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Research Article

Women's Participation in the Aquaculture Value Chain in Selective Regions of Sierra Leone

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Abstract: This study was conducted to examine the socio-economic activities of fish farmers in the different study areas, investigating the extent of women's participation in the aquaculture value chain and identifying critical areas where women lack knowledge and need improvement or encouragement to participate fully. This research was conducted in three provinces in Sierra Leone namely Northern, Southern and Eastern Provinces with a total of 59 respondents randomly chosen from the various districts. Respondents include fish farmers, processors, marketers, pond owners and stakeholders. Instruments used for valid data collection were a well-structured questionnaire, personal interviews, group discussions and observations. The information generated from the completed questionnaire were analyzed using a statistical package for social sciences which present the data in the form of patterns emerging from bar charts. Results from the research reveal the different areas of the value chain where women fish farmers are majorly engaged, highlighting their strengths and weaknesses. Conclusively the research reveals that daily fish farming activities are almost entirely in the hands of women with them being actively involved in marketing and processing commonly perceived by fish farmers as a job fit for women. From this research study, it is safe to say that the men may be the pond owners but the aquaculture value chain is dominated by women in Sierra Leone. Therefore, this research recommends the empowerment of women through granting loans, capacity-building training and easy access to land for their full participation in aquaculture activities.

Keywords: Women, aquaculture, value chain, Sierra Leone.

Introduction

Aquaculture is a growing industry in Sierra Leone with a guaranteed market due to the gradual decline of our capture fisheries. Over 80% of Sierra Leoneans depend on fish for their source of protein but with fish scarcity from the wild, the alternative for protein intake from fish in our diet is through Aquaculture. Nutrition security and income generation benefits from aquaculture make it more attractive to women. According to FAO, (2020) women constitute 19 per cent of the global workforce in the aquaculture sector. Aquaculture has grown at an impressive rate around the world with women's active involvement, which is an opportunity for many developing countries like Sierra Leone to capitalize on as the role of women in national development has begun to attract attention in recent years (Olufayo, 2012). Aquaculture which has often been regarded to be dominated by men in Sierra Leone, a reflection of the fact that it is labor intensive, highly technical and their easy access to land according to Sankoh *et al.,* (2018) is now becoming more attractive to women in the rural communities in Sierra Leone as it improves their income earnings from marketing, serve as a source

of quality protein for their family, a lucrative investment option with guarantee safety and it saves their rural communities from fish scarcity. Women's roles vary considerably between and within regions and are changing rapidly in many parts of the world, where the aquaculture sector is empowering women socially as well as economically (Sari *et al.*, 2017).

Women make essential contributions to rural economies in all developing countries and they have the potential to play current roles in aquaculture and use it as a tool for poverty alleviation (Olufayo, 2012). Many women showing increasing involvement in all aspects of aquaculture find it to be empowering and studies have revealed that women's engagement in capture fisheries and aquaculture is significant (Subasinghe, 2017). Women in Sierra Leone's rural communities are faced with discrimination when it comes to aquaculture and other agricultural activities. Even though women often show their capability in managing complex households with extended families and pursue multiple livelihood activities that are essential for the management of their homes, their work in aquaculture is still unpaid.

In order to develop the economic status of rural women, enhance their participation and utilize their full potential in profitable aquaculture, there is a need to provide capacity-building support and equip them with quality education in the area of the newest technology in aquaculture which would eventually lead to poverty alleviation and sustainable food security among rural women (Olufayo, 2012). It is obvious that the small numbers of women that are involved in fish farming are faced with more severe constraints than men and are often termed as unskilled and thus confined to processing and marketing activities (Kronen, 2014). Bringing women into the mainstream of aquaculture development would totally be in line with the blue transformation initiative which has the vision to expand aquatic food systems, and increase their contribution to feeding the worlds growing population by fostering equitable and sustainable growth and gender equality (FAO, 2020). By comparison with industrial and small-scale fisheries, little has been published about women in aquaculture in Sierra Leone and much work needs to be done to improve the scope of women's participation and productivity in aquaculture. This paper, therefore, raises awareness of women's involvement along the aquaculture value chain. It reviews areas where women's participation could be addressed by providing appropriate support to women in aquaculture which includes formal recognition of their potential for sustainable fish food and nutrient security.

Materials and Method

Description of the study areas

This study was conducted in three provinces in Sierra Leone namely Northern, Southern and Eastern Provinces. Makali, Bo and Kenema were the three districts purposely selected from the provinces respectively because of the rate of fish farming being practised.

Figure 1. Map of Sierra Leone showing all three district's study areas

Northern Province

According to Statistics Sierra Leone mid-term population and housing census (2021), the Northern Province is divided into two namely; the northeast and the northwest. The North West has a total of three districts namely Port Loko, Kambia and Karene. The North East comprise four Districts namely; Bombali, Falaba, Koinadugu and Tonkolili.

The study area Makali is a town in the Tonkolili District, in Sierra Leone approximately 124 km away from Makeni; which is the administrative and economic centre of the Northern Province and the fourth largest city of major towns in Sierra Leone. The Tonkolili district has a population of 557,257, based on the 2021 Sierra Leone national census and the majority of its population are Muslims with Christians forming a minority of the population. The largest ethnic group in the Northern Province is Temne.

Southern Province

The Southern Province consists of four districts (Bo, Bonthe, Moyamba and Pujehun). The capital and administrative centre is Bo, which is one of the research study areas. Bo is also known as the third largest city in Sierra Leone (after Freetown and Kenema) with a population of 756,975 according to Sierra Leone 2021 housing and population census. Bo city is the primary home of Njala University, the second-largest university in Sierra Leone. The population from the Bo districts is largely from the Mende ethnic group.

Eastern Province

The Eastern Province is one of the provinces of Sierra Leone which is divided into three districts known as Kenema, Kono and Kailahun. Its capital and administrative centre is Kenema which is also known to be the second largest and second most populated city in Sierra Leone, after the nation's capital Freetown. The Kenema district which is also another research study area has a population of 772,472 according to Sierra Leone 2021 housing and population census. Kenema is one of the principal homes of the Mende people, who form the plurality of the city's population.

Sampling methodology

The sampling method used to collect the data for this research is mainly random from the three districts selected due to fish production. The number of respondents from the three districts was randomly selected to avoid being biased and to have different perspectives from the three districts.

Sample size and selection of respondents

The research targeted all levels of fish farmers including; fish processors, fish marketers, field staff at each of the sites, owners of fish ponds, fishing women and men group leaders, stakeholders in relation to fish farming projects and those that have benefited from aquaculture intervention. The population of active fish farmers in the study areas varies and therefore informs varied proportions of the 10% predetermined population sizes of the respective study sites and in total 59 personal interviews were conducted.

The instrument used for data collection

Instruments used for valid data collection are a well-structured questionnaire and Secondary information sought from the desktop review of journals, articles bibliography, monographs, short communications and past research work (projects, dissertations, and thesis) to cover the full scope of the study research requirements.

Questionnaires were administered to both male and female fish farmers independently and they were directly interviewed at their fish farms and houses where the researcher also carried out personal observations.

The structured questionnaires were used to extract demographic data and research questions.

Data Analysis

The information generated from the completed questionnaire was analyzed using content analysis of respondents and descriptive statistical analysis which is widely used in scientific research to obtain results in the form of percentages. The Statistical Package for Social Sciences (SPSS) was used to present the data in a more meaningful way with simpler interpretation in the form of patterns emerging from bar charts.

Results

Demographic characteristics of respondents

Sex of respondents

The gender of the respondents in the study area in figure 2 shows that (42.40%) were female whilst (57.60%) of the respondents were male.

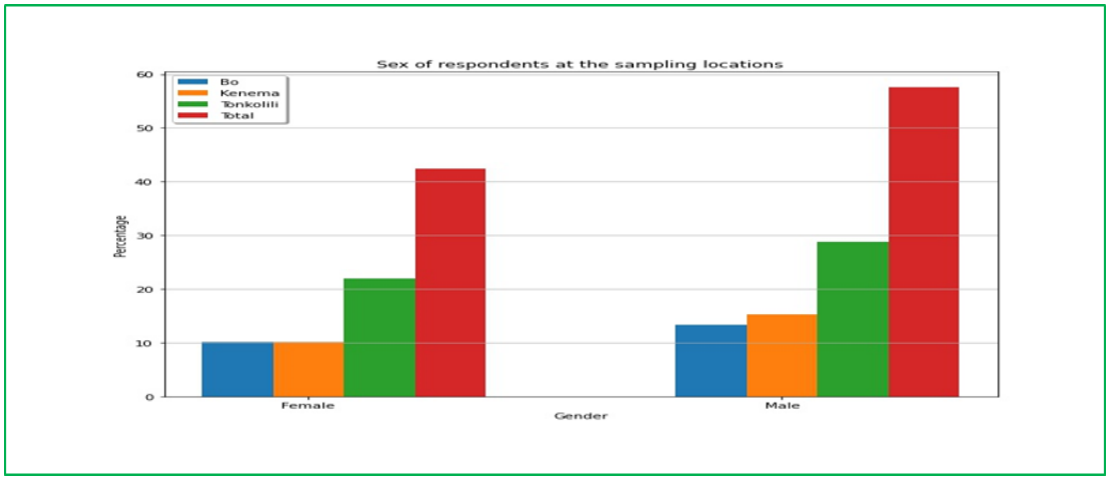

Figure 2. Sex of the respondents at the sampling locations

Age range

In total (3.40%) of the respondents falls under the age range of (10-20) years, (18.60%) fall under the age range of (21-30) years, (22.00%) fall under the age range of (31-40) years, (40.70%) fall under the age range of (41-50) years, (8.50%) falls under the age range of (51-60) years, (6.80%) falls under the age range of (61 and above).

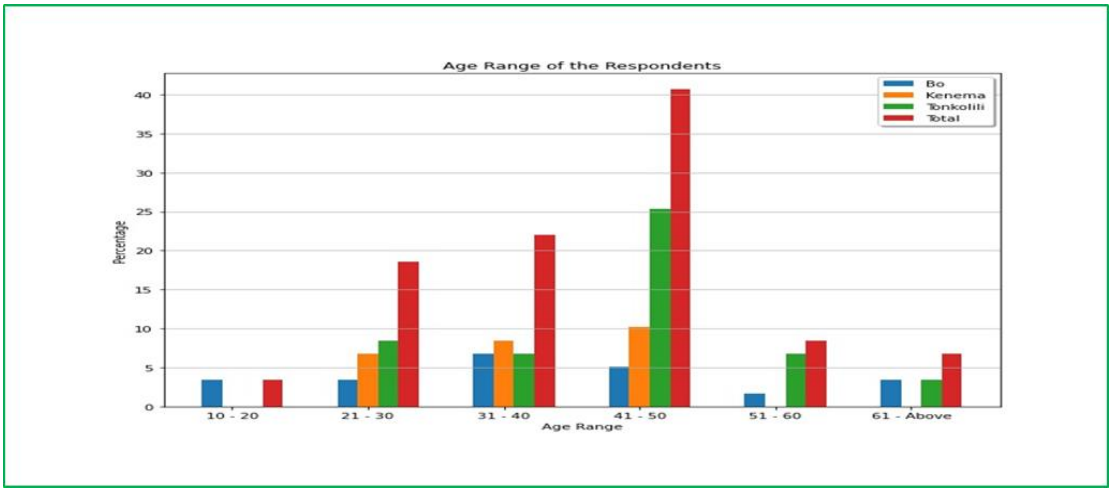

Figure 3. Age Range of the Respondents

Marital status

Marital status in the three sampled districts reveals (16.90%) were divorced, (66.10%) were married, (15.30%) were single and (1.70%) were widowed.

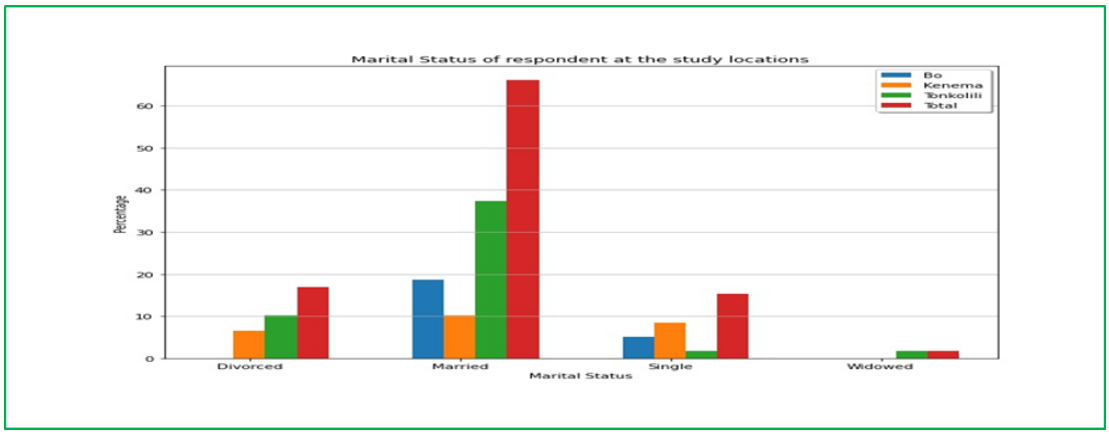

Figure 4. Marital Status

Level of education

In total (11.9%) of the respondents have a university level of education, (1.7%) of respondents have a Technical Vocational institute level of education, (30.5%) of the respondents have a secondary level of education, (30.5%) of the respondents have no education, (23.7%) of the respondents have a college education and (1.7%) of the respondents learnt Arabic studies.

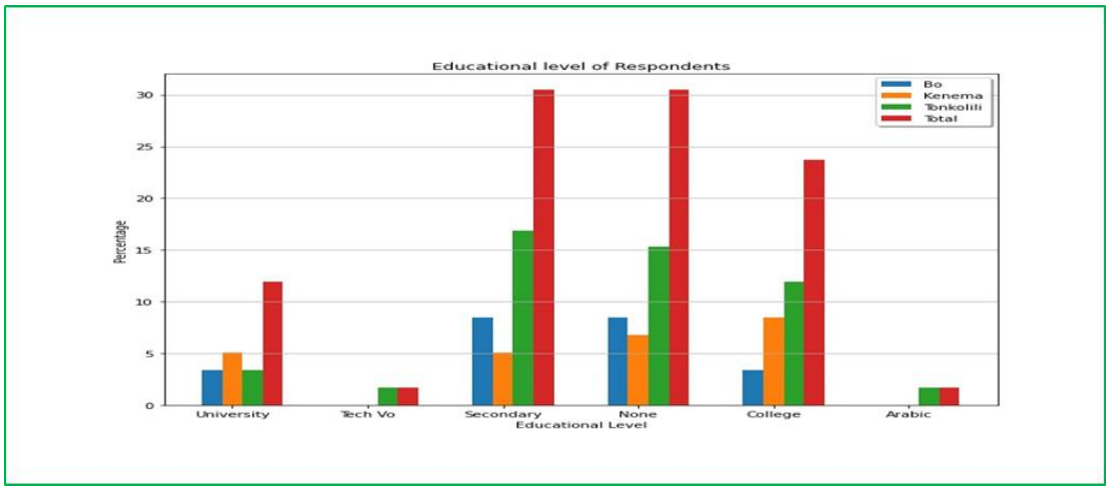

Figure 5. Level of education of the respondents

The main occupation of respondents

The main occupation of respondents in all three districts shows (22.0%) as an agriculturist, (3.4%) were civil servants, (45.8%) were fish farmers, (3.3%) were students, (1.7%) were students while involved in trading, (and 1.7%) were traders.

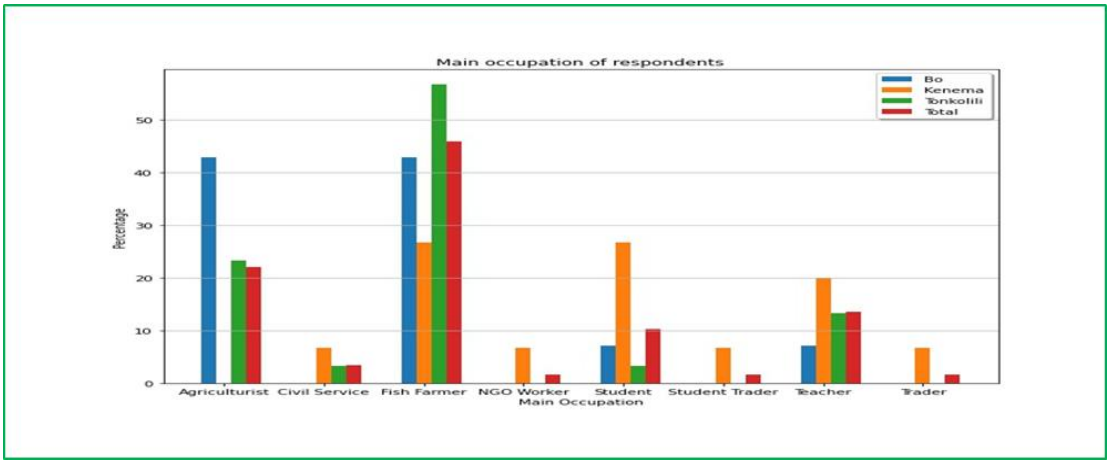

Figure 6. The main occupation of the respondents

Involvement of female fish farmers in Aquaculture

This section provides an analysis of the research findings for the roles played by men and women within the value chain. It also highlights perceptions of women's participation in the value chains. The research findings in (figure 7) show a total of (93.2%) of women that are actively involved in marketing and (6.8%) of women that were moderately in fish marketing in all three districts.

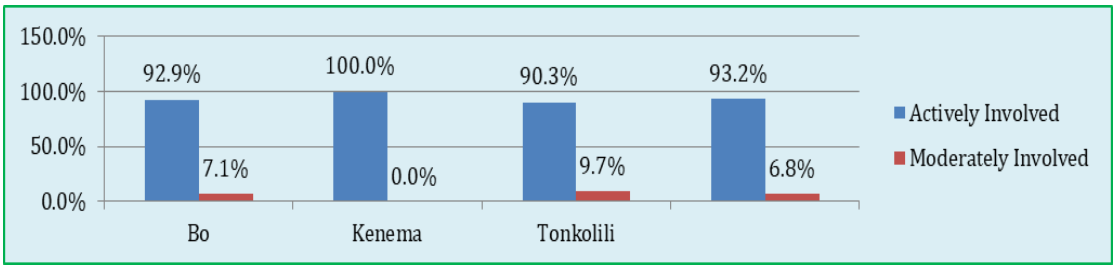

Figure 7. Women's involvement in marketing

The research findings in (figure 8) show a total of (83.1%) of women that are actively involved in fish processing and (11.9%) of women that were moderately involved and (5.1%) that were not involved in fish processing in all three districts.

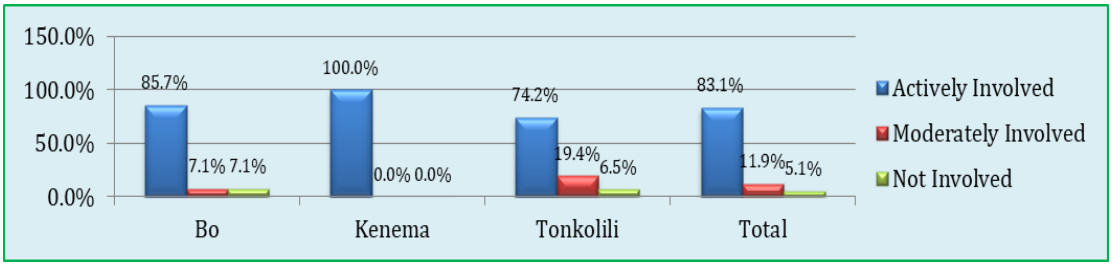

Figure 8. Women's involvement in processing

The findings from the result in (figure 9) show that (50.80%) are actively involved, (28.80%) are moderately involved and (20.30%) of women are not involved in fish handling.

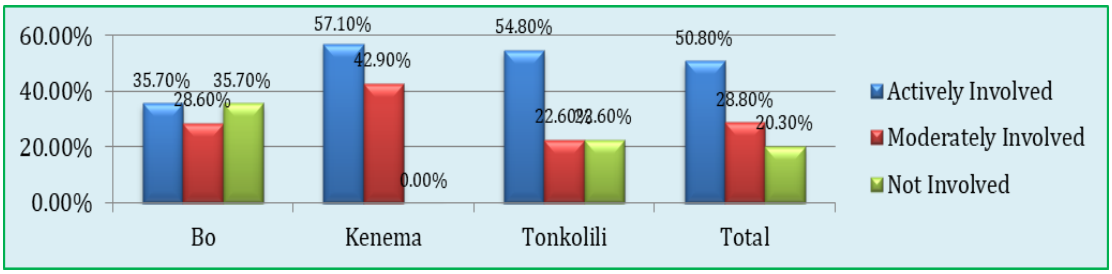

Figure 9. Women's involvement in fish handling

Figure 10 shows a total of (71.2%) of women actively involved in feeding the fish, (20.3%) of women tend to be moderately involved and the lowest percentage of (8.5%) of women are not involved in feeding the fish.

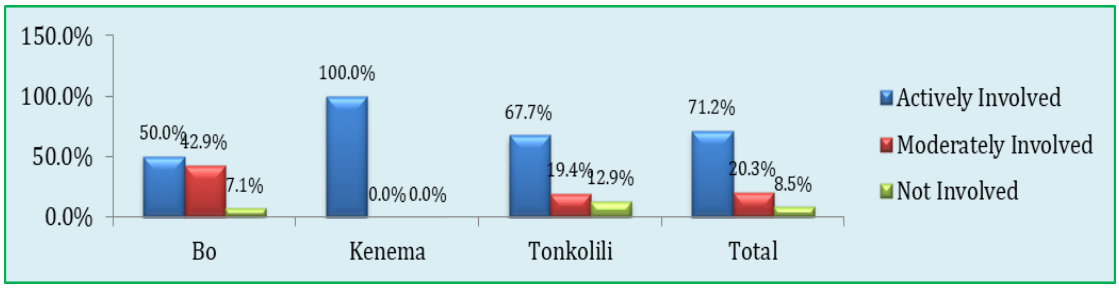

Figure 10. Women's involvement in the feeding of fish

Findings from the results shown in (figure 11) show women are actively involved with a total of (64.0%) in fish feed preparation, (20.3%) are moderately involved and (15.3%) were not involved with fish feed preparation.

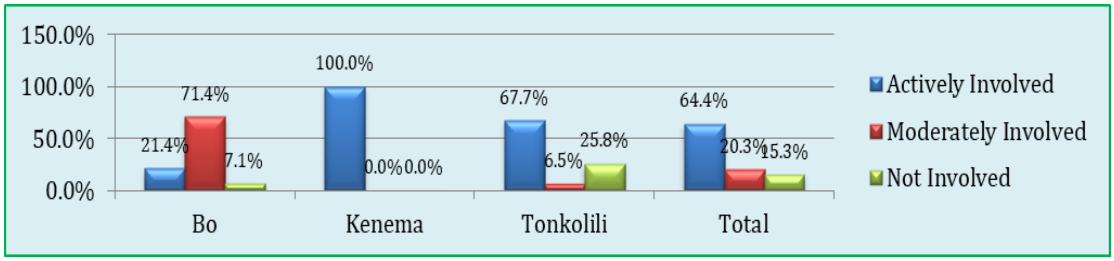

Figure 11. Women's involvement in the preparation of fish feed

Findings in (figure12) reveal that the majority of women a total of (69.5%) are actively involved in sorting and grading after harvest, (16.9%) of women who are moderately involved and (13.6%) of women that are not involved in the process of sorting and grading.

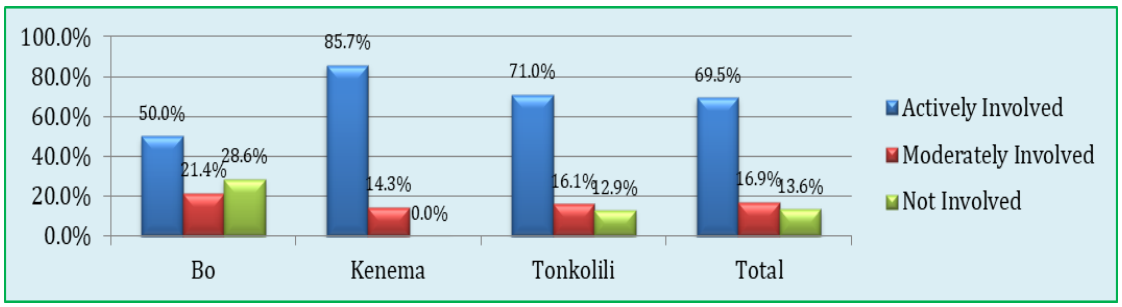

Figure 12. Women's involvement in sorting and grading after harvest

This research in (figure 13) shows a total of (55.9%) of women are actively involved in the management of seeds, (20.3%) were moderately involved whilst a total of (23.7%) were not involved in the management of seeds.

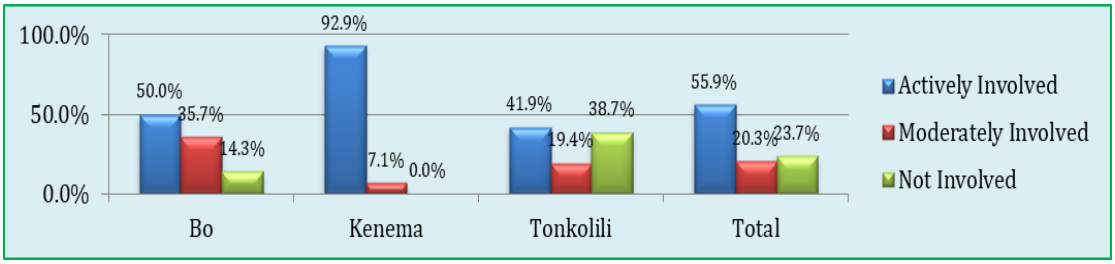

Figure 13. Women's involvement in the management of seeds

The findings from the result in (figure 14) show that (45.2%) of women are actively involved, (39.0%) of women are moderately involved and (15.3%) of women are not involved in the process of fish seed stocking.

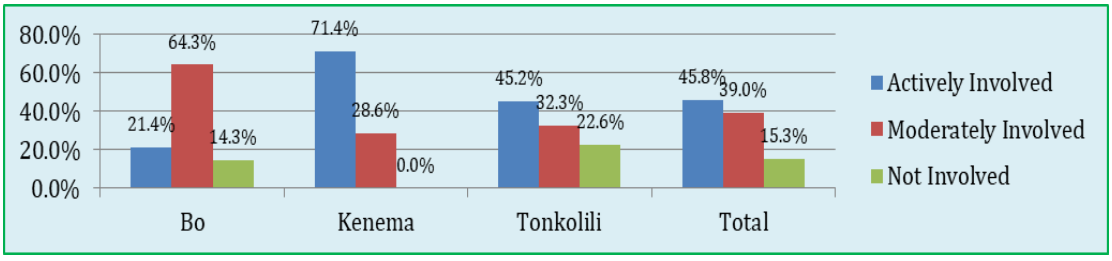

Figure 14. Women's involvement in stocking

Figure 15 shows that (30.5%) of women are actively involved, with the highest percentage (44.1%) of women moderately involved and (25.4%) of women that are not involved in the daily supervision of the pond.

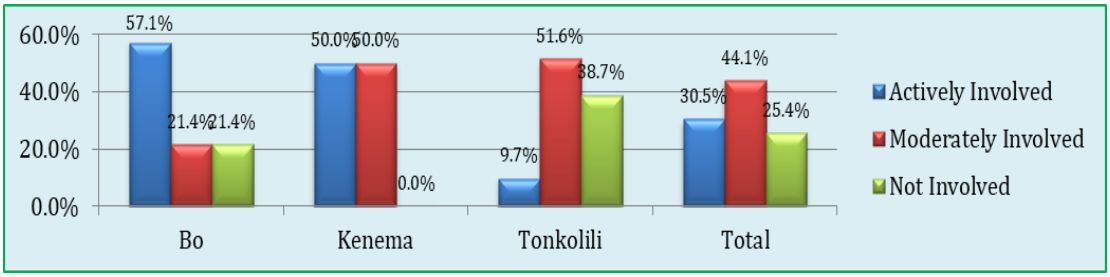

Figure 15. Women's involvement in the daily supervision of the pond

The findings in (figure 16) show that a total of (39.00%) of women are actively involved in pond maintenance, a total majority of (45.80%) of women are moderately involved and a total of (15.30%) of women are not involved in the maintenance of the fish pond.

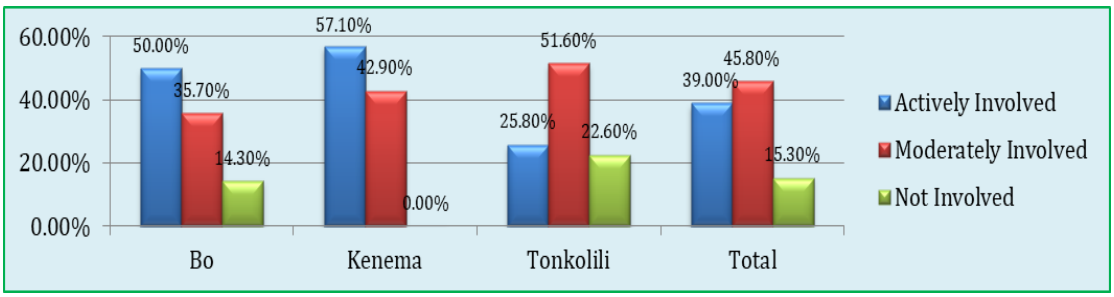

Figure 16. Women's involvement in pond maintenance

From the total sample of fish farmers in (figure 17), it shows (35.6%) of women that are actively involved in fish transportation, a total of (33.9%) that were moderately involved and a total of (30.5%) that were not involved in fish transportation.

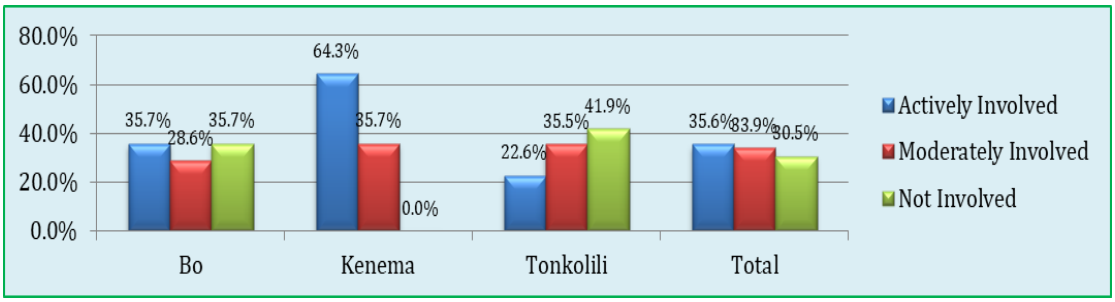

Figure 17. Women's involvement in the transportation of fish

Results presented in (figure 18) show a total of (35.6%) of women were actively involved, (37.3%) were moderately involved and (27.1%) of women that were not involved in the fertilization of fish ponds.

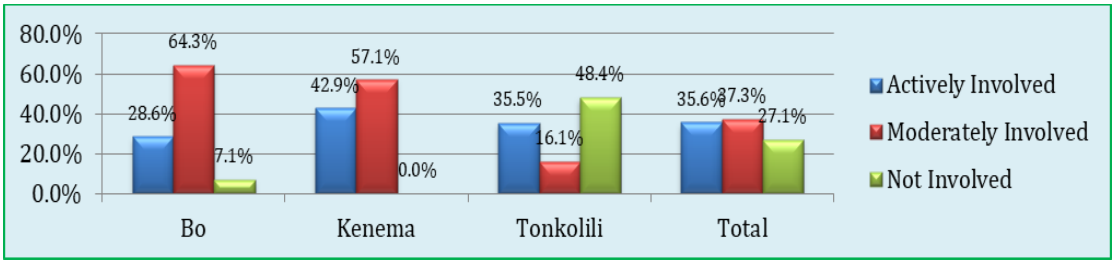

Figure 18. Women's involvement in fertilization of fish pond

Figure 19 shows that (49.20%) are actively involved, (35.60%) are moderately involved and a total of (15.30%) of women are not involved in farm sanitation.

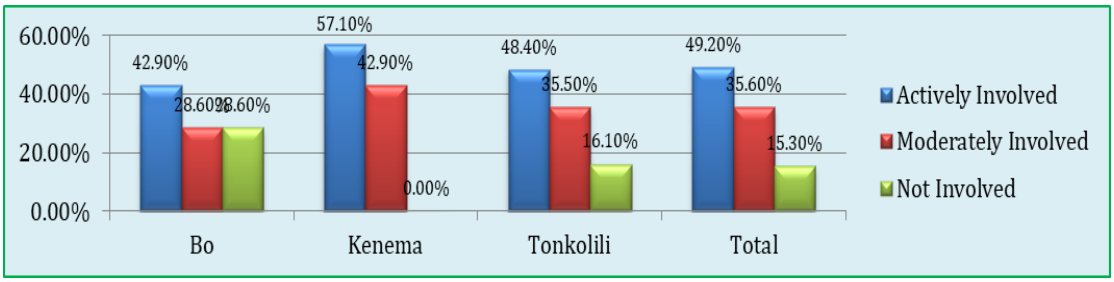

Figure 19. Women's involvement in farm sanitation

The findings from (figure 20) show (11.9%) of women are actively involved, a higher percentage (50.8%) of women are moderately involved and (37.3%) of women are not involved in pond water management.

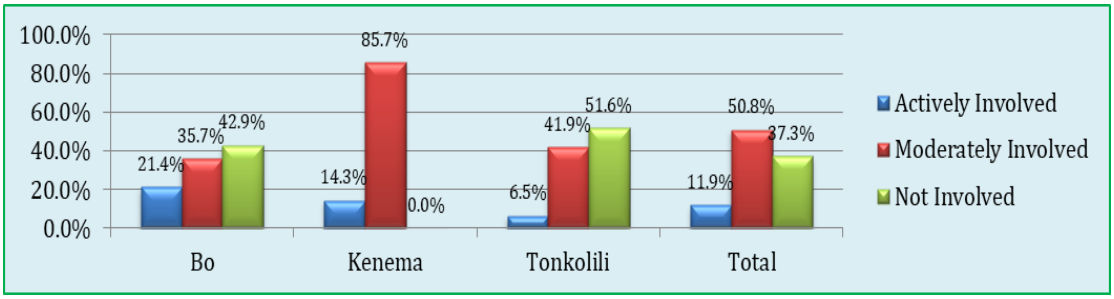

Figure 20. Women's involvement in pond water management

The findings from the result in (figure 21) show that only (28.8%) of women are actively involved in record keeping, (47.5%) are also moderately involved and (23.7%) are not involved at all in record keeping.

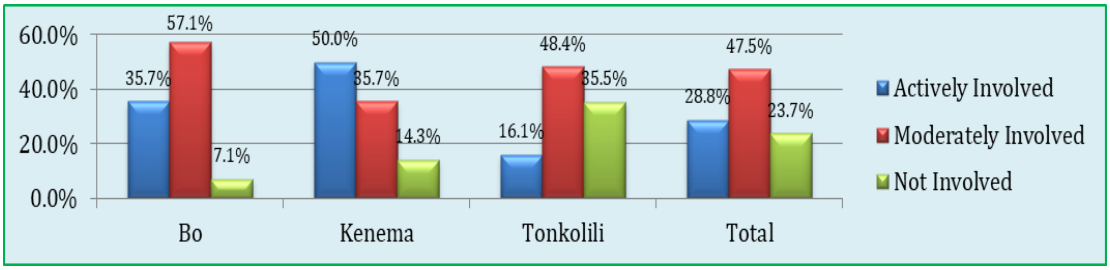

Figure 21. Women's involvement in record keeping

Research findings in (figure 22) show a lower percentage of (6.8%) of women that are actively involved in pond construction, (64.4%) of women are moderately involved and (28.8%) are not involved in pond construction.

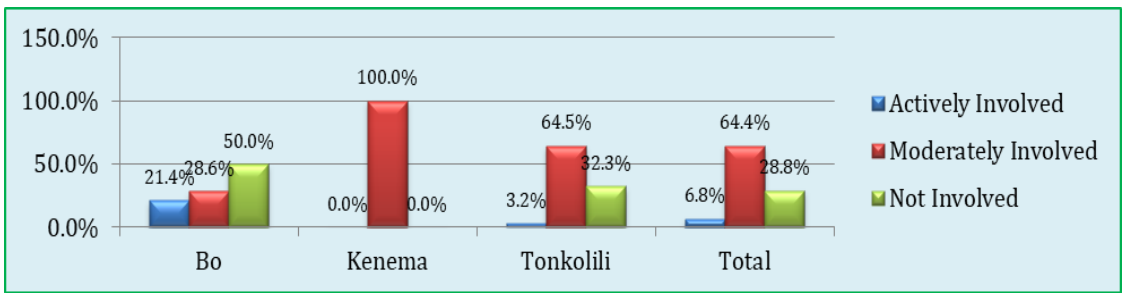

Figure 22. Women's involvement in the construction of ponds

It was observed in the available data in (figure 23) that only (8.5%) of women were actively involved in fish breeding, (42.4%) were moderately involved and a total of (49.2%) were not involved in fish breeding.

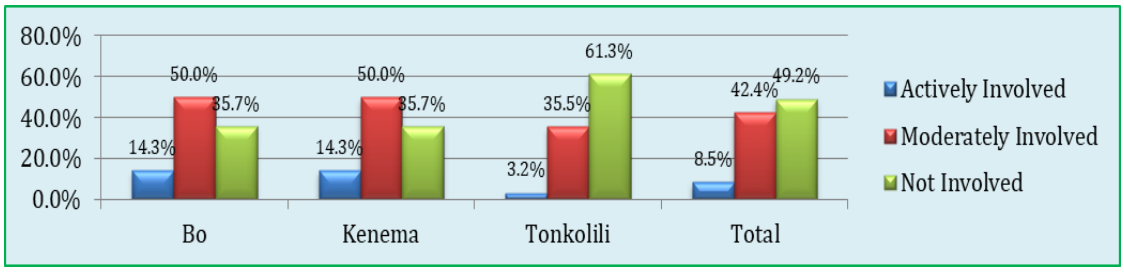

Figure 23. Women's involvement in fish breeding

It was observed in (figure 24) that a total of (16.9%) of women fish farmers were actively involved in disease control, (22.0%) of women are moderately involved while the highest total percentage (61.0%) of women are not involved in disease control.

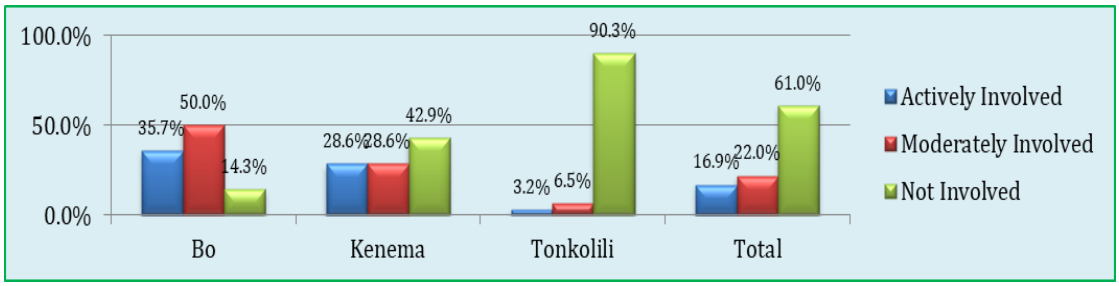

Figure 24. Women's involvement in disease control

Discussion

The results of the sex of the respondents in the study area in figure 2 indicated that there are more male fish farmers than female fish farmers. This shows that aquaculture fish farming is dominated by men. This result is in line with Sankoh *et al.*, (2018) who also prove from their research in Sierra Leone that there are more male farmers. The results of the respondents in the study area in figure 3 indicated that participation in aquaculture is great among adults. It also shows more youth employment in aquaculture activities within the age bracket of (21-40) years. It was equally observed that there was a decrease in aquaculture participation as the age of the respondents increased. This is due to the fact that aquaculture is very tasking and needs a high amount of energy to participate fully (Cliffe *et al.*, 2015). The results also showed in figure 4 that the highest number of the respondents were married. Aquaculture in Sierra Leone is dominated by fish farmers that are married. This encourages the division of labor and unpaid work for women in aquaculture because their spouse or family owned the pond. These results also corroborate of the results of Sankoh *et al.*, (2018) in their research on Sierra Leone aquaculture assessment with special reference to the Tonkolili and Bombali districts.

The educational status of fish farmers in the study area in figure 5 revealed that the majority of the respondents had a secondary level of education or had no education whatsoever. The study also reveals in figure 6 that the majority of the respondent's main occupation was aquaculture and second to them were agriculturists that practice integrated fish farming as their secondary occupation. The results are in line with Sankoh *et al.*, (2018) where the majority of their respondent's main occupation was farming. The Aquaculture value chain which involves a series of activities and transactions to make a product and deliver it to consumers from farms to final markets is done sometimes equally by men and women, but nevertheless, women play major roles in various areas of the aquaculture value chain (Subasinghe, 2017). The series of activities in the value chain include fish marketing, processing, handling, fish feeding, fish feed preparation, sorting and grading after

harvest and the management of seeds. Research findings show that the involvement of women in the aquaculture value chain is not only visible in the grow-out stages but throughout the production. From the research results in figures 6 and 7, it was revealed that women are actively involved in the marketing and processing of aquaculture products in Sierra Leone. In the rural communities where we have more aquaculture practice, there is a cultural stereotype where it is commonly perceived by fish farmers that marketing and processing are jobs fit for women and therefore men tend to be less involved. Women are respected for their bargaining power when it comes to marketing fish or fish products. There is more at stake for women when they market their products as the income generated goes mainly toward their homes and the education of their children. From the focus group discussions, women reveal that they normally sell their harvest raw and that they mostly process the fish if the harvesting process goes on too late. The processing method commonly used by women in rural communities in Sierra Leone is smoking. This result is in line with the findings of Sankoh *et al.,* (2018) and it is also in accordance with studies conducted in top aquaculture-producing countries like Bangladesh and Indonesia (Rahman *et al.,* 2019).

According to Veliu *et al.*, (2009) women are widely respected for their roles in processing and marketing fish and their ability to build capital this way makes a significant contribution to household livelihoods. From this research study, it is safe to say that the marketing and processing value chain is dominated by women. It was also observed that these ventures are almost entirely in the hands of women in all three districts. In figure 8, the result showed that in total women are active in fish handling processes. Fish handling is one of the most crucial activities in aquaculture because fish is highly perishable and needs proper handling. The group discussion suggests that men tend to shy away from fish handling afraid not to be responsible for fish spoilage due to bad handling practices by throwing the fish into containers due to their lack of patience. Therefore, more room is given to women in fish handling because they have the most patience to carry out fish handling activities. Women delicately handle fish because their focus is to have a good end product since they are responsible for marketing it and a good product comes with a high-value price. Women also dominate in the aspects of fish feed preparation and feeding the fish as shown in the research finding in figures 9 and 10 respectively. According to Agbebi *et al.,* (2016) women have the knowledge and the key responsibility for feeding the fish by utilizing household wastes.

The research shows the majority of women are involved in fish feed preparation. This result agrees with the findings of Veliu *et al.*, (2009) in which fish feed preparation in Nigeria is also dominated by women. Women clearly dominate in the aspects of feeding the fish using the locally prepared fish feed in Sierra Leone confirming the results obtained by Sankoh *et al.,* (2018) who also reported that women are active in fish feeding. It was gathered from the group discussions that fish feeding could easily be managed by women since they are mostly around the home being domestic and they also find it easy to transform kitchen waste into the fish feed which men perceived to be a demanding job. The findings in figure 11 show the majority of women are involved in the process of sorting and grading. This process is sometimes done immediately after harvest and it is time-consuming which makes women's involvement more welcoming because men don't have the most patience. Women are majorly involved because it is so easy for them to place value on fish. This result corroborates research done in Bangladesh where the women are also involved in sorting the fish by size and species (Kruijssen *et al.,* 2021).

This research also proves in (figure 12) that women are actively involved in seed management. This result is in contrast to the findings of Das and Khan (2016) who reported that women in Bangladesh are involved in seed management but are not in the majority. From the discussions, it was mentioned that women are actively involved in the management of seeds because their male counterparts genuinely trust them with the process of seed management. As reported by Sankoh *et al.,* (2018), that gender roles are fairly distinct in Sierra Leone. This research result shows various degrees of women's participation in aquaculture. The research findings in figures 13, 14, 15, 16, 17, 18, 19 and 20 show women's involvement but also show that their roles in these production aspects are not

predominant. Women together with their male counterparts are involved in pond stocking, daily supervision of the pond, maintenance of the pond, fish transportation, fertilization of fish pond, farm sanitation, pond water management, and record keeping.

The findings from the result in (figure 13) show that women are actively involved in the process of fish seed stocking. This result corroborated the research done by Sankoh *et al.,* (2018) where women are also active in pond stocking. From the discussion, the farmers said that the women are active and also play supportive roles to men which are needed for a smooth stocking process. The findings in figure 14, the result showed that the total majority of the women were moderately involved in the daily supervision of the pond. From the group discussions, it was gathered that early in the morning the men in the fish farming groups or the spouse of the female fish farmer would observe the ponds and check that all parameters are in place and also give instructions to the women on what they should do for the day before stepping out to do other jobs. Women tend to be home most of the time doing domestic activities and even if they step out, they return early therefore the daily supervision of the pond is easy for them and that is how they became moderately involved in the daily supervision of the pond as agreed with what's done in the findings of Das and Khan (2016), in Bangladesh in which majority of the women are moderately involved.

Research findings in figure 15, showed in total that the majority of the women were moderately involved in pond maintenance. This finding is in agreement with the studies done in Bangladesh by Das and Khan (2016), where the majority of the women are only moderately involved in pond maintenance. The research findings presented in (figure 16) show women to be actively involved in the transportation of fish. Most fish ponds in the rural communities are found in the inland valley swamp areas and because of the poor road network, the women would trek with fish baskets after harvest from fish farms to the main roads where the men would transport them with bikes to the local markets. However, this is not the case in Bangladesh according to Das and Khan (2016) where the majority of the women are not involved in fish transportation.

Results presented in (figure 17) show in total women are moderately involved together with their male counterparts in fertilization of the pond which is in contrast to studies carried out in other countries like Rwanda by Agbebi *et al.,* (2016) women participate extensively in collecting compost materials to enrich the pond nutrient level. Nevertheless, their contribution to fertilizer application in Bangladesh is also noted (Rahman *et al.,* 2019). The result in figure 18 reveals that women do care about farm sanitation. Women are intensively involved in farm sanitation and from the group discussion they reveal that they pick around the pond daily and never allow garbage to be thrown around the pond area. The findings from (figure 19) show women to be moderately involved in pond water management. Women find pond water management to be technical but women render assistance by playing a complementary role to men. This result is also in line with the research done in Tanzania a case study of Ukerewe district by Luomba (2013), where both men and women were involved in pond water management.

It was observed in the available data in (figure 20) that the majority of the women are moderately involved in record keeping. From group discussions, it was gathered that the men keep the books and do all the entries but the women memorize the records. Results in figure 21 show that majority of the women are only moderately involved in the construction of ponds. Pond construction is labor-intensive and women usually shy away from the heavy load in aquaculture. Pond construction is physically demanding therefore men tend to dominate in this process (Sankoh *et al.,* 2018). According to Agbebi *et al.,* (2016), which stated that even in women-only groups, men are asked to assist in the tasks of pond construction and pond maintenance and similarly women are responsible for specific tasks. The women that are involved mostly do some clearing, carrying off the dirt and water and most importantly preparing food for the men that are doing the hard labour. This study clearly showed that even though women's involvement is found in all nodes of the aquaculture value

chain, their level of participation varies according to their strength and their weakness. The result in figures 22 and 23 is a clear indication that the tasks in aquaculture are gendered.

Research results in figure 22 showed that the majority of the women are not involved in fish breeding. Fish breeding is highly technical and women have the perception that it's a man's job or responsibility but this is mostly due to the fact that women lack knowledge in fish breeding. It was observed in (figure 23) that the majority of the women are not involved in disease control. This aspect is not unique to women fish farmers in Sierra Leone, as this result corroborates that of Das and Khan (2016) that women do not have much involvement in diseases control by applying antibiotics and this may be due to the fact that they lack the technical know-how on how to prescribe these antibiotics and also how to administer these drugs to the fish.

Conclusions

Evidence dispels the notion that women are only minimally involved in aquaculture in Sierra Leone. The fact, however, is that women contribute meaningfully by playing a critical role in every link of the value chain in aquaculture. Women are majorly involved in the daily operations of the fish farm which according to the survey includes marketing, processing, feed preparation, feeding of fish, fertilization, pond sanitation, sorting and grading after harvesting, stocking and fish handling. Women also provide partial assistance to men in record keeping, fish breeding, pond water management, disease control, fertilization of the pond, transportation of fish, daily supervision of the pond and management of seeds.

Most of the activities in aquaculture make enough room for female participation and the men involved in aquaculture are content with their leadership role in some of these activities as they regard themselves to do more movement and not have the same amount of patience as women. It shows that women's roles and the extent of their participation in the aquaculture value chain are enormous. Their crucial involvement in aquaculture is one issue that needs to be recognized and addressed when dealing with improvements in livelihood in rural communities, sustainable fish productivity and nutrition security.

Recommendations

From the research study, the following recommendations are made

- ✓ More women should be encouraged to participate in aquaculture activities for more robust aquaculture development.
- ✓ Provision of capacity building for women by enhancing their skills in aquaculture with technical training, especially in their areas of weakness.
- ✓ There is a need to support and strengthen women's fish farmers groups or organizations for sustainable fish farming practices.
- ✓ There is a need for Government and non-governmental organizations to provide financial assistants and easy access to loans for successful aquaculture practice.
- ✓ Government should ensure effective monitoring systems for effective fish farm management.

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Appendix: Plates

Plate 1. Focus group discussion with fish farmers in Bo district

Plate 2. Personal interview of fish farmers in Bo

Plate 3. Personal interview with a female researcher in Makali Hatchery

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