Gender friendly drudgery reducing harvesting technologies: Bridging the gap

Jatinder Kishtwaria\textsuperscript{a} and Aruna Rana\textsuperscript{b}

\textsuperscript{a} Prof. & Head, Department of Family Resource Management, College of Home Science, CSK Himachal Pradesh Agricultural University, Himachal Pradesh, India 176062

\textsuperscript{b} Research Associate, Department of Family Resource Management, College of Home Science, CSK Himachal Pradesh Agricultural University, Himachal Pradesh, India 176062

\section*{Abstract}

\textbf{Key Words:} gender, drudgery, technologies, harvesting, ergonomics

\section*{Introduction}

Agriculture in developing countries heavily depends on manual labour and major contribution comes from women. They are actively involved in pre-sowing, post-sowing, harvesting and post-harvesting operations. Rural women’s work ranges from crop production to harvesting operations, from livestock rearing to raising babies (Khalida Jamali, 2009). These agricultural operations are time and energy consuming and women can be relieved of this drudgery by use of improved technologies. Therefore, it becomes imperative to empower farm women with scientific knowledge and gender friendly appropriate technology based on principles of ergonomics to bridge the gap in access to appropriate technology to reduce drudgery, ill health, stress and enhance efficiency, productivity, better health and satisfaction. Role of women in agriculture sector is as important as men, therefore, women should educate themselves in agricultural.

Inventory of all agricultural tasks depicted harvesting as one of the most drudgery prone task with high energy cost, thereby making it amenable to ergonomic interventions in terms of improved technologies (Improved sickle, cutter and uprooter) to relieve women from high energy demands, time spent, associated drudgery and ill health.

Thus, the study was undertaken with the objectives to identify the drudgery index of farm women in various agricultural operations, to ascertain health status of farm women, to assess ergonomic cost of harvesting work with existing and improved technologies and to evaluate the drudgery reduction on selected parameters due to use of new improved tools.

\section*{Methodology}

Locale: The study was conducted in the hill state of India viz. Himachal Pradesh in four phases. Phase I – Drudgery Index of farm women in all agricultural tasks; Phase II – Health status of farm women; Phase III
– Ergonomic cost of harvesting operation with existing and improved technology; Phase IV - Interventions through improved technologies

**Phase I: Drudgery of farm women involved in various agricultural tasks** - Survey was conducted on a representative sample of 35 villages and 900 farm women. Data were collected on a pre-tested interview schedule by employing three parameters i.e. time spent, exertion perceived and difficulty score to find the most drudgery prone task on hierarchy basis. The coefficients of each activity were drawn on above three parameters to calculate the drudgery Index.

**Phase II – Health status of hill farm women:** Health status of 30 volunteer farm women involved in harvesting activities was ascertained on the variables such as body mass index; body composition; physical fitness level and aerobic capacity (VO²).

**Phase III Ergonomic cost of harvesting with existing and improved technology:** The ergonomic cost of harvesting operation was calculated on above sub sample by measuring the physiological cost of work (polar heart rate monitor); energy expenditure (0.159*HR-8.72); muscular stress (grip dynamometer); musculo-skeletal problems (body maps and perceived exertion on five point scale by Varghese et. al. - 1994) while working with both existing and improved tools to elicit reduction in the drudgery, enhanced efficiency and production output.

**Phase IV Interventions through modified improved technologies:** The existing tools were improved as per anthropometric data and physical fitness levels of 30 farm women on ergonomic parameters. Three tools for harvesting operations were improved and introduced after modification viz. serrated sickle; cutter and uprooter. Improved tools were light in weight, with convenient handles made up of plastic and wooden material with good grip and suitable length as per women’s dimensions.

**Results and Discussion**

Harvesting was identified as one of the most drudgery prone tasks based on the calculated drudgery index (34). Activities like weeding, cutting, uprooting, transplanting, harvesting and threshing were found to be maximum drudgery prone activities performed by women (Oberoi and Singh, 2001). The health status of majority of farm women (50 %) depicted normal BMI; ectomorph body type (63.33 %); high average PFI (40 %) with good aerobic capacity (36.66 %). The ergonomic cost of harvesting operations depicted that heart rate values (Cutting -110 bpm⁻¹, Uprooting -125 bpm⁻¹) of women were very high and above permissible limits of work load. Significant reduction in the heart rate values was observed while working with the improved tools viz. sickle for cutting (1.77*), cutter (2.08**) and uprooter (4.99**). Sutjana DP (2000) says that the sickle is still an ultimate choice hand tool for harvesting the new variety of rice.

The sharpness of serrated sickles is more stable than non serrated ones and its use reduces the workload and work time loss and that harvesting can be continuously done over an 8-hour period.
According to Nag et. al (1988), when compared with the squat position, the bend position may result in a 16% increase of working speed, but it requires 18% more energy. However, the bend during longer periods of work may lead to tensing of certain muscles and thus result in quicker tiredness and soreness (Schilling, 1982; Manuaba, 1985; Pheasant 1995). Coverage of land (sq.mt) showed significant increase while working with the improved tools (sickle = 4.08**; cutter = 2.67** and uprooter = 0.48). There are numerous types of work related MSDs that are reported in agriculture (Singh and Arora, 2010) and involves risk factors associated with MSDs (NIOSH, 2001). Data analysis of musculo - skeletal problems showed that severity of pain was reduced in various body parts after using the improved tools. The productivity of farmers using serrated sickles was higher than that of farmers using non serrated sickles (Sujtana, PD. 2000). Hence, use of improved tools over the existing ones for harvesting operations is recommended for drudgery reduction and enhanced output.

Conclusion
Role of women in agriculture is increasingly understood and recognized. There is a need to have national policy on occupational health in agriculture to empower farm women in reducing drudgery, increasing safety, productivity, efficiency and well being of farm women. Hence, it may be concluded that new/improved technologies used in harvesting activity are significant contribution in reducing drudgery and improving the output and satisfaction of rural masses both in hill areas of and other regions of India.

References: