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## RESEARCH ARTICLE

### SOCIO-DEMOGRAPHIC DETERMINANTS INFLUENCING FARMERS' DECISION ON ADOPTION OF HORTICULTURE FARMING IN NANDI COUNTY, KENYA.

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#### Abstract

The study sought to establish the influence of respondents' socio-demographic characteristics on adoption of Horticulture farming among small scale farmers in Nandi County, Kenya. A cross-sectional survey research design was employed and a sample of 400 respondents was systematically selected. A well structured Questionnaire, Focus Group Discussion and Key Informant Interviews were the main data collection tools used. Pearsons correlation test was used to establish relationships among variables under study. The study assessed the influence of gender, age, level of education, land size and income control. Findings showed that these factors influenced adoption of horticulture farming among the respondents in differing extents. Although horticulture farming has not been extensively embraced as the main commercial crop, respondents expressed high acceptability, rated it as highly compatible with their farming objectives and expressed a high inclination towards their further adoption. Various horticultural crops were planted by respondents namely kale, cabbages, bananas, traditional vegetables (*managu, saka, mitoo and kunde*), tomatoes, passion fruits and pineapples. However, among the various crops planted by the respondents horticultural crops came in fourth in terms of the proportion of land allocated to them. The study recommends that there is need to sensitize farmers on the benefits of engaging in the production such high value crops. The government also needs to come up with programmes that would provide information and train farmers on the trends that are taking shape on farming within the region and globally. Furthermore, agricultural promotions need to be targeted well among potential adopters considering that study has revealed the nature of farmers that are well placed to adopt innovations.

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#### Introduction:-

In Africa, agricultural and rural development is considered very important as they form the bedrock for effective development (World Bank 2007). Agriculture has stood out as the starting point of rural transformation, and the

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main economic base for small-scale farmers. Although horticultural farming has been considered a bright spot in many African countries (AVRDC, 2004), for a long time its growth has not kept pace with the rest of the world due to low uptake of innovations (Weinberger & Lumpkin, 2005). It faces unprecedented challenges (IFAD 2002) that include changing weather patterns, inadequate access to inputs, lack of market for the produce coupled with flooding of the local markets by imported products due to market liberalization. Compared to the rest of the world, a number of countries that were dependent on agriculture such as Malaysia, Mauritius, Thailand and South Korea have been transformed into newly industrialized countries (National Economic and Social Council of Kenya (NESC), 2007) but farmers in many African countries continue to wallow in poverty. To realize such growth, there is need to harness science, technology and innovation to improve agricultural production, especially among smallholders (IFAD 2002).

According to Kurt Larsen, Ronald Kim, and Florian Theus(eds), (2009), whereas prior to the mid-1990s, horticultural exports were significant in South Africa, Zimbabwe and Kenya, today the list has expanded to include Ghana, Ivory Coast, Uganda, Ethiopia, Egypt and Zambia. After South Africa, Kenya and Ivory Coast are the largest fruit and vegetable exporters in sub-Saharan Africa. However; scarce information exists to explain the low uptake of horticultural farming and production in sub-saharan Africa. In Kenya, commercially-oriented horticulture production dates back to the early days of the 20th Century when private entrepreneurs began to venture into large-scale commercial production (Minot and Ngigi, 2003). The horticulture industry mainly comprises of fruits, vegetables and cut flowers (Food and Agriculture Organization [FAO], 2003) and constitutes 33% of agriculture's contribution to the Kenyan economy. It is the fastest growing sub-sector in the country and is ranked second in terms of foreign exchange earnings from exports after tourism with tea following closely at third place (Adekunle, Ellis-Jones, Ajibefun, Nyikal, Bangali, Fatunbi & Ange, 2012).

In Kenya, the success so far realized in this sub-sector has been attributed in part to its natural advantage for the production of horticultural crops. In addition, there has been a lot of input and support in the form of policy and program implementation namely; the formulation of the National Agriculture and Livestock Extension Programme (NALEP) and the Small-Holder Horticulture Marketing Program (SHoMAP). Emphasis was also put on the role of the extension service as a facilitator, connecting the farmer with private sector services rather than managing government handouts (Melinda et al, 2006). There has also been the formulation of the horticulture policy 2010 that analyzes the various industry concerns and highlights the challenges faced. These interventions offers support services (financing the industry, research and extension), marketing (local, regional and export markets), infrastructure development as well as regulatory and institutional arrangements (Ministry of Agriculture, 2010). The policy provides for the capacity building and empowerment of farmers engaged in horticulture farming. Besides the policy interventions, the country also actively participates in a number of regional initiatives, such as the harmonization of horticulture standards for the East Africa Community (EAC), Horticulture Council of Africa (HCA), and in sharing of information and experiences on high value agriculture (Omondi, 2006).

Over time, horticulture production had been practiced but it was not until 2008 that the Ministry of Agriculture within its "Strategy for Revitalizing Agriculture, 2004-2014" put in a lot of effort to increase the quantity and improve the quality of horticultural production by small-scale horticulture producing households. Despite all this input, the outcomes have not been commensurate with the efforts. Kenya's small scale horticulture farmers have failed to achieve agricultural growth despite the many new technologies developed and the varied interventions formulated towards the transformation of this sector by diverse agricultural development actors. Horticultural productivity therefore continues to decline for reasons that are not adequately documented. Although this sub-sector has been extensively studied in Kenya, focus has been more general on the technical aspects of adoption yet socio-cultural factors that play a significant role in the successful uptake of innovations and change processes have been given little attention. Thus, there is need to assess the influence of socio-demographic factors on the uptake of horticulture farming in specific parts of Kenya with high potential for horticultural production.

Therefore the main objective of this study was to investigate how the prevailing socio-demographic characteristics of farmers influenced the uptake of horticulture farming in Nandi County. Specifically, the study sought to;

1. Investigate the proportion and demographics of households engaged in horticulture farming and;
2. Describe how the socio-demographic characteristics bear on farmers' decision whether to adopt horticulture farming or not.

### Resources and Procedures:-

The study employed a cross-sectional survey research design to facilitate snapshot systematic gathering of descriptive data (Bhattacharjee, 2012) regarding socio-demographic characteristics of households engaged in horticulture farming in the research area. Survey is a systematic method which involves collecting relevant data and subsequently describing the behavior of a subject without manipulating it in any way (Bryman, 2004; Kothari, 2004). The study was conducted Nandi south sub-county in Nandi County, Rift Valley Province, Kenya. Nandi County is situated on the western part of the Rift-valley province, within latitude 0.25 (0° 15' 0 N) and longitude 35.08 (35° 4' 60 E). The altitude ranges between 1300 metres and 2500 metres above sea level (Government of Kenya, 2001). The county has a total area of approximately 2,920km<sup>2</sup> and a population of 752,965 people (Kenya National Bureau of Statistics [KNBS], 2010). Administratively, the county consists of five sub-counties namely; Nandi North, East, South, Central and Tindiret Districts. Nandi South has a total population of 157,967 people comprising of 78,209 males and 79,758 females with a total of 30,643 households (KNBS, 2010). The predominant farming activities are food crops such as maize, beans, banana, kales, onions and cash crop such as tea and coffee. The study targeted households in Aldai Division, Nandi South sub-county where Ndurio and Kemeloi locations were selected purposively as they are the locus of the horticulture promotion activities and, their representativeness of the entire county as they cut across both the highly and the lowly populated areas of the district. There are 23,281 households in Aldai Division with 3,476 being in Kemeloi while 1,528 in Ndurio (KNBS, 2010).

To arrive at the desired sample size, the following formula developed by Norman (2010:183) is used;

$$n = \frac{pqZ^2}{E^2}$$

where:

n- The desired sample size

p- Proportion of population estimated to have characteristics being measured (50%)

q- (p-100) =50%

Z- The standard normal deviate of the required confidence level (1.96)

E- Maximum error desired in estimating population parameter (.05)

$$n = \frac{(.50)(.50)(1.96)^2}{(.05)^2} = 384$$

This formula gave a sample size of 384 which was adjusted to 400 and data was collected from a minimum of 415 households in order for the sample population to be within +5 of the population with a 95 percent level of confidence and to cater for non response.

The study utilized systematic random sampling technique to select farmers proportionately from Ndurio and Kemeloi locations. A list of all farmers was developed and in every 13<sup>th</sup> household, the household head or the representative, as designated by the household members, was sampled for interviewing.

A well structured Questionnaire, Focus Group Discussion and Key Informant Interviews were the main tools used to collect information from the key informants with regard to the study subject. To collect the quantitative data, the study utilized a questionnaire that was administered by the researcher to seek information from 400 household heads. Two focus group discussions of 10 and 12 members each were also held with knowledgeable leaders or representatives of horticulture farmers in every location. The Key Informant interviewees comprised individuals who were grounded in the community and, who had particular or “expert” knowledge about horticultural issues, the people and their livelihood activities. These individuals included the divisional horticulture officer, the district agriculture officer and those who had worked under the horticulture promotion project.

To analyze data the study utilized descriptive statistics namely measures of dispersion namely frequencies and percentages and cross tabulations. Pearson’s correlation technique (r) was used to test for the statistical significance of associations between selected variables (Gupta, 2008). Data was then presented in form of tables of frequencies.

### Results:-

Study findings showed that 60.1% of the respondents sampled were male while 39.9% were female. This finding was further supported by key informant interviews, which alluded to the dominance of men in horticulture farming. Pearson’s correlation analysis yielded a correlation coefficient (p=-.181\*\* p<.01). The result is significant at p < .01.

The results point to a negative relationship between the respondent's gender and adoption of horticulture farming with the male respondents being more inclined to its adoption more than female respondents. Respondents' age was found to range between 20 to above 50 years with 3% of the respondents being aged less than 20 years, 28.25% were aged between 21-30 years, 27.5% were aged 31-40 years, 28.75% were aged between 41-50 years while 12.5% were aged 51 and above. Pearson's correlation analysis was utilized to ascertain the relationship between respondents' age and their likelihood to adopt horticulture farming and it yielded a correlation coefficient ( $p=.055^*$   $p<.05$ ). The result is significant at  $p < .05$ . The results indicate a weak positive relationship between the respondent's age and adoption of horticulture farming. Findings on the respondents' marital status showed that 71.75% were married, 19.75% were not yet married, 8% were widowed while 0.5% were divorced/separated. This means that engagement in horticulture farming was prevalent among persons of all marital status with the majority being the married ones (71.8%). Pearson's correlation analysis was utilized to ascertain the relationship between respondents' marital status and their likelihood to adopt horticulture farming and it yielded a correlation coefficient ( $p=-.012^*$   $p<.05$ ). The result is significant at  $p < .05$ . The results indicate a weak negative relationship between the respondent's marital status and adoption of horticulture farming. This means that although engagement in horticulture farming was prevalent among persons of all marital status, the majority were the married ones.

In reference to the level of education, majority of the respondents were found to be literate with 15.75% having attained primary education level, 34.5% had attained secondary level education, 39.25% had attained middle level college (certificate and diploma) education while 10.5% had attained university level education. This reflects a fairly high level of literacy given that majority (84%) of the respondents had attained secondary level of education and above. Pearson's correlation analysis yielded a correlation coefficient ( $p=-.058$ ;  $p<.05$ ). The result is not significant at  $p < .05$ . Thus, there is no association between the respondent's level of education and adoption of horticulture farming. This is because respondents of all levels of education were engaged in horticulture farming with the majority (84%) having attained secondary and middle level college education.

Land is a major factor of production and thus it is the centre around which farming decisions and activities revolve. Study findings showed that respondents had varied land sizes with 22.5% of them having less than 2.5 acres, 37.3% had between 2.6-5 acres, 16.6% had between 5.1-7.5 acres, 12.4% had between 7.6-10 acres while 11.2% had more than 10 acres. Taking a comparative view of the farm allocated to the various crops planted/activities engaged in, the results showed that tea were allocated the largest portion with 32.25% of the respondents having less than one acre while 43.5% had between 1-2 acres. This was followed closely by cereals where 47.25% of the respondents had less than one acre while 35% allocated between 1-2 acres. Livestock farm came third with 45.25% of the respondents having less than one acre while 27.25% allocated between one to two acres. Horticulture came fourth with 81.1% of the respondents having less than one acre, 15.7% allocated between 1-2 acres, 2.2% allocated between 2-3 acres while 1% allocated 3-4 acres. Pearson's correlation analysis yielded a correlation coefficient ( $p=.207^{**}$   $p<.01$ ). The result is significant at  $p<.01$ . This implies that respondents who had large land holding engaged more in horticulture farming.

When it comes to control of proceeds/income from horticulture farming, 52% reported to be controlled by husband while 48% reported to be controlled by the wife. The greater control of income by husbands is in line with the earlier finding which showed that majority of the respondents (60%) were male. Pearson's correlation analysis yielded a correlation coefficient ( $p=.095$ ;  $p<.05$ ). The result is not significant at  $p < .05$ . This implies that whether the man or the woman controls the household income it did not significantly influence the uptake of horticulture farming.

Respondents' propensity to adopt horticulture farming was also studied and the findings showed high levels of acceptance of horticulture farming with 34% of the respondents rating it as highly acceptable, 23% rated it as fairly acceptable 32% rated it as acceptable, and 11% rated it as least acceptable or unacceptable. It is only flowers that respondents did not favour engaging in their production with 70% of them rating it as least acceptable, 5% rated it as fairly acceptable, 10% rated it as acceptable and 7% rated it as highly acceptable. Findings further showed that 83.75% of respondents planted bananas, 77% planted kales (*sukuma wiki*) and cabbages, 72.25% planted traditional vegetables (*managu, saka, mitoo* and *kunde*), 66.75% planted tomatoes, 57.75% planted passion fruits while 25.75% planted pineapples. It is only the flowers that farmers didn't engage in its production given that none of the respondents sampled was engaged in their production. 88.1% of the respondents saw horticulture as compatible with their farming objectives while 11.9% cited it as incompatible. The high compatibility of horticulture farming with the respondents farming objectives shows that it has potential for wider embracement as a mainstream agricultural

activity. The reasons cited in support of this level of compatibility included 33% of respondents owing it to the nutritional value, 30% reported the high returns, 22% cited their short maturity period, 8% cited their steady cash while 7% said it required small farm size. This is further supported by the prevailing community attitude towards horticulture farming that was rated by respondents as favourable (95%) while 5% saw it as unfavourable.

The respondents' view of the compatibility of horticulture farming with their general farming objectives contrasts the views of those who did not favour horticulture farming. The reasons they cited to discourage them from engaging in horticulture farming were 35% of the respondents cited their small farm sizes, 27% reported to have invested in other crops, 16% saw horticulture farming as very demanding, laborious and tedious because its is done manually, 8% reported the unfavourable weather conditions, 5% cited their high perishability, a further 5% cited lack of a ready market and 4% cited lack of monthly payment. Other reasons that were given pertained to the harmful effects associated with the various horticultural crops including the unfounded fears based on genetically modified organisms (GMO) theory/conception; that the scientifically improved crop varieties (a case in point was tissue culture bananas) can cause cancer. Kales (*sukuma wiki*) were also reported to be highly acidic and therefore could not be consumed by individuals who had health conditions/experiences relating to ulcers. Furthermore, kales were reported to be soil degrading. There were no harmful effects associated with/reported on traditional vegetables, passion fruits, cabbages and pineapples although there was a general fear that the high level of chemicals used in the production of horticulture crops can have an effect on the consumers.

### Discussion:-

The high number of male participants in horticulture farming is attributed to division of labour among the Nandi community, where culturally men control the main means of family livelihood/income. This follows from rules of inheritance which are normally considered discriminatory to women and therefore disadvantaging them in the control of lucrative sectors of the societal economy (Hollis, 1909). Such division of labour and distribution of resources is illustrated well by the human agency theory which puts it that in every society, concepts of power and prestige are attributed differently to persons of different gender. Thus, although horticulture farming had initially been women's domain when its focus was subsistence oriented, however, men have dominated it since it was introduced as a cash crop.

The lower participation by women is also explained by the culturally entrenched division of labour coupled with other factors such as women having limited access to critical farm resources (land, labor, and cash) and being discriminated against in terms of access to external inputs and information (Ragasa, 2012). Michael and Cheryl (1999) explains further the disparity between male and female adopters that, throughout many parts of sub-Saharan Africa, women have greater difficulty than men in obtaining labor, especially male labor needed for land preparation activities (e.g., clearing, burning, plowing), and men mostly have claim over women's labor, but women do not have similar claim over men's labor. World Bank, FAO and IFAD (2008), illuminates further the challenges faced by women to include a combination of gender-blind legislation and policies and gendered norms that often place men in positions of benefit more than women such as in market opportunities or public programs that directly or indirectly influence technology adoption decisions. Furthermore, the lack of access to information about the technology and more so the lack of engagement of key actors (women and men) in priority-setting and innovation processes are hindrances to a much improved and faster adoption of new technologies in society (Meinzen-Dick et al, 2010). Study by Oduol and Mithöfer (2014) found out that female-headed households tend to have low levels of education and smaller household sizes, indicating that they could be facing severe constraints related to access to information and labour than male headed households. Such structural inhibitions and norms restrict women's mobility or decision making and limit their opportunities and sources of livelihoods and ultimately restrict them on the technologies to be adopted. It is therefore the differentiated lack of access to these technologies and complementary inputs and resources between men and women that mainly explain the observed slower adoption rate of technologies by women than men. Thus, technology adoption decisions depend primarily on access to these resources, rather than on gender *per se*.

Horticulture farming was found to be prevalent among persons of all ages however younger respondents engaged in horticulture farming than the older members of their society. High levels of adoption were therefore concentrated among respondents aged between 21–40 years. This means that youthful respondents engaged in horticulture farming more than the older members of society do. This is attributable to horticulture's need of certain specific skills for effective production. These skills evolve and change with time, therefore younger members of society are more placed to possess these skills (Conroy, 2005) and if not, then they are more willing to seek these skills than the

older members of society given their agility. Also, horticulture farming is labour intensive and owing to such intense labour demands youthful persons are more placed to handle them than the older members of society. Furthermore, given the study area was typically rural with no other active economic sector other than farming; this may have contributed to the prevalence of engagement in horticulture farming across the various age groups as the main form of occupation for a majority of households. This can be explained by the high fertility of land within the study area which makes it possible for the farming of various horticultural crops and other crops such as maize, beans, tea and bananas.

However, in existing literature, there is contention on the direction of the effect of age on adoption decisions. One assumption is that younger farmers are more likely to adopt innovations than older ones. This line of argument is supported by Biwott (2016) who found out that young farmers were more alert to obtaining information from various sources that discuss several ways of improving their vocation than older farmers who were found to seek access to such varying sources of information by joining Faith Based Organizations (FBO). Conroy (2005) found out that younger farmers are likely to take up new technology than older farmers given that they are of higher schooling and have more contact to innovations. Gockowski and Ndoumbe (2004) found out that age of the household head had a significant negative and elastic effect on adoption decisions with younger farmers being more likely to adopt intensive mono-crop horticulture than older ones.

The other assumption is that older farmers are more likely to adopt innovations than younger ones. Ashenafi (2007) found out that older farmers are likely to adopt new technology due to their experience or reject it all together. Age is depicted here to signify more exposure to production innovations/technologies and greater accumulation of physical and social capital and large family sizes. Thus, studies show that there is no conclusive evidence on the direction of influence of age on agricultural innovation adoption. This argument is supported by Conroy (2005) who holds that command of age on farmer's contribution to new technology is indecisive. Drawing from the above studies it can be concluded that the influence of a respondent's age on adoption of innovation is dependent on the nature of innovation under consideration. Totally new ideas and practices/innovations are more likely to be adopted by younger farmers while ideas and practices/innovations that build on the existing ones are more likely to be adopted by the older members of society given their accumulated experience.

The high number of married participants in horticulture farming is attributable to the fact that among the Nandi community that was studied here, individuals who have attained puberty are considered adults and at this stage/age one can marry or get married (Hollis, 1909). Thus, there is a high likelihood that they would be married owing to their ages and such other factors as the societal expectations on its members. Like any other community/society, the respondents had chosen to "settle down in life" and establish their families having attained the expected age in keeping with the societal agency expectations. It can also be explained by the fact that married individuals have a lot of obligations towards their families/children and therefore are more likely to engage in alternative income generating activities such as horticulture farming to earn income for financing provision for their families. Majority of the respondents engaged in this study (75.8%) had between 4 to 6 dependants and this translates to a lot of demands for provision by the heads of families. This is because marriage brings with it additional household members in the form of marriage partner, children and dependants who besides creating more pressure for provision can in the contrary motivate more productivity by being a source of additional labour. Children/dependants can assist with the various farm activities and thus enabling households address the labour intensive nature of horticulture farming more effectively as compared to those who had few dependants/small household size. This argument is supported by Biwott (2016) who held that large households spend more on food and other needs and such higher expenditures associated with larger household sizes tend to cause more resource constraints and hence the need for external support such as adoption of more effective innovations/techniques of production. This argument is reinforced by study findings which showed that majority of the respondents (56%) relied on family labour, 18% relied on hired labour while 26% utilized both family and hired labour in their horticulture farms. Thus, the number of dependants that ranged from 4-6 in most households serves as a source of labour for the horticulture farms. On the contrary, labor shortages may prevent/retard adoption of horticulture farming especially in households with small family size and are not able to hire alternative labour. This variation in the way marital status, household size and number of dependants influence adoption of horticulture farming is illustrated well by the agency theory, which argues that different individuals within the same situation will adopt different ways of responding/coping with the situation.

This high level of education also reflects horticulture farming as an income generating engagement of choice among persons of all levels of education and works of life and underscores horticulture's requirement of certain specific skill/expertise for its management. Such high levels of education connote high level of awareness and ability to understand, process and respond appropriately/make informed decisions based on the information given. The above finding is in line with that of Mwaura et al (2013), in their study on African leafy vegetables, who found out that 72.2 percent of farmers had attained secondary level education and above while about 10.8 percent were uneducated. Horticulture farming therefore stands out as an income generating activity of choice among persons of all levels of education where for some it is the main form of occupation/income generating activity and for others it is a refuge/disguised form of unemployment or an alternative or additional source of income. For those who had attained primary and secondary level of education, horticulture farming was reported to be their main occupation given that there are limited opportunities for employment in the study area apart from farming. For those who had middle level college and university education, some engaged in horticulture farming as a disguised form of unemployment as they sought employment in other areas while those who had been employed in other sectors engaged in horticulture farming as an alternative/additional income generating venture. Study has also shown that education increases awareness and prepares people for innovative changes. Maurice et al (2009) in their study of Production Risk and Farm Technology Adoption in Rain-Fed, Semi-Arid Lands of Kenya, found out that education of the household head increased the probability of a farm household adopting terracing. This is because through education, household heads who are the primary decision-makers are more capable of accessing, analyzing and assimilating information regarding the various technologies, their advantages, and the dangers of not adopting them if they are better educated. Masuki *et al.*, (2003) concurs with Maurice that increase in education level catalyzes the process of information flow and exposes farmers to a wider field of knowledge thus promoting adoption of the new technologies. The high level of literacy/education reflected by the above results is expected to positively affect/influence the diffusion and adoption rate of horticulture farming because education is a key determinant in adoption of new ideas in many aspects of life as it enhances how individuals seek, access, perceive, and understand issues and phenomena so as to make informed decisions. From the above studies, education serves to either increase prior access to external sources of information or enhance the ability to acquire information through experience with new technology. Educated persons also are better able and willing to acquire information about potential innovation and to make rational evaluations of the risks involved in trying such new innovations (new inputs, crops or methods). Educated farmers may also be more aware of the benefits of modern technologies and may have a greater ability to learn new information hence easily adopt new technologies/innovation. Also educated farmers are able to interact more effectively with support institutions such as credit and extension agencies, because they can understand processes of transactions, requirements and keep records properly thus increasing the likelihood of accessing and obtaining such services. Furthermore, increased literacy and numeracy also help farmers to acquire and understand information and calculate appropriately input quantities as required in the modernizing or rapidly changing societal environment.

Respondents who had large land holding engaged more in horticulture farming. Farmers with larger land holding tend to be interested in issues that concerns their farming activities and will be more likely to adopt new and innovative farming methods/crops than those with small land holdings. The large land holding will also accord them more space where they can try out new crops/approaches while still being able to continue their usual farming activities without any inhibition. Larger farm size is also associated with greater wealth, increased availability of capital, and high risk bearing ability which makes investment in new technologies/innovations more feasible (Norris and Batie, 1987). The findings from this study contrasts this argument given that in reference to the proportion of land put under horticulture farming, respondents who had small land holding devoted a greater portion of their land to horticulture farming than those who had large land holding. Study findings showed that among respondents who owned 1-2.5 acres 96.7% allocated horticulture farming less than one acre; among those who owned 2.6-5 acres 80.1% allocated horticulture farming less than one acre while 19.2% allocated between 1-2 acres to horticulture; among those who owned 5.1-7.5 acres 70.6% allocated horticulture farming less than one acre while 26.5% allocated between 1-2 acres to horticulture; among those who owned 7.6-10 acres 63.9% allocated horticulture farming less than one acre while 27.8% allocated horticulture between 1-2 acres; while for those who had more than ten acres 81.4% allocated horticulture less than one acre while 11.9% allocated between 1-2 acres. Feder et al (1982) and FAO, (2014) support the above finding that the "intensity" of adoption (e.g., proportion of area allocated to new variety, quantity of fertilizer per. acre) may be higher on smaller farms, under certain conditions, while in other cases the opposite is observed. Farm size can therefore have different effects on the rate of adoption of innovations depending on the characteristics of the technology and institutional setting. More specifically, the relationship of farm size to adoption of innovations depends on such factors as characteristics of the innovation being adopted

where characteristics imply its compatibility, relative advantage, complexity and affordability. Other factors include; fixed adoption costs, risk preferences, human capital/skills required, credit constraints, labor requirements, tenure arrangements, (Feder et al., 1982).

The greater control of income by male respondents can be attributed to the patriarchal nature of the Nandi community where sources of family income and other family property or enterprise considered valuable are normally controlled by men. However, findings showed that even in some cases where the respondents were male, women controlled the income from horticulture farming. This is because although culturally men control the main sources of family income, women are also allowed to control income from their 'small' sources such as kitchen gardens (*kabungui*). Therefore in most of the cases where women controlled the income, horticulture farming may not have been the main source of household income. In such cases women had their kitchen gardens (*kabungui*) where they farm for household consumption and whenever there are any extra produce they can sell them. This finding concurs with that of Mwaura, Muluvi and Mathenge (2013) in their study on African Leafy Vegetables and Household Wellbeing in Kenya: A Disaggregation by Gender, where women were found to have a higher share of income from the vegetables as compared to men. This was seen to be accounted for by men's better opportunities for farm and non-farm enterprises due to the patriarchal nature of society, which contribute much income than vegetables, as compared to women who face many significant constraints in production and grow vegetables as a primary source of income.

High levels of acceptability of horticulture farming with individuals farming objectives as shown by the findings point to its compatibility with preferences/internal states that would favour or discourage adoption of 'new' innovations or the development of new technology within the existing socio-cultural context. This is because individuals act according to their attitudes, beliefs and state of knowledge possessed, all of which must be changed first in order for individuals to embrace such changes in societal structure and processes. Ragasa, (2012) argues that individually or in groups, farmers have certain expectations on technology advancement based on their socio-cultural conditions. Individually or collectively they use socio-cultural based indicators to monitor and evaluate these technologies for adoption. Thus, individuals are more willing to adopt processes that lead to optimal rates of development than on the contrary.

### **Conclusion and Recommendations:-**

The study found out that majority of the respondents were male and that the respondents' gender and size of land owned significantly influenced adoption of horticulture farming. Respondents' age, marital status, level of education and income control did not yield any significance in reference to their influence on adoption of horticulture farming. The study concludes that, although the level of optimism that was expressed by the respondents coupled with other factors such as land size, level of education, high acceptability of horticultural crops and the youthful population that is ready to adopt. There is need for the various institutions charged with the promotion of horticulture farming to put in place the necessary structures and ensure a supportive environment that takes into consideration the varied needs of the respondents.

The study recommends that various stakeholder should put strategies in place to help accelerate wider adoption of available improved technologies and innovations in the area. In addition, stakeholders should in jointly promote technologies with wide ranging utilization and options so as to enhance increased uptake of the same among resource-poor farmers. There is also need to sensitize farmers on the benefits of engaging in the production of high value crops. The government also needs to come up with programmes that would provide information and train farmers on the trends that are taking shape on farming in the region and globally. Furthermore, agricultural promotions need to be targeted well among potential adopters considering that study has revealed the nature of farmers that are well placed to adopt innovations.

### **References:-**

1. Adekunle, A. A, Ellis-Jones J., Ajibefun I., Nyikal R. A., Bangali S., Fatunbi O., & Ange A.,(2012). *Agricultural innovation in sub-Saharan Africa: Experiences from multiple-stakeholder approaches*. Accra: Forum for Agricultural Research in Africa (FARA).
2. AVRDC (2004). *Global horticulture; Now is the time for action*. Washington: The World Vegetable Center Publication No. 04-598.



3. Adimado S (2001). *Willingness to Pay for Research Findings: A Case Study of Pineapple Farmers in Ghana*. Unpublished MPhil Thesis Submitted, Department of Agricultural Economics and Agribusiness, University of Ghana, Legon, Accra Ghana, pp. 38-50.
4. Ashenafi, G., (2007). *Triticale Crop and Food Security, and Determinants Influencing the Adoption of Triticale: Example from the Amhara Region, Ethiopia*. University of Kassel, Germany Tropentag.
5. Baumüller Heike (2015) *Enhancing smallholder market participation through mobile phone-enabled services: The case of M-Farm in Kenya*. Center for Development Research (ZEF) University of Bonn.
6. Bhattacharjee, A., (2012). *Social Science Research: Principles, Methods, and Practices*. Open Access Textbooks. [http://scholarcommons.usf.edu/oa\\_textbooks/3](http://scholarcommons.usf.edu/oa_textbooks/3).
7. Biwott D. Kimutai (2016). *Determinants of Small-scale Horticulture Farmers' Decision to join Farmer-based Organizations in Nandi County, Kenya*. International Journal of Economics, Commerce and Management Vol. IV, Issue 4, April 2016. <http://ijecm.co.uk/> ISSN 2348 0386
8. Bryman, A., (2004). *Social research (2<sup>nd</sup> ed)*. New York: Oxford University Press.
9. Conroy, (2005) *Participatory livestock research: A guide*, London, ITDG publishing Federal Ministry of Agriculture (FMA) (2005). Annual Report, Nigeria
10. Feder Gershon, Richard E. Just, David Zilberman (1982) *Adoption of Agricultural Innovation in Developing Countries. A Survey*. World Bank Staff Working Papers Number 542. The World Bank Washington, D.C., U.S.A.
11. Food and Agriculture Organization (FAO) (2003). *Value chain analysis: A case study of mangoes in Kenya*. Nairobi: Food and Agriculture Organization (FAO).
12. Food and Agriculture Organization (FAO) (2014). *Understanding smallholder farmer attitudes to commercialization – The case of maize in Kenya*. Food and Agriculture Organization of the United Nations. Rome. ([www.fao.org/publications](http://www.fao.org/publications))
13. Gockowski J, Ndoumbe M. (2004). *The Adoption of Intensive Monocrop Horticulture in Southern Cameroon*. J. Agric. Econ., 30: 195-202.
14. Government of Kenya (2001). *Nandi district development plan (2002-2008)*. Nairobi: Government printer.
15. Gupta, S. P., (2008). *Statistical methods (36<sup>th</sup> ed)*. New Delhi: Sultan Chand & Sons Educational Publishers.
16. Hollis A.C. (1909). *The Nandi Their Language and Folk-lore*. Clarendon press. London
17. IFAD. (2002). *Managing for Impact in Rural Development: A Guide for Project M&E*. Rome: International Fund for Agricultural Development.
18. Kenya National Bureau of Statistics (2010). *The 2009 Kenya population and housing census*. Nairobi: Government Press.
19. Kheralla M, Minet N, Kachule R, Souce BG, Berry P (2001). *Impact of Agricultural Market Reforms on Smallholder Farmers in Benin and Malawi*, Research Report, Vol. 2, IFPRI.
20. Kothari, C.R., (2004). *Research methodology: methods and techniques*. New Delhi: New age international publishers limited.
21. Kurt Larsen, Ronald Kim, and Florian Theus (eds) (2009). *Agribusiness and Innovation Systems in Africa*. World Bank. Washington dc.
22. Langyintuo A. S, Mekuria M. (2005). *Accounting for neighborhood influence in estimating factors determining the adoption of improved agricultural technologies*. A paper at American Agricultural Economics Association annual meeting, providence, Rhode Island, pp.1-28.
23. Luukkainen Jonna (2012) *A Comparison of Extension Methods Used by Different Agricultural Extension Service Providers in Nyandarua County, Kenya*. A Bachelors thesis presented to HAMK University of applied sciences.
24. Masuki, F. G. K., Khamaldin, D. M., Siza, D. T., Filbert, B. R., Amon, Z. M. and Nuhu H. (2003). *Smallholder System Innovations Programme, Soil-Water Management* Research Group, Sokoine University of Agriculture, Morogoro, Tanzania.
25. Maurice Juma, Wilfred Nyangena, and Mahmud Yesuf (2009) *Production Risk and Farm Technology Adoption in Rain-Fed, Semi-Arid Lands of Kenya*. Environment for Development Discussion Paper Series EfD DP 09-22 October 2009.
26. Meinzen-Dick, R., Quisumbing A., Behrman J., Biermayr-Jenzano P., Wilde V., Noordeloos M., Ragasa C., & Beintema N., (2010). *"Engendering agricultural research."* IFPRI: Washington, D.C.
27. Melinda Cuellarl, Hans Hedlund, Jeremy Mbai, Jane Mwangi (2006) *National Agriculture and Livestock Extension Programme (NALEP) Phase I Impact Assessment*. Swedish International Development Cooperation Agency SIDA <http://www.sida.se/publications>

28. Michael L. Morris and Cheryl R. Doss (1999) *How does gender affect the adoption of agricultural innovations? The case of improved maize technology in Ghana*. Unpublished paper Presented as a Selected Paper at the Annual Meeting, American Agricultural Economics Association (AAEA), Nashville, Tennessee, August 8-11, 1999
29. Ministry of Agriculture (2010). *National Horticulture Policy*. Nairobi: Government printer.
30. Minot Nicholas and Ngigi Margaret (2004). *Are Horticultural Exports a Replicable Success Story? Evidence from Kenya and Côte d'Ivoire*. International Food Policy Research Institute Washington, DC discussion paper
31. Morris, M.L., R. Tripp, and A.A. Dankyi. (1999). *Adoption and impacts of improved maize production technology: A case study of the Ghana Grains Development Project*. Mexico, D.F.: CIMMYT.
32. Mwaura S.N., Muluvi A.S. and Mathenge M.K. (2013). *African Leafy Vegetables and Household Wellbeing in Kenya: A Disaggregation by Gender*. Invited paper presented at the 4th International Conference of the African Association of Agricultural Economists, September 22-25, 2013, Hammamet, Tunisia National Economic and Social Council of Kenya (NESC). (2007). *The Kenya Vision 2030 Programme*. <www.nesc.go.ke> 19 June 2007.
33. Norman, B., (2010). *Designing social research (3<sup>rd</sup> ed)*. Cambridge: Polity press.
34. Norris, P. E., & Batie, S. S. (1987). *Virginia farmers' soil conservation decisions: An application of Tobit analysis*. Southern Journal of Agricultural Economics, 19(01), 79-90.
35. Oduol Judith Beatrice Auma and Dagmar Mithöfer (2014). *Constraints to and Opportunities for Women's Participation in High Value Agricultural Commodity Value Chains in Kenya*. The Maastricht School of Management. Working Paper No. 2014/11
36. Omondi T., (2006). *Kenya joint assistance strategy (KJAS) 2007- 2012*. Nairobi: DFID.
37. Ragasa Catherine (2012). *Gender and Institutional Dimensions of Agricultural Technology Adoption: A Review of Literature and Synthesis of 35 Case Studies*. Selected Poster prepared for presentation at the International Association of Agricultural Economists (IAAE) Triennial Conference, Foz do Iguaçu, Brazil 18- 24 August, 2012.
38. Rogers, E. M., (1995). *Diffusion of innovations* (4th ed.). New York: Free Press.
39. Tanui, J K., Feng, W., LiXinghui, Wang, Y., & Kipsat M. J., (2012). *Socio-economic constraints to adoption of yield improving tea farming technologies: A study of small holder tea farmers affiliated to estates in Nandi Hills, Kenya*. African Journal of Agricultural Research Vol. 7(16), pp. 2560-2568.
40. Weinberger, K., & Lumpkin. T., (2005). *Horticulture for poverty alleviation: The unfunded revolution*. Washington D.C: The World Vegetable Center.
41. The World Bank. (2007). *Cultivating knowledge and skills to grow African agriculture: A synthesis of an institutional, regional, and international review*. Report number 40997 Afr. Washington: The World Bank.
42. World Bank, FAO and IFAD (2008) *Gender in Agriculture Sourcebook*. World Bank, Washington, D.C. Available at <http://siteresources.worldbank.org/INTGEN-AGRLIVSOUBOOK/Resources/CompleteBook.pdf>.