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GENDER DISPARITIES IN UPTAKE OF INFORMATION ON SOIL FERTILITY MANAGEMENT IN THE CENTRAL HIGHLANDS OF KENYA

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ABSTRACT

Low soil fertility is a fundamental constrain to crop production in the central highlands of Kenya. The aim of the study was to assess gender disparities in sourcing information and preference of extension methods used in dissemination of integrated soil fertility management (ISFM) in the central highlands of Kenya from a comparative perspective. Data were collected from 240 respondents through the use of structured interview schedule and analysed using descriptive statistics, t- tests and bivalent correlation analysis. There were significant relationship ((χ^2=27.43, df=9 P=0.001) between gender and sources of information on use of animal manure. Demonstration was scored more significantly (P=0.042) by male farmers than female farmers in training on the use of animal manure. There was a significant positive correlation (r=0.218, P≤0.01) between number of non formal trainings attended and reliability of government extension agents on inorganic fertilizers. Resource constrain followed by lack of individual follow up by extension agents were scored as the most critical constraints in dissemination of soil fertility management practices. Extension agents should increase their interaction with both female and male farmers to enhance their participation in extension programmes which is envisaged to improve reliability of extension agents as a source of information on ISFM practices.

KEYWORDS: Dissemination, Comparative, Farmers, Extension Agents

INTRODUCTION

Low soil fertility is a fundamental constrain to crop production in the central highlands of Kenya. Unfortunately, adoption of improved recommendations still remains low while efforts to improve dissemination of research outputs on a wider scale still remains a challenge (Gündel et al. 2001). The key problem faced by governments and donors is how to improve the interchange of information between the farmer, the researcher, and the extension agent (Commonwealth secretariat, 2001). Inadequate links between researchers and farmers has resulted in a pitiful lack of take-up of research advances in the field. To be successful, extension agents need to be aware of the information needs of both the male farmers and the female farmers. Timely and relevant information on soil fertility management can fundamentally alter people's decision-making capacity and is critical to increasing agricultural productivity (Asres, 2005). Despite the immense contribution of women to the household economy and given their critical role in determining and guaranteeing food security, rural women often face difficulties than men in gaining access to agricultural information to increase their production (Winrock, 2001). Women have also had less contact with extension services than men and generally use lower levels of technology because of problems of access, cultural restrictions on use or lesser interest in doing research on women's fields (World Bank, 2000).

The challenge therefore is to ensure that the extension system have a gender dimension and that the extension agents are aware of the importance of equal participation of both men and women farmers in extension programmes. The aim of the study was to address this rather broad issue from a comparative perspective and thereby assess gender disparities in sourcing information and preference of extension methods used in dissemination of soil fertility management in the central highlands of Kenya. The findings of this study will help in guiding policy makers and development planners who are concerned about gender issue while designing agricultural projects within the region and elsewhere in the country.

MATERIALS AND METHODS

There were 6 villages sampled in both Maara and Mbeere South districts in the Central highlands of Kenya. The choice of the study area was based on the fact that numerous research projects on soil fertility management practices had been conducted in the region. Systematic random sampling technique was used to select 40 farmers from each village. In all, two hundred and forty (240) respondents were selected for the research. The data were collected through personal interviews with a pre-tested and validated interview schedule in May 2010. Before the survey was conducted, enumerators were trained on how to collect data. Pre- testing of the questionnaires was carried out to ensure accurate and precise collection of data.

RESULTS

Social Demographic Farm Characteristics

In Maara, male farmers composed of 85.8% of the sample, while in Mbeere South males and females comprised of 58.3 % and 41.7% of the sample respectively. The mean age for female household heads was 49 years while the mean age for male house hold heads was 47 Years. A higher (26.6%) percentage of male farmers had attained secondary education as compared to female farmers (23.9%). More female farmers (73.3%) were members of farmer groups or local association as compared to male farmers 61.8 % (Table 1).

Table 1: Distribution of Sample Respondents Based on their Personal Characteristics

District	Male	Female	Total
Maara	103 (85.8)	17 (14.2)	120 (100)
Mbeere	70 (58.3)	50 (41.7)	120 (100)
Total	173 (72.1)	67 (27.9)	240 (100)
Age			
15-30yrs	22 (12.7)	5 (7.5)	27 (11.3)
31-45 yrs	64 (37)	31 (46.3)	95 (39.6)
46-60 yrs	64 (37)	21 (31.3)	85 (35.4)
>61 yrs	23 (13.3)	10 (14.9)	33 (13.8)
Total	173 (100)	67 (100)	240 (100)
Level of Education			
No education	9 (5.2)	4 (6)	13 (5.4)
Primary education	102 (59)	41 (61.2)	143 (59.6)
Secondary education	46 (26.6)	16 (23.9)	62 (25.8)
Tertiary education(specify)	16 (9.2)	6 (9)	22 (9.2)
Total	173 (100)	67 (100)	240 (100)
Years of experience			
Less than 10 years	36 (20.8)	10 (14.9)	46 (19.2)
11-20yrs	62 (35.8)	19 (28.4)	81 (33.8)
Above20 years	75 (43.4)	38 (56.7)	113 (47.1)
Total	173 (100)	67 (100)	240 (100)

Table 1: Contd.,

District	Male	Female	Total
Social participation			
Yes	107 (61.8)	49 (73.1)	156 (65)
No	66 (38.2)	18 (26.9)	84 (35)
Total	173 (100)	67 (100)	240 (100)

Numbers in Parenthesis Represent the Percentage of Respondents (N = 240)

Sources of Information Utilized by Farmers to Obtain Information on Animal Manure

There were significant relationship ((χ^2=27.43, df=9 P=0.001) between gender and sources of information on animal manure. The reveals that 13% of the female farmers did not use animal manure to improve their soil fertility (Table 2). About 25% of the male farmers obtained information from the government extension officers on the use of animal manure while only 9% of the female farmers obtained information from the government extension officers. None (0%) of the male farmers obtained information from researchers or agro input dealers. About 41% of the farmers used their own experience on utilization of animal manure (Table 2). The implication of the results is that majority of the farmers obtained information from other farmers or utilized their own experience to improve soil fertility on their farms using animal manure.

Table 2: Comparison of Gender Respondents on Sources of Information on Use of Animal Manure

Source of Information on Use of Animal Manure	Male	Female	Total (N)
Does not practice	11 (6)	9 (13)	20 (8)
Government extension officer	44 (25)	6 (9)	50 (21)
NGO extension officer	1 (1)	1 (1)	2 (1)
Researchers	0 (0)	4 (6)	4 (2)
Agro input dealers	0 (0)	1 (1)	1 (0.4)
Radio/TV	1 (1)	1 (1)	2 (1)
Exhibitions	1 (1)	0 (0)	1 (0.4)
Other farmers	43 (25)	18 (27)	61 (25)
Your own experience	72 (42)	27 (40)	99 (41)
Total	173 (72.1)	67 (27.9)	240 (100)

Numbers in Parenthesis Represent the Percentage of Respondents

Farmers Attitude towards Extension Agents and Researchers

About 13.3% of the male farmers and 9% of the female farmers had visited research station (Table 3). Among the male farmers who had visited research station, the highest proportion (25%) had favourable attitude towards researchers. A higher proportion of the male farmers (97.1%) who had unfavourable attitude toward researchers had never visited research station. Out of the 37 female farmers who had favourable attitude towards researchers only 13.5% had visited research station.

In addition, none (0%) of the farmers with unfavourable attitude towards researchers had visited research station. There was significant relationship between farmer's attitude towards researchers and visit to research station (χ^2=22.124, df=2, P=0.001) among the male farmers (Table 3). This implies that farmers' attitude towards researchers had an influence on farmers' visit to research station.

Table 3: Relationship between Attitude towards Researchers and Visit to Research Station by Gender

Attitude towards Researchers	Visited Research Station					
	Male			Female		
	Yes	No	Total	Yes	No	Total
Favourable	21 (25)	63 (75)	84 (100)	5 (13.5)	32 (86.5)	37 (100)
Neutral	1 (1.8)	54 (98.2)	55 (100)	1 (4)	24 (96)	25 (100)
Unfavourable	1 (2.9)	33 (97.1)	34 (100)	0 (0)	5 (100)	5 (100)
Total	**23 (13.3)**	**150 (86.7)**	**173 (100)**	**6 (9)**	**61 (91)**	**67 (100)**
	(χ^2=22.124, df=2, P=0.001)			(χ^2=2.188, df=2, P=.335		

Number in Parenthesis Represents Percentage of Respondents

There was a significant relationship between farmer's attitude towards extension agents and visit by extension agents (χ^2=17.973, df=2, P=0.001) among the male farmers and (χ^2=7.285, df=2, P=0.026) among the female farmers (Table 4). More male farmers (59.6%) with favouable attitude towards extension agents had been visited by extension agents as compared to the farmers with neutral and unfavourable attitude towards extension agents. Over 39%of the female farmers who had favourable attitude towards extension agents had been visited by extension agents. None (0%) of the female farmers with unfavourable attitude had been visited by an extension agent. More male farmers (44.2%) had been visited by extension agents as compared to 26.9% female farmers (Table 4).The results implies that visit by extension agents influenced the attitude of the farmer towards extension agent.

Table 4: Relationship between Attitude Towards Extension Agents And Visit By Extension Agent By Gender

Attitude towards Extension Agents	Visited by Extension Agent					
	Male			Female		
	Yes	No	Total	Yes	No	Total
Favourable	53 (59.6)	36 (40.4)	89 (100)	15 (39.5)	23 (60.5)	38 (100)
Neutral	20 (28.2)	51 (71.8)	71 (100)	3 (11.5)	23 (88.5)	26 (100)
Unfavourable	3 (27.3)	8 (72.7)	11 (100)	0 (0)	3 (100)	3 (100)
Total	**76 (44.2)**	**96 (55.8)**	**172 (100)**	**18 (26.9)**	**49 (73.1)**	**67 (100)**
	(χ^2=17.973, df=2, P=0.001)			(χ^2=7.285, df=2, P=0.026)		

Number in Parenthesis Represents Percentage of Respondents

Participation of Farmers in Different Extension Programmes

Majority (94.8%) of the male farmers and 88.1% of the female farmers had not attended farmer field schools (FFS). About 68.6% of the male farmers and 71.6% of the female farmers had not attended workshop/Seminar as an extension programme in training on ISFM (Table5). A larger proportion of the male farmers (61.3%) and 49.3% of the female farmers had attended demonstration. More female farmers (55.2%) had not attended field days as compared to 35.3% of the male farmers. There was significant relationship between gender and attendance of field days (χ^2=14.184, df= 6, P=0.028) which implies that the attendance of field days was mainly by male farmers. About 5.2% of the male farmers had attended field days for at least five times while only 1.5% of the female farmers had attended field days five times. In addition, out of the 116 farmers who had not attended exhibition, majority (59.7%) of the farmers were females (Table5). The result implies that there was more participation of the male farmers in extension programmes used to train on ISFM than the female farmers.

Table 5 : Distribution of Respondents by Gender on Participation in Different Extension Programmes

Extension Programme	Number of Times Attended						
Workshop/seminar	**0**	**1**	**2**	**3**	**4**	**5**	**>5**
male	118 (68.6)	20 (11.6)	23 (13.4)	7 (4.1)	3 (1.7)	1 (0.6)	0 (0)
female	48 (71.6)	10 (14.9)	4 (6)	3 (4.5)	1 (1.5)	0 (0)	1 (1.5)
Total	166 (69.5)	30 (12.6)	27 (11.3)	10 (4.2)	4 (1.7)	1 (0.4)	1 (0.4)
Demonstration	**0**	**1**	**2**	**3**	**4**	**5**	**>5**
male	67 (38.7)	41 (23.7)	33 (19.1)	12 (6.9)	6 (3.5)	9 (5.2)	5 (2.9)
female	34 (50.7)	14 (20.9)	9 (13.4)	5 (7.5)	0 (0)	5 (7.5)	0 (0)
Total	101 (42.1)	55 (22.9)	42 (17.5)	17 (7.1)	6 (2.5)	14 (5.8)	5 (2.1)
Field days	**0**	**1**	**2**	**3**	**4**	**5**	**>5**
male	61 (35.3)	38 (22)	28 (16.2)	15 (8.7)	14 (8.1)	8 (4.6)	9 (5.2)
female	37 (55.2)	11 (16.4)	3 (4.5)	4 (6)	5 (7.5)	6 (9)	1 (1.5)
Total	98 (40.8)	49 (20.4)	31 (12.9)	19 (7.9)	19 (7.9)	14 (5.8)	10 (4.2)
Exhibitions	**0**	**1**	**2**	**3**	**4**	**5**	**>5**
male	76 (43.9)	50 (28.9)	41 (23.7)	5 (2.9)	0	1 (0.6)	0
female	40 (59.7)	15 (22.4)	11 (16.4)	1 (1.5)	0	0 (0)	0
Total	116 (48.3)	65 (27.1)	52 (21.7)	6 (2.5)	0	1 (0.4)	0
FFS	**0**	**1**	**2**	**3**	**4**	**5**	**>5**
male	164 (94.8)	2 (1.2)	2 (1.2)	2 (1.2)	0 (0)	3 (1.7)	0
female	59 (88.1)	3 (4.5)	0 (0)	1 (1.5)	2 (3)	2 (3)	0
Total	**223 (92.9)**	**5 (2.1)**	**2 (0.8)**	**3 (1.3)**	**2 (0.8)**	**5 (2.1)**	**0**

Number in Parenthesis Represents Percentage of Respondents

Extension Method Preferred in Training of Animal Manure

Farmers were requested to score the preference of various extension methods in training of animal manure using the scores 1= not preferred, 2= least preferred, 3= fairly preferred, 4=Most preferred. Demonstration was the most scored followed by farmer extension, workshops and field days, respectively. Demonstration was scored more significantly (P=0.042) by male farmers than female farmers. Workshop/seminars was highly scored by female farmers (P=0.007) than the female farmers while farmer field schools were equally scored by both the male and female farmers. Male farmers had significantly (P=0.001) scored field days more highly than female farmers. Use of teaching aids as an extension method was the least scored overall but it was lowly scored by the female farmers as compared to the male farmers (Table6).

Table 6: Comparison of Extension Method Preferred in Training on Animal Manure by Gender

Extension Method	Male	Female	t	Sig. (2-tailed)
Demonstrations	3.2 ±1.1	2.9± (1.3	2.057	0.042
Farmer to farmer extension	2.9 ±1	2.9 ±1.1	0.003	0.998
Workshops/seminars	2.2 ±1	2.6 ±1.1	-2.743	0.007
Field days	2.2 ±1	1.8 ±1	3.260	0.001
Farmer field school	1.8 ±1	1.8 ±1	0.488	0.627
Exchange visits	2.1 ± 0.9	1.8 ±0.9	1.857	0.066
Use of teaching aids	2.2 ± 1	1.6 ±0.6	4.929	0.000

Values Arranged as Means and Standard Deviation

Constraints That Hinder Successful Dissemination of ISFM

The rank orders of the constraints were identified through using score values of the constraints as 1= not critical, 2= least critical 3-= moderately critical and 4= most critical. The constraint that got the highest score value was taken as the most critical constrain that hinder the dissemination of ISFM practices. Resource constrain was perceived as the most critical constraint by both the female and male farmers followed by lack of individual follow up by the extension agents

and poor attitude towards extension agents respectively. However, resource constrain was perceived as more critical by the male farmers than female farmers at 0.003 probability level (Table 7). The perception that ISFM practices were not practical oriented was considered as significantly more critical by male farmers than by female farmers at 0.037 probability level. No individual follow up by farmers was scored significantly (P=0.036) more by the male farmers than among the female farmers possibly because male farmers preferred individual approach than the female farmers. There was a significant difference (P=0.017) in the scoring of poor attitude towards extension agent as a constraint in dissemination as it was scored more critical by the male farmers than among the female farmers (Table 7).

Table 7: Constraints that Hinder Dissemination of ISFM Information as Perceived by Farmers

Constraints	Male	Female	t	Sig. (2-tailed)
Not Practical Oriented	2.4 ±1.1	2.1 ±1	2.110	0.037
Repetition of the information	2.5 ±0.9	2.7 ±0.9	-1.736	0.085
Inadequate literature materials	2.4 ±0.9	2 ±0.9	3.040	0.003
Information is not related to their problems	2.6 ±1	2.4 ±1.2	1.274	0.205
No individual follow up by extension workers	3 ±1	2.7 ±1	2.121	0.036
Lack of discussion groups for farmers	2.7 ±1	2.5 ±1	1.078	0.283
Low literacy among farmers	2.7 ±1.1	2.4 ±0.9	1.780	0.077
Poor attitude towards extension workers	2.8 ±1	2.4 ±1.2	2.432	0.017
Resource constraints	3.3 ±0.9	2.8 ±1.1	3.028	0.003
Very sophisticated terms are used during trainings	2.7 ±1.3	2.4 ±1.1	1.523	0.130

Values Arranged as Means and Standard Deviation

Characteristics of Good Communicators

In scoring characteristics of good communicators, the person who listens to farmers needs and responds was the most scored, followed by the person who encourages farmers' participation and the person who demonstrates. The person who uses simple terms to express his views and the person who encourages farmers' participation were scored as more important by the male farmers than the female farmers at 0.05 probability level (Table 8). The person who gives real life example and the person who is motivating were equally scored by both the male and the female farmers. The characteristic of a person who use teaching aids was scored as the least important overall but was scored more by the male farmers than female farmers at 0.01 probability level.

Table 8: Characteristics of Good Communicators as Perceived by Farmers

Characteristics of Good Communicators	Male (N=173)	Female (N=67)	t	P
Person who listens to farmers needs and responds	3.7 ±0.6	3.7 ±0.5	-0.602	0.548
Person who demonstrates	3.5 ±0.7	3.5 ±0.7	0.154	0.878
The person who is motivating	3.5 ±0.6	3.5 ±0.6	-0.133	0.894
Person who encourages farmers' participation	3.6 ±0.6	3.4 ±0.6	2.204	0.03
Person who gives real life example	3.3 ±0.8	3.3 ±0.8	0.147	0.884
A jovial person	3.2 ±0.8	3.2 ±0.8	0.001	0.999
The person who uses simple terms to express his views	3.5 ±0.6	3.2 ±0.7	2.731	0.007
Person who uses locally available resources to train	3.3 ±0.7	3.2 ±0.7	1.477	0.142
Person who uses teaching aids	2.9 ±0.9	2.7 ±0.7	2.615	0.01

Relationship between Social Economic Factors and Reliability of Government Extension Agents as a Source of ISFM Information

A Pearson test was done between the continuous independent variables and the dependent variables while Kendal's tau b test was done between the discrete independent variables and dependent variables to test on their correlation. There was a significant negative correlation (r=-0.190, P≤0.01) between gender and reliability of government extension agents on inorganic fertilizers but a significant positive correlation (r=0.218, P≤0.01) between number of non formal trainings attended and reliability of government extension agents on inorganic fertilizers (Table 9). There was a significant positive correlation between number of times visited by agricultural officers, number of the groups a farmer belonged and reliability of government extension agents on combined inorganic and inorganic fertilizers (P<0.01) but a significant negative correlation (r=-0.115, P≤0.01) between gender and reliability of government extension agents on combined inorganic and inorganic fertilizers (Table 9).There was no significant correlation between age, education level, years of farming experience and reliability of government extension agents on ISFM practices.

Table 9: Factors That Influence Reliability of Government Extension Agents as a Source of ISFM Information

Socio-Economic Characteristics	Reliability of Government Extension Agents as a Source of ISFM Information				
	Green Manure	Inorganic Fertilizers	Combined Inorganic and Organic Fertilizers	Erosion Control Measures	Animal Manure
Gender(1=Male, 2=female)	-0.030	-0.190**	-0.164**	-0.120*	-0.185**
Age	0.018	0.024	0.067	-0.016	0.074
Educational level	0.017	0.027	0.062	0.051	0.023
Years of farming experience	-0.075	-0.056	-0.014	-0.005	0.006
Non formal trainings	0.062	0.218**	0.190**	0.080	0.205**
Number of the groups	-0.054	0.049	0.127*	0.047	0.145**
Total farm size	-0.063	-0.106*	-0.069	-0.012	-0.034
Number of times visited by agricultural officers	0.139*	0.242**	0.240**	0.091	0.286**

***Correlation is Significant at the 0.05 Level (2-tailed)**Correlation is Significant at the 0.01level (2-Tailed)**

DISCUSSIONS

Majority of the farmers utilized their own experience while other farmers and government extension officers were also major sources of information for the farmers who used animal manure to improve soil fertility on their farms. The results support the findings of Fekandu (1997) that though knowledge is produced through agricultural research, it is not the only avenue for knowledge generation. Learning from experience, interaction and farmers' experimentation are other sources. Nevertheless, more male farmers significantly obtained information on animal manure from government extension officers than female farmers. Other studies by Mahapatra (1987), explains that, in India, women learned of extension messages through indirect channels of communication such as husbands, neighbors and other villagers. This finding agree with the findings of Saito and Weidemann, (1990) who found out that for most women farmers in Burkina Faso, relatives and friends were the source of information. On the other hand, Dagnachew (2002), states that extension efforts and technological packages usually address men farmers and hence extension agents are most likely to visit male farmers than female farmers.

Farmers' attitude towards extension agent or researchers is expected to influence the relationship with respect to agent as a source of information. Majority of both the male and the female farmers had favourable attitude towards

extension workers and researchers. The results do not agree with Boone (1989), who found widespread resentment towards extension agents among farmers because they resent advice from agents who adopt superior attitudes. However, visit to research station or visit by an extension agent positively influenced the attitude of the farmer towards the agents. Hence female farmers were the most affected as majority had not visited research station nor had majority been visited by extension agents.

Participation in extension programmes enables farmers to identify their farm problems and to set sound solutions for further measure. Evidence from the results suggests that women had not participated as much as men in extension programmes meant to disseminate information on ISFM. The least attended activity by both male and female farmers was farmer field school while the most attended activity was field days but significantly attended more by men. The possible reason is because rural women have less available time and mobility due to their dual domestic and agricultural roles. However, Saito and Spurling, (1992) explains that some extension programs do not take special consideration of the needs of women in agriculture. For example, public discussion meeting are often held at times convenient to men but when women are unable to attend.

Many constrains on dissemination of ISFM practices are common to both men and women. However, resources constrain and lack individual follow up by extension agents was perceived as more critical by the male farmers than female farmers. The findings agrees with Kamau et al. (2002) who noted that financial constraints at community level are a cross-cutting issue in up-scaling adoption of agricultural technologies. Lack of individual follow up by extension agents was perceived as more critical by the male farmers probably because of their high preference of individual interaction approach as shown by the results. Male farmers scored print media as a more available source of information than female farmers, hence inadequate literature material had been perceived as significantly more critical by the male farmers than the female farmers. Personal Communication skills have a direct effect on the responsiveness of the information by the farmer. Farmers prefer a person who listens and responds to their needs and the person who encourages their participation. The approach need to be farmer friendly with more incorporation of the farmers' ideas and their active participation.

There was significant negative correlation between gender and reliability of government extension agents on inorganic fertilizers, animal manure, combined organic and inorganic fertilizers and soil erosion control measures information. The implication is that male farmers relied more on government extension agents more than the female farmers. This could be attributed to the fact that in most rural communities, men have more freedom to move about to get information (Adeogun et al, 2010) and this may likely affect their reliability of government extension agents as source of information. Number of non formal trainings attended by the farmer, number of groups a farmer belonged and number of times a farmer had been visited by extension agents positively influenced reliability of government extension agents on combined organic and inorganic fertilizers and animal manure information.

CONCLUSIONS

Male and female farmers need relevant and timely information to improve soil fertility and increase their farm income. As this study indicates, extension agents and researchers should accommodate women as different clientele because women have divergent roles, interests and learning preferences from men. Public agricultural meetings should be held at convenient times when both men and women are in a position to attend but not during the peak labour periods like planting or weeding when women are busy on the farm. To a great extent, a combination of extension teaching methods should be adopted when planning extension programmes to cater for gender preferences in uptake of information on different soil fertility technologies.

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