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LIKELY EFFECT OF GENDER AND EDUCATION ON INFORMATION ADOPTION AND UTILIZATION AMONG SUGARCANE FARMERS IN THE NYANZA REGION, KENYA

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ABSTRACT

A lack of education and training is what limits the adoption of technology and, hence, development by small scale farmers. Controversy reigns on whether women are less or more likely to adopt and utilize agricultural information. Similarly, there is no agreement on whether education exacerbates the adoption of agricultural information. Given this lack of clarity, this study aimed to determine the likelihood of the effect of gender and the level of education on the adoption and utilization of information gadgets among sugarcane farmers in the Nyanza region, Kenya. This study adopted technology diffusion theory and correlational research design. Stratified, random sampling was purposively used among 317 sugarcane farmers. Chi-square and multinomial logistic regression were used to generate results which showed that women were significantly less likely to use radios than men. However, the females were more likely to utilize agricultural information in planting, finding new markets, sourcing for raw materials, seeking for referrals, checking for weather updates and farm inputs than men. Regarding the levels of education, those with a primary education were significantly less likely to utilize information gadgets to discover information than those with a secondary education.

Contribution/Originality: Not only did this study incorporate the aspect of adoption of information gadgets but also investigated their use to obtain agricultural information across the gender and education spectra. This, therefore, provides a medium through which policy makers can disseminate agricultural information based on the specific socio-demographic category of interest.

1. INTRODUCTION

The agricultural sector in Kenya directly contributed to 24% of the Gross Domestic Product (GDP) and indirectly to 27% through connections with the manufacturing, distribution, and other service-related sectors. Close to 45% of the total government revenue came from the agricultural sector. Over 75% of the country's total industrial raw materials and more than 50% of its total export earnings emanated from the agricultural sector (Kenya Agricultural Research Institute[KARI], 2008). However, Ramashala (2012) and Anguyo (2014) observed that harvesting sugarcane does not necessarily increase food adequacy. Poor sugarcane out-growers were unable to meet their food requirements (Terry & Rhyder, 2007), and shifting to cane farming by small-scale producers led to an increase in food insecurity (Tyler, 2008).

Regarding information adoption and utilization, O'Grady and O'Hare (2017) observed that new technologies can be promoted, opportunities can be provided, and a platform for exchanging knowledge, strategies, and experiences can be created among farmers. Although there has been an information revolution geared towards providing volumes of technological, market, and institutional information to small farmers, such information is yet to reach the majority of the poor producers in low-income countries (Stringer, 2001).

However, if farmers are able to adopt and utilize agricultural information effectively then they can realize better agricultural gains. Witnessed elsewhere, countries like India and Bangladesh that have adopted and utilized agricultural information have realized remarkable improvements in their yields and levels of income as these increased by 15% and 15.2% respectively (Raj, Murugesan, Aditya, Olaganathan, & Sasikumar, 2011) and UNCTAD (2012).

On the above basis, this study looked at the possible reasons for the low adoption and utilization of information among the Kenyan sugarcane farmers. Potential policy recommendations are presented at the end of the analysis of this study which will be useful to the policy implementers as well as to the researchers and scholars as a reference for future studies and a benchmark for drawing conclusions in related studies.

1.1. Extent of Adoption and Utilization of Information in the Nyanza Region

Tables 1 and 2 below present the survey statistics on the extent of the adoption and utilization of agricultural information among sugarcane farmers in Nyanza region. Verification of the adoption was based on the physical presence of the information gadget/s. To obtain the extent of information adoption, weights were given to the percentages obtained and Table 1 summarizes the weights.

Table-1. Measurements of the extents of adoption and utilization of information by sugarcane farmers.

Category (%)	Extent	Weights
0	No extent	0
1-20	Small extent	1
21-40	Some extent	2
41-60	Moderate extent	3
61-80	Great extent	4
81-100	Very great extent	5

Source: Fagenson-Eland, Ensher, and Burke (2004).

Table 2 indicates the categorization based on the agro-ecological zoning. The results indicate that the Awendo sugar belt has the greatest adoption of mobile phones (100%). This is followed by the Ndhiwa sugar belt (95.9%), the Chemelil sugar belt (87.6%), and lastly by the Muhoroni sugar belt (84.4%). On radios, the results indicate that, again, Awendo has the greatest adoption (98.1%), followed by Chemelil (85.7%), then Muhoroni (71.9%), and lastly Ndhiwa (65.8%). A look at television adoption revealed that Awendo had the highest (74.8%), Ndhiwa (45.2%), Muhoroni (31.3%), and lastly Chemelil (22.9%). On the adoption of computers, the results showed that Awendo led by 45.8%, Ndhiwa with 10.9%, Chemelil with 0.9%, and it was 0% in Muhoroni.

Overall, the results showed that mobile phones (93.4%) and radios (83.9%) were highly adopted weights of 5 and 4.5 respectively; televisions were moderately adopted (46.4%) with a weight of 2.75, while computers were adopted to some extent (18.3%) with a weight of 1.7. Based on the null hypothesis that there was no statistical difference across the zonal spectrum, Chi square results showed that the probabilities were all significant ($p = 0.000$), hence the acceptance of the alternative hypothesis that there were statistical differences across the zonal spectrum.

Table-2. Extent of adoption of information by sugarcane farmers in the Nyanza region.

Zones	Mobile phone	Radio	Television	Computer	Aver	Totals
Awendo	107(100%)[5]	105(98.1%)[5]	80(74.8%)[4]	49(45.8%)[3]	76.7%[4]	107
Chemelil	92(87.6%)[5]	90(85.7%) [5]	24(22.9%)[2]	1(0.9%) [1]	49.3%[3]	105
Muhoroni	27(84.4%)[5]	23(71.9%) [4]	10(31.3%)[2]	0 (0%) [0]	46.9%[3]	32
Ndhiwa	70(95.9%)[5]	48(65.8%) [4]	33(45.2%)[3]	8(10.9%) [1]	54.5%[3]	73
Totals	296(93.4%)	266(83.9%)	147(46.4%)	58(18.3%)		317
Av. weight	[5]	[4.5]	[2.75]	[1.7]		
Chi-square	0.000	0.000	0.000	0.000		

Source: Study data.
( ) frequencies in terms of percentages; [ ] weights.
Note: Sugarcane farmers: awendo – 107; Chemelil -105; Muhoroni- 32; Ndhiwa -70.

Regarding information utilization, the aspects included were the possibilities of whether farmers were able to use the information gadgets to seek agricultural information on cultivation, planting, finding markets, finding sources of raw materials notably fertilizers, pesticides, and weedicides, getting referrals on expertise, weather updates, or seeking cheaper farm inputs like labour and capital. The null hypothesis was that there is a statistical difference on information usage across the zonal spectrum.

Table-3. Extent of information utilization among sugarcane farmers in the Nyanza region.

Zones	Awendo	Chemelil	Muhoroni	Ndhiwa	Totals	Chi-square
Cultivation	14(10.7)[1]	61(46.6)[3]	18(13.7)[1]	38(29) [2]	131(41.3)[3]	0.000
Planting	12(10.8)[1]	56(50.5)[3]	18(16.2)[1]	25(22.5)[2]	111(35) [2]	0.000
Markets	6(10) [1]	33(55) [3]	7(11.7) [1]	14(23.3)[2]	60(18.9) [1]	0.000
Fertilizers	5(7.7) [1]	36(55.4)[3]	10(15.4)[1]	14(21.5)[2]	65(20.5) [2]	0.000
Referrals	8(25.8) [2]	7(22.6) [2]	5(16.1) [1]	11(35.5)[2]	31(9.8) [1]	0.000
Weather	7(7) [1]	63(63) [4]	18(18) [1]	12(12) [1]	100(31.5)[2]	0.000
Farm inputs	9(10.6) [1]	54(63.5)[4]	12(14.1)[1]	10(11.8)[1]	85(26.8) [2]	0.000
Average	(11.8) [1.1]	(44.6) [3.1]	(13.2) [1]	(19.5) [1.7]		

Source: Study data.
( ) frequencies in terms of percentages; [ ] weights.
Note: Sugarcane farmers: Awendo – 107; Chemelil -105; Muhoroni- 32; Ndhiwa -70.

From Table 3, the percentages show that the utilization of gadgets to seek information on cultivation was applied to a moderate extent among the farmers. Farmers from Chemelil comparatively used them moderately as opposed to farmers in Ndhiwa who used them to some extent. Farmers in Awendo and Muhoroni utilized them to small extents. Regarding the use of gadgets to seek information on planting, generally it was applied to some extent, with Chemelil using them to moderate extents, Ndhiwa using them to some extent, while Awendo and Muhoroni used them to small extents. Utilization of the gadgets to solicit information on markets was generally done to small extents. Farmers in Chemelil used them to a moderate extent, farmers in Ndhiwa used them to some extent, while farmers in Awendo and Muhoroni used them to small extents.

Utilization of information gadgets to seek for information on fertilizers was done to some extent and to moderate extent by farmers in Ndhiwa and Chemelil respectively, while those from Awendo and Muhoroni employed their use to a small extent. Meanwhile, regarding seeking referrals, the gadgets were used to some extent in Awendo, Chemelil, and Ndhiwa. Muhoroni used them to a small extent. On weather updates, the gadgets were used to a great extent by farmers in Chemelil, while the rest of the farmers in Awendo, Ndhiwa, and Muhoroni used them to a small extent; a similar situation with equivalent results was experienced on the usage of these gadgets to seek information relating to farm inputs.

2. LITERATURE REVIEW

This study was premised on the theory of technology diffusion. Technology diffusion theory narrates that any new technology that comes into the economy takes some time before it is diffused (adopted) by people. For such technologies to be diffused, the users must possess the necessary skills, Mukoyama (2003). In this scenario, the

technology analyzed in this study was the adoption and utilization of agricultural information dissemination through mobile phones, radio, television, and computers.

Information communication and technology (ICT) development has had an effect on individuals and families. This is due to its incorporation into both family and work life. Information "adoption" refers to the selection of a technology for use by an individual, a family, or an organization, Adeoye and Adeoye (2010). The process of adoption begins with the user becoming aware of the existence of the technology, and ends with the user embracing the technology (Bridges to Technology Corp, 2005).

However, in the process of adoption, awareness needs to be created and this is only possible through the production and distribution of printed materials, electronic media, radio, and television (Nnadi, Umunakwe, Nnadi, & Okafor, 2012). On the flipside, technology "utilization" refers to the proficiency in applying technological resources to achieve instructional goals (Varzaly & Elashmawi, 1984). However, it has been noted that farmers fail to utilize technologies because of the lack of training and language, along with traditional constraints and failures by the owners of the technology to visit the farmers (Lokeswari, 2006).

On the aspect of the utilization of mass media by farmers in Ikwere, Nigeria, through a multi-stage sampling technique, Ani, Umunakwe, Ejiogu-Okereke, Nwakwasi, and Aja (2015) obtained a sample of 180 farmers and found that other than television and radio, computers were least used within the study area. This was attributed to their relative high cost. Other than televisions, radios, and computers, this study looked at mobile phone penetration and usage.

Patil, Gelb, Maru, Yadaraju, and Moni (2008) observed that high levels of illiteracy are still a major impediment on ICTs utilization. This was concluded after examining the adoption of information and communication technology for agriculture in India. This conclusion was also arrived at by Mwombe, Mugivane, Adolwa, and Nderitu (2013) after evaluating information and communication technology utilization by small-holding banana farmers in the Gatanga District in Kenya, after using descriptive and regression analysis.

While assessing the moderating effect of education level on technology adoption in Jordan, Abu-Shanab (2011) examined 878 bank customers and employed the use of a seven point Likert scale. From the results, the conclusion was that education was a significant predictor to the use of internet banking. This observation was also supported by Bucciarelli, Odoardi, and Muratore (2010) after analyzing the role of education and training in technology adoption in various European countries. From the use of factor analysis, they reported that in Scandinavian countries high levels of ICT adoption are associated with high levels of education and training. The same significant relationship between the level of education and adoption of radio and television was also witnessed by Terngu, Imbur, and Iortima (2012).

According to KNBS (2010), 33.1 % of household members aged above three years owned a radio, 18.2 % owned a computer, 15 % owned a television (TV) set, while 7.4 % had internet connectivity. They observed that radio usage is more common among those households headed by a less educated person, while television usage is common among households headed by an educated person and computer usage is common among households headed by elites.

On the impact of gender on the adoption of new technologies, Tanellari, Kostandini, and Bonabana (2013) concluded that female farmers are less likely to adopt new technologies than their male counterparts. This was after they surveyed 373 farmers in the largest peanut-growing region in eastern Uganda in 2011 using a random utility framework. On the other hand (Zhou & Xu, 2007) investigated whether gender matters in adopting educational technology at a Canadian University. After using t-tests and chi-square tests, the results indicated that females were less confident in using educational technologies than their male counterparts.

Doss and Morris (2001) investigated 420 maize farmers located in 60 villages in Ghana between November 1997 and March 1998. In their study, they distinguished between the gender of the farmer and the gender of the head of the household. Although their study did not have information pertaining to the household head and

therefore assumed that all married female farmers lived in a male-headed household, they concluded that female-headed households were less likely to adopt new technologies.

On the other hand, Obisesan (2014) investigated gender differences in adopting cassava production technology in Southwest Nigeria. This author used a multi-stage sampling technique among 482 respondents and the use of the Tobit regression model, Propensity Score Matching (PSM), and Foster- Greer- Thorbecke class of poverty measures (FGT). The results suggested that females are less likely to adopt technology.

3. METHODOLOGY

This study used a correlational research design to investigate the determinants of information adoption and utilization among sugarcane farmers in the Nyanza region, Kenya. Stratified, random sampling was used. Stratas were based on the three counties of Kisumu, Homabay, and Migori that grow sugarcane. Kisumu county had two sugar belts (Chemelil and Muhoroni), Homabay county had the Ndhiwa sugar belt, while Migori county had the Awendo sugar belt. The 317 farmers targeted were those aged above 25 years and whose experiences in farming spanned approximately five years and over. Primary data was collected through questionnaires which were tested for reliability and validity. The data was estimated using a multinomial logit model, and heteroscedasticy was tested using the Levene's test.

The econometric model estimated was as follows:

$$Y_i = \alpha_0 + \alpha_{1i} x_1 + \alpha_{2i} x_2 + \varepsilon_i$$

Where:

$Y =$ Information adoption or utilization.

$x_1 =$ Gender.

$x_2 =$ Level of education.

$\alpha_0 =$ The constant.

$\alpha_1, \alpha_2 =$ The random coefficients of gender and the level of education.

$i =$ Cross-sectional individual farmer subscript.

$\varepsilon_i \sim N(0, \sigma^2)$

4. RESULTS AND DISCUSSION

This section presents the results and discussion of the study both in Table 3 and 4. Table 4 depicts the results of chi-square tests measuring statistical independence of the regional adoption and utilization of information among sugarcane farmers. Based on the significant chi-square probabilities, there was an indication of statistical difference on information utilization across the agro-ecological zones. The average weights showed that in Chemelil, farmers utilized information gadgets moderately, those from Ndhiwa used them to some extent, while those in Awendo and Muhoroni used them to a smaller extent.

From Table 3, there was no significant correlation between the adoption of mobile phones and their usage in all the sugar belts. There was significant association between the usage of radios and cultivation in Awendo, Chemelil, and Ndhiwa. There was significant association between the usage of radio and planting in Chemelil and Ndhiwa. In finding new markets, raw materials, and weather information in Awendo, there was a strong association of radio use. Radio use and referrals exhibited a strong correlation in Ndhiwa. Television usage had a stronger and more

significant correlation to planting, finding new markets, and reading of weather patterns in Awendo, and purchase of farm inputs in Chemelil. Use of computers had a significant correlation to cultivation, raw materials, weather, and purchase of farm inputs in Ndhiwa. Overall, radios were significantly used as a source of agricultural information dissemination in most of the regions.

Table-4. Chi-square tests measuring statistical independence of the regional adoption and utilization of information among sugarcane farmers.

		Mobile phone		Radio		TV		Computer	
		No.	Chi-square	No.	Chi-square	No.	Chi-square	No.	Chi-square
	Awendo	14	C	12	0.486**	6	0.294	0	0.317
	Chemelil	54	0.256	56	0.445**	11	0.146	1	0.101
	Muhoroni	15	0.140	14	0.150	6	0.219	18	C
Cultivation	Ndhiwa	35	0.228	23	0.519**	16	0.181	1	0.413*
	Awendo	12	C	11	0.277	4	0.343*	0	0.347
	Chemelil	51	0.126	52	0.347*	11	0.272	1	0.109
	Muhoroni	15	0.185	14	0.222	6	0.239	18	C
Planting	Ndhiwa	24	0.166	13	0.387*	9	0.139	0	0.455
	Awendo	6	C	4	0.700**	2	0.375*	0	0.322
	Chemelil	33	0.297	31	0.267	8	0.223	1	0.180
	Muhoroni	5	0.360	5	0.258	1	0.393	7	C
New markets	Ndhiwa	12	0.310	9	0.283	6	0.306	0	0.435
	Awendo	5	C	5	0.318*	2	0.214	0	0.244
	Chemelil	33	0.164	33	0.289	72	0.234	0	0.216
	Muhoroni	8	0.371	8	0.363	7	0.517	5	C
Raw materials	Ndhiwa	14	0.244	11	0.149	5	0.320	1	0.544**
	Awendo	8	C	7	0.241	2	0.167	1	0.257
	Chemelil	7	0.217	7	0.177	2	0.179	0	0.085
	Muhoroni	3	0.360	2	0.366	5	0.146	5	C
Referrals	Ndhiwa	11	0.183	6	0.360*	4	0.175	0	0.365
	Awendo	7	C	6	0.398*	13	0.345*	1	0.237
	Chemelil	57	0.237	55	0.230	6	0.193	1	0.123
	Muhoroni	15	0.208	14	0.171	7	0.326	18	C
Weather	Ndhiwa	12	0.144	10	0.231	8	0.262	4	0.403*
	Awendo	7	C	9	0.196	12	0.152	3	0.096
	Chemelil	51	0.289	49	0.257	3	0.392*	0	0.397
	Muhoroni	9	0.236	9	0.184	5	0.492	12	C
Farm inputs	Ndhiwa	10	0.109	6	0.091		0.168	4	0.415**

Source: Survey data.
( ) frequencies in terms of percentages; [ ] weights.
Note: Sugarcane farmers: awendo – 107; Chemelil -105; Muhoroni- 32; Ndhiwa -70.
c. not computed because the gadget is constant; * 5% level significant; ** 1% level significant.

The multinomial regression results for the likely effects of gender and education on information adoption and utilization among the sugarcane farmers in Nyanza are presented in Tables 5, 6, and 7.

4.1. Gender and Information Adoption

In Table 5, we present the results for the likely effect of gender on the adoption of information by sugarcane farmers in the Nyanza region. Adoption and utilization results were analyzed separately using the multinomial logit regression model. Male (coded 1) was used as the base, while women were coded 2. The results are shown in the Table 5.

Table-5. Likely effect of gender and information adoption.

Gender	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Male	(base outcome)					
Female						
Mobile	-43.49362	2791.279	-0.02	0.988	-5514.3	5427.312
Radio	-215.8861	.2681974	-804.95	0.000	-216.4117	-215.3604
Television	-38.84593	3304.439	-0.01	0.991	-6515.427	6437.735
Computer	-33.06322	2669.662	-0.01	0.990	-5265.504	5199.377
Education	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Primary						
Mobile	-3.634073	1.71656	-2.12	0.034	-6.998468	-.2696774
Radio	-3.794893	1.681436	-2.26	0.024	-7.090448	-.4993385
Television	-1.80637	.8493233	-2.13	0.033	-3.471013	-.1417265
Computer	-1.442984	.7137233	-2.02	0.043	-2.841856	-.0441122
Secondary	(base outcome)					
Post-secondary						
Mobile	.0360164	1.199868	0.03	0.976	-2.315682	2.387715
Radio	-.2262068	1.18267	-0.19	0.848	-2.544198	2.091785
Television	-.4018644	.5500343	-0.73	0.465	-1.479912	.676183
Computer	-.1300455	.5398756	-0.24	0.810	-1.188182	.9280912

Source: Survey data.

As seen in Table 5, the coefficients on mobile phones, television, and computers were negative and insignificant i.e. $(\alpha_1 = -43.49362; p = 0.988); (\alpha_3 = -215.8861; p = 0.991)$ and $(\alpha_4 = -33.06322; p = 0.990)$ respectively. The direction and probabilities were an indication that women were significantly less likely to adopt information gadgets than men, except radios which showed a significant probability, $(\alpha_3 = -215.8861; p = 0.000)$.

With regards to information gadgets adoption, Table 5 shows that the coefficients for mobile phones, radios, televisions, and computers had significant negative probabilities i.e., $(\alpha_1 = -3.634073; p = 0.034); (\alpha_2 = -3.794893; p = 0.024)$; $(\alpha_3 = -1.80637; p = 0.033)$ and $(\alpha_4 = -1.442984; p = 0.043)$ respectively. This indicated that farmers with a primary education were significantly less likely to adopt information gadgets than their counterparts with a secondary education. Conversely, those with a post-secondary education were significantly less likely to adopt radios, television, and computers, $(\alpha_2 = -0.222068; p = 0.848); (\alpha_3 = -0.4018644; p = 0.465)$ and $(\alpha_4 = -0.130045; p = 0.810)$ respectively. This is an indication that those with a post-secondary education are significantly less likely to adopt information gadgets that their counterparts with a secondary education, except the use of mobile phones whose direction was positive $(\alpha_1 = 0.0360164; p = 0.976)$.

From Table 5, the likelihood of women adopting mobile phones is greater and significant than men, $(\alpha_1 = 1.298132; p = 0.005)$. This means that for every man adopting a mobile phone, close to two women are likely to adopt mobile phones. However, with increased levels of education, the farmers were less likely to adopt information, $(\beta_3 = -0.6971544; p = 0.000); (\beta_4 = -0.7967783; p = 0.000)$. This meant that as farmers

increase their levels of education, they are 0.6971544 less likely to adopt television and 0.7967783 less likely to adopt computers.

4.2. Gender and Information Utilization

The data on gender and information utilization was redefined based on the responses against each agricultural activity. The responses on the agricultural activities took the format of a Likert scale, namely strongly agree, agree, indifferent, disagree, and strongly disagree. These responses were given different weights with strongly agree given a weight of five, and strongly disagree given a weight of one. Therefore, new variables on the agricultural activities that took into consideration the influence of gender were generated by considering the quotient between the individual response and the respondent's gender.

The results shown in Table 6 demonstrate that women were more likely to utilize the gadgets to generate information on planting, searching for new market areas, checking for raw materials, and seeking for referrals, weather updates, and farm inputs than men.

Table-6. Likelihood of gender and information utilization.

Gender	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Male	(base outcome)					
Female						
Cultivation	31.5969	3218.583	0.01	0.992	-6276.71	6339.904
Planting	1.907837	.2617494	7.29	0.000	1.394818	2.420856
Marketing areas	2.402422	.3582323	6.71	0.000	1.700299	3.104544
Raw materials	3.246956	.3914047	8.30	0.000	2.479817	4.014095
Referrals	3.494284	.4702018	7.43	0.000	2.572705	4.415863
Weather	4.201062	.5655052	7.43	0.000	3.092692	5.309432
Farm inputs	2.949743	.4250631	6.94	0.000	2.116635	3.782852

Source: Survey data.

On planting, for every man who used gadgets to seek information, there were approximately two women $(\alpha_2 = 1.907837; p = 0.000)$, for every man who used a gadget to seek for new market areas, there were approximately three women $(\alpha_3 = 2.402422; p = 0.000)$, for every man who used a gadget to seek raw materials, there were approximately four women $(\alpha_4 = 3.246956; p = 0.000)$, for every man who used a gadget to seek for referrals, there were approximately four women $(\alpha_5 = 3.494284; p = 0.000)$, for every man who used the gadget to seek for weather updates, there were approximately five women $(\alpha_6 = 4.201062; p = 0.000)$, and for every man who used a gadget to seek farm inputs, there were approximately three women $(\alpha_7 = 2.949743; p = 0.000)$.

4.3. Education Levels and Information Utilization

This paper investigated the different education levels and information utilization among the respondents within the study area. From the results in Table 7, we can see that the different levels of education were captured, and the frequencies outlined as follows:

Table-7. Summary of education statistics.

Education	Frequency	Percentage	Cumulative
Primary	109	34.38	34.38
Secondary	140	44.16	78.55
Diploma	51	16.09	94.64
Graduate	13	4.10	98.74
Post-graduate	4	1.26	100

Source: Survey data.

From Table 7 it can be seen that those with a primary school education constituted 34.38% of the total and were considered to be least educated. Those who had a secondary education were 44.16% of the total. Those with diploma certificates, bachelor's, and post-graduate degrees were 16.09%, 4.10%, and 1.26% respectively. This study considered them to be educated. In total, they constituted 21.45%. Those with information gadgets were coded 1 and those without them were coded 2. Possession of the gadgets acted as the base.

In determining the likelihood of information utilization among the farmers within the study area, educational levels were categorized into three, namely primary, secondary, and post-secondary. Based on the level of education, new responses on utilization of the gadgets were generated and weighted by getting a quotient between the original individual respondent and his/her levels of education. Responses on the farming activities were on the basis of a Likert scale.

Table-8. Information utilization by education levels.

Gender	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Primary						
Cultivation	-36.01072	3039.345	-0.01		-5993.016	5920.995
Planting	-2.763322	.4531887	-6.10	0.000	-3.651556	-1.875089
Marketing	-3.521146	.487076	-7.23	0.000	-4.475798	-2.566495
Raw materials	-3.039758	.4331812	-7.02	0.000	-3.888777	-2.190738
Referrals	-3.587406	.4849471	-7.40	0.000	-4.537885	-2.636927
Weather	-3.618455	.5064642	-7.14	0.000	-4.611107	-2.625803
Inputs	-4.17515	.5832688	-7.16	0.000	-5.318335	-3.031964
Secondary	(base outcome)					
Post-secondary						
Cultivation	5.473	.7380302	7.42	0.000	4.026487	6.919512
Planting	1.417774	.2084077	6.80	0.000	1.009303	1.826246
Marketing	1.446269	.2519935	5.74	0.000	.9523711	1.940168
Raw materials	1.684073	.249957	6.74	0.000	1.194166	2.17398
Referrals	1.807887	.3050937	5.93	0.000	1.209914	2.405859
Weather	1.507354	.2404632	6.27	0.000	1.036055	1.978653
Inputs	1.621144	.2773547	5.85	0.000	1.077539	2.164749

Source: Survey data.

From Table 8, those with a primary education were less likely to use the information generated from the information gadgets in planting, marketing, sourcing raw materials, referrals, checking for weather updates, and sourcing inputs than those with a secondary education. Given the signs and the probabilities on the agricultural activities, except the probability on cultivation, those who had left at primary school level were less likely to use information gadgets to seek for information than those from secondary schools. Conversely, those with post-secondary school qualifications were more likely to use information gadgets to seek for information than those in secondary schools.

5. CONCLUSIONS

This paper set out to examine the likely effect of gender and education on information adoption and utilization among sugarcane farmers in the Nyanza region, Kenya. From the perspective of information adoption, the results

indicate that women are less likely to adopt information gadgets that men. With regards to the level of education, the results portray that those with higher levels of education are more likely to adopt information coming from information gadgets. Therefore, this study recommends that focus should be devoted towards equipping women with prerequisite knowledge to enable them to embrace technology and information that emanates from such technologies. This is because, females are more likely to utilize the information in agricultural practices than men. Besides, as one's educational level increases, the affinity for using information gadgets to solicit information also increases. Therefore, this study recommends that more training should be accorded to farmers, especially females, if information channeled through information gadgets is to be disseminated properly.

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