Women-owned Keyhole Gardens

An opportunity to strengthen household food security in Ghana
About MEDA

Since 1953, MEDA has been designing and implementing market-driven economic development programs that improve the welfare of millions of people around the world. As a leader in financial services and market development, MEDA collaboratively creates business solutions to poverty by working in partnership with the poor and the institutions that serve them.

About the Bill & Melinda Gates Foundation

Guided by the belief that every life has equal value, the Bill & Melinda Gates Foundation works to help all people lead healthy, productive lives. In developing countries, it focuses on improving people’s health and giving them the chance to lift themselves out of hunger and extreme poverty. In the United States, it seeks to ensure that all people—especially those with the fewest resources—have access to the opportunities they need to succeed in school and life. Based in Seattle, Washington, the foundation is led by CEO Sue Desmond-Hellmann and Co-chair William H. Gates Sr., under the direction of Bill and Melinda Gates and Warren Buffett.
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Mennonite Economic Development Associates (MEDA) implemented a pilot to extend the growing season for female farmers with the ultimate goal of contributing towards improved food security for women and their families in Northwestern Ghana. Funded by the Bill & Melinda Gates Foundation, the project tested two water catchment, storage and irrigations systems: ferrocement tanks and keyhole gardens. MEDA completed an evaluation of these technologies in February 2015.

MEDA’s summative evaluation assessed the technology's affordability and its ability to generate income for women and increase household access to nutritious food. Existing literature and MEDA research informed the evaluation. Using a mixed methods approach, the evaluation covered a 34 sample size. Quantitative data was continuously collected on garden water and crop consumption, while qualitative data was gathered via individual interviews and focus group discussions.

Results of the evaluation show that ferrocement tanks are too expensive for wide-scale commercial scale-up. However, even without the tanks, the keyhole gardens successfully extended the growing season and met women’s needs. Key results include: 100% of participating households have access to vegetables and 91% of women generate income from vegetable sales. Of the women who earn income, 100% save for various purposes including school fees, emergencies, child inheritance and income-generating activities.

When women were asked what changes they had experienced as a result of the garden...

- 58% reported increased marital harmony
- 50% cited improved household nutrition
- 50% mentioned improved payment of school fees.

As a result of the pilot’s promising results, this evaluation brief offers recommendations for scale up and improvement of the garden design and water catchment strategy.
Methodology

The evaluation of the pilot used a mixed methods approach with a sample size of 34. Table 1 provides a snapshot of the methodology. The evaluation built upon existing literature on keyhole gardens and historical staff reports detailing field visits to innovative water storage and irrigation technologies.

Quantitative data was gathered on an ongoing basis by the field project officer since the pilot’s inception in November 2014 through to April 2015. Women tracked their daily water usage for keyhole gardens, and the market value and use of vegetables harvested. This data was then reported back to the field officer.

Qualitative data was gathered over three days in February. A general interview guide approach was used for the 13 individual interviews and two focus group discussions. The field officer, a Canadian project coordinator, and a local translator visited the three pilot communities and interviewed all 12 women with keyhole gardens. Of the 12, eight women were nominated for the pilot and four built keyhole gardens following the pilot with support from MEDA. In addition, four men of the households with keyhole gardens were interviewed. One focus group included 18 community members interested in building gardens, while the other involved three women with keyhole gardens. The individual interviews were designed with open-ended questions, emphasizing the importance of drawing out the participant’s perspective. For example, interviewers asked “what has the keyhole garden enabled you and your household to do?” In addition, close-ended questions were used, such as the amount of income earned from gardens. The evaluation team debriefed daily after community visits. Following the qualitative data collection, the interviews were transcribed, coded and analyzed, including quantifying data where appropriate. Existing quantitative data collected from the field project officer was also integrated.

Table 1: Snapshot of Evaluation Methodology

<table>
<thead>
<tr>
<th>Data Type</th>
<th>Quantitative Data</th>
<th>Qualitative Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method</td>
<td>Survey (monitoring survey administered to project clients)</td>
<td>Focus Group Discussions: 2 Individual interviews: 13</td>
</tr>
<tr>
<td>Respondents</td>
<td>Project clients (women who own keyhole gardens and/or ferro-cement tanks) completed the survey on an ongoing basis</td>
<td>Project clients, clients’ husbands, community members interested in building a keyhole garden</td>
</tr>
<tr>
<td>Sample Size</td>
<td>10</td>
<td>34</td>
</tr>
</tbody>
</table>
Limitations

Since the sample size is 34 individuals, including 12 with keyhole gardens, it is non-random and too small a sample size to be statistically significant. Qualitative evaluation tools were not piloted prior to assessment. Another challenge is the introduction of multiple technologies in one pilot, which adds a layer of complexity to the evaluation. Finally, the female farmers, who kept record of daily water use on their gardens, have low literacy. Often children documented results, posing a challenge to obtaining accurate data.

What are keyhole gardens?

Popular with international development and permaculture practitioners, keyhole gardens have been successfully tested in both developed and developing countries. With a central compost basket and circular raised structure, the keyhole garden conserves water and retains nutrients better than regular ground gardens. Improved soil conditions can yield higher quality crops often in greater quantities. This MEDA evaluation also found that keyhole gardens use 16% less water and yield 6% more vegetables than conventional gardens during the dry season.

Keyhole gardens are simple, quick to implement and cost effective. Vulnerable populations, such as individuals with HIV/AIDS and the elderly, can more easily tend to a raised garden bed.
Background

Northern Ghana’s dry season spans November to April. During this time, farmers maintain a small ground garden or stop gardening altogether. With the hope to change this pattern by extending dry season production, MEDA introduced ferro-cement tanks and keyhole gardens. The Bill & Melinda Gates Foundation funded this pilot. The ferro-cement tanks, built primarily with local materials, can store 7,241 litres of water by collecting rain during the wet season. The stored water is then applied to locally made keyhole gardens to grow vegetables throughout the dry season.

In consultation with local partners, three communities were selected for the pilot. Zambogu, Maase and Tendoma communities were chosen because they had experience in dry season farming and were already engaged in a concurrent MEDA soybean cultivation project. In summer 2014, MEDA performed pilot demonstrations in each community. MEDA asked community members to nominate two to three female farmers as project clients who fulfilled MEDA’s selection criteria. Criteria included experience with dry season gardening, at least two rooms roofed with corrugated sheets to catch rain water, willingness to support construction of technologies by providing stones, water and unskilled labour, and being an early adopter of innovations, etc. Out of the 17 women nominated, eight fulfilled the criteria.

Keyhole garden and ferro-cement tank construction was completed in autumn 2014. The client households prepared necessary building materials in advance. On the day
of construction, MEDA’s project officer trained and assisted households in building the gardens. A skilled artisan trained local tradesmen on how to build ferro-cement tanks. This training built local capacity for tradesmen to construct tanks commercially in the future. In subsequent months, the project field officer routinely monitored households and provided technical support when necessary. For example, the officer advised women on how to treat disease-affected vegetables.

Once households reaped the benefits of the gardens, other women became interested. Four additional women built their own gardens three months after the pilot launch. Twenty individuals reported interest or are actively preparing materials to build a keyhole garden.

Why were women selected as project clients?

Women produce **70%** of Ghana’s food crops and are eager to expand dry season crop cultivation.

Women are looking for ways to increase the income they bring into their households and see opportunity in diversifying their dry season activities.

Women are seeking more information about nutrition and how to best meet the nutritional needs of their families.
Evaluation findings and results

Completed in February 2015, MEDA’s summative evaluation found users appreciated ferro-cement tanks, but felt they would likely be too expensive for most rural households to access without subsidy. Keyhole gardens however, were highly cost effective and yielded positive results. The gardens improved household access to nutritious foods and increased women’s income. These benefits promoted notable gains in gender equity, including greater financial independence for women.

Cost benefit of keyhole gardens

Table 2 highlights the strong economic opportunity keyhole gardens offer for female farmers. The garden pays back the cost of investment in just twenty days.

Table 2: Cost Benefit of a Keyhole Garden

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stones</td>
<td>$ 0.00</td>
</tr>
<tr>
<td>Firewood</td>
<td>$ 0.00</td>
</tr>
<tr>
<td>Compost/Manure</td>
<td>$ 0.00</td>
</tr>
<tr>
<td>Seeds</td>
<td>$ 1.37</td>
</tr>
<tr>
<td><strong>Total cost</strong></td>
<td><strong>$ 1.37</strong></td>
</tr>
<tr>
<td><strong>Total income generated in 1 season</strong></td>
<td><strong>$24.76</strong></td>
</tr>
<tr>
<td><strong>Payback period</strong></td>
<td><strong>20 days</strong></td>
</tr>
</tbody>
</table>

Cost of ferro-cement tanks

During implementation, ferro-cement tanks were not commercially viable for women, as indicated in Table 3.

Table 3: Cost of a Ferro-cement Tank

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials</td>
<td>$ 893</td>
</tr>
<tr>
<td>Labour</td>
<td>$ 149</td>
</tr>
<tr>
<td><strong>Total Cost</strong></td>
<td><strong>$1042</strong></td>
</tr>
</tbody>
</table>

Women in Zambogu who decided to build their own keyhole gardens following MEDA’s initial client selection.
Pilot results: intended results

All women extended their growing season and have access to vegetables

Women watered gardens an average of 5,716 litres during the 23-week dry season. Unlike previous dry seasons, 42% of women are now able to grow crops year round. About one third of women reported an increase in household consumption of vegetables as compared to last year.

91% of women generate income

Women earned USD $1.28 more per week on average than their previous dry season. For the full season, women generated about USD $25. In addition to selling surplus vegetables, women were able to save time and money by no longer having to buy produce at faraway markets.

All women save a portion of their income

Of those who earn income, all women saved for various purposes, including income generating activities, school fees, emergencies and children’s inheritance, among others. Women’s ability to save benefits the whole household. Children’s educational opportunities are strengthened. Families gain a more secure future through improved access to food, greater opportunities to earn income, and a stronger savings safety net.

All women find keyhole gardens easy to use

Keyhole gardens were consistently cited as easy to use and appropriate for women. In particular, three elder participants appreciated how the design of the garden prevents them from having to bend down, as well as the garden’s proximity to home.

Previously in the dry season, I didn’t have any work. Now I have the garden. I feel happy because I have something to do.”

Maase woman, 67 years old

If my husband didn’t have money for school, the kids would not go. Now I can pay for my kids to go to school.”

Tendoma woman, 32 years old
Ferro-cement tanks are too costly for rural households

Though effective in collecting and storing water, ferro-cement tanks proved to be expensive and therefore financially inaccessible for most rural households without subsidy (Table 3).

When women were asked how the keyhole garden has changed their household:

58% of women attributed greater household harmony to keyhole gardens

Both women and men have seen an improvement in their spousal relationship. Initially, a few men did not value the garden, but now pay greater attention and contribute to its maintenance. For some women, earning their own income reduced their dependence on their husband for money.

50% of women attributed improved household nutrition to keyhole gardens

Women felt that better nutrition in the home resulted in reduced sickness and happier families.

50% of women attributed paying more in school fees to keyhole gardens

In addition, several households have improved school attendance as compared to last year. One school purchases keyhole garden vegetables and prepares nutritious meals for schoolchildren.

“My husband began inviting me to important meetings, increasing my status in the community.”

Zambogu woman, 30 years old

“My wife is not so stressed. She cooks healthier food and it’s better for the children, especially as we can pay for uniforms and school fees.”

Husband of Tendoma, keyhole garden owner
Potential to scale

Introducing keyhole gardens as a new way to grow crops during the dry season sparked significant community interest. Demonstrating success in yielding quality vegetables and creating a stream of income led to a substantial increase in interest. Four of the respondents were motivated to build their own gardens after seeing the keyhole design and witnessing the many benefits other women were enjoying.

"Fresh vegetables are scarce during the dry season and limit the soups you can make. We know vegetables are good for us and when you cook fresh vegetables, the family is happier. We now have the feeling like it is the wet season when vegetables are abundant."

Zambogu woman, 25 years old

"I felt very happy with what I saw with the other women’s keyhole gardens. At first, I was buying vegetables from these women, but soon I wanted to grow and sell my own vegetables."

Zambogu woman, 20 years old
Barriers to scaling

Various barriers to building keyhole gardens exist that hinder community adoption.

50% of women identified gathering stones as a barrier and 42% identified collecting sticks as a barrier. Oftentimes, women lack the time or ability to gather stones and sticks used to build keyhole gardens.

33% of women identified lack of water as a barrier. Women can wait as long as three hours to gather water at community boreholes. Some women have to walk over 0.5 km to fetch water.

33% of women identified lack of available labour as a barrier. Women need access to family or community members to support construction.

Women believe keyhole gardens are limited in size. Though effective, keyhole gardens are limited in size. One elder, solely responsible for taking care of her five grandchildren, reported that the garden provided sufficient vegetables but inadequate income to afford other household staples.
Recommendations

Keyhole garden design

Improving women’s access to water. The piloted ferro-cement tanks provided an additional water source; however the technology was unaffordable. To reduce the water burden, inexpensive water barrels could provide a solution by replacing the shallow water basins that are commonly used. In Zambogu community, one woman is able to store eight times more water with a barrel than her basin. The increased storage space allows her the freedom to fetch water at times convenient for her, avoiding peak hours at the community borehole.

Substituting firewood. Firewood is commonly used to build the garden fence and compost basket. Instead of collecting firewood, which can take up to 30 hours, women could plant milk weed to grow a fence during the wet season. Jatropha plant could also be tested. For the compost basket, cassava sticks could replace firewood. An added benefit is that cassava sticks yield leaves that can be eaten. Alternatively, women could weave a compost basket using twine and fewer sticks.

Substituting stones. Currently, women gather stones in the surrounding area, which is laborious and time consuming. Sandcrete blocks, typically used to construct houses, are an alternative solution. Sandcrete blocks can be built by family members at no cost, or supported through community members for a fee.

MEDA developed a pictorial instruction manual following the pilot. The step-by-step manual illustrates how to build a keyhole garden. Costs of proposed innovations are listed in Table 4.

Table 4: Cost of Recommended Innovations

<table>
<thead>
<tr>
<th>Innovation</th>
<th>Cost</th>
</tr>
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<tbody>
<tr>
<td>Water Barrel</td>
<td>$37.91</td>
</tr>
<tr>
<td>Milk Weed/Cassava</td>
<td>$ 0.00</td>
</tr>
<tr>
<td>Sandcrete blocks</td>
<td>$ 3.92</td>
</tr>
<tr>
<td>Instruction Manual</td>
<td>$ 2.56</td>
</tr>
<tr>
<td><strong>Total Cost per keyhole garden</strong></td>
<td><strong>$44.39</strong></td>
</tr>
</tbody>
</table>
Keyhole garden scale up

As mentioned above, there is significant appetite from community members to build their own keyhole gardens. Across three communities, over 20 individuals were interested. Incorporating incentives for women to build gardens could stimulate faster adoption. For example, when working with a new community, offer incentives (i.e. discounted seed, water barrels, sandcrete blocks) to the first two or three women interested. Once established, the gardens act as demonstration sites to the community, spurring greater demand.

Another factor to consider is the target age group. The average age of MEDA’s initial eight women was 48 years old. In contrast, women who built gardens post-selection averaged 26 years. Since it is more difficult for elderly women to collect water, mostly young women built keyhole gardens and didn’t perceive the need for a ferro-cement water tank.

It’s also worth acknowledging the influence MEDA’s household selection criteria had on the pilot’s results. Selection criteria targeted economically productive women familiar with dry season crop cultivation. Future projects should take this into consideration. Ongoing technical assistance during the dry season is also an important factor to incorporate.
Additional reading


End notes

1. Refer to Additional Reading section at the end of the document for a list of literature consulted.

2. All costs are reported in US dollars.

3. Uncaptured costs include MEDA technical assistance and unpaid community labour.

4. Income includes the market value of garden vegetables consumed, income earned from garden vegetable sales, and last season’s vegetable spending at market (because women no longer purchase vegetables at the market).
This report would not have been possible without the expertise, hard work and dedication of the MEDA WISP team, who piloted new women-owned water storage and irrigation technologies. We specifically would like to appreciate the efforts of Jalaludeen Masoud, the WISP Project Officer based in Wa, Ghana.

We would also like to acknowledge the Bill & Melinda Gates Foundation, who has funded this initiative, and Centre for the Alleviation of Poverty, the Environment and Child Support (CAPECS), Community Aid for Rural Development (CARD) and ProNet for partnering with MEDA on this project.

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