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Estimation of Workload of Farm Women in Maize Production System

Geeta Chitagubbi[1], Rajeshwari Desai[2*], Meghana Kelgeri[3] and Shobha Kasar[4]

[1]Professor & Sr. Scientist (AICRP-FRM), [2]Junior Scientist (AICRP-FRM) and [3]Junior Research Fellow (AICRP-FRM), [4]Junior Research Fellow (AICRP-FRM)
All India Coordinated Research Project on Family Resource Management
College Of Community Science, University of Agricultural Sciences, Dharwad-580005, India
*Corresponding Author E-mail: rajmanohardesaiuas@gmail.com

ABSTRACT

In India, maize is the third most important food crops after rice and wheat. According to advance estimate it is cultivated in 8.7 m ha (2010-11) mainly during kharif season which covers 80 per cent area. Accordingly, women participation and their work load in agriculture is increasing. Hence, the present study is an attempt to estimate the workload of farm women in maize production system. Fifty women actively involved in maize production system were selected for the study. Two villages viz., Hullambi and B.Gudihal villages of Kalaghatagi taluka were identified as operational villages. The questionnaire was used for detailed data collection on characterization of drudgery of women in maize production system through personal interview method. The drudgery experienced by the farm women was assessed by seven parameters viz., physical load, posture load, repetitive strain, physiological load, time load and body pain & musculo skeletal disorder. These parameters were recorded by using the five point scale of the perception of the farm women. The calculated drudgery index in maize production system depicted that among five activities, dibbling (DS: 19.96) was the most drudgery prone activity followed by cob removing (DS: 19.57), top dressing of fertilizer (DS: 16.74), removal of stalks and stubbles (DS: 15.87) and weeding (DS: 14.04). The statistical analysis revealed that the factors causing drudgery were significantly different and it is inferred that among the six factors postural load, physiological load and musculoskeletal disorder were influencing variations in respective orders of priority for total drudgery. Hence, this calls for the intervention of gender friendly improved agricultural tools which reduce the drudgery of farm women and increase the work efficiency.

Keywords: *Workload, Farm Women, Maize Production System, Drudgery Score*

INTRODUCTION

In India, a huge proportion of women are involved in agriculture sector. Their activities vary from land preparation to post harvest operations. Most of these works are labour intensive, repetitive, monotonous and causes serious physical and mental strain.

This results in occupational health hazards and reduction in work efficiency. The traditional tools are designed according to the male worker's physique and farm women are forced to use these tools due to lack of women friendly tools. The traditional tools used by women involves operating in bending or squatting posture which cause drudgery and serious health issues such as back pain, knee pain and sometimes also causes injury (Khadatkar et al., 2014).

Women in India play a major role in shaping the economy of the country. The women work force in agriculture and allied sectors is estimated to be around 92 million which amounts to 40 per cent of the total rural workers in the country (Singh et al, 2007).Women work in agriculture as farmers on their own account, as unpaid workers on family farms and as paid or unpaid laborers on other farms and agricultural enterprises. In agriculture the majority of women are food producers working on joint family farms and tending their own land for household food production while only a small percentage is independent farmers. They are involved in both crop and livestock production at subsistence and commercial levels. They produce food and cash crops and manage mixed agricultural operations often involving crops and livestock farming. All of them are considered part of the agricultural labor force. The sustainable production of food is the pillar of food security. Women in developing nations play vital roles in maintaining the three pillars of food security- food production, economic access to available food, and nutritional security (Nahusenay A., 2017).

The maize is cultivated throughout the year in all states of the country for various purposes including grain, fodder, green cobs, sweet corn, baby corn, pop corn in peri-urban areas. The predominant maize growing states that contributes more than 80 per cent of the total maize production are Andhra Pradesh (20.90 %), Karnataka (16.50 %), Rajasthan (9.90 %), Maharashtra (9.10 %), Bihar (8.90 %), Uttar Pradesh (6.10 %), Madhya Pradesh (5.70 %), Himachal Pradesh (4.40 %). The participation of women in maize production was found to be quite high. Although women do not have a key role in decision-making processes, they contribute significantly to raising maize production levels. Their contribution to sowing (particularly line-sowing), weeding, harvesting, is enormous.

The farm women are subjected to extra harsh conditions of work that leads to drudgery. Hence, need of technological empowerment is the need of hour by introducing women friendly improved farm tools and equipments can reduce drudgery in farm operations. Drudgery / work load is generally conceived as physical and mental strain, fatigue, monotony and hardships experienced while doing a job. Hence, this study was conducted to know the drudgery of women in maize production system and to estimate the work load of farm women in maize production system.

MATERIALS AND METHODS

The study was conducted in Hullambi and B.Gudihal villages of Dharwad district from Karnataka state, India. The random sampling method was used to select fifty farm women between the age range of 30-45 years who were physically fit with normal physiological parameters were selected for the study. Care was taken to select the women who were actively involved in farm activities especially in maize production system. Pre-structured questionnaire was introduced to elicit the information on characterization of drudgery of women in maize production system through personal interview method.

Gender participation was assessed by using five point scale

- ❖ WE - Women Exclusive only (1)
- ❖ WD - Women Dominated and supported by men (2)
- ❖ ME - Men Exclusive only (3)
- ❖ MD - Men Dominated and supported by women (4)
- ❖ EP - Equal Participation by men and women (5)

The drudgery of women was assessed by the seven parameters, namely physical loads carried, postural discomfort, time load, repetitive strain, physiological load and body pain & musculo-skeletal disorders by using different scales as detailed below.

I. Estimation of work load of farm women

a. The **physical load** was recorded based on the distance covered and weight of lifting the load. The farm women were asked to rate the drudgery of carrying load by using the five point scale.

Very heavy-5, Heavy-4, Moderately heavy-3, Low-2, Very low-1

b. Postural discomfort : The posture used while performing the selected activities (sitting, standing, bending, squatting, and kneeling) in each production system was recorded. The postural discomfort in each body part was rated by using the five point scale by the women.

Very severe-5, Severe-4, Moderate-3, Mild-2, Very mild-1

c. Depending on the **time** of performance of the activity the respondents were asked to rate the workload as per time on the five point scale-

Very high duration-5, High duration-4, Moderate-3, Less duration-2 Very less duration-1

d. Repetitive strain was recorded in two forms. First through knowing whether the activity is continuous or cyclic and the strain rating is recorded on five point scale i.e., Very exhausted-5, Exhausted-4, Moderately exhausted-3, Mildly exhausted-2, Comfortable-1.

e. The overall **physiological workload** rating was recorded by using the five point scale.

Very light-1 Light-2, Moderately heavy-3, Heavy-4, Very heavy-5

f. Body pain and musculo-skeletal disorder

The Corlet & Bishop's body map was used to locate pain by the respondents for Musculo skeletal Disorder. Then the pains and disorders are recorded as per the body part and symptoms or disorder experienced and the rating of pain on five point scale (Very painful-5, Painful-4, Moderate-3, Mild pain-2, No pain-1).

g. The data **on pain in different body parts** is summarized together by adding the ratings of pain in all parts and dividing it by the number of body parts to get over all pain rating. The frequency of pain is also recorded by using a 5 point scale i.e., Never-1, Very often-2, Not Very Often-3, Quiet often-4, Always-5.

Assessment of Drudgery Index

The average scores of above selected six parameters viz., rating on work demand, rating on felling on exhaustion, Rating on posture assumed in work, rating on manual loads operatives, rating on work load perception, rating on difficulty perception were added to calculate the drudgery index

RESULTS AND DISCUSSION

Socio economic characteristics of the sample is represented in Table 1. The maximum (78%) percentage of the households belonged to the nuclear family followed by younger age group (58%) and middle age group (42%). Maximum percentage of households had less than 10 years of farming experience (52%) followed by 10-20 years of farming experience (48%)

Gender participation and technology usage in maize production system.

Table 2 represents the gender participation and technology usage in maize production system. The farm activities viz., dibbling, top dressing of fertilizer were solely performed by women exclusive (82% and 80% respectively). Removal of stalks and stubbles was observed to be an activity with equal participation of both men and women (50%).Cob removing activity was found to be women dominating activity among 52 per cent.

Physical load carried:

Table 3 represents the physical load rating perceived by women in maize production system**.** Based on three aspects Viz., physical load carried while performing activity, distance of carrying load women were asked to rate the drudgery of carrying load by using 5 point scale. Maximum load rating/score was given to top dibbling (3.74) followed by removal of stalks and stubbles (3.64) and weeding (2.02 rating) by farm women involved in Maize production system.

Postural Discomfort experienced in various body parts while performing various activities in maize production System.

Table 4 depicts the posture used and postural discomfort experienced in various body parts while performing various activities in maize production system. Standing and bending were the main postures used in almost all activities except weeding, which was performed in squatting and bending posture.

Maximum postural discomfort rating in lower back (3.30) was given while performing dibbling followed by cob removing with mean score 3.16, top dressing of fertilizer with mean score 3.05, removal of stalks and stubbles and weeding (Mean score: 2.76 and 2.64 respectively). These activities are performed by more than fifty percentage of women.

Overall physiological load and Repetitive strain rating given by the selected women while performing various activities in maize production System

The overall physiological workload rating and repetitive strain rating of the activities performed by women in maize production system is presented in Table -5. Maximum rating of physiological workload was given to dibbling (3.12) followed by cob removing (3.00), top dressing of fertilizer (2.96), removal of stalks (2.70) and weeding (2.50) which are performed by almost all women.

Similarly maximum repetitive strain rating was given to dibbling (Mean score: 3.30), top dressing of fertilizer (Mean score: 3.05) followed by (Mean score: 3.38) and cob removing (Mean score: 3.16).

Time Duration of the activities performed by women and the workload as per time in maize production system.

Among all the activities weeding was done for maximum number of days (29.81 man days) followed by top dressing of fertilizer (14.88 man days), and removal of stalks and stubbles (10.01 man days). The work load against time duration was highest for cob removing followed by dibbling, removal of stalks and stubbles and top dressing of fertilizer (Table 6). The highest work load rating was given to dibbling (3.44) followed by removal of stalks (3.16) and top dressing of fertilizer (3.04).

Body pain rating while performing various activities in maize production System.

Table 7 shows the body pain rating while performing various activities in maize production system and it can be observed that maximum pain was experienced in lower back while performing all most all listed activities in maize production system by maximum percent of women.

The main body parts in which women experienced pain were Neck, shoulder, upper arm, lower arm, chest, upper leg, lower leg, upper back and lower back. It can be observed from the Table-7 that highest pain rating of 3.59 (towards painful) was experienced in lower back while performing dibbling followed by removal of stalks and stubbles.

While performing Top dressing of fertilizer activity maximum pain rating of 4.00 was experienced in upper leg by 54 per cent of women followed by moderate pain rating by majority of the farm women (Lower back (98 %), upper arm (68 %), and shoulder (66%))

Further it is revealed that from the total score of the body pain rating that maximum pain was observed in different parts while performing dibbling (3.26) flowed by cob removing (3.21),top dressing of fertilizer (3.11), weeding (2.86).

Drudgery parameters and drudgery index in maize production system

Drudgery parameters and drudgery index in maize production system is presented Table 8. Among the five activities, dibbling is the most

drudgery prone activity with Drudgery Index of 19.96 followed by cob removing (3.26), top dressing of fertilizer (2.76), Removal of stalks and stubbles (2.64) and weeding (2.34).

    The Anova explains that the factors causing drudgery were significantly different and it is inferred that among the six factors postural load, physiological load and musculoskeletal disorder were influencing variations in respective orders of priority for total drudgery.

Table 1: Socio economic characteristics of the sample selected for the study in maize production system.

N=50

Sl. No.	Variables	Categorization	Frequency	Percentage
I	Family type	Nuclear	39	78.00
		Joint	6	12.00
		Extended	5	10.00
II	Age of the respondent	Young (18 - 35 Yrs)	29	58.00
		Middle age (36-45 yrs)	21	42.00
III	Land Holdings	Small	33	66.00
		Medium	9	18.00
		Large	8	16.00
IV	Type and Average number of animals	Bullocks	28	40.00
		Cows	13	14.00
		Buffaloes	23	32.00
V	Number of years of farm experience	Less than 10 years	26	52.00
		10 - 20 years	24	48.00

Table 2: Gender Participation and technology usage in maize   production system

N=50

Activity	Gender participation					Technology usage
	WE	WD	ME	MD	EP	
Removal of stalks and stubbles	8(15)	14(28)	-	3(6)	25(50)	Mannual
Dibbling	41(82)	7(14)	1(2)	1(2)	-	Mannual
Top Dressing of fertilizer	40(80)	9 (18)	-	1 (2)	-	Mannual - Plastic Basket
Weeding	33 (66)	14 (28)	-	3 (6)	-	Kurpi
Cob removing	11 (22)	26 (52)	-	7 (14)	6 (12)	Mannual

Note: Figures in parenthesis indicates percentages
WE: Women Exclusive,   WD: Women Dominating   ME: Men Exclusive,
 MD: Men dominating,   EP: Equal participation

Table 3: Physical load rating perceived by women in maize production system

N=50

Activity	Physical Load rating
Removal of stalks	1.82
Dibbling	3.74
Top Dressing of fertilizer	2.02
Weeding	1.56
Cob removing	3.64

Very heavy-5,   Heavy-4,   Moderately heavy-3,   Low-2,   Very low-1

Table 4: Postural Discomfort experienced in various body parts while performing various activities in maize Production System   N=50

Activity	Posture used	Head	Neck	Shoulder	Upper arms	Lower arms	Chest	Hips	Upper legs	Lower legs	Upper back	Lower back	Mean
Removal of stalks	Standing & Bending	-	2.82	2.65	2.77	2.85	3.00	2.75	2.43	2.5	3.00	2.88	2.76
Dibbling	Standing & Bending	-	-	3.25	3.06	3.00	3.19	-	3.42	3.65	3.52	3.59	3.30
Top dressing of fertilizer	Standing & Bending	2.50	1.00	3.05	3.22	3.25	3.33	3.58	3.60	3.64	3.53	2.88	3.05
Weeding	Bending & squatting	2.00	2.46	2.47	2.56	3.00	-	2.50	2.92	2.83	2.83	2.87	2.64
Cob removing	Standing & Bending	2.00	3.19	3.03	3.16	3.09	3.00	3.50	3.54	3.55	3.61	3.16	3.16

Note: Figures in parenthesis indicate percent
Discomfort Rating: Very severe-5,   Severe-4, Moderate-3, Mild- 2, Very mild-1

Table 5: Physiological load and Repetitive strain rating given by the selected women while performing various activities in maize Production System   N=50

Sl. No	Activity	Posture used	Physiological load rating	Repetitive strain rating	Posture load
1	Removal of stalks	Standing & Bending	2.52	2.76	2.70
2	Dibbling	Standing & Bending	3.10	3.30	3.12
3	Top dressing of fertilizer	Standing & Bending	2.56	3.05	2.96
4	Weeding	Bending & squatting	1.82	2.64	2.50
5	Cob removing	Standing & Bending	3.00	3.16	3.00

Physiological load rating: Very light-1, Light-2, Moderately heavy-3, Heavy-4, Very heavy-5
*Repetitive strain rating: Very light-1, Light-2, Moderately exhaustive -3, exhaustive -4, Very exhaustive -5

Table- 6: Time Duration of the activities performed by women and the workload as per time in maize production system. N=50

Activities	Time Duration	
	No. of Man days	**Work load as per Time**
Removal of stalks	10.01	3.16
Dibbling	5.97	3.44
Top Dressing of fertilizer	14.88	3.04
Weeding	29.81	2.66
Cob removing	9.24	3.56

Work load: Very high duration-5, High duration-4, Moderate-3, Less duration-2
Very less duration-1

Table 7: Body pain rating while performing various activities in maize Production System
N=50

Activities	Neck	Shoulder	Upper arms	Lower arms	Chest	Upper legs	Lower legs	Upper back	Lower back	Mean
Removal of stalks	2.50	2.52	2.85	2.52	3.00	3.14	3.29	3.33	3.09	2.91
Dibbling	2.75	3.05	2.97	3.06	3.38	3.57	3.50	3.48	3.59	3.26
Top dressing of fertilizer	3	3	3	3	3	4	3	3	3	3.11
Weeding	3	2.59	2.81	2.75	-	2.79	3	3	2.98	2.86
Cob removing	-	2.35	3.14	3.18	3.33	3.46	3.55	3.33	3.36	3.21

*Note: Figures in parenthesis indicate percent
Pain Rating: Very painful-5, Painful-4, Moderate-3, Mild-2, No pain-1

Table 8: Drudgery parameters and drudgery index in maize production system

Farm activity	Physical Load	Posture Load	Repetitive strain Load	Physiological Load	Time load	MSD load	Total Drudgery score	Average Drudgery score	Drudgery level
Removal of stalks	1.82	2.70	2.76	2.52	3.16	2.91	15.87	2.64	MH
Dibbling	3.74	3.12	3.30	3.10	3.44	3.26	19.96	3.32	H
Top dressing of fertilizer	2.02	2.96	3.05	2.56	3.04	3.11	16.74	2.79	MH
Weeding	1.56	2.50	2.64	1.82	2.66	2.86	14.04	2.34	Low
Cob removing	3.64	3.00	3.16	3.00	3.56	3.21	19.57	3.26	H

Very heavy-5, Heavy-4, Moderately heavy-3, Low-2, Very low-1

CONCLUSION

The factors causing drudgery were significantly different and it is inferred that among the six factors postural load, physiological load and musculoskeletal disorder were influencing variations in respective orders of priority for total drudgery. Farm women involved in maize production system were experiencing drudgery while performing activities like dibbling, cob removing, top dressing of fertilizer, weeding and removal of stalk and stubbles. Hence, this calls for the intervention of gender friendly improved agricultural tools, which reduce the drudgery of farm women and increase the work efficiency and also helps for betterment of farm women.

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