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### Occupational health hazards in harvesting and post harvest activities of turmeric performed by women workers of Odisha

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#### Abstract

Women's role in harvest and post harvest activities of turmeric can't be ignored because they work as frontline workers in most of the turmeric growing states in India. They play a major role in the post harvest activities such as sorting, grading, boiling, drying, polishing, grinding etc are being done manually. An attempt was made to study the existing practices and extent of involvement of tribal women in post harvest activities of turmeric crop and to identify the occupational health problems of tribal women in post-harvest activities of turmeric cultivation. This study suggested for further ergonomic evaluation of each activities to recommend suitable interventions of technologies which can help tribal women overcome the physically demanding activities.

**Keywords:** Occupational health, problems, tribal women, post-harvest activities turmeric

#### Introduction

Turmeric is recognized as the "golden spice" as well as the "spice of life." This is predominantly used by the households because of its importance in culinary, high medicinal value, anti-cancer and anti-viral properties. India is the largest producer of turmeric (*Curcuma longa*) in the world (80%). In case of production of spices or seed spices women's participation is much more as compared to men. Work as frontline workers in most of the turmeric growing states in India. Women involve in land preparation, planting, mulching, manuring, harvesting and post harvest operations. They play a major role in the post harvest activities such as sorting, grading, boiling, drying, polishing, grinding etc are being done manually. Women's role in harvest and post harvest activities of turmeric can't be ignored because they work as frontline workers in most of the turmeric growing states in India. These are drudgery prone, hazardous and take lots of time to complete the task. This involves lots of time and physical effort of the women workers engaged in these activities. Keeping this view a pilot study was conducted in Kandhamal, Koraput and Nayagarh districts of Odisha where tribal women actively participate in turmeric cultivation since years.

#### Objectives

- To study the existing practices and extent of

involvement of women workers in post harvest activities of turmeric crop.

- To identify the occupational health problems of women workers in post-harvest activities of turmeric cultivation

#### Methodology

The study was conducted to determine the problems of women working in the turmeric cultivation in Kamndhamal, Koraput and Nayagarh districts of Odisha. The sample size was 150 and simple random sampling was done to select respondents. Participatory observations and Interviews were conducted for gathering data. Structured interview schedule developed for data collection. The information collected through filling of interview schedules from 150 respondents. Questions were also asked on their feeling and perception at work. Data were also collected to have the general information i.e., socio economic status of the farm women involved in turmeric production, extent of involvement in post harvest management of turmeric, their work profile, working hours, facilities provided, constraints faced etc. Specific information pertaining to existing practices followed by women workers in performing harvest and post harvest activities from both the states were also recorded through primary and secondary sources. The after receiving the responses, the data was analyzed and tabulated.

## Results and Discussion

The findings of the study are further treated through summarized tables and have been presented under following sections:

### Personal profile of the women workers while performing turmeric cultivation activities

The demographic profile of respondent revealed that about 32 percent women workers belonged to the age group of 40 to 49 years followed by 50 to 59 years (26.67 %) 30 to 39 years (23.33%) and 20 to 29 years (18%). It was found that about 38.67 per cent women workers were functionally literate who were able to do the signatures only. About 28.67 per cent women workers had primary education and 11.33 per cent completed middle school examinations. There were 16.67 per cent illiterate women workers among them. It was also found that majority of the women workers belonged to schedule tribe category (66.67%) followed by other backward caste (23.33 %) and general caste (10%). It was observed that about 37.33 per cent of the women workers were land less followed by 58.00 per cent were marginal farmers. There were very less number of women workers belonged to the small, medium and large farmers' category in both the states. It was also found that about 38.67 per cent of them were having annual income in between Rs.40000-60000/- followed by 30.00 per cent women workers getting Rs.60000 to 80000/-. The results indicated that there were major per cent of women workers were having their annual income below Rs 80000/-. There were very less number of women workers who were having their annual income more than Rs 80000/-. The results are in line with the study conducted in Haryana by Godara (2023) <sup>[8]</sup> where more than fifty per cent (51.00%) of the women farmers were in the age group of 35-45years.

### Work profile of the women workers while performing turmeric cultivation activities

The work profile of the women workers in turmeric cultivation were collected by interviewing the women workers. It was found that majority of the workers were cultivators (59.33%) followed by agricultural labourers (37.33%) and land owners (3.33 %) in Odisha. About 52.67 per cent women workers were working in the daily basis at processing centres. All of the women workers were working from 9 am to 5pm at both the states and they were doing overtime of 2 hours during peak period. Women workers were getting one break for 30 minutes to take lunch. The time schedule of work of women workers revealed that they work for 8-10 hours per day (65.33%) and 6-8 hours per day was 34.67 per cent. Promila (2014) <sup>[17]</sup> also confirmed that majority of the respondents (73.25%) were working 5-8 hrs per day in poly houses of Karnal, Ambala and Hisar.

### Existing harvest and post harvest practices by the women workers while performing turmeric cultivation activities in Odisha

The existing harvest and post harvest practices in turmeric cultivation and involvement of women workers were collected through structured interview schedule. It was found that gathered rhizome entails a number of steps, including boiling, drying, polishing, and colouring. The data revealed that all of the respondent (100%) participated in harvesting, separating finger rhizome from mother rhizome, drying, polishing, sieving, cleaning, grading & sorting, packaging (packing and sealing), storage and also marketing which were mostly manually done. Only 6 percent of them were coloring in traditional process. Most of the tasks were seasonal and take lots of time and physical effort responsible for drudgery and health hazards. Some of the women involved in large production of turmeric did polishing, grinding etc in daily/ weekly basis. Maximum time consumed in separating rhizomes (8 to 10 hrs/day) followed by harvesting, gathering, drying, cleaning, grading and sorting (8 to 10 hrs/day) and rest of the activities took 6 to 8 hours except boiling and marketing (2-4 hrs/day). They were doing it manually in their traditional chulha and utensils. After boiling they used dry the rhizomes at open ground or harvesting ground. Polishing and colouring are the very heavy tasks which were done manually. These two activities are being done by the Self help groups in daily basis and were also responsible health hazards. Grading and storage were the seasonal activities mostly done manually. This also includes cleaning and packaging in large size sacs or packets. Value addition such as making powders and packaging were the regular activities done on daily basis by the group members. The women workers reported that all the activities starting from harvesting to carrying produce, separating, boiling, drying, polishing, cleaning, grading, and packaging related activities involved repetitive and forceful tasks. In almost all the activities use of body parts such as upper arm, lower arm, palm, fingers, shoulder, neck, head, upper and lower back. It was evident that in most of the activities static awkward postures and repetitive movements were adopted by the workers by adopting sitting, squatting, bending and twisting of body parts. These prolonged awkward posture leads to musculoskeletal problem in the long run and also responsible for occupational health hazards. Babu *et al* (2015) <sup>[4]</sup> also revealed that harvesting of turmeric was done with the help of small spade by the farm families. Mostly the land was ploughed by men and the rhizomes were gathered by hand by women. The fingers rhizomes were separated from the mother rhizomes by both men and women and kept in shade for 2-3 days to dry. Similarly, Zend *et al* (2019) <sup>[26]</sup> confirmed that in turmeric cultivation, women workers participated in planting of rhizomes, weeding, harvesting and cleaning activities. Most of the procedures such as planting, earthing up, harvesting in turmeric production system were manually done. Lack of awareness on the manually operated machines available for earthing up task was also noticed

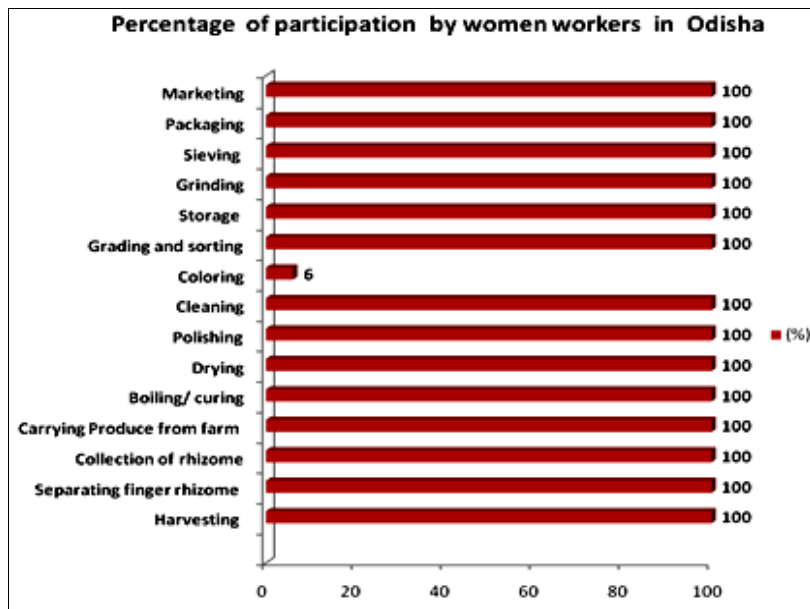


Fig 1: Existing harvest and post harvest practices by the women workers while performing turmeric cultivation activities in Odisha

**Posture adopted by the selected women workers of Punjab and Odisha**

In Punjab and Odisha, different postures were adopted by the women workers revealed that in harvesting, bending and stooping posture was adopted in both the states as they did in manual method. In most of the activities such as separating rhizomes, cleaning, boiling, drying, gathering, polishing, cleaning, grading, storage packaging sitting, squatting and bending postures were adopted by all the women workers from both the states. Prolonged static standing, sitting, squatting, bending postures are considered very harmful for body. These awkward postures were responsible for musculoskeletal disorders in long run. Similarly Singh and Vinay (2013) [19] reported that various activities done by women workers in agriculture and allied field. They women workers adopted traditional postures like sitting, squatting, stooping, sitting cum bending, standing cum bending, erect standing etc. There are various ill effects and musculoskeletal problems of such postures and in order to minimize the adverse effects of these postural discomfort and hazards.

**Difficulty level of tasks perceived by women workers while performing turmeric cultivation activities**

The difficulty level of tasks perceived by women workers in turmeric cultivation were gathered through participatory observations, discussions and documentations. It was scored ranging from 1-5 such as Very Difficult -5, Difficult -4, Normal-3, Easy-2, Very Easy-1 and calculated mean scores and ranked the activities accordingly. From the following table 1, the level of difficulty in various activities as perceived by women were collected and mean scores and ranks were calculated accordingly. It was found that polishing was manually operated task and considered as the very difficult tasks with mean score 4.77 (rank I). In the method of manual polishing, dried turmeric fingers are being rubbed on a hard surface or trampling under feet covered with gunny bags indicated as one of most drudgery prone and hazardous activity. Harvesting (4.6), boiling or curing got score of 4.37, separating finger rhizome from mother rhizome (4.16) and sieving/ cleaning after polishing

(4.15). Drying, storage, packaging and, marketing were ranked consequently which were considered as less difficult as compared to the above mentioned tasks. Intervention of women friendly ergonomically designed technologies can help in reducing the difficulties of women workers involved in turmeric cultivation in Odisha. Zend *et al* (2020) [27] also confirmed that postures like squatting and bending were difficult to maintain when working in the turmeric production system, but when the frequency of posture changes are less, planting and hand weeding activities in squatting posture are considered as less difficult. Most of the respondents reported that many of the activities are very painful in the turmeric production system. Similarly, as per the workload perception, respondents categorized these activities as “very heavy” in terms of workload assessment. Ojha *et al* (2017) [15] also confirmed that in sugarcane harvesting activity, 21 per cent agriculture workers perceived the task to be very difficult whereas 12 per cent agriculture workers were found the task was difficult and 22.2 per cent of agriculture workers found very difficulties during cleaning of fields.

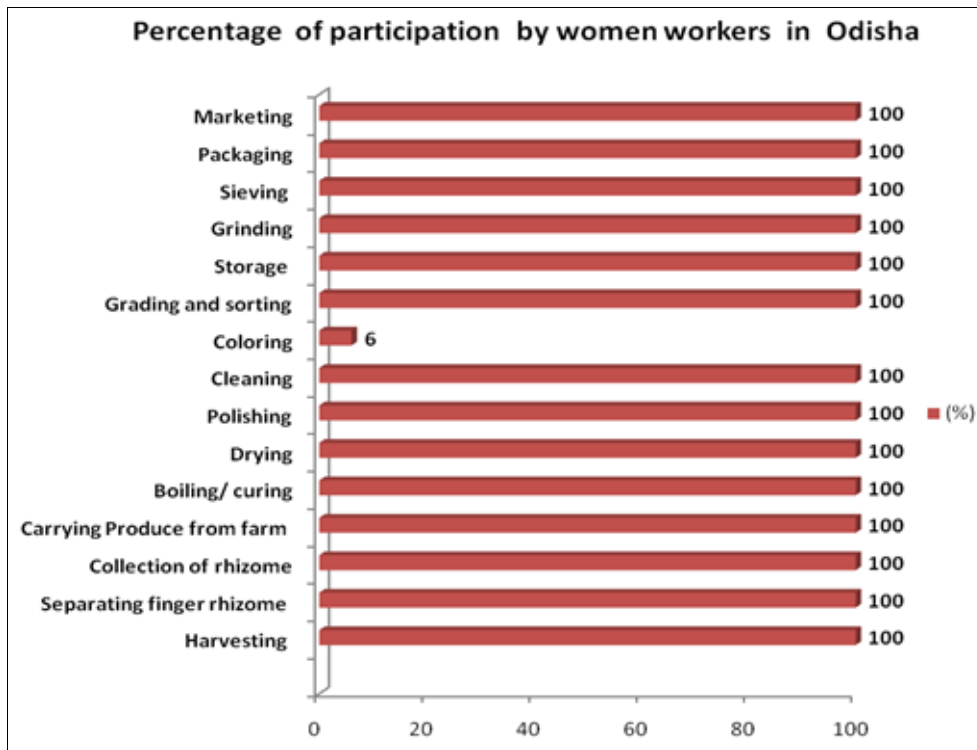
Table 1: Level of difficulty in various activities as perceived by women (n=150)

Activities	Mean Score	Rank
Harvesting	4.6	II
Separating finger rhizome from mother rhizome	3.75	VI
Gathering	2.75	XII
Carrying Produce from farm to home	3.46	VII
Boiling/ curing	4.16	IV
Drying	3.01	X
Polishing	4.77	I
Sieving	4.15	V
Coloring	0.83	XIII
Grading and sorting	3.3	VIII
Storage	3.2	IX
Grinding	3.0	XI
Straining	3.75	VI
Packaging	4.37	III
Marketing	3.0	XI

**Problems faced by women at workplace in turmeric cultivation**

The problems faced by women at workplace in turmeric cultivation were collected through structured interview schedule and participatory observation methods and mean scores were calculated and problems were ranked. The data revealed that the occurrence mean score for physical problem were identified and revealed that strain in eyes (2.33) body ache (2.29), skin allergies (1.97), gastric issues (1.75) and headache (1.45) were the major problems. Tiredness (2.41) followed by (2.15) Joint pain, muscle

tightness (1.99), stiffness (1.76) and numbness in hands (1.79) were the other symptomatic problems recorded. Bending and lifting (3.0) were the most awkward posture responsible for occupational health hazards. Psychological problems such as too much workload (2.88), dual role stress (2.51), Irritation (2.26), job insecurity (2.00) and lack of enthusiasm (1.92) were also the major psychological problems. Exertion due to heavy lifting (2.73) and long walk due to distance workplace (2.49), high time pressure (2.17) and uncomfortable working climate (2.0) were other work related psychological problems also had been observed.



**Table 2:** Problems faced by women at workplace in turmeric cultivation (n=150)

Health problem	Odisha			Mean Score
	Always	Sometimes	Never	
<b>a) Physical problem</b>				
Fever	0	15	135	1.10
Headache	0	67	83	1.45
Body ache	54	85	11	2.29
Strain on eyes	49	101	0	2.33
Skin problem (allergies)	40	65	45	1.97
Insomnia	0	0	0	0.00
Gastrointestinal disorder		62	138	1.75
<b>b) Symptomatic problems</b>				
Muscles tightness	25	98	27	1.99
Joint stiffness	0	114	36	1.76
Numbness of arms /hand	0	118	32	1.79
Joint pain	45	82	23	2.15
Tiredness	76	60	14	2.41
<b>Difficulty in</b>				
Standing	0	142	8	1.95
Bending	150	0	0	3.00
Lifting	150	0	0	3.00
Moving	27	123	0	2.18

c) Psychological problems				
Increased negativity	0	36	114	1.24
Irritation	67	55	28	2.26
Depression	0	18	122	1.05
Anxiety	0	64	86	1.43
Low self confidence	0	49	101	1.33
Too much workload	132	18	0	2.88
Low motivation	0	23	127	1.15
Poor work environment	18	36	106	1.55
Forgetful	96	35	19	2.51
Dual role stress	0	138	12	1.92
Lack of enthusiasm	15	135	0	2.10
Job insecurity	0	150	0	2.00
e) Work related problems				
Long walk due to distance workplace	95	34	21	2.49
Exertion due to lifting heavy weight	110	40	0	2.73
Uncomfortable working climate	0	150	0	2.00
High time pressure	65	46	39	2.17

Similarly, Zend *et al* (2019) [26] reported that that women participated in planting of rhizomes, weeding, harvesting and cleaning activities. Most of the procedures such as planting, earthing up, harvesting in turmeric production system were manually done. There were no specific tools or implement used by the farmers or farm women. Lack of awareness on the manually operated machines available for earthing up task was also noticed. Burning sensation to the skin, skin peeling and allergy were the major health problems reported by farm women.

#### Health hazards faced by women at workplace in turmeric cultivation

The data on Health hazards faced by women at workplace in turmeric cultivation were collected through structure interview schedule and participatory observation methods and mean scores were calculated and problems were ranked. The data revealed that insect bites (1.94) followed by trips (1.7) and slips (1.28) were the factors responsible for accidental hazards because the most of the activities conducted at upland in hilly and forest areas of two districts. The major work related injuries were followed by bruises/ blisters in palms (3.0), injuries during polishing (2.78), injuries during boiling (2.66), injuries while harvesting (2.38), and cut in lower arms (1.08). Insect bite was also observed (2.20) followed by biting of Scorpions were also observed at workplace as these were forests. During winter majority were suffered from cold environment with teary eyes (2.14) followed by bleeding from nose (1.33) and unconsciousness (1.21). Problems related to excessive sweating (2.89), dehydration (2.34) and affected by heat stress (2.25) and sun stroke (1.15) were observed during hot climate. Similarly Babel and Rajvanshi

(2013)<sup>3</sup> made an attempt to investigate occupational health hazards faced by the spice grinding workers. The results depicted that majority of the respondents were wearing the Dhoti, Kurta and Pajama and did not use protective clothing. It was also observed that physical problems such as burning sensation on skin while cleaning and grinding chillies, eye irritation, watery nose, coughing and sneezing etc were faced by the respondents. Therefore, there was a need emerged out to generate awareness among the spice grinding workers for the use of personal protective clothing to save themselves by various physical problems. Sneezing (2.39), followed by water from nose (2.20) by burning in eyes (2.05), itching eyes (2.39) and difficulties in breathing (1.41) were the major health problems observed due to pollution at work place. Mehta *et al* (2015) [14] reported similar results related to health hazards such as cuts and abrasions due to pricking of dry straw threshing of mustard and all of the women workers reported irritation in eyes and followed by throat, nose & ears due to the dust. Muscular cramps (2.29) followed by carpal tunnel syndrome (1.41), cervical problems (1.27) repetitive strain injuries (1.08) and were observed as the musculoskeletal problems occurred due to improper workplace and work method. Sohail *et al* (2020) [19] also revealed prevalence of musculoskeletal disorders among workers, issues related to air pollution and allergies due to fine dust particles and lack of safety equipment. They also highlighted improper workplace design at the mills. Badodiya *et al* (2013) [5] reported that most of the tribal farm women workers (44.17%) were frequently facing health hazards in operation of agricultural activities whereas 34.17 per cent were facing sometimes and 21.66 per cent were facing rarely.



**Table 3:** Health hazards faced by women at workplace in turmeric cultivation (n=150)

Types of hazards/ Injuries	Odisha			Mean Score
	Always	Sometimes	Never	
<b>Types</b>				
<b>Accidental hazard</b>				
Slips	26	38	86	1.28
Trips	32	53	65	1.7
Insect stuck in eyes	23	74	53	1.94
<b>Injuries</b>				
Crushing of fingers	0	45	105	0.9
Burning of fingers	73	51	26	2.48
Cut in lower arms	0	54	96	1.08
Cut in lower body part	0	35	115	0.7
Bruises/ blisters in palms	118	32	0	3
Injuries while harvesting by digging	26	93	21	2.38
Injuries during boiling	55	78	17	2.66
Injuries due to Polishing	85	54	11	2.78
<b>Bites</b>				
Snake bite	0	8	142	1.05
Scorpion bite	0	29	121	1.19
Insects bite	36	108	6	2.20
<b>Environmental hazard</b>				
<b>Effect due to very cold</b>				
Tears from eyes due to severe cold	63	45	42	2.16
Unconsciousness	7	18	125	0.5
Blood from nose	11	28	111	0.78
<b>Effect due to very hot climate</b>				
Heat stress	65	58	27	2.46
Dehydration	76	49	25	2.5
Sun stroke	0	23	127	0.46
Excessive sweating	134	16	0	3
Bleeding from nose	0	17	133	0.34
<b>Polluted environment due to dust and other particles</b>				
Water from nose	45	90	15	2.20
Sneezing	68	72	10	2.39
Burning in eyes	41	75	34	2.05
Itching in eyes	38	60	52	1.91
Tears from eyes	36	82	32	2.03
Difficulties in breathing	9	46	95	1.43
Choked nose	10	29	111	1.33
<b>MSDs Problems</b>				
Cervical problems	0	31	129	0.62
Muscular cramps	59	75	16	2.68
Sore feet	0	0	150	0
CTS (carpel tunnel syndrome)	0	52	108	1.04
Repetitive strain injuries	0	12	138	0.24
Ligament injury	0	0	150	0

### Body part discomfort of women workers in post harvest activities in turmeric

Corlett and Bishop's developed Body part discomfort scale<sup>6</sup> was used for survey of symptoms that assess the respondent's experience of discomfort at various body parts. The overall level of discomfort experienced by the worker was done by summation of all the individual sensations through the various sense channels. It helped to find out the physical discomfort by asking them for rating the amount of discomfort for each specific body parts. The data revealed that that respondents complained discomfort in lower back got maximum mean score was 3.86 (rank I) followed by the score of discomfort in lower arm was 3.73. The mean score

for discomfort in right hand was 3.47 followed by upper back was 3.45, wrist and upper arm (3.37), shoulder (3.29) and left hand (3.18). Lesser pain was perceived in ankle (2.86), knees (2.73), legs (2.71), thighs (2.41), neck (2.06). It can be assumed that due to adoption of awkward postures and repetitive motion of body parts the respondents experienced pain of discomfort in various parts of the body. Similarly, Premkumari *et al* (2018)<sup>[15]</sup> found that the BPDS for subjects during weeding with khurpi ranged from 56 to 70 and the BPDS for subjects during weeding with CIAE and CIAE weeder ranged from 59 to 64 and 52 to 63 respectively. Maximum BPDS was observed in khurpi followed by CIAE wheel hoe and CAE weeder.

**Table 4:** Body part discomfort faced by women in different activities of turmeric

Body parts discomfort scale	Odisha					Mean Score	Rank
	Very Severe	Severe	Moderate	Mild	Very mild		
Neck	0	6	43	65	26	2.06	XI
Shoulder joint	27	56	15	37	15	3.29	VI
Upper back	15	74	28	29	4	3.45	IV
Lower back	43	65	19	23	0	3.85	I
Upper arm	36	49	18	29	18	3.37	V
Lower arm	42	51	34	20	3	3.73	II
Right hand	27	69	21	14	19	3.47	III
Left hand	9	54	49	31	7	3.18	VI
Wrist	21	33	78	16	2	3.37	V
Knees	6	29	45	59	11	2.73	VIII
Thighs	0	18	34	89	9	2.41	X
Leg	0	26	59	61	4	2.71	IX
Ankle/feet	0	35	66	39	10	2.84	VII

### Conclusion

It can be concluded that post harvest activities of turmeric entails a number of tedious and repetitive steps. These are time consuming activities and need physical effort which are responsible for drudgery and health hazards. In manual polishing, dried turmeric fingers are being rubbed on a hard surface or trampling under feet covered with gunny bags indicated as one of most drudgery prone and hazardous activity. Due to lack of facilities for boiling, peeling, drying, polishing, grinding of turmeric, post harvest losses has also been observed. This study suggested for further ergonomic evaluation of each activities to recommend suitable interventions of technologies which can help women to overcome the time-consuming and physically demanding activities.

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