

# EFFECTS OF WATER HYACINTH INVASION OF LAKE VICTORIA ON WOMEN'S HOUSEHOLD ACTIVITIES, KARACHUONYO, HOMA BAY COUNTY, KENYA

<sup>1</sup>Irene Khabuchi, <sup>2</sup>Dr. Felix M'mboyi, <sup>3</sup>Dr. Odek Antony Wando

Nairobi, Kenya

---

**Abstract:** The invasion of water hyacinth weed into Lake Victoria was a game changer, especially on women's livelihoods. Since they had been accustomed to fishing-related activities, they were forced to adjust accordingly. This research therefore sought to find out how water hyacinth affects women's livelihoods in Karachuonyo, Homa Bay County. The research was guided by the following objectives; to determine the economic effects of water hyacinth on women's household activities in Homa Bay County; to examine the effects of water hyacinth on women's access to education in Homa Bay County; to assess the effects of water hyacinth on women's health in Homa Bay County. The research adopted a mixed methods research which combined both qualitative and quantitative design; to establish the effects of water hyacinth on women's social interaction. Questionnaires were employed in collecting data and they were analyzed using SPSS and presented in form of tables, figures and percentages. At the same time, the qualitative responses were used to buttress those figures. It was established that indeed women's livelihoods have been affected since the invasion of water hyacinth. However, there were adjustments that have been made to enable them cope up with the biting effects of the weed to their economic life. It is expected that the results will find use by scholars, the county and national government and health sectors.

**Keywords:** Water hyacinth, Economic effects, Homa Bay, Women.

---

## 1. INTRODUCTION

### 1.1 Background of the Study

Until the glaring effects of water hyacinth (*Eichhorniacrassipes*) were visibly manifested in all spheres of life around the Lake Victoria belt (Yongo, Outa, & Ngodhe, 2017; Oladimeji, Abdulsalam, Muhammed-Lawal, Adefalu, & Adepaju, 2016), no one gave serious thought on the obnoxious weed. The water hyacinth problem is now compounded and affects all persons living around the lake whether fisher folk or just adjacent agrarian communities. The immediate casualties are fisheries, water supply, human health, transport, agriculture and loss of biodiversity (Osumo, 2001). Water hyacinth therefore is seen to pose serious environmental and socio-economic problems in the use and management of water resources (Makhanu, 1997). In addition to significant impact-socio-economic and environmental impacts, Water hyacinth has been found to negatively affect water quality especially in Lake Victoria (Njiru, Othina, Getabu, Tweddle, & Cowx, 2002).

### 1.2 Problem Statement

The presence of Water Hyacinth weed in Lake Victoria has become an economic challenge that is now inhibiting the socioeconomic livelihoods of the fisher folk communities in Homa Bay County. Since its advent, many of the households in the county are now being compelled to shift from fishing activities to subsistence agriculture. This shift has greatly

disadvantaged the small scale women entrepreneurs who are now being forced to seek for alternative livelihoods to maintain their families. This has been worsened by the failure of the government to actively respond to the challenge. The weed has threatened the fish stock in the lake hence reducing their breeding and nursery grounds. At the same time, most parts of the fish landing sites have been blocked by the floating water plant and as a result, the fisher men are forced to land far from where they are used to. This inconvenience ends up delaying access to markets and increased costs for the Homa Bay communities. As a consequence, this invasion of the lake by the hyacinth weed has rendered many people, especially fisher folk women, unemployed as the small business activities they undertake around the lake have been negatively affected.

### 1.3 Research Objectives

The study was guided by the following objectives:

1. To determine the economic effects of water hyacinth on women's household activities in Homa Bay County
2. To establish the effects of water hyacinth on women's access to education in Homa Bay County.
3. To examine the effects of water hyacinth on women's access to health in Homa Bay County
4. To assess the effects of water hyacinth on access to social interaction in Homa Bay County

## 2. LITERATURE AND THEORETICAL REVIEW

### 2.1 Women's Livelihoods

In Sub-Saharan Africa, fishing activities are highly gendered and with clear division of labour. The men mostly are involved in the fishing while women do processing, drying and retail selling. Empirical evidence has shown that there is an association between the fishing communities in low-income countries and vulnerability to HIV infection (MacPherson, et al., 2012). Transactional sex has been quoted as the motivator for HIV related challenges within the community. This control of the means of production by men, the power dynamics and poverty makes it very hard for women to negotiate safe sex and consequently infecting the women and affecting the communities (MacPherson, et al., 2012).

### 2.2 Economic Effects of Water Hyacinth Invasion on Women's Livelihoods

Marian (2011) examined the impact of water hyacinth on fishing industry. The study was concentrated at Winam Gulf, Kisumu and applied use of GIS and Remote Sensing to show the spread and pattern of invasion of water hyacinth (2000-2010). Secondary data was used to show impact of water hyacinth on fishing industries. The study found that the area covered by water hyacinth at Winam Gulf in the year 2<sup>nd</sup> December, 2000 was 531.99 Ha while on 14<sup>th</sup> December, 2010, the mat had covered 37,000 Ha. Secondly, fish production was greatly hampered with fish processing plants closing down and water transport operators being locked out of business due to Water Hyacinth (Marian, 2011).

### 2.3 Social Effects of Water Hyacinth Invasion on Women's health

Several studies have been carried out with the aim of establishing how water hyacinth invasion affects women's health. Mojola (2011) examined the association between the roles of the eco-social environment in shaping HIV risk. The paper argued that changing ecological environment of Lake Victoria, mapping onto a gendered economy, social construction of fisher folk's sexual relationships and sexual mixing patterns had an unexplained influence on the HIV risk mitigation. Further, Mojola (2011) demonstrated the impact of disrupted lake and fish ecology on fishermen's sexual, domestic and economic partnership and normalization of 'sex for fish' economy.

### 2.4 Theoretical Review

The study utilized the Gender and Development theory. This theory requires the women to develop agencies and resultantly their voices will be amplified. The inherent capabilities will lead to functioning and enable them to benefit and control the outcomes in development. This GAD theory is relevant and appropriate to this study examining the contribution of water hyacinth invasion of Lake Victoria on women's household activities. On emphasizing GAD in current context of the study means, supporting women to control means of livelihood such as fishing and trade without being asked for undue incentives such as sex for fish, being intimidated, relegate participating in selling small fish with low potential for higher income, and again using nearly all their income on food and getting clean water for domestic use. From GAD approach, the fisher folk women should be amplified through participating in the decision making avenues and management of beach management units.

### 3. RESEARCH METHODOLOGY

#### 3.1 Research Design

This study employed a mixed methods approach. According to Creswell (2011), a mixed-methods research is defined as a process that focuses on collecting and analysing data that is mixed; both quantitative and qualitative data in a single study or series of studies. Its central premise is that the use of quantitative and qualitative approaches, in combination, provides a better understanding of the research problem than either approach alone. According to Punch (2014), such a study is well placed to benefit from both quantitative and qualitative methods of data collection and data analysis.

#### 3.2 Study Area and Target Population

Homa Bay County is one of Kenya's 47 counties (devolved government units) resting on a latitude of 0°15' South and 0°52' South, and between longitudes 34° East and 35° East. Homa Bay is expansive with a water area of 1,227 km<sup>2</sup> and aggregate area of land mass and water being 4,267.1 km<sup>2</sup>. The county's population was estimated at 1,038,858 persons disaggregated as 498,473 males and 540,386 females in 2012 projected in Kenya Demographic Census 2009 (KNBS, 2009). The population is a youthful population comprising 48.8 per cent aged 0-14 years while 27.5 per cent comprising youth aged 15-29 years. The study targets the communities living along Lake Victoria who are affiliated to beach management units (BMUs).

#### 3.3 Data Collection

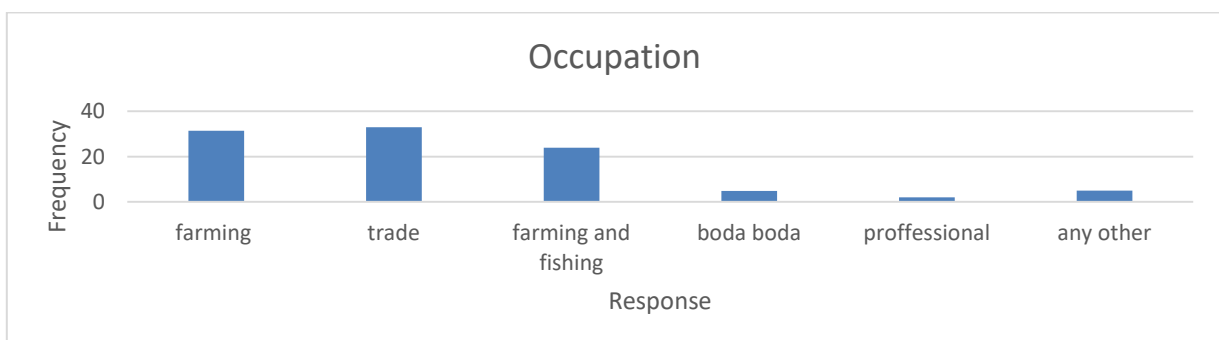
Two sets of data were gathered: quantitative data which was collected through semi-structured questionnaire responses and augmented or complemented by secondary data; and qualitative data was gathered through focused group discussions (FGDs) and key informant interviews (KIIs). The study had three tools (semi-structured questionnaire, KII and FGD guide, and unstructured observation guide). The semi-structured questionnaire contained questions based on the research questions.

### 4. RESEARCH FINDINGS AND ANALYSIS

The researcher sought to find out the demographic characteristics of the respondents. The results were as follows:

#### 4.1 Occupation

The study also wanted to find out what the respondents engaged in to meet their livelihoods. This was considered important because hyacinth affects people's income in great ways. The responses are as in figure 1 below:



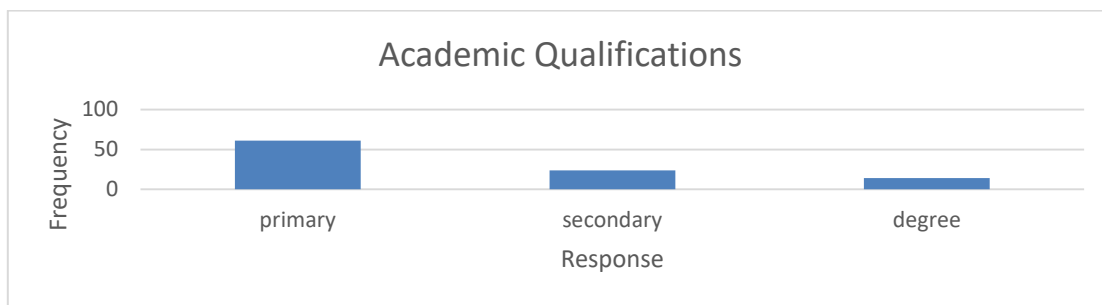
**Figure 1: Occupation**

Source: Field results, 2019

A majority of the respondents, 33%, engage in trade while another 23.85% engage in both fishing and farming. Another 31.35% engage in farming while 4.8% are engaged in *boda boda* business. The least, 2% and 5% engage in professional and other unspecified businesses respectively. Therefore, the implication here is that the respondents were well suited to answer the questions sufficiently given that most of their economic activities revolved around the rural areas and as such fishing affects them either directly or indirectly.

#### 4.2 Academic qualifications

This considered an important parameter in measuring the level of dependency on fishing or possession of an extra source of income emanating from the qualifications one had. The table below presents the findings.



**Figure 2: Academic qualifications**

Source: Field results, 2019

A majority of the respondents, 61% had attained primary level education while 23.8% had secondary education while 14.3% had attained a degree. Therefore, this implied that the level of education was restricted to secondary and primary, hence a majority of the respondents did not possess extra qualifications and so an indication that they depended fully on fishing and were as such affected by water hyacinth

#### 4.3 Age

Age was also considered as an important variable since the older persons had experienced the economic activity before the invasion of water hyacinth and were as such better placed to state the changes that have been brought by the hyacinth. The age is presented in the table below:

**Table 1: Age**

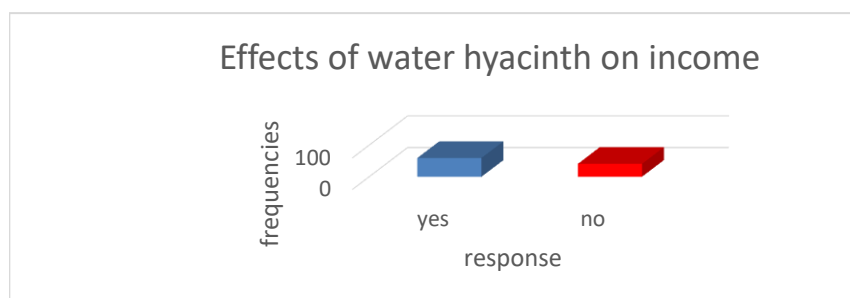
	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 19-24	9	42.9	42.9	42.9
Valid 25-30	1	4.8	4.8	47.6
Valid Above 30	11	52.4	52.4	100.0
Total	21	100.0	100.0	

Source: Field results, 2019

From the table above, a majority of the respondents, 52% were aged above 30. Another 42% were aged between 19-24 while only a paltry 4.8 were below 25-30. This was considered as a sufficient representation for the study.

#### 4.4 Economic effects of water hyacinth on household activities

The research proceeded with the premise that water hyacinth has impacted on the livelihoods of women. In the table below, the respondents were asked to indicate how their livelihoods were affected by water hyacinth invasion. The responses were as follows:



**Figure 3: Effects of water hyacinth on sources of income**

Source: Field results, 2019

From figure 3 above, it was apparent that the majority of the respondents, 59.3% attested that the weed has affected their source of income while the remaining 40.7% answered in the negative. Asked further, those who answered in the affirmative indicated that since the weed penetrated to their fishing grounds, the amount of fish that was harvested significantly declined. As a result, their daily returns were significantly reduced. However, those who indicated in the negative averred that after the weed became prevalent, they were forced to quickly adjust by seeking alternative sources of income hence so far the weed has not affected their sources of income. These findings are in tandem with those of Okello (2013) who stated that since women are more vulnerable and unless they are empowered, the fight against HIV/AIDS is far from over. In fact, Magdalene Achieng', a resident of Kendu Bay stated as follows:

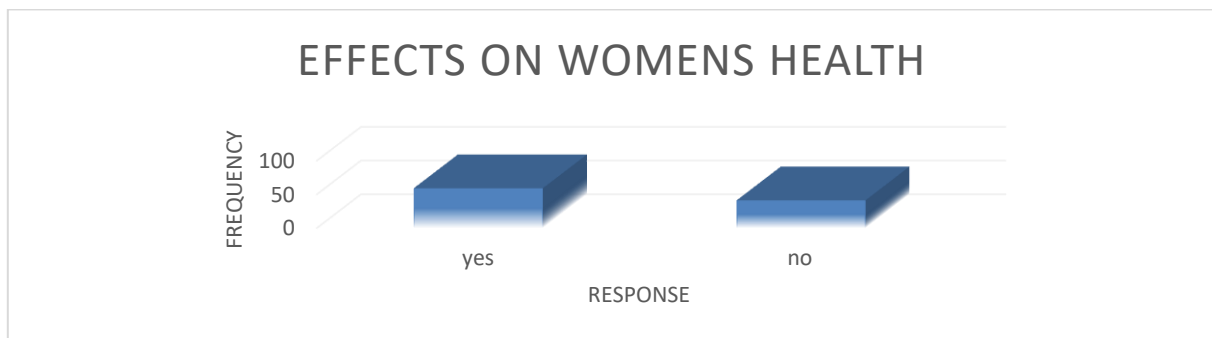
*'I used to derive my livelihood through buying and selling fish; however, since the water hyacinth invaded the lake, I had to switch to farming-specifically dairy farming. Initially it was tough but with time I got used to it.'* KII 1.

As to whether they have an alternative source of income, the respondents averred that they have engaged themselves in teaching of secondary students; farming; trading in general merchandise; Cyber café; selling ice cream along the beach; trading of shoes and fish mongering in order to mitigate the effects of water hyacinth. This was also seconded by another respondent, Pauline Akinyi who stated that:

*"This deadly weed has significantly reduced my household income and we are now really struggling..... we can't afford basic goods now I have been forced to fetch new income sources through small scale farming which was never on our minds before..."*

#### 4.5 Effects of water hyacinth invasion on people's health

This question was aimed at ascertaining whether water hyacinth has an effect on women's health. The findings are tabulated in the table below:



**Figure 4: Effects on Women's Health**

Source: Field results, 2019

A majority of the respondents, 59% stated in the affirmative while 41.0% in the negative. This aversion was an affirmation that just like other sectors of the livelihoods of the people like education and income source, women's health has also been negatively affected. There is thus a linkage between the encroachment of the hyacinth weed and increase in diseases and health problems. Furthermore, they indicated that some women are forced to engage in anti-social activities such as exchanging sexual favours with money in a bid to meet their needs. This has exposed them to extreme health risks such as HIV/AIDS and sexually transmitted diseases. One of the respondents who is a community health worker stated as follows:

*'Some of those women who never adjusted after the invasion of water hyacinth resorted to anti-social behaviour in order to meet their needs. As a result, there was a significant rise of HIV/AIDS cases after the invasion of the water hyacinth.'* (KII 2)

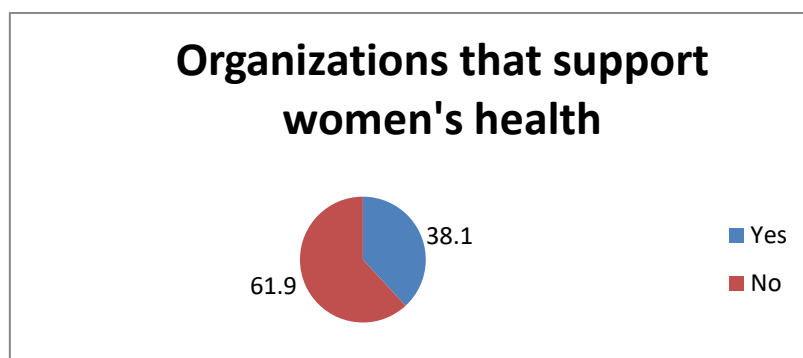
As to how women's health has been affected by the weed, the respondents gave several effects such as: Hyacinth readily comes with dangerous snakes, malaria, typhoid, guinea worm infesting humans. Besides, it causes a lot of delays causing a lot of fish to go bad which cause swelling of stomach due to mollusc attack and skin itching.

A villager, Grace Akinyi, who was asked about the effects of hyacinth stated as follows: ....

*“This water weed is killing our children and some adults because it has come with a lot of problems.....dangerous snakes live in the weed and bite and kill our husbands when they are out fishing.....malaria has increased in the village because mosquitoes live and breed in the weed.....typhoid is so much because people fetch dirty water that has a source near the weed and when they drink they get deadly diseases and some die.....our children are now swelling their stomachs because of mollusc attack and guinea worms have started appearing and infecting us.....I have even heard from my friends that this weed causes typhoid, amoeba, ionic deficiency anaemia, bilharzia and even HIV/AIDS....because of the weed, we are in danger of being wiped out in this village and we need urgent help from our government.....”*

#### 4.6 Organization Support

As to whether there are organizations that support women’s health conditions, the results were as in figure below:



**Figure 5: Organization Support**

Source: Field results, 2019

Interestingly, as much as it has been demonstrated that women’s health is negatively affected by the invasion of water hyacinth, there were few organizations to support women’s health as was revealed by 61.9% of the respondents who indicated that there were none. Only 38.1% of the respondents indicated that there were organizations which support women’s health. Those that indicated there were organizations to take care of women’s health cited CBO’s (Community Based Organizations), NGO’s and Health welfare organizations which exist. According to Raphael Ocholla, 40 who is a resident of Odiado in Karachuonyo:

*‘Some of the organizations that deal with the support of women’s health include Ampath, Tears of hope, widows and orphans international, Oasis of help organization, global providers international, among others. They have really been helpful in addressing the adverse effects that have arisen since the invasion of hyacinth weed.’ KII 3*

**Table 2: Health conditions associated with water hyacinth**

	Frequency	Percent	Valid Percent	Cumulative Percent
Gonorrhoea	1	4.8	4.8	4.8
other	20	95.2	95.2	100.0
Total	21	100.0	100.0	

Source: Field results, 2019

As to which conditions are associated with water hyacinth, a majority of the respondents, 95.2% attested to there being no health condition associated with water hyacinth while a paltry 4.8 % stated that the health condition associated with water hyacinth was gonorrhoea.

#### 4.7 Effects of water hyacinth on social interaction

The respondents were also asked to state how water hyacinth has affected education and social interaction. They stated that since the invasion of hyacinth, there was reduced movement of people which hindered human interaction. This is because hyacinth causes serious blockage of access to the beaches prompting friends to keep away from the beaches. At the same time, water transport barrier to other parts of the island like Rusinga. In an interview with a villager of Karachuonyo, Alfred Omollo, stated as follows:

*“ .....since this dangerous weed started choking our waterways in the lake, our boats started stalling and we were unable to continue with water transport services.....so many challenges have come up whereby even the monthly women group and youth group beach meetings were suspended because people are unable to use their boats to cross over to meet with their neighbouring villagers.....the weed has even blocked access to beaches and even to Rusinga Islands....people have lost their livelihoods because they can't meet in merry go rounds' and also the youth can't earn transport fee income because their boats are idle...”*

#### 4.8 Solving the water hyacinth problem

This question was aimed at finding out practical measures that the respondents think may play a major role in solving the water hyacinth menace. The responses are tabulated in table 3 below:

**Table 3: Solving the water hyacinth problem**

Response	Frequency	Percent	Valid Percent	Cumulative Percent
	1	4.8	4.8	4.8
Awareness	19	90.5	90.5	95.2
alternative source of income	1	4.8	4.8	100.0
Total	21	100.0	100.0	

Source: Field results, 2019

According to the table of results above, a majority of the respondents, 90.5%, suggested that there should be awareness campaigns while a paltry 4.8% suggested that there should be alternative sources of income which will make people to seek their livelihoods from. Others stated that there should be eradication of water hyacinth to provide easy access to the water; proper sensitization along the beaches and SACCO formation. One of the villagers, Naomi Anyango, explained as follows:

*“Over the last three years, our women and youth groups have begun to innovatively utilize the water weed for their income generating activities.....for example there is a group using the weed in my village to manufacture ropes, chairs, organic manure and in developing material for cooking/fire lighting.....some groups are manufacturing paper, baskets, ropes, biogas, animal fodder, fertilizers and fish feed from this weed.....we are hoping that the community around here will receive more education on how best to make use of this water weed as a resource for livelihoods.....”*

#### 4.9 Directions for future study

Based on the findings, the following issues can form basis for future research on the issue:

- 4.9.1 Role of county government in alleviating water hyacinth
- 4.9.2 The challenges and opportunities that water hyacinth brings
- 4.9.3 Role of water hyacinth on teenage pregnancies

#### 4.10 Conclusion

The research was aimed at demonstrating how the invasion of water hyacinth has affected women's livelihood in Karachuonyo sub-county, Homa bay County. As to whether the water hyacinth has an economic effect on women's household activities, it has been demonstrated that indeed women's economic activities have been largely affected since the invasion of the weed. However, it was also revealed that they were actively engaged in mitigating measures to cushion

them from these adverse economic effects like seeking alternative sources of income. The second objective was to find out the effects of water hyacinth on women's access to education. Some stated that since their sources of income had gone down, that made it difficult to take their children to school and as such, many children dropped out of school. However, the majority, averred that education was not affected because there were bursaries by the CDF (Constituency Development Fund) and the County Government which help their students attend secondary school while the Free Primary Education ensured that pupils went to school for free, all they were required to do is to buy them uniform.

The research also sought to establish the effects of the weed on women's health; on this, it was established that many diseases came up after the invasion of the weed and negatively affected women in the area, particularly those who reside adjacent to the lake. Lastly, was to examine the effects of water hyacinth on women's social interaction; it was indeed established that women's interaction was greatly reduced because of the inaccessibility of the lake to cross over and engage in welfare meetings and associations.

Therefore, based on these findings, it behoves both the state and non-state actors to establish practical steps both at policy level and practical levels to ensure that women's livelihoods are not adversely affected by the weed as this will go down a long way in ensuring that there is improvement of livelihoods in the society.

#### ACKNOWLEDGEMENT

I thank God for giving me the strength and wisdom as I undertook this research. I also appreciate the effort and advice of my supervisor, Dr. Felix M'mboyi. I thank my family for their encouragement. May God bless you all.

#### REFERENCES

- [1] Abule, E., Berhe, K., Getahun, Y., Adane, Z., Alemayehu, N., Fayisa, Y., et al. (2017). Water hyacinth (*Eichhornia crassipes* (Mart.): Land use/land cover changes and community-based management in east Shoa zone, Ethiopia. *International Journal of Environmental and Agricultural Research (IJOEAR)*, 3 (5), 1-7.
- [2] Achieng', B (2012) Influence of Gender vulnerability to HIV/AIDS among small scale traders around Lake Victoria, Homa Bay County. UON: Thesis
- [3] Asian Development Bank. (2014). *Gender-Inclusive Disaster Risk Management*. Manila: Asian Development Bank.
- [4] Bari, F. (1998). Gender, Disaster, and Empowerment: A Case Study from Pakistan. In E. Enarson , & B. H. Morrow (Eds.), *The Gendered Terrain of Disasters: Through Women's Eyes* (pp. 1-20).
- [5] Becker, P. (2011). Whose Risks? Gender and Ranking of Hazards. *Disaster Prevention and Management*, 20 (4), 423-433.
- [6] Bennett, L. (2002). *Using Empowerment and Social Inclusion for Pro-Poor Growth: A Theory of Social Change*. Working Draft of Background Paper for the Social Development Strategy Paper. Washington, DC: World Bank.
- [7] Bradshaw, S. (2013). *Gender, Development and Disaster*. Northampton: Edward Elgar.
- [8] Cameron, R. (2011). Mixed Methods Research: The Five Ps Framework. *The Electronic Journal of Business Research Methods*, 9 (1), 96-108.
- [9] Camlin, C. S., Kwena, Z. A., & Dworkin, S. L. (2013). Jaboya Vs. Jakambi: Status, Negotiation, and HIV Risks among Female Migrants in the "Sex For Fish" Economy In Nyanza Province, Kenya. *AIDS Educ Prev.* , 216-231.
- [10] County Government of Homa Bay. (2013). *The First Homa County Integrated Development Plan (CIDP) 2013-2017*. Homa Bay, Kenya: County Government of Homa Bay.
- [11] Creswell, J. W., & Plano, C. V. (2011). *Designing and Conducting Mixed Methods Research* (2nd ed.). Thousand Oaks, CA: Sage.
- [12] Feilzer, M. Y. (2010). Doing mixed methods research pragmatically: Implications for the rediscovery of pragmatism as a research paradigm. *Journal of Mixed Methods Research*, 4 (1), 6-16.
- [13] Gokhale, V. (2008). *Role of Women in Disaster Management: An Analytical Study with Reference to Indian Society*. Paper presented at the 14th World Conference on Earthquake Engineering. Beijing, China.



- [14] Gorard, S. (2013). *Research Design: Creating Robust Approaches for the Social Science*. Thousand Oaks, CA: Sage.
- [15] Kabeer, N. (2001). Reflections on the Measurement of Women's Empowerment. In *Discussing Women's Empowerment-Theory and Practice*. . Stockholm: Novum Grafiska AB.
- [16] Kamau, P., & Ngigi, S. (2013). Potential for Women Fish Traders to Upgrade within the Fish Trade Value Chain: Evidence from Kenya. *DBA Africa Management Review*, 3 (2), 93-107.
- [17] Kateregga, E., & Sterner, T. (2007). Indicators for an Invasive Species: Water Hyacinths in Lake Victoria. *Ecological Indicators*, 7 (2), 362-70.
- [18] Kateregga, E., & Sterner, T. (2009). Lake Victoria Fish Stocks and the Effects of Water Hyacinth. *The Journal of Environment and Development*, 18 (1), 62-78.
- [19] Kishor, S. (2000a). Empowerment of women in Egypt and links to the survival and health of their infants. In H. Presser, & G. Sen, In *Women's Empowerment and Democratic Processes: Moving Beyond Cairo*. New York: Oxford University Press.
- [20] Kishor, S. (2000b). Women's Contraceptive Use in Egypt. What do Direct Measures of Empowerment Tell us? Paper prepared for presentation at the annual meeting of the Population Association of America, March 23-25, 2000. Los Angeles, California.
- [21] Kowalczyk, D. (2015). *Correlational Research: Definition, Purpose & Examples*. Unpublished Ph.D Lecture.
- [22] Krejcie, R. V., & Morgan, D. W. (1970). Determining Sample Size for Research Activities. *Educational and Psychological Measurement*, 30 (1), 607-610.
- [23] Kwena, Z., Bukusi, E., Omondi, E., & Ng'ayo, M. (2012). Transactional Sexual Relationships In The Fishing Communities Along Lake Victoria In Kisumu County, Kenya. *African Journal of AIDS Research*, 11 (1), 9-15.
- [24] Lugonzo, H. M., Chege, F., & Wawire, V. (2017). Relationship Between Fishing Industry around Lake Victoria and Enrolment of Girls in Secondary Schools of Nyangoma Division, Siaya. *Green Journal of Education Research*, 7 (4), 28-36.
- [25] Lwenya, C. A., Lwenya, K. R., & Abila, R. (n.d). *Gender Participation in Fisheries Management of Lake Victoria, Kenya*. Nairobi: Kenya Marine and Fisheries Research Institute.
- [26] MacPherson, E. E., Sadalaki, J., Njoloma, M., Nyongopa, V., Nkhwazi, L., Mwapasa, V., et al. (2012). Transactional sex and HIV: understanding the gendered structural drivers of HIV in fishing communities in Southern Malawi. *J Int AIDS Soc, Suppl 1*, 1-9.