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Technical Bulletin No. 24

Occupational Health Hazard of Farm Women

Jyoti Nayak
Shiv Pratap Singh
Gayatri Moharana

Directorate of Research on Women in Agriculture
(Indian Council of Agricultural Research)
Bhubaneswar 751 003, Odisha

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Occupational Health Hazard Faced By Farm Women at their Workplaces
2013

Compiled by
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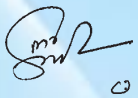
Foreword

The Directorate of Research on Women in Agriculture, formerly known as National Research Centre for Women in Agriculture, was established in 1996 under the aegis of the Indian Council of Agricultural Research to undertake gender related research in agriculture and organize HRD activities for R & D stakeholders. Since its inception, DRWA has been working on different thematic areas, an important area being improving work efficiency and reducing drudgery of farm women. During few years of its existence, DRWA has evaluated, refined and developed a number of farm technologies with women perspective.

I appreciate the efforts of authors in preparing a bulletin entitled 'Occupational health hazard faced by farm women at their workplaces' under institute project which was conducted at Bhopal region. I hope the bulletin will be immensely useful to the extension personnel, researchers and policy makers for effective planning of the activities related to occupational health hazards faced by farm women at different workplaces like farm, household and animal rearing.



M.P.S. Ayra
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2013
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Preface

In rural areas, agricultural activities are actively shared by farm women with male workers/ farmers. In addition to the agricultural activities, farm women have to spent considerable time in preparation of meals for family members, rearing of children and caring of old parents, if any. Thus, their involvement for agriculture is un-comparable to male workers/ partners. Keeping this in view, a project titled 'occupational health hazard faced by farm women at their workplaces in Bhopal district' was undertaken during the year 2010-12 in about 96 villages, covering 480 households. Three major activities of farm women such as household, farm and animal rearing were considered for assessment of their occupational health hazard. In household activity, cooking was taken as workplace while agriculture land and farm machinery were taken as workplace in farm activities and rearing place of animal was the workplace in animal rearing activities.

In this bulletin, methodologies for selection of villages, development of health hazard index & stress index and validation techniques were highlighted. Dr. Krishna Srinath, then Director, DRWA has extended wholehearted support, guidance and encouragement in all stages for carrying out this activities. Authors are highly indebted to the present Director Acting Dr. MP S Arya for his consistent encouragement in preparing this bulletin.

March, 2014
Bhubaneswar

Jyoti Nayak
S P Singh
Gayatri Moharana

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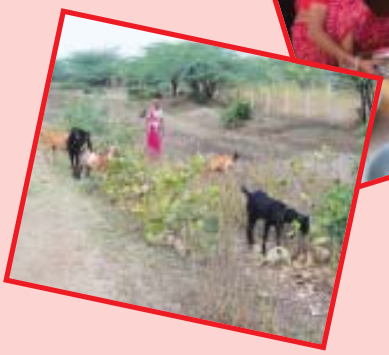


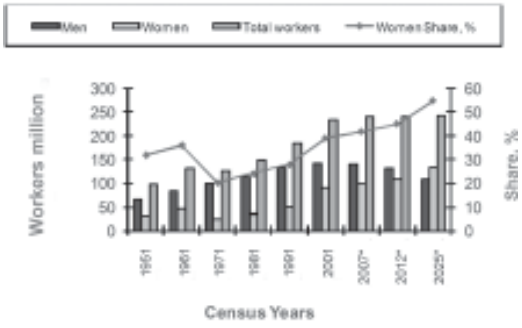
1. Introduction

Woman is the backbone of agricultural workforce but worldwide her hard work has mostly been unpaid. She does the most tedious and back-breaking tasks in agriculture, animal husbandry and homes. It is a fact that the women of rural areas contribute to agricultural work in addition to their domestic work. Presently they contribute one-third of the agricultural labour force and about 48 per cent of self employed farmers. Furthermore, management and involvement of Indian women in farming enterprise has been on rise recent years especially in better endowed rural regions (Praveen et al. 2005).

More than half of the world's food is grown by women. Women's work is both wide ranging and multifaceted throughout the year and they perform multiple tasks in the sphere of agriculture. Women's indigenous knowledge of seed preparation and soil management, plants and pest control, post-harvest processing and storage, animal husbandry as well as food processing and meal preparation are significant, crucial also in ensuring food security through sustainable agriculture.

However, there is little recognition of their significant role and contribution to the socio-economic development of a nation. The entrenched social and religious norms that define women's role as secondary and subordinate keep women vulnerable and dependent and allow women's exploitation as agricultural workers and farmers. Agricultural tasks range from highly mechanized operations employing state-of-the-art technology to maintenance of subsistence plots. (Fenske and Simcox, 2000). Given the vast diversity of agricultural activities, this represents a challenge to health care providers. The identification of occupational health hazards and the development of systems to evaluate intervene and decrease the risk factors and resulting disorders can be quite labor intensive and will require extensive occupational health knowledge.

1.1 Workforce Trends in Agriculture



Farm women involvement in agriculture since 1951 is shown graphically as compared to men. In year 1971 farm women involvement was drastically reduced to about 25 per cent from above 35 percent. Thereafter their involvement in agriculture is increasing due to her significance in agriculture.

1.2 Occupational Health hazards

A hazard is something that can cause harm if not controlled. It is an unplanned, unforeseen or uncontrolled event- generally one which has

unhappy consequences. It also refers to the potential risks to health and safety for those who work outside and inside the home. As farm women involve both in household and farm activities, they are more prone to this. They are exposed both outdoor and indoor environment. The different types of hazards are given below,

Physical hazards

Physical factors in the work place such as noise, vibration, poor illumination, ionizing and non-ionizing radiation and microclimatic conditions can all affect health adversely. Noise-induced hearing loss is one of the most prevalent occupational health effects in both developing and developed countries. Contact with wild and poisonous animals: insects, spiders, scorpions, snakes, certain wild mammals can affect heath.

Chemical hazards

About 100 000 different chemical products are in use in modern environments and number is growing. Exposure varies widely. Health effects include damage to the central nervous system and liver (caused by exposure to solvents), pesticides poisoning, dermal and respiratory allergies, dermatomes, cancers and reproductive disorders. Women exposed to toluene have reported a greater frequency of menstrual dysfunction including dysmenorrheal, irregular cycles and spontaneous abortions. Toxic corrosive, allergenic and carcinogenic chemicals act by local action, inhalation and ingestion on exposure to concentrations beyond the threshold limit value (TLV).

Biological hazards

Workers may be exposed to infections and parasitic agents at the workplace. Persons working with animal products and agricultural workers are likely to be exposed to biological hazards.

Mechanical hazards

There are numerous types of work-related musculoskeletal disorders that are reported in agriculture. Women on an average have a smaller stature and have less physical strength; their vital capacity is 11% less; their hemoglobin is app. 20% less; their skin area is larger as compared to circulating volume; they have larger body fat content. They have lower heat tolerance and greater cold tolerance. So they are more prone to mechanical hazards. These include disorders of the back pain, neck pain, tendon, shoulder disorders, cumulative trauma disorder, repetitive motion disorder, carpel tunnel syndrome. Mechanical hazards, unshielded machinery, unsafe structures in the workplace and dangerous tools are some of the most prevalent workplace hazards in developed and developing countries. Approximately 30% of the workforce in developed countries and between 50%-70% in developing countries may be exposed to a heavy physical workload or ergonomically poor working condition, involving much lifting and moving of heavy items, or repetitive manual tasks. These can lead to injuries and musculoskeletal disorders. Such disorders are the main cause of both short-term and permanent work disability and lead to economic losses.The mechanical hazards in industry centre round machinery, protruding and moving parts and the like. About 10% of industrial accidents are due to mechanical causes.

Psychosocial hazards

Occupational stress is one of the major problems from a gender perspective. Stress

caused by time and work pressures has become more prevalent during the past decade. Monotonous work, work that requires constant concentration, irregular working hours, shift-work, and seasonal-work can also have adverse psychological effects. Psychological stress and overload have been associated with sleep disturbances, burn-out syndromes, depression and hypertension. Social conditions of work such as gender distribution, segregation of job and equality in the workplace raise concerns about stress in the workplace. Besides farm activities farmwomen involve in domestic activities. These arise from the worker's failure to adapt to an alien psychosocial environment. Frustration, lack of job satisfaction, insecurity, poor human relationships and emotional tension are some of the psychosocial factors that may undermine both the physical and mental health of workers.

Ergonomical hazards

Ergonomics involve the environment, the tool, the workstation, the task, the organization. It goal to reduce work-related musculoskeletal disorders (MSDs) developed by workers. MSDs are injuries and illness that affect muscles, nerves, tendons, ligaments, joints or spinal disks. Common symptoms of MSDs are painful joints, numbness in hands, waists, forearms, shoulders, knees and feet, back or neck pain. Swelling or inflammations are common. Risk factors are static posture, forceful exertion, repetitive movement, extreme range of motion, awkward posture

1.3 Stress

It can be defined as a reaction to a short-lived situation, such as working in un-ventilated kitchen under smoky, hot environment and less illumination. Or it can last a long time if respondents/workers are dealing with dangerous machine, a spouse's death or other serious situations. Stress becomes dangerous when it interferes with respondent's/ worker's ability to live a normal life over an extended period. Respondents/workers may feel tired, unable to concentrate or irritable. Stress can also damage respondent's physical health

Therefore it is very necessary to find out the health hazards associated with the farm women at their work places (household, farm and animal rearing). The household activities such as collection of fuel & fodder, fetching of water, cooking, feeding & caring of domestic animals, milking, cleaning of shed and disposal of animal wastes are the tedious tasks perform by the women without any help of family members. These are the possible factors which may leads to health hazards due to heavy tasks which involve static awkward postures, repetitive motions of upper & lower limbs, twisting and bending at waist, knees, wrists, neck and shoulders. Besides these slips and trips due to uneven or slippery working surface responsible for accidents at working place. Environmental factors have their own effect on the human body at their respective work places. It is very difficult for a worker to perform any task with excess level of temperature, humidity, noise and smoke as well as in lower illumination level. It also decrease the working efficiency of the performer involved in different activities. Due to this ignorance, women might be suffering from various health hazards. Some ways and means could be suggested for reduction of chances to expose the identified health hazards at their workplace in carrying out above-mentioned tasks. Keeping this in view a study was conducted at DRWA on "Occupational Health hazards of farm women at their workplace in Bhopal''. A conceptual frame work has been developed to get better accomplishments in this particular area of research.

2. Methodology

In order to reach the objectives of the present study, a detailed plan of work and sequential procedure were followed. The selection of samples and sampling technique, selection of tools for data collection and analysis of data were also described for the study. This study was organized under following sub headings to depict the plan of work and sequential procedure.

2.1. Research Design

2.2. Selection of Samples/ locale

2.3. Development of Indices

2.4 Validation techniques

2.5. Method of Data Collection

2.1. Research Design

The research design is the specification of methods and procedures used for acquiring information needed for the study. It is the arrangement of the conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure. In fact the research design is the conceptual structure within which research was conducted. It is the plan that specifies the sources and types of information relevant to the research problem, approached for gathering and analysis of data. In a study, research design is needed because it facilitates the smooth sailing of the various research operations. Hence in the present study both descriptive and experimental research designs were planned.

- Descriptive designs were chosen to find out the demographic profile of the rural women with the help of interview schedule, regarding their work place, working profile, identification of risks at work places, risk with tools used by workers and the risk prone activities performed by them were also assessed with the help of standardized questionnaire.
- Experimental design were planned to study the measurements of the different dimensions of the workstations, store rooms, anthropometric measurement of subjects and the measurements of existing environmental parameters of the different rooms including kitchen, preparatory place, living room, cleaning place and entrance of the house. The main purpose of experimental research design was to find out the perceived rate of exertion and the measurement of energy expenditure while performing various tasks by adopting various postures.

2.2 Selection of sample/ locale

An effort was made to carry out this research work under project titled 'Occupational health hazards of farm women at their workplace in Bhopal district'. Bhopal district comprises of two tehsils namely, Berasia and Huzur. Of 512 villages, such villages were considered from both tehsil (Berasia & Huzur) those had about

100 households. Using random sample technique, putting the formula =ROUND (Number of cluster x RAND (), 0) in Microsoft Excel, 12 cluster village (having 4 villages in each cluster) were taken from each tehsil. Selection of households was based on land size category i.e. landless, marginal (< 1ha), small (1-2ha), semi medium (2-4 ha) and large (> 4 ha) and their proportion in villages. Pre-tested structured questionnaires were used for collection of the data on general information, involvement of women in different farm, household & livestock activities, possession and use of different household and agricultural tools and equipment, health hazards due to smoke, illumination & noise, fuel consumption, carrying load in collection of fuel, fodder & fetching water, safety practices in their day to day life to prevent minor and major injuries etc. from 480 households Further, data were also collected personally from 50 households of 24 main villages on workplace (cooking stove); continuous time spent at cooking stove; illumination level during cooking, food preparation, living room & their entrance; temperature, humidity & smoke in kitchen during cooking meal; time spent in cooking major food items and daily fuel consumption. The measurement was done during day time. Illumination level was measured using Lux meter. A sling type hand operated psychrometer was used for knowing dry and wet bulb temperatures. Based on conversion chart with this device, relative humidity was obtained.

2.3 Development of indices

The entire hazard is not at risk. A risk is in combination of the probability that a particular outcome will occur and the severity of the harm involved. The harm generally describes the direct or indirect degradation, temporary or permanent, of the physical, mental, social well being of workers. For example, in household activities, cooking being one of the very important activities in rural India which is performed in a traditional earthen Chula under poor ventilated and less illuminated room is a hazard. The outcome could be a blurred vision, irritation, respiratory problem etc. In farm activities, continuous riding on a tractor is a hazard as due to vibration that could result into acute back & body pain or injury. In animal rearing, hitting by animal is a hazard as it immediately harms/injured the person. Therefore, such method would be appropriate for developing **occupational health hazard index** (OHHI) for household, farm and animal rearing activities, which can be easily used and understand by most of the persons.

Keeping this in view, an Overlay and Index Method is considered due to multi-ferrous and inter-related activities to know the extent of hazard level faced by farm women while performing household, farm and animal rearing activities. Both indoor and out door activities are performed by the farm women in rural areas. Indoor activities mostly confine to cooking, food preparation, cleaning, washing and post-harvest related activities such as cleaning, drying and storage. Outdoor activities are fuel and water collection, farm related works and animal rearing. These activities are inter-related. List of variables for assessing hazard ratings are given in Annexure-1. A methodology is described below:

- Rating scale of 1, 2, 3 and 4 are considered based on the data obtained during bench-mark survey from respondents. One represents low level of hazard means a

hazard which are un-noticed. Two spells for medium level of hazard means hazard which are noticed by the respondents but cured locally. Three describes for high level of hazard which are noticed by the respondents and not cured locally. Four categorically warns for severe level of hazard which means permanent damage or fatal.

- Following table (matrix) is used for calculating the hazard index:

Activity	Rating for Hazard for number of respondents (N)				Hazard Index
	1	2	3	4	
Household/ farm/ animal rearing	n_1	n_2	n_3	n_4	= (n_1 x 1 + n_2 x 2 + n_3 x 3 + n_4 x 4)/ (n_1 + n_2+ n_3 + n_4) x 4
Total	=n_1 x 1	=n_2 x 2	=n_3 x 3	=n_4 x 4	

Where, n_1, n_2, n_3 and n_4 = number of respondents falling in respective rating of hazard.

- As involvement of farm women (respondents) in household, farm and animal rearing activities, the overall OHHI was derived by assessing their rate of involvement in these activities.

$OHHI_{fw}$ = **(x)** x Household + **(Y)** x Farm + **Z** x Animal

Where,

$OHHI_{fw}$ = Occupational health hazard index for farm women

X , **Y** and **Z** constants which are derived from rate of involvement

Stress index is developed for the farm woman involved in household, farm and animal rearing activities by assigning numerical ratings 1 through 5 against structured sentence. These statements may cause the stress which further resulted into problem/ incident/ accident/ health problems of farm women. The scoring key, given below, will guide in assessing extent of stress.

40-60 : Virtually free from stress

61-100 : Somewhat stressed

101-140 : Stressed- need to watch

> 141 : Super stressed –Need to reduce all pressures in her life or try getting counseling.

The structured statements that may cause some stress are given below in tabular form.

Stress Index

S. No.	Statements	Ratings				
1	I don't have any problem for food preparation work. [Light, sorting grain, peeling, cutting, chopping, pounding, dough making, milling of pulses & wheat]	1	2	3	4	5
2	I don't have any problem for cooking food for my family alone. [Indoor, out door, temperature, Smoke, light, fuel, water, within the reach of all materials related to cooking, tiredness]	1	2	3	4	5
3	I don't have any problem in cleaning the dishes/utensils. [use of ash, detergent, water availability, rubbing of vessel, proper place for cleaning]	1	2	3	4	5

S. No.	Statements	Ratings				
4	I always find difficulty in getting the items related to cooking due to non-availability of storing space.	1	2	3	4	5
5	I do not tire in fetching water from a well outside of my home.	1	2	3	4	5
6	Management of fuel wood for cooking is a heavy task for me.	1	2	3	4	5
7	Management of dung cake for cooking is not burden to me.	1	2	3	4	5
8	I do not have any problem in cleaning of house daily .	1	2	3	4	5
9	I do not find any difficulty in washing cloth.	1	2	3	4	5
10	I always cover my face while doing all household work at the presence of elders.	1	2	3	4	5
11	I am not comfortable in keeping veil while cooking.	1	2	3	4	5
12	I am experiencing r eciprocator related problem while cooking in un-ventilated kitchen	1	2	3	4	5
13	I always come in problem when I am in tension or pre-occupied in some of tasks/worries.	1	2	3	4	5
14	I always get tired physically after completing the household tasks.	1	2	3	4	5
15	I am always under fear while cooking as some of my friend burnt her face partially/ fire caught to saree while preparing food.	1	2	3	4	5
16	Milling of pulse with hand stone mill is a tough job for me	1	2	3	4	5
17	Milling of wheat with hand stone mill is also difficult task for me	1	2	3	4	5
18	I comfortably perform field preparatory work in every season. [Squatting/ sitting/ bending posture, scorchy heat, taking out the foreign material from field and its disposal, clod breaking]	1	2	3	4	5
19	I do not have any difficulty in bringing food items for husband to the field.	1	2	3	4	5
20	I do not indulge in to any problem while carrying FYM/ fertilizer/ seed etc.	1	2	3	4	5
21	I do not feel any un-easiness with dust.	1	2	3	4	5
22	I use to prepare chemicals in bare hand.	1	2	3	4	5
23	I am having skin problems after chemical preparation, fertilizer application, working in summer, rouging, weeding, harvesting, threshing, vegetable plucking, winnowing, cleaning and storage.	1	2	3	4	5
24	I frequently find scratches on body due to use of sickle.	1	2	3	4	5
25	I find less irritation while using some protective wear during rouging, inter -culture, plucking, harvesting, threshing, winnowing and storage.	1	2	3	4	5
26	I feel inferiority while working with t hresher, winnower, tractor, etc due to no knowledge of the operational tips.	1	2	3	4	5

S. No.	Statements	Ratings				
27	I met with accident while working with thresher, winnower, grader etc.	1	2	3	4	5
28	I came to understand that pre -occupied mind set and hurry always fear me to meet with any accident/ problem.	1	2	3	4	5
29	Once I was hospitalized due to carrying/loading the materials.	1	2	3	4	5
30	While working in scorchy heat, I was suffering from dehydration and sunstroke.	1	2	3	4	5
31	I feel depressed when I get less wage to counterparts for same work.	1	2	3	4	5
32	I deprive of using improved farm tools and equipment for the operations which are being performed by me.	1	2	3	4	5
33	I find my self fully tensed during peak season of farm work. [All household work, rearing of ch ildren, guest and farm work]	1	2	3	4	5
34	I occasionally tired after completing the field work.	1	2	3	4	5
35	I always feel insecure in farm work regarding livelihood.	1	2	3	4	5
36	I always become disturb due to family tension and faced with some incident/ accident/ health problems. [Father in law, mother -in-law, husband, husband's brother, husband's sister, children, my parents and family members]	1	2	3	4	5
37	I do not find any problem while feeding to animal, cleaning shed and disposing the cow dung. [Sneezing, skin problem, infection to self & children, irritation, vomiting, headache]	1	2	3	4	5
38	I sometime get injured while chaffing fodder. [Minor cut, major cut, damage to any body part]	1	2	3	4	5
39	I sometime hit by animal while feeding, cleanin g and milking.	1	2	3	4	5
40	I upset for not getting the price of produce. [Vegetable, grains, milk, fruit etc]	1	2	3	4	5

The level of stress can be assessed based on above-mentioned statements by the researchers/ social workers.

2.4 Validation techniques of health hazard index

An occupational health hazard index obtained from developed methodology was validated by selecting parameters in one of the activities. Household activity was selected purposefully as cooking and food preparation was major tasks for women in rural area. Selection of parameters for this activity was based on the findings of survey data collected by Anganwadi/ Asha workers. Thus, illumination, ventilation, smoke and working environment were the parameters which were indulging farm women for hazard. Illumination level and carbon-mono-oxide was measured by lux meter and gas

detection meter, respectively. Globe bulb thermometer was used to know the radiation temperature affecting to farm women due to burning of biomass (fuel wood, dung cake and crop residue). Psychomotor was used for getting dry and wet bulb temperatures. Weighing balance (spring type) was for knowing the quantity of fuel used per day.

The data obtained with respect to illumination level, ventilation status and carbon-mono oxide level the respondents were rated to the hazard scale of 1 through 4. Details are given below:

1 : Illumination level $\geq$300 lx for cooking, CO level $\leq$35 ppm, ventilation and $\geq$750 lx for food preparation

2 : CO level 35-70 ppm, 100-300 lx for cooking, improper ventilation/ window, 100-750lx food preparation

3 : Poor illumination level for cooking and food preparation (<100 lx), CO level > 70 ppm, poor ventilation/ window

4 : Permanent health problem due to indoor environment/cooking (Chronic respiratory problem as she was forced to use inhaler for routine activities)

2.5 Method of Data Collection

Collection of descriptive data

The demographic profile of the rural women were collected with the help of interview schedule, regarding their work place, working profile, identification of risks at work places, risk with tools used by workers and the risk prone activities performed by them were also assessed with the help of standardized questionnaire. Involvement of farm women in different activities are shown in Figure 1.

Assessment of workplace

Kitchen was selected as a workplace to assess the different dimensions that might affect farm women's household activities. Cooking place was one of the main work areas at household. Anthropometric data of 50 farm women (subjects) from selected 24 main villages. The data were recorded on age, stature, body weight, sitting height, acromial height while sitting, elbow rest height while sitting, arm reach from wall and hand preferences. Data were also collected regarding sitting distance of farm women from chulha, dimensions of chulhas, and increase in height due to use of tawa, pan, vessel and cooker. The data were correlated with workplace where farm women used to sit for cooking the food. Besides these environmental parameters were measured with the help of required instruments.

3. Findings

This chapter deals with the findings of the present investigation and discussion in accordance with the objectives set forth for the study. The discussion of the present study has been compared with the results of the similar type of studies conducted earlier, that helps in drawing the generalization of this research. It is beyond the doubt that activities performed by the farm women in agriculture, household and animal rearing demand a high degree of physical effort, leading fatigue. The major causative factors responsible for this were the static muscular effort and unnatural postures, mainly due to faulty designed workstation and adverse environmental condition. Working for several hours within adverse working environment also affects the working efficiency of the worker. Therefore application of ergonomics principles, which should concern with the design of work station, design of equipments and environmental condition, is necessary.

3.1. General information about respondents

Majority of respondents (75.2%) was of 31 to 50 years age which indicated that responsibility was owned by middle age group people in a family (Table 1). The literacy rate amongst selected respondents was 44.2 per cent which was on higher side as compared to census 2001 for rural area of Bhopal district (36.5%). Farming was the main occupation of respondents (69.0%) followed by wage workers (28.8%) and service (2.3%).

3.2 Farm women's activities in household

Wheat milling was done by 14.6 per cent respondents while 58.7 per cent respondents were doing pulse milling with hand stone mill (Table-1). Rest activities such as house cleaning, water collection, washing cloth, spice making, cooking, vegetable peeling & cutting, food grain sorting and utensil cleaning were performed by almost all the respondents. Respondents were adopting mixed (90.2%) posture followed by sitting (5.2%), standing (2.5%) and bending posture, respectively for cleaning activity. Sitting posture was adopted by almost all the respondents for cooking except very few (0.8%). Only 0.2 per cent respondent from marginal category had assess of water in her house while 89.4 per cent respondents were collecting water from inside the village and 10.4 per cent respondents from outside the village.

Cooking place of 59.8 per cent respondents was inside the house followed by outside house (37.3%) and separate (2.9%) kitchen. Some types of ventilation mechanism were found in 45.2 per cent respondents. Earthen chulha was available as the only means for them as cooking device. In addition to this 17.9 per cent respondents had LPG stove, 13.1 per cent had smokeless chulha, kerosene stove with 2.5 per cent and 2.1 per cent biogas.

It was observed that rural women carried minimum 17-30 kg green fodder daily covering distance of about 2-4 km. The head load was more than the recommended limit (Table 2).

Table 1. Farm women's involvement in household activities.

Household activities	Category-wise involvement of respondents, %					Average
	Landless (119)	Marginal (102)	Small (129)	Semi (81)	Large (49)	
House cleaning	100.0	100.0	100.0	100.0	100.0	**100.0**
Water collection	100.0	100.0	100.0	100.0	100.0	**100.0**
Washing cloth	100.0	100.0	99.2	98.8	100.0	**99.6**
Spices making	99.2	99.0	99.2	100.0	100.0	**99.5**
Cooking	99.2	99.0	99.2	100.0	100.0	**99.5**
Vegetable peeling	100.0	99.0	98.4	98.8	100.0	**99.2**
Vegetable cutting	100.0	99.0	99.2	97.5	100.0	**99.2**
Food grain sorting	100.0	99.0	99.2	97.5	100.0	**99.2**
Utensil cleaning	100.0	99.0	99.2	97.5	100.0	**99.2**
Milling pulses	42.9	99.0	60.5	48.1	42.9	**58.7**
Milling wheat	2.5	57.8	4.7	3.7	4.1	**14.6**

Even for fuel wood collection, a head load of 20-36 kg was carried by the respondents from about 4 km distance as they mostly used to go forest twice in a week.

Table 2. Head load carrying by rural women

Particulars	Weight carried, kg	Distance to travel, km	Time spent per trip, min	Remark
Green fodder	17-30	2-4	60-120	> the limit of 15 kg
Fetching of water	15	0.5	15-30	High frequency
Fuel wood	20-36	4	90-150	> the limit of 15 kg

3.3 Farm women's activities in farm

In farm activities it was found that rural women involved in all most all activities starting from carrying dung to the field to marketing the produce (Table 3). The highest involvement was found in cleaning grains (91.3%) and least was in fertilizer broadcasting (2.5%) operations. It is analysed from the table that out of 21 farm activities, five activities such as cleaning grain, grain drying, harvesting, storing grain and weeding were the major operations where landless respondents (81.5% to 52.1%) were mostly involved while ten farm operations such as weeding, harvesting, maize cob plucking, dehusking maize, groundnut harvesting, groundnut decortication, winnowing, cleaning grains, grain drying and storing grain for rest of the respondents. Plucking vegetables was also the activity performed by 25.6 to 35.3 per cent respondent except landless.

Table 3. Involvement of farm women in various farm activities.

Farm activities	Category-wise involvement of farm women in various farm activities, %					Total %
	Landless	Marginal	Small	Semi	Large	
Carrying dung to field	0.8	4.9	11.6	6.2	4.1	**5.8**
Fertilizer carrying	0.8	11.8	7.0	4.9	2.0	**5.6**
Fertilizer broadcasting	0.0	2.9	5.4	1.2	2.0	**2.5**
Seed treatment for sowing	0.0	13.7	21.7	9.9	6.1	**11.0**
Carrying seeds	0.0	14.7	11.6	7.4	4.1	**7.9**
Irrigation to field	0.0	5.9	4.7	2.5	2.0	**3.1**
Weeding	52.1	80.4	76.0	64.2	44.9	**65.8**
Preparation of solutions of chemical	0.8	9.8	7.0	9.9	4.1	**6.3**
Spraying chemical	1.7	12.7	7.8	8.6	4.1	**7.1**
Harvesting	79.8	95.1	96.1	96.3	69.4	**89.2**
Threshing	5.9	0.0	38.0	19.8	6.1	**15.6**
Maize cob plucking	6.7	74.5	82.9	80.2	83.7	**61.9**
Dehusking maize	5.9	74.5	82.9	82.7	83.7	**62.1**
Groundnut harvesting	4.2	67.6	79.8	74.1	81.6	**57.7**
Groundnut decortication	4.2	67.6	79.1	75.3	75.5	**57.1**
Winnowing	19.3	76.5	82.9	90.1	85.7	**67.3**
Cleaning grains	81.5	92.2	96.1	96.3	91.8	**91.3**
Grain drying	79.8	93.1	93.8	96.3	87.8	**90.0**
Storing grain	70.6	95.1	89.9	93.8	89.8	**86.9**
Plucking vegetables	5.0	35.3	25.6	27.2	34.7	**23.8**
Marketing	2.5	24.5	17.8	14.8	8.2	**14.0**

It was found that cleaning grain was such activity where most of the farm women (78.8%) performed work independently without any assistance from male workers. Lowest independent involvement (0.2 to 0.8) was in preparation of solution of chemicals, carrying seeds, fertilizer carrying, threshing, seed treatment, fertilizer broadcasting and carrying dung to field. Winnowing fan was used for cleaning the grains by 17.9 per cent of the respondents. It is analysed from the table that cleaning grain, grain drying, weeding and harvesting were again the major operations where landless respondents (79.8 % to 41.2%) were mostly involved independently while rest respondents (83.7% to 24.8%) were mostly involved in nine major farm operations such as cleaning grain, grain drying, weeding, dehusking maize, maize cob plucking, harvesting, groundnut decortication, digging groundnut and winnowing.

Table 4. Farm tools and equipment used by respondents.

Farm tools & equipment	Category of respondents	Frequency of utilization by farm women, %		
		Sometimes	Always	Total
A. Farm tools				
Spade	Landless	24.4	7.6	31.9
	Marginal	64.7	31.4	96.1
	Small	75.2	22.5	97.7
	Semi	70.4	23.5	93.8
	large	59.2	28.6	87.8
Axe	Landless	21.8	5.9	27.7
	Marginal	62.7	23.5	86.3
	Small	73.6	19.4	93.0
	Semi	69.1	27.2	96.3
	large	57.1	38.8	95.9
Kudali	Landless	5.0	0.8	5.9
	Marginal	58.8	21.6	80.4
	Small	65.1	18.6	83.7
	Semi	69.1	19.8	88.9
	large	63.3	30.6	93.9
Khurpa	Landless	4.2	0.0	4.2
	Marginal	42.2	4.9	47.1
	Small	57.4	2.3	59.7
	Semi	63.0	2.5	65.4
	large	61.2	10.2	71.4
B. Farm equipment				
Seed treatment drum	Marginal	2.0		2.0
	Small	4.7	0.8	5.4
	Semi	4.9		4.9
	large	2.0	4.1	6.1
Fertilizer broadcaster	Marginal	1.0	0.0	1.0
	Small	6.2	0.8	7.0
	Semi	3.7	1.2	4.9
	large	18.4	4.1	22.4
Manual sprayer	Marginal	19.6	0.0	19.6
	Small	20.9	1.6	22.5
	Semi	9.9	3.7	13.6
	large	20.4	4.1	24.5
Improved sickle	Landless	2.5	0.8	3.4
	Marginal	19.6	0.0	19.6
	Small	30.2	5.4	35.7
	Semi	32.1	11.1	43.2
	large	28.6	10.2	38.8

Farm tools & equipment	Category of respondents	Frequency of utilization by farm women, %		
		Sometimes	Always	Total
Groundnut decorticator	Small	0.8	0.0	0.8
	large	0.0	2.0	2.0
Thresher for wheat, soybean, gram & pigeon pea	Landless	5.0	0.0	5.0
	Marginal	96.1	2.9	99.0
	Small	91.5	7.8	99.2
	Semi	82.7	13.6	96.3
	large	79.6	18.4	98.0
Maize sheller	Marginal	2.9	0.0	2.9
	Small	1.6	0.0	1.6
	Semi	2.5	0.0	2.5
Cleaner - grader	Small	0.8	0.8	1.6
	Semi	2.5	0.0	2.5
	large	10.2	4.1	14.3
Tractor	Landless	3.4	0.8	4.2
	Marginal	89.2	5.9	95.1
	Small	85.3	10.1	95.3
	Semi	77.8	18.5	96.3
	large	46.9	51.0	98.0
Tractor trolley	Landless	4.2	0.0	4.2
	Marginal	92.2	3.9	96.1
	Small	86.8	7.7	94.6
	Semi	81.5	14.8	96.3
	large	49.0	49.0	98.0
Bullock cart	Landless	1.7	0.0	1.7
	Marginal	34.3	2.0	36.3
	Small	39.5	5.4	45.0
	Semi	40.7	7.4	48.1
	large	14.3	2.0	16.3

3.4 Farm women's activities in animal rearing

In animal rearing activities, more than 80 per cent respondents involved in cleaning shed, gathering dung and milk processing from all categories (Table 5). The percent of involvement for feeding animal, preparation of feed, fodder collection was 63.8, 67.7 and 69.6 per cent, respectively. Lowest involvement (only 1.2%) was found in animal grazing activity by farm women.

About 54 per cent farm women used to gather dung with hand. They were used to carry head load for disposal of dung, fodder and feed material. Lowest involvement was found in fodder chaffing.

An analysis regarding farm women initiation in taking/ carrying out animal rearing activities independently without assistance of male workers revealed that gathering and disposal of dung were such activities which were

Table 5. Involvement of farm women in various animal rearing activities.

Involvement in farm activities	Category-wise involvement of farm women in animal rearing activities, %					Total, %
	Landless	Marginal	Small	Semi	Large	
Cleaning shed	62.2	77.5	92.2	95.1	98.0	**82.7**
Gathering dung	62.2	77.5	90.7	92.6	95.9	**81.7**
Feeding animal	43.7	96.1	66.7	63.0	38.8	**63.8**
Grazing animal	0.0	2.0	3.1	0.0	0.0	**1.2**
Buying feed	43.7	28.4	27.1	9.9	10.2	**26.9**
Preparation of animal feed	54.6	70.6	76.0	75.3	59.2	**67.7**
Milking	9.2	9.8	16.3	6.2	10.2	**10.8**
Processing of milk	60.5	78.4	89.9	95.1	93.9	**81.5**
Fodder collection	52.1	68.6	81.4	85.2	59.2	**69.8**
Chaffing fodder	6.7	15.7	18.6	12.3	14.3	**13.5**

performed by 75.6 and 74.6 per cent women, respectively.

3.5 Hazards Faced by Farm women in Day to Day Household, Farm and Animal Rearing Activities

Burning of cut-wood, forest wood, dung cake, agriculture waste and kerosene were the main source of fuel for cooking and these became a main source of hazard for farm women in un-ventilated and less illuminated workplace. Eye itching, irritation, breathing, water in eyes, blurred vision etc were the common problems among the farm women (Table 6). The problems by burning cut wood was highest followed by dung cake.

Table 6. Hazards faced by farm women during cooking due to fuel burning.

Problems	Cause	Hazards faced by different categories of farm women, per cent					
		Landless (119)	Marginal (102)	Small (129)	Semi (81)	Large (49)	Overall (480)
A. Burning cut wood in earthen Chula for cooking							
Eye itching/ irritation/ pain	Accumulation of smoke due to poor ventilation & working environment	23.5	25.5	20.9	27.2	26.5	**24.2**
Breathing		7.6	15.7	11.6	12.3	20.4	**12.5**
Tear		2.5	1.0	4.7	1.2	2.0	**2.5**
Vision		0.8					**0.2**
B. Burning forest wood in earthen Chula for coo king							
Eye itching/ irritation/ pain	Accumulation of smoke due to poor ventilation & working environment	0.8	1.0	-	1.2	-	**0.61**
Breathing		-	-	-	-	-	
Tear		0.8	-	-	1.2	-	**0.61**
Vision		-	-	-	-	-	

C. Burning dung cake in earthen chulha for cooking							
Eye itching/ irritation/ pain	Accumulation of smoke due to poor ventilation & working environment	20.2	23.5	20.9	23.5	24.5	**22.1**
Breathing		5.9	10.8	10.9	2.5	14.3	**8.5**
Tear			2.0	2.3		2.0	**1.3**
D. Burning agriculture waste in earthen Chula for cooking							
Eye itching/ irritation/ pain	Accumulation of smoke due to poor ventilation & working environment	2.5	-	-	1.2		**0.82**
Breathing		2.5	-	-	1.2	-	**0.82**
Tear		2.5	-	-	1.2	-	**0.82**
Vision		2.5	-	-	1.2	-	**0.82**
E. Using kerosene stove for cooking							
Eye itching/ irritation/ pain	Accumulation of smoke due to poor ventilation & working environment	4.2	0.98	2.3	3.7	4.1	**2.9**
Breathing		4.2	0.98	2.3	3.7	4.1	**2.9**

Load carrying

Water and fuel wood carrying are the important regular activities to meet the day-to-day cooking activities. A rural woman used to carry about 18-litre water per trip by covering distance of 1.4 km (Table 7). Frequency of water carrying was 6. Similarly fuel wood/ twigs carried by a rural woman twice in a week was about 27 kg by covering distance of 2.7 km. The average load carrying by a worker should not be more than 30% of body weight (Anon., 2009). 5th & 95th percentile and average weight of Madhya Pradesh farmwomen was 33.3, 58.5 and 45.9 kg, respectively (Gite et al., 2009), thus, carry able load should be 10 to 17 kg.

Table.7 Load carrying by rural women.

Particulars	Average (+ S.D) Values
Water carrying per trip, l	18.1 (+ 2.6)
Frequency per day	6.0 (+ 1.7)
Distance traveled per trip, km	1.4 (+ 0.2)
Fuel wood carrying per trip, kg	27 (+ 7.9)
Frequency per day	1
Distance traveled per trip, km	2.7 (+ 1.2)

Load carrying and environment at workplaces were the factors that provided discomfort and harm to farm women which lead to a hazard. It was also found that respondents faced (back, shoulder, leg, chest) pain, crushing finger, etc due to work load and type of work in farm activities (Table 8). The shoulder pain was highest among respondents.

Table 8. Factors responsible for hazards to farm women in farm activities.

S. No	Particulars	Discomfort and harm faced by different categories of farm women, per cent					Overall (480)
		Land less (119)	Marginal (102)	Small (129)	Semi (81)	Large (49)	
1.	Back pain due to load	58.8	55.9	51.9	70.4	42.9	**56.7**
2.	Shoulder pain	60.5	56.9	55.8	75.3	44.9	**59.4**
3.	Leg /foot pain	68.1	71.6	62.0	80.2	69.4	**69.4**
4.	Itching	18.5	22.5	15.5	27.2	10.2	**19.2**
5.	Chest pain	32.8	38.2	23.3	37.0	16.3	**30.4**
6.	Crushing finger	18.5	13.7	12.4	13.6	10.2	**14.2**
7.	Hearing problem	10.9	6.9	8.5	8.6	6.1	**8.5**
8.	Dust problem	16.0	17.6	14.0	11.1	16.3	**15.0**
9.	Headache	51.3	52.0	48.1	56.8	49.0	**51.3**
10.	Looh	50.4	65.7	60.5	61.7	53.1	**58.5**
11.	Heat stress	49.6	52.9	49.6	55.6	44.9	**50.8**
12.	Dehydration	49.6	67.6	48.1	55.6	44.9	**53.5**
13.	Need of hospital	14.3	13.7	11.6	17.3	6.1	**13.1**
14.	Need of medicine	21.0	23.5	20.2	23.5	10.2	**20.6**

Lack of safety measures in farm machine/ equipment were the source of hazard to farm women due to their loose clothes (saree), (Table 9). Farm women were also affected by slipping and falling of machine on their body.

Table 9. Hazards faced by farm women due to farm machines in farm activities

S. No	Hazards due to machine	Hazards faced by different categories of farm women, per cent					Overall (480)
		Land less (119)	Marginal (102)	Small (129)	Semi (81)	Large (49)	
1.	Cloth trapping	3.4	8.8	3.9	6.2	6.1	**5.4**
2.	Slipping	0.8	7.8	3.1	1.2	6.1	**3.2**
3.	Fall of machine	2.5	3.9	1.6	2.5	4.1	**2.7**

Farm women were involved in animal rearing work such as cleaning shed, gathering dung, feeding animal, preparing feed, animal grazing, fodder collection & chaffing and milking (Table 15). These activities may lead to hazard if not properly performed with care. It was also found that body parts (leg, eye and hand) of some of the farm women injured due to hurt by animal.

Electricity, socio-psychological and physical/ biological factors were also attributed towards hazards which were faced by farm women in carrying out household, farm and animal rearing activities were due to (Table 10).

Deprivation of modern equipment/ technology, low wage, monotonous work, irregular hours and excess responsibilities were the main causes under socio-psychological type of hazards.

Table 10. General hazards faced by farm women.

S. No	Particulars	Landless	Marginal	Small	Semi	Large	Total
1.	Electricity						
	Electric heater	2.5	2.0	2.3	4.9	6.1	**3.1**
	Electrical shock	0.0	8.8	7.0	2.5	2.0	**4.4**
	Electrical injury	6.7	2.9	3.1	2.5	2.0	**3.8**
	Electrical accidents	5.9	9.8	7.8	4.9	12.2	**7.7**
2.	Socio-psychological						
	Harassment	30.3	19.6	13.2	12.3	20.4	**19.4**
	Low wage	67.2	57.8	32.6	23.5	16.3	**43.3**
	Monotonous work	44.5	50.0	34.1	45.7	22.4	**40.8**
	Irregular hours	40.3	35.3	24.8	33.3	20.4	**31.9**
	Excess responsibility	21.8	30.4	13.2	23.5	10.2	**20.4**
	Deprive of modern equipment	47.1	53.9	31.0	43.2	30.6	**41.0**
3.	Physical/ biological						
	Fall from ladder	4.2	7.8	7.8	4.9	10.2	**6.7**
	Snake/insect bite	7.6	5.9	6.2	3.7	6.1	**6.0**
	Poison	7.6	13.7	6.2	6.2	4.1	**7.9**
	Pesticide reaction	5.0	9.8	3.1	4.9	4.1	**5.4**
	Animal bite	8.4	5.9	4.7	1.2	4.1	**5.2**

3.6 Validation of health hazard index

An occupational health hazard index obtained from above-mentioned methodology was validated by selecting parameters in one of the activities. Household activity was selected purposefully. In this, cooking and food preparation was major tasks for women in rural area. Therefore, this activity was considered for validation. Selection of parameters for this activity was based on the findings of survey data. Therefore, illumination, ventilation, smoke and working environment were the parameters which are indulging farm women for hazard. The data obtained with respect to illumination level, ventilation mechanism and carbon-mono oxide level the respondents were rated to the hazard scale of 1 through 4. Details are given below:

1 : Illumination level $\geq$300 lx for cooking, CO level $\leq$35 ppm, ventilation and $\geq$750 lx for food preparation

2 : CO level 35-70 ppm, 100-300 lx for cooking, improper ventilation/ window, 100-750lx food preparation

3 : Poor illumination level for cooking and food preparation (<100 lx), CO level > 70 ppm, poor ventilation/ window

4 : Permanent health problem due to indoor environment/cooking (Chronic respiratory problem as she was forced to use inhaler for routine activities)

Hazard index based on measured data

S. No.	Activity	Hazard rating for number of respondents (N)				Hazard Index value
		1*	2**	3***	4****	
1.	Cooking	7	-	58	1	0.7
2.	Food preparation	6	17	43	-	0.64

* 1 = Low level of hazard [(Illumination level = >300 lx for cooking, >750 lx for food preparation), CO level <35 ppm, proper ventilation and window]

**2 = Moderate level hazard: 200-300 lx for cooking, 100-750lx food preparation, CO level 35-70 ppm, improper ventilation/ window

***3 = High Level hazard: [(Low illumination level for cooking, 100-200 lx for food preparation), CO level 50-70 ppm, poor ventilation/ window]

****4. Severe hazard : Permanent health problem

Hazard index based on survey data (perception)

S. No	Working Environment	Activity	Rating Score for Hazard for number of respondents (N)				Hazard Index value
			1*	2**	3***	4****	
1.	Indoor	Household	177	128	172	2	0.49
2.	Outdoor	Animal rearing	453	15	11	1	0.27
		Farm work	151	293	33	3	0.44

Overall occupational health hazard (farm) index will be

= 0.233 x Household + 0.491 x Farm + 0.276 x Animal

= 0.114 + 0.216 + 0.075

= 0.405

Satisfactory level: 0.25

* 1 = Satisfactory level of hazard: Un-noticed due to less time spent or outside cooking

**2 = Moderate level hazard : Self affected due to smoke

***3 = High risk Level hazard: Self + child affected due to smoke

****4. Very high risk to hazard : [Liable to permanent damage/ life risk]

By considering the perception about hazards faced by women in household, farm and animal rearing activities, the overall occupational health hazard index was found to 0.405. The medium level of hazard was found in household (0.49) and farm (0.44) activities. Low level of hazard was in animal rearing (0.27) activity. For validating their perception about extent of hazards, data collected from 66 respondents of 24 villages for workplace i.e. cooking related activities revealed the occupational health hazard index was 0.67 which is about 37 per cent higher level of index. This clearly indicated that their perception about the existence of hazards was lesser than the actual as faced by them in performing various activities.

3.7 Workplace condition

The illumination level was too low (Table 11) for cooking (0 to 55 lx without kerosene lamp and 10-82 lx with kerosene lamp) as against recommended value of 300 lx. Rural women spent minimum 2 h in a whole day continuously under similar environment for cooking work which indicated the overburden, stress and hazard faced by them.

Table 11. Illumination level at different places.

Particulars	Illumination level (Lux) at different workplace				
	Food preparation	Cooking		Living room	Entrance
		Without lamp	With lamp		
Average	323	15	46	117	224
S.D	123	16	22	95	177
Range	130 to 455	0 to 55	10 to 82	1 to 223	32 to 550
Recommended*	750	300		300	500

* Source: http://ergonomics.about.com/od/lighting/a/lightlevelrooms.htm dated 10.3.2011 at 15.12 h.

Average fuel consumption for a family of 7 persons was 12.35 kg biomass (Table 11). Of this, share of dung cake was highest (53.8%) followed by 37.0 per cent wood/twigs and 9.7 percent agricultural residue.

Table 12 Fuel consumption for cooking/ day for a family of seven persons.

Type of fuel	Consumption/day, kg
Wood/ twigs	4.6
Dung cake	6.65
Agriculture residue	1.2

Dry bulb temperature and relative humidity during cooking were 32.3 + 1.9 0C and 37 + 10.3 per cent, respectively. Carbon mono-oxide (CO) was found in the range of 11-308 ppm while using mixed fuel (Table 12).

Table 12. Working environment at work place (cooking).

Particulars	Average	SD	Range
Carbon mono-oxide level, ppm			
Dung cake	37.5	4.9	34-41
Mixed fuel	72.2	70.6	11 to 308
Dry bulb temperature, ^{0}C	33.4	2.7	30-37
Relative humidity, %	31.3	10.9	14-47
Globe bulb temperature, ^{0}C	38.8	2.2	36-44

Rural women spent more than 30 min continuously for making roti, dal and vegetables at earthen Chulha for a family of 5-7 persons in the working environment described above.

Power operated cleaner-grader provided highest level of noise at ear level of respondents and least in DRWA hand operated maize dehusker-sheller (Table 13). Higher level (> 80 dbA) suggested for adequate rest break while working with this machine.

Table 13. Noise level during operation of different farm equipment/ machines.

Farm equipment/ machines	Noise level, db (A)			
	Outlet	Machine	Ear level	Place
Wheat flour mill	87.8	93.25	88.25	Puckka house
Power operated Cleaner -grader	97.8	103.5	98.9	Puckka farm shed
DRWA Maize dehusker -sheller	79	97	83	Puckka farm shed
Tractor operated Wheat thresher	89.7	91.3	90.1	Open field

3.8 Status of Workplace

About 80 percent of them were literate. Most of the household acquired single burner earthen chulha and about one fifth of selected respondents had gas as cooking device). Nearly 70 percent of the rural women were doing preparatory work for cooking food in a posture of sitting with folded legs. Whereas about 30 percent respondents had used small stools for sitting while doing preparatory work for foods and few of them having gas adopted standing posture for the same responsibility. About 60 percent of respondents adopted posture i.e. sitting with folded legs and rest of the subjects used small stools for sitting while cooking in earthen chulha. For cleaning vessel, more than half of the subjects were adopted sitting posture and 30 percent in squatting posture. Most of them were able to vary posture while doing preparatory work for food and cooking. Very few of them were adopted same posture while cleaning the vessels or dishes due to their physical condition. About 90 percent of women performed various tasks for preparatory work related to food inside of the house throughout the year. It was also found that most of the housewives cooked food inside their house in all the seasons. Whereas it is also seen that more than 70 percent subjects used to clean their dishes or vessels at outside of their houses. All of them were having traditional household equipment such as sickle, peeler, supa, khal-batti, different types of chakki, strainer etc to perform cooking related activities. The items required for food preparation and cooking activities were found out of the reach of 70 percent women at their work place. This indicated that they have to move or change their posture more frequently while performing their tasks. It was found that about 90 percent of the subjects used wood and dung cake as cooking fuel. Very few of them used agricultural residue/ waste as cooking fuel. Households having LPG connection were utilizing the gas mostly during urgency as a gas cylinder lasts within 3-4 months. Respondents used to manage their time very effectively and performed the tasks related to food preparation such as, fetching water, collection of fuel and fodder, pulse making with hand stone mill (chakki), wheat flour making with hand stone mill and pounding spices with khalbatti in

addition to rearing of children, animal care and farm work. The data revealed that 56 percent respondents were using hand stone mill for making pulses and about 30 percent were doing this activity sometimes, while rest of them performed usually. It was also seen that about 30 percent respondents were using hand stone mill for flour making in case of special occasion. More than 50 percent subjects used to pound spices for their day to day consumption in food items. About all the respondents adopted bending or twisting posture while performing various tasks and more than 80 percent of them usually lift or lower heavy objects during their performance. Fetching water was a very tedious task for the respondents and about 90 percent of them performed this activity in morning as well as in the evening. Most of the respondents were lifted or carried or lowered the objects which were more than 20 kg per time.

3.8.1 Anthropometric data of farm women

The average age, stature and weight of the respondents was 36 yrs (varied from 19-70 yrs), 152.4 cm (varied from 122-169 cm) and 50.42 kg (varied from 33-72 kg), respectively. About 78 per cent of respondents were right handed. The BMI was found 21.79 which indicated about their normal body health. The average sitting height at cooking place was 73.7 cm which varied from 85-62 cm. The average sitting acromial height and resting elbow height of the respondents were 52.3 and 23.8 cm, respectively. The maximum and minimum reach of the respondents while sitting was 80 and 60 cm, respectively. They were able to perform their task within the maximum reach, particularly with single burner earthen chulha. They faced difficulty where the tasks or objects were out of their reach, particularly with double burner earthen chulha. Rural women used to bend their body/ head/neck forward/backward/ sideward and also extend their arm & hand as a routine activities to complete the task while cooking. This may create problems such as pain in body parts, joints and mental stress to finish the work.

The average sitting distance of farm women from chulha was 9.7 cm where the maximum and minimum distance was 28 and 1 cm, respectively). This clearly indicated that they were sitting very near to chulha and always getting radiant heat. The average height and width of the chulha (single) were 20.0 and 32.0 cm, respectively. The data were correlated with workplace where farm women used to sit for cooking the food.

3.8.2 Refinement in workplace

Farm women were using single and double burner earthen chulha for cooking. While analyzing the workplace with regard to anthropometric dimensions of farm women, sitting style and dimensions of chulha, it is observed that women used to sit closely either side of chulha facing to wood entering side (Figure 1). During this way, the movement of right hand of respondent is limited to only one of burner whereas left hand can reach up to 2nd burner without movement. Shoulder (Bideltoid) can be moved maximum up to 20 to 25 cm. This way space can be provided to right hand while space for left hand will be reduced. This position is necessary for the women while making roti and making roti consumed at least 30 min time. Change of the sitting style of women will not be easy because in the traditional chulha, an open space of about 40 cm in length was provided for cooking bati, potato, brinjal etc. With single burner earthen

chulha, problem with respect to movement will be less as compared with double burner earthen chulha. The repetitive side movement may create muscle problem to women in longer time.

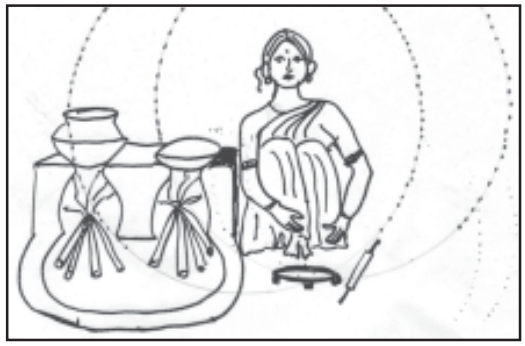


Figure 1. Traditionally way of cooking food on double burner earthen chulha.

To avoid this type of problem, hands on experience on improved chulha to farm women need to be given with specific benefit of its using. Suggested workplace for single burner earthen chulha (Facing to side of chulha) is shown in Figure 2. This may reduce the repetitive side way movement.

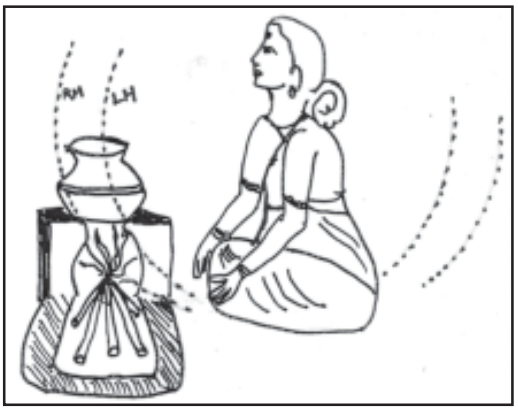


Figure 2. Improved workplace for farm women on single burner chulha

4. Conclusion

Occupational Health Hazards have been a widespread problem in agriculture in more than a decade. Occupational risk factors include static position, forward bending, heavy lifting and carrying, kneeling and vibration in agriculture. The identification of occupational health hazards and development of systems to evaluate intervene and decrease musculoskeletal risk factors and resulting disorders is quite crucial for safety of farm women. Role of women in agriculture is increasingly understood and recognized in agriculture. Women play a substantial role in decision making in farm related tasks. There is need to initiate women oriented researches in agriculture. As woman has different ergonomical characteristics than man, design of women friendly tools and equipment is required. Work station should be adjustable to make it comfortable for women during performing agricultural activities.

5. Suggestions

The challenges for reducing OHH among farmwomen are significant.

1- There is a need for researches to make agricultural health and safety as priority along with musculoskeletal disorders among farmwomen at the most

2- There is a need to develop low cost technologies for the critical field problems of repetitive and forceful tasks such as weeding, harvesting, lifting and carrying heavy loads and so on.

3- There is an urgent need to train farm women about using women friendly technologies and operating improved tools and equipment.

4- There is a need for conducting awareness, intervention and prevention programs about OHH for farm women.

5- Setting up of industries in rural areas to produce gaseous and liquid fuels from biomass should be encouraged in terms of availability of easy finance and tax benefits.

6. Reference

- Fenske R.Simcox NJ1995 Agricultural workers. In BS Levy, DH Women, Occupational Health Recognizing and Perceiving Work Related Disease and Injury 3rd Edition Boston Little Brown and Co, pp 665-684.
- Praveen PLRJ, A Rama Rao M, Venkata Rao 2005 Decision Making Pattern of Rural Women in Farm Related Activities *Agriculture Extension Review* Nov-Dec,2005,pp.3-5
- Sauter SI. Swanson NG 1992. The effect of frequent rest breaks on performance and wellbeing in repetitive VDT work.
- Turner WED 2004 Prevention of Work Related Musculoskeletal Disorder…An evidence Based
- World Resources Institute, United Nations Environment Programme, United Nations Development Programme and World Bank. 1998-99 World Resources; a Guide to the Global Environment. Oxford University Press, Oxford,1998-99.

- Fenske R.Simcox NJ1995 Agricultural workers. In BS Levy, DH Women, Occupational Health Recognizing and Perceiving Work Related Disease and Injury 3rd Edition Boston Little Brown and Co, pp 665-684.
- Praveen PLRJ, A Rama Rao M, Venkata Rao 2005 Decision Making Pattern of Rural Women in Farm Related Activities *Agriculture Extension Review* Nov-Dec,2005,pp.3-5
- Sauter SI. Swanson NG 1992. The effect of frequent rest breaks on performance and wellbeing in repetitive VDT work.
- Turner WED 2004 Prevention of Work Related Musculoskeletal Disorder…An evidence Based

- Nayak, J., Singh, S P and Moharana, G. 2012. Occupational health hazards of farm women at their workplace in Bhopal district. Final Report. DRWA, Bhubaneswar.

Annexure-1

List of variables

Hazard ratings		Variables
A. Household		
1	:	Itching in hand, Burn due to cooking oil/ fuel wood/ utensils, Minor scratches in hand/ finger, Occasional slip during cleaning/ washing, Sneezing during sweeping/cleaning/ cooking, Occasional insect bite, Rare electric shock, Postural discomfort, Less effect of smoke Water carrying/ collection De-stoning/ cleaning of food grains Making of dung cake
2	:	Eye itching/ irritation Running tear Respiratory symptoms Fuel wood collection Minor cuts Shifting and lifting of material Less ventilation Less light at workplace Need of medicine Excess responsibility
3	:	Affect to child Respiratory problem Blurred vision Need of hospital
4	:	Chronic respiratory problems, severe burning injury, fatal accidents
B. Farm		
1	:	Tiredness Uneasiness Weather affect Minor dust during primary processing of grains Sorting of grains for seed Postural discomfort due to use of traditional farm tools and equipment Minor scratches with crops

Itching due to crop
Ambient conditions

2 : Trapping of cloths
Fall of machine/ equipment
Irritating sound
Dust at the time of threshing/ cleaning/ winnowing
Whole body vibration due to traveling tractor
Minor cuts with farm tools/ equipment
Seasonal mixing of chemical for seed treatment/ preparation of chemical solution
Snake/ insect bite during farm work
Pesticide application
Animal bite during farm work or for farm work
Sun stroke
Need of medicineExcess responsibility

3 : Injured body parts due to farm tools/ equipment, animal, lifting or carrying seed/fertilizer material/ object/ equipment
Need of hospital
Break in work
Injury due to trapping of cloths

4 : Severe accidents with farm tools and equipment affecting respondents for permanent disability/ loss

C. Animal rearing

1 : Daily dung collection
Cleaning of cow shed
Washing of animal
Animal feeding
Preparation of animal feed
Grazing/ shifting of animal from one place to another
Milking
Fodder collection
Chaff making
Postural discomfort
Watering
Ambient conditions

2 : Hurt by animal
Minor injury due to chaffing
Postural discomfort while milking
Disposing of dung for FYM
Need of medicineExcess responsibility

3 : Injured body parts due to animal hitting, Frequency of hurt by animalNeed of hospital

4 : Severe accidents with animals affecting respondents for permanent disability/ loss

HOUSEHOLD ACTIVITIES

Collection of Fuel

Cooking Food at low illumination

Cutting of Vegetable with Sickle

Fetching Water

Manual Grinding

Cleaning Utensil

FARMING RELATED ACTIVITIES

Weeding

Harvesting of Vegetables

Sorting and Grading of Green Leaves

Cleaning of Food Grains

Winnowing

Grinding of Pulses

Manual Decortication

Packaging of Food Grains

Sorting and Grading of Food Grains

Working in Flour Mill

Deshelling of Maize

ANIMAL REARING ACTIVITIES

Collection of Fodder

Grazing

Disposal of Animal Waste

Preparation of Dung cake

Cleaning of Animal Shed

Cleaning of Animal Shed

Measuring load of fodder

Measuring Illumination level

Measuring Emission of Gas

Measuring Sound Level

Anthropometric Measurement

Measurement of Workstation

DIFFERENT TYPES OF HAZARDS

Hazard due to Thresher

Hazard due to Household

Hazard due to Snake Bite

Hazard due to Hand Weeding

Hazard due to Animal Horn