

# Work-related ergonomic study among egg sellers- a study carried out West Garo Hills, Meghalaya

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■ **ABSTRACT** : The study has investigated the drudgery index and the musculoskeletal discomfort perceived by the respondents engaged in activities related to selling of eggs in the hilly terrain of West Garo Hills, Meghalaya. Findings reveal that cleaning of eggs is most drudgery prone compared to other activities they perform. The activity demands the use of small muscles and continuous movement of the hand at wrist level while holding and cleaning the eggs by using paper/cloth. The activity of cleaning also demands more attention to avoid loss, as egg shells are more fragile. Moreover, the sellers felt discomfort at the mid back, lower back and buttocks due to prolong sitting posture they adopt and due to twisting of the body to reach the items kept at the sides and back. Thus, designing of functional work station is the need for this group of sellers so as to reduce the drudgery level to eliminate musculoskeletal disorders.

■ **KEY WORDS:** Drudgery, Musculoskeletal discomfort, Body Map, Postures

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**A**mong the perishable good sellers, one important group is the egg sellers. They play an important role in providing a rich source of protein at door step of the consumer. While working towards making eggs available for the consumers, they had to come across a series of activities. These activities involve bending, stooping, twisting etc. These postures, the sellers adopted frequently while performing the activities associated with selling of eggs resulting to musculoskeletal discomfort among the egg sellers. Therefore, there is a need to study the drudgery and the musculoskeletal discomfort faced by this group of sellers specially who are working in the hilly regions. It is rightly said that the population working in hilly regions have to

work hard compared to their counterpart working in plain regions.

## ■ RESEARCH METHODS

The study was carried out by considering 25 sellers who are engaged in various activities related to selling of egg. The egg sellers of three daily markets under Tura Municipal Board, West Garo Hills, Meghalaya are considered. Interview Schedule was formulated and used to collect the primary data. The level of discomfort in different parts of the body was measured with the help of Body Map. The collected data was analyzed through appropriate statistics and presented in tabular form. Bar and pie diagrams are used for easy accessibility to the

subject.

### Identification of drudgery prone activities:

For identification of drudgery prone activities related to selling process was identified as per the procedure followed by Anonymous (1998-99) considering three parameters.

### Time spent:

**Time spent (hrs./year) = Time in min/day x total no. of days performed in a year.**

The time in min/day was converted into man-days. The number of man-days taken to perform each activity in a year was calculated for each activity. The man-days spent for each activity was calculated at the rate of 8 hours per day.

### Performance of frequency score:

Performance frequency score was calculated on the basis of following score weightage:

Daily – 5, Alternate days – 4, Weekly – 3, Fortnightly – 2, Seasonally – 1.

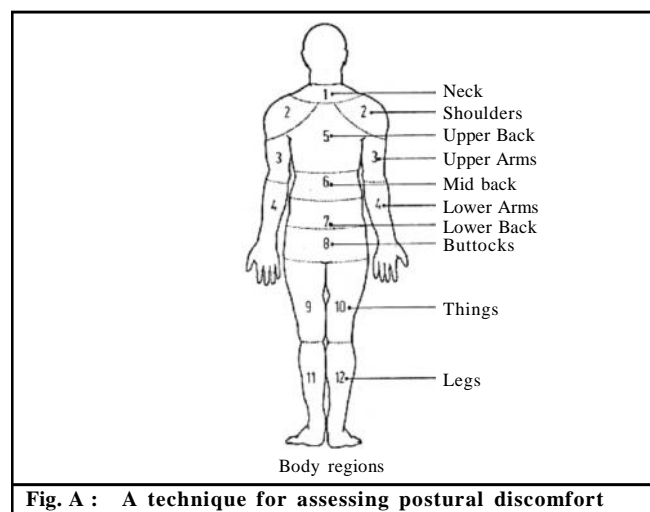
The total scores thus, obtained was divided by the total respondents involved in each activity.

### Difficulty score (DS):

Difficulty score was calculated on the basis of the following weightage:

Most difficult – 5, Difficult – 4, Neutral – 3, Easy – 2 and Very easy – 1.

The total scores thus, obtained was divided by the total respondent for each activity.



**Fig. A : A technique for assessing postural discomfort**

Finally, Drudgery Index (DI) was calculated with the following formula:

$$\text{Drudgery index} = \frac{X + Y + Z}{3} \times 100$$

X = Co-efficient of time spent

Y = Co-efficient of performance frequency score

Z = Co-efficient of difficulty score

To identify the incidents of musculoskeletal discomforts during the activity along with questionnaire, body map (Corlett and Bishop, 1976), was also used.

## RESEARCH FINDINGS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

### Socio-economic background:

The study reveals that higher percentage (76%) of the sellers involved in selling of eggs belongs to the age group of 18 -35 years and are mostly (88%) male. More than 50 per cent of the respondents (52%) are follower of Muslim religion. Educational status is found to be very poor. A higher percentage (72%) of the respondents belongs to Joint family. Data related to size of family reveals that more than 60 per cent (64%) of the egg sellers have large family size (more than 7). 60 per cent of the respondents earns an income between Rs. 5000/- to 10,000/- per month.

### Activities performed by the egg sellers:

The data presented in Fig. 1 related to activities performed by egg sellers depicted that activities of collection of the egg box for sale from source is found to perform by 12 per cent of the respondents. None of the respondents are found involve in activities like loading in the carrier vehicles and unloading the loads from the carrier vehicle. 44 per cent of the respondent perform the activities of carrying the egg boxes to the point of sale and activity of proper storage of the egg boxes. The activity of cleaning eggs is found to perform by 68 per cent of the respondents. Further, study divulges that the activities like taking out the egg plates from box, cleaning of the selling area, arranging the eggs for sale, testing in front light for quality, packing and giving it to the buyer, repacking of the unsold eggs and cleaning of area at the end of the sale are found to perform by the

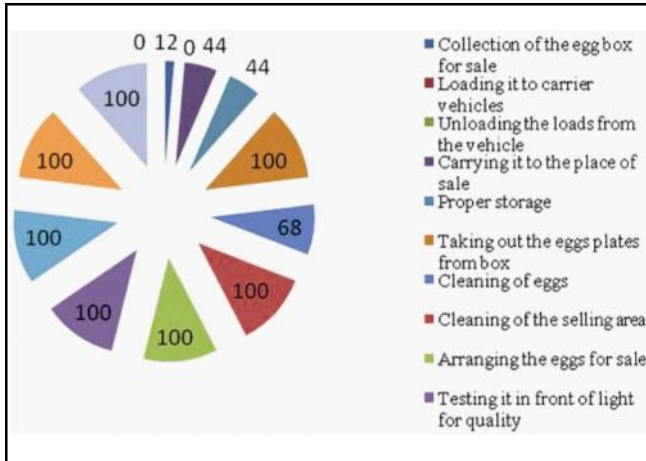


Fig. 1 : Pie-diagram showing distribution of respondents according to performance of various activities related to egg selling

entire respondent.

The study shows that more than half of the activities are performed by all the respondents while doing the job of selling eggs. The activity of cleaning eggs is usually performed by the respondents who sales local eggs. The performances of various activities indicate that they adopt various postures frequently to facilitate the selling process. Moreover, in the process of selling eggs the sellers have to remain very careful in handling of the egg boxes, at the time of arrangement of eggs for sale and at the time of sale as eggs are very fragile.

**The maximum drudgery prone activity in egg selling:**

The study divulges that the maximum drudgery prone activity among the all the activities performed by the

Table 1 : Drudgery Index of the activities performed by egg sellers

Sr. No.	Activities	Time spent Mean ± SD	Frequency of performance Mean ± SD	Difficulty score Mean ± SD	Drudgery index	Ranking
1.	Collection of egg box for sale	0.11±0.015	0.73±0.11	0.8±1.3	54	VIII
2.	Carrying it to the point of sale	0.04±0.012	0.74± 0.09	0.65±0.22	47	X
3.	Proper storage	0.06±0.025	1±0	0.80±0.14	62	III
4.	Cleaning of the selling area	0.04±0.014	1±0	0.72±0.14	58	V
5.	Taking out the egg plates from the box	0.11±0.032	1±0	0.73±0.09	61	IV
6.	Cleaning of eggs	0.16±0.054	0.95±0.08	0.96±0.07	69	I
7.	Arranging the eggs for sale	0.07±0.026	1±0	0.64±0.14	57	VI
8.	Testing it in front of light for quality	0.05±0.016	1±0	0.54±0.18	53	IX
9.	Packing and giving it to the buyer	0.25±0.054	1±0	0.51±0.15	58	V
10.	Repacking of the unsold eggs	0.14±0.043	1±0	0.88±0.10	67	II
11.	Cleaning of the area at the end of the sale	0.03±0.008	1±0	0.64±0.18	55	VII

Table 2 : Moderate pain in different body parts

Sr. No.	Body parts	Mean Score ± SD	Percentage of mean of score	Overall discomfort
<b>Egg Sellers</b>				
1.	Neck	2.48±0.71	49.60	Moderate
2.	Shoulder	2.48±0.71	49.60	Moderate
3.	Upper Arm	2.60±0.57	52.00	Moderate
4.	Lower Arm	2.64±0.49	52.80	Moderate
5.	Upper Back	2.60±0.57	52.00	Moderate
6.	Mid Back	3.20±0.64	64.00	Severe
7.	Lower Back	3.40±0.50	68.00	Severe
8.	Buttocks	3.28±0.45	65.60	Severe
9.	Right Thigh	2.16±0.80	43.20	Moderate
10.	Left Thigh	2.16±0.80	43.20	Moderate
11.	Right Leg	2.68±0.85	53.60	Moderate
12.	Left Leg	2.68±0.85	53.60	Moderate

Overall Discomfort Score attained:

Very mild = upto 20%, Mild = 20-40%, Moderate = 40 – 60%, Severe = 60 – 80%, Very Severe ≥80%

egg sellers is cleaning of eggs (DI=69%), followed by activities such as repacking of the unsold eggs (DI=67%), proper storage (DI=62%), taking out egg plates from the box (DI=61%), cleaning of the selling area and packing and giving it to the buyers (DI=58%), arranging the eggs for sale (DI=57%), cleaning of the area at the end of the sale (DI=55%), collection of egg box for sale (DI=54%), testing it in front of light for quality (DI=53%) and carrying it to the point of sale (DI=47%). The activity of cleaning of eggs got the highest rank and is the most drudgery prone activity as the activity is tiresome due to maximum utilization of time, repeated movement of wrist to remove the dirt, holding of the egg by fingers with good grip and the activity also draw continuous attention of the sellers during cleaning.

**Musculoskeletal problems faced by the egg sellers:**

Data presented in Table 2 reveals that the respondents while performing the activities related to selling of eggs felt severe pain in mid back (64%), lower back (68%) and buttocks (65%) and felt moderate pain in neck (49.6%), shoulder (49.6%), upper arm (52%), lower arm (52.8%), upper back (52%), right thigh (43.2%), left thigh (43.2%), right leg (53.6%) and left leg (53.6%).

It is clear from the data that the respondents felt severe to moderate pain in different body parts because of more degree of extension of body parts from the normal body alignments and longer duration at sitting posture.

**Conclusion:**

The study concluded that the sellers involved in



Plate 1 : Picturesque presentation of the postures adopted to perform the activities

selling of eggs perceive drudgery while performing the activities related to selling of eggs thus, leading to musculoskeletal discomfort at different parts of the body. Hence, further investigation with large sample is suggested for ergonomic intervention to reduce the drudgery level leading to musculoskeletal disorder.

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