



ISSN (E): 2277- 7695  
ISSN (P): 2349-8242  
NAAS Rating: 5.23  
TPI 2022; SP-11(3): 1144-1147  
© 2022 TPI  
[www.thepharmajournal.com](http://www.thepharmajournal.com)  
Received: 26-01-2022  
Accepted: 28-02-2022

#### Hebbal Swati

Ph.D. Scholar, Department of Family Resource Management, College of Community Science, University of Agricultural Sciences, Dharwad, Karnataka, India

#### Renuka Salunke

Professor, Department of Family Resource Management, College of Community Science, University of Agricultural Sciences, Dharwad, Karnataka, India

#### Corresponding Author

#### Hebbal Swati

Ph.D. Scholar, Department of Family Resource Management, College of Community Science, University of Agricultural Sciences, Dharwad, Karnataka, India

## Ergonomic assessment of fuel wood collection and carrying activity by the rural women with traditional and improved method in Dharwad district

Hebbal Swati and Renuka Salunke

#### Abstract

In India, women are the focal point of every family and traditionally responsible for collection and carrying of fuel wood. Fuel wood is prime source used for the domestic purpose. For collection and gathering of fuel wood women have to walk for miles to full fill their household demands. The present study was conducted during the year 2020-21. It was observed from study that, women respondents carried heavy fuel wood bundles manually on their head for long distances without using any preventive measures. Fuel wood collection and carrying activity is physically demanding and drudgery prone task. In the long run this leads to many hazards physically and physiologically and also increased in to risk of injuries, falls, fractures, stress and strain on head and shoulder. Hence, in the present study the head load manager for carrying fuel wood was introduced. As per the findings of the study, the drudgery perception and postural discomfort among women respondents traditional, was found to be as compared to the improved method (Head load manager). Hence, the introduction head load manager for carrying fuel wood would reduce the work load and enhance the efficiency of the women involved in fuel wood collection and carrying activity.

**Keywords:** Drudgery, work load, socio economic status, fuel wood, traditional method, improved method

#### Introduction

Indian women demonstrate very important role in all the aspects, and became life line of family, back bone of society, and pioneer of all the civilization. In India, about 70 per cent of the people are living in rural areas. People in rural area especially women pay most of their time in meeting the fundamental needs of the family and traditionally responsible for performing all the household chores, such as preparation of food, collection of fire wood, fetching water, cleaning home, bearing children and caring for elders. Among all these activity, fuel wood collection and carrying is of the main, lively hood task performed regularly by the rural women.

According to the International Energy Agency (IEA) about 2.4 billion world's population completely depend on fuel wood for cooking and water heating purpose. In most of developing countries 90 per cent of rural dwellers and 30 per cent of urban dwellers rely on fuel wood for cooking (Barkha *et al.* 2017) <sup>[2]</sup> and it has highest share of energy consumption in rural areas (Farida and Indira 2011) <sup>[5]</sup>.

Although the India is developing very fast but maximum people staying in rural area are still dependent on fuel wood for meeting their domestic energy requirements. Nowadays there are many fuel substitutions are available at village level, people still preferred fuel wood for preparing food items mainly due to low socio economic condition of the family, cultural beliefs of the rural people, cost effectiveness of fuel wood and also increasing cost of liquid fuels such as LPG and Kerosene. Often manual mode (carrying on head) of fuel wood carrying is one of the most common, physically demanding activities. According to findings of the Dufault (1998) <sup>[4]</sup> carrying load on head is the only means of carrying or moving of goods around the villages and farms.

However there is a high degree of advancement in technology, people still involved manual load handling task either by necessity or by choice. According to the reports of Dufault (1998) <sup>[4]</sup> with prevailing practice in rural areas people carry nearly 30 kg of loads or more over a long distances. This is higher than the RWL (Recommended Weight Limit) of 23 kg as given by the NIOSH (National Institute for Occupational Safety and Health) committee.

The continuous collection and carrying of fuel load on head leads to various health hazards and enhance risk of injuries. Hence, the efforts are required to provide technological solutions to mitigate drudgery among rural women involved in fuel wood collection activity.

### Objectives

- To study the socio-economic status of the rural families.
- Ergonomic assessment of the load perception of rural women involved in fuel wood collection carrying activity.

### Material and Methods

The study was conducted in five taluks of Dharwad district, namely Kalaghatagi, Kundagoal, Navalgund, Dharwad and Hubballi during the year 2020-21. Further two villages from each taluka were randomly selected for the study. Thus, a total of 10 villages and from each village proportionate of 25 rural women were selected for the study. For experimental study 30 physically fit rural women who are regularly involved in fuel wood collection and carrying activity were selected as sub samples under the study. Stratified random sampling method was adopted for selection of samples. Pre-structured personal interview schedule was administered on 250 rural women to collect the required information.

Agarwal (2005) [1] scale was used for assessment of socio economic status of the respondent's family. For assessment of postural discomfort REBA (Rapid Entire Body Assessment) work sheet (Hignett and Mc Antamney, 2000) [6] was used. The introduction of head load manager (Improved method)

for carrying fuel wood bundles to mitigate work load and drudgery among rural women.

### Results and Discussion

The distribution of selected respondents according to their socio economic status categories as per the Agarwal scale (2005) [1] and it is presented in Fig 1. As per the scale the data was categorised in to 5 group's viz., upper high, high, upper middle, and lower middle, poor and very poor/ below poverty line. It is clear from the table that majority of the respondents from all the taluks such as Kalaghatagi taluk (96%), Kundagol taluk (80%), Navalgund taluk (96%), Dharwad taluk (82%) and Hubballi taluk (94%) belonged to the poor socio economic class. Further, except Nalgund taluk and least per cent of the respondents of Klaghatagi taluk, Kundagol taluk, Dharwad taluk and Hubballi taluks were found to be in lower middle socio economic class. Whereas, except Kalaghatagi taluk respondents very few per cent respondents from Kundagol taluk (2%), Navalgund taluk (4%) Dharwad taluk (6%) and Hubballi taluks (2%) respondents belonged to very poor or below poverty line socio economic status category. The results were in contradictory with results of Badigannavar and Hasalkar (2017) [3] that majority of the respondents were belonged to the lower middle socio economic group. Irrespective of taluka wise data, majority of the respondents belonged to poor socio economic status class followed by lower middle socio economic status class (7.6%) and very few per cent of the respondents (2.8%) found to be in poor or below poverty line socio economic status category.

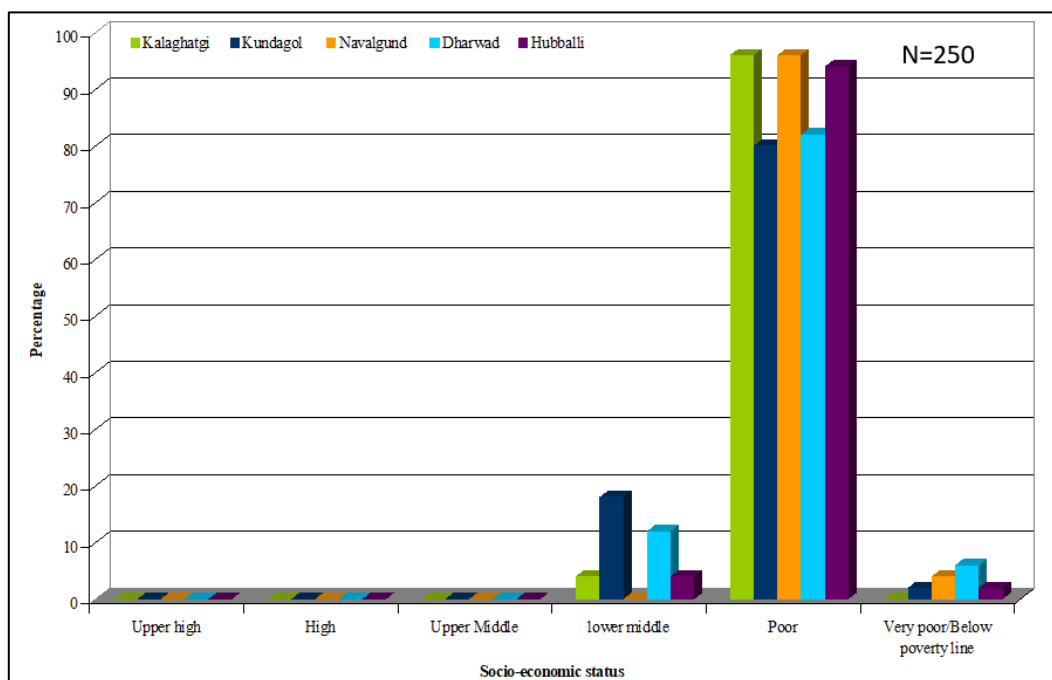


Fig 1: Socio economic status of the rural families

It is clear from the Table 2 that higher percentage of the respondents (46.6%) belonged to more than 46 years of age followed by less than 35 years (30%) while remaining 23.3 per cent of the respondents belonged to the age between 35-46 years.

With reference to the height of the respondents about 40 per cent of the respondents were having height between 152-157cm which was followed by 33.3 per cent of the respondents had more than 157cm of height while about 26.6

per cent of the respondents had less than 157 cm of height. With regard to the weight of the respondents about 40 per cent of the respondents were having body weight between 50-56kg followed by equal per cent of the respondents had less than 50kg as well as more than 56kg of body weight.

Further from the table it is clear that more than 90 per cent of the respondents (93.3%) had normal body mass index (BMI) with range between 20.0-25.0 and belonged to the mesomorphic body type.

**Table 2:** Physical parameters of women respondents involved in fuel wood carrying activity

n=30

Physical parameters	Categories	Frequency (N)	Percentage (%)
Age (years)	<35	9	30.0
	35-46	7	23.3
	>46	14	46.6
Height (cm)	<152	8	26.6
	152-157	12	40.0
	>157	10	33.3
Weight (kg)	<50	9	30.0
	50-56	12	40.0
	>56	9	30.0
<b>Body Mass Index (%)</b>			
Low weight normal	18.5-20.0	1	3.3
Normal	20.0-25.0	28	93.3
Obese Grade I	25.0-30	1	3.3
<b>Body Type</b>			
Ectomorph	<20	1	3.3
Mesomorph	20-25	28	93.3
Endomorph	>25	1	3.3

**Table 2:** Details of fuel wood carrying activity performed by rural women

n=30

Details	Categories	Frequency (N)	Percentage (%)	Mean±SD
Weight of load carried (kg/day/trip)	<24	5	16.6	25.56±1.86
	24-26	20	66.6	
	>26	5	16.6	
Distance covered (km/day/trip)	<3.5	5	16.6	4.0±0.85
	3.5-4.5	21	70.0	
	>4.5	4	13.3	
Time spent (hrs/day/trip)	<3	5	16.6	3.66±0.77
	3-4	23	76.6	
	4>	2	6.6	

Similarly Sharma *et al.* (2019) [9] revealed that higher percentage of the respondents were on normal category in relation to Body Mass Index score. Further equal per cent of the respondents (3.3%) belonged to the both low weight normal category with BMI range between 18.5-20 as well as obese grade-I with BMI range between 25-30 and they belonged to the ectomorphic (BMI less than 20) and endomorphic (BMI more than 25) body types.

Table 2 interprets the details on fuel wood carrying activity performed by rural women. With regard to the weight of the fuel wood bundles carried by the women respondents per day per trip was categorised in to three groups based on mean and standard deviation. It is clear from the table that, more than two third of the respondents (66.6%) were carried between 24-26kgs of fuel wood bundles. Further equal per cent of the respondents (16.6%) were carried less than 24 kg and more than 26 kg of fuel wood bundles. The average weight of collected fuel wood was 25.56 kg and the standard deviation was 1.86. The results are on far with the results of Farzana *et al.* (2017) [7] that more than 90 per cent of the respondents were carried weight between 31-40 kg and spent more than 6 hours per day.

With respect to distance covered by the respondents while searching and collecting fuel wood was classified in to three groups based on mean and standard deviation. It is evident from the table that majority of the respondents (70%) were covered a distance between 3.5km to 4.5km followed by 16.6 per cent of the respondents were travelled less than 3.5 km further remaining 13.3 per cent of respondents were covered

more than 4.5 km of distance. The average distance travelled by the respondents was 4 km and the standard deviation was 0.85.

With regard to the time spent per day per trip by the selected respondents for collection and carrying fuel wood was categorised in to three groups based on mean and standard deviation.

It is clear from the table that majority of the respondents (76.6%) were spent time between 3-4 hours which was followed by less than 3 hours and very few per cent of the respondents (6.6%) were spent more than 4 hours of their time for collection and carrying fuel wood. The average time spent by the respondents was 3.66 hours.

**Table 3:** Ergonomic evaluations of drudgery factors experienced by fuel wood collectors

Variables	Traditional method (Mean ±SD)	Improved method (Mean ±SD)	't' test
Work related drudgery	4.9±0.3051	3.4±0.498	12.041**
Work load experienced	4.833±0.379	4.2±0.550	6.233**
Level of difficulty perception	4.966±0.182	4.2±0.550	12.042**

\*\*significant at 1 percent level

Table 4 Unfolds the risk assessment of the women respondents based on REBA while performing fuel wood carrying activity. From the assessment, it is clear from the

table that higher percentage of the respondents (86.6%) had very high risk in traditional method of carrying fuel wood whereas only 13.3 per cent of the respondents at high risk in traditional method of carrying fuel wood.

Further it was clear from the table that, maximum percentage of the respondents (76.6%) were at high risk followed by 23.3 per cent of the respondents were at medium risk in improved method of carrying fuel load. The present study were in line with Qutubuddin *et al.* (2013) [8] in which women respondents in brick field industry carrying bricks with traditional method were at high risk with REBA score 10-13 that indicates immediate attention is required.

**Table 4:** Risk assessment of women respondents based on REBA while carrying fuel wood

n=30

Risk level	REBA Score	Traditional method	Improved method
Negligible risk	1	-	-
Low risk	2-3	-	-
Medium risk	4-7	-	7 (23.3)
High risk	8-10	4 (13.3)	23 (76.6)
Very high risk	11+	26(86.6)	-

### Conclusion

Fuel wood is the predominant fuel resource largely used by rural people for cooking and water heating purpose. Therefore it can be noted that carrying of fuel wood with traditional method is more strenuous and drudgery prone task often invariably performed by rural women. The traditional method of carrying fuel wood was found to be heavy while with the improved method, the work load was moderately heavy. Further use of head load manager for carrying fuel wood, would reduce the head heaviness and drudgery perception among women folk and enhance their work efficiency.

### Reference

1. Aggarwal OP, Bhasun SK, Sharma AK, Chabra P, Aggarwal K, Rajoura OP. A new instrument for measuring socio economic status of the family. Preliminary study. Indian. J Comm. Med. 2005;34(4)111-114.
2. Barkha S, Verma S, Mustafa M. Ergonomic evaluation of drudgery load faced by farm women in wheat harvesting. Intl. Curr. Microbiol. App. Sci 2009;6(10):3014-3022.
3. Badigannavar R, Hasalkar S. Fuel consumption pattern in rural areas of Dharwad district. Intl. J Pure and Appl. Biosci. 2017;5(3):996-1000.
4. Dufault A. Women carrying water: How it affects their health. Water lines and sanitation health. 1998;6:23-25. <http://www.who.int/water>
5. Farida A, Indira B. Domestic fuel consumption pattern among rural households. Asi. J Home sci, 2011;6(2):273-276.
6. Hignet J, McAntmeney. REBA: A survey for the intervention of work related entire body assessment, Appi. Ergon. 2000;24:121-131.
7. Farzana R, Akhtar A, Faruquee MH, Rabey SD, Mostary Z, Khan M, *et al.* Work related musculoskeletal disorder among the head, 2017.
8. Qutubuddin SM, Hebbal SS, Kum AC. Ergonomic evaluation of task performed by women workers in manual brick kilns. Global J Rech. Engg. 2013;13(4):249-256.

9. Sharma B, Singh V, Mustafa MD. Ergonomic evaluation of drudgery load faced by farm women. Intl. J Microbiol. App. Sci. 2019;6(10):3014-3022.