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The U.S. Government's Global Hunger & Food Security Initiative

**Integrating Gender and Nutrition within Agricultural Extension Services**

Technology Profile

Type of Technology:

Physical

# Treadle Pumps in Eastern Province, Zambia

April 2016

This profile was compiled by Elizabeth Hohenberger, University of California – Davis, and Molly Messner, University of Illinois, Urbana-Champaign, with input from Cultural Practice, LLC.

The **Integrating Gender and Nutrition within Agricultural Extension Services** (INGENAES) project works to improve agricultural livelihoods focusing on strengthening extension and advisory services to empower and engage smallholder farmers, men and women. The technology profiles support INGENAES's goal of improving the dissemination of gender-appropriate and nutrition-enhancing technologies and inputs to improve women's agricultural productivity and enhance household nutrition. The technology profiles identify issues and opportunities to make technologies more attractive for men and women farmers, to increase men's and women's benefits from using technologies, and to design distribution models for extension agents, input suppliers, and mobile devices to get the technologies into men's and women's hands.

Sixty percent of Zambians live in fairly remote rural areas with very limited infrastructure in the way of roads, water or electricity. Poverty and stunting levels are very high across the country, and particularly in Eastern Province where this technology assessment was conducted. Agricultural productivity is particularly low in Zambia with only 50% of agricultural enterprises using fertilizer.

In Zambia, 78% of women are engaged in agriculture whereas only 69% of men are engaged in agriculture (Sitko et al. 2011). Women are also responsible for domestic food production and household nutrition adding to their labor burden. However, women farmers in Zambia often do not own or control many productive resources, are disproportionately excluded from decision-making processes, and are less likely to benefit from public services, such as extension (Sitko et al. 2011). Few women have land in their own name (USAID N.D.). They are disadvantaged by poor access to information, communications, infrastructure and markets, and reduced access to training and education. Limited access to and control of resources and services frequently results in lower crop yields for women, and women's income-generating abilities are also constrained by their primary task of producing agricultural products to meet household consumption needs (Sitko et al. 2011). Results from the Women's Empowerment in Agriculture Index showed that only 40% of women in households with both adult men and women in the Eastern Province Feed the Future Zone of Influence have achieved gender parity. Lack of control over use of income and limited access to assets were particularly strong contributors to this lack of parity (Feed the Future FEEDBACK 2013).

Zambian agriculture would benefit from improvements in small-scale agricultural production, and reaching women is a necessity given their active participation and potential. However transitions from rainfed to irrigated agriculture can significantly alter gender relations and control in agricultural production and income (van Kloppen and Hussain 2004; Wahaj and Hart 2012). This assessment examines men's and women's access to and benefits from a productivity enhancing technology, an irrigation treadle pump. The importance of gender analysis for irrigation, and specifically, treadle pumps, has been highlighted in previous work in Kenya, Tanzania, Malawi and Zambia (Njuki et al 2014; Chancellor and O'Neill 1999; Mansigoni, 2006). This brief contributes additional insights from a recent treadle pump program in Eastern Province, Zambia.

## Technology Design and Dissemination

In 1998, Kickstart developed the first of their "MoneyMaker" treadle pumps, designed to save farmers time and energy on irrigation. Resembling a mechanical Stairmaster exercise machine, foot action pushes water through a hose from a water source as deep as seven meters (7.65 yards). The most recent version, the MoneyMakerMax, was launched in 2012 with modifications that make it lighter for farmers to carry to their fields, and it is more efficient. It can irrigate up to two acres a day. Previous pumps introduced into Zambia were imported, some were considerably heavier, and they were introduced through larger irrigation schemes (Chancellor and O'Neill 1999).

**BOX 1 DATA COLLECTION**

Fieldwork was conducted in Eastern Province in August 2015. Data was collected through interviews and group discussions with CASH project staff and men and women purchasers of the MoneyMaker Max treadle pump, as well as farmers who had not purchased the pump. Approximately 45 farmers were interviewed, 75% men, 25% women. Most of the farmers interviewed were involved in farmer associations working with the CASH project.

In Zambia the Feed the Future Commercial Agribusiness for Sustainable Horticulture (CASH) project, implemented between 2011-2015 by Agribusiness in Sustainable Natural African Plant Products (ASNAPP), focused on creating sustainable market linkages for small-scale horticulture farmer groups. The CASH project trained farmers on business and farming practices, and facilitated partnerships between farmers and local businesses. The CASH project partnered with farmers to prioritize constraints and address them with new techniques and technologies such as improved seeds and shade houses. When irrigation was identified as a constraint, the organization formed a partnership with Kickstart and the Vision Fund to disseminate and finance MoneyMakerMax treadle pumps through loans to farmers in associations.

CASH used farmer associations to disseminate information about the pumps. Oftentimes, husbands and wives were both involved in the farmer associations, even though there was the misconception that only one member of the household was permitted to be involved. Farmers mostly heard about the treadle pump through the farmer associations, but the message also spread through friends or family members. Participation in a farming association affiliated with CASH was the most important means to obtain the pump.

Both men and women reported that they had learned about the benefits from the CASH project and the Kickstart partnership, however, women frequently reported they had also or alternatively learned about the benefits from friends whose production and income had increased using the pump. Women were more likely to rely on information and evidence from friends before obtaining a pump. Men and women stated that once they had obtained the pump, they had access to use it whenever they wanted. Both women and the wives of men who acquired pumps reported that they had access to the pump at any time, with one wife stating "no one can tell me no."

Farmers were taught how to use the treadle pump by CASH and Kickstart - together they conducted demonstrations of the pumps with the farmer associations. Vision Fund educated the interested farmers on how to finance a loan. Farmers eligible to receive pumps needed to have access to appropriate land and water. The CASH project connected to farmers to Kickstart to purchase the pumps on loan for 960 ZMK, which farmers were expected to pay back within six months. Pumps were provided to individuals but on the basis of a group loan and repayment. Once pumps were distributed to the group members, the farmers were further taught how to use and maintain the technology.

CASH also partnered with the Catholic Relief Services MAWA Project and the Ministry of Gender to provide gender trainings to farmers. These focused on how to motivate women to seek leadership

positions within farming communities and to engage women in the technical skills involved in business, such as effective negotiation practices.

## Gender Analysis

The gender analysis examined the impacts of the treadle pumps on food availability and quality, men's and women's time and labor, and men's and women's access to and control over income.

### Food Availability and Quality

**Both men and women stated that the amount of crops available for sale and consumption increased.** They also stated that a greater diversity of crops can be grown and that the pumps allow for expanding production on underutilized lands. Production diversity is a benefit noted in other studies of treadle pumps in Zambia (Dhaka 2000). Farmers commented that with increased income and more time other food items could be purchased to contribute to improved health. They explained that there could be a large increase in the production of their vegetable crops due to the pump and that the family will consume more of what is cultivated from their gardens, and be able to purchase more with the income from the increased sale of their crops. One man stated that he sells more and buys preferred consumption items such as rice, meat, even animals. Several women said that household food consumption would come from storing what they cultivate and they would use the money from selling the crops to buy food items like sugar and salt. Additional to increased production, the pump extends the growing period in the garden. One respondent said that he can plant and harvest in different stages so there is a constant flow of food and income.

A farmer learns to use the treadle pump.
© M Messner 2015

Both men and women stated that they believed the food for household consumption is more nutritious because they are growing different things and are able to have a diverse diet. Women said that they had been told that each crop provides different types of nutrition and that eating different kinds of food will provide a better diet. Some men related how nutritious they believed their food to be as a result of the pump. For example, one man explained that after using the pump, crops were healthier and therefore more nutritious for his family to eat. Another man explained that he knows the food is more nutritious because he is able to see a difference in himself. He has "gained body because of the variety."

### Time and Labor

The time spent on irrigation activities before the introduction of the treadle pump was extensive and the activity was laborious, according to the farmers interviewed. It involved many trips to and from a water source with cans, using buckets or dishpans to splash water to splash onto the crops from irrigation channels bordering the plot. Both men and women farmers stated that before the pump, irrigation took many hours and up to a full day, which was described by farmers as slow and challenging. Some studies suggest that this work was primarily the responsibility of women (Dhaka 2000). Some men complained about the distances, and women objected to the physical difficulty. These results are consistent with earlier studies of treadle pumps in Zambia (Chancellor and O'Neill 1999, Dhaka 2000).

**The MoneyMakerMax pumps reduce the burden of former methods of irrigation because farmers do not have to spend time filling, lifting, and exerting energy carrying cans of water.** Both men and women report that using the treadle pump is less exhausting than using cans or dishpans. They now spend just a few hours watering crops and have more time to perform other activities related to the farm or household (such as weeding or resting). One woman reported she now has greater flexibility with her time. She said the pump is faster than using watering cans so she has time to grind maize during the day. Before the pump, she would have to wake up early to perform this task.

The treadle pump reduces the difficulty of irrigation. © M Messner 2015

**The MoneyMakerMax pumps not only reduce the difficulty of irrigation for farmers, but allow them to increase production in part by increasing the amount of land under production.** Farmers stated this repeatedly as a benefit of the pump. One woman farmer claimed it is easier because she can manage a larger portion of land without becoming tired. Furthermore, these crops would fare better with the pump because they are getting more moisture than with the cans. One man explained that he is now able to put the water "right onto the crops." Neither men nor women farmers highlighted the challenge of increased demand for labor as a result of area expansion, an issue which was raised in earlier studies where, for example, the gender division of labor increased the demand for women's time in weeding (Chancellor and O'Neill 1999).

Despite the advantages of the treadle pumps, men and women farmers expressed some concerns. One woman reflected it is difficult to use the pump if the pipes are bent. A man made a similar comment, in that when the pipes crack, the leakages need to be maintained. But he also remarked that the pump is easy to fix when it requires maintenance. Many men also reported that though they preferred the pump over cans, they really wanted a fuel powered pump. There were some complaints about the amount of energy required to pump, something mentioned in other studies as well (Mangisoni 2006), but both men and women farmers expressed that the time spent in irrigation was reduced.

## Income and Assets

Men and women who had the pump for longer than three months reported that the amount available for sale and consumption had increased with a noticeable difference in income. One man claimed that plants grew rapidly because of an increase in moisture, and now he would be found frequently at the market selling. Many of the farmers interviewed had not possessed the treadle pump long enough to record a difference in income. Women expected increased income and mentioned they would use it for expenses such as building a new house and paying school fees.

Some men farmers responded that they control the income and their wives and families agree with spending decisions, while others indicated that they controlled it evenly with their wives. The majority of married women said they shared control over income with their husbands. Widows responded that they controlled the income themselves. No farmers said that adoption of the pump changed how income was controlled, except for a farmer who said his father had previously controlled the income.

## Issues and Opportunities

The gender analysis revealed few differences in men's and women's appreciation of the treadle pumps. Both indicated that they expect to benefit from increased production and income as a result of the availability of a marketable surplus. The challenges with previous irrigation practices were a strong incentive for both men and women to use the pumps and the interviews revealed that both men and women gained time as a result of the treadle pump. There is some indication that women gain considerable time through the use of the pump, although labor may decrease in irrigation and increase during other time periods with weeding, etc.

The interviews did not reveal that the introduction of the pumps led to any shift gender access to or control over income, although it is likely too early to determine if there will be any effects in this area. This is an important area for the project to follow up.

One noticeable difference was in the ways men and women learned about the pump, with a higher proportion of women learning about the pumps through friends whereas men learned about it through the CASH project.

There was a clear demand for the technology. Both men and women interviewed who did not have pumps eagerly expressed their interest. Most of those farmers interviewed who did not have pumps had not attended meetings where extension agents introduced the pumps. But there were several constraints to adoption. Clearly having access to land with access to water (lowland 'dambo' land) is a prerequisite. Some farmers did not think they could purchase the technology because they were not part of the targeted associations, although group membership was largely important because it facilitated access to credit. Some who chose not to adopt the technology were fearful of not being able to repay the loans. In several interviews, men farmers said that money was a challenge to obtaining the pump, as it was hard to accumulate such a large sum. The Kickstart lending process placed responsibility for loans on the group members who purchase a pump, so when one member defaulted on payments, all those in the group were liable. One man reported that he did not want to be responsible for other farmers' payments, so he had yet to obtain one. Both men and women expressed concern about the default risk.

An earlier study for Zambia discussed gender issues related to the adoption of heavier tadle pumps promoted through different means (Moona 1998). Some differences in the results point to improvements in both the technology and the approaches by development projects: The Kickstart treadle pump is much lighter and easier to use; women were deliberated targeted by the CASH project and were involved in training and use of the pump; incomes increased because more markets were promoted by the project although men were still more active than women in marketing; and, in this study, women's opinions were specifically pursued and recorded.

Important future research topics on gender impacts of treadle pumps include documenting the intra-seasonal shift in labor between men and women, exploring the gender control and use of increased income resulting from significant production increases, and tracking whether the pumps do facilitate an increased diversity in production and whether this diversity translates into greater diversity in diets for various household members.

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This profile was produced as part of the United States Agency for International Development (USAID) and US Government Feed the Future project "Integrating Gender and Nutrition within Extension and Advisory Services" (INGENAES). Leader with Associates Cooperative Agreement No. AID-OAA-LA-14-00008.



Technical editing and production by Kathryn Heinz

ILLINOIS UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN
UCDAVIS UNIVERSITY OF CALIFORNIA
UF UNIVERSITY of FLORIDA
cultural practice, LLC