ASSESSMENT OF ACCESS TO AND UTILISATION OF TREADLE AND HIP PUMP TECHNOLOGY BY FARMERS IN MACHAKOS COUNTY, KENYA

#11285

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ABSTRACT

The aim of this study was to assess the access to and utilization of the treadle and hip pump technology by farmers in Machakos County, Kenya so that gender responsive strategies can be suggested to improve the uptake of the technology among the farmers. This was due to low adoption of the two pumps in Machakos county after previous KickStart International and Washington State university (KSI/WSU) study that marketed and distributed the technology among farmers in the county. The specific objective in this paper was to examine the challenges facing farmers when accessing to and utilizing the pumps in the county that seemed to be in dire need of the pumps due to the arid and semi-arid climate, yet the adoption was too low. The study was guided by the social relations framework of analysis by Naila Kabeer which was complemented by the diffusion of innovations theory. The study used experimental and descriptive research designs for both qualitative and quantitative data. The study had 70 respondents comprising 42 farmers who were pump buyers purposively selected for the study and 28 pump non-buyers identified via snowball sampling method. Data were collected using interview schedules, key informant interview guides and focus group discussion guides. Findings reported major challenges to access to and utilization of the pump technology were at family level and market level. The study concluded that the use the treadle and hip pump technology was still appropriate in compared to the tools they were previously used to. However, the challenges faced by the farmers were both internal and external, i.e., from buyers and marketers to the environment in which the operated. The pump technology design hampered use by women since it required a lot of energy to use. The study recommended putting gender responsiveness in design of pumps, consistent intergenerational marketing and distribution of the pump technology with follow up by the innovation marketer for adoption among women, men and youth.

INTRODUCTION

Globally, farming is perceived as a lucrative venture in regions with sustained fertility and water resources. For arid and semi-arid region, farming has been a difficult and expensive venture as irrigation projects are required to enable food security for both domestic and commercial use. For this reason, the need to develop more approaches that will improve farming in arid and semi-arid areas became a necessity for non-governmental organizations (NGOs) and government stakeholders (Ivers & Cullen, 2011). Regardless of this provision, the need to develop small-scale farmers required cheap farming technology that they could use in smallholder farms. This led to embracing of technology in the agriculture sector. One of the technologies is the treadle pump, which was developed in 1979 by a team working with the Rangpur Dinajpur Rural Service (RDRS). The treadle pump extracted larger volumes of water more than the existing hand-operated pumps. The design of the pumps targeted the poor and those in remote areas with limited access to diesel and technical support (Purcell, 1997).

Asia was the birthplace of the treadle pump (Orr et al. 1991), for this reason, the demand for the technology in rural Bangladesh was significant. Its popularity then increased its supply across neighboring nations including India and Pakistan. In these regions, the number of rural farmers was massive as they solely depended on agriculture for their livelihood. Both men and women in the regions were provided with treadle water pumps. NGOs' involved in the programme wanted to increase the buying power of the consumer thus launching a purchasing plan that would fit the financial comfort of the farmers. The NGOs' provided pumps for irrigation projects on credit to farmers prior to agreeing to a payment plan (Prabhu, 1999). Since the creation of the treadle pump in Bangladesh, 1.4 million pumps had been sold to the local farmers by 1991 (Alistair et al. 1991). This depicted the importance of the affordable irrigation option.

The hip pump is a KSI innovation of the small-scale irrigation pump in terms of the body parts used to operate it, lighter weight and lower cost than the treadle pump. From these efforts, the treadle and hip pump technology is being used mainly in Kenya, Tanzania, Malawi, Zambia, Mali, Burundi, Sudan, Burkina Faso, Uganda and Rwanda (Sijali & Mwago, 2009). The popularity of the technology in these countries was mainly influenced by Kick Start International (KSI). The organization was born in Kenya, which increased the use of pumps in the country as well in East Africa.

Machakos County is one of the 47 counties in Kenya and formerly part of the Eastern province where the pump technology has been adopted, thus of interest to this study. An introduction of small-scale irrigation technology by KSI in conjunction with Washington State University (WSU) targeting women began in 2014 and ended in 2016 in the county. The goal of KSI/WSU was to offer the technology and purchasing plan fit to the financial comfort of women farmers and through comprehensive marketing of the pumps to assure as many sales as possible. The farmers were to purchase the pumps either in cash, on credit or savings options. The treadle pump cost KES 14,950 while the hip pump cost KES 9,500 which farmers were expected to pay back within six months. Pumps were provided to individuals but based on 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 KSI (2015).

This study sought to assess how the women farmers were accessing the KSI/WSU technology as well as utilizing the treadle and hip pump technology in their farms in Machakos County since the former study was not scaled up as envisioned. The researcher engaged with women farmers who took up the KSI/WSU pump technology and those who did not take up the technology, yet they had water available to irrigate their crops, i.e., the non-buyers in the study.

MATERIALS AND METHODS

The study used experimental and descriptive research designs for both qualitative and quantitative data. The study had 70 respondents comprising 42 farmers who were pump buyers purposively selected for the study and 28 pump non-buyers identified via snowball sampling method. Convenience sampling was used to sample the key informants i.e. chiefs, extension officers from various wards and KSI/WSU representative in the county. Data were collected using interview schedules, key informant interview guides and focus group discussion guides. The study's quantitative data was analyzed using SPSS version 23 to give descriptive statistics. Data were

presented as percentages, frequencies, averages tabulations, histograms, and pie charts. Qualitative data were analyzed using content analysis, organized into themes and patterns formed, and presented in a narrative form and verbatim quotations.

RESULTS AND DISCUSSION

Challenges faced by farmers when accessing and utilizing the treadle and hip pump

This section covers the results and discussion that sought to find out the challenges that women farmers faced while accessing and utilizing the treadle and hip pump irrigation technologies. In the study 62(**88.6%**) stated that they had challenges while 8(**11.4%**) did not face challenges in the process of acquiring their pump. The researcher categorized the list of challenges given from individual responses and FGD discussions into themes under institutions in Naila Kabeer's social relations framework on how access to and utilization of the treadle and hip pump challenges were reworked in the four institutions categories of the family, community, market and state.

Table 1. Challenges as perceived by study respondents.

Levels of challenges	Buyers				Non buyers				KSI representative		Chiefs		Extension officers	
	Female		Male		Female		Male							
	No	%	No	%	No	%	No	%	No	%	No	%	No	%
Family	20	67	5	42	11	58	5	56	1	100	4	50	2	50
Community	21	70	3	25	6	32	7	78	1	100	6	75	1	25
Market	16	53	10	83	4	21	5	56	1	100	2	25	3	75
State	25	83	7	58	8	42	7	78	1	100	4	50	2	50
Average Family Community State Market	23(**54.5%**) 14(**47.5%**) 15(**50%**) 20(**68%**)				14(**50%**) 15(**55%**) 14(**50%**) 11(**38.5%**)				1(**100%**) 1(**100%**) 1(**100%**) 1(**100%**)		4(**50%**) 6(**75%**) 2(**25%**) 4(**50%**)		2(**50%**) 1(**25%**) 3(**75%**) 2(**50%**)	

Major challenges to access to and utilization of the pump technology among pump buyers were at family level and market level. At family level, the women willingness to acquire the pumps was met by the inability to do so due to lack of finances while at market level, the pump design itself required some gender responsive considerations as some women said it was tiresome for them to use.

> "The pump is tiresome and requires two people when using especially the pedalling part requires a lot of energy which we women lack. Personally, I am involved in directing the hose to the crops or tank while my husband or son pedals the pump" (Interview with a woman pump buyer at Kithimani 15/4/2017)

Community level and state challenges were reported too, however, solution to their contribution to the challenges would act as accessories to strengthen solutions at family and market level. Asked

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about the disparities in representation, a female extension officer from Machakos town Sub County had this to say,

> "We have previously experienced situations where male officers were chased from homes by some male homeowners especially when they appeared alone. Although this was partly solved by meeting the farmers in groups, some women in groups may not express themselves well in these groups which are also male dominated," said Mueni. (Key informant interview with Machakos sub county extension officer 15/2/2017)

Lack of water, finances, labor, time of pump repayment, priorities in a family, source of information about the pumps and distance to point of purchase of the pump were also critical. The following responses from the farmers informed part of the challenges.

> "The time limit for repayment was too short" (Interviews with a savings buyer from Machakos on 13/2/2017)

Group members from Kyangala also thought the distance to where they get the pumps was too far.

> "The distance to the market especially to vendors is far and I am unable to replace my rubber caps". (FGD with a group from Kyangala on 14/2/2017)

The challenges faced by the farmers were both internal and external, i.e., from buyers and marketers to the environment in which they operated.

The research recommended family level challenges to be addressed through education on importance of support of farm chores by everyone in the family regardless of their gender. Market level challenges to also be addressed by the marketer through design of pumps that are gender responsive to allow participation in utilization by all members of the family. Another gender aspect the marketer could utilize in marketing and distribution is through working with female opinion leaders, establish demonstration farms with female headed households as well as appointing enterprising lead farmers such as the group secretary and pump dealers to build supply networks and create linkages with farmers. This secretary could earn steady income from a profit-sharing model from sales. The marketer could also consider advertising and marketing that does not conform to gender stereotypes during promotional campaigns through promoting multiple range of products for women and men. The type of media chosen and content of message about the pump to reach women should consider their low mobility outside their home. Community level challenges could be adjusted through tapping on solutions at family level while state level challenges to be addressed in a bottom-up manner by marketers together with other key players in agriculture such as community-based organizations (CBO's), NGOs, self-help groups and faith-based organizations through lobbying for support at county and national level.

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