

Transforming gender relations through the use of hermetic technology

By Loveness K. Nyanga, Sylvia Chahwanda, Moira Ngaru, Mavis P. Dembedza, Lucia Manema, Charlene P. Ambali and Catherine Chidewe



CHARLENE AMBALI

Context

Maize is a key food security crop in Zimbabwe and a diet staple, but poor storage technologies result in significant crop losses and the degradation of produce quality. Fungi can produce harmful chemicals called mycotoxins, of which aflatoxins are the most potent and make grain unsafe for human consumption and animal feed. Aflatoxins have serious health and economic consequences. In young children, for example, aflatoxins can cause stunting, poor cognitive development and greater susceptibility to infectious diseases (Khangwiset *et al.*, 2011).

As a means of addressing aflatoxin contamination in maize and reducing human exposure, the *Reducing maize-based aflatoxin contamination and exposure in Zimbabwe* project introduced hermetic technology to farmers in Makoni and Shamva districts. Hermetic metal silos are cylindrical structures constructed from galvanized iron sheets and are hermetically sealed. The technology eliminates oxygen, thereby killing any insect pests inside. Hermetic bags are made from multi-layer recyclable polyethylene plastic with a proprietary barrier layer, which creates a modified atmosphere of low oxygen and high carbon dioxide. The result is that the aroma, color and freshness of the stored crop are preserved, and insects and fungi are controlled (SDC, 2008).

Between July and August 2015, the hermetic technology was distributed to 270 smallholder farming households. Training in pre- and post-harvest management practices to reduce aflatoxin contamination, and the health risks associated with their consumption, was also provided. The dynamics of household decision-making affect

Key messages

- Following the introduction of hermetic storage technology in 2015, men and women maize farmers have increasingly shared maize grain management. In baseline studies, 68% of respondents stated that maize de-husking was carried out by both men and women. This percentage increased to 92.5% in a 2016 survey.
- The introduction of hermetic technology is saving women time and labor by removing the need for chemical protectant application to control insect infestations, and subsequent maize cleaning prior to milling.
- Study results indicated a lower occurrence and concentration of aflatoxin M1 in the urine samples of women and children from households using hermetic technology, compared to samples from households using conventional storage facilities.
- Women's awareness of aflatoxins, and their associated health risks, increased from 36% in May 2015 to 99% in June 2016.

new technology adoption, therefore, it was a priority to monitor changes in intra-household gender relations caused by the technology. Gender roles regarding decision-making in pre- and post-harvest management activities, such as access to, control of, and ownership of resources, were monitored through focus group discussions, surveys and observations.

Emerging outcomes

Increased workload sharing between men and women

Unequal power relations between men and women influence the adoption and impact of new agricultural technologies at the household level, therefore, efforts had to be made to ensure initiatives intervened in a gender-just manner (the avoidance of overburdening women as a result of the new technology, in addition to their existing responsibilities). Although technology is often viewed as labor saving, it is important to determine whose labor is saved and at what point in the value chain.

As part of this research project, an analysis was conducted into how work is shared within the maize value chain. The results showed an emerging trend towards an increase in the sharing of maize management (Figure 1), although certain tasks remain predominantly women's work such as drying and winnowing. In addition, men are beginning to recognize that women are already burdened with household responsibilities such as raising children, household maintenance and caring for the elderly, and therefore need to make certain concessions.

"I recognize that women do a lot of care work. Nowadays, we do a lot of the farm work as a family and I take the opportunity to let my wife have a break earlier than anyone else."

— Mr. Makoni, Councillor, Ward 19, Makoni district

Men are increasingly taking on roles that have been traditionally done by women such as grain monitoring and winnowing, indicating the blurring of gender roles as families pursue a common goal of food and nutrition security. The introduction of hermetic technology has

removed the need for chemical protectant application to control the infestation of stored grain by insect pests, saving time and labor for both men and women. Results show that the time saved by the technology has encouraged collaborative work. For example, there has been a 7.2% increase in shared grain loading after the introduction of hermetic technology and a 24.5% increase in collaborative maize de-husking by men and women since the introduction of the hermetic technology.

Training by the Cultivate Africa's Future project has been cited as having contributed to the change in relations as aptly stated by one male project participant.

"During training we were taught how important it is to work as a family and this has changed our household food security for the better."

— Mr. Nyagope, Makoni district

Improved maize grain quality reduces women's work burdens

Household awareness of the aflatoxins that affect maize and legumes, and their management, has increased among women from 36% in June 2015 to 99% in May 2016. Such knowledge has reduced fungal outbreaks during storage from 44% to 6%, and resulted in farmers being able to maintain grain quantity and quality. The enhanced quality has in turn reduced women's drudgery in tasks such as maize cleaning to remove contaminants prior to milling.

"Today there is no need to clean the maize grain when preparing it for milling. This task would normally take me at least an hour."

— Ms. Madamombe, Ward 3, Shamva district

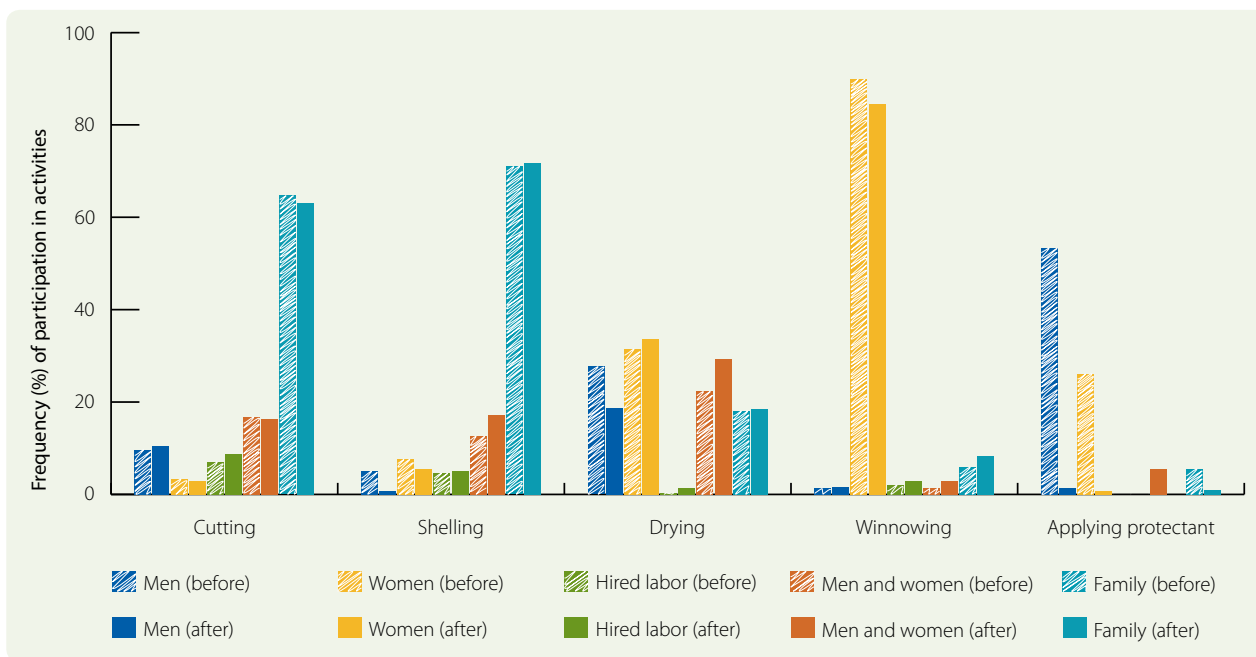


Figure 1: Distribution of workload before and after the introduction of hermetic technology to Makoni and Shamva districts, Zimbabwe

The hermetic technology is providing assured food security, which indirectly reduces the need for women to partake in part-time work to feed the family.

Hermetic technology increases joint decision-making

Through the use of hermetic technology, men and women are jointly making decisions in order to maximize household food, nutrition and income security.

“The grain represents a family effort and provides assured food, nutrition and income security; therefore, we consult each other (as husband and wife) on use of the grain and the acquired income.”

— Mr. Kayemba, Makoni district

Money from the sale of the stored grain is now mostly managed by both men and women (58.8%). Joint ownership of maize granaries has also increased from 26.9% in June 2015 (before the introduction of hermetic technology) to 38.2% in May 2016. With the research having introduced a ‘movable maize granary’ (the silos and hermetic bags), a family approach to granary ownership has created common ground for men and women to highly value food, nutrition and income security for the family.



Since 2015, 120 hermetic bags have been distributed in Makoni and Shamva districts



The use of hermetic technology has reduced the exposure of women and children to aflatoxins

Reduced exposure of women and children to aflatoxins

Maize meal is used to make porridge so constitutes a significant diet staple for children under five years old. In the study, although human exposure to aflatoxins increased with increased storage time of the harvested crops, results indicated a lower occurrence and concentration of aflatoxin M1 in the urine samples of women and children from households that used the hermetic technology to store maize grain, compared to the urine samples of women and children from households that used conventional storage facilities. A similar trend was also observed for breastmilk, whereby the number of aflatoxin M1 positive samples increased from 0% (beginning of storage season) to 20.6% (end of storage season) for households using the hermetic metal silos, compared to an increase from 0% to 85% for households using conventional storage facilities. Such data indicates that hermetic technology is able to better protect women and children against the harmful effects of aflatoxins than conventional storage methods.

Conclusion

The introduction of hermetic technology has been accompanied by changes in household roles and responsibilities. The gradual inclusion of women to participate in decision-making is apparent through the increased appreciation of the family centered approach to farming, i.e. prioritizing joint ownership of the granary,



LOVENESS K. NYANGA

The introduction of hermetic technology has increased joint decision-making and workload sharing by men and women

and the increase in joint decision-making by households. In addition, the use of hermetic technology to store maize grain has shown to reduce exposure of women and children to aflatoxins. Hence, the development is positively contributing to the empowerment of women and the health of women and children.

Since 2015, the project has distributed 150 metal silos and 120 hermetic bags, both with a capacity of one ton. It is encouraging to note that all project participants, and even individuals outside of the project, have expressed willingness to buy the hermetic technology using their own money. This signals wider adoption of the technology in future, but improved financial services are required and communities must be organized to promote collective action.

The project outcomes have demonstrated that it is possible to implement gender-just technology interventions in the management of post-harvest loss. In the application of similar projects in the future, it is recommended to closely monitor the gender strategy indicators for equitable processes and outcomes such as

the number of men and women involved, the time spent by women and men in pre- and post-harvest activities, and changes in the traditional roles of men and women.

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Contact

Loveness K. Nyanga: nyangael@yahoo.com

Cultivate Africa's Future (CultiAF) supports research to achieve long-term food security in Eastern and Southern Africa.



International Development Research Centre
PO Box 8500, Ottawa, ON Canada K1G 3H9
Phone: +1 613 236 6163 | Fax: +1 613 238 7230 | www.idrc.ca