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INVISIBLE OVERTIME AND OCCUPATIONAL HEALTH RISK AMONG WOMEN AGRICULTURAL WORKERS IN HIMACHAL PRADESH

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ABSTRACT

Women agricultural workers conduct intensive work on the farms and shoulder an unshared burden of household labour, but the role of these women has not been sufficiently explored in the framework of their health issues in the context of western Himalayan setting. This article discusses the issues of occupational exposure, working hours, sanitation and household duties of 500 female agricultural workers from Kangra and Una districts of Himachal Pradesh in 2022-23. Participants were divided according to land access status: 335 landless workers, 92 women cultivating small plots (1-30 units) and 73 cultivating medium-sized plots (31-50 units). The descriptive statistics were obtained from the results of the thesis cross-tabulations, and the Pearson chi-square tests were recalculated. Sowing (91.0%), transplanting (78.0%) and weeding (75.0%) were the common operations and 61.2 of the canners expended 6 to 8 hours daily while 15.8 worked for more than eight hours daily. This was followed by invisibles of overtime: 78.6% said that they worked without support from men at home. 76.4% reported to have presented pesticide related health hazards, 73.6% had back or joint pain and 21.8% had physical weakness. Over half of these (52.6%) used open ground toilets. Exposure to working hours and sanitation varied markedly between land access groups with some disadvantages toward some access, but some towards others; and small parcels of modest land holdings did not remove exposure from the equation. The results indicate that the issue of occupational health cannot be divorced from the issue of time poverty, household material infrastructure, gender allocation of household work. Responses need to be multi-faceted and include measures such as use of a pesticide-safe tool, fitting labourers with protective clothing, provision of on-site health services, improving sanitation and coordinative re-distribution of unpaid labour.

KEYWORDS: women agricultural workers; occupational health; unpaid work; time poverty; pesticide exposure; Himachal Pradesh

1. INTRODUCTION

Women are an essential group in agricultural production, particularly in labor-intensive operations

like sowing, transplanting, weeding, harvesting and the care of livestock as well as their post-harvest activities. However, their contribution is frequently attributed incompletely since paid farm labour or farming on family properties and unpaid home production of food are not mutually exclusive. The outcome is an employment profile where citizens can be in the labour force at the same time as having weak bargaining power and a high degree of total days in work and health risks. Women's access to assets, services, technology and decision-making is unequal, despite their contribution to labour in agrifood systems, and is also documented in the Food and Agriculture Organization (FAO) [1].

Task, environment, technology and social position are the generators of occupational risk in agriculture. Acute discomfort during transplanting and weeding, manual lifting, long standing, hard ground, exposure to heat and rains, contact with pesticides and insufficient sanitation facilities can cause chronic musculoskeletal and respiratory conditions. Agriculture is considered hazardous by International Labour Organization (ILO) due to the machinery, animal contact, chemical, biological factors, ergonomic strain, and unfavourable weather conditions that come with the job, as well as the lack of preventative measures and surveillance [2]. Women may have an extra risk since tools, work norms and protective equipment are not often designed for women or harmonised and accommodated for women working together.

Women have many other aspects to their work on the farm. There are activities that happen before and after work, such as cooking, cleaning, fetching water, washing clothes, looking after children and old parents. This second shift establishes invisible overtime, which refers to those necessary working hours that slip past us uncompensated, and without regular employment being added to an evaluation of occupational health and safety. Time-use studies in India indicate that women undertake a lot of unpaid domestic/care-work activities compared to men [3]. Five to six hours is a normal day for many farmers, but this can quickly be considered excessive if recovery time is too short.

It is an issue that needs to be addressed in a dedicated manner in the state of HP. Hill agriculture is characterized by small holdings, dependency on the rains, scattered population and hard access. (Lyszkowski 1973 quoted in Rasch 2000). Since women's situation at the bottom of the rural labour markets is generally not identifiable from the state's aggregate measures of social indicators, gender-specific indicators must be employed. Gender-specific indicators will need to be used since the aggregate social indicators will not capture women's situation at the bottom of the rural labour markets. Kangra and Una also have different terrain and agriculture opportunities making the element of field evidence important. If the 'health analysis' is limited to disease diagnosis, it overlooks the pathways that make people vulnerable to weak sanitation, domestic work responsibilities and the exposure to pesticides linked to repetitive tasks.

This focused reanalysis of a survey of 500 women farmers workers is developed on the basis of a doctoral study conducted on their experiences. In this article, I seek to report on this focused reanalysis of a doctoral study involving the experiences of 500 female farming labourers. It is conceptually different from the general socioeconomic or financial-inclusion perspective, in that total workload (including work from home) and occupational context of women is the focus of the analysis. The question would be: (i) What farm activities are most women involved in, (ii) how paid working time and domestic time are split, (iii) what health and sanitation risks faced by women are most prevalent and (iv) if paid working time/sanitation differs among groups of women depending on their access to land. The article states that access to land is hardly a good indicator of occupational protection. Field and household are both health sensitive rural management issues.

2. LITERATURE REVIEW

2.1 Gendered agricultural work and occupational exposure

Importantly, the international documentary evidence clearly identifies, separates and distinguishes women's involvement in agriculture from the nature and quality of this involvement. Inadequate access to land, finance, agronomic inputs, technology and extension services are impeding on productivity and well-being due to gender vulnerabilities, according to FAO's analysis of women in agrifood systems [1]. Previous FAO projects also confirmed that closing gender gaps in productive resources can positively affect agricultural outcomes while noting that gender constraints faced in institutions will affect women's ability to benefit from labor [4]. The above insights have direct relevance to occupational health: Said health result access to safe tools and reliable information determines the possibility of avoiding exposure, and access to medical resources and decision-making determines whether exposure is avoided.

Agricultural safety standards emphasize prevention as a management responsibility not an individual worker's responsibility. The code of practice ILO recommendations for health and safety in the use of household chemicals include: Risk assessment, training, safe handling of chemicals, protective equipment, health surveillance and appropriate welfare facilities [2]. World Health Organization (WHO) has also correlated the use of pesticide with preventable poisoning cases and various other health impacts in long term and highlighted hazard reduction and proper management throughout the pesticide lifecycle [5]. Implementing such recommendations is challenging in an informal employment and frequent change of work place context where workers are responsible for their protection.

Indian studies have consistently heralded the link between the musculoskeletal stress and agricultural activities of women. Varghese and Panicker reported the rate of musculoskeletal morbidity in female agricultural workers and also their association with strenuous posture and repetitive activity [6].

Ergonomic studies on working the paddy also reported that bending and squatting, load carrying and repetitive working in the hands are significant factors associated with pain and fatigue arising from the activities performed on the farm [7]. The burden may be underestimated if pain is normalised as an inevitable consequence of a woman's work or if workers do not have the time or money to seek medical assistance.

2.2 Unpaid work, time poverty and recovery

Recovery is an important contributor to the health effect from an occupational exposure. Women workers, who have to go out of work for a while and then start to work for several hours in cooking, cleaning, water collection and care taking have limited time to rest. The Time Use Survey in India also shows a significant disparity in labor devoted to unpaid domestic work and caregiving between male and female [3]. The idea of time poverty refers to where discretionary or restorative time is lost, due to the lack of necessary paid and unpaid time. This constraint can be exacerbated in agriculture households during the time sensitive farming seasons.

Prevention is also a topic of unpaid work. A person whose working time is not in their control might be more likely to delay health care, use unsafe equipment or work through the pain, or skip a train session. The reasons can be considered as follows as far as power matters in house hold are concerned. The reasons can be considered as below: But Kabeer's framework of resources-agents-achievements continues to be relevant - doesn't mean that everyone who has some earnings or land therefore also has access to resources that can be used for health protection [8].

2.3 Sanitation as determinant of an occupation and home

Safe sanitation is often considered to be the infrastructure of a household; however, for rural women it has occupational dimensions. Poor facilities may limit access to water, aggravate conditions and hinder women's privacy and safety for watering or defecating. A definition of safely managed sanitation that focuses on access is central to health, dignity and gender equality and is provided by the WHO and UNICEF Joint Monitoring Programme (JMP) as an access condition which is shared by improved facilities and safe treatment or disposal [9]. Limited welfare at work and long working hours are worsened by the lack of a private facility for agricultural workers who work in the field and spend their evenings in the vicinity of their homes.

From the reviewed literature it seems that a pathway can be identified where labourious work exposes the employee to physical risk; exposure to pesticides and poor facilities further increase the environmental risk; the absence of pay further extends the duration of work and the lack of agency reduces the ability to prevent and treat exposure. However, empirical studies tend to focus on each of them individually. In the present study, they are connected with women agricultural workers in two

districts of HP.

3. METHODOLOGY

3.1 Study design and sample

This article is a secondary study of primary information gathered in 2022-23 from the districts of Kangra and Una in the state of Himachal Pradesh in the context of a doctoral work. Parent survey included 500 women farmers who were interviewed using a structured questionnaire. The respondents were divided into three groups based on land access: Group I comprised 67.0% of women who were landless agricultural workers, Group II consisted of 18.4% agricultural workers who had 1–30 units of land and Group III consisted of 14.6% agricultural workers who had 31–50 units of land. The holdings in the last two groups were mostly rain-fed or dry. However, there were no individual level identifiers available nor required and the analysis was based on the aggregate frequency tables preserved in the thesis.

3.2 Variables and analysis

The four domains that were chosen were agricultural activities, daily paid working hours, unpaid domestic work and occupational or environmental health indicators. Agricultural tasks are noted in multiple response format and interpreted as prevalence of participation instead of mutually exclusive categories. The category number, paid working hours, was divided into below 6 hours, 6 hours to 8 hours and over 8 hours. Domestic-work allocation identified women workers who worked on their own, and male-supported households. Sanitation type and perceived occupational problems such as hazard associated with pesticides and physical weakness were considered as environmental factors. No inferential claim is based on any cells in the source table that showed transcription errors in their group totals; selected instances of BQRs of illness frequencies are presented in a descriptive manner. Frequencies and percentages are measurements of the sample. Working hours, sanitation and allocation of domestic-work frequencies were independently derived with Pearson chi-square tests. Fisher's exact test was used to determine significance level of $p < .05$. This recalculation is to remove dependence on the summary of the test in the parent document and to enhance the reproducibility of the analytical basis. No variable-by-variable level or average modelling or causal inference could be done as only aggregate tables were available.

3.3 Ethical considerations and data availability

The document details only numerical facts derived from anonymous and consolidated data obtained in the author's doctoral field survey, with no names or anything else that might reveal personally identifying data. The parent study was conducted under the supervision of academia within the institutions. Consent documentation and the appropriate institutional ethics approval/exemption (where relevant) should be submitted with the corresponding author when the paper is submitted to

the Journal. The basic information they use to draw conclusions is in the doctoral thesis and is aggregated so that the respondent level data are not publicly available, since the survey relates to personal socioeconomic and health conditions. The author may consider requests for access based on institutional and confidentiality considerations.

4. RESULTS

4.1 Concentration in labor-intensive farm operations

Women were mainly engaged in manual processes that required repetitive motions and prolonged postures. 91.0% carried out sowing, 78.0% transplanting and 75.0% weeding. The high percentages of contact with agricultural inputs were at fertiliser application (45.4%) and post-harvest work (39.8%) and moderate contact was seen at plant protection (43.8%). The above statistics indicate the occupational exposures can occur outside of harvest season. Women work throughout the production cycle, and often multi-speak several operations.

Table 1. Participation in selected agricultural operations (N = 500)

Agricultural operation	Respondents	Percentage
Sowing	455	91.0
Transplanting	390	78.0
Weeding	375	75.0
Fertiliser application	227	45.4
Plant protection	219	43.8
Post-harvest operations	199	39.8
Harvesting	194	38.8
Storage	178	35.6

Source: Author's analysis of doctoral survey tables, 2022-23. Multiple responses were permitted; percentages do not sum to 100.

It is particularly important to combine transplantation and weeding work as both are usually performed by forward bending, squatting or kneeling. Lifting and carrying because of sowing, harvesting and storage. Incorporation of plant protection also brings the potential for chemical exposure. The task profile is however, not a single dominant hazard, rather it is a combination of different ergonomic, chemical and environmental risks.

4.2 Paid working time varies across land-access groups

Sixty-one.2% of those from the sample were engaged in agricultural labour by working six to eight hours per day, while the other 15.8% engaged in agricultural labour more than eight hours per day. A higher proportion of landless workers worked more than eight hours per day than pertained to women in the biggest group of workers with access to land, and in a higher number of people in Group III (76.7%) than in Group I (55.5%) did the 6 to 8 hours configuration apply. Based on cell frequencies the Pearson chi square test was recalculated and there was found to be a significant difference between the working hour distribution of groups $\chi^2(4) = 14.94$, $p = .005$.

Table 2. Daily agricultural working hours by land-access group

Daily hours	Group I Landless	Group II 1-30 units	Group III 31-50 units	Total
Below 6 hours	87 (26.0)	18 (19.6)	10 (13.7)	115 (23.0)
6-8 hours	186 (55.5)	64 (69.6)	56 (76.7)	306 (61.2)
Above 8 hours	62 (18.5)	10 (10.9)	7 (9.6)	79 (15.8)
Total	335 (100)	92 (100)	73 (100)	500 (100)

Source: Author's recalculation from doctoral survey cross-tabulations. Values are n (% within group). Pearson $\chi^2(4) = 14.94$, $p = .005$.

Protection through pattern is not to be taken as a literal use of land, rather the pattern rather represents an attempt to protect. Few household production activities people are quantified by agricultural-labour hours, since wage labour and cultivation can be camped by women, whose hours are not reported on both these activities. In contrast, the larger proportion of very long days for the landless workers is indicative of reliance on wage labor. In both situations, the method of categorizing paid-hours underestimates overall labour load, particularly along with domestic labour outside of the field.

4.3 Invisible overtime and reported health risks

There was great disparity in family duties. On average, 393 women (78.6%) performed own household tasks and 107 (21.4%) received men's help in performing these tasks. Lack of male support was highest amongst the landless workers (73.2%), and even more extreme amongst Groups II and III (91.3% and 87.7%). Chi-square ($\chi^2(2) = 18.35$, $p < .001$) indicated a strong relationship between land-access group and allocation of household work for participants. Low land access may thus be accompanied by increased productiveness demands, but lower or equal amounts of care workload.

There were high levels of perceived occupational problems. Sixty-seven percent of the respondents indicated health hazards resulting from the use of pesticides, while 63.5% reported physical weakness.

In the total sample Rückenschmerzen (back/joint pain, 21.8%), Frühlingskopfschmerzen (headache, 9.4%), Allgemeine Belastungsfähigkeit (general malaise, 7.0%), Kopfschmerzen (fever, 6.0%), Bauchschmerzen (abdominal pain, 5.4%) and Weiße Flecken (leucorrhoea, 5.0%) were recorded. These are descriptive prevalences rather than clinical diagnosis, but the pattern is consistent of there being a repetitive strain on the physical body, exposure to chemicals and inadequate rest.

Table 3. Domestic-work allocation and selected health indicators

Indicator	Respondents	Percentage
Women perform domestic work without male support	393	78.6
Male support in domestic work	107	21.4
Reported pesticide-related health hazards	382	76.4
Reported physical weakness	368	73.6
Back or joint pain	109	21.8
Headache	47	9.4
General malaise	35	7.0
Asthma	27	5.4

Source: Author's analysis of doctoral survey tables, 2022-23. Occupational problems were multiple-response items. Illness figures are self-reported and descriptive.

4.4 Sanitation deficits compound occupational vulnerability

Over half of the respondents used open ground sanitation (52.6%), 20.8% used septic-tank facility and 26.6% access to public toilet. Increased in group III from 49.0% of use for open ground to 64.4% of group III landless workers. The difference was statistically significant with the group difference being $\chi^2(4) = 10.65$, $p = .031$. The outcome was a practical example of why land access should not be perceived as a good proxy for welfare – the most prevalent practice was open-ground sanitation, but this category had the smallest land access size.

Table 4. Sanitation facility by land-access group

Sanitation facility	Group I Landless	Group II 1-30 units	Group III 31-50 units	Total
Open ground	164 (49.0)	52 (56.5)	47 (64.4)	263 (52.6)
Septic tank	73 (21.8)	23 (25.0)	8 (11.0)	104 (20.8)

Sanitation facility	Group I Landless	Group II 1-30 units	Group III 31-50 units	Total
Public toilet	98 (29.3)	17 (18.5)	18 (24.7)	133 (26.6)
Total	335 (100)	92 (100)	73 (100)	500 (100)

Source: Author's recalculation from doctoral survey cross-tabulations. Values are n (% within group). Pearson $\chi^2(4) = 10.65, p = .031$.

Sanitation has direct links to health and dignity, but can also have indirect links to changes in work behaviour. Without private facilities, women may restrict fluid and urine output, withhold urination or go to a remote spot at an inconvenient time. These mechanisms have not been measured during the field survey, and should be tested in future work. But the identified gap in the infrastructure is significant and it should be taken into consideration in occupational health program planning.

5. DISCUSSION

The results show a systemic activation of the accumulation risk system. Women are first involved in activities such as repetitive bending, manual handling, and coming into contact with agricultural chemicals. Second, slightly more than three quarters report agricultural activity involving 6 or more work days and a significant proportion more than 8 days. Thirdly, almost 80% of women perform household chores without any help from men. Fourth: Sanitation levels are below par in over half of the sample. These exposures are interdependent in that physical work leads to fatigue, recovering from unpaid work is reduced, insufficient facilities make recovery difficult and unhealthy, and informal work creates a lack of access to prevention and compensation.

The high rate of sowing, transplanting and weeding agrees with the results of research which suggests that women are involved in labour-intensive and repetitive tasks in a farm [1], [6], [7]. This prominence of back and joint pain as a symptom is therefore plausible, and a cross-sectional self-report survey cannot make a clinical causal inference. Pain can signify agricultural or domestic work and cannot differentiate between their effects. This is the reason it is important that the occupational, health assessment measures the whole working day, not one workplace.

Pesticide related risk must be given special consideration. 43.8% of the sample conducted plant protection while 76.4% detected health hazards related to pesticides. This difference could be due to indirect exposure during ingredients mixing, re-entry into treated fields, washing treated clothes, induced drift or storage in close distance of the home. It could also be a perception or not a medical harm. In either case, targeted pesticide applicator safety programs will leave out many women who have been exposed. Training should include understanding labels, how to mix it, dispose of it, re-entry

intervals, laundry and safe storage, and protective equipment should adapt to the climate and to be made female friendly.

The outcome of the "domestic-work" analysis is complicated and undermines the idea that more land means better welfare for women. Landless women were less likely to report no man support as compared to women in Groups II and III. Land could be a beneficial addition to household productive capacity but at a time of increased farming responsibilities. If nothing else occurs, changes in productive assets can add to the workload of women. An agency interpretation of empowerment is supported by this finding: empowerment is helpful but can only be implemented with control, workload and distribution of complementary responsibilities [8].

It should also be noted that the substantial difference between paid working times for the different groups must be interpreted with care. The above 8-hour wage-work days for women with land may be less because own-farm work has been substituted for, not because total, overall hours of work have been reduced. These are indistinguishable in aggregate view of the survey tables. Paid labour, own-farm work, livestock work, travelling, domestic work, care and rest should be noted in 30-minute blocks for both peak and lean seasons in future, including paid work. Then there is potential of establishing a link between posture and duration of contact in a more reliable manner by incorporating wearable or observational ergonomic clues.

The sanitation results indicate that the material protection is not monotonically increasing with land access. Almost 2/3 of female Group III used open ground. Explanations that could be raised are among others the accessibility of settlement, water availability, the function of facilities or the measurement of the use instead of the ownership. However, policy should track facilities – and not simply construction – used and private and supported by water. Safe toilets are also relevant for agricultural workers who have to go to agricultural worksites or community facilities to use the restroom.

6. POLICY AND MANAGEMENT IMPLICATIONS

This calls for coordination between agriculture, labour, health, rural development and local-government institutions to be effective. Occupational health modules should be integrated into the normal contact of the agricultural extension service with the farmer and the worker. Demonstrations may be used for teaching safer postures, task rotation, correctly sized tools and mechanical aids and planning rest. Standing or semi-upright tools can limit the amount of bending required but adoption will be dependent on price and participation of women in design of the tools and also terrain.

Much more than alerting people of pesticide risks is needed in pesticide management. Local programmes should be developed to identify the individuals who clean up, spray, weed and wash

contaminated clothing; to use local language to provide instruction; to recommend use of integrated pest management practices and lower hazard options; and to make right-sized gloves, masks, footwear and clothing available. The health workers should be educated to take occupational history and identify potential histories of exposure to pesticides. Communities can track could be beneficial in the identification of clusters and unsafe practices.

The time constraints of women should be taken into consideration in primary health and outreach services schedule. Screening of agricultural villages could be carried out through periodic mobile clinics and offer screening for MSK problems, respiratory symptoms, blood pressure, reproductive-health concerns; use of appropriate referral systems could alleviate the cost of post-screening evaluation. Physiotherapy guidance and exercises should be part of preventive care, but this load is not entirely a female's responsibility – workload and equipment remain structural determinant.

Household and institutional solutions are needed to address time poverty. Unpaid domestic work in public communication needs to be raised as a collective issue. Support for child care activities, especially during the peak season, access to reliable water supply, clean and functioning sanitation can diminish the time and physical strain involved in household reproduction. Collective procurement of protective equipment through worker groups and self-help groups, or organizing training and negotiating with landowners may also take place.

Last but not least, data should reflect that woman are workers. Task, exposure, hours, payment and injury, should be recorded on employment registers and/or health records. Sex disaggregated data alone is not sufficient in cases of invisibility of unpaid work and own farm labour. A practical district dashboard might include indicators related to long workdays, chemical training, access to protective equipment, musculoskeletal symptoms, the condition of sanitation, male participation in domestic work.

7. LIMITATIONS

There are four main weaknesses of the study. First, it is cross-sectional and thus lacks causal inferences with regard to work and health outcomes. Secondly, all health conditions are self-reported, rather than clinically diagnosed. Third and most important, the analysis is using aggregate thesis tables, without factoring in age, educations, income or district, and an internally inconsistent illness cross-tabulation needed to be removed from the inferential testing. Fourth, own farm, livestock, travel and domestic time is not included in paid-work hours. Therefore, these results shall be interpreted as a risk profile and a basis for targeted investigation, rather than estimates of disease(s) that are attributable to agriculture.

8. CONCLUSION

In the case of women agricultural workers, the agriculture production in Kangra and Una is maintained from labour-intensive activities and they have to bear a very significant, unshared domestic burden. Sowing is their primary activity, 78.6% of them engage in sowing, at least 6 hours of agricultural labour are performed daily, more than three quarters report domestic work without males' help, 76.4% of the persons feel there are health risks associated with pesticides use and 52.6% use open ground sanitation. The significant variations between groups of people who have and do not own land and those who own very little land indicate that landlessness and land ownership of only a small amount are not the only indicators of vulnerability. Women without land tend to be overrepresented among the very longest paid workday categories and women with land are especially underrepresented with somewhat less male support and somewhat poorer sanitation on certain measures.

The key message is that occupational health needs to be considered from a whole system perspective. Logical steps, such as safer tools, risk reduction of chemicals and easy access to health care are all necessary but will be limited if women do not have the time to cope and the support of the community at home. It is necessary to link effectuations for safe artefacts, mobile screening, sanitation facilities and unpaid work redistribution to district level programmes. It is not enough just to acknowledge invisible overtime, it's essential to assess how risky these overtime hours are and how best to manage the risk in the countryside.

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CONFLICT OF INTEREST

The author declares no conflict of interest.

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