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# ADVANCING AQUACULTURE APPROPRIATION AND ADVANCEMENT IN KAPIRI MPOSHI DISTRICT OF CENTRAL PROVINCE, ZAMBIA

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A study on Advancing Aquaculture Appropriation and Advancement in Kapiri Mposhi District of Central Province, through a survey using questionnaires and face to face interviews. A population of 40 respondents (35 males and 5 females) of the fish farmers were interviewed for this survey. Two computer programs were used to analyze the data; the Statistical Package for Social Sciences (SPSS 23.0) and Microsoft Excel version 16. The findings of this study showed that there were low levels of youths and women (females) participating in the aquaculture sector. The main challenges of these low participation levels were that the youths did not have capital, they were unsettled, preference of white-collar jobs and not fieldwork, and liked short term investments not long ones like fish farming. For the women it was due to labour intensive, especially in pond construction and inability to own their own land and that there was a lack of encouragement from the government. The results also showed that 32.5% of the respondents indicated that the extension workers didn't visit them under the category of how often the extension workers visited them and how effective the contact was among the farmers and the extension agents since they started fish farming, 62.5% of the respondents indicated that it was very poor. The government was trying to help the fish farmers by forming associations such as cooperative society and local association, but still, 32% of the population didn't belong to any association which was not good, this was because of lack of knowledge by the farmers. This study also alludes to the fact that the majority of the farmers in the study area were men over the age of 45 years giving 65% of the total population. Other challenges were the lack of information by the fish farmers, which caused them to only focus on production instead of venturing into other activities such as fingerling production. Almost every farmer in the study area produced table-size fish giving up to 95% and also low levels of education had been a challenge. Because a lot of fish farmers had a poor educational background (the majority, 40% who only attained primary education), a lot of people had begun to think that fish farming was for those who were not educated and that fish farming was for the poor. There is a need for the government to boost extension services delivery by training farmers in improved practices and the formation of cooperatives.

**Keywords:** Advancement, Appropriation, Aquaculture, Promoting, Adoption, Development, Kapiri Mposhi

## 1.0 INTRODUCTION

Aquaculture, beyond doubt, is the fastest-growing food-production sector in the world. The important role of aquaculture in providing aquatic animal protein to make up for the shortfall in wild fisheries, and its socio-economic security role providing livelihood opportunities and economic security, particularly in the less developed regions of the world (FAO, 2002). The fisheries sub-sector through aquaculture in Zambia plays a significant role in the economy as it offers an opportunity for improved nutrition, income generation, and job creation, resulting in the general wealth creation and food security at national and household levels (Nyembe *et al*., 2018).

Aquaculture production does not only increase food supply, but also provide employment. To ensure an increase in aquaculture production, extension services need to be provided to youths and women in the aquaculture industry.

In Zambia, about 75% of fish farmers are considered to be small-scale (Nsonga and Simbotwe, 2014). Although Zambia has around 15 million hectares of water in the form of inland rivers, lakes, and swamps,which

provide the natural resources needed for fish production but still capture fisheries provide the majority of fish over 80,000 tons (t) although production has stagnated in the last decade, (Alexander *et al*., 2019). However, up to date, the fish demand in Zambia is high due to fish being white meat of cheap/ affordable price and the rapid increase of the population, however, both the capture fisheries and aquaculture sector fails to reach the peoples demand for fish or rather the fish per-capita for the people hence just import fish to reduce on the demand (Piers, 2017). The author further reported that Zambia imports about 40,000 tons of fish annually, which means the total fish production in Zambia both capture fisheries and aquaculture was not meeting the demands of the people (Piers, 2017).

According to Gombe, (2016) extension education is a system that provides knowledge and skills to rural people (farmers) informally intending to influence their decisions towards life, which will increase their general living standard. Extension education adopts informal ways of empowering the rural farmers to enable them to identify their problems and solve the problems in their own way, using their local resources with slight scientific modifications. The significance of this study was to investigate the major roles of extension services in Advancing Aquaculture Appropriation and Advancement in the study area.

## 2.0 MATERIALS AND METHODS

### 2.1 Description of the study site

This study was conducted in Kapiri Mposhi, which is located in the Central Province, North of the City of Lusaka along the Great North Road, 60 km North of Kabwe and 140 km South of Ndola. Its geographical coordinates are 13° 58' 0" South, 28° 41' 0" East, and its original name (with diacritics) is Kapiri Mposhi (Gazetteer, 2005; The Central Province Expo and Forum, 2018).

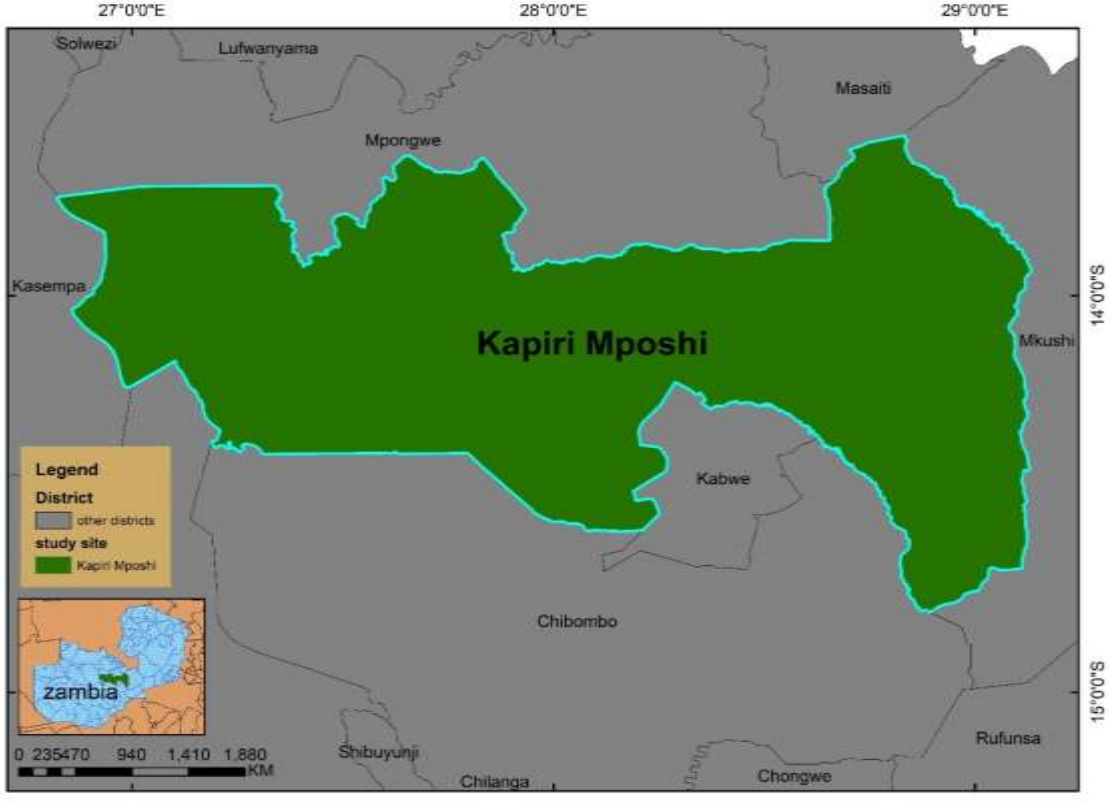


**Figure 1: Map of Zambia showing a study location (Source: Google Map.com)**

### 2.2 Sampling method and sample size

The study involved simple random sampling also known as Probability sampling, which is based on the notion of random selection where every item of the population has an equal probability of inclusion in the sample. Information was thoroughly obtained from the Department of Fisheries in Kapiri Mposhi district and small-scale fish farmers in the area through a structured questionnaire. The location of the farmers was also obtained from the Department of Fisheries.

The sample size of the study was based on the static theory of Claves (1987); which states that any sample of 30% of the units or more gives a true representation of the population. A sample size of 100% was selected which represented the entire population.

To generate the sample size, Boyd's formula was used to calculate the sample size (n) i.e.

$$\frac{n}{N} \times 100 = C$$

Expressing "n" in terms of "N" and "C" gives us the formula for sample size

$$Sample\ size\ (n) = \frac{CN}{100}$$

Where,

$C = Samplepercentage$,
$N = Populationsize$, and
$n = samplesize$

### 2.3 Data Collection

Both primary and secondary data were collected. Primary data was collected in person using structured questionnaires, face-face interviews, and personal observation. Questionnaires were administered to the fish farmers and an officer from the Department of Fisheries, whilst. personal interviews and observations supplemented the questionnaires.

Secondary data was obtained from the Department of Fisheries in the Ministry of Fisheries and Livestock and other relevant sources.

### 2.4 Data Analysis

The data collected were analyzed using the Statistical Package for Social Sciences (SPSS) version 23.0. All responses were given numerical codes to standardize before setting the process for using statistical methods. Variables were firstly made and secondly, data for each variable was entered and was then analyzed using computer software; Microsoft Excel 2016 to produce pie charts, and graphical representation of the data.

## 3.0 RESULTS AND DISCUSSION

The study revealed that the majority of fish farmers of Kapiri Mposhi district were males as compared to women (87% and 13%) (figure 2). There was low participation of women in aquaculture in the study area, a sign of gender imbalance in the aquaculture sector.

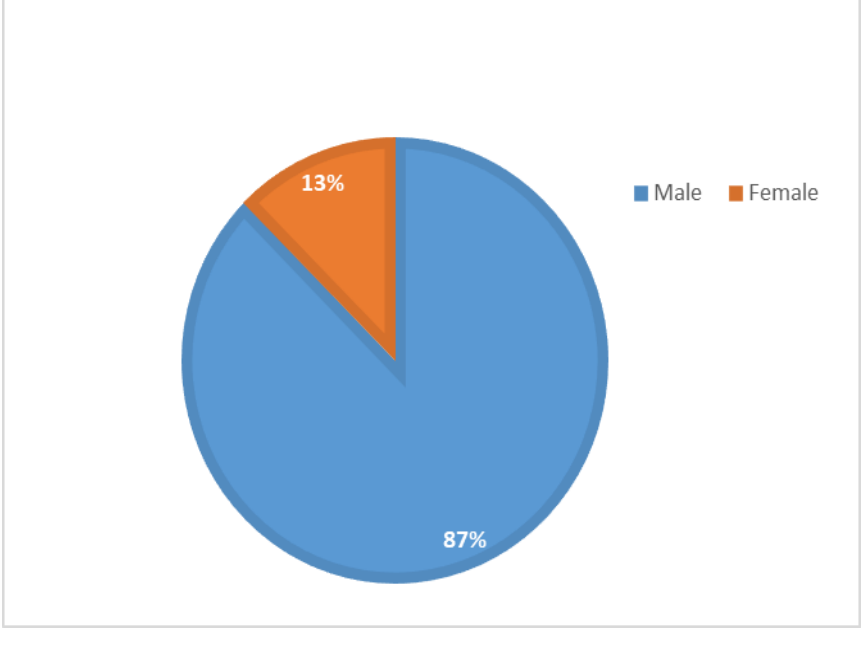


**Figure 2: Gender of the respondents**

This study agrees with Brummett *et al*., (2010) who reported that men were the most predominant in fisheries and aquaculture activities. Another study done by Mushili and Musuka, (2015) revealed that the majority of the fish farmers were males at 70%. Similarly, Musaba and Namanwe, (2010) also reported that the majority of fish farmers in Zambia were males. The low levels of women in fish farming were largely attributed to the labour intensiveness of the sector. Simataa and Musuka (2013) also stated that the low participation levels of females in aquaculture were due to labour intensive especially the construction phase and the inability to own their own land. Another study done on the determinants of participation in the youth-in-Agriculture programme in Ondo

State, Nigeria revealed that the majority of the respondents were males (59.4%) leaving 40.6% for the females (Adesina and Favour, 2012).

Figure 3 shows the marital status of the respondents. The results showed that the majority were married at 90% while widows and widowers were at 10%. Meanwhile, no one fell in the category of single or divorced.

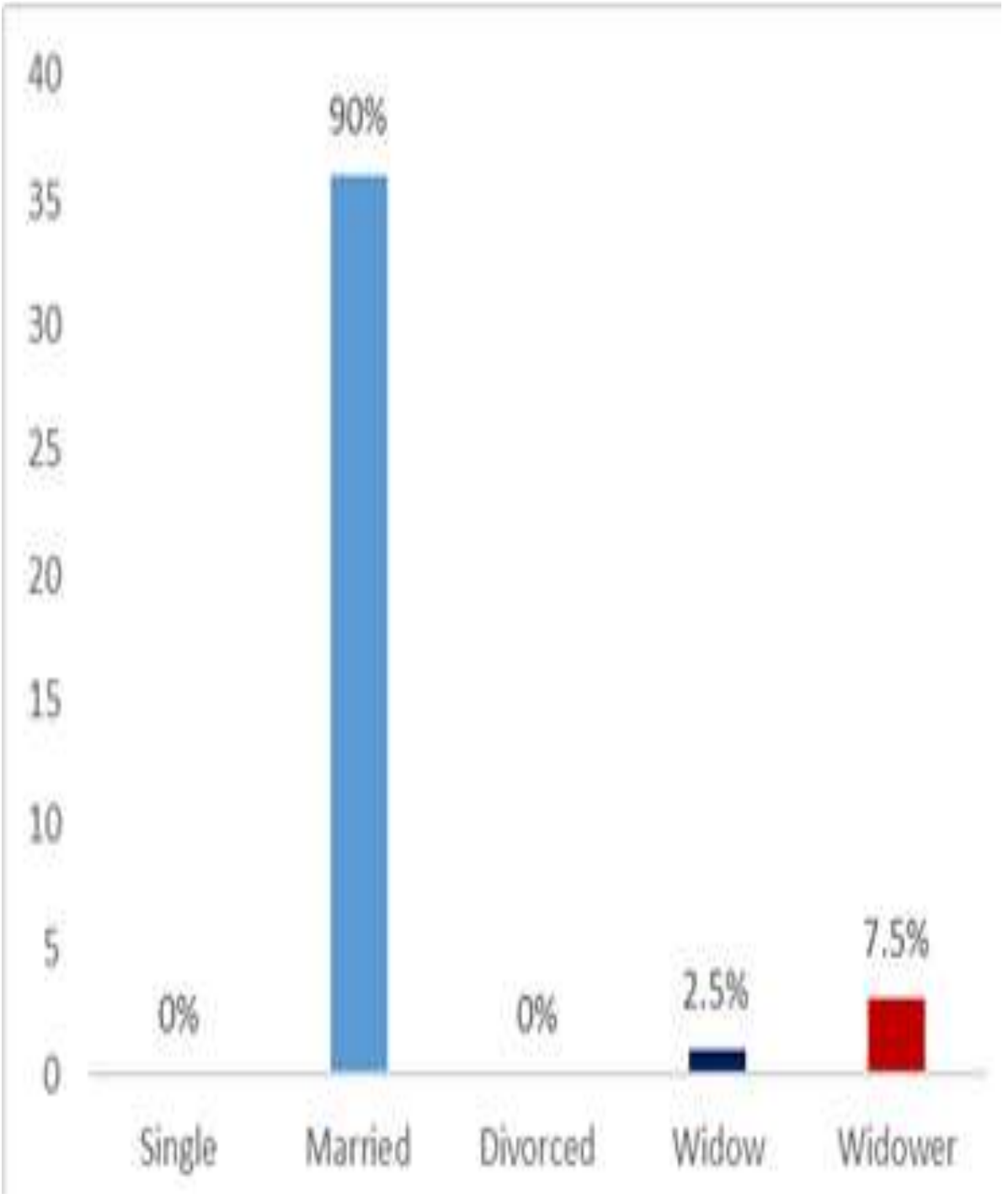


**Figure 3: Marital status of the respondents**

A study done by Adesina and Favour, (2012) stated that the majority of the respondents were married at 60.2% and according to Njera *et al*., (2017), there were more married people, which indicated that aquaculture was used as a source of income to manage some daily expense for some families and also to pay school fees for the children.

The findings in figure 4 show that the majority of the respondents were in the age group above 40 years, which was at 65%, followed by the age group in the range between 25 and 35 (30%) and respondents in the age range between 36 and 40 years were at 5%. A study by Adesina and Favour (2012), revealed that the majority of respondents were under the age of 40.

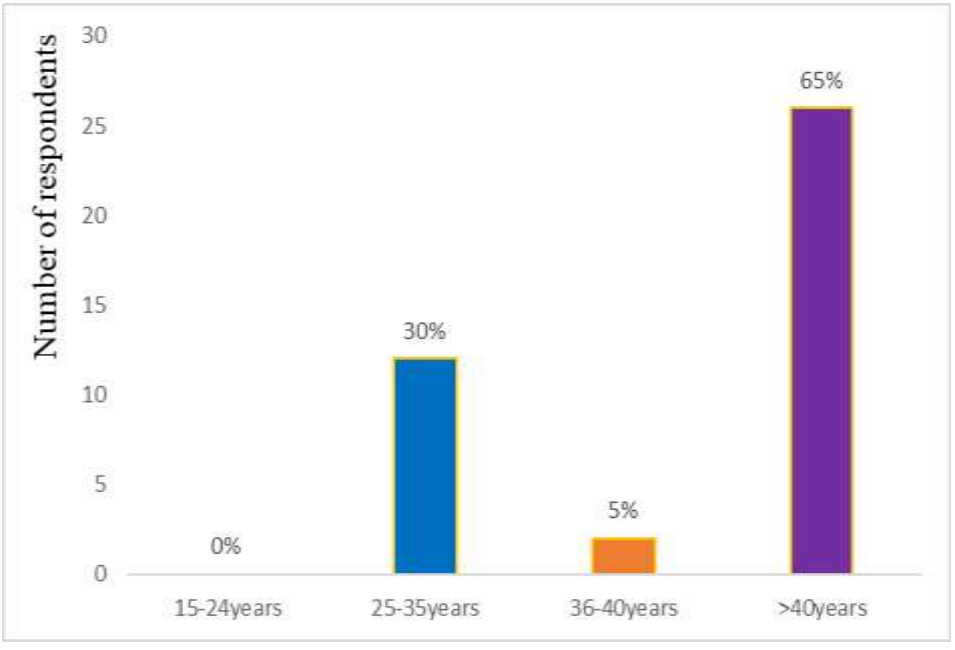


**Figure 4: Age of the respondents**

Studies on the effect of withdrawing Nile tilapia (*O. niloticus*) from aquaculture production in Zambia examined the importance of gender, marital status, size of land ownership and age of members on the capacity of fish farmers organizations at the local level, and reported that the majority of respondents were elderly and many of them above 40 years old (Simataa and Musuka, 2013; Njera *et al*., 2017). Similarly, Ifejika *et al*., (2010) revealed in their study that the majority of respondents (90.3%) were males aged 40 years but not more than 55 years.

Figure 5 shows that the majority of respondents (40%) had primary education, with 35%, 15%, and 10% secondary and higher education having a lower level of education than primary education, respectively. Results of this study revealed that the level of education was independent of the farmer's knowledge about fish farming

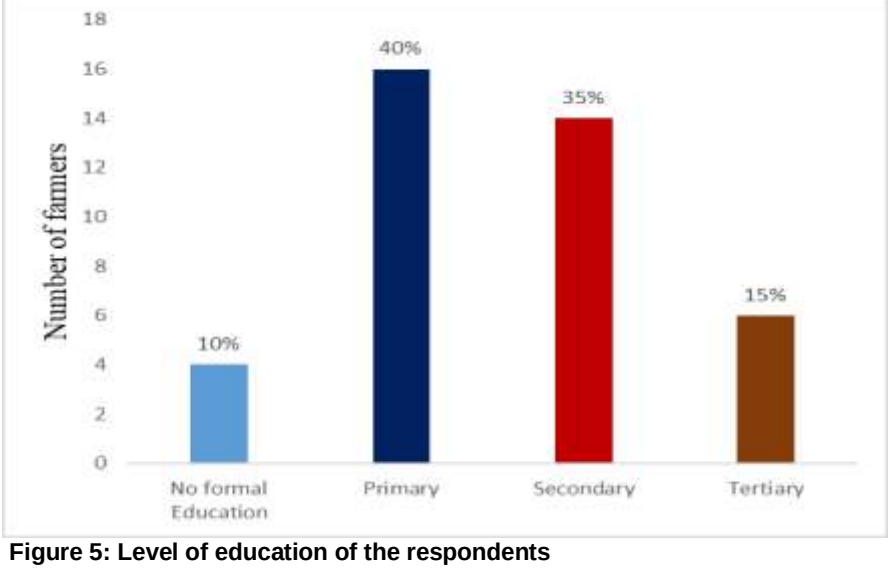


**Figure 5: Level of education of the respondents**

Therefore, farmers practised or knew about fish farming regardless of their level of formal education. In line with a study done on Gender Perspective of Youth Engagement in Aquaculture which states that only 6.11% of males and 4.44% of females spent more than 12 years in training, this indicates that in this sector there were low levels of education (Gbigbi *et al*., 2017). Contrary to a study done in Nigeria, the majority of the respondent (64.1%) attained tertiary education. This implied that fish farming is not only for the non-educated or poor but is for anyone who has an interest (Adesina and Favour, 2012).

Figure 6 results show that 90% of the population of respondents were house heads while only 10% held other positions in the households, and all heads were either married men or widowed women.

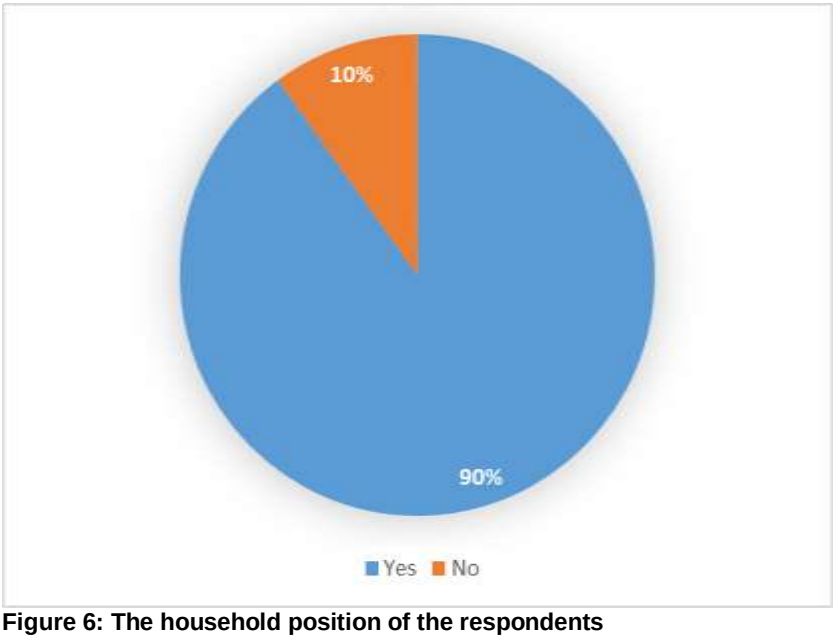


**Figure 6: The household position of the respondents**

Figure 7 represents the level of scale in which the fish farmers of Kapiri Mposhi district belonged. According to the results above, those that were small-scale farmers had the highest percentage which was at 87%, followed by the emergent farmers at 13% and with no respondents on the commercial scale.

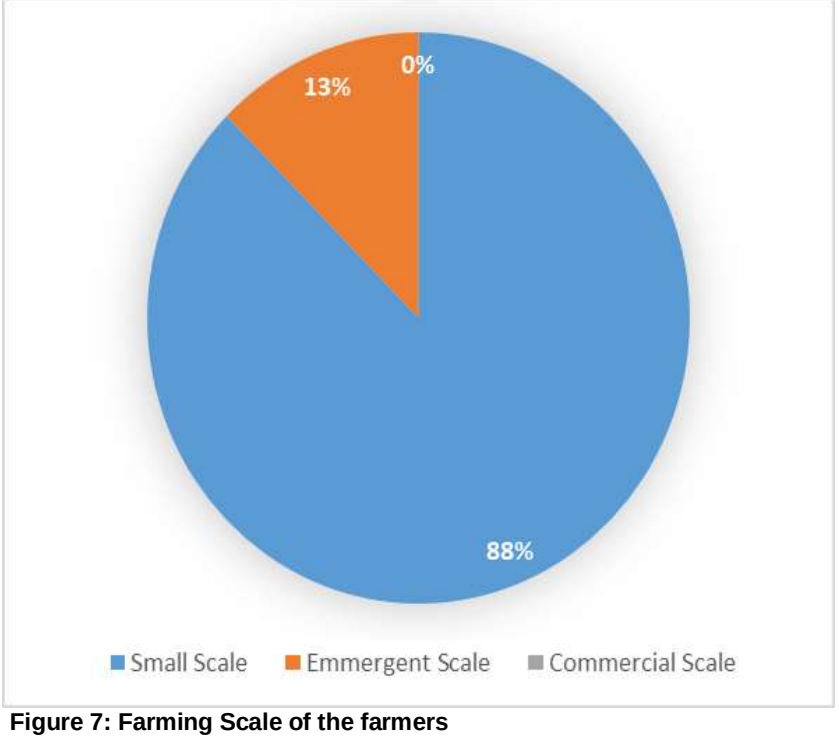


**Figure 7: Farming Scale of the farmers**

Alexander *et al*., (2019) defined small-scale farming based on the levels of intensity, degrees of commercialisation, types of aquaculture systems, and production levels, which was a case in the study. In contrast, Sitko *et al*., (2011) also defined small scale farmers as those with less than 1 ha of landholdings and who were generally only able to build small ponds.

However, this study was consistent with that done by Genschick *et al*., (2017) who reported that the small-scale aquaculture was scattered throughout Zambia in all 10 provinces with a total of 12,010 farmers engaged in fish production in 2014, with the largest numbers of small-scale farmers found in Northern and North-Western Provinces of the country.

The findings of figure 8 show that 57.5% of the fish farmers of Kapiri Mposhi district had farmland of between 1-2 hectares, 32.5% had land of less than 1 hectare and 10% had farmland of more than 2 hectares.

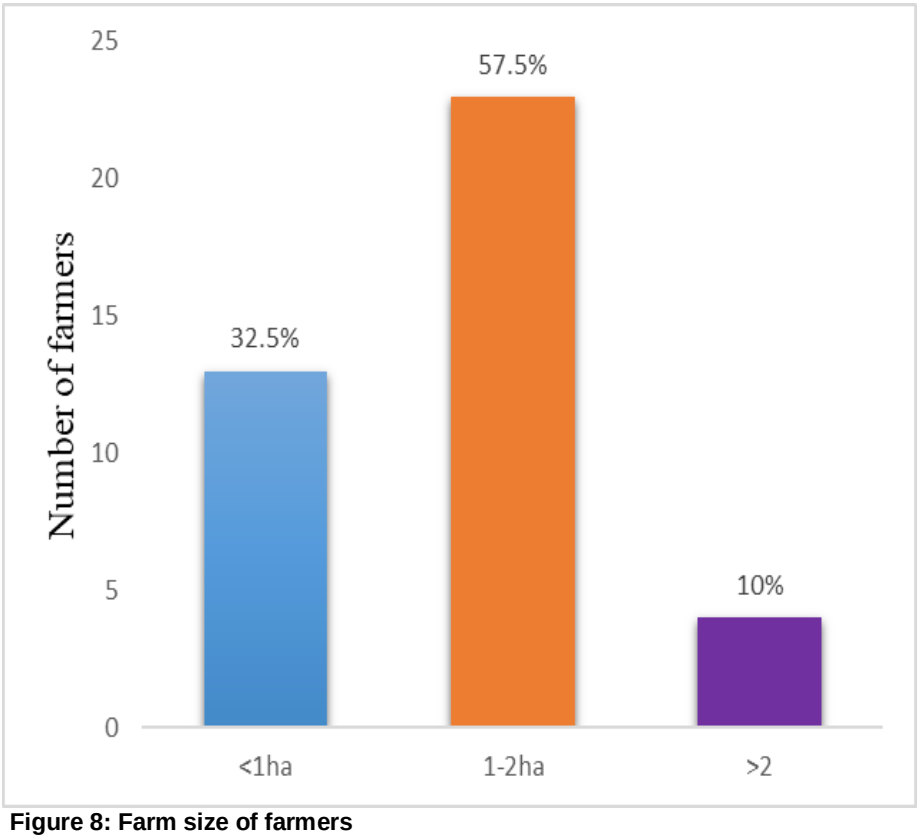


**Figure 8: Farm size of farmers**

Adesina and Favour, (2012), reported that the majority of the fish farmers in Odo state had a farm size ranging between 1ha and 5ha. This implied that most of the farmers were small scale fish farmers as international standards classify farmers having farms less than 10 hectares as small-scale farmers (Adesina and Favour, 2012).

The findings for figure 9 shows that 57.5% of the fish farmers acquired their land through traditional authority, followed by 30% who inherited. The other 7.5% and 5.0% were through rented and purchased lands respectively.

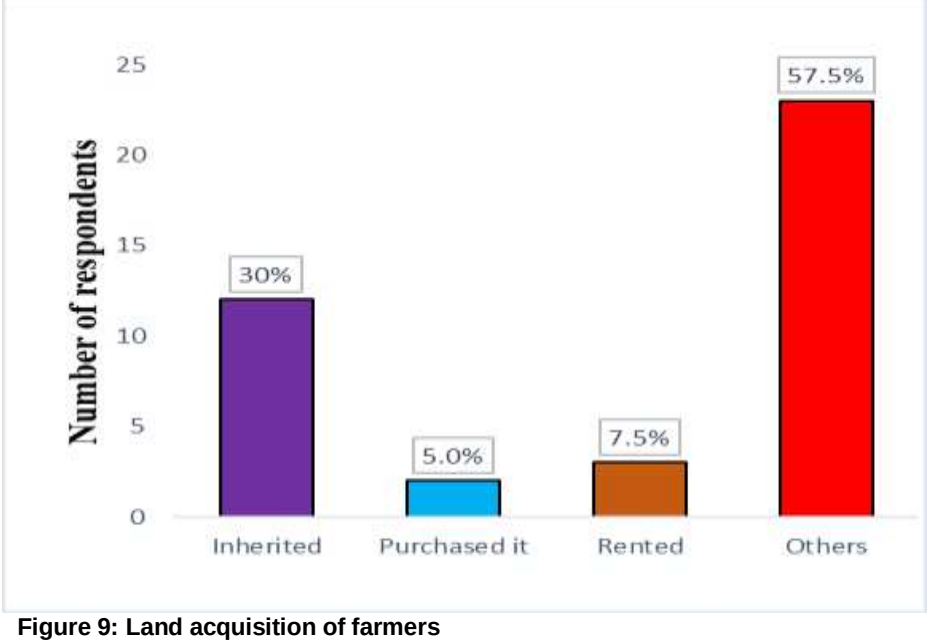


**Figure 9: Land acquisition of farmers**

Most of the labour in small scale farming was provided by family members, although the hired labour was also used. Across countries, family labour in small scale agriculture was substantial (Rapsomanikis, 2015).
According to figure 10, the majority of fish farmers fell under the year range 1-5 years at 85%, followed by those that had been farming for the years ranging between 6 and 10 years at 10%. It also shows that those who

had been farming for more than 15 years had a low percentage (5%). However, a study done in Nigeria revealed that more than half (50.8%) of respondents had between 1 and 5 years of farming experience, this implied that most respondents were fresh hands in agriculture (Adesina and Favour, 2012). A study done by Ifejika *et al*., (2010) also agreed that the majority of the fish farmers had a farming experience of fewer than five years.

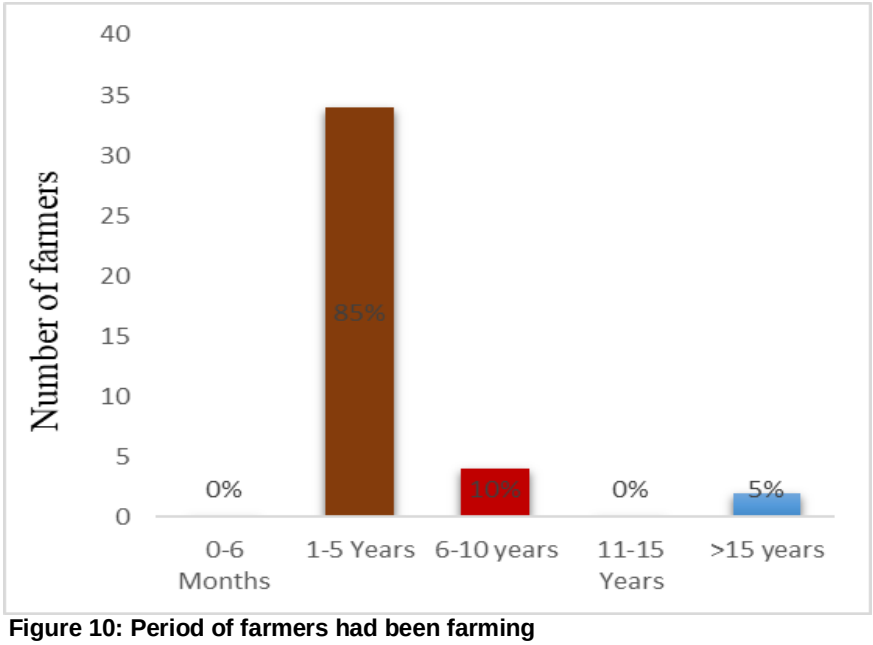


**Figure 10: Period of farmers had been farming**

The authors and Ayisi *et al*., (2016) found that the above-average of the respondents fell under the category of fewer than five years under the period of farmers had been farming (Ifejika *et al*., 2010). This gives a great risk to the farmers who fell in this category because they might lack experience as compared to those farmers that have been in fish farming for more than five years. Another study done by Syandri *et al*., (2015) reported that there were low experience levels of farmers in aquaculture which only showed that only 21.25% had the experience.

Figure 11 shows that almost all the respondents produced table size fish. However, only 5% produced both fingerlings and table size fish, the fingerlings produced was because of the reproduction of the mixed fish stocked in the ponds and no respondent were only producing fingerlings.

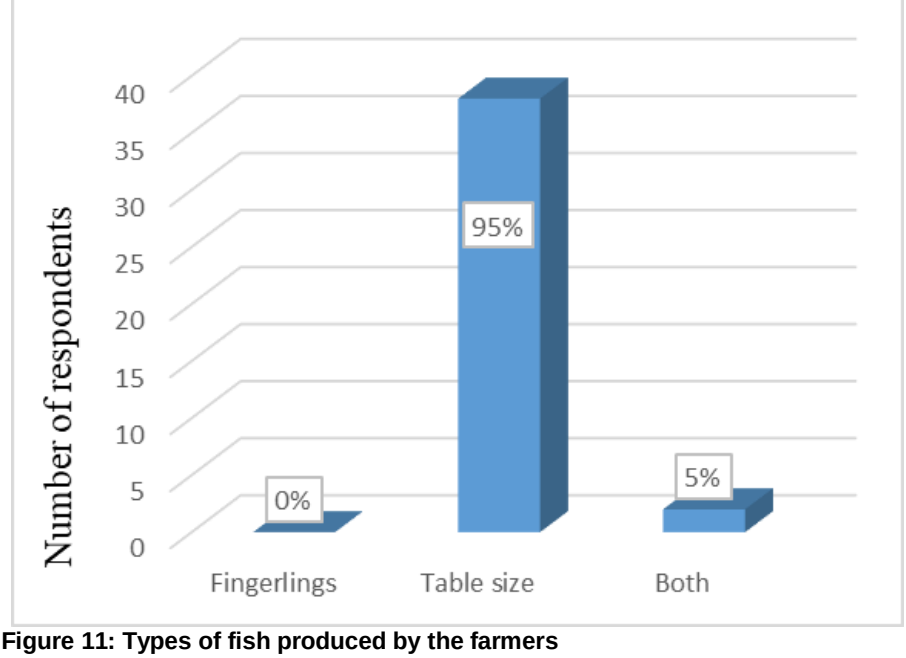


**Figure 11: Types of fish produced by the farmers**

The results of the study agreed with the findings of Mainza and Musuka (2015), who observed that the majority of the farmers produced table size fish in a range between 200g to 400g.

Figure 12 shows the location of fish sales, which was interpreted as follows; the majority indicated the local market, followed by others which included the neighbor, friends and relatives, and lastly both the local market and others with 57%, 38% and 5% respectively.

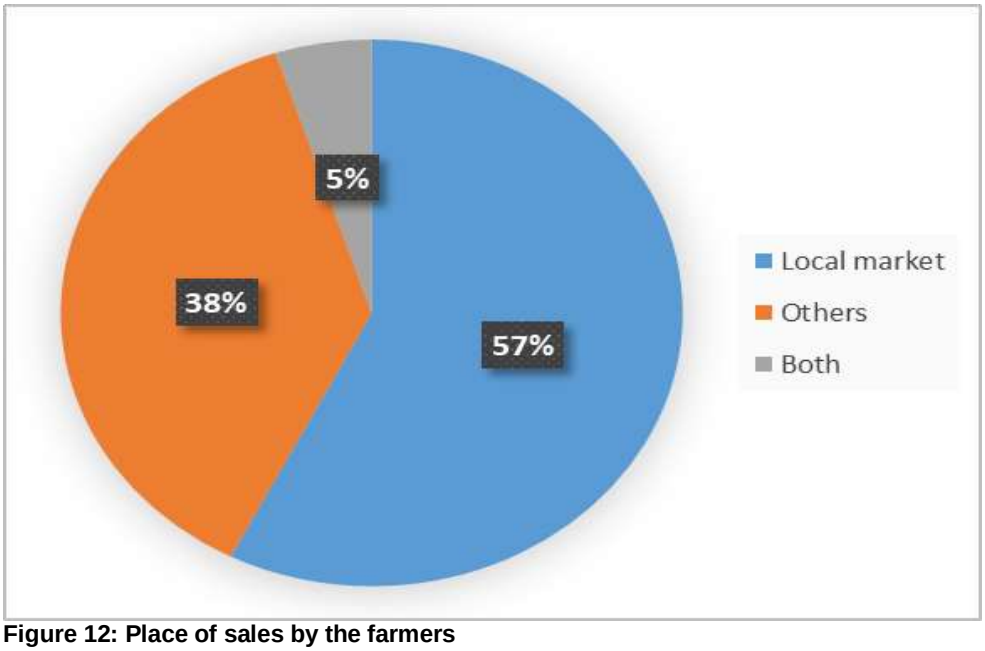


**Figure 12: Place of sales by the farmers**

A study done by Genschick *et al*., (2017), agrees with this study, where 57% of the total population of the respondents were also selling to the local market, followed by 41% of surveyed farming households who used most of the harvest for household consumption and lastly the remaining 2% who used their fish mainly for barter, e.g., exchange with containers of maize. In contrast, only 10 % of the farmers sold fish mainly at local markets, whereas selling at the farm gate to traders and retailers was more prominent (16 % and 22 % of farmers respectively) (Alexander *et al*., 2019).

Figure 13 shows visitation by the extension worker, where 50% of the respondents fell under others, which included the farmers to make a follow up for the extension agent to visit their farms and others didn't know that such existed. The second was the category of extension agents not visiting the fish farmers, which had a percentage of 32.5%. Thirdly visitation of the extension of agents of once in 6 months and once per year was 12.5% and 5.0% respectively. Lastly, there were no respondents in the category of extension agents visiting once per month.

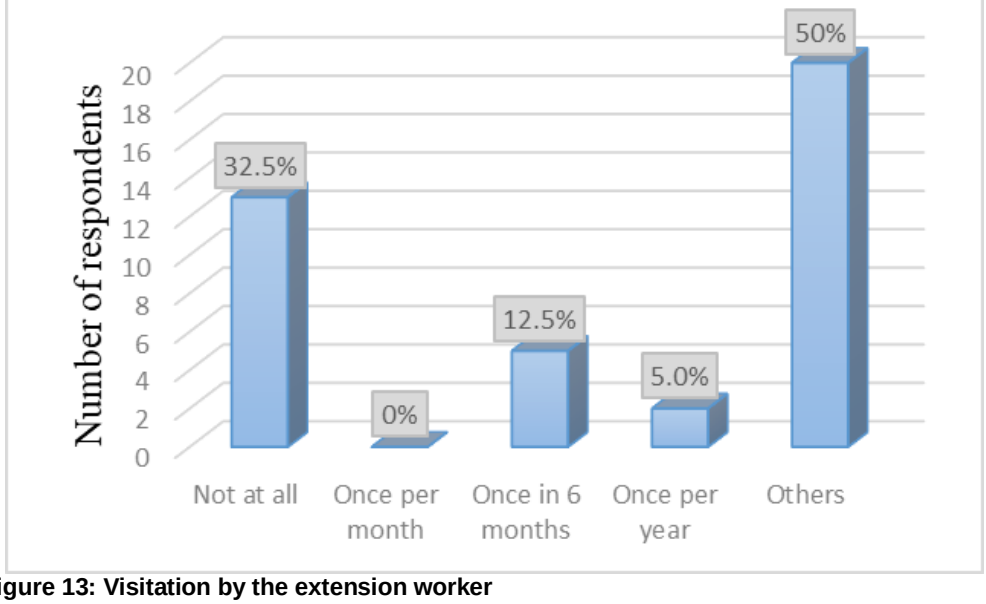


**Figure 13: Visitation by the extension worker**

Figure 14 shows how effective the contact between the fish farmers and the extension agent from the time the farmers began fish farming: The majority indicated very poor contact, at 62.5%, followed by strong contact with

25%. Lastly with farmers who revealed that they did not know and those that responded that the contact was very strong, stood at 7.5% and 5% respectively.

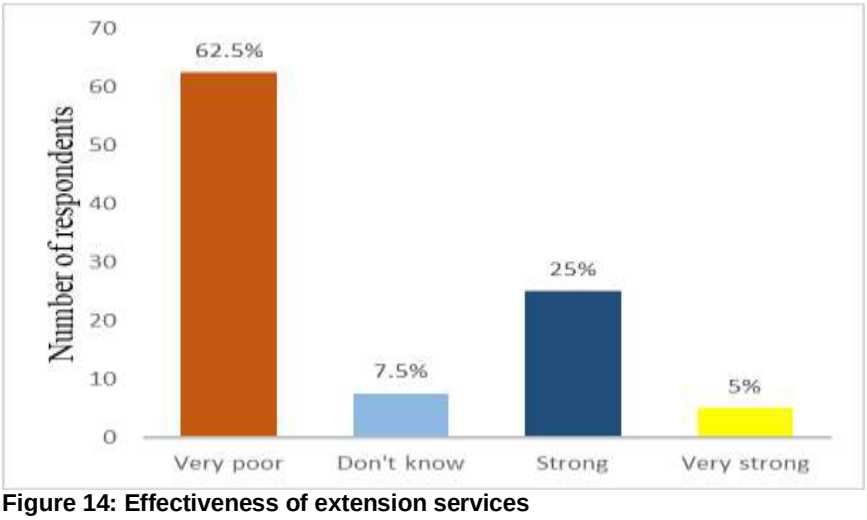


**Figure 14: Effectiveness of extension services**

A study done by Ayisi *et al*., (2016) elaborated the aquaculture extension service delivery and indicated that there was a ratio of 1:17 for the extension workers to the farm visitation. That was indicative of very low levels of extension worker's visitations to farmers. The authors reported that a large number of the respondents (48%) found the extension services unavailable (Ayisi *et al*., 2016).

According to figure 15, the level of youths and women participation in aquaculture was below average (70%) and at 30% on average. In agreement with the study by Ifejika *et al*., (2010), who also reported the low youths' and women's levels in aquaculture which stood at 29.9% and 9.7% respectively.

A study by Adesina and Favour (2012) also revealed that the participation means of youths in agriculture was only 3.24 years which implied that most of the respondents were new entrants into the programme. The authors further revealed that there was a need to improve on the effectiveness of the technology used in the agriculture sector through the extension workers so that the youths' and women's participation levels can increase (Adesina and Favour, 2012).

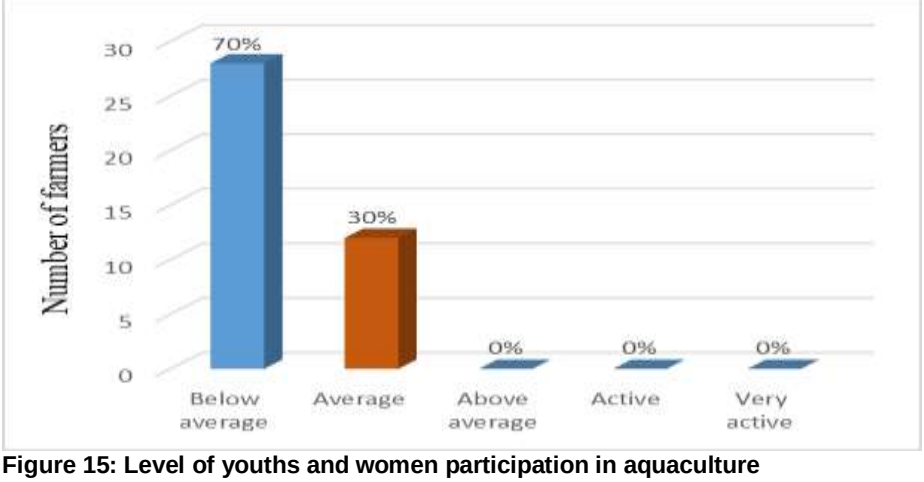


**Figure 15: Level of youths and women participation in aquaculture**

According to Mainza and Musuka (2015), only 13% of the total population of women participated in fish farming because of the following; labour intensiveness of the venture, especially the pond construction phase; and inability to own land of their own, where traditionally the land was owned by the male folks and the need for married women to seek approval from their husbands before participating in any venture. Besides, Mainza and Musuka (2015), elaborated that woman had the inability to access land to be used as collateral, as such they lacked the desire to apply for a bank loan to start fish farming activities. The reason for the low youth participation levels in aquaculture was highlighted as follows in line with a study, "Preference for the white-collar jobs, lack of capital for investment, lack of encouragement from the government and Expertise (Adelodun, 2015; Srikanth, 2018)."

In contrast, a study done on the role of women in sustainable aquacultural development in Delta state reported that they were regular visits and training by the Agricultural Development Program (ADP) extension

specialists as well as by the officers of the Department of Fisheries of the State Ministry of Agriculture to women involved in fish farming (Nwabueze, 2010).

Figure 16 shows how training/seminars conducted by the extension agents/NGOs had impacted on the fish farmer's activities and the results were that 42.5% of the respondents fell under below average, however, 25% of the respondents revealed that the impact was high, followed by those that indicated that the impact was on the average. Lastly was those that said the impact was above average with and very high with 15% and 0% respectively.

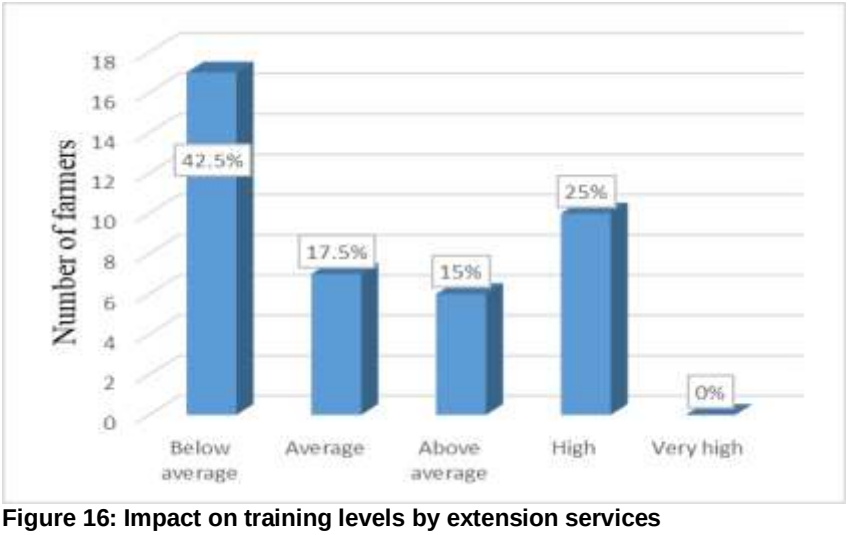


**Figure 16: Impact on training levels by extension services**

As earlier observed, the services of the extension workers were found to be unavailable to the respondents in a study done by Ayisi *et al*., (2016), however, it can be concluded in line with this study that there was minimal impact on the training levels by the extension agents.

Figure 17 shows which organization supplied the farmers with inputs to support their aquaculture production and the results were as follows; the finding showed that the majority of the respondents got their inputs from the government, at 55% which includes Mwekera and other government fish farms. That was followed by 45% which was from others, such as private fish farm friends, neighbours or relatives, and nothing for the NGOs.

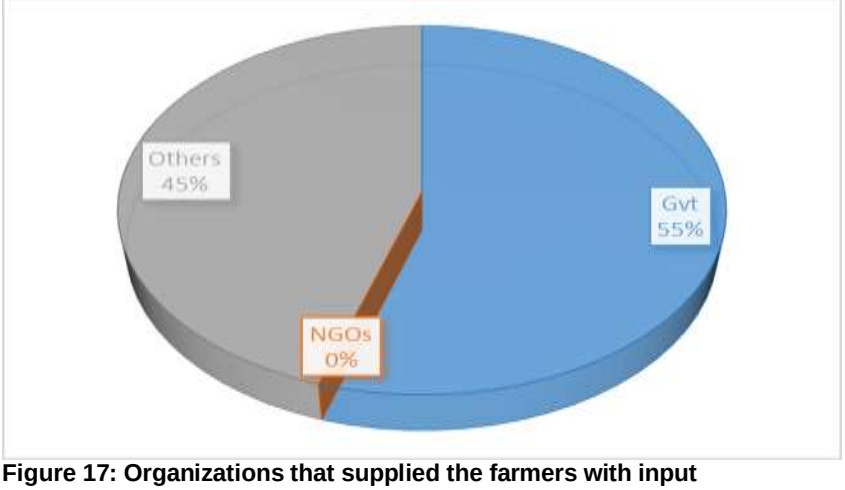


**Figure 17: Organizations that supplied the farmers with input**

This study is in agreement with a study done by Mainza and Musuka, who reported that almost 60% of the farmers purchased their indigenous fingerlings from Government fish farms, while other fish was procured from private fish farms (Mainza and Musuka, 2015). A study done by Howell (2020) revealed that the researchers identified that although the suppliers of the fish farming inputs might be available, the small-scale farmers were unable to purchase or hire feeding or harvesting equipment due to up-front costs hence they used the locally available equipment.

Figure 18 shows that 40% of the respondents belonged to the Zambia National Farmers Union (ZNFU), followed by 13% which did not belong to any association. Nevertheless, 18% belonged to the cooperative society and finally, 10% belonged to the local association. Meanwhile Figure 19 shows the farmer belonging to a specific association and the results show that the majority (35%) of the respondents fell between 6 months and

1 year, followed by those that did not belong to any farmers' association. It was further observed that the majority of the respondents were either ignorant about the farmers' association or that's when they had joined the association.

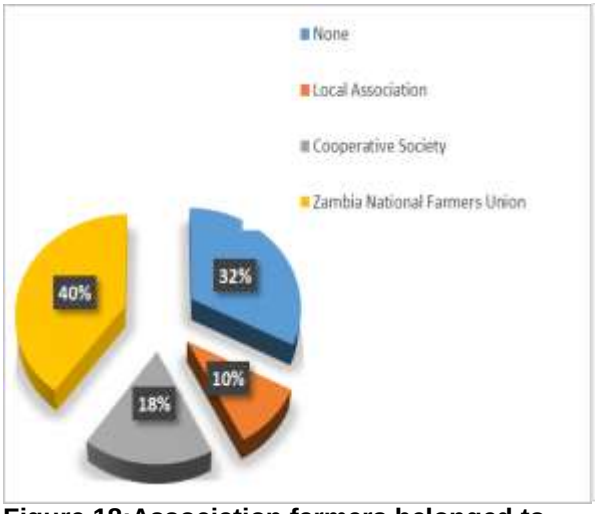


**Figure 18:Association farmers belonged to**

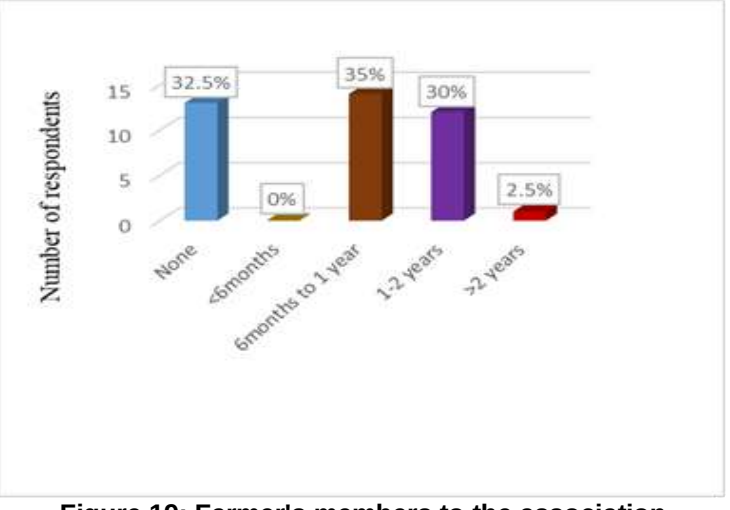


**Figure 19: Farmer's members to the association**

In a study done on Catfish and Allied Fish Farmers Association of Nigeria (CAFFAN), Ogun state chapter elected new officers as the government called for cooperation among fish farmers, the director of fisheries services in that state advised fish farmers to be part of the fish farmers association so that they can be able to produce sufficient fish to feed the nation which agrees with the study (Nigerian Farming Online Magazine, 2018).

Unlike in Zambia where farmers' association was still in its infant stage, in Uganda, a study revealed that through politics a Walimi Fish Farmers' Cooperative Society (WAFICOS) was formed and 34 fish farmers were registered with it and it had a vision of making aquaculture a competitive and profitable enterprise (The 5m Editor, 2011). In agreement with the study, Ifejika *et al*., (2010) also revealed that the majority (60%) of the respondents belonged to an association and they belonged to the various fish farming association.

## 5.0 CONCLUSION AND RECOMMENDATIONS

Based on results from these studies, it has been observed that there were low participation levels of youths and women in aquaculture in the study area. This could be one of the major reasons that had caused the aquaculture sector not to reach its full potential. The challenges of low youth participation included lack of capital, preference for a white-collar job, and lack of encouragement from the government. Although women played a major role in aquaculture production around the world, both as labourers and as managers of the production process, there was still low participation levels among them which included, high level of illiteracy among women, which hindered acquisition of knowledge information; lack of land ownership, thus limiting access and control over resources and Inability of most women to procure a loan.

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