

# Assessment of load factors affecting women farmers in maize production operations

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■ **ABSTRACT :** Women in agriculture play a vital role in wide range of activities, thereby contributing to sustainable agricultural development. To achieve inclusive agricultural growth, empowering women by having comprehensive understanding about work participation, gender issues, drudgery and health and nutritional status is necessary. The study was conducted in tribal development block of Udaipur district namely Kherwara. Data were collected from 60 tribal farm families by a pre-designed interview schedule. Different socio-personal characteristics revealed that all of the tribal women were in 20 to 50 years age group, belonged to nuclear and not heading the family, illiterate and engaged in all type of agricultural activities and rearing small herd of livestock. Based on the study it was seen that there were six load factors which affected women's work efficiency in maize production operation. The data explained that average MSD Load factor was highest (3.37/5) followed by Repetitive Strain Load (3.04/5), Physical Load (2.70/5), Time Load (2.18/5), Posture Load (1.92/5) and Physiological Load (1.80/5).

■ **KEY WORDS:** Tribal women, Gender participation, Maize production system, Load factors, Physical load, Repetitive strain load, MSD load, Posture load

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**F**arming in India is mainly a family occupation. Most of the family members are actively engaged in farming. The farming capabilities for taking timely and judicious decisions by the farm families have a direct bearing on the agricultural development in country. There has been little realization about the contribution of women in the economic activities of a country. The female population constitutes nearly half of the total population. It is a well recognized fact that more than 60 % of agricultural operations have been traditionally handled by women. They also play a pivotal role in agriculture and livestock management. Drudgery is a term used to

represent the dissatisfactory experiences that constrain work performance in any activity (Technical module/ AICRP- FRM/ DRWA/ 2009). The daily work schedule of rural women is very demanding and arduous. It is estimated that during peak period, women work every day for about 8-9 hours in agriculture and 4 hours in household activities and there are certain agricultural operations in which female agricultural workers are considered better than male workers as studied by Bhole and Pattai (1998). Women carryout many jobs as weeding, transplanting, harvesting, threshing and storing grains, tending animals and providing fuel and

water (Swaminathan, 1993). Looking at the significant role of tribal women in agriculture and allied activities, the study on various load factors affects tribal woman's work in maize production operation was undertaken keeping in view of the improving the work efficiency of tribal women in Maize production system. Farmwomen are the backbone of Indian agriculture. Growing food has been an interminable saga of her life. The load factors *i.e.* physical, posture, repetitive strain, physiological, time and MSD were calculated in the present study on the basis of perception of women. The data of the load factor gives a clear view that what are the loads which were perceived by women affecting their work and needed some interventions.

## ■ RESEARCH METHODS

The present investigation was carried out in the Kherwada Tehsil of Udaipur district of the Rajasthan state, which is one of the tribal districts of the state. In selecting the district the main consideration was the agriculture as the main occupation of people living in such villages. In this area male migration rate is also high. From the selected tribal villages, 60 respondents were randomly selected. The structured interview schedule keeping in view the objectives of the study was prepared and used for the data collection. Data were collected by arranging personal interview from the total selected 60 tribal farmwomen. Interview schedule was used for collecting general background information and to elicit information on drudgery involved in women dominated activities in Maize production operations. Drudgery in Maize production system was calculated as per the six parameters *i.e.* physical load, posture, repetitive strain, physiological load, musculoskeletal disorder, time load and load factor. An exploratory research design was used for this study as the study was concerned to find out various load factors involved in maize production operations.

This section contained questions to assess drudgery involved in women dominant activities performed in cultivating maize crop. This included in-depth farm activity analysis of the different sub activities involved in cultivation of maize crop, like land preparation, manuring, sowing, weeding and interculturing, plant protection, harvesting and post harvest activity of. Drudgery in these activities was calculated as per the following six parameters:

### **Physical load:**

Physical load was calculated by studying the weight of the load, distance carried, height lifted and load rating.

### **Posture:**

Posture was observed by studying the posture adopted for maximum time and scoring of the posture was done,

### **Repetitive strain:**

Repetitive strain included nature of repetition *i.e.* cyclic or repetitive from very exhausted to comfortable.

### **Physiological load:**

Physiological load was measured on the basis of physiological load faced by subjects.

### **Musculoskeletal disorder (MSDs):**

Body pain and disorder was studied for all the body parts. Each body part involved in any activity was studied on the basis of body disorder symptoms, body pain rating and frequency.

### **Duration/Time:**

It included number of hours/day spent on any activity along with duration of that activity and man days involved. It also included number of labours employed and workload as per time based on 5 point continuum scale ranging from very high duration to very less duration.

The load factors were calculated on the basis of perception of respondents towards drudgery.

### **Load factor:**

Load factor was calculated by Matrix Ranking *i.e.*, by making combination of all the drudgery causing variables. There were 15 combinations, from each combination, one factor had to be selected responsible for drudgery in the particular activity. Like this, for each activity all the combinations needed were assessed. Factor with the highest score was considered responsible for the drudgery for that particular activity. This process was done for all the activities. Thus, each activity had one major factor responsible for the drudgery followed by other factors.

Estimation of load factor by comparative selection (Matrix ranking) from combinations given (Mrunalini *et al.*, 2015 and Garasia *et al.*, 2015).

Physical load x Posture	Physical load x Repetitive strain	Physical load x Time	Physical load x MSD	Physical load x Physiological load
Posture x Repetitive strain	Posture x Time	Posture x MSD	Posture x Physiological load	Repetitive strain x Time
Repetitive strain x MSD	Repetitive strain x Physiological load	Time x MSD	Time x Physiological load	MSD x Physiological load
<ol style="list-style-type: none"> <li>1. There are 15 combinations enlisted in 15 boxes.</li> <li>2. The opinion of the respondent needs to be elicited for every box of combination for each activity.</li> <li>3. Only one variable from each of the combination listed shall be tick marked in every box.</li> <li>4. Summate the frequency as per the tick mark given in every box against each variable.</li> <li>5. The sum obtained against each variable needs to be mentioned as load factor at the columns mentioned with variable name.</li> </ol>				

**RESEARCH FINDINGS AND DISCUSSION**

Women make important contributions to the agricultural and rural economies of all aregions of the world. There are various types of the loads which affected the women in performing agricultural activities. The results elicited the information about the load factors which were affected women’s work efficiency in maize production operation.

**Background characteristics of respondents :**

Background characteristics of respondents engaged in Maize Production System pertaining to age, caste, family type, size, years of farming, education, occupation, income, land holding size were analysed and presented in table .The majority of respondents (45%) belonged to age group of 30-40 years followed by 40-50 years (30%) and 20-30 years (22.50%). All belonged to schedule tribe and 91.25 per cent had nuclear families. Majority (60 %) had medium size family with 5-8 members, followed by small family size (25 %) and only 15 per cent with large family size. Majority 45 per cent were engaged in farming since last 20-30 years, 30 per cent of them were engaged in farming from 30-40 years and 22.50 per cent from 10-20 years. The wide range of year of farming was found because of male migration. The young male population of selected village is migrated to nearby urban places for income generation.

The results also revealed that maximum 65.62 per cent respondents were illiterate while majority *i.e.*, 13.12 per cent were educated upto middle school, 12 per cent received education upto high school while only 4 per cent were graduate. It was elicited that main occupation of 84.37per cent of respondents was agriculture and service while 15.62 per cent of them were involved in agriculture only.

Data depicted that a majority of 85.62 per cent of

respondents were small farmers, 10 per cent were marginal farmers while only 4.37 per cent possessed large landholdings. All of them had irrigated land but 25 per cent also had unirrigated land.

**Summary of various types of load factors involved in maize production operations :**

The load factors were used to calculate the type of drudgery faced by women in performing various maize production operations. On one side all the load factors were related to each other but on the other side different operations had different type of load. It was clearly visible in results that all activities have different load factors. It was depicted that the load factors differed from operation to operation in maize production system. This was due to differences in the activities and also due to use of different tools/technologies/methods in performing different activities.

There were two land preparation operations *i.e.* removing of stalk and stubbles and land preparation. In removing of stalk and stubbles it was found that it had more musculoskeletal load factor 4.22 followed by physical 3.85 and posture load factors 3.05 scores out of 5 scores. This indicated that in removing of stalks and stubbles women faces more body pain which was due to awkward posture adopted and more physical exertion. Preparation of irrigation channel was the operation which was mostly done in bending and squatting posture and required continuous eight hours work for 2 to 3 days, it had more physical load and posture load. Due to awkward posture for prolonged time farm women felt more physical exertion.

Manuring is the activity which is sub divided by three operations *i.e.* transportation, mixing and spreading of manure. In the operation transportation of manure from farm to home/home to farm the women farmers faced lot of MSDs and physiological load is also high in this.

**Table 1 : Summary of various load factors involved in maize production system**

Sr. No.	Farm activity	Load factors						Total
		Physical load factor	Posture load factor	Repetitive strain load factor	Physiological load factor	Duration/ time load factor	MSD load factor	
1.	<b>Land preparation</b>							
	Removing of stalks and stubbles	3.85	3.05	2.10	1.22	0.57	4.22	15
	Preparation of channels for irrigation	4.45	3.02	2.87	1.97	0.67	2.07	15
2.	<b>Manuring</b>							
	Transportation of manure	3.02	1.97	0.47	3.98	0.97	4.62	15
	Mixing of manure	1.02	1.97	2.10	4.05	1.07	4.80	15
	Spreading of manure	2.95	0.93	2.88	3.08	0.58	4.60	15
3.	<b>Sowing</b>							
	Seed treatment	0.83	1.98	3.82	3.28	0.52	4.58	15
	Seed dropping	2.83	0.87	3.80	1.45	4.62	1.42	15
4.	<b>Weeding</b>							
	Weeding (plant to plant)	2.10	4.65	2.02	0.50	1.10	4.63	15
	Interculturing (row to row)	2.10	1.87	3.82	0.48	2.62	4.13	15
	Top Dressing	0.93	1.98	3.70	0.53	3.32	4.52	15
5.	<b>Harvesting</b>							
	Picking	3.12	1.15	3.72	2.08	2.85	2.07	15
	Gathering	2.82	0.88	3.85	0.87	4.23	2.33	15
	Loading of Bundles	2.93	0.93	3.80	2.20	2.93	2.17	15
6.	<b>Baggage and Transport</b>							
	Baggaging at Field	4.55	0.93	3.90	0.93	3.12	1.52	15
	Manual Carrying	3.07	3.03	1.15	2.12	0.97	4.63	15
7.	<b>Stripping</b>	1.80	1.92	3.83	1.17	3.88	2.40	15
8.	<b>Maize Shelling</b>	1.75	0.53	4.03	1.93	3.87	2.88	15
9.	<b>Storage</b>	4.42	2.85	2.87	0.53	1.35	3.00	15
	Averages	2.70	1.92	3.04	1.80	2.18	3.37	15

This is due to the heavy load which was carried by them for long distance. The heavy load also caused pain in head, back and shoulders and increased the physiological burden of women. It increased the heart rate of women and also increased energy expenditure. Hence, it was found that due to heavy manual material handling this activity caused MSDs and enhanced physiological cost of work. In the activity mixing of manure MSD load factors and physiological load factors were found highest which depicted that due to the manual work involved it resulted in lot of body discomfort and pain and this affects women's physiological cost of work. The operation of spreading of manure had lot of MSDs, physiological load and physical load. Due to the manual load handling, they experience pain and discomfort in body part which leads to increase in physiological cost of work. It involved more repetitive strain also which was due to continuous repetition of work.

Sowing activity involved two sub operations namely seed treatment and seed dropping. In seed treatment more load was observed in MSDs followed by repetitive strain and physiological load of work. MSDs were more because of the exposure of fertilizer application which leads to increase in physiological cost of work. Repetitive strain load factor was also found high in this seed treatment activity as it required continuous repetition of work. In seed dropping activity time factor was high followed by repetitive strain factor compared to other load factors which indicated that women performed this work repetitively for long duration.

Weeding activity had three sub activities namely weeding row to row, interculturing and top dressing. The data depicted that in weeding activity MSD load factor was found very high. It indicated that weeding activity resulted in lot of body pain and discomfort. This was due to improper posture adoption in weeding plant to

plant. In top dressing time load factor was also found high due to more time requirement to perform the task. The published report of AICRP in Home Science, ICAR (2001) for the plan period 1996-2001 brought forth the results of survey conducted on 7700 farm women in 9 states of India, assessing drudgery on basis of time consumed in agriculture and allied activities and found women spend in weeding 1110 hrs/ year.

Harvesting activity consisted three sub operations *i.e.* picking, gathering and loading of bundles. It was revealed by results that in all these three operation physical load factor, repetitive strain factor and time load factor was found high. Physical load factor was due to heavy manual material handling and distance carried, repetitive strain was due to performance of task repetitively and time factor is due to prolonged time required in performance of the harvesting work.

The activity of baggage and transportation was divided into two sub operations namely baggaging at field and manual carrying from farm to home. In baggaging at field women made the bundles of harvested crop to transport them to either farm to home or to market for sale. This operation has more physical load factor as well as time load factors. The results of the study are in conformity with the survey results reported by AICRP in Home Science (2001) highlighting temporal costs of activity is the dominating drudgery factor. The material handling was required more in this operation for prolonged duration. The operation of manual carrying had more MSD factors followed by physical load factors. Women faced more body pain and discomfort due to carrying of heavy load on their head for very long distance.

The operation of stripping had more repetitive strain load factor and time load factor compared to other load factors. This activity required repetition of movement

for long period of time.

In maize shelling activity repetitive strain load factor was more followed by time load factor and MSD load factor. This activity was done by women for long period of time with very low output. It required repetitive strain due to repetition of activity and caused musculoskeletal problems.

An analysis of load factors in maize production operation depicted that it had lot of MSDs followed by repetitive strain factor, physical load factor and time load factor. Due to continuous repetition of work for prolonged time and heavy manual material handling it manifested into body discomfort, pain which leads to musculoskeletal health problems.

Revanwar *et al.* (2015) conducted study on Assessment of Drudgery of Farm Women in the Cotton Production System. Results indicated that drudgery index of women was categorized as medium to high in Cotton production activities. Significant variation was observed due to factors contributing to drudgery of women labourer in cotton production system. Therefore in order of priority, physiological load, physical load, Repetitive strain load factors contributed to overall drudgery of women agricultural labourers. The study revealed that drudgery of women labourers in Cotton cultivation is characterized by physiological, physical and repetitive strain load experienced due to lack of protective aids and appropriate technologies.

Overall it can be summarized that:

- Physical load factor was maximum for Bagging at field (4.55/5), preparation of channel of irrigation (4.45/5) and storage (4.42/5).
- The posture load factor was maximum for weeding (4.65/5).
- The repetitive strain load factor was maximum for Maize Shelling (4.03/5) followed by harvesting activity (3.85/5), maize shelling (3.83/5), interculturing (3.82/5) and sowing (3.82/5). Thus it was seen that Repetitive Strain was high in agriculture operations of maize cultivation.
- Physiological load factor was maximum in all operations of manuring. This attributed to prolonged walking with manual load carrying giving rise to heartbeats and thereby increasing physiological load.
- Time load factor was maximum for gathering the harvested maize (4.23/5) followed by stripping, maize shelling and top dressing after weeding (3.32/5).

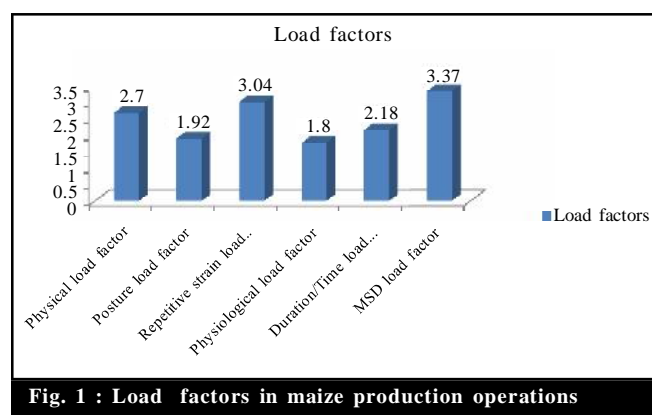


Fig. 1 : Load factors in maize production operations

– All other load factors put stress on MSD factors. Hence, MSD load factor which is mainly a resultant of Physical load, Posture load, Repetitive strain load, exhibited maximum overall value (3.37/5) among all other factors. MSD load was high for various operations viz., Mannuring, Weeding, Manual carrying of harvested crop and Removing of stalks and stubbles.

Overall value of load factors depicted in Fig. 1 explained that average MSD Load factor was highest (3.37/5) followed by Repetitive Strain Load (3.04/5), Physical Load (2.70/5), Time Load (2.18/5), Posture Load (1.92/5) and Physiological Load (1.80/5).

### Summary and conclusion :

Overall it can be concluded that Maize Production Operations in tribal area were drudgery prone operations which require lot of women participation and cause various types of the loads which affected the health of the women farmers. The load factors perceived by women were physical, posture, repetitive strain, physiological, time and MSD load factors affects their work efficiency directly or indirectly and causes lot of occupational health problems. Due to the male migration they involved more in maize cultivation and had lot of occupational health problems. These areas were also observed low in literacy rate and very less exposure of new agricultural technologies which makes their tasks more tedious. In agriculture sectors lot of improved tools and technologies available specially for women which reduces women's drudgery and makes their work more comfortable. There is a great need to introduced these tools and technology in tribal areas also so that their loads

can be reduced and occupational health can be improved.

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