it works, the greater the risk for MSDS complaints. At higher body generally often experience back pain due to due to the equilibrium condition in order to receive the load structure, good weight of the body as well as other additional loads (5).

### Univariate

In this study, the focus of the study were age, tenure, the height and MSDS complaints among bricks printer. Preview age, tenure, height and MSDS complaints of respondents as follows.

#### 1. Age of respondents

Based on the results of the study to 37 respondents obtained the frequency distribution of the age of the respondents is presented in Table 1.

Table 1. Distribution and Frequency of respondent's age

No.	Age	Number	Percentage(%)
1	<35 years	17	45.95
2	≥ 35 years	20	54.05
Total		37	100

Sources: Primary Data

Table 1 shows the distribution and frequency of respondent's age were chosen as samples in this study. Average age of respondents is 33.87 years old. As many as 17 (45.94%) of respondents ages <35 years old and categorized as no-risk aged group.

#### 2. Tenure of respondents

Based on the results of the study to 37 respondents obtained the frequency distribution of the respondents tenure is presented in Table 2.

Table 2. Distribution and Frequency of respondent's tenure

No.	Tenure	Number	Percentage(%)
1	<8 years	16	43.24
2	≥ 8 years	21	56.76
Total		37	100

Table 2 shows the distribution and frequency of respondent's tenure were selected as samples in this study. On average, respondents had 10.62 years of tenure. As many as 16 (43.24%) of respondents have a tenure < 8 years and categorized as a group are not at risk.

#### 3. Height of respondents

Based on the results of the study to 37 respondents obtained frequency distribution of heights is presented in Table 3.

Table 3. Distribution and Frequency of respondent's height

No.	Height	Number	Percentage (%)
1	<151 cm	25	67.57
2	≥151.3 cm	12	32.43
Total		37	100

Table 3 shows the distribution and frequency of respondent's height were selected as samples in this study. On average, respondents had height 149.42 cm. As many as 25 (67.57%) of respondents had a height <151 cm and categorized as a group are not at risk.

#### 4. Musculoskeletal Disorders Complaint

Based on the results of the study to 37 respondents obtained frequency distribution of musculoskeletal disorders complaints is presented in Table 4.

Table 4. Distribution and Frequency of respondents musculoskeletal disorders complaints

No.	MSDS Complaints	Number	Percentage(%)
1	complaints	21	56.76
2	no complaint	16	43.24
Total		37	100

Based on Table 4, it is known that the majority of respondent's worker is impaired by as much as 21 respondents or 56.76%. While respondents were not experiencing as many as

16 complaints musculoskeletal disorder or by 43.24% of respondents.

MSDS complaints experienced by 56.76% of respondents mapped by *Nordic Body Map* to 28 points of the body. Point is an indicator of the body are mapped locations MSDS complaints in this study. The frequency distribution of respondents by the body that feel MSDS complaint can be seen in Figure 1.

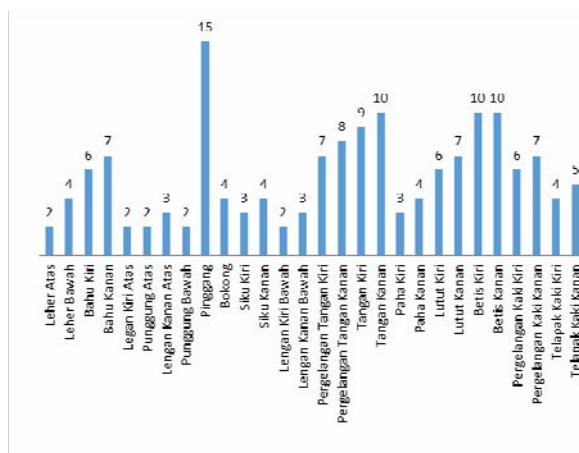


Figure 1. Distribution Frequency MSDS complaints locations

Figure 1 examines that part of body that most complained is waist as many as 71.43% respondents, followed by right shoulder, right arm, left calf, right calf and left hand as many as 47.62% and 42.6% respectively. Respondents who complain of pain waist section has an average age of 40.87 years with an average service life of 15.73 years and an average height of 148.4 cm.

Each job position has different effects on the body. In the brick molding process workers have to adjust the body with the tools and objects that worked. Brick molding activities is work being done on the floor by bending and squatting position so as to cause complaints of pain in the hip, spine or on the knees, if this position is maintained for a long time and constantly lead to serious problems in the muscles and joints. Based on observations, printer bricks in the village of Lok Buntar dominant work by using the right hand so that your right hand is one of the most body point in complaining

Working with a squat position has the advantage, among others, energy consumption and reduced blood circulation purposes. Working with a squatting position also has positive factors that can prevent workers from arthritis or osteoarthritis. But the squat stance for too long can cause the spine to curve and stress on leg muscles, knees and lumbar region. Symptoms that may occur are fatigue, pain, restless or edgy (15).

This is consistent with data reported by the Center for Ecological Health Research and Development Department of Health in 2004 involving 800 people from the informal sector in Indonesia 8 which shows complaints musculoskeletal disorder affects about 31.6% of oil palm farmers in Riau, 21% artisans puppet skin in Yogyakarta, 18% artisans onyx in West Java, 16.4% of gold miners in West Kalimantan, 14.9% in Bogor shoemaker, and 8% in Central Java brass artisans. Brick craftsman in Lampung and Jakarta are fishing in a group of workers who suffered most MSDS complaints, each about 76.7% and 41.6%. All average workers complain of pain in the back, shoulders, and wrists (4).

In addition to mapping points of the body that have complaints, based on research results musculoskeletal perceived MSDS complaints by workers printer bricks in Sungai Tabuk Village Lok Buntar District is also divided according to the type of complaint is considered, the level of complaints, time of presentation, and the frequency of complaints. The description of the type of complaint, complaint rates, time of onset of complaints and the frequency of complaints with the following explanation.

#### a. Types of complaints

Type of complaint that most felt by the data above is as much as 100% or the total respondents felt sore. Followed by pain or pain that is felt 76.19% of respondents. While the types of complaints that are not perceived by the respondents during the last seven days is swelling around the body. Aches and pains classified in phase 1 of the 3 stages of severity of complaints musculoskeletal, where complaints arise will usually disappear after a period of

work (in one night) and had no effect on job performance (6,7).

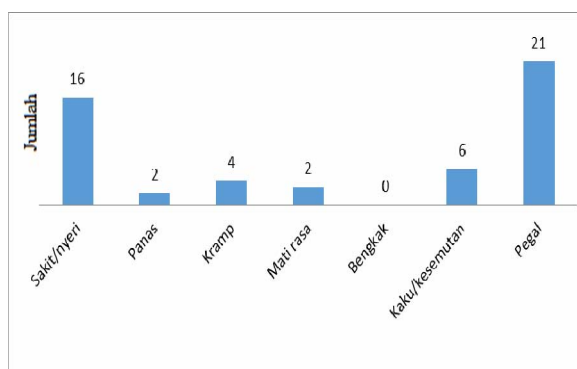


Figure 2. Distribution Frequency MSDS types complaints

#### b. The level of complaints

The rate refers to respondent pain VAS. 61.90% of the 21 respondents felt minor complaints, while the pains felt by 33.30%, and 4.80% of respondents who felt the complaints were very sick. Respondents who experienced a mild complaint median age of 37.31 years to 12.54 tenure life and 147 cm height. Respondents who experienced pain complaint levels had an average age of 45.43 years, with an average tenure of 21.57 years and an average height of 148.29 cm. Respondents to the level of complaints is very ill 61-year-old with tenure of 15 years and 148 cm height.

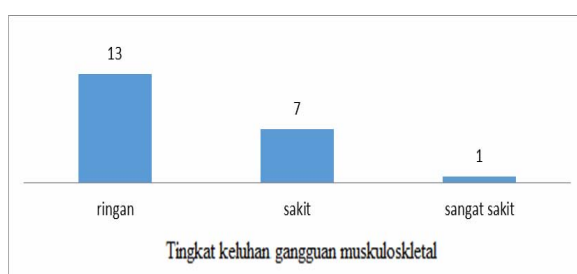


Figure 3. Distribution Frequency MSDS level complaints

#### c. Time of symptoms

Based on this research, it is known that the overall scorer brick workers have complaints at night or while resting. This is because the effects of stress that would arise when your muscle relaxation of the body, when the absence of

muscle exercise that will arise will be silent inflammation and pain. Based on the interview, respondents analgesic drugs and herbal medicine to reduce pain at night, at work or at the time of the aches and pains that arise when working.

#### d. Frequency of complaints

Frequency of MSDS complaints the respondents perceived more as much as 1-2 times a week for as many as 42, 86% of respondents. MSDS complaints that appear several times in a day experienced by 38.09% of respondents. Frequency of perceived grievances experienced by respondents and 1 times a day experienced by 14.29% of respondents. While the frequency of the complaint to the respondent that appears 3-4 times a week just 4.76 respondents.

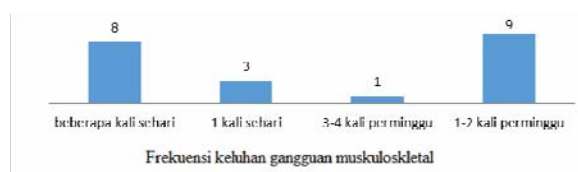


Figure 4. Distribution Frequency MSDS complaints

During the study, the group of respondents who felt the emergence of the complaint several times in one day had an average age of 46.5 years with an average tenure of 17 years and with an average height of 147.63 cm. Respondents who felt the emergence of complaint 1 times in one day had an average age of 40 years with an average service life of 24 years and height 148.33 cm. Respondents who feel complaints 3-4 times a week had an average age of 33 years with an average tenure of 20 years, height 141 cm. While respondents who felt the MSDS complaint 1-2 times a week had an average age of 37.66 years with an average tenure of 11.11 years and an average height of 147.78 cm.



## Bivariate

### 1. The correlation between age and MSDS complaints

Based on Table 5, there are 6 respondents (16.2%) with age <35 years who had MSDS complaints and as many as 15 respondents (40.5%) with age ≥ 35 years who had MSDS complaints. From the results obtained *chi-square* statistical test *p-value* of 0.001 with a 95% degree of confidence, and it can be concluded that there is a significant correlation between age and MSDS complaints. Risk calculation obtained *estimate* of 17.5 means the printer OR brick aged ≥ 35 years 17.5 times more likely to experience MSDS complaints compared with brick scorer aged <35 years.

The results are consistent with research conducted by Mutiah in 2013 which proves that there is a significant correlation between age and MSDS complaints workers wok makers in the village Cepogo Boyolali. Research conducted by Endang to haul loads artisan gold miners in the district of Lebak Ciligrang in 2010 also proved that workers aged ≥ 35 years had a risk of 9 times to experience MSDS complaints compared with workers aged <35 years (3.16).

Age causes a decrease in the ability of body

tissues (muscles, tendons, joints and ligaments). In line with the increasing age of the bone degeneration will happen, it starts at age 35 and increases at age 40 years or older. According to Zaki in heavy physical activity correlation study with *back pain* in the working age population in Java and Bali mentioning that the peak complaints musculoskeletal disorders in women with age 46 ± 14.1 years. At the age of degeneration in the form of tissue damage, tissue turn into scar tissue, and a reduction in the stability of fluid that causes bone and muscle is reduced and the time a person reaches 60 years of age, average muscle strength decreased to 20% (3,5,17).

Basically muscle disorder is one of the common health problems for middle age and older. At the age of muscular strength and endurance began to decline coupled with physical stress factors of work with a high workload situation will increase the risk of MSDS complaints especially in workers aged over 35 years. This result is supported by the conditions in the study is that the majority of workers aged ≥ 35 years, in fact there are two workers aged ≥ 60 years are still forced myself to work as a printer bricks.

Table 5. Statistical analysis of correlation between age and MSDS complaints

No	Age	MSDS complaints		Total	Odd Ratio (OR)	p-value
		No complaints	There complaints			
1	<35 years (no risk)	14 (37.8%)	6 (16.2%)	20 (54%)	17,500	0.001
2	≥ 35 years (risk)	2 (5.4%)	15 (40.6%)	17 (46%)		
<b>Total</b>		16 (43.2%)	21 (56.8%)	37 (100%)		

Source: Primary data

Table 6. Statistical analysis of correlation between tenure and MSDS complaints

No.	Tenure	MSDS complaints		Total	Odd Ratio (OR)	p-value
		No complaint	There complaints			
1	<8 years (no risk)	13 (35.1%)	3 (8.1%)	16 (43.2%)	26,000	0,000
2	≥ 8 years (risk)	3 (8.1%)	18 (48.7%)	17 (56.8%)		
<b>Total</b>		16 (43, 2%)	21 (56, 8%)	37 (100%)		

Source: Primary Data

Table 7. Statistical analysis of correlation between height and MSDS complaints

No.	Height	MSDS complaints		Total	Odd Ratio (OR)	p-value
		No complaint	There complaints			
1	<151.3 cm (no risk)	9 (24, 3%)	16 (43, 3%)	25 (67, 6%)	0,402	0,353
2	≥ 151.3 cm (risk)	7 (18, 9%)	5 (13, 5%)	12 (32, 4%)		
<b>Total</b>		16 (43, 2%)	21 (56, 8%)	37 (100%)		

Source: Primary Data

## 2. The correlation between tenure and MSDS complaints

Based on Table 6, there are 3 respondents (8.1%) with tenure <8 years who had MSDS complaints and as many as 18 respondents (48.7%) with the tenure  $\geq 8$  years who had MSDS complaints. From the results obtained *chi-square* statistical test *p-value* of 0.000 with a 95% degree of confidence, and it can be concluded that there is a significant correlation between tenure and MSDS complaints. Calculation of *risk estimate* obtained by 26,000 OR printer means a brick with 8-year tenure  $\geq 26$  times more likely to experience MSDS complaints compared to bricks printer with tenure <8 years.

The results are consistent with research conducted by Zulfiqor in 2010 which proves that there is a correlation between long working lives by tampering complaint musculoskeletal on Fabrication welder at the PT. Caterpillar Indonesia Year 2010. Research conducted by Nurhikmah the furniture trade in the District of Tangerang City museum in 2011 also proves that workers who have tenure  $\geq 8$  years have 8,929 times the risk for experiencing MSDS complaints compared to workers with tenure <8 years (2.8).

The period of employment is a factor related to the length of one's work. In this regard, the complaint musculoskeletal disorders including chronic disease that requires long time to develop and manifest. The longer the time worked, the greater the risk for MSDS complaints, especially jobs that require great exertion such as printing and lifting bricks. In the process of printing and transporting bricks, the whole body under stress, so that the blood vessels shrink. This situation reduces the flow of blood that carries oxygen and sugar throughout the body, resulting in bone and muscle will feel tired and sore, and the most influential parts of the body at the time of printing and is transporting backbone. Imposition backbone in a long time resulting in permanent narrowing of the disc cavity and also resulted in degeneration of the spine that causes chronic lower back pain. (3.16).

Based on observations at the time of the study, the average worker has been worked into

the printer bricks from a young age because of his profession as a printer brick is handed down from the family profession. Not surprisingly, there are some respondents that have been working for 20 to 30 years due to economic demands. In this case, Sungai Tabuk Village Lok Buntar District Local Government is expected to intervene against a brick printing workers. These interventions may include assistance in the form of venture capital, Small and Medium Enterprise Credit (KUKM) to the printer bricks. This is done to provide venture capital for the improvement of quality of life and economic improvement of the standard printer when bricks and expected capital gain, the printer can be changed professions brick and has a more promising job or continue working as a printer of bricks, but the proceeds must be used to buy and create an ergonomic work facilities in order to provide comfort and prevent workplace complaints of occupational diseases and improve labour productivity.

## 3. The correlation between height and MSDS complaints

Based on Table 7 it is known that there are 16 respondents (43.3%) with height <151.3 cm experiencing MSDS complaints and as many as 5 respondents (13.5%) with the height  $\geq 151.3$  cm experiencing MSDS complaints musculoskeletal. From the test results obtained by *chi-square test* *p-value* of 0.353 with a 95% degree of confidence, and it can be concluded that there is no significant correlation between height and MSDS complaints.

This study is in line with that made by the states in 2010 Cherry wood height has no significant correlation with MSDS complaints on driving activities expedition team Enseval PT Putera Megatrading Jakarta with *p-value*: 1.000. At higher body generally will experience MSDS complaints in the waist area, but no significant correlation between height with MSDS complaints in this study may be due to respondents with height <151.3 also experiencing MSDS complaints so it can be said respondents with both high-risk and respondents with a body height not risk having

the same risk of experiencing MSDS complaints that may arise due to factors of old age or because of long working lives because of these two risk factors is the dominant factor that causes MSDS complaint (11).

Although the effect is relatively small, height is one key element of a person's size and weight is a factor that can cause skeletal muscle complaints. However, body size is also influenced by other elements, namely body weight as measured by BMI. A person with excess weight will strive to support the weight of the front of the lower back muscles contracting and if this continues in the long term will lead to an emphasis on cushioning the spinal cord. This is the deficiency in this study because it does not measure BMI and height only focuses on bricks printer. It is expected that future studies will look at the correlation between BMI and MSDS complaints among brick workers

#### D. Conclusion

The conclusion of this study is the majority of respondents (54.05%) aged over 35 years with an average age of all respondents was 33.87 years. Most of the respondents (56.76%) have a service life of less than 8 years with an average tenure of all respondents was 10.62 years. Most of the respondents (67.57%) have a height of less than 151.3 cm with an average height of all respondents was 149.43 cm. Most of the respondents (56.76%) had MSDS complaints. There is a significant correlation between age and MSDS complaints brick molders in Sungai Tabuk Village Lok Buntar District. There is a significant correlation between tenure and MSDS complaints musculoskeletal brick molders in Sungai Tabuk Village Lok Buntar District. There was no significant correlation between heights with MSDS complaints brick molders in Sungai Tabuk Village Lok Buntar District.

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