Norad

Development and Scaling of Sustainable Feeds for Resilient Aquatic Food Systems in Sub-Saharan Africa:

Gender equality and social inclusion (GESI) assessment: Zambia, Nigeria and Kenya

Research supported by

INCLUDOVATE
INNOVATE FOR INCLUSION

WorldFish

CGIAR

Gender equality and social inclusion (GESI) assessment: Zambia, Nigeria and Kenya

Authors

Sujata Ganguly, Kristie Drucza, Wanja Njiriri and Rodrigue Yossa.

Citation

This publication should be cited as: Ganguly S, Drucza K, Njiriri W and Yossa R. 2023. Gender equality and social inclusion (GESI) assessment: Zambia, Nigeria and Kenya. Penang, Malaysia: WorldFish. Program Report: 2023-60.

About Development and Scaling of Sustainable Feeds for Resilient Aquatic Food Systems in Sub-Saharan Africa (FASA)

WorldFish has partnered with the Norwegian Agency for Development Cooperation (Norad) on a 5-year project to develop low-cost and highly nutritious aquatic feeds based on novel ingredients. The project, known as Development and Scaling of Sustainable Feeds for Resilient Aquatic Food Systems in Sub-Saharan Africa (FASA), will run from 2022 to 2027 with Norad funding the initiative through a NOK 80 million (approximately USD 8 million) grant. The project aims to enable 5000 smallholder aquatic food producers in Kenya, Nigeria and Zambia to test and use these feeds and ingredients, which will increase their income, improve their nation's food security as well as reduce waste and pollution. An estimated 30 and 40 percent of aquatic food producers engaged in the project will be women and youths, respectively.

Acknowledgments

The Development and Scaling of Sustainable Feeds for Resilient Aquatic Food Systems in Sub-Saharan Africa (FASA) project is funded by the Norwegian Agency for Development Cooperation (Agreement SAF-21/0004.). This work was undertaken as part of the CGIAR Research Initiative on Resilient Aquatic Food Systems for Healthy People and Planet, and funded by CGIAR Trust Fund donors: www.cgiar.org/funders.

Contact

WorldFish Communications and Marketing Department, Jalan Batu Maung, Batu Maung, 11960 Bayan Lepas, Penang, Malaysia. Email: worldfishcenter@cgiar.org

Photo credits

Front cover, Rodrigue Yossa/WorldFish.

Disclaimer

This report must be read, and the results considered, in conjunction with the climate and environmental analysis report as well as the country outcomes report for Kenya, Nigeria and Zambia under the FASA project.

Table of contents

List of abbreviations

ADS 205	Automated Directive Services
BMU	Beach Management Unit
CDF	Constituency Development Fund
CEEC	Citizens Economic Empowerment Commission
FASA	Development and Scaling of Sustainable Feeds for Resilient Aquatic Food Systems in Sub-Saharan Africa
GESI	Gender Equality and Social Inclusion
GMP	Genetically Modified Plant
KII	Key Informant Interview
NADS	National Aquaculture Development Strategy
Norad	Norwegian Agency for Development Cooperation
SDG	Sustainable Development Goal

Glossary

Aquaculture: Aquaculture is the farming of aquatic organisms, including fish, mollusks, crustaceans and aquatic plants. Farming implies some form of intervention in the rearing process to enhance production, such as regular stocking, feeding, protection from predators, etc. Farming also implies individual or corporate ownership of the stock being cultivated. For statistical purposes, there are two types of aquatic organisms: (1) those harvested by an individual or corporate body that has owned them throughout their rearing period contribute to aquaculture, while (2) those exploitable by the public as a common property resources, with or without appropriate licenses, are the harvest of fisheries.

Customary laws: This refers to a set of customs, practices and beliefs that are accepted as obligatory rules of conduct by indigenous peoples and local communities.

Extensive farming system: An extensive system is the least managed form of fish farming, in which little care is taken. This system involves large ponds measuring 1 to 5 ha in area with a stocking density limited to fewer than 5000 fish/ha. No supplemental feeding or fertilization is provided. The fish eat only natural food. Yield is poo, at just 500 kg/ha to 2 t/ha, and survival is low. Labor and investment costs are low, and income is minimal.

Fisheries management: Fisheries management is the integrated process involved in creating regulations or rules that govern fisheries activities in order to ensure the continued productivity of the resources and the accomplishment of other fisheries objectives. The process includes information gathering, analysis, planning, consultation, decision-making, allocation of resources, and formulation and implementation, with enforcement as necessary.

Gender equality: Gender equality is the absence of any discrimination based on gender, with equal rights, responsibilities and opportunities for everyone, without distinction based on their gender. This means transforming the distribution of opportunities, choices and resources available to women and nonbinary people so that they have equal power to shape their lives and participate in the process, thereby increasing equality between people of all genders. Rights, responsibilities and opportunities will not depend on the gender that society attributes to each person, ensuring that everyone has equal access to socially, economically and politically valued goods, resources, opportunities, benefits and services.

Gender equality and social inclusion (GESI)
: GESI is the collective term that is widely applied to recognize the complementary actions needed to ensure equal access to socially, economically and politically valued goods, resources, opportunities, benefits and services for all.

Gender unequal: This refers to programs or policies that offer a disproportionate benefit to men and boys. They do not consider preexisting forms of inequality and increase gender gaps.

Gender unaware: This refers to programs or policies that are designed without prior analysis of the culturally defined economic, social and political roles and responsibilities associated with being female and male.

Gender aware: This refers to programs or policies that are informed by a gender analysis and acknowledge that women and men have different roles, responsibilities and needs. They may try different things to reach women and may reach as many women as men, but they do not specifically aim to reduce existing gender inequalities.

Gender responsive: This refers to programs or policies that acknowledge specific needs, priorities, power structures, and relationships between men and women, and seek to properly address them in designing, implementing and evaluating activities. The programs and approaches apply targeted actions to address inequalities and promote the empowerment of women.

Gender transformative: This refers to programs or policies that seek to change unequal gender relations by redressing the root causes of gender inequality. They challenge deeply entrenched gender norms, biases and stereotypes in order to promote shared power, control of resources and decision-making, and women's empowerment. They recognize and strengthen positive norms to create an enabling environment for more equal societies.

Intensive farming system: An intensive fish farming system is a well-managed form of fish farming, in which all attempts are made to maximize fish production using the minimum amount of water. This system involves small ponds, tanks or raceways with very high stocking densities of 10–50 fish/m^3 of water. Fish are fed wholly formulated feed. Proper management requires using aerators to control water quality and using highly quality feed to meet the nutritional needs of the fish. Yields range from 15 to 100 t/ha or more. Although the cost of investment is high, the return from the fish yield exceeds it, thereby ensuring profit.

Semi-intensive farming system: Semi-intensive fish culture systems are more prevalent and involve rather small ponds of 0.5–1 ha in an area, with higher stocking densities of 10,000–15,000 fish/ha. In this system, care is taken to develop natural food through fertilization either with or without supplemental feed. However, the main food source is natural food. Yield is moderate, at 3–10 t/ha, and survival is high.

Social inclusion: Social inclusion refers to the process of improving the terms for individuals and groups to take part in society. It also describes how to improve the ability, opportunity and dignity of disadvantaged people on the basis of their identity to take part in society. It makes the "rules of the game" fairer.

User and tenure rights: Fisheries user and tenure rights deals with how marine and inland capture fisheries are accessed, used and managed using various types of rights-based approaches.

Washington Group Short Set of Disability Questions[1]: The Washington Group on Disability Statistics developed, tested and adopted a set of six questions in national censuses and surveys. The questions reflect advances in the conceptualization of disability and use the World Health Organization's International Classification of Functioning, Disability, and Health (ICF) as a conceptual framework. The medicalization of disability used to place disability within the person and characterize it by impairments or deficits in bodily functions. In a break from the past, the ICF presents a biopsychosocial model that locates disability as the interaction between a person's capabilities (limitation in functioning) and environmental barriers (physical, social, cultural or legislative) that may limit their participation in society.

Executive summary

The Development and Scaling of Sustainable Feeds for Resilient Aquatic Food Systems in Sub-Saharan Africa (FASA) project is an initiative funded by the Norwegian Agency for Development Cooperation (Norad). It operates in Nigeria, Zambia and Kenya, with research support from Malaysia and Sweden. Includovate spearheads the gender and social inclusion work under the guidance of the WorldFish project leader based in Malaysia. The primary goal is to lead gender and social inclusion (GESI) efforts within the FASA project, aiming to conduct comprehensive gender and social assessments and identify opportunities to advance GESI objectives set by Norad, WorldFish and other key stakeholders within the innovative feed landscape.

To conduct this GESI assessment, the project used the Automated Directive Services (ADS 205) domains of the United States Agency for International Development, focusing on identifying key GESI-related issues and constraints. Emphasis was placed on understanding how proposed interventions would impact various social groups, including women, men, youths and other marginalized communities. The assessment involved a meticulous desk-based policy review of the legal frameworks governing the fisheries sector in Nigeria, Zambia and Kenya, analyzing existing laws, policies and regulations related to fisheries resource management, including aquaculture, from a gender perspective. This review was followed by primary data collection, employing a mixed research approach involving 28 key informant interviews (KIIs) and 420 survey responses across the three countries.

Summary of findings

Gendered policy review of fisheries laws

The policies governing Nigeria's fisheries sector predominantly focus on technical aspects, overlooking broader social dynamics and gender differences within fishing communities. Although some regulations benefit small-scale communities, there is a lack of consideration for distinct experiences, needs and contributions of men and women. Nigeria's policies reinforce informal customary rules rooted in traditional norms, limiting women's access rights and decision-making power. Despite this, there are opportunities for the FASA project to integrate gender-sensitive approaches, aligning with the National Gender Policy and the Sustainable Development Goals (SDGs). On average, Nigeria's policies are gender unequal.

Zambia's Fisheries Act (2011) and regulations exhibit gender inequality, but the National Water Policy stands out as gender-responsive, considering specific challenges that women face in water management. The Water Management Act promotes gender balance in representation and management, encouraging women's meaningful participation. Despite the gender-aware policies, access and tenure rights for women remain inadequately protected. The FASA project can address this by ensuring gender balance in aquaculture-related bodies and sharing gender studies with policymakers.

Kenya's policies vary in their gender responsiveness. Although the Fisheries Management and Development Act (2016) showcases gender responsiveness with provisions for women's representation and gender parity, other regulations demonstrate varying degrees of gender awareness. Policy incongruence is significant in Kenya, creating challenges for effective gender integration. The FASA project can enhance institutional capacity by including women, youths and marginalized groups in fish feed production, advocating for compliance and adopting a gender-transformative approach aligned with the National Gender Policy.

Sociodemographic background of survey respondents

Across the surveyed respondents in the three countries, the majority are married, with more unmarried men than women. They tend to have secondary or higher education, follow the Christian faith, and typically have around two children under the age of 18. Few respondents identify as disabled, live in female-headed households or are migrants. Regarding occupation, fish farming serves as either the primary or secondary

source of income for most of the respondents in Nigeria. In contrast, fish farming in Zambia and Kenya is primarily a secondary occupation, with no significant gender differences. Regarding income, there is no specific pattern in Nigeria. In Zambia and Kenya, however, fish farming contributes up to 40 percent of household income, with no considerable gender differences.

Concerning aquaculture practices, earthen ponds are commonly used, especially in Zambia and Kenya, without significant gender differences. In Nigeria, men are more likely to use earthen ponds, whereas concrete tanks are more popular among women. A few respondents in Kenya, primarily women, reported using cages. Intensive and semi-intensive farming practices are prevalent in Nigeria, with more women engaging in intensive practices for earthen ponds and men for concrete tanks. In Zambia and Kenya, semi-intensive and extensive farming methods dominate.

Fish feed ingredients and use

In Nigeria, respondents, regardless of gender, use maize powder, genetically modified plants (GMPs) and various brans and cakes for fish farming, though men use them slightly more than women do. Maize powder is predominantly chosen for its availability, a factor that primarily women highlight. Men also mention its affordability and nutritional value as reasons for using it. Other ingredients that men and women favor include GMPs for their availability and nutritional benefits and various brans and cakes because of their availability. These essential ingredients are typically acquired through purchases, primarily made by women, from local stores or suppliers in larger towns. Additionally, some individuals, mainly women, process maize powder at home. Both men and women respondents consider seasonality factors, acknowledging the variations in ingredient availability and the associated higher prices during times of scarcity. This awareness influences their decision-making regarding ingredient choices in fish farming practices. In Nigeria, these ingredients serve dual purposes. They are used not only as fish feed but also as fodder for other animals and even for human consumption. Maize powder and GMPs are predominantly used by male family members for other purposes.

In Zambia, respondents use chicken manure and feathers, along with GMPs, for their aquaculture practices. Notably, women tend to use them more than men do because of their availability. Chicken manure is typically processed at home. Respondents, especially women, emphasize the affordability and availability of GMPs, which are key factors influencing their choice. GMPs are primarily purchased from local markets. Women respondents note specific seasonal considerations related to both chicken manure and GMPs. For chicken manure, these considerations encompass weather patterns and disease outbreaks, highlighting the need for strategic planning during certain times of the year. In Zambia, chicken manure and feathers are also used for compost, and GMPs are used to feed other animals. Chicken manure and GMPs are predominantly used by male family members for other purposes.

In Kenya, respondents use plant leaves and various brans and cakes in their aquaculture practices. Plant leaves are a common choice, with a higher percentage of men using them because of their availability. Plant leaves are processed at home. However, there are seasonal concerns related to plant leaves, with scarcity becoming an issue during the dry season. Brans and cakes are another significant input, with a higher percentage of women using them because of their nutritious value. Unlike plant leaves, brans and cakes are purchased from the market. Similar to plant leaves, seasonal variations impact the availability of brans and cakes, especially when there is no harvest. In Kenya, plant leaves are also used as compost and other animal feed, while rice bran is primarily used as animal fodder. Plant leaves and various brans and cakes are predominantly used by male family members for other purposes.

There is some competition for using common fish feed ingredients across the three countries. Similarly, while respondents report instances of household disputes regarding these ingredients, they are not widespread. The underlying cause of these household disputes primarily stems from the dual nature of these ingredients, serving as essential components for both fish feed and other household needs, including human consumption. This multifaceted use can create challenges, as household members navigate the allocation of these resources for different purposes.

Gendered and socially differentiated needs and risks associated with the use of novel ingredients

In Nigeria, gender disparities are evident in various aspects related to fish feed in aquaculture. Compared to men, women face significant challenges in accessing the information, skills, resources and assets necessary for fish feeds. Although both genders recognize the need to improve feed quality, men exhibit higher awareness in this regard. Men also generally feel more confident about possessing the required skills for enhancing feed quality. The availability of fish feed ingredients concerns women, who are unsure about the ingredients they desire. Despite willingness from both genders to experiment with new feed ingredients, women encounter barriers such as lack of funds, limited access to inputs, and insufficient knowledge, all of which hinder their participation. Access to information remains a challenge, especially for women, who are uncertain about how to access information on new fish feed ingredients. Additionally, both men and women express a need for more information on various ingredients. Barriers to accessing this information include cost, inadequate technology, geographical constraints and land scarcity. For women, financial constraints, lack of technology and limited knowledge are significant barriers preventing them from enhancing the quality of their preferred ingredients. Despite these challenges, women express higher satisfaction with their current strategies compared to men, who are more uncertain about their approaches. Youths also face more obstacles than do adults. These are primarily related to financial constraints, lack of inputs and limited knowledge, restricting their ability to experiment with new feed ingredients.

In Zambia, gender disparities are evident in the aquaculture sector concerning fish feed. Women acknowledge the need to improve feed quality, but they are uncertain about possessing the necessary skills and resources. Although both genders express a willingness to experiment with new feed ingredients, women face barriers such as limited access to inputs, services, funds, knowledge, decision-making power and confidence, all of which hinder their participation. Men generally exhibit higher awareness about accessing information on new fish feed ingredients. Both genders feel the need for additional information on various ingredients, but obstacles like technology limitations and lack of smartphones hinder their access. For women, challenges in mechanization, acquiring new skills, finance, technology, income and knowledge prevent them from enhancing the quality of their preferred ingredients. In addition, women express more dissatisfaction than men with their current strategies for addressing fish feed barriers. Youths face similar challenges as women, primarily related to limited access to inputs, services, funds and knowledge, restricting their ability to experiment with new feed ingredients compared to adults.

In Kenya, there is a shared recognition between men and women about the need to enhance the quality of fish feeds. However, both genders express uncertainty about possessing the necessary skills and resources to do so. Although women are willing to experiment with new feed ingredients, they face various barriers such as limited access to funds, decision-making power, inputs, knowledge, services and competition for ingredients. There is a lack of clear patterns regarding the perceived risks of trying new fish feeds, but women tend to express more concerns about financial losses. Information access and needs are relatively similar between genders, though women are slightly more unsure about accessing information. Both men and women acknowledge the need for additional information on various ingredients. Common barriers to information include technology limitations, cost, location and lack of smartphones. For women, challenges in technology, income, finance, mechanization, new skills, infrastructure and knowledge hinder their efforts to improve the quality of their preferred ingredients. Interestingly, women seem more satisfied than men with their current strategies to address fish feed barriers. Youths face similar obstacles as women, making it challenging for them to experiment with new feed ingredients compared to adults.

ADS 205 framework

Laws, policies, regulations and institutional practices

The study highlights a significant gap in the participants' knowledge regarding the formal laws and regulations governing fisheries in all three nations. The household survey identifies grassroots organizations working to address barriers that women and youths face, bringing attention to the lack of awareness surrounding these organizations. Although Kenya exhibits a higher level of awareness and a greater number of organizations in comparison to Nigeria and Zambia, the overall pattern emphasizes the need for improved efforts to inform communities about the existence and initiatives of these organizations. Some key highlights are as follows:

- In all three countries, women, in general, have a higher level of awareness than men regarding organizations working to remove barriers that women face in their communities. In Zambia and Nigeria, men are either unaware or do not know of such organizations. They may be under the impression that they do exist, even if they do not know about them.
- There is a relatively low level of awareness among respondents regarding organizations working in their communities to address the barriers that youths face across the three countries. In Nigeria, adult women are more likely than young women to either report the absence of such organizations or express uncertainty about their presence in their communities. Young men in Nigeria and Zambia are more likely than adult men to report the absence of such organizations or express uncertainty about their presence.
- The younger generation, in general, tends to have less awareness than the older generation about organizations working to address fish feed barriers in their communities or report that they do not know about them.

Overall, fish feed farmers in Zambia have more interaction with authorities, followed by Kenya and then Nigeria. In Zambia, women have more interaction with authorities than men.

Gender roles and responsibilities

The study examined the gendered division of labor between men and women across paid and unpaid work (caregiving and household tasks) and community service to identify potential constraints and challenges. Some key highlights are as follows:

- Constructing or digging ponds: Across the three countries, this is considered men's work, involving adult men in Nigeria and Kenya as well as some young men in Zambia.
- Collecting water from ponds: Adult women and men do this task a lot in Nigeria, with 20 percent more men and even some young men involved. It is not often done in Zambia, but if it is, adult men are responsible. A third of men do this in Kenya, with some adult women and young men involved.
- Cleaning ponds: Half as many women as men clean ponds in all three countries, with some young men involved.
- Feeding fish: Across the three countries, men and women are responsible for feeding fish. More young men do the task than adults, with negligible differences in age among women in Zambia and Kenya. In Nigeria, adult women are largely responsible.
- Day-to-day household management: In Nigeria, men and women are equally responsible for the day-to-day management of the household, while it is mainly men's responsibility in Zambia and Kenya.
- Fishing and harvesting: This is mainly done by male household members, though women are involved to a lesser extent. Regardless of gender, respondents are generally unaware of how much fish harvesting their spouse does. However, Nigeria has the largest number of women, at nearly two-thirds, out of all the countries reporting their involvement in harvesting.
- Selling fish products: This is mainly done by women, with no stark difference by age. In Nigeria and Zambia, a large percentage of men also sell fish. Neither spouse is accurately aware of how much fish their spouse sells.
- Processing (dried fish and fish paste): In Nigeria and Zambia, half to most of the respondents do not process fish. If they do, it tends to be a role for women, with no stark difference by age, except that in Kenya the task is mainly done by adult women.
- Selling surplus produce at markets: In Nigeria, there are a number of subsistence farmers in our sample. However, if there is a surplus, then men and women equally sell it, with no clear demarcation by age. In Zambia and Kenya, more younger women than men sell the surplus.

- Unpaid domestic duties: Adult women do the bulk of the unpaid work across all three countries, with some girls helping. Some boys help in Nigeria.
- Paid work: Across all three countries, men do more of the paid work than women. All respondents tend to underreport the amount of paid work done by their spouse.
- Food shopping at markets: Women do the most of the food shopping in all three countries. Men self-report their involvement, though the women's answers did not reflect this contribution.

Time use

Across the board, respondents express a high level of satisfaction, being either satisfied or very satisfied, with their available leisure time. Generally, individuals within these communities feel they have a sufficient amount of time for personal activities and relaxation. Consequently, both male and female respondents of all age groups should have ample time to participate in training sessions and events for the FASA project. In Kenya, however, a majority of respondents from both genders indicate having only 1 hour of leisure time. This suggests a relatively restricted amount of free time for personal activities and relaxation. This limitation could be attributed to specific factors unique to the communities in Kenya, such as work obligations, household duties or other time-intensive commitments.

Access to and control over resources and information

In all three countries, the survey reveals a wide array of information sources and communication channels used by communities. Cultural norms impact interactions with extension officers, often necessitating approval from spouses to attend training. Key channels include farmer cooperatives, digital platforms like SMS and WhatsApp, as well as local leaders and television. In Nigeria, women primarily rely on friends and group meetings, while Zambian women highly value information from local leaders. Across the countries, young individuals tend to use the internet more than adults. In Kenya, half of young women prefer local leaders as their source of information, compared to over one-third of adult women. Conversely, more than one-third of young men and almost two-thirds of adult men rely on local leaders. Similar age-related differences were not significant in the other two countries.

Microfinance groups in Kenya predominantly empower women economically, whereas men engage in diverse income-generating activities beyond traditional agriculture. Zambia demonstrates a robust presence of agricultural cooperatives, promoting collective productivity and resource use. In Nigeria, both agricultural cooperatives and savings and credit groups are popular, providing inclusive opportunities for community members to enhance their economic prospects. Despite variations, a consistent trend across the three countries is the active participation of adult women and young men in savings groups and agricultural cooperatives, showcasing the diverse roles that different gender and age groups undertake in these economic activities.

Morning is the preferred training time for both women and men across the three countries, except in Zambia, where respondents, especially women, prefer 14:00. The survey data underscores that group members often self-select to participate, leading to a high level of satisfaction because of the benefits derived from group membership. Leadership roles vary. In Nigeria and Zambia, young women are more actively engaged in leadership positions than adult women. Kenya presents a different trend, however, where more adult women hold leadership roles. Conversely, adult men in Nigeria and Kenya are more likely than young men to occupy such positions, while Zambia shows a higher percentage of young men in these roles. Respondents express limited interest in joining new groups because of time and financial constraints.

Norms and beliefs

In rural fishing communities of Nigeria, Zambia and Kenya, deeply rooted cultural norms sustain gender disparities, especially regarding women's access to technology and opportunities within the fishing industry. The study highlights prevalent norms, such as women predominantly handling unpaid domestic work, limiting their involvement in paid and physically demanding tasks. Although some communities express approval for shared tasks, significant portions believe their societies would disapprove. In particular, young women in Kenya exhibit strong disapproval, emphasizing deeply ingrained societal norms. Despite theoretical acceptance of sharing tasks, these beliefs often do not translate into household practices. In Nigeria, although most endorse

shared responsibilities, the gap between approval and practice remains considerable. Men, in particular, are hesitant because of fear of community disapproval, indicating the enduring influence of societal perceptions. In Zambia, despite widespread approval, many anticipate community disapproval, yet nearly half engage in shared responsibilities, indicating a willingness to challenge societal norms. Kenya presented a complex scenario, as despite approval, especially among men, there is an anticipation of societal disapproval. However, half of the respondents continue sharing tasks, indicating a gradual transformation in gender dynamics.

Regarding life satisfaction, Nigerians, both men and women, express higher current satisfaction and more optimistic future expectations. Zambian women and men exhibit moderate satisfaction and expectations, while Kenyan women and men report the lowest levels of both. These varying levels of satisfaction and expectations reflect the complex interplay of cultural norms and individual perceptions within these communities.

Patterns of power and decision-making

The survey reveals a preference for shared decision-making in household and community matters, highlighting the importance of collaboration. Gender disparities exist, particularly in Nigeria, but are less prominent in Zambia and Kenya. There is a notable desire among young individuals for increased involvement in decision-making, underlining the necessity for initiatives that engage youths. In Nigeria and Kenya, women express a need for greater participation in decisions concerning earnings, emphasizing the significance of their economic empowerment. Comfort levels in public speaking vary across the three countries, with evident gender differences, indicating a requirement for communication and confidence-building programs. Zambia stands out for its higher overall comfort levels in public speaking. Additionally, the majority of respondents emphasize the importance of consulting spouses in decision-making processes. These findings reveal the need for targeted programs to address gender disparities, empower women economically, engage youths and enhance communication skills within these communities.

Conclusion

In conclusion, the FASA project's GESI assessment sheds light on intricate gender dynamics within rural fishing communities of Nigeria, Zambia and Kenya. The research highlights profound cultural norms and beliefs that perpetuate gender inequalities, especially concerning women's access to technology and opportunities in the fishing industry. Although theoretical acceptance of shared responsibilities exists, these beliefs often do not translate into practical applications within households because of the fear of community disapproval, particularly among men. The study illuminates various aspects of gender roles, decision-making patterns, and access to resources and information. It reveals a strong preference for shared decision-making, emphasizing collaboration in household and community matters. However, significant gender disparities persist, especially in Nigeria, necessitating targeted interventions. The research underscores the importance of empowering women economically, engaging youths and enhancing communication skills to bridge these gaps.

Additionally, the assessment provides valuable insights into the diverse sources of information and communication channels that these communities use. It emphasizes the critical role of local leaders, digital platforms, farmer cooperatives and television in disseminating information. Despite challenges, there is a high level of satisfaction with available leisure time, indicating potential opportunities for participation in training programs. Furthermore, the study delves into the complex landscape of fish feed ingredients and their use, revealing multifaceted challenges that both men and women face, including limited access to funds, inputs and information. Understanding these challenges is vital for designing effective strategies that cater to the specific needs of different gender and age groups within these communities.

In summary, the GESI assessment not only highlights existing disparities but also points toward potential avenues for positive change. By addressing these challenges through targeted programs, there is a significant opportunity to transform gender dynamics, enhance economic prospects, and foster better communication and collaboration within these communities. These findings serve as a foundation for informed policymaking and the development of inclusive initiatives that can create lasting impact and promote gender equality in the fisheries sectors of Nigeria, Zambia and Kenya.

1. Background

1.1. Research objectives

The primary purpose is to lead the GESI work in the FASA project. There are two specific objectives:

1. Conduct gender and social assessments for developing and scaling sustainable feeds.
2. Identify opportunities for the project to advance the GESI goals of Norad, WorldFish and other key stakeholders within the novel feed landscape.

1.2. Research questions

1. What are the gendered and socially differentiated *needs* associated with the use of novel ingredients?
2. What are the gendered and socially differentiated *risks* associated with the use of novel ingredients?
3. What are the gendered and socially differentiated *opportunities* associated with the use of novel ingredients?

1.3. Intended outcome

These assessments will enable WorldFish to identify such risks and to ensure that women, youths and other marginalized groups are prioritized throughout implementation and ensure the same access to project opportunities as nonmarginalized groups.

2. Conceptual framework

2.1. ADS 205

The assessments are based on the five domains detailed in ADS 205.

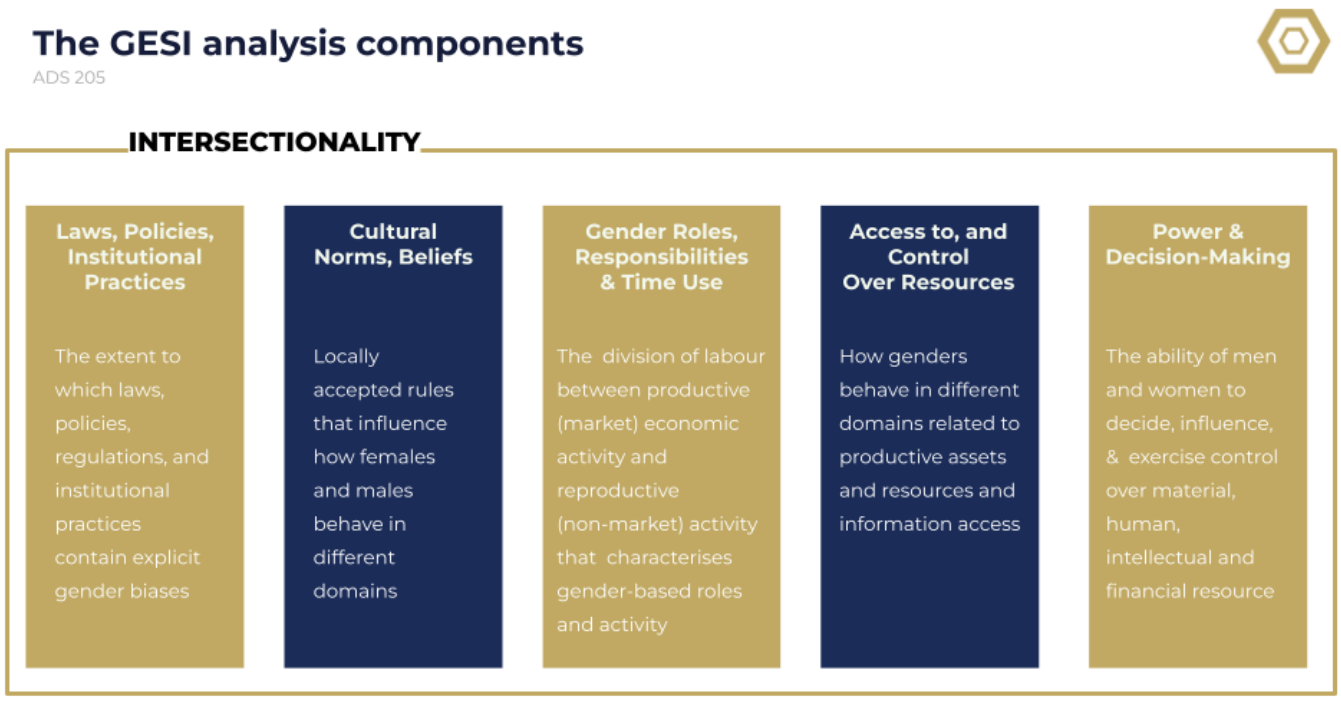


Figure 1. ADS 205 plus intersectionality.

2.1.1. Laws, policies, regulations and institutional practices

The study identified the extent to which laws, policies, regulations and institutional practices contain explicit or implicit gender biases. Explicit biases include explicit provisions that treat males and females differently, and laws and regulations that criminalize and/or restrict individuals on the basis of their gender identity or expression. Implicit biases include the different impacts of laws, policies, regulations and practices on men and women because of different social arrangements and economic behavior.

2.1.2. Cultural norms and beliefs

The study examined locally accepted quality of life goals and aspirations, perceptions of gender identity and expression, and ideas that impact participation in project activities.

2.1.3. Gender roles, responsibilities and time use

The study examined the gendered division of labor between men and women across paid and unpaid work (caregiving and household tasks) and community service to identify potential constraints to participation in development projects.

2.1.4. Access to and control over resources

The study mapped the productive assets and resources (land, housing, equipment, income, social benefits, public services and technology) and differences in access to information.

2.1.5. Patterns of power and decision-making

The study examined the ability of men and women to decide, influence and exercise control over productive and financial resources, and their decision-making capacity in agricultural cooperatives.

Box 1. Norad's thematic priority areas for women's rights and gender equality.

The following are the priority areas for the FASA project:

- the rights of girls to education
- women's political rights and empowerment
- women's economic rights and empowerment
- a life free of violence and harmful practices
- sexual and reproductive health and rights.

What will these priority areas mean for the project and how will they be linked with ADS 205?

Norad's thematic priority areas	Link with FASA	Link with ADS 205[2]
Women's political rights and empowerment	Women have equal leadership in groups, etc., associated with the project.	• Cultural norms and beliefs • Gender roles, responsibilities and time use
Women's economic rights and empowerment	Any value chain opportunities equitably benefit women and any income derived is equitably shared.	• Patterns of power and decision-making • Access to and control over resources • Gender roles, responsibilities and time use
A life free of violence and harmful practices	A "do no harm" approach is adopted that involves checking to ensure gender-based violence does not increase with income and empowerment and ensures that markets are safe places for women	• Laws, policies, regulations and institutional practices • Patterns of power and decision-making

2.2. The gender continuum

The gender continuum has been used to help assess and rank different policies according to their level of gender integration. It has five phases.

1. **Gender unequal:** These types of programs and policies offer a disproportionate benefit to men and boys, as they do not consider preexisting forms of inequality. As a result, they increase gender gaps because men and boys benefit more than women and girls.

2. **Gender unaware** (formally "gender blind"): This refers to programs and policies that are designed without prior analysis of the culturally defined economic, social, and political roles and responsibilities associated with being female and male. As such, they may or may not have an impact on gender inequality.

3. **Gender aware:** Here, programs and policies are informed by a gender analysis and acknowledge that women and men have different roles, responsibilities and needs. They may try different things to reach women, and may reach as many women as men, but do not specifically aim to reduce existing gender inequalities.

4. **Gender responsive:** The specific needs, priorities, power structures and relationships between men and women are acknowledged, and they seek to properly address them in designing, implementing and evaluating activities. The programs and approaches apply targeted actions to specifically address inequalities and promote the empowerment of women.

5. **Gender transformative:** Programs seek to change unequal gender relations, focusing on redressing the root causes of gender inequality. They challenge deeply entrenched gender norms, biases and stereotypes in order to promote shared power, control of resources and decision-making, and women's empowerment. These recognize and strengthen positive norms to create an enabling environment for more equal societies.

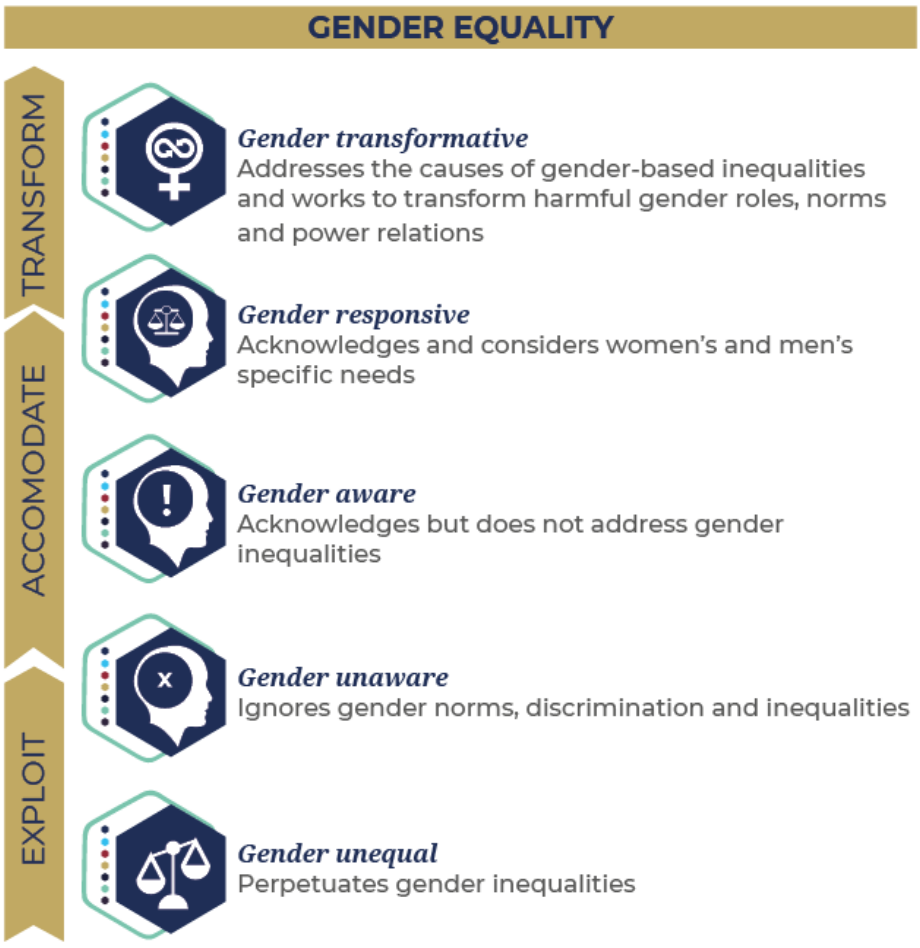


Figure 2. The gender continuum.

3. Methodology

The study was aligned with the gender analysis domains outlined in ADS 205: (i) laws, policies, regulations and institutional practices that influenced the context in which men and women acted and made decisions, (ii) cultural norms and beliefs, (iii) gender roles, responsibilities and time use, (iv) access to and control over assets and resources, and (v) patterns of power and decision-making. These domains framed the identification of relevant questions around key gender issues, gaps between men and women, and areas where women and girls were disempowered, and supported the analysis.

3.1. Desk review

Criteria	Inclusion criteria	Exclusion criteria
Geographic scope	Kenya, Nigeria and Zambia	Any other country or continent
Study target population	Women and men of different socioeconomic groups, including the most vulnerable in fish-dependent rural livelihoods	Non-fish-dependent communities
Data sources	Policies (related to fish, agriculture, climate, water, gender)	Other policies

Table 1. Desk review guide for researchers.

3.2. Gender equality and social inclusion assessments

GESI assessments were carried out for each country, considering the lack of sufficient information on local ingredients for sustainable use in fish feeds. Furthermore, there was a significant gap in understanding the full range of factors that influence how women and men adopted and used aquaculture innovations, particularly in relation to gender power relations and dynamics. This GESI assessment used the ADS 205 domains and focused on identifying key gender and social inclusion-related issues and constraints, with an emphasis on how proposed interventions would impact women, men, youths, disabled individuals and other marginalized social groups.

Methods	Key informant interviews	Surveys		Total survey respondents
		Aged 30 and below	Over 30 years old	
Local partners and cooperatives	5 male government officials 1 male fish feed producer 1 female fish feed producer 1 female fish feed seller 1 female feed miller and producer 1 male program NGO officer 1 male feed miller	-	-	
Women fish farmers	-	22 (19)	43 (36)	65 (55)
Men fish farmers	-	12 (10)	23 (26)	35 (36)
Total	**10 (11)**	**34 (29)**	**66 (62)**	**100 (91)**

Note: Figures in parentheses indicate achieved numbers.

Table 2a. Sample distribution for qualitative and quantitative data collection for GESI assessments, Nigeria.

Methods	Key informant interviews	Surveys		Total survey respondents
		Aged 30 and below	Over 30 years old	
Local partners and cooperatives	3 male government officials 2 female government officials 1 male fish feed producer 1 female fish farmer	-	-	
Women fish farmers		26 (14)	54 (58)	80 (72)
Men fish farmers	-	13 (9)	27 (35)	40 (44)
Total	**10 (7)**	**39 (23)**	**81 (93)**	**120 (116)**

Note: Figures in parentheses indicate achieved numbers.

Table 2b. Sample distribution for qualitative and quantitative data collection for GESI assessments, Zambia.

Methods	Key informant interviews	Surveys		Total survey respondents
		Aged 30 and below	Over 30 years old	
Local partners and cooperatives	5 female government officials 2 male government officials 1 male fish feed producer 1 male fish feed supplier 1 female fish feed supplier	-	-	10
Women fish farmers	-	60 (8)	130 (104)	190 (112)
Men fish farmers	-	30 (11)	60 (90)	90 (101)
Total	**10 (10)**	**90 (19)**	**190 (194)**	**280 (213)**

Note: Figures in parentheses indicate achieved numbers.

Table 2c. Sample distribution for qualitative and quantitative data collection for GESI assessments, Kenya.

3.2.1. Selection criteria for locations

There were two main selection criteria for the FASA project when choosing locations. The first was the project's interest, specifically regarding priority areas in each country. The second was identifying the biggest needs. For example, within the priority areas, where do women fish farmers have limited access to relevant information, markets, fish feed, etc.? Are there particular locations where cultural or gender norms hamper women's participation and decision-making in the fish value chain, as determined by women's lack of involvement in the fish value chain?

Nigeria	Zambia	Kenya
Oyo, Lagos	Eastern (Chipata, Sinda, Petuake and Katete)	Kisumu, Busia
Abuja FCT/Nassarawa	Northwestern (Solwezi and Mushindamo districts)	Kakamega,Vihiga
Adamawa	Southern (Kalomo and Livingstone districts)	HomaBay, (Kisii)
Sokoto		Siaya, (Migori)

Note: Migori and Kisii were not visited due to riots.

Table 3. Country-wise location for data collection.

3.2.2. Sampling strategies

3.2.2.1. Sampling strategy for Nigeria

In Lagos State and the city of Ibadan in Oyo State, a purposive sampling method was used because of the clusters of fish farmers. Two specific areas were deliberately chosen where these clusters were located. Within these areas, a random sampling technique was used to select male farmers from the cluster. For female farmers, a snowball method was applied, wherein existing participants were asked to refer other female farmers within the same clusters. Notably, these clusters were situated within the same local government areas.

For Nigeria, the enumerators faced challenges when doing the KIIs because of the limited time the respondents gave them. Most of the areas in Nigeria, like Lagos and Oyo, are busy business regions, so the respondents are always on the move. The respondents could not give more than 25 minutes of their time for these interviews.

3.2.2.2. Sampling strategy for Zambia

In specific districts, enumerators liaised with the Ministry of Fisheries and consulted the district officer to identify suitable fish farmers based on gender and age criteria. The officer compiled a list of eligible fish farmers, specifying their locations. Subsequently, the enumerators, accompanied by ministry representatives or camp officers, conducted interviews in the designated areas. In contrast, some districts used a stratified random sampling method because of the study's focus on subgroups. In Kalomo, for instance, fish farmers were categorized into subgroups consisting of 13 women, 3 men and 2 youths. However, this approach faced challenges in districts like Livingstone, where the list of fish farmers provided by the District Fisheries Office, facilitated by WorldFish Zambia, primarily included institutions such as churches, schools and commercial hatcheries, making the selection of individual farmers more complex.

As for Zambia, the districts in Southern and Northwestern provinces were changed upon advice from WorldFish Zambia. Earlier, the data collection was planned in the districts of Zambezi and Kasempa in Northwestern province and in the districts of Kalomo Monze/Namuala in Southern province. WorldFish Zambia advised us to collect data in Solwezi and Mushindamo in Northwestern province and Livingstone and Kalomo in Southern province. Data collection did not take place in Luapula province but in Eastern province, where the plan was to visit two districts. However, we ended up going to four districts because of a lack of sufficient respondents for interviews and surveys. In Solwezi, we faced some transportation issues going to the interior rural areas, and county fisheries officials provided their 4x4 vehicles with drivers to reach some areas for data collection. All these factors impacted the sample distribution as well.

3.2.2.3. Sampling strategy for Kenya

The survey employed a purposive sampling method in Kenya. In each county, the enumerators initiated the process by engaging with the county director of fisheries, who oversees fisheries management within the counties. The enumerators communicated the survey's objectives clearly. The county fisheries leadership then assisted in pinpointing the specific communities engaged in fish farming and the relevant fish farmers for the study. The fisheries office department maintains this information, which encompasses details of all registered fish farmers. Additionally, in every county, enumerators were accompanied by a subcounty fisheries officer. This officer introduced them to the farmers and ensured a smooth process by establishing trust and rapport. Preliminary discussions were organized with the farmers to schedule interviews at their convenience.

Data collection only took part in six counties instead of eight. It did not take place in Migori and Kisii because of security concerns in those counties from ongoing protests in Kenya at the time hence. The protests delayed data collection by 4 days.

3.2.3. Data analysis

Prior to the data analysis, the quantitative data was checked for missing values, duplications, data inconsistencies, etc. Insights from the data were summarized using SPSS in tabular format, applying univariate and bivariate analysis.

The qualitative data, collected from the KIIs, was translated and then transcribed into a Word document. Insights collected from the KIIs were clustered and organized into "thematic codes." These codes identify the needs, risks and opportunities associated with the use of novel ingredients by gender, age and other intersectional categories and align with ADS 205. The data was analyzed within and across country contexts. Includovate undertook a thorough synthesis and analysis of all the quantitative and qualitative data and information gathered from a documentation and desk review as well as the surveys and KIIs.

Box 2. Analysis of the quantitative data.

The independent variables, particularly gender and age, have been taken into account as background characteristics in the study.

3.3. Limitations of the study

- Only between seven and 11 KIIs were completed per country. Given how vast this sector is and how many diverse stakeholders there are, more interviews would have allowed a more inclusive and representative sample by province, country and identity group.
- With a limited budget, we could not survey all the provinces and counties where the FASA project will be implemented. However, we did attempt to represent all diverse locations in our sample.
- The survey and the qualitative data collection occurred at the same time. It would have been more fruitful to collect and analyze the survey data first and then return to the study locations again and use the qualitative data to explore the survey findings further.
- The enumerators were not as skilled at qualitative data collection methods as with the survey method. Despite training and tool testing, the enumerators did not probe as much as taught and anticipated, which reduced the quality of the data.

4. Literature review

Includovate conducted a three-staged systematic literature review[3] for WorldFish to identify (i) potential social and gender risks associated with the use of local ingredients for fish feed instead of for preexisting local uses, (ii) emerging gender-inclusive business and livelihood opportunities, entry points and strategies associated with the use of local ingredients for fish feed, and (iii) methods used for empirical assessment of these issues to inform the design of potential future fieldwork. The first stage was identifying peer-reviewed, unpublished and grey literature using an inclusion/exclusion criteria matrix. The second stage was analyzing the selected literature centered on the objectives. The third stage was developing a methodological blueprint to provide recommendations for potential WorldFish empirical research. This blueprint was informed by insights from the literature review and from literature on methodologies from selected studies used in fish feed ingredients, as well as the existing literature on social and gender risks.

The review found that fish feeds are a fundamental resource for aquaculture. Yet the high costs of standard feeds limit returns for fish farmers, as they represent 40–70 percent of total production costs for small-scale aquaculturists.[4,5] To reduce costs, especially in low-income countries, alternative affordable and nutritious fish feeds need to be found. However, introducing new ingredients could create competition or cause strain on other aspects of small-scale aquaculture production or livelihood systems. For example, women may feed local ingredients such as peels to small livestock or use them in other types of livelihood activities on which they depend. Redirecting these ingredients to fish feed could inadvertently undermine women's control over assets or cause household tension. As such, there is a need for alternative local ingredients that can mitigate the escalating cost of traditional fish feeds, without incurring adverse consequences. The literature reviewed suggests that a deep endogenous understanding of local gender norms would be required to avoid undermining women's goals and strategies.

The full range of factors shaping how women and men adopt and use aquaculture innovations is understudied—particularly the surrounding gender power relations and dynamics.[6] There is some information on access to and control over aquaculture assets, which reveals women's disadvantaged position. The role of gender and social norms is alluded to in many studies and is usually considered a barrier to women's equitable advancement. However, the pockets of literature do not add up to offering the context specificity required. What is known is that gender and social norms can be a positive or negative force for change, making them worthy of study.

The literature review completed for this study builds on the past literature review[7]. However, it digs deeper into the categories of the ADS 205 framework and focuses on country-specific nuances, especially relevant policies, aiming to identify opportunities for WorldFish to influence policy changes that would enhance the affordability of locally produced fish feeds.

In the current scenario, according to the literature review, projects aim to promote gender equality and social inclusion in the aquaculture sector, but certain social groups are more at risk of exclusion from development projects. These groups include women, youths and other marginalized groups such as people with disabilities, internally displaced persons, migrants workers and other indigenous communities. This means that without a concerted effort, these groups could miss out on fish feed projects and benefits.[8] Socially excluded groups undertake diverse roles in aquaculture, the same as more included or mainstream groups. However, they are often unable to acquire the specialized knowledge and skills required to be as successful. According to Barclay et al.[9] sociocultural and economic barriers that lead to marginalization and exclusion culminate in limited access to information, productive resources, technology, extension services and market opportunities. For example, women may have limited access to education and training opportunities, which can

limit their ability to be members of cooperatives or to participate in fish feed projects. Similarly, youths may face challenges in accessing credit and financing to start their own fish feed businesses.

Applying a gender-transformative approach, which is the final goal in the gender continuum, requires aquaculture projects to address structural barriers that reinforce gender inequalities. Such an approach does more than self-improvement for women. In the context of fish feeds, a gender-transformative approach will aim to transform power dynamics embedded in sociocultural norms, patriarchal and religious beliefs, and policy and legal limitations.[10] This involves working with both men and women to challenge gender norms and promote more equitable and inclusive practices that support viable and profitable aquaculture businesses.

5. Gendered policy review of fisheries laws

A desk-based policy review of the legal framework governing the fisheries sector in Nigeria, Zambia and Kenya was conducted to critically assess and analyze the existing laws, policies and regulations related to fisheries resource management, including aquaculture, from a gender perspective. Gendered policy reviews seek to identify how gender roles, norms and inequalities intersect with fisheries policies and regulations, and how these factors impact genders differently in terms of access, participation, benefits and decision-making in the fisheries sector. It also examines how the documents consider the needs of poor, vulnerable and marginalized fishing communities. The following country sections briefly cover the laws, policies and regulations and their gender components. Access and user rights are also covered, along with the proposed management arrangements. Includovate has used the gender continuum (Figure 2) to assess the extent to which the policy and legal frameworks address gender.

5.1. Nigeria

5.1.1. Laws, policies and regulations

This section provides a brief overview of the key fisheries policies, laws and regulations in Nigeria and their gender components. It also discusses management of the sector and access and user rights.

5.1.1.1. Sea Fisheries Act (1992)

This act regulates the management, conservation and development of marine fisheries resources in Nigeria, as the country does not have specific legislation on aquaculture. It is gender unequal, as it has no reference to gender and does not consider preexisting forms of inequality.

5.1.1.2. National Aquaculture Strategy

This promotes the socioeconomic development of fishing communities by facilitating access to farm inputs, equipment and credit services. It also includes cross-sectoral components concerning availability and access to fish farm inputs (feeds, seed and capital), fish fingerling hatcheries, fish feed production, integrated fish farming such as rice, poultry, pigs, crops, ornamental fish farming, shrimp farming, broodstock production, and live fish transportation and handling. Notably, section 4.2.1 of the strategy mandates the government to do the following:

- Promote large-scale investment in fish feed production.
- Stimulate domestic feed industries by using locally available ingredients (cereals, lantern fish and freshwater clupeids) as basic feed ingredients, and encourage research on local alternatives for fishmeal.
- Address underuse of existing feed mills by providing incentives for them to incorporate locally sourced fishmeal.
- Make information on feed and feed materials, especially local sources and prices, regularly available to producers through all means of transmission.
- Ensure feed quality through inspections and a program in place for feed standards and certification for both local and imported feeds.
- Promote the adoption of appropriate feed manufacturing guidelines, such as the FAO Technical Guidelines for Good Aquaculture Feed Manufacturing Practice, which covers various topics including purchasing ingredients, processing, bulk storage, handling, monitoring and documenting. However, the guidelines do not encompass the handling and management of manufactured aquaculture feeds by farmers on their farms.
- Facilitate rapid clearance of imported fish feeds from ports in the country.

Although the National Aquaculture Strategy creates an enabling environment for the FASA project, it is silent on gender and social issues and does not recognize women. Therefore, it is gender unaware on the continuum because it offers no analysis and may (or may not) have an impact on gender inequality. Additionally, the strategy does not have an implementation plan.

5.1.1.3. Sea Fisheries Regulations on Fish Inspection & Quality Assurance (1995)

This encompass rules concerning quality control of fish, production monitoring, transportation, handling, storage and packaging. The Federal Department of Fisheries is the regulating body. This regulation does not explicitly address any gender issues and is gender unequal on the continuum.

5.1.2. Access and tenure rights

5.1.2.1. Water Resources Decree (1993)

This provides a legal framework for managing, using and protecting water resources in the country. Notably, section 2 states any person may (i) "take water without charge for his domestic purpose or for watering his livestock from any water course to which the public has free access" or (ii) "may use water for the purpose of fishing or for navigation to the extent that such use is not inconsistent with any other law for the time being in force." It also states that whoever has a statutory or customary right of occupancy to any land "may take and use water from the underground water source or if abutting on the bank of any water course, from that water course, without charge for domestic purposes, for watering livestock and for personal irrigation schemes." This provision promotes social equity by granting improved access to water resources for any person. However, it does not recognize the different barriers that already exist for women, and it fails to ensure that women's rights and needs regarding water access are adequately recognized and protected. As such, it is gender unequal.

5.1.2.2. Water Use and Licence Regulations (2016)

This regulation protects water resources, promotes equitable water distribution, ensures responsible practices by license and service providers, enhances sustainable water management and supports the overall development and well-being of the society. For example, section 2(f) grants statutory or customary right of occupancy to land and the associated access to water resources, "where a statutory or customary right of occupancy to any land exists, take or use water without charge from the underground water source, or if abutting the bank of any watercourse, from that water course, for reasonable use." This provision recognizes customary water rights related to domestic use, fishing and livestock, which promotes social equity. However, it does not address gender disparity in terms of water access or make explicit references to gender or women. It is therefore gender unequal.

5.1.3. Management

5.1.3.1. Federal

The Water Resources Decree (1993) grants the federal government the authority over both surface and groundwater, as well as water in multistate watercourses. This authority is aimed at supporting the country's water resource planning, development and use. It also involves coordinating the distribution and management of water resources, as well as enforcing suitable standards for investigating, using, controlling, protecting and administering water resources. Additionally, the Federal Department of Fisheries is responsible for ensuring the quality of fish and fish products, as well as issuing health certificates. It is also responsible for supervising the progress of both industrial and artisanal fishing, which encompasses aquaculture. It is mandated to oversee the protection of the rights of small-scale and artisanal fishermen (no references to fisherwomen) by granting preferential access to customary fishing areas situated within 5 nautical miles of the coastline. The water decree does not have any gender provisions, making it gender unequal.

5.1.3.2. State

In accordance with schedule II Part I, Item 29 of the Constitution of Nigeria (1999), the state government of fisheries has the power to legislate on all issues relating to inland small-scale fisheries. The state department is responsible for implementing the national policies and regulations formulated by the federal state within their legal jurisdiction to meet local needs. It also issues licenses and permits for fishing activities, including aquaculture. The state department also engages directly with the communities, fishing cooperatives and other stakeholders to foster collaboration. This involves providing training and conducting research to ensure the sustainability and equitable management of fishery resources. However, no provisions for gender equality are made.

5.1.3.3. Local

According to the constitution, the state government should recognize village level institutions and its customary rules, norms and taboos. Local institutions give access to and use of fishery resources. For instance, village heads or *sarkin ruwas* (head fishermen[11]) and *bulamas* (water chiefs[12]) usually preside and exercise some level of regulatory power with respect to fishery access. Additionally, the state government recognizes fisher cooperatives and organizations as formal governance structures of small-scale fisheries to promote inclusive tenure and user rights, but no gender balance is mentioned.

Across different levels of governance, these management structures in water resources and fisheries in Nigeria are gender unaware. There are no specific provisions for women or gender equality, and they use gendered language such as "fishermen."

5.1.4. Gender

The Constitution of the Federal Republic of Nigeria (1999) promotes good governance and the welfare of all persons in the country, on the principles of freedom, equality and justice, and for the purpose of consolidating the unity of people. It prohibits discrimination and guarantees equality and nondiscrimination under the following four provisions:

1. Section 42(1): A citizen of Nigeria of a particular community, ethnic group, place of origin, sex, religion or political opinion, shall not, by reason only that he is such a person (i) "be subjected either expressly by, or in the practical application of, any law in force in Nigeria or any executive or administrative action of the government, to disabilities or restrictions to which citizens of Nigeria of other communities, ethnic groups, places of origin, sex, religions or political opinions are not made subject," or (ii) "be accorded either expressly by, or in the practical application of, any law in force in Nigeria or any such executive or administrative action, any privilege or advantage that is not accorded to citizens of Nigeria of other communities, ethnic groups, places of origin, sex, religions or political opinions." It also states the following: "No citizen of Nigeria shall be subjected to any disability or deprivation merely by reason of the circumstances of his birth."
2. Section 3(e): "there is equal pay for equal work without discrimination on account of sex, or on any other ground whatsoever."
3. Section 15(2): "Accordingly, national integration shall be actively encouraged, whilst discrimination on the grounds of place of origin, sex, religion, status, ethnic or linguistic association or ties shall be prohibited."
4. Section 222(b): "the membership of the association is open to every citizen of Nigeria irrespective of his place of origin, circumstance of birth, sex, religion or ethnic grouping."

5.1.4.1. The National Gender Policy 2021–2026

This policy sets minimum standards for the Nigerian government to advance gender equality and empower women across different sectors by addressing gender disparities, promoting equal participation of women and men in decision-making processes and ensuring that government programs and policies are gender sensitive and gender responsive. It also establishes standards for good governance, accountability and social responsiveness to meet the needs of vulnerable groups.

5.1.5. Conclusion

Most of the policies, regulations and legislation governing the fish feeding sector in Nigeria focus on the technical aspects of resource management, conservation and industry regulation. They overlook the broader social dynamics that shape access to resources, decision-making power, livelihood opportunities and overall well-being within fishing communities. By doing so, they ignore gender differences, though some regulations grant rights to small-scale communities, which can benefit some women. Most policies do not take into account the distinct experiences, needs and contributions of men and women in fishing communities and do not incorporate measures to promote gender equity and social inclusion. Moreover, they reinforce informal customary rules and regulations, rooted in traditional norms and practices, that limit women's access rights to fisheries resources and decision-making structures at the community level. Customary laws put women at a disadvantage by limiting their power to exert influence over the management of fisheries resources.

As such, Nigeria's policies are, on average, gender unequal.

➔ There are opportunities for the FASA project to integrate gender-sensitive approaches in Nigeria that promote equitable access, benefits and decision-making across all related policies. The National Gender Policy and the SDGs can be used to influence policy alignment.

5.2. Zambia

5.2.1. Laws, policies and regulations

This section provides a brief overview of the key fisheries policies, laws and regulations in Zambia and their gender components. It also discusses management of the sector and access and user rights.

5.2.1.1. Fisheries Act (2011)

This act is a legal framework that governs the management, conservation and development of fisheries resources in Zambia. It encompasses both inland and marine fisheries, delineating the government's powers and responsibilities while also defining the rights and obligations of various stakeholders. The primary objectives of the act are to promote sustainable development in fisheries and to adopt a precautionary approach in fisheries management, conservation, use and development. Additionally, the act creates fisheries management areas and fisheries management committees, facilitates the regulation of commercial fishing and aquaculture activities, and establishes the Fisheries and Aquaculture Development Fund. The act does not explicitly address any gender considerations in the management and conservation aspects of fisheries' resources and is, thus, gender unequal.

5.2.1.2. Fisheries Regulations (2012)

This regulation provides legal provisions for conserving, managing and protecting fish resources, fish products, fishing boats and aquaculture licences. It does not have any explicit gender provisions and does not consider preexisting forms of inequality. As such, it is gender unequal.

5.2.1.3. National Water Policy (2010)

This policy provides the overall framework for managing water resources in Zambia. It emphasizes the need for integrated management, community participation and the sustainable development and use of such resources for social and economic growth. The policy promotes gender-responsive planning, implementation and monitoring of water projects through the consideration of the specific needs, priorities and challenges women face in water management and infrastructure development. It also encourages the participation of youths in decision-making processes related to water resources, and acknowledges that involving young people in these processes can lead to more sustainable and effective water management practices. This policy is gender responsive.

5.2.1.4. Water Resources Management Act (2011)

This provides the legal framework for the sustainable management, development and conservation of water resources in Zambia. It establishes the Water Resources Management Authority as the regulatory body responsible for water allocation, licensing and monitoring through the following:

- Article 8(1): "The function of the Authority is to promote and adopt a dynamic, gender-sensitive, integrated, interactive, participatory and multisectoral approach to water resources management and development."
- Article 6(k): "there shall be equality between both genders in accessing water resources and, in particular, women shall be empowered and fully participate in issues and decisions relating to the sustainable development of water resources and, specifically, in the use of water."
- Section 21: This part of the act emphasizes the importance of gender-balanced representation in water resources management institutions, boards, committees and other relevant bodies. This provision aims to ensure that women have a meaningful role in shaping water policies and strategies. It also acknowledges the valuable contributions that young people can make to water resource management, and encourages their active participation in decision-making processes and initiatives related to water resources. This act is gender responsive.

5.2.1.5. National Aquaculture Development Strategy

The National Aquaculture Development Strategy **(**NADS) is a comprehensive strategy developed by the Zambian government to guide the development of the aquaculture sector. The strategy outlines key objectives, targets and actions for sustainable aquaculture growth. It focuses on improving production practices, promoting investment, enhancing value chain development and strengthening institutional capacity. The strategy includes provisions related to gender, youths and fish feeds to ensure equitable participation, social inclusion and improved production practices. The strategy supports research and development efforts to improve the availability and quality of aquaculture feeds, including the development of locally appropriate and cost-effective feed formulations. The strategy is gender aware, as it acknowledges that women and men have different roles, responsibilities and needs.

The NADS further aims to integrate GESI into aquaculture development by (i) increasing the participation of women and youths in the value chain by a minimum of 40 percent, (ii) enhancing the participation of people with disabilities by at least 20 percent by the year 2024, and (iii) conducting at least one sensitization activity annually on issues related to child labor, HIV and gender-based violence in each province. Furthermore, it emphasizes the adoption of climate-smart practices to enhance the economic resilience of fish farmers.

5.2.2. Access and tenure rights

The Water Resources Management Act (No. 21 of 2011) establishes a framework for allocating and using water resources. It provides for the issuance of water rights and permits, which grant individuals or entities the right to use water for various purposes, including domestic, agricultural, industrial and commercial uses. No specific gender provisions are made around access and tenure rights, though it does mention gender-balanced representation in water resource management.

The Fisheries Act also has provisions for access and tenure rights but does not include gender provisions, aside from mentioning the need for a gender analysis:

- Article 4.1(h): This part of the Fisheries Act (2011) mandates the Department of Fisheries to ensure the fair access to fisheries resources for commercial, recreational and indigenous use. Fishing rights can be granted through licenses, leases or other forms of authorization and are subject to conditions and restrictions established by the government. The act also establishes that in granting access rights the government must take into account factors such as the conservation and sustainable use of fishery resources, the livelihoods of local communities and the interests of different stakeholders. No specific gender provisions are made around access and tenure rights.
- Article 2(h): "in consultation with the institution responsible for national statistics, establish and maintain an information system, which will be accessible by both genders, in accordance with regulations issued by the Minister providing for the content of the system, which shall include relevant hydrological, hydrogeological, meteorological, climatological, water quality, water storage and supply and use data, and relevant information on potentials for the use of water."
- Article 2(k): This part of the act requires individual or entities to conduct research on, and carry out analysis of, the structural links between gender relations, poverty, disease, climate change, water use and development.

5.2.3. Management

According to the Water Management Act (2011), water resources are managed through a combination of state-level regulation and local community involvement. The state-level management is overseen by the Water Resources Management Authority, which is responsible for allocating water permits, monitoring water use and enforcing regulations. Local communities and water resource user associations play an important role in the sustainable management of water resources at the community level, ensuring that water allocation and use are aligned with local needs and priorities and mandating gender-balanced representation in water resources management. The following provisions are provided in the act to promote gender and social equity:

- Article 3(1): The director, under a fisheries management committee, appoints a zone and village fisheries management committee for the purpose of fisheries management and aquaculture development. In doing so, the existing forms of social organization, traditional knowledge and practices of small-scale fisheries are recognized and respected.
- Article 2(a): This part of the act enhances community participation in decision-making processes through the co-management approach.
- Article 18(l): This part promotes gender mainstreaming in the decision-making processes relating to the use of water.
- Article 20(q): This part promotes the participation of the community in water resources management and ensures gender mainstreaming in the decision-making process relating to managing, developing and using water.

5.2.4. Gender

5.2.4.1. Constitution of Zambia (2016)

The constitution recognized the equal worth of women and men and their right to freely participate in, determine and build a sustainable political, legal, economic and social order, as per the following:

- Article 11: "It is recognised and declared that every person in Zambia has been and shall continue to be entitled to the fundamental rights and freedoms of the individual, that is to say, the right, whatever his race, place of origin, political opinions, colour, creed, sex or marital status."
- Article 173 (j): "adequate and equal opportunities for appointments, training, and advancement of members of both genders and members of all ethnic groups."
- Article 173 (k): "representation of persons with disabilities in the composition of the public service at all levels."
- Article 231: This part of the constitution establishes the Gender Equity and Equality Commission, with operational offices at the provincial and district levels, to promote the attainment and mainstreaming of gender equality within the country.
- Article 259(1): "a. Where a person is empowered to make a nomination or an appointment to a public office, that person shall ensure— b. that fifty percent of each gender is nominated or appointed from the total available positions, unless it is not practicable to do so; and c. equitable representation of the youth and persons with disabilities, where these qualify for nomination or appointment."

5.2.4.2. Gender Equity and Equality Act, 2015

This act was enacted to promote gender equity and equality in various aspects of society, including the political, social and economic spheres. It aims to eliminate discrimination against women and promote their full and equal participation in all sectors of society. The following is a summary of the main provisions and objectives of the act:

- Establish the Gender Equity and Equality Commission as the responsible authority for overseeing and implementing measures to promote gender equity and equality in Zambia.
- Promote both gender equity and equality and the integration of both sexes in all spheres of life within Zambian society.
- Prohibit harassment, victimization and harmful practices, including social, cultural and religious practices that discriminate against individuals based on their gender.
- Create public awareness and training programs aimed at raising public awareness of gender equity and equality to influence broader positive social change.
- Eliminate discrimination against women by aligning measures with international conventions and protocols, including the Convention on the Elimination of all Forms of Discrimination against Women, the Protocol to the African Charter on Human and People's Rights on the Rights of Women in Africa, and the SADC Protocol on Gender and Development.
- Stimulate the allocation of productive resources and development opportunities for both sexes, ensuring that men and women have equal access to resources and opportunities.

5.2.4.3. National Gender Policy (2014)

This is a strategic framework developed by the government to promote gender equity and equality in the country. The policy sets priority areas of action at the national, provincial, district and community levels in terms of planning, resource allocation and implementation of development programs to promote gender equity and equality.

5.2.5. Conclusion

Although Zambia's Fisheries Act (2011) and regulations are gender unequal, the National Water Policy is gender responsive, as it considers the specific needs, priorities and challenges women face in water management and infrastructure development. It also encourages the participation of youths in decision-making processes. The Water Management Act is also gender responsive and makes provisions for a gender balance in representation and management and aims to ensure that women have a meaningful role in shaping water policies and strategies. The NADS is gender aware, as it acknowledges that women and men have different roles, responsibilities and needs. Access and tenure rights seem to be the least protected for women across the policies.

➔ There are opportunities for the FASA project to ensure a gender balance in Zambia's aquaculture-related bodies in alignment with the Water Management Act, promote a gender-responsive approach in alignment with the National Water Policy and share any gender studies with policymakers.

5.3. Kenya

5.3.1. Laws, policies and regulations

This section provides a brief overview of the key fisheries policies, laws and regulations in Kenya and their gender components. It also discusses management of the sector and access and user rights.

5.3.1.1. Fisheries Management and Development Act (2016)

This provides the overarching framework for (i) conserving, managing and developing fisheries and other aquatic resources, (ii) value addition and marketing, and (iii) fish quality and safety. The aim is to enhance fishing as a sustainable livelihood for all including poor and disadvantaged fishing communities.

In terms of gender, article 4(1c) mandates "the Cabinet Secretary to observe regional, gender, age, disability and ethnic balance, and shall, to the extent possible, ensure an equitable representation from different sub-sectors of the fisheries sector in making appointments of the members to the Kenya Fisheries Council." This, in turn, contributes to a more inclusive, equitable and responsive approach to fisheries management and development. This act is gender responsive.

5.3.1.2. Fisheries Regulations (2007) on Safety of Fish, Fishery Products and Fish Feed

This mandates the adoption of international standards such as the Codex Alimentarius, World Health Organization guidelines, and the International Food Safety Management System. This ensures alignment, standardization and enforcement of stringent good hygiene practices in all stages of fishery production, processing and distribution to prevent contamination and ensure product safety. This is of great importance in regulating fish feed production to ensure the availability of high quality fish feeds in the market. However, there are no gender provisions under the Fisheries Regulations (2007), making it gender unequal.

5.3.1.3. Beach Management Unit Regulations (2007)

This promotes co-management of fisheries resources between the government and local communities through localized administrative units for enhanced food security and sustainable livelihoods, with explicit provisions for women and representation in decision-making processes and governance structures within beach management units (BMUs). The regulation is gender aware**,** as article 2f states that there must be in place "processes necessary to ensure that not more than two thirds of Beach Management Units are of the same gender and to ensure the inclusion of youth and persons with disability in leadership."

5.3.1.4. Water Act, 2016

This act provides for the regulation, management and development of water resources, water and sewerage services, and for other connected

purposes. Although it outlines a number of management arrangements and bodies, it does not mention gender or consider preexisting forms of inequality, so it is gender unequal.

5.3.1.5. National Water Harvesting and Storage Authority Strategic Plan 2022–2027 (November 2021)

This strategic plan emphasizes the centrality of access to water and the realization of the related SDGs, as recognized in the Vision 2030 Strategy. The plan presents the National Water Harvesting and Storage Authority's mandate of developing, maintaining and managing national public works for storing water resources and controlling flooding and droughts. As such, it prioritizes the strategic interventions and actions that the authority will implement from 2022 to 2027.

The strategic plan covers the following:

- functions and roles of the National Water Harvesting and Storage Authority
- situational analysis and evaluation of objectives and outcomes of the previous strategic plan
- vision, mission, mandate and core values of the plan,
- strategic objectives and measures for their accomplishment
- implementation and coordination framework
- risk analysis and mitigation framework
- financial resource requirements
- monitoring, evaluation and reporting.

One of the strategic objectives is to comply with the gender-mainstreaming policy, making it gender responsive.

5.3.1.6. Water Resources Regulation (2021)

This regulation divides the use of water into four categories. These are considered by the Basin Water Resources Commission, and the local association, wherever they exist. If the water use category by the authority has to be disputed, the tribunal set up for this purpose takes it up. Permits need to be taken for use of water from a water resource for any activity, and these permits are given for a period of 1 year, not exceeding 2 years. The main requirement for the permit is the land ownership document. There are no gender provisions, making it gender unequal.

5.3.1.7. Aquaculture Business Development Programme

This program is aimed at improving production and productivity as well as the food security and nutrition of smallholder farmers. It supports the aquaculture value chain with a series of strategic public-private producer partnerships, as well as deepening and broadening business plans for smallholder farmers groups. As such, aquaculture has been growing rapidly in response to declining capture fisheries and increasing national demand for fish. However, the sector continues to face several challenges, including (i) low extension capacity, (ii) high cost and inadequate supply of inputs, such as quality seeds and fish feeds, (iii) low uptake of technology, (iv) lack of agroecological-specific fish strains, and (v) hatcheries, especially for marine aquaculture, thus compelling farmers to rely on wild seeds, which are seasonal. This has led to inefficient market systems for smallholder farmers, particularly women and youths, limited financing options and leading to low adherence to environmental regulations.

5.3.2. Access and user rights

The Fisheries Management and Development Act grants community access rights, promotes GESI in fishing rights allocation and emphasizes the inclusion of disadvantaged groups in fishery management, as per the following:

- Article 39 (3n): This part of the act further stipulates that the director general shall, in consultation with other stakeholders, develop guidelines and standards for developing fishery management plans, which should include a social impact assessment with references to disadvantaged groups, including women, youths and persons with disability.
- Article 64(1): This part ensures that local communities maintain access rights to traditional fishing grounds. This provision prohibits any actions that would take away communal access to fishing grounds without a valid reason and without consulting the affected community. By involving the local

communities in decision-making processes, and factoring their collective voice and interests, this provision promotes community participation and ensures that their livelihoods are respected and safeguarded. It also safeguards their cultural heritage, practices and values attached to fishing.

5.3.2.1. Marine Fisheries, Access and Development Regulations (2022)

This promotes sustainable use of fisheries resources and safeguards traditional landing sites and fishing grounds in favor of local fishing communities, as per the following:

- Article 27(a): This part of the regulation underscores the importance of fair and equitable allocation of fishing rights to ensure "no more than two thirds of the fishing rights in a particular commercial fishery species shall be allocated to the same gender." This provision promotes an equal distribution of fishing rights and economic benefits among men and women, whether they are involved in artisanal or commercial fishing activities.

5.3.3. Management

The Fisheries Management and Development Act has a provision for gender representation of all stakeholders, from different communities and fisheries subsectors, in the institutions that oversee the management of fisheries resources, as per the following:

- Article 37(1): This part of the act establishes BMUs and sets out standards for their management that include protecting vulnerable groups, especially youths and women. The composition of the executive committee of each BMU is also stipulated by the two-thirds gender rule in all elective positions, and it further guarantees the inclusion of youths and persons of disability within leadership roles. Furthermore, the regulations provide for equitable power redistribution, giving priority to the poor and disadvantaged to support in the jurisdiction of BMUs.
- Article 11(4): "The Cabinet Secretary shall, in making appointments under subsections (1) (c), have regard to the principle of gender parity, age, regional and ethnic balance and shall, to the extent possible, ensure an equitable representation." This provision ensures that leadership and decision-making structures are composed of a diverse group of individuals representing different perspectives and experiences, which promotes inclusivity and fairness.

The Water Act, 2016 (No. 43 of 2016) established the Ministry of Water and Irrigation, which is supported by the Water Resources Management Authority to oversee the water allocation and use, as well as ensuring sustainable management of water resources. It also established the Water Services Regulatory Board to oversee the regulation of water services provision, including water supply and sanitation services. Other institutions included in the act are the National Water Harvesting and Storage Authority, the Water Services Regulatory Board, the Water Sector Trust Fund, and the Water Tribunal. The act emphasizes the importance of public participation in water resource management decisions, encouraging collaboration between government agencies, local communities and other stakeholders through water resource user association. These associations focus on the conservation, use and management of water resources, establishing equitable water allocation plans and resolutions of water conflicts within communities. However, the act does not mention gender or consider preexisting forms of inequality.

5.3.4. Gender

5.3.4.1. Constitution of Kenya (2010)

The constitution states that women and men have the right to equal treatment, including the right to equal opportunities in political, economic, cultural and social spheres (Article 27:6). Article 27 (4) lists grounds for legal action on discrimination on the basis of race, sex, pregnancy, marital status, health status, ethnic or social origin, color, age, disability, religion, conscience, belief, culture, dress, language or birth. The gender provisions articulated in Articles 10, 29 and 81 reference gender equality and quotas to reduce barriers to women's participation in leadership and governance institutions. The two-thirds rule appears in the constitution and aims at enhancing gender parity in legislative bodies at both county and national levels.

5.3.4.2. 2019 National Gender and Development Policy[13]

This policy outlines a range of areas to promote gender equality:

- Strengthen normative, legal, policy and administrative frameworks for gender equality and women's empowerment at all levels.
- Ensure equal opportunities, and reduce inequalities of outcome, including by eliminating discriminatory laws, policies and practices and promoting appropriate legislation, policies and action.
- Empower women and men to have access to and control over economic opportunities and resources.
- Eliminate discrimination in access to employment, promotion and training, including equal remuneration to enhance income security for men and women
- Enhance and sustain measures to eliminate gender disparities in access to, retention, transition, performance and quality in education for women, men, girls and boys.
- Promote new attitudes, values and behavior and a culture of respect for women and men, boys and girls.
- Facilitate affordable, accessible, acceptable and quality health care services, including reproductive health care, emergency services, family planning, and HIV and AIDS services for women and men, girls and boys.
- Implement measures to overcome barriers inhibiting women's access to and control of productive resources, such as land ownership, housing and agriculture.
- Ensure a clean, secure and sustainable environment.
- Integrate and mainstream gender perspectives in peace and security processes for a stable and secure environment for all.
- Ensure equitable and meaningful participation and representation of women and men in governance, power and decision-making positions in the public and private sectors.
- Harness information and communication technology as a tool for broader strategies and programs to create opportunities for empowerment of women and men.
- Promote the respect for civil, political, economic and social rights of all.
- Put in place measures to ensure that gender is considered in dealing with other forms of inequalities.
- Eliminate sexual and gender-based violence against women and men, girls and boys in both public and private spheres.
- Enhance the respect and promotion of children's rights for girls and boys.
- Ensure the increased participation and visibility of men and women in the media and communications sector.
- Ensure equitable access to justice for men and women.
- Create institutional mechanisms for the advancement of gender equality and women's empowerment.

5.3.5. Conclusion

Kenya has implemented several policies and regulations that rate differently on the gender continuum. The Fisheries Management and Development Act (2016) is gender responsive and has some management provisions, which include a 33 percent representation of women and provisions for youths and persons with disabilities; other articles discuss gender parity, age, regional and ethnic balance. Meanwhile, the Fisheries Regulations (2007) on Safety of Fish, Fishery Products and Fish Feed is gender unequal, the Beach Management Unit Regulations (2007) is gender aware, the National Water Harvesting and Storage Authority Strategic Plan 2022–2027 (November 2021) is gender responsive, the Water Resources Regulation (2021) is gender unequal, the Marine Fisheries, Access and Development Regulations (2022) is gender aware, and the Water Act, 2016 is gender unequal. In contrast, the constitution and the National Gender and Development Policy are transformative. Given all this, policy incongruence is the most extreme in Kenya.

- There are opportunities for the FASA project to enhance the institutional capacity of the water resource associations and BMUs in Kenya to include women, youths and marginalized groups in fish feed production and to advocate for compliance and coherence across policies. This includes promoting the representation of women, youths and people with disabilities on decision-making bodies and adopting a gender-transformative approach that aligns with the National Gender and Development Policy .

5.4. Summary

For each of Nigeria, Zambia and Kenya this policy review emphasizes that the FASA project should not assume that gender, youths and marginalized groups will automatically be incorporated into policies and programs. The policy, regulation and legislative environment for incorporating gender into aquaculture and fisheries policies varies across the three countries. Nevertheless, there are opportunities to improve the enabling policy, regulation and legislative environment. Women's access and user rights are weak across all three countries and are less secure than men's. In each country, fisheries-related policies do not align with national gender policies or the SDGs.

As it currently stands, FASA in Nigeria can integrate a gender-sensitive approach and promote equitable access, benefits and decision-making. In Zambia, FASA can promote a gender balance in aquaculture-related bodies and engage with local communities and structures. In Kenya, FASA can ensure that local governing bodies include women in fish feed production. In all three countries, the SDGs and the national gender policies can be used to advocate for gender changes across any policy that is revised during FASA. Overall, enhancing the gender and inclusion capacity of fisheries bodies in each of three countries is essential.

6. Findings: Fish feeds

This section includes findings from the KIIs and the survey conducted in the three study countries. The results are mainly presented by gender but also by age and gender, where there is a considerable difference.

The structure for this section is as follows:

- sociodemographic profile of the survey respondents
- farming household occupation and income sources
- farming type and farming system
- fish feed ingredients and use
- household contestations for feeds
- gendered and socially differentiated needs and risks associated with the use of novel ingredients.

6.1. Sociodemographic background of the respondents

This section presents the sociodemographic profile of the survey respondents. This includes marital status, level of education, religion, whether the respondent is the household head, disability status, length of stay in the community (or if they are migrants), mean age, and mean number of children below age 18. The majority of the respondents are married, with more unmarried men than women. Most have secondary or higher education, follow Christianity, are nonmigrants and have approximately 2 children under age 18. In Zambia, women have a lower level of education than do men.

Table 5 outlines the current marital status of the respondents. The majority are married. In Nigeria, one-third of men are unmarried, while the remaining two-thirds are married. Among women, nearly three-quarters are married, while the rest are either unmarried or considered single (divorced, separated or widowed). More young women are married than adult women. In Zambia, nearly three-quarters of respondents are currently married. More adult men than young men are married, while the reverse is true among women. In Kenya, more than three-quarters are married, with higher percentages among both adult men and women than for youths of both genders.

	Nigeria			Zambia			Kenya		
	Women	**Men**	**Total**	**Women**	**Men**	**Total**	**Women**	**Men**	**Total**
Number of respondents	55	36	91	72	44	116	112	101	213

Table 4. Total number of respondents for the survey data.

What is your marital status?	Nigeria			Zambia			Kenya		
	Women	**Men**	**Total**	**Women**	**Men**	**Total**	**Women**	**Men**	**Total**
Unmarried	15%	36%	23%	11%	14%	12%	5%	6%	6%
Currently married	71%	64%	68%	71%	75%	72%	80%	91%	85%
Divorced	6%	0%	3%	10%	5%	8%	0%	0%	0%
Separated	4%	0%	2%	1%	5%	3%	1%	0%	1%
Widowed	6%	0%	3%	7%	2%	5%	13%	3%	9%

Table 5. Marital status.

Table 6 reveals the level of education of the respondents. In Nigeria, more than three-quarters have tertiary education, with a negligible difference by gender. A higher percentage of adult women have tertiary education than young women, while there is no difference by age among men. In Zambia, one-third of respondents have secondary education, while slightly more than half have tertiary education. Overall, women have a lower level of education than do men. Percentages of tertiary education are higher among young women than adult women, while there is no difference by age among men. In Kenya, almost half of the respondents have secondary education, while the rest are roughly split between primary and tertiary education, with a negligible difference by gender. The percentage of young women with tertiary education is significantly higher than for adult women, while there is negligible difference by age among men. Although levels are still low, Kenya has the highest levels of respondents without formal education, while Nigeria has none.

Table 7 outlines the religion of the respondents. In Zambia and Kenya, almost all of the respondents are Christians, while nearly two-thirds in Nigeria are Christians and just over one-third follow Islam.

Table 8 outlines the percentage of respondents who report themselves as household heads. Far more men did so than women across the three countries, especially in Zambia and Kenya. Among women, Zambia has the highest levels followed by Kenya. Less than one-quarter of adult women in Nigeria are households heads and none among young women. There is no stark difference by age and gender in the other two countries.

What is the highest level of education you have achieved?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
No formal education	0%	0%	0%	3%	0%	2%	5%	3%	4%
Primary	4%	3%	3%	17%	9%	14%	30%	25%	27%
Quranic/Arabic	0%	3%	1%	0%	0%	0%	0%	0%	0%
Secondary	20%	17%	19%	39%	23%	33%	44%	50%	47%
Tertiary (undergraduate)	40%	50%	44%	38%	57%	45%	21%	22%	22%
Tertiary (post-graduate)	36%	28%	33%	4%	11%	7%	1%	1%	1%

Table 6. Level of education.

What religion do you follow?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Islam	31%	47%	37%	0%	2%	1%	3%	6%	4%
Christianity	69%	53%	63%	100%	98%	99%	97%	94%	96%

Table 7. Religion.

Are you the head of the household?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Yes	18%	78%	42%	28%	96%	53%	25%	95%	58%

Table 8. Household head.

The six-item Washington Group Short Set of Disability Questions is a set of questions designed to identify people with a disability. As shown in Table 9, the questions assess whether people have difficulty performing basic universal activities such as walking, seeing, hearing, cognition, self-care and communication. In Nigeria, most respondents do not have any difficulty, except wearing glasses and climbing steps, mostly among women. In Zambia, some women and men wear glasses. In Kenya, some have levels of difficulty, such as wearing glasses, climbing steps and remembering or concentrating. In general, the difficulties are higher among adult women and men than their counterparts. However, more younger respondents reported wearing glasses than did older ones.

As shown in Table 10, the vast majority of respondents across all three countries are nonmigrants, with little difference by gender. As shown in Table 11, the mean age of the respondents is around 42 years old in Nigeria, 43 in Zambia and 49 in Kenya. The mean number of children under age 18 is around 2 in Nigeria and Kenya and around 3 in Zambia.

Do you have difficulty with any of the following?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Seeing	20%	3%	13%	8%	9%	9%	17%	13%	15%
Hearing	0%	3%	1%	1%	2%	2%	3%	5%	4%
Climbing steps	11%	0%	7%	3%	0%	2%	13%	15%	14%
Remembering or concentrating	2%	0%	1%	1%	0%	1%	10%	14%	12%
Washing and dressing	2%	0%	1%	0%	0%	0%	4%	5%	4%
Communicating	0%	0%	0%	0%	0%	0%	0%	1%	1%

Table 9. The Washington Group Short Set of Disability Questions.

How long have you been living continuously in the country?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Always	84%	83%	84%	76%	84%	79%	93%	99%	96%
Visitor	0%	0%	0%	19%	7%	15%	5%	0%	3%
Migrant	16%	17%	17%	4%	9%	6%	2%	1%	1%

Table 10. Length of stay.

How many children do you have and how old are they?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Mean age	41.4	42.4	41.8	44.0	41.0	42.9	46.6	50.9	49.0
Mean number of children under age 18	1.7	1.8	1.7	2.8	2.3	2.6	2.2	2.7	2.0

Table 11. Mean age and number of children under age 18.

In conclusion, the majority of the survey respondents across all three countries are currently married, with more unmarried men than women. The majority have secondary or higher education, follow Christianity and have around 2 children under age 18. Few of the respondents are disabled, female household heads or migrants. In Nigeria and Kenya, there is no difference by age in the level of education, while in Zambia women have a lower level of education than do men.

6.2. Farming household occupation and income sources

This section presents the main occupation, secondary occupation, household wealth status of the respondents compared to their neighbors and the percentage of their income coming from fish farming. Fish farming is either a primary or secondary occupation for most of the respondents in Nigeria, while in Zambia and Kenya it is mostly a secondary occupation, without any stark difference by gender.

Table 12a outlines the main occupation of the respondents. Less than half in Nigeria are fish farmers, while more than one-quarter are in Kenya. In Zambia, where percentages of fish farmers are very low among both men and women, the majority of respondents are farmers in another value chain compared to about one-third in Kenya.

Table 12b outlines the secondary occupation of the respondents. It is interesting to note that fish farming has the highest percentages of secondary occupation for all three countries, among both men and women.

Table 13 lists the percentage of household income from fish farming. The results suggest that few households earn most of their income from fish farming. In fact, in each of three countries, fish farming accounted for 40 percent or less of household income for the majority of both men and women.

In both Nigeria and Zambia, young men earn less of their income from fish farming than do adult men, while the reverse is the case for women in Zambia and Kenya. There is no significant difference among men in Kenya and among women in Nigeria.

What is your main occupation?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Fish farming	46%	44%	45%	4%	5%	4%	21%	39%	29%
Farming (other)	7%	8%	8%	53%	43%	49%	43%	35%	39%
Salaried	20%	19%	20%	31%	23%	28%	10%	2%	6%
Business	27%	28%	28%	13%	25%	17%	26%	21%	24%
Others	0%	0%	0%	0%	5%	2%	1%	3%	2%
Pension							0%	1%	1%

Table 12a. Main occupation.

What is your secondary occupation?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
None	13%	6%	10%	3%	0%	2%	0%	4%	2%
Fish farming	49%	53%	51%	81%	71%	77%	79%	62%	71%
Farming (other)	9%	11%	10%	10%	21%	14%	13%	28%	20%
Salaried	0%	3%	1%				1%	0%	1%
Business	24%	19%	22%	7%	7%	7%	6%	3%	5%
Others	5%	8%	7%	0%	2%	1%	1%	3%	2%

Table 12b. Secondary occupation.

Household income from fish farming	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
0%–20%	27%	14%	22%	58%	32%	48%	37%	27%	32%
21%–40%	29%	28%	29%	25%	39%	30%	40%	49%	44%
41%–60%	24%	31%	26%	10%	21%	14%	15%	17%	16%
61%–80%	20%	17%	19%	4%	2%	3%	6%	6%	6%
81%–100%	0%	11%	4%	3%	7%	4%	2%	2%	2%

Table 13. Household income from fish farming.

Table 14 outlines household wealth status. In comparison their neighbors', respondents for all three countries overwhelmingly report that their status is average. The next highest response, for each country, is above average in comparison.

Overall, fish farming is either a primary or secondary occupation for most of the respondents in Nigeria and mostly a secondary occupation in both Zambia and Kenya, without any significant difference by gender. In Zambia and Kenya, fish farming contributes up to 40 percent of household income, with no specific pattern in Nigeria and no considerable differences by gender in any of the three countries. As for household wealth, most respondents report their average status. Although there is no considerable difference by gender across the three countries among those who reported 'average status', percentages in Nigeria are lower among women than men, while the reverse is true among those who report having above average status. In both Zambia and Kenya, a notable gender disparity emerges when examining self-perceived wealth in relation to neighbors', as a higher proportion of women consider their status below average. This divergence could potentially impact their access to essential resources and their ability to benefit from various community interventions and programs in these regions.

How is your household's wealth status compared to your neighbors'?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Worse	0%	0%	0%	1%	0%	1%			
Below average	0%	3%	1%	21%	7%	16%	16%	11%	14%
Average	73%	81%	76%	53%	55%	53%	68%	67%	68%
Above average	27%	17%	23%	24%	36%	28%	16%	21%	18%
Richest	0%	0%	0%	1%	2%	2%	0%	1%	1%

Table 14. Household wealth status.

6.3. Farming type and farming system

This section describes the farming type and farming system of the surveyed respondents. Earthen ponds are commonly used in Zambia and Kenya, without any difference by gender. In Nigeria, men use them more than women, who tend to use concrete tanks more.

Table 15a lists the percentage of respondents with earthen ponds, the type of farming system they have and the type of water they use. The vast majority of respondents in Zambia and Kenya use earthen ponds, while less than half do so in Nigeria. The most popular system in Nigeria is intensive farming followed by semi-intensive, while semi-intensive is the preferred method in both Zambia and Kenya followed by extensive.

In terms of gender, men in Nigeria are more likely than women to use an earthen pond, while women in Nigeria and Kenya are more likely to intensively farm their earthen pond. Semi-intensive farming system is common in Zambia. There is little difference between the sexes in Zambia and Kenya in terms of earthen pond use.

Almost all respondents in each of the three countries report using fresh water.

What farming type and farming system do you use?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Earthen pond	31%	58%	42%	96%	98%	97%	85%	90%	87%
How would you describe your farming system?									
Extensive	12%	5%	8%	38%	33%	36%	30%	44%	37%
Intensive	77%	57%	66%	0%	16%	6%	23%	9%	16%
Semi-intensive	12%	38%	26%	62%	51%	58%	47%	47%	47%
What type of water do you use in your fish farm?									
Fresh water	100%	100%	100%	100%	100%	100%	97%	98%	97%

Table 15a. Earthen pond.

Table 15b lists the percentage of respondents with concrete tanks, the type of farming system they have and the type of water they use. In Nigeria, close to half use concrete tanks, with a slightly higher percentage among women than men. More than half of women and men use an intensive system, while most of the rest do semi-intensive farming. Adult men and women use earthen ponds while young men and women use concrete tanks.

In both Zambia and Kenya, the percentage of respondents using concrete tanks is negligible.

Almost all respondents in all three countries reported using fresh water.

Table 15c lists the percentage of respondents with cages, the type of farming system they have and the type of water they use. In Kenya, women are somewhat more likely than men to use cages. Semi-intensive farming is the preferred system by a wide margin, especially among women.

All respondents reported using fresh water.

No respondents in Nigeria and Zambia reported doing cage farming.

Overall, earthen ponds are commonly used in Zambia and Kenya, without any difference by gender, while both earthen ponds and concrete tanks are common in Nigeria, with percentages tilted toward ponds among men and concrete tanks among women. Kenya is the only one of the three countries that reports using cages, with more women doing so than men. Intensive and semi-intensive farming are common in Nigeria, while semi-intensive and extensive farming are common systems in Zambia and Kenya.

6.4. Fish feed ingredients and use

This section describes the responses from key informants on detailed questions about feed ingredients. In Nigeria, the top-three ingredients women use are maize powder, GMPs, and brans and cakes, mainly because they are available with GMP also being chosen for its nutritious value. In Zambia, the top-two ingredients women use are chicken manure and feathers, for their availability, and GMPs, for their affordability. In Kenya, women use plant leaves because of their availability and brans and cakes because of their nutritious value.

What farming type and farming system do you use?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Concrete tanks	46%	39%	43%	4%	2%	3%	2%	0%	1%
How would you describe your farming system?									
Extensive	8%	0%	5%	33%	100%	50%			
Intensive	52%	57%	54%						
Semi-intensive	40%	43%	41%	67%	0%	50%			
What type of water do you use in your fish farm?									
Fresh water	100%	93%	97%	100%	100%	100%			
Other	0%	7%	3%						

Table 15b. Concrete tanks.

What farming type and farming system do you use?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Cages							14%	9%	12%
How would you describe your farming system?									
Extensive							0%	22%	8%
Intensive							19%	11%	16%
Semi-intensive							81%	67%	76%
What type of water do you use in your fish farm?									
Fresh water							100%	100%	100%

Table 15c. Cages.

6.4.1. Nigeria

In Nigeria, fish farms rely heavily on locally sourced ingredients for their feed production. These ingredients constitute anything fed to fish. They include potato peels, groundnut cake, fishmeal, poultry waste, cassava peels, ricemeal, legumes, certain fruits, and trees. In Sokoto, locally sourced ingredients include fishmeal, soybeans, grasshopper meal, maize, cassava, cassava flour, wheat bran, corn bran and rice bran. Some formulations also incorporate fish, maize, cassava, Indomie waste, cassava peels, soybeans, cassava flakes and bloodmeal. Moreover, they use groundnut cake, soybean meal, fish cake, spaghetti waste, flour waste and catfish meal as sources of carbohydrate, alongside fishmeal, catfish meal and tilapia meal in their feed mixtures.

Table 16 lists the fish feed ingredients used in Nigeria. Maize powder and GMPs are widely used throughout the country, as are various brans and cakes. Use by gender is approximately the same, though men use them slightly more than do women.

The reasons behind maize powder being used are because of its availability, reported by 69% of the respondents. For women, it is more about the availability (67%) but for men apart from availability (72%), its affordability (64%) and nutritional value (56%) are the other factors considered. GMP is used because of its availability (72%, across gender) and nutritious value (65% with 59% women, 72% men) by both men and women respondents. Rice bran is mainly used for its availability as reported by 58% (63% women, 52% men) of the respondents, especially women.

What fish feed ingredients do you currently use?	Women	Men	Total
Potato waste	7%	8%	8%
Poultry waste	22%	28%	24%
Microalgae	11%	14%	12%
Plant leaves	22%	28%	24%
Chicken manure and feathers	11%	17%	13%
Ghee residue	0%	3%	1%
Cassava waste	26%	36%	30%
Jute, subabul, raintree, spirulina, moringa	11%	22%	15%
GMPs (soybean, BT-maize, genetically modified cotton, Roundup Ready canola)*	58%	69%	63%
Rice bran, wheat bran, peanut oil cake, sesame oil, cake, cotton seed cake, mustard oil cake, neem seed cake, palm kernel meal	55%	69%	60%
Non-conventional plant sources (Bermuda grass, nursery grass (sages), typha, maize spike	4%	6%	4%
Earthworms (Eisenia fetida)	16%	14%	15%
Kitchen leftovers	29%	17%	24%
Maize powder	66%	69%	67%

**If the participants use GMO soybean or maize, all have been combined under one category. This holds true for all three countries.*

Table 16. Fish feed ingredients used in Nigeria.

Table 17 lists the places that respondents source their fish feed ingredients from. Maize powder, GMPs and various brans and cakes are all sourced mainly from local stores and suppliers, though some women get theirs from suppliers in big towns. The majority of the respondents across both genders buy them from the market.

Table 18 reveals whether respondents take into account any seasonality considerations associated with the feed ingredients they use. Only seven respondents report taking into account such considerations associated with the three main ingredient categories. For maize and GMPs, the main reasons among women are availability and cost, as well as scarcity and increase in price during the wet season, while men report cheaper prices after the rainy season and higher prices during the dry season. For the brans and cakes category, women report that they are cheaper at the beginning of the dry season around October and November and scarce during rains, while men report that they are cheaper during the dry season, with a reduction in their availability during the dry season immediately after harvesting.

Where do you get your fish feed ingredients?	Maize powder			GMPs			Brans and cakes		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Barter with neighbor	2	3	5				1		1
Process at home	12	11	23	5	3	8	5	4	9
Local store or supplier	31	20	51	30	25	55	30	21	51
Supplier from big town	15	7	22	20	11	31	10	10	20
Animal waste								1	1
Friends					1	1			

Table 17. Sources of fish feed ingredients in Nigeria.

Do you take into account any seasonality considerations for your fish feed ingredients?	Maize powder			GMPs			Brans and cakes		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Yes	4	3	7	4	3	7	3	4	7

Table 18. Seasonality considerations associated with feed ingredients in Nigeria.

Overall, respondents in Nigeria use maize powder, GMPs and various brans and cakes without any specific difference by gender, though men use them more than do women. Maize powder is mainly used for its availability, especially among women, while men also use it for its affordability and nutritional value. GMPs are used for their availability and nutritional value, while brans and cakes are used for their availability, for both men and women. All three ingredients are bought (mainly by women) either from local stores or from suppliers in big towns. Some process maize powder at home. Seasonality considerations, mentioned only by a handful respondents, are mainly related to seasonal variations in availability and high prices associated during times of scarcity.

6.4.2. Zambia

In Zambia, fish feeds commonly used include sunflower, soybeans, maize, maize bran, roller meal, cassava, fishmeal, sorghum, millet and locally produced soybeans. However, the use of local alternatives such as sorghum, millet and cassava is limited because of a lack of knowledge of their formulation. Although sunflower, soybeans and maize are readily available, they are not cultivated on a large scale. Additionally, commercially available feeds like Tiger Feed, Namfeed and Novate are also used in the country.

Table 19 lists the fish feed ingredients used in Zambia. Chicken manure and feathers and GMPs are widely used, with higher percentages among women than men. Additionally, the percentages of women using kitchen leftovers and maize powder are more than double that of men.

Three-quarters of the respondents, especially women, reported availability as the main reason for using chicken manure and feathers, while nearly two-thirds use GMPs for their availability, more so among women than men, and over half of both genders use GMPs for their affordability.

According to a female fisheries assistant officer in Zambia, maize-based substrates are used as fish feeds during the harvest period but become scarce outside the harvest season. "Maize-based substrates are mainly used during the time of harvest," she said. "It is hard to purchase during nonharvesting seasons, but sometimes the farmers barter or make some local arrangements with fellow farmers to get it."

Farmers need to use adaptive strategies to address the feed challenges they face, including using traditional methods of exchange or collaboration.

Table 20 list the places respondents source their fish feed ingredients from. Over double the number of women than men source their chicken manure and feathers from animal waste, mainly at home, and more than double the number of women get their GMPs either from local stores or suppliers or by processing them at home.

What fish feed ingredients do you currently use?	Women	Men	Total
Potato waste	1%	0%	1%
Poultry waste	11%	5%	9%
Microalgae	6%	0%	3%
Plant leaves	21%	25%	22%
Chicken manure and feathers	44%	36%	41%
Ghee residue			
Cassava waste	4%	0%	3%
Jute, subabul, raintree, spirulina, moringa	1%	2%	2%
GMPs (BT-maize, genetically modified cotton, Roundup Ready canola)	33%	30%	32%
Rice bran, wheat bran, peanut oil cake, sesame oil cake, cotton seed cake, mustard oil cake, neem seed cake, palm kernel meal	13%	11%	12%
Non-conventional plant sources (Bermuda grass, nursery grass (sages), typha, maize spike)	0%	2%	1%
Earthworms (Eisenia fetida)	6%	5%	5%
Kitchen leftovers	28%	11%	22%
Maize powder	24%	9%	18%

Table 19. The fish feed ingredients used in Zambia.

Where do you get your fish feed ingredients from?	Chicken manure and feathers			GMPs		
	Women	Men	Total	Women	Men	Total
Barter with neighbor	14	4	18			
Process at home	14	4	18	17	7	24
Local store or supplier	3	1	4	19	9	28
Grown in own field				0	1	1
Animal waste	22	9	31			
Buy from neighbor	2	2	4			
Poultry farmers	1	0	1			

Table 20. Sources of fish feed ingredients in Zambia.

As shown in Table 21, few respondents mention any seasonality considerations associated with their feed ingredients. For chicken manure and feathers, the main reasons are weather patterns and disease outbreaks, running out of broilers and selling broilers. For GMPs, the once-a-year harvest and lack of year-round supply are the main reasons, while for men it is because it is a seasonal crop.

Do you take into account any seasonality considerations for your fish feed ingredients?	Chicken manure and feathers			GMPs		
	Women	Men	Total	Women	Men	Total
Yes	5	0	5	8	4	12

Table 21. Seasonality considerations associated with feed ingredients in Zambia.

Overall, respondents in Zambia use chicken manure and feathers as well as GMPs, with higher use among women than men. They are used mainly for their availability, especially for women, while affordability and availability are the main reasons for GMPs. Chicken manure is processed at home, while GMPs are purchased from the market. Seasonality considerations for chicken manure for women include weather patterns and disease outbreaks, variations in availability for GMPs.

6.4.2.1. Kenya

In Kenya, key ingredients used as fish feeds include shrimps (*ochongá*), rice bran or germ, *omena* (small fish), soybeans, lucina plants, vegetables (*sukuma wiki*), maize bran, sorghum, potato leaves, cassava leaves, maize grains, sunflower, karadina from busia and kisumu, cotton seeds, rice charm and black soldier fly.

Table 22 lists the fish feed ingredients used in Kenya. Plant leaves and the category of various brans and cakes are the two main ingredients. Men tend to use plant leaves, while women tend to use brans and cakes. Women are also more likely to use poultry waste, maize powder, chicken manure or cassava waste. Interestingly, men are more likely than women to use kitchen leftovers.

More than half of the respondents use plant leaves for their availability, though percentages are over twice as high for men than women. Ingredients in brans and cakes are used mainly for their nutritious value, more so among men than women.

Table 23 lists the sources of fish feed ingredients. Plant leaves are readily available at home, so that is where they are usually processed, among both men and women. Few respondents buy them. In contrast, brans and cakes are mainly purchased, usually from local stores and suppliers, by both men and women.

What fish feed ingredients do you currently use?	Women	Men	Total
Potato waste	14%	8%	11%
Poultry waste	23%	14%	19%
Microalgae	3%	8%	5%
Plant leaves	44%	67%	55%
Chicken manure and feathers	18%	12%	15%
Ghee residue	1%	0%	1%
Cassava waste	17%	11%	14%
Jute, subabul, raintree, spirulina, moringa	1%	2%	1%
GMPs (BT-maize, genetically modified cotton, Roundup Ready canola)	6%	9%	8%
Rice bran, wheat bran, peanut oil cake, sesame oil cake, cotton seed cake, mustard oil cake, neem seed cake, palm kernel meal	68%	55%	62%
Non-conventional plant sources (Bermuda grass, nursery grass (sages), typha, maize spike	0%	1%	1%
Earthworms (Eisenia fetida)	10%	9%	9%
Kitchen leftovers	9%	17%	13%
Maize powder	28%	14%	21%

Table 22. Fish feed ingredients used in Kenya.

Where do you get your fish feed ingredients from?	Plant leaves			Brans and cakes		
	Women	Men	Total	Women	Men	Total
Barter with neighbor	12	21	33	2	1	3
Process at home	46	62	108	4	5	9
Local store or supplier	3	8	11	71	52	123
Supplier from big town	1	0	1	14	16	30
Animal waste	1	0	1	1	0	1
Government store				1	0	1

Table 23. Sources of fish feed ingredients in Kenya.

Table 24 lists whether respondents take into account any seasonality considerations associated with the fish feed ingredients. Plant leaves are scarce during the dry season. For brans and cakes, women point out that supply is high during harvests but low the rest of the year, while men point to their scarcity during the planting season and an overall difficulty finding in the market at any time other than during harvests.

Do you take into account any seasonality considerations for your fish feed ingredients?	Plant leaves			Brans and cakes		
	Women	Men	Total	Women	Men	Total
Yes	23	25	48	3	7	10

Table 24. Seasonality considerations associated with fish feed ingredients in Kenya.

Overall, respondents in Kenya mainly use plant leaves as well as various brans and cakes. Men are more likely to use the former, and women the latter. Plant leaves are mainly used for their availability, while brans and cakes are used for their nutritious value, as reported mostly by men. Plant leaves are processed at home, while rice bran is purchased from the market. Scarcity during the dry season is the main seasonality concern for both categories of ingredients, among men and women.

Table 25 collates and summarizes the difference and similarities in the women's responses across all three countries.

	Nigeria	Zambia	Kenya
Fish feed ingredients	• Maize powder • GMPs • Brans and cakes	• Chicken manure and feathers • GMPs	• Plant leaves Brans and cakes
Reason for using these ingredients	• Maize powder for its availability • GMPs for their availability and nutritious value • Brans and cakes for their availability	• Chicken manure and feathers for their availability • GMPs for their affordability and availability	• Plant leaves for their availability • Brans and cakes for their nutritious value
Source of ingredients	• Purchased either from local stores or from suppliers in big towns • Some maize powder processed at home	• Chicken manure and feathers processed at home • GMPs purchased from the market	• Plant leaves processed at home • Brans and cakes purchased from the market
Seasonal considerations	• Variations in availability • High prices during scarcity	• Weather patterns and disease outbreaks for chicken manure and feathers • Variations in availability for GMPs	• Variations in availability

Table 25. Differences and similarities in feed ingredients and use for women.

6.5. Household contestation for feeds

The contestation over fish feed ingredients can unravel any efforts made to develop feed value chains. Men and women report similar responses across all three countries. In Nigeria, fish feed ingredients are also used to feed other animals as well as for human consumption. In Zambia, chicken manure and feathers are also used as compost, while GMPs are used to feed other animals. In Kenya, plant leaves are used for human consumption, compost and feeding other animals, while brans and cakes are mainly used to feed other animals. Some respondents report household disputes over the use of ingredients, though these are not common.

6.5.1. Nigeria

As shown in Table 26, the three most common ingredients in Nigeria for feeding fish (maize powder, GMPs, and brans and cakes) are also the most commonly used for other purposes. More women than men use each of the three for human consumption and to feed other animals. The biggest competitor for maize powder and GMPs is humans, while for brans and cakes it is feeding other animals.

Other use	Maize powder*			GMPs**			Brans and cakes***		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Human consumption	31	20	51	26	17	43	7	5	12
Feeding other animals	12	10	22	12	10	22	20	19	39
Compost				0	1	1	5	1	6
Income					1	1			

*61 respondents (36 women, 25 men), **57 respondents (32 women, 25 men), ***55 respondents (30 women, 25 men)

Table 26. Other uses of fish feed ingredients in Nigeria.

Maize powder and GMPs are mainly used for human consumption, while brans and cakes are also used to feed other animals.

Table 27 lists other household members in Nigeria who use the ingredients and how they use them. Across all feeds, the biggest competition comes from spouses (whether men or women), who are the main users of maize powder, GMPs and various brans and cakes. Maize is mainly used by male household members, whereas all household members use brans and cakes.

Although rare, household disputes do occur over the use of ingredients, mainly maize powder and GMPs. The main reason is competition between its use as a fish feed ingredient as well as for human competition. "Sometimes we forgo consumption and feed livestock and use it for the preparation of the fish feed," said a female respondent in Nigeria. Another male respondent in Nigeria said, "This is especially when the quantities available are not up to the quantities needed."

No household disputes were reported for brans and cakes.

Household user	Maize powder			GMPs			Brans and cakes		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Daughter				3	0	3	2		2
Mother-in-law	6	4	10	4		4	2		2
Father-in-law							1		1
Son	3	0	3	4	1	5	2		2
Spouse	13	11	24	8	10	18	3	5	8
Brother	3	1	4	2	2	4	2	4	6
Sister	2	1	3	1	1	2			
Workers		1	1		1	1	0	1	1

Table 27. Use of ingredients among other household members in Nigeria.

6.5.2. Zambia

As shown in Table 28, the two most common fish feed ingredients in Zambia (chicken manure and feathers and GMPs) are also used for other purposes. More than double the number of women than men also use chicken manure and feathers as compost, and nearly double use GMPs to feed other animals.

Other use	Chicken manure and feathers*			GMPs**		
	Women	Men	Total	Women	Men	Total
Human consumption				4	2	6
Feeding other animals	1	1	2	14	8	22
Compost	32	15	47			
Income	4	2	6	2	2	4

*48 respondents (32 women, 16 men), **37 respondents (24 women, 13 men)

Table 28. Other uses of fish feed ingredients in Zambia.

Table 29 describes the other household members using the ingredients. In terms of who else in the household uses the ingredient, spouses followed by other male household members also use chicken feathers and manure. The same was found with genetically modified plants (GMP), although the competition is less than for chicken feathers and manure, and GMP is also used by female household members. There is no household dispute for the use of genetically modified plants, and only one respondent mentioned household disputes for chicken manure and feathers.

6.5.3. Kenya

As shown in Table 30, the two most common fish feed ingredients in Kenya (plant leaves and various brans and cakes) are also used for other purposes. The biggest competitor for plant leaves is human consumption followed by feeding other animals and then compost. For brans and cakes, feeding other animals is by far the main competition.

Table 31 describes the other household members using the ingredients. In terms of who else in the household uses the ingredient, plant leaves and rice bran are mainly used by spouses. Rice bran is also used by FIL, sons and male siblings.

There is no household dispute over the use of rice bran, and two men reported household disputes over the use of plant leaves). They explained that their spouse may sell kales meant for feeding fish and this can result in a quarrel if this was done without consultation.

Household user	Chicken manure and feathers			GMPs		
	Women	Men	Total	Women	Men	Total
Father-in-law	1	0	1	3		3
Son	3	1	4	3		3
Spouse	19	10	29	4	8	12
Male sibling	2	1	3	3		3
Female sibling				1		1
Mother-in-law				2		2
Daughter				1	2	3

Table 29. Use of ingredients among other household members in Zambia.

Other use	Plant leaves*			Brans and cakes**		
	Women	Men	Total	Women	Men	Total
Human consumption	34	51	85	10	8	18
Feeding other animals	30	47	77	69	51	120
Compost	21	12	33	10	6	16
Income	4	10	14			

**117 respondents (49 women, 68 men), **132 respondents (76 women, 56 men)*

Table 30. Other uses of fish feed ingredients in Kenya.

Household user	Plant leaves			Brans and cakes		
	Women	Men	Total	Women	Men	Total
Daughter	2	0	2	1	0	1
Female sibling	2	0	2	1	0	1
Male sibling	1	4	5	4	4	8
Spouse	30	57	87	36	32	68
Son	4	0	4	7	4	11
Family (all family members)	0	1	1			
Mother or mother-in-law	1	1	2	2	0	2
Father or father-in-law				10	0	10

Table 31. Use of ingredients among other household members in Kenya.

Overall, there is some competition over the use of the most common fish feed ingredients across all three countries. In Nigeria, the ingredients are also used to feed other animals as well as for human consumption. In Zambia, chicken manure and feathers are used as compost, and GMPs are used for feeding other animals. In Kenya, plant leaves are used for human consumption and feeding other animals, while brans and cakes are mainly used to feed other animals. This is true for both men and women. Moreover, household members, especially spouses, are more likely to use maize powder and GMPs in Nigeria, chicken manure and GMPs in Zambia, and plant leaves and various brans and cakes in Kenya. Household disputes were uncommon, mainly over competition between use as a fish feed ingredient as well as for human competition.

6.6. Gendered and socially differentiated needs and risks associated with the use of novel ingredients

According to the KIIs, the use of novel ingredients in fish farming is associated with gendered and socially differentiated needs. The survey respondents were asked several Likert scale questions to identify their needs and requirements, and deeper questions were asked during the KIIs.

6.6.1. Gendered needs

Respondents were asked to rate the needs associated with the use of novel ingredients. As shown in Table 32, women in Zambia and Kenya strongly agree that they need to improve the quality of what they feed their fish. Only in Nigeria do men strongly agree more than women. Nigeria also has more men and women disagreeing that they need to improve what they feed their fish, whereas in Zambia and Kenya there is no doubt that improvements to fish feeds are needed.

In Nigeria, nearly three-quarters of respondents either agree or strongly agree that they need to improve quality, with a higher percentage among men. In Zambia, the percentage is even higher, though strong agreement is greater among women. In Kenya, almost all of the respondents either agree or strongly agree, with strong agreement higher among women.

I need to improve the quality of what I feed my fish.	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Strongly agree	55%	61%	57%	49%	32%	42%	64%	55%	60%
Agree	13%	17%	14%	42%	55%	47%	34%	41%	37%
Neither agree or disagree	18%	8%	14%	3%	9%	5%	1%	0%	1%
Disagree	13%	14%	13%	6%	2%	4%	1%	1%	1%
Strongly disagree	2%	0%	1%	1%	2%	2%	0%	1%	1%

Table 32. Fish quality.

6.6.2. Gendered skills

Despite the fact that the majority of women across all three countries strongly agree on the need to improve their fish feeds, many of them are unsure if they have the right skills to do so, as shown in Table 33. In Nigeria, less than half of women either agree or strongly agree that they have the necessary skills. In Zambia, only a little more than one-third of women agree or strongly agree that they have the necessary skills. In Kenya, even fewer women agree or strongly agree, with the largest share being unsure.

I have the skills I need to improve the quality of my fish feeds.	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Strongly agree	13%	22%	17%	11%	18%	14%	7%	6%	7%
Agree	33%	33%	33%	25%	27%	26%	23%	24%	24%
Neither agree or disagree	24%	19%	22%	11%	2%	8%	42%	45%	43%
Disagree	13%	14%	13%	43%	32%	39%	24%	23%	24%
Strongly disagree	15%	11%	13%	10%	21%	14%	4%	3%	3%
Prefer not to answer or do not know	4%	0%	2%						

Table 33. I have the skills I need to improve the quality of my fish feeds.

6.6.3. Gendered resources and assets

As shown in Table 34, most respondents across all three countries do not have the resources and assets they need to improve the quality of their fish feeds. Only a quarter of respondents in Zambia either agree or strongly agree with the statement, and the percentages are even lower in Nigeria and, especially, Kenya. Overall, women appear slightly less optimistic than men regarding the resources and assets they need.

In Nigeria, the largest share of respondents neither agree nor disagree, while the biggest share in Zambia and Kenya disagree, with higher rates among women across all three countries.

I have the resources and assets I need to improve the quality of my fish feeds.	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Strongly agree	4%	6%	4%	6%	16%	10%	1%	3%	2%
Agree	15%	17%	15%	11%	21%	15%	6%	7%	7%
Neither agree or disagree	38%	28%	34%	10%	14%	11%	30%	38%	34%
Disagree	26%	33%	29%	56%	36%	48%	53%	46%	49%
Strongly disagree	18%	17%	18%	18%	11%	16%	10%	7%	9%
Prefer not to answer or do not know				0%	2%	1%			

Table 34. Resources and assets.

6.6.4. Feed availability

As shown in Table 35, more participants in the three countries are either unsure or disagree that fish feed ingredients are unavailable to them, but the combined percentage for each country is only slightly higher than for those who are either unsure or agree. Few participants in any of the three countries either strongly agree or strongly disagree. Most responses fall somewhere in between, and results among women and men vary depending on the country.

The fish feed ingredients I want to use are unavailable to me.	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Strongly agree	6%	14%	9%	6%	5%	5%	3%	4%	3%
Agree	22%	17%	20%	38%	18%	30%	23%	26%	24%
Neither agree or disagree	40%	28%	35%	15%	30%	21%	28%	35%	31%
Disagree	26%	31%	28%	36%	34%	35%	35%	22%	29%
Strongly disagree	7%	11%	9%	3%	7%	4%	0%	3%	1%
Prefer not to answer or do not know				3%	7%	4%	12%	11%	11%

Table 35. Availability of fish feed ingredients.

6.6.5. Innovation

As shown in Table 36, most respondents across all three countries are willing to try new fish feed ingredients. In fact, the majority of men and women strongly agree, especially in Zambia and Kenya. In Nigeria, almost a quarter are either unsure or unwilling. There are no significant differences by gender in any of the categories across any of the three countries.

I am willing to try using new fish feed ingredients.	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Strongly agree	46%	56%	50%	71%	64%	68%	55%	62%	59%
Agree	29%	22%	26%	29%	34%	31%	44%	38%	41%
Neither agree or disagree	15%	11%	13%	0%	2%	1%	1%	0%	1%
Disagree	11%	11%	11%						
Strongly disagree									
Prefer not to answer or do not know									

Table 36. Willingness to try new fish feed ingredients.

6.6.6. Innovation barriers

As shown in Table 37, most respondents across all three countries list several factors causing women to miss out on experimenting with new feed ingredients compared to men. Lack of funds is the main obstacle in both Kenya and Nigeria. In Zambia, lack of access to services and inputs, lack of funds and lack of knowledge are, in order, the main obstacles. The most significant differences by gender are lack of confidence in Nigeria, and competition for ingredients in both Zambia and Kenya. Harassment, discrimination and competition for ingredients are all mentioned more by women than men in Zambia and Kenya, while the reverse is true in Nigeria.

Which factors are causing women to miss out on experimenting with new fish feed ingredients?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Lack of funds	78%	83%	80%	85%	86%	85%	96%	93%	95%
Lack of decision-making	35%	47%	40%	54%	34%	47%	84%	68%	77%
Lack of time	35%	39%	36%	26%	21%	24%	54%	54%	54%
Lack of access to services	40%	47%	43%	86%	89%	87%	75%	52%	64%
Lack of access to inputs	53%	44%	50%	88%	84%	86%	82%	57%	70%
Lack of confidence	13%	28%	19%	53%	55%	53%	47%	42%	45%
Lack of knowledge	51%	56%	53%	85%	77%	82%	81%	59%	71%
Competition for ingredients	26%	39%	31%	40%	18%	32%	57%	33%	46%
Discrimination	11%	14%	12%	13%	2%	9%	37%	24%	31%
Harassment	7%	11%	9%	13%	0%	8%	24%	7%	16%
Others	22%	22%	22%	21%	30%	24%	4%	4%	4%

Table 37. Factors causing women to miss out on experimenting with new fish feed ingredients.

6.6.7. Innovation risks or opinions

As shown in Table 38, the largest share of respondents across all three countries disagree that attempting to use new fish feeds means losing money, followed by those who are unsure. The difference between these top-two answers is far more pronounced in Zambia than in either Nigeria or Kenya. Very few respondents in any of the countries strongly agree. There are no significant variations between women and men in any of the responses.

Attempting to use new fish feeds means losing money	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Strongly agree	0%	6%	2%	3%	2%	3%	1%	2%	1%
Agree	24%	14%	20%	15%	14%	15%	12%	11%	11%
Neither agree or disagree	22%	31%	25%	25%	16%	22%	30%	29%	29%
Disagree	36%	28%	33%	47%	52%	49%	30%	43%	36%
Strongly disagree	18%	19%	19%	8%	16%	11%	26%	16%	21%
Prefer not to answer or do not know	0%	3%	1%	1%	0%	1%	2%	0%	1%

Table 38. Perceived risk of using new feeds.

6.6.8. Information access

As shown in Table 39, the main response given for whether respondents know how to access information about new fish feed ingredients differs in each of the three countries. In Nigeria, more than one-third agree, though the rate is much higher among men. In Zambia, nearly half disagree, with a fairly higher rate among women. In Kenya, nearly half are unsure, with no significant variation between women and men.

6.6.9. Information needs

As shown in Table 40, respondents across all three countries and both genders report needing additional information on all ingredients. Men and women in Nigeria seem the most informed, with Zambia being less so.

I know how to access information about new fish feed ingredients	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Strongly agree	2%	3%	2%	3%	7%	4%	3%	2%	2%
Agree	31%	50%	39%	21%	36%	27%	30%	35%	32%
Neither agree or disagree	36%	19%	30%	19%	18%	19%	49%	42%	46%
Disagree	15%	17%	15%	51%	36%	46%	15%	20%	17%
Strongly disagree	15%	8%	12%	6%	2%	4%	1%	1%	1%
Prefer not to answer or do not know	2%	3%	2%				2%	1%	1%

Table 39. Knowledge of how to access information about new fish feed ingredients.

Are there any fish feed ingredients you would like more information about?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Potato waste	62%	72%	66%	83%	80%	82%	63%	56%	60%
Poultry waste	40%	39%	40%	67%	73%	69%	62%	54%	58%
Microalgae	66%	69%	67%	96%	86%	92%	63%	64%	64%
Plant leaves	47%	44%	46%	92%	93%	92%	70%	49%	60%
Chicken manure and feathers	49%	44%	47%	65%	73%	68%	60%	54%	57%
Ghee residue	49%	53%	51%	85%	82%	84%	65%	59%	62%
Cassava Waste	40%	44%	42%	71%	68%	70%	59%	53%	56%
Jute, subabul, raintree, spirulina, moringa	51%	42%	47%	90%	91%	91%	63%	61%	62%
GMPs (soybean, BT-maize, genetically modified cotton, Roundup Ready canola)	44%	36%	41%	89%	89%	89%	63%	63%	63%
Rice bran, wheat bran, peanut oil cake, sesame oil cake, cotton seed cake, mustard oil cake, neem seed cake, palm kernel meal, RB and oils	51%	42%	47%	97%	86%	93%	63%	47%	55%
Nonconventional plant sources (Bermuda grass, nursery grass (sages), typha, maize spike	42%	50%	45%	89%	89%	89%	56%	52%	54%
Earthworm (Eisenia fetida)	46%	42%	44%	74%	73%	73%	63%	47%	55%
Kitchen leftovers	40%	31%	36%	56%	52%	54%	56%	43%	50%
Maize powder	40%	33%	37%	61%	64%	62%	54%	41%	47%

Table 40. Desire for more information on fish feed ingredients.

6.6.10. Information barriers

As shown in Table 41, most respondents report several factors preventing them from accessing the information they need regarding novel fish feed ingredients.

In Nigeria, information on cost is the main factor for both women and men. Lack of proper technology and location of information are the next two reasons among women, with the order reversed for men. Another significant reason is lack of enough land, according to a quarter of both women and men. In Zambia, lack of proper technology is the main reason given by both genders, followed by location of information, though at a much higher percentage among women. Lack of a smartphone is the third reason for both women and men. In Kenya, lack of proper technology is far and away the main reason, at nearly three-quarters of respondents, followed by cost and location of information, with higher rates among women for all three responses.

What factors prevent you from accessing the information you need to use novel fish feed ingredients?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Age	2%	3%	2%	0%	2%	1%	5%	3%	4%
Sex				4%	0%	3%	4%	1%	2%
Education level	4%	3%	3%	8%	2%	6%	21%	11%	16%
Location of information	33%	42%	36%	57%	36%	49%	45%	35%	40%
Cost of information	46%	47%	46%	18%	9%	15%	55%	37%	46%
Lack of a smartphone	6%	8%	7%	29%	23%	27%	33%	27%	30%
Lack of proper technology	36%	28%	33%	58%	43%	53%	78%	67%	73%
Not enough land	27%	28%	28%	11%	7%	10%	21%	8%	15%
Low status in community	6%	0%	3%	6%	2%	4%	15%	3%	9%
Spousal permission	6%	0%	3%	7%	0%	4%	16%	2%	9%
Language barriers	2%	6%	3%	7%	2%	5%	10%	8%	9%
Other	2%	14%	7%	4%	9%	6%	3%	3%	3%

Table 41. Factors preventing access to information for novel fish feed ingredients.

6.6.11. Quality barriers

As shown in Table 42, most respondents in each of the three countries report several factors preventing them from improving the quality of their preferred ingredients.

There is some variation in the results by age and gender. The top-three reasons by age and gender for each country are as follows:

Nigeria
- Adult women: finance, income and mechanization
- Young women: finance, new skill, technology
- Adult men: finance, income, new skill
- Young men: finance, income, new skill.

Zambia
- Adult women: new skill, mechanization, finance
- Young women: mechanization, new skill, technology
- Adult men: new skill, mechanisation, finance
- Young men: finance, new skill, network/social capital

Kenya
- Adult women: technology, income, finance
- Young women: income, finance, knowledge
- Adult men: income, finance, technology
- Young men: technology, finance, income.

6.6.12. Overcoming barriers

Table 44 outlines the level of satisfaction with the strategies that respondents are using to address these fish feed barriers. In Nigeria and Kenya, most respondents are satisfied, while those in Zambia are largely dissatisfied, with rates higher among women for all three countries.

What factors prevent you from improving your preferred fish feed ingredients?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Income	53%	67%	58%	71%	52%	64%	94%	91%	93%
Finance	73%	83%	77%	86%	77%	83%	94%	92%	93%
Infrastructure	47%	53%	50%	44%	32%	40%	73%	70%	72%
Technology	58%	64%	60%	76%	59%	70%	95%	80%	88%
Mechanization	56%	56%	56%	93%	75%	86%	84%	68%	77%
Land	31%	33%	32%	10%	5%	8%	14%	8%	11%
Water	22%	17%	20%	18%	11%	16%	6%	5%	6%
Time	15%	8%	12%	7%	5%	6%	21%	5%	14%
Network or social capital	44%	47%	45%	25%	32%	28%	29%	13%	21%
Knowledge	51%	47%	50%	69%	57%	65%	72%	45%	59%
New skill	58%	69%	63%	93%	86%	91%	82%	76%	79%
Self-esteem or confidence	6%	8%	7%	13%	2%	9%	29%	12%	21%
Decision-making power	11%	11%	11%	15%	2%	10%	39%	18%	29%
Other	4%	14%	8%	4%	2%	3%	2%	0%	1%

Table 42. Factors preventing the improvement of preferred fish feed ingredients.

What factors prevent you from improving your preferred fish feed ingredients?	Nigeria				Zambia				Kenya			
	Young women	Adult women	Young men	Adult men	Young women	Adult women	Young men	Adult men	Young women	Adult women	Young men	Adult men
Income	37%	61%	60%	69%	65%	73%	50%	53%	100%	93%	82%	92%
Finance	68%	75%	70%	89%	77%	89%	100%	74%	100%	93%	91%	92%
Infrastructure	47%	47%	50%	54%	59%	40%	33%	32%	63%	74%	73%	70%
Technology	63%	56%	70%	62%	88%	73%	50%	61%	88%	95%	73%	81%
Mechanization	47%	61%	60%	54%	100%	91%	50%	79%	88%	84%	64%	69%
Land	26%	33%	50%	27%	18%	7%	17%	3%	50%	12%	9%	8%
Water	21%	22%	40%	8%	24%	16%	17%	11%	13%	6%	0%	6%
Time	5%	19%	10%	8%	6%	7%	0%	5%	13%	22%	9%	4%
Network or social capital	47%	42%	60%	42%	24%	26%	67%	26%	25%	29%	18%	12%
Knowledge	58%	47%	60%	42%	65%	71%	50%	58%	100%	70%	64%	42%
New skill	68%	53%	80%	65%	88%	95%	83%	87%	88%	82%	73%	77%
Self-esteem or confidence	5%	6%	0%	12%	12%	13%	0%	3%	50%	27%	9%	12%
Decision-making power	16%	8%	0%	15%	12%	16%	0%	3%	50%	39%	36%	16%
Other	0%	6%	10%	15%	6%	4%	0%	3%	0%	2%	0%	0%

Table 43. Factors preventing the improvement of preferred fish feed ingredients, by age and gender.

How satisfied are you with the strategies you are currently using to address these fish feed barriers?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Very dissatisfied	4%	3%	3%	10%	2%	7%	0%	1%	1%
Dissatisfied	7%	3%	6%	44%	36%	41%	11%	13%	12%
Neither satisfied nor dissatisfied	31%	47%	37%	18%	16%	17%	25%	29%	27%
Satisfied	55%	42%	50%	17%	18%	17%	60%	55%	57%
Very satisfied	4%	6%	4%	0%	5%	2%	2%	1%	1%
Prefer not to answer				11%	23%	16%	3%	2%	2%

Table 44. Satisfaction level in addressing fish feed barriers.

Overall, adult women and men are more satisfied than young women and men in Nigeria and Zambia, while the reverse is true in Kenya.

6.6.13. Youth barriers

Table 45 lists the factors causing youths to miss out on experimenting with new feed ingredients compared to adults. Both genders in all three countries list lack of funds is main reason, with women in Zambia also listing lack of access to inputs. The next highest is lack of knowledge in Nigeria, lack of decision-making in Kenya.

Profit margins and lack of patience among youths are other factors in Nigeria causing them to miss out on experimenting with new feed ingredients compared to adults. In Zambia, lack of interest is one of the important other factors. According to women respondents in Zambia, there are several reasons for this lack of interest among youths: (i) they would rather get a salaried job than venture into labor-intensive activities, (ii) they think that fish farming is for old people, that it is dirty work and they lack patience, and (iii) they lack interest in fish farming because they are not patient enough to wait for 6 months. According to men respondents in Zambia, youths like making fast money and they lack the seriousness and commitment needed to be successful at it. In Kenya, meanwhile, youths lack interest and passion and more inclined toward white-collar jobs.

Which factors are causing youths to miss out on experimenting with new fish feed ingredients?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Lack of funds	86%	89%	87%	89%	93%	91%	97%	93%	95%
Lack of decision-making	33%	28%	31%	36%	14%	28%	79%	63%	71%
Lack of time	22%	14%	19%	8%	2%	6%	19%	16%	17%
Lack of access to services	36%	39%	37%	76%	64%	72%	67%	45%	56%
Lack of access to inputs	49%	50%	50%	89%	82%	86%	70%	57%	64%
Lack of confidence	18%	22%	20%	40%	23%	34%	47%	24%	36%
Lack of knowledge	55%	53%	54%	81%	57%	72%	63%	40%	52%
Competition for ingredients	24%	36%	29%	28%	14%	22%	46%	32%	39%
Discrimination	4%	6%	4%	18%	0%	11%	35%	14%	25%
Harassment	6%	3%	4%	8%	0%	5%	28%	18%	23%
Others	11%	25%	17%	21%	27%	23%	5%	14%	9%

Table 45. Factors causing youths to miss out on experimenting with new fish feed ingredients.

Overall, there are many gendered and socially differentiated needs and risks associated with the use of novel ingredients across the three countries.

In Nigeria, women have less access than men to information, skills, resources and assets necessary for fish feed. Women also lack access to services and finances more than men, and this curbs their innovation.

- Gendered needs: Both women and men report a need to improve the quality of fish feeds, though more men than women strongly agree. This could mean that men have more awareness about quality feeds than women.
- Gendered skills: Half of the respondents (more men than women) agree that they have the skills they need to improve the quality of their fish feeds, while the other half (more women than men) are either unsure or disagree. This finding again reinforces that men are more knowledgeable about quality fish feeds than women.
- Gendered resources and assets: A high percentage of the respondents, with negligible difference by gender, either are unsure or disagree that they have the resources and assets they need to improve the quality of fish feeds.
- Feed availability: More women than men are unsure whether the fish feed ingredients they want are available. Also, more men than women disagree that ingredients are unavailable to them. This likely means that women do not have access to or knowledge about the feed ingredients they would like to use.
- Innovation: Across both genders, respondents are willing to try using new fish feed ingredients, though more so among men than women. This is a positive finding, as the FASA project has willing recipients of new knowledge and ideas across all three countries.
- Innovation barriers: The main factors causing women to miss out on experimenting with new feed ingredients compared to men include a lack of funds, lack of access to inputs, lack of knowledge and a lack of access to services. The FASA project should be mindful of these barriers, which could limit women's ability to benefit from the project as much as men.
- Innovation risks or opinions: More women than men agree that attempting to use new fish feeds means losing money, though more women than men disagree. As such, a clear pattern does not exist in Nigeria.
- Information access: Men are more aware than women of how to access information about new fish feed ingredients, while women appear unsure.
- Information needs: Respondents from both genders report needing additional information on all ingredients.
- Information barriers: Both genders report the cost of information, not having the right technology, location of information and not enough land as the factors preventing them from accessing the information required for them to use novel fish feed ingredients.
- Quality barriers: For women, the factors preventing them from improving the quality

of their preferred ingredients are finance, technology, new skills, mechanization, income, knowledge and infrastructure.
- Satisfaction with strategies: Women are more satisfied than men with the strategies that they are using to address these fish feed barriers, while more men are unsure.
- Barriers for youths: Lack of funds, lack of access to inputs and lack of knowledge are the main factors causing youths to miss out on experimenting with new feed ingredients compared to adults.

In Zambia, women know that they need to improve the quality of their fish feeds, but they are not sure if they have the skills to do so. Although they are willing to innovate and use new ingredients, women are more dissatisfied than men with the strategies that they are using to address fish feed barriers.

- Gendered needs: Strong agreement is higher among women than men on the need to improve the quality of feed.
- Gendered skills: More women than men are either unsure or disagree that they have the required skills to improve the quality of their fish feeds.
- Gendered resources and assets: More women than men are either unsure or disagree that they have the resources and assets they need to improve the quality of fish feeds.
- Feed availability: More men than women are unsure whether fish feed ingredients they want to use are available to them or not, while more women agree that fish feed ingredients they want to use are unavailable to them.
- Innovation: Across gender, respondents are willing to try using new fish feed ingredients, though there is stronger agreement among women than men.
- Innovation barriers: Lack of access to inputs, lack of access to services, lack of funds, lack of knowledge, lack of decision-making and lack of confidence are the main factors causing women to miss out on experimenting with new feed ingredients compared to men.
- Innovation risks or opinions: More women are unsure whether attempting to use new fish feeds means losing money, though more men than women disagree.
- Information access: Men are more aware than women of how to access information about new fish feed ingredients.
- Information needs: Respondents from both genders report needing additional information on all ingredients.
- Information barriers: Both genders report not having the right technology, location of information and not having smartphones as the main factors preventing access to the information required for novel fish feed ingredients.
- Quality barriers: For women, the main factors preventing them from improving the quality of their preferred ingredients are mechanization, new skill, finance, technology, income and knowledge.
- Satisfaction with strategies: Women are more dissatisfied than men with the strategies that they are currently using to address fish feed barriers.
- Barriers for youths: Lack of access to inputs, lack of access to services, lack of funds and lack of knowledge are the main factors causing youths to miss out on experimenting with new feed ingredients compared to adults.

In Kenya, women want to improve their fish feeds. However, they are not sure that they have the right skills to do so, and they know they do not have the right resources and assets necessary. That said, women are willing to try out new fish feed ingredients with the right information and opportunity.

- Gendered needs: Strong agreement is higher among women than men regarding the need to improve the quality of feed. Both women and men report a need for improvements to fish feeds.
- Gendered skills: Men and women are unsure whether they have the required skills to improve the quality of their fish feeds. One-quarter of the respondents disagree that they have the required skills, without any difference by gender.
- Gendered resources and assets: Compared to the other two countries, a higher percentage of respondents, both men and women, are either unsure or disagree that they have the resources and assets they need to improve the quality of their fish feeds.
- Feed availability: More men than women are unsure whether the fish feed ingredients they want to use are available to them. On the flip side, more women than men disagree that these ingredients are unavailable to them.

- Innovation: Across gender, respondents are willing to use new fish feed ingredients, though men have stronger agreement than women.
- Innovation barriers: Lack of funds, lack of decision-making, lack of access to inputs, lack of knowledge, lack of access to services, competition for ingredients and lack of time are the main factors causing women to miss out on experimenting with new feed ingredients compared to men.
- Innovation risks or opinions: A clear pattern does not exist in Kenya. Although more women strongly disagree that using new fish feeds means losing money, the reverse is true among those who agree.
- Information access: Gender differences are not that stark in Kenya, though more women than men are unsure how to access information about new fish feed ingredients.
- Information needs: Respondents from both genders report needing additional information on all ingredients.
- Information barriers: According to respondents from both genders, not having the right technology, cost of information, location of information and not having smartphones are the main factors preventing access to the information required for novel fish feed ingredients.
- Quality barriers: For women, the main factors preventing them from improving the quality of their preferred ingredients are technology, income, finance, mechanisation, new skills, infrastructure and knowledge.
- Satisfaction with strategies: Women are more satisfied than men with the strategies they are using to address these fish feed barriers.
- Barriers for youths: Lack of funds, lack of decision-making, lack of access to inputs, lack of knowledge, lack of access to services, competition for ingredients and lack of time are the main factors causing youths to miss out on experimenting with new feed ingredients compared to adults.

6.7. Discussion on fish feed findings

This section summarizes the findings according to the gendered and socially differentiated needs, risks and opportunities associated with the use of novel ingredients across the three study countries.

6.7.1. Needs

In Nigeria, women require new fish feed ingredients. The top-three fish feed ingredients are maize powder, GMPs and various brans and cakes. The main reason for using these ingredients is for their availability, with GMPs also having a nutritious value. However, these ingredients have seasonal variations in availability and high prices during times of scarcity. GMPs and various brans and cakes are purchased, suggesting there is a need to improve the supply of nutritious and affordable feed ingredients.

In Zambia, women require more availability of fish feeds. The top-two fish feed ingredients have variation in availability. Chicken manure and feathers vary because of weather patterns and disease outbreaks, while availability for GMPs varies because of seasonal variations. Given that these ingredients are chosen because they are available and/or affordable, there is a need to improve supply and affordability. Moreover, GMPs are purchased from the market, suggesting a willingness to invest in fish feed ingredients.

In Kenya, plant leaves and various brans and cakes also have seasonal variations in availability. Plant leaves are used when they are available, whereas brans and cakes are chosen for their nutritious value. Brans and cakes are purchased, suggesting there is a willingness to pay for nutritious ingredients.

In all three countries, women strongly agree that they need to improve the quality of what they feed their fish. Nigeria has more mixed responses, whereas in Zambia and Kenya there is no doubt that improvements to fish feeds are needed. Despite the majority of women across all three countries strongly agreeing on the need to improve fish feeds, many are unsure if they have the necessary skills to improve their fish feeds. In order, Kenya, Zambia and then Nigeria are unsure or disagree that they have the right skills to improve fish feed quality. Women require more confidence and skills to improve the quality of their fish feeds.

Several other factors also prevent women from accessing the information they require for novel fish feed ingredients. According to women in Nigeria, the cost of information, not having the right technology, location of information and

not having enough land are their main obstacles. Among women in Zambia, not having the right technology, location of information and not having a smartphone are the main restrictions. For women in Kenya, not having the right technology, the cost of information, location of information and not having smartphones are the main factors preventing access.

6.7.2. Risks

In Zambia and Kenya, fish farming is mostly a secondary occupation contributing up to 40 percent of the household's income, meaning involvement in fish activities could be deprioritized if the primary income source is easier and more lucrative. This risk is more likely when most respondents do not have the resources and assets they need to improve the quality of their fish feeds. In all three countries, around half of women disagree or strongly disagree that they have the resources and assets needed to do so. The FASA project could struggle to include and reach women in the program if it does not also provide them with the resources and assets they need.

Respondents identify a number of other factors as barriers that prevent women and men from improving the quality of their preferred ingredients, with some minor variation by age and gender. Finance is main barrier for women of all ages in Nigeria, followed by income and mechanization for adult women, and new skills and technology for young women. This suggests that the FASA project could risk further marginalizing women from the program in Nigeria if it does not also offer access to finance.

In Zambia, barriers for adult women include new skill, mechanization and finance. For young women, it is mechanization, new skill and technology. The FASA project could risk marginalizing women from the program in Zambia if it does not also offer mechanization and new skills. Moreover, women have a lower level of education than do men. To ensure comprehension, this might mean that training women will need to be more basic and pictorial than that offered to men.

In Kenya, barriers for adult women are technology, income and finance, while for young women they are income, finance and knowledge. The FASA project could risk marginalizing women from the program in Kenya if it does not increase incomes or offer access to finance.

A big risk is that women's access and user rights are weak across all three countries, and definitely less secure than men's. This means that some women could be reluctant to participate in the FASA project without encouragement and without women-friendly groups and spaces. Couples training, pictorial manuals, demonstrations and female trainers should also be used to help women learn. The policy review emphasized that the project should not assume that gender, youths and marginalized groups will automatically be incorporated into policies and programs without extra effort.

6.7.3. Feed ingredient risks

The contestation over fish feed ingredients can unravel any efforts made to develop feed value chains. In Nigeria, there is a risk that maize powder and GMPs could lead to disputes about how they are used. The biggest competitor for these ingredients is human consumption. Although brans and cakes are also used as animal feed, they do not appear to cause household disputes, presenting an opportunity for the FASA project in Nigeria.

In Zambia, chicken feathers and manure are used more by male household members, though women also use it as compost. Competition for GMPs is less than for chicken manure and feathers, and women mainly use GMPs to feed other animals. There are no household disputes over GMPs, and only one respondent mentioned household disputes for chicken manure and feathers. As such, both ingredients present opportunities for the FASA project in Zambia, with GMPs presenting the least controversial choice.

In Kenya, the biggest competitor for plant leaves is human consumption followed by feeding other animals and then compost. For brans and cakes, it is feeding other animals, with some small competition from human consumption and compost. Men and women both use brans and cakes as well as plant leaves. No household disputes were recorded over the use of brans and cakes, but there were two reports of disputes over the use of plant leaves. As such, brans and cakes present the most opportunity for the FASA project in Kenya.

6.7.4. Opportunities

Opportunities can be found across all three countries to improve the use and quality of fish feed ingredients. Feed availability is not a problem, as the ingredients women want to use are available in each country. However, people are using ingredients that they know about. Considering most respondents across the three countries are willing to try using new fish feed ingredients, the FASA project has an enabling environment to introduce new ingredients and educate women on their benefits and use.

In all three countries, women strongly agree that they need to improve the quality of what they feed their fish. Nigeria has more mixed responses, whereas in Zambia and Kenya there is no doubt that improvements are needed. Funding support, combined with access to inputs, knowledge and services, will ensure a high uptake of new ingredients. Kenyan women also mention a lack of decision-making power and competition for ingredients as the main factors causing them to miss out on experimenting with new feed ingredients compared to men. Another factor to overcome is that some respondents think using new fish feeds could mean losing money, with percentages higher in Nigeria followed by Zambia and then Kenya. Given this, there are many opportunities for the FASA project to overcome the challenges that women face while trying to innovate with new fish feed ingredients. However, raising awareness on the benefits of innovating will be needed to create demand.

Overall, the respondents report needing additional information on all ingredients. Men and women in Nigeria seem the most informed, with Zambia being the least so. Percentages vary, but women in all three countries report wanting information on many new fish feed ingredients, including microalgae, potato waste, various brans and cakes, chicken manure and feathers, ghee residue, plant leaves, nonconventional plant sources, GMPs, earthworms, and those in the category of jute, subabul, raintree, spirulina and moringa. However, most respondents across all three countries are either unsure or do not know how to access information about new fish feed ingredients. As such, there are many opportunities for the FASA project to introduce new fish feed ingredients.

There are opportunities to enhance the supportive policy, regulatory and legislative framework. The FASA project can incorporate gender-sensitive strategies in Nigeria, fostering fair access, equitable benefits and inclusive decision-making. In Zambia and Kenya, FASA can strive for gender balance within aquaculture-related organizations while actively engaging with local communities. Furthermore, the project can advocate for the integration of gender-responsive provisions into all governing bodies and policies by aligning with the SDGs and the national gender policies.

7. Findings: ADS 205 framework

In this section, the key findings are presented along five main ADS 205 domains. The findings from the qualitative and quantitative data have been combined and presented wherever relevant.

7.1. Laws, policies, regulations and institutional practices

The governing laws, policies and regulations are covered under section 5. This section discusses the awareness of this enabling environment and how it is managed in practice. It also covers group membership and women's leadership in these groups.

From the KIIs, it was found that the respondents had little knowledge of the formal laws, policies and regulations governing fisheries in each of the three countries. The household survey did not ask about policies and laws, but it did ask questions about institutions working in local communities to remove gender and youth barriers. These findings are presented in in the sections below.

7.1.1. Organizations working with women in local communities

This section reveals variations in awareness of organizations working to remove barriers faced by women in the communities. The findings show that there may not be many such organizations in their communities, or respondents do not know about the organizations that do exist. As shown in Table 46, Kenya stands out with the highest level of awareness, followed by Zambia and Nigeria. In all three countries, however, far more respondents either do not know or do not believe that such organizations exist.

In Nigeria and Zambia, a higher percentage of adult women than young women say there are no such organizations in their community. There is no significant difference by age among men. It can be assumed, then, that men in Zambia and Nigeria are unaware or do not know of organizations existing in the community for women. In Kenya, twice the amount of adult women than young women do not know, while percentages are similar among young men and adult men, at about one-quarter.

Are there any organizations working in your community to remove barriers faced by women?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Yes	13%	3%	9%	21%	18%	20%	41%	32%	37%
No	31%	19%	26%	51%	39%	47%	36%	45%	40%
Do not know	56%	78%	65%	28%	43%	34%	23%	24%	24%

Table 46. Organizations working in the community to remove barriers women face.

Box 3. Stakeholders identified by the key informants.

Nigeria: Various initiatives and services play a crucial role in supporting women in aquaculture by providing both financial assistance and extension services. In Sokoto, Women's Development Centers serve as vital communication hubs, facilitating interactions between women and directors to raise awareness about feed production. These centers also organize specialized training programs for women interested in venturing into feed production. Furthermore, the local government collaborates closely with relevant public departments, agencies and academic institutions to deliver essential extension services to all stakeholders involved in the fisheries and aquaculture value chain, with a particular emphasis on feed production. In Adamawa, the National Directorate of Employment takes the lead in providing comprehensive training programs. These initiatives, organized in partnership with the Fish Farmers Association, are exclusively designed to empower women in aquaculture. The focus is on enhancing their knowledge and skills. In Abuja, women should be empowered through skills training and supported through improved access to capital, grants and loans with flexible repayment terms to help women and youths start their fish farming businesses effectively. Financial institutions are recognized as pivotal organizations that can play a significant role in assisting women entrepreneurs in the aquaculture sector by providing the necessary financial resources and support.

Zambia: Several programs and services are instrumental in supporting women in aquaculture, providing financial assistance and promoting community development. The Constituency Development Fund (CDF) is a government-led initiative that plays a vital role in allocating funds to local constituencies for the purpose of enhancing community development. In the southern provinces of Zambia, women have reported leveraging CDF funds to acquire fishing assets, thereby supporting their aquaculture businesses. This financial support helps women build their capacity within the aquaculture sector. The Citizens Economic Empowerment Commission (CEEC) is another key player in Zambia's aquaculture landscape. This organization provides crucial financial and credit services to women engaged in large-scale aquaculture activities, including fish feed production. By offering financial assistance, the CEEC facilitates the growth and sustainability of women-owned businesses in the aquaculture industry. In Solwezi, a noteworthy initiative focuses on scaling up nutrition, and women are prominently involved in these programs. These initiatives not only address the nutritional needs of the community but also empower women by involving them in activities related to nutrition and agriculture, including aquaculture. This underscores the commitment to women's participation and empowerment in various aspects of the aquaculture sector.

Kenya: Various government offices and organizations are actively involved in providing financial support and extension services to empower women in aquaculture. In Homabay, the County Government Fisheries Office offers pond production support to farmers, which includes valuable assistance in fish feed provision to enhance production. Furthermore, the office provides extension services encompassing aspects like pond design, fish fingerling sourcing, water quality management and feed management. These services are pivotal in ensuring that women involved in aquaculture have access to the necessary resources and knowledge to thrive in their ventures. In Busia, the County Fisheries Department offers training services to fish farmers, including women, on using affordable local feed supplements as an alternative to expensive commercial feeds. This effort aims to make fish farming more financially viable and accessible to all project beneficiaries, thereby fostering their participation and success in the industry. In Kakamega, the county government operates a fish feed subsidy program that significantly benefits women in aquaculture, with farmers paying only half of the actual cost. Additionally, organizations like the Kenya Marine and Fisheries Research Institute provide training to farmers on feed formulation and technical expertise, further enhancing their capabilities. In Siaya, the county government offers essential technical assistance to women engaged in aquaculture.

In conclusion, the survey findings indicate variations in awareness of organizations working to remove barriers faced by women in the three study countries. Respondents in Kenya are more informed about the presence of such organizations in their communities than their counterparts in Nigeria and Zambia.

Furthermore, the data shows that women generally have a higher level of awareness than men in all three countries. This gender disparity might be indicative of differing life experiences and levels of exposure to gender biases. Women might be more familiar with these organizations because of direct encounters with gender-related challenges or active participation in discussions and initiatives related to gender issues.

However, these results should be treated with caution, because they reveal some discrepancy in how respondents interpreted the phrase "organizations that work with women in fisheries." Some people answered about any organization, even if they do not specifically aim to work with women, such as any finance organization that lends to women; others answered according to organizations that are specifically focused on women, whether it be finance, extension, etc. Overall, these findings underscore the importance of raising awareness, particularly among men, about the existence and work of organizations that are friendly to women, focus on women and address gender-based barriers. Increased awareness would contribute to greater engagement and support for these organizations.

7.1.2. Organizations working with youths in local communities

This section reveals that there are not many organizations working with youths in local communities, and even if they exist, they are unknown. Overall, as shown in Table 47, respondents are unaware that there are organizations working in their communities to remove barriers (not specific to fisheries) that youths face. However, women are more aware of such organizations than men in all three countries, which probably reflects their gendered role as primary caregivers. In Nigeria, about two-thirds of the respondents do not know about such organizations, whereas almost half of those in both Zambia and Kenya responded that there are no such organizations in their communities.

Tables 48–50 break down the data further by age. The most notable variation is in Zambia, where young men are almost twice as likely as adult men to be unaware of such organizations, while adult men are more than twice as likely to say they do not exist.

Are there any organizations working in your community to remove barriers faced by youths?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Yes	9%	6%	8%	22%	14%	19%	21%	18%	20%
No	22%	31%	25%	46%	36%	42%	43%	55%	48%
Do not know	69%	64%	67%	32%	50%	39%	36%	28%	32%

Table 47. Organizations working in the community to remove the barriers youths face.

Are there any organizations working in your community to remove the barriers faced by youths?	Nigeria			
	Young women	Adult women	Young men	Adult men
Yes	16%	6%	0%	8%
No	16%	25%	30%	31%
Do not know	68%	69%	70%	62%

Table 48. Organizations in Nigeria working in the community to remove barriers for youths.

Are there any organizations working in your community to remove barriers faced by youths?	Zambia			
	Young women	Adult women	Young men	Adult men
Yes	24%	22%	0%	16%
No	35%	49%	17%	40%
Do not know	41%	29%	83%	45%

Table 49. Organizations in Zambia working in the community to remove the barriers for youths.

Are there any organizations working in your community to remove barriers faced by youths?	Kenya			
	Young women	Adult women	Young men	Adult men
Yes	25%	21%	27%	17%
No	50%	42%	55%	54%
Do not know	25%	37%	18%	29%

Table 50. Organizations in Kenya working in the community to remove barriers for youths.

Overall, the survey results reveal a relatively low level of awareness among respondents across the three countries regarding organizations working in their communities to address the barriers for youths. Zambia and Kenya have relatively higher levels of awareness than Nigeria. Another plausible explanation could be that there are, in fact, not many of these organizations doing this work in their communities.

The data also highlights a gender gap in awareness. Women tend to be more informed than men about these organizations, a trend observed across all three countries. Furthermore, adult women in Nigeria are more likely than young women to either report the absence of such organizations or express uncertainty about their presence in their communities, whereas there is little variation in awareness by age among women in Kenya. Young men in Nigeria and Zambia are more likely than adult men to express uncertainty about their presence, while awareness in Kenya is fairly consistent across age groups. These findings emphasize the need for increased efforts to raise awareness about organizations addressing youth-related challenges and to support the limited number of organizations working with youths.

7.1.3. Organizations working to remove fish feed barriers

This section covers organizations working to remove fish feed barriers in general. As shown in Table 51, Kenya has more such supporting organizations than either Nigeria and Zambia. Although women in Nigeria are more aware of organizations than men, the difference is negligible. In Zambia, a higher percentage of men than women do not know about such organizations, while the reverse is true in Kenya.

Are there any organizations working in your community to remove any fish feed barriers?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Yes	13%	8%	11%	19%	16%	18%	46%	46%	46%
No	35%	36%	35%	51%	43%	48%	30%	38%	34%
Do not know	53%	56%	54%	29%	41%	34%	23%	17%	20%

Table 51. Organizations working in the community to remove fish feed barriers.

In Nigeria, 95% of young women (and 100% of young men) reported 'no' or don't know of the organisations working in this community to remove fish feed barriers as compared to their counterparts and this was higher than adult women (83%) and men (89%). In Zambia, younger women (77%) were also less aware than adult women (82%) while there is no stark difference by age among men. In Kenya, young men (82%) were much less aware than adult men (51%) of the organisations working in this community to remove fish feed barriers, while there is no stark difference by age among women.

Are there any organizations working in your community to remove any fish feed barriers?	Nigeria				Zambia				Kenya			
	Young women	Adult women	Young men	Adult men	Young women	Adult women	Young men	Adult men	Young women	Adult women	Young men	Adult men
Yes	5%	17%	0%	12%	24%	18%	17%	16%	50%	46%	18%	49%
No	26%	39%	40%	35%	35%	56%	33%	45%	38%	30%	55%	36%
Do not know	68%	44%	60%	54%	41%	26%	50%	40%	13%	24%	27%	16%

Table 52. Organizations working in the community to remove fish feed barriers, by age and gender.

As shown in Table 53, very few respondents in any of the three countries report disliking anything about the way they are treated or the services they receive from these organizations.

Overall, respondents in Kenya have greater awareness and access to organizations working to address fish feed barriers in their communities. This suggests that efforts to combat fish feed barriers are more prominent and effective in Kenya or that Kenya receives more support. Box 3 does suggest there are more organizations working on fish feeds in Kenya and that they include women. In Nigeria and Zambia, more people are unaware than aware of such organizations, suggesting the need for either more organizations or more outreach from the ones that do exist.

Gender differences are not stark for any country.

Among the respondents in all three countries who were aware of the organizations, they did not express any significant dissatisfaction with how they are treated or the services they receive from these organizations. This suggests a generally positive perception of the organizations and their efforts in addressing fish feed barriers. However, the younger generation, in general, tends to have less awareness of these organizations or does not know about them when compared to the older generation. Overall, Kenya has the most awareness of women and youths of fish feeding organizations.

7.1.4. Interaction with authorities

This section specifically discusses the authorities involved in fish feeds, including local government and nongovernment stakeholders, input dealers, extension officers and others. As shown in Table 54, fish feed farmers in Zambia have more interaction with authorities, followed by Kenya and then Nigeria. In Zambia, women have more interaction with authorities than do men. These interactions can encompass various aspects of engagement, such as seeking information, obtaining permits or licenses, addressing regulatory issues or participating in government programs related to fish farming. All the respondents across the three countries report having collegial relationships with officials and never facing any problems, such as harassment.

Is there anything you dislike about how these organizations treat you or the services they offer?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Yes	0%	3%	1%	6%	7%	6%	5%	5%	5%

Table 53. Perception of treatment from these organizations or services they offer.

Have you had any interactions with authorities during your fish feed work?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Yes	9%	17%	12%	54%	43%	50%	30%	32%	31%

Table 54. Interactions with authorities.

Considering that Kenya has more organizations working in fish feeds than does Zambia (section 7.1.3), the higher level of interaction in Zambia suggests that the government is more heavily involved in the fishing sector than in other countries. Overall, the variation in the degree of interaction between fish feed farmers and authorities across the three countries underscores the importance of considering local contexts and factors that influence the relationship between farmers and government bodies in the agriculture and aquaculture sectors.

7.1.5. Proposed policy recommendations

The key informants were asked about (i) policies that need to change to improve the affordability of locally produced fish feeds, (ii) how policies, rules and regulations could better be leveraged to further the access of women to novel feed ingredients, and (iii) policies that need to change to improve the affordability of locally produced fish feeds for women. We have broken down the findings from the KIIs by country. Because of the limited sample size, however, the findings cannot be extrapolated and generalized.

7.1.5.1. Nigeria

The government official in Sokoto emphasized the need for policy changes and improvements in training methods for women involved in producing fish feed. The key areas of focus include enhancing the quality and simplicity of training, ensuring consistency in training programs and establishing a mechanism for monitoring the progress of women in adopting local ingredients in feed production. Additionally, creating partnerships with research institutions was also pointed out as essential in facilitating knowledge exchange and technology transfer between researchers and fish farmers and identifying effective feed ingredients. There is also a need for creating policies that encourage continuous collaboration and information sharing among farmer cooperatives to enable women to access and adopt new aquaculture practices more effectively. This would also improve access to markets and timely access to credit as key factors in furthering the adoption and use of aquaculture innovations by both women and men.

A fisheries officer proposed that the government could play a role in improving the affordability of local fish feeds. This could involve providing land at a reduced cost or even for free in order to cultivate feed ingredients. Additionally, offering fertilizers at lower rates or for free would further support the cultivation of crops to use in fish feeds. Such government support would incentivize more people to engage in farming for fish feed production.

7.1.5.2. Zambia

A fisheries officer emphasized the need for policy changes that prioritize the production of local ingredients for fish feeds. This shift in policy direction would involve identifying and incorporating suitable ingredients into fish feeds and then implementing flexible efforts, such as empowerment initiatives or supporting out-grower programs, to stimulate the production of these ingredients. The aim is to increase the availability of raw materials on the market, which would lead to a decrease in prices for fish feeds. The key informant also mentioned that training and awareness are essential strategies to encourage women's active participation in fish farming. By providing training and raising awareness among women, they can better understand that fish farming is not exclusively for men but is open to everyone, including women. This knowledge helps break down gender-related barriers and encourages women to participate more actively.

7.1.5.3. Kenya

The county director of fisheries in Kakamega proposed a need for policy changes and strategic measures to improve the affordability of locally produced fish feeds for women. This involves establishing country-specific regulations that support and promote cottage feed production, involving women in particular. Second, offering financial incentives (tax breaks) and other support mechanisms (technical assistance, access to funding) would promote local manufacturers. This would lead to increased competition, potentially reducing costs and making fish feeds more affordable for everyone, including women. Additionally, leveraging policies should involve addressing gender-specific barriers and ensuring fair access to novel feed ingredients for women. Other key informants were unaware of the existing policies but did suggest lifting a ban on BT soy.

The respondents were questioned about regulations they would want to alter to enhance their ability to benefit from the fish feed industry or value chain, as shown in Tables 55–57. Given that not all respondents are familiar with the regulations concerning the fish feed industry or value chain, their responses encompass a range of desired changes. These include greater awareness of local feed ingredients, increased availability and affordability of low-cost local ingredients, and improved quality control measures, in addition to alterations in regulations and taxes.

Respondents in Nigeria made the following key recommendations and concerns for the country's fish farming and feed industry:

Women respondents

- Enhanced policy and quality control: There is a strong call for improvements in policies regarding the establishment of the fish feed industry and the quality control of feed ingredients. These enhancements are seen as essential for the industry's growth and sustainability.
- Affordable ingredients: Access to affordable ingredients is crucial to reduce the production cost of fish feed. High prices and subpar ingredient quality are significant challenges for fish farming.
- Lower taxes and import duties: Stakeholders urge the government to reduce taxes and levies on imports of fish feed ingredients. This includes lowering import duties on fish feeds and related premixes while also eliminating taxes on micronutrients and other agricultural inputs that raise the cost of feed ingredients.
- Regulatory revisions: Regulations concerning nonconventional feed ingredients should be revisited to incorporate processing methods, making it more inclusive and adaptable to industry needs.
- Government subsidies: There is a call for government subsidies to support fish farming, particularly for women in the sector. These subsidies should focus on making local ingredients more affordable.
- Training: Stakeholders emphasize the need for more training, particularly in modern techniques using cost-effective local ingredients in feed production.
- Eliminating middlepersons: Middlepersons in the supply chain should be reduced or eliminated to ensure fair pricing and more direct access to resources for fish farmers.
- Sustainable market creation: Creating a sustainable market for fish farmers is essential for the long-term success of the industry.

Men respondents

- Quality assurance and licensing: There is a call to introduce licences for fish farmers and feed millers to ensure the production of high quality feed. Additionally, assistance in upgrading machinery for feed millers is seen as essential.
- Import tariffs and regulations: Stakeholders emphasize the need to revisit import tariffs on micronutrients. They suggest that regulations regarding growth promoters should be more flexible if they do not affect the genetic composition of fish, while strict enforcement of existing growth promoter regulations remains essential. Furthermore, they propose government intervention in regulating feed prices.
- Government subsidies: There is a strong push for government subsidies, not only for fish feed but also for production of animal feeds in general. This is viewed as a means to make feed more affordable and encourage production.
- Training and empowerment: Stakeholders call for comprehensive training programs, particularly on modern techniques using cost-effective local ingredients for feed. Additionally, they recommend that the government select and empower youths who are already engaged in fish farming, focusing resources on those with a genuine interest in the field.
- Eliminating middlepersons: Reducing or eliminating middlepersons in the supply chain is seen as essential to ensure fair pricing and better access to resources for fish farmers.
- Promotion of nonconventional ingredients: Encouraging nonconventional feed ingredients is suggested to diversify feed sources and promote sustainability.

These recommendations collectively aim to enhance the quality, accessibility and sustainability of the fish farming and feed industry in Nigeria, ultimately benefiting both farmers and consumers.

Nigeria	Women	Men
Quality control	Enhance the policy that establishes the fish feed industry and the quality control of feed ingredients.	Create a license for fish farmers and feeds millers to ensure quality. Issue a license for feed millers and help improve their machinery.
Affordable ingredients	Create access to cheap ingredients that will reduce the cost of fish feed production. The government should assist with ways to get inexpensive feed because high prices and poor quality make production stressful.	
Tax and import duties and regulatory revisions	The government should reduce taxes and other levies on imports of fish feed ingredients. Reduce import duties on fish feeds and other mineral and vitamin premixes. Remove taxes on micronutrients and other agricultural inputs, which will have a multiplier effect on the cost of agricultural produce used as fish feed ingredients. Readdress regulations on the types and forms of nonconventional ingredients to include processing methods.	Reduce regulations on import tariffs on micronutrients. Make the laws restricting growth promoters more flexible for those that do not affect the genetic composition of fish, while implementing strict regulations on growth promoters that do affect genetic composition. The government should regulate feed prices.
Government subsidies	Encourage government to provide subsidies to grow fish. Government should make local ingredients available at affordable rates. Subsidize fish feed for women growing fish.	Government should provide subsidies on feed for any animal production.
Training	More training is needed.	Government should train farmers on modern techniques of using local inexpensive ingredients for feed. Government should select and train only youths who are already practicing fish farming and empower them instead of training more youths who have no interest in fish farming.
Others	Eliminate middlepersons and create a sustainable market for fish farmers.	Eliminate middlepersons and encourage the use of nonconventional feed ingredients.

Table 55. Policy recommendations in Nigeria.

Respondents in Zambia's fish farming and feed industry highlight the following critical factors and recommendations to improve the sector:

Women respondents

- Access to finances: Ensuring easy access to finance, such as bank loans, is crucial for acquiring the necessary resources for a successful business venture in fish farming.
- Financial services and information: Improving access to financial services and information is vital for fish farmers to make informed decisions and manage their operations effectively.
- Certification rules: Establishing clear certification rules for the production of homemade feed for commercial use is essential to guarantee quality and safety.
- Loan payment facilitation: The CEEC should take responsibility for loan payments related to fish farming or purchasing.
- Fisheries extension officers: Create a deliberate policy to deploy fisheries extension officers who can provide guidance and support to fish farmers.
- Training: More training programs are needed, especially on local feeds and the use of novel ingredients.
- Sensitization and outreach: Authorities should conduct sensitization and outreach programs to educate fish farmers on best practices.
- Access to information and technology: Improve access to the right information, technologies and machinery for processing feeds using local ingredients to reduce costs.
- Certification for homemade feed: Provide certificates to enable more people to produce their own feed using local materials, with support from local authorities.
- Price reduction: Reduce feed prices and prices of ingredients, as high costs are a significant concern.
- Fingerling quality: The industry should provide faster-growing fingerlings to enhance productivity.
- Proximity and infrastructure: Address challenges related to proximity, long distances and poor road networks that hinder access to resources and services.
- Monitoring and support: Deploy more field officers from the Ministry of Fisheries and Livestock to monitor and support the fish feed value chain.
- Packaging: Improve feed packaging to make it more accessible to all members of the community.

Men respondents

- Loan payment frequency: The CEEC should adjust loan repayment schedules to every 6 months (after harvests) rather than monthly payments, making it more manageable for farmers.
- Regulatory exceptions: Make exceptions to regulations on animal feed standards, particularly for people in rural communities, to reduce compliance burdens.
- Access to funds: Make rules governing access to funds for agribusiness, including fish farming, clearer and more accessible.
- Species selection: Advise farmers on suitable fish species to grow in the region, especially those that are commercially viable.
- Alternative feeds: Promote the use of alternative types of feed in fish farming to reduce costs and increase sustainability.
- Training on local feeds: Educate farmers on how to use local feeds effectively.
- Training and site visits: Provide training for fish farmers, including site visits to share practical knowledge.
- Sensitization: Conduct sensitization campaigns so that farmers can learn about the benefits of using various types of feed, including local options.
- Cost reduction: Reduce the cost of commercial feed, which is a significant concern for farmers.
- Government support: Encourage the Ministry of Livestock and Fisheries to increase its support for fish farmers, including facilitating access to loans and making more frequent visits to assist farmers.

Zambia	Women	Men
Access to finance	Improve access to finance for buying the necessary resources for a successful business venture. Increase access to finances such as bank loans. Improve access to financial services and information.	Remove barriers associated with obtaining bank loans for agriculture purposes.
Regulations	Improve certification rules for the production of homemade feed for commercial use The CEEC should pay loans for fish farming Create a deliberate policy for fisheries extension officers.	The CEEC should ensure that people pay their loans every 6 months, after they have harvested their fish, rather than every month. Create regulations on standards according to the bureau on animal feeds, especially requirements, though make exceptions for people in rural communities. Improve the rules guiding access to funds for agribusinesses.
Training	Provide more training on local feeds and on how to use novel ingredients. Authorities should do more sensitization and outreach programs.	Include more species to grow, especially for commercial purposes. Other types of feed are needed. Train farmers on local feeds and provide services to fish farmers and site visits.
Access to information	Provide access to the right information, technologies and machines so that farmers can process their own feeds using local ingredients, as commercial feeds are too expensive.	Increase awareness of other types of local feeds.
Certificate	Provide a certificate for more people to make their own feed using local materials and increase support from local authorities.	
Cheap ingredient	Reduce prices for fish feed ingredients. The industry should provide fingerings that grow fast.	Reduce the cost of commercial feed.
Transportation	Resources and services are needed to increase proximity, reduce distances and improve the road network.	
Quality control	The Ministry of Fisheries and Livestock should deploy more field officers to adequately monitor and support farmers regarding the fish feed value chain, specially water quality and feed nutrition.	The ministry should make more visits to fish farmers and also help them access loans.
Other	Improve feed packaging to give access for all people in the community.	

Table 56. Proposed policy recommendations in Zambia.

Respondents in Kenya made the following recommendations related to improving access to affordable, high quality fish feeds and promoting equitable market access:

Women respondents

- Equal market access: Promote equal market access for local farmers alongside developed companies.
- Regulatory changes: Advocate for changes in licensing regulations that facilitate easier entry into the market.
- Tax reduction: Reduce levies and taxes on fish farming activities to lower production costs.
- Free licensing: Issue licenses for fish feed suppliers at no cost.

- Ingredient transparency: Provide information on the ingredients used in fish feed formulations to promote transparency.
- Affordable feed: Work toward making affordable and quality fish feed available to farmers.
- Extension officer involvement: Promote the involvement of extension officers throughout the entire value chain to provide support and guidance.
- Fish feed formulator: Develop a fish feed formulator tool or service to help farmers create their own feeds.
- Cost reduction: Reduce the cost of ingredients used in fish feed production and ensure their availability.
- Affordable machinery: Make machinery used for formulating fish feeds affordable and accessible to farmers.

Men respondents

- Affordable, high quality feeds: Ensure access to fish feeds that are both affordable and of high quality.
- Access to funds: Simplify access to financial resources, such as loans, to help fish farmers invest in their operations.
- Avoid county-to-county taxation: Remove taxes on fish feeds that vary from one county to another, which can create inconsistencies and challenges for farmers.
- Reducing taxation: Reduce taxes on fish feeds to make them more accessible to farmers.
- Market opportunities: Ensure that local farmers have equal opportunities in the market, leveling the playing field with established firms.
- Feed production: Encourage established firms to disclose the components and ingredients used in producing fish feeds, promoting transparency in the industry.

Kenya	Women	Men
Access	Improve access to affordable high quality feeds and equal access to markets with developed companies.	Improve access to affordable high quality feeds and make it easier to access funds.
Taxes and regulations	Change licensing regulations. Reduce levies and taxes. Provide free licenses for potential suppliers.	Avoid county to county taxation on fish feeds. Reduce taxes on fish feeds to make it easier for farmers to access fish feeds.
Access to information	Make information available about ingredients used in fish feed formulations.	
Quality control	Making cheap and quality fish feed Involve extension officers in the whole value chain.	
Others	Develop a fish feed formulator. Reduce the cost of ingredients used to making fish feeds more available. Make the cost of machines used to formulate fish feeds affordable and available.	Provide equal market opportunities for farmers as for well-established firms. Encourage established firms to make public the components used in producing fish feeds.

Table 57. Proposed policy recommendations in Kenya.

Overall, the data offers several key insights into the landscape of laws, policies, regulations and institutional practices related to fisheries and their intersection with gender and youth barriers in the three countries. There is a significant gap in the knowledge of formal laws, policies and regulations governing fisheries among participants in each country, which means the findings and the proposed policy changes require triangulation and further scrutiny.

The household survey does identify some organizations operating at the grassroots level to address barriers for women and youths, but it also reveals a lack of awareness about them. Although Kenya demonstrates a higher level of awareness, and more organizations, than either Nigeria or Zambia, the overall pattern suggests that there is room for improvement in informing communities about the existence and activities of these organizations.

To sum up, the findings emphasize the necessity of awareness campaigns to educate communities about organizations dedicated to addressing barriers for women and youths in fisheries. Capacity building on gender and youth awareness will also be required for the organizations that are able to offer support. Moreover, strategies should be developed to alleviate financial constraints that impede the participation of women and youths. Ultimately, the study underscores the importance of promoting informed decision-making, fostering participation and championing inclusivity within communities to advance sustainable and equitable fisheries practices.

7.2. Gender roles and responsibilities

The study examined the gendered division of labor between men and women across paid and unpaid work (caregiving and household tasks) to identify potential constraints and challenges.

The research findings from the key informants shed light on the vital roles women play in the aquaculture sector, particularly in feed production. First, women hold certain control over on-farm by-products, which can be used as fish feeds, as they are actively involved in food processing. This grants them the opportunity to decide how to allocate these by-products, choosing whether to use them for fish farming or for other purposes, such as maize bran for poultry feed or vegetable waste for livestock feed, which might offer them greater benefits. As such, women are engaged to some extent in feed formulation by selecting and sourcing the appropriate ingredients, and they play a direct and active role in the processing of fish feeds. This labor-intensive task involves various activities, including grinding, mixing and pelleting the ingredients to create well-balanced and nutritious feed products for fish. In some instances, women also take charge of packaging, marketing and distributing fish feeds to farmers.

The survey further explored the gendered division of labor by asking questions around paid and unpaid tasks and who does most of the activities, as shown in Tables 58a–n.

This section examines what men and women do in these spheres, including roles and responsibilities during paid work, and unpaid work to get an accurate portrait of how people lead their lives and to anticipate potential constraints to participation in development projects.

7.2.1. Fishing from rivers and canals

The vast majority of respondents in Nigeria and Zambia, and about two-thirds of those in Kenya, do not fish in rivers and canals.

Who in your household fishes from rivers or canals?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Not applicable	96%	92%	95%	88%	91%	89%	62%	59%	61%
Self	2%	8%	4%	4%	9%	6%	3%	8%	5%
Spouse	2%	0%	1%	6%	0%	3%	5%	1%	3%
Girls									
Boys				3%	0%	2%	8%	11%	9%
Father or father-in-law									
Mother or mother-in-law									
Other male members							5%	12%	9%
Other female members							18%	9%	14%

Table 58a. Gender roles and responsibilities: Fishing from rivers and canals.

7.2.2. Fishing from rice fields during monsoons

Almost all respondents in Nigeria and Zambia do not fish from rice fields during the monsoon season, with a slightly lower percentage in Kenya.

7.2.3. Building or digging ponds

Responses regarding who builds or digs ponds varied among the three countries and by gender. More than half of all respondents in Nigeria mention that the activity is not applicable, but only about one-quarter do so in Zambia and even less in Kenya, where the largest share of respondents say the activity falls under the purview of other male members. In Zambia, the top-three responses are not applicable, self and other male members, at just over one-quarter each. Men are much more likely to build or dig ponds than women in all three countries, while women are more likely to say the activity does not apply.

Who in your household fishes from rice fields during the monsoon season?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Not applicable	98%	94%	97%	97%	100%	98%	88%	79%	84%
Self	0%	3%	1%	1%	0%	1%	0%	3%	1%
Spouse	2%	3%	2%	1%	0%	1%	2%	0%	1%
Girls									
Boys							8%	8%	8%
Father or father-in-law									
Mother or mother-in-law									
Other male members							3%	10%	6%
Other female members									

Table 58b. Gender roles and responsibilities: Fishing from rice fields during the monsoon season.

Who in your household builds or dig ponds?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Not applicable	66%	42%	56%	32%	21%	28%	19%	14%	16%
Self	7%	50%	24%	11%	57%	28%	2%	38%	19%
Spouse	15%	0%	9%	18%	0%	11%	30%	1%	16%
Girls									
Boys				4%	0%	3%	11%	7%	9%
Father or father-in-law				4%	0%	3%	0%	1%	1%
Mother or mother-in-law									
Other male members	13%	8%	11%	31%	21%	27%	38%	40%	39%
Other female members				0%	2%	1%			

Table 58c. Gender roles and responsibilities: Building or digging ponds.

BUILDING OR DIGGING PONDS

This is considered men's work in all three countries, involving adult men in Nigeria and Kenya and also some young men in Zambia.

7.2.4. Collecting water from the pond

Responses about water collection varied across the three countries. In Nigeria, two-thirds of all respondents say it is their responsibility, though the rate is higher among men. In Zambia nearly three-quarters of respondents, with rates just about even between men and women, say the activity does not apply to them. In Kenya, meanwhile, responses are mixed, and all fall below one-quarter, even within gender; the only exception is the one-third of men who say it is their responsibility.

Who in your household collects water from the pond?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Not applicable	11%	14%	12%	71%	73%	72%	24%	23%	24%
Self	58%	78%	66%	4%	25%	12%	13%	33%	22%
Spouse	11%	0%	7%	8%	0%	5%	23%	4%	14%
Girls							0%	1%	1%
Boys	7%	0%	4%	3%	0%	2%	11%	8%	9%
Father or father-in-law				3%	0%	2%			
Mother or mother-in-law									
Other male members	11%	8%	10%	10%	2%	7%	7%	14%	10%
Other female members	2%	0%	1%	1%	0%	1%	22%	18%	20%

Table 58d. Gender roles and responsibilities: Collecting water from the pond.

COLLECTING WATER FROM THE POND
Adult women and men do this task a lot in Nigeria, with 20 percent more men and even some young men involved. It is not often done in Zambia, but if it is, adult men are responsible. A third of men do this in Kenya, with some adult women and young men involved.

7.2.5. Cleaning the pond

In all three countries and across both genders, the largest share of respondents say cleaning the pond is their responsibility. However, rates are about twice as high among men than women. As such, it is no surprise that the next highest response is other male members. In Kenya, the highest response among women is that it is their spouse's responsibility.

Who in your household cleans the pond?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Not applicable	18%	11%	15%	18%	9%	15%	17%	15%	16%
Self	31%	61%	43%	32%	59%	42%	23%	55%	39%
Spouse	4%	11%	7%	15%	0%	10%	31%	3%	18%
Girls	4%	0%	2%				0%	1%	1%
Boys	11%	3%	8%	6%	5%	5%	6%	4%	5%
Father or father-in-law				1%	0%	1%			
Mother or mother-in-law									
Other male members	31%	14%	24%	28%	27%	28%	21%	21%	21%
Other female members	2%	0%	1%				1%	1%	1%

Table 58e. Gender roles and responsibilities: Cleaning the pond.

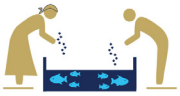
POND CLEANING
Half as many women as men clean ponds in Nigeria, Zambia and Kenya, with some young men involved.

7.2.6. Feeding fish

Most respondents across all three countries and both genders say feeding the fish is their responsibility, with rates highest in Nigeria, Kenya and then Zambia. One assumption for this finding is that respondents might have interpreted "feeding" in economic terms, focusing on earning money to provide for the family rather than the actual act of preparing meals to feed the family. If "feeding" were replaced with "cooking," the responses would have been different.

Who in your household feeds the fish?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Not applicable				11%	9%	10%	4%	0%	2%
Self	78%	75%	77%	56%	55%	55%	65%	68%	67%
Spouse	4%	11%	7%	10%	16%	12%	21%	23%	22%
Girls									
Boys	6%	3%	4%	3%	2%	3%	3%	3%	3%
Father or father-in-law									
Mother or mother-in-law				0%	2%	1%			
Other male members	11%	6%	9%	19%	14%	17%	5%	4%	5%
Other female members	2%	6%	3%	1%	2%	2%	2%	2%	2%

Table 58f. Gender roles and responsibilities: Feeding fish.



FEEDING FISH
In all three countries, men and women are responsible for feeding the fish. Young men do the task more than adults, with negligible difference across age among women in Zambia and Kenya. In Nigeria, adult women are responsible.

7.2.7. Day-to-day management of the household

The majority of respondents in all three countries say household management is their responsibility, with some variation. Almost all respondents in Nigeria say this is theirs, about three-quarters say so in Kenya, and the same for just about half in Zambia. By gender, percentages are similar in Nigeria, but are heavily skewed toward men in both Zambia and Kenya.

Who manages the household on a day-to-day basis?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Not applicable				15%	11%	14%	3%	0%	1%
Self	95%	89%	92%	47%	75%	58%	59%	91%	74%
Spouse	2%	6%	3%	18%	11%	16%	30%	5%	18%
Girls	2%	0%	1%						
Boys	2%	0%	1%	4%	0%	3%	0%	1%	1%
Father or father-in-law				1%	0%	1%			
Mother or mother-in-law									
Other male members	0%	6%	2%	14%	2%	10%	7%	3%	5%
Other female members							1%	0%	1%

Table 58g. Gender roles and responsibilities: Day-to-day management of the household.

DAY-TO-DAY MANAGEMENT OF THE HOUSEHOLD
Men and women are equally responsible for the day-to-day management of the household in Nigeria, while it is mainly men's work in Zambia and Kenya.

7.2.8. Fishing and harvesting

In general, most respondents in each of three countries say fishing and harvesting are their responsibility. Almost all men and nearly two-thirds of women say so in Nigeria. In both Zambia and Kenya, about two-thirds of men say it is their responsibility, over three times more than among women. The largest share of women in Zambia say it is a task for other male members, while for women in Kenya it is the responsibility of their spouse followed other male members.

Who in your household does the fishing and harvesting?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Not applicable	0%	3%	1%	14%	9%	12%	4%	0%	2%
Self	62%	97%	76%	17%	64%	35%	16%	67%	40%
Spouse	6%	0%	3%	19%	2%	13%	41%	1%	22%
Girls	2%	0%	1%						
Boys	6%	0%	3%	4%	0%	3%	5%	5%	5%
Father or father-in-law				6%	0%	3%			
Mother or mother-in-law									
Other male members	26%	0%	15%	40%	25%	35%	33%	26%	30%
Other female members							2%	1%	1%

Table 58h. Gender roles and responsibilities: Fishing and harvesting.

FISHING AND HARVESTING
Fishing and harvesting are mainly done by male household members, though women are involved to a lesser extent. Spouses do not know exactly how much fish harvesting each other does. However, Nigeria has the largest number of women reporting their involvement in harvesting.

7.2.9. Selling fish products

Most respondents across all three countries and each gender say they are responsible for selling their household's fish products. The only outlier to this is among men in Kenya, more than half of whom say it is their spouse's responsibility.

Who in your household sells the fish products?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Not applicable	0%	3%	1%	3%	2%	3%	4%	1%	2%
Self	96%	89%	93%	89%	77%	85%	80%	37%	60%
Spouse	2%	6%	3%	4%	18%	10%	12%	55%	32%
Girls							0%	1%	1%
Boys	0%	3%	1%	1%	0%	1%	1%	0%	1%
Father or father-in-law	2%	0%	1%						
Mother or mother-in-law									
Other male members				3%	2%	3%	0%	2%	1%
Other female members							4%	5%	4%

Table 58i. Gender roles and responsibilities: Selling fish products.

SELLING FISH PRODUCTS
This is mainly done by women across all three countries, with no stark difference by age. In Nigeria and Zambia, a large percentage of men also sell fish. Spouses do not know exactly how much fish each other sells.

7.2.10. Processing fish into dried fish and fish paste

Results vary for this activity. Just under half of respondents in Nigeria say processing does not apply, while a little more than one-third say it is their responsibility, while nearly three-quarters in Zambia say it does not apply. In Kenya, although more than half of all respondents say it is their task, this is only because most of those responses come from women. Men in Kenya are largely in agreement with women, with two-thirds saying it is their spouse who does the processing.

Who in your household processes the fish?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Not applicable	51%	42%	47%	65%	73%	68%	7%	11%	9%
Self	46%	28%	39%	22%	7%	16%	84%	18%	53%
Spouse	0%	22%	9%	0%	7%	3%	1%	63%	31%
Girls							0%	3%	1%
Boys							1%	0%	1%
Father or father-in-law									
Mother or mother-in-law				3%	2%	3%			
Other male members	0%	6%	2%	3%	5%	3%	0%	1%	1%
Other female members	4%	3%	3%	7%	7%	7%	7%	4%	6%

Table 58j. Gender roles and responsibilities: Processing fish into dried fish and fish paste.

PROCESSING
In Nigeria and Zambia, half to most of the respondents do not process their fish. If they do, it tends to be a role for women, with no stark difference by age, except that in Kenya the task is mainly done by adult women.

7.2.11. Selling surplus produce at markets

Most respondents say selling surplus produce is their responsibility, with some significant variation by gender in Zambia and Kenya. In Nigeria, just over half say it is their task, while more than one-third say it does not apply, with almost no difference at all between women and men. In Zambia, nearly two-thirds of respondents say it is their task, but the rate is much higher among women than men. The gender difference is starkest in Kenya, where the vast majority of women say it is their responsibility, to which nearly two-thirds of men concur.

Who in your household sells any surplus fish?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Not applicable	38%	39%	39%	15%	14%	15%	2%	1%	1%
Self	53%	53%	53%	75%	55%	67%	84%	27%	57%
Spouse	0%	8%	3%	4%	30%	14%	7%	64%	34%
Girls				1%	0%	1%	0%	1%	1%
Boys	2%	0%	1%	1%	0%	1%	1%	0%	1%
Father or father-in-law									
Mother or mother-in-law							0%	1%	1%
Other male members	4%	0%	2%	1%	2%	2%	0%	2%	1%
Other female members	4%	0%	2%	1%	0%	1%	6%	4%	5%

Table 58k. Gender roles and responsibilities: Selling surplus produce at markets.

SELLING SURPLUS PRODUCE AT MARKETS
In Nigeria, there are a number of subsistence farmers in our sample. However, if there is a surplus, then men and women equally sell it, with no clear demarcation by age. In Zambia and Kenya, more younger women than men sell any surplus.

7.2.12. Unpaid domestic duties

Across all three countries, respondents overwhelmingly say unpaid domestic duties are the responsibility of women and girls. Half of all respondents say it is their task, with percentages heavily skewed toward women, particularly those in Kenya and Nigeria, where the difference between women and men is especially acute.

Among those in each country who say it is their spouse who takes care of these duties, almost all of the respondents are men. These observations reflect traditional gender norms and socialization patterns, where women and girls are often expected to participate in household chores and childcare, even from an early age.

Who in your household is responsible for unpaid work?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Not applicable	11%	14%	12%	1%	5%	3%	1%	1%	1%
Self	47%	33%	42%	79%	25%	59%	80%	17%	50%
Spouse	2%	39%	17%	6%	46%	21%	1%	69%	33%
Girls	15%	6%	11%	3%	11%	6%	8%	4%	6%
Boy	9%	3%	7%						
Father or father-in-law							1%	0%	1%
Mother or mother-in-law							1%	1%	1%
Other male members	2%	3%	2%	0%	2%	1%	5%	7%	6%
Other female members	15%	3%	10%	11%	11%	11%	5%	1%	3%

Table 58l. Gender roles and responsibilities: Unpaid work.

UNPAID DOMESTIC DUTIES
Adult women do the bulk of the unpaid work across all countries, with some girls helping and some boys in Nigeria.

7.2.13. Paid work

In general, respondents consider paid work to be largely men's responsibility. However, one-third of women in Nigeria and about one-quarter of women in both Zambia and Kenya say it is theirs. Perhaps surprisingly, the largest percentage of respondents in Zambia say paid work is not applicable to them.

Who in your household is responsible for paid work?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Not applicable	9%	14%	11%	42%	34%	39%	9%	14%	11%
Self	33%	67%	46%	24%	39%	29%	24%	41%	32%
Spouse	33%	8%	23%	8%	2%	6%	28%	0%	15%
Girls									
Boys	4%	0%	2%	0%	2%	1%			
Father or father-in-law	2%	0%	1%						
Mother or mother-in-law									
Other male members	16%	6%	12%	19%	21%	20%	18%	29%	23%
Other female members	4%	6%	4%	7%	2%	5%	21%	17%	19%

Table 58m. Gender roles and responsibilities: Paid work.

PAID DOMESTIC DUTIES
Men do more of the paid work across all countries than do women. All married respondents tend to underreport the amount of paid work done by their spouse.

7.2.14. Shopping for food

About two-thirds of respondents in Nigeria and Zambia and more than half in Kenya say shopping for food is their responsibility, especially among women. Married men largely say that their spouse is responsible for this task, though there is a significant discrepancy between men who say it is their responsibility and women who agree. In Nigeria, results are almost even between men who say it is their spouse's responsibility and men who say it is theirs.

Who in your household does the food shopping?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Not applicable	4%	0%	2%	1%	5%	3%	2%	1%	1%
Self	82%	44%	67%	89%	23%	64%	93%	21%	59%
Spouse	7%	42%	21%	1%	71%	28%	1%	73%	35%
Girls	0%	3%	1%	1%	2%	2%	1%	0%	1%
Boys	2%	0%	1%						
Father or father-in-law	0%	3%	1%						
Mother or mother-in-law	2%	0%	1%	4%	0%	3%	0%	1%	1%
Other male members	0%	6%	2%				0%	3%	1%
Other female members	4%	3%	3%	3%	0%	2%	4%	1%	2%

Table 58n. Gender roles and responsibilities: Shopping for food.

SHOPPING FOR FOOD
Women do the most of the food shopping in all three countries. Men self-report their involvement, though women do not see this contribution in their answers.

Overall, the survey data provides valuable insights into the gendered division of activities within the context of fisheries. The roles and responsibilities of men and women in this sector exhibit distinct patterns, reflecting traditional gender norms and cultural practices prevalent in the surveyed communities.

WOMEN'S WORK

	FEEDING	Women are primarily responsible for daily feeding.
	DAY-TO-DAY MANAGEMENT	Women play a central role in the day-to-day management of household chores.
	SELLING FISH PRODUCTS	Women are actively involved in marketing and selling fish products, and they participate in selling the harvested fish to local markets or consumers.
	PROCESSING	Women often engage in processing fish, which can involve cleaning, gutting and preparing fish for sale or consumption.
	SELLING SURPLUS PRODUCE AT MARKETS	In addition to selling fish, women can also be responsible for selling any surplus agricultural or fishery-related produce at local markets.
	UNPAID DOMESTIC DUTIES	Alongside their fisheries-related responsibilities, women continue to do the lion's share of unpaid domestic duties, which include household chores, childcare and food preparation.
	SHOPPING FOR FOOD	Women are typically responsible for purchasing food and other necessities for their households from local markets.

MEN'S WORK

	FEEDING	Like women, men also participate in feeding.
	DAY-TO-DAY MANAGEMENT	Men share in the day-to-day management of household chores.
	BUILDING AND DIGGING PONDS	Men are often involved in constructing and digging fishponds. This task is crucial for creating suitable environments for fish farming.
	COLLECTING WATER FROM THE POND	Men may be responsible for ensuring a consistent water supply to the fishponds, which is essential for maintaining the aquatic habitat.
	SELLING SURPLUS PRODUCE AT MARKETS	In addition to selling fish, men may also be responsible for selling any surplus agricultural or fishery-related produce at local markets.
	FISHING AND HARVESTING	Men typically take on the role of harvesting the fish from the ponds.
	FISHING AND PAID DOMESTIC DUTIES	In some cases, men might be involved in paid domestic duties, which could include income-generating activities outside of fisheries.

These gendered divisions of labor reflect traditional roles and responsibilities assigned to men and women within these communities. Although women are primarily engaged in tasks related to caring, processing and marketing fish, men tend to focus on activities such as constructing, maintaining and harvesting the fishponds. Efforts to challenge and transform these traditional roles can lead to increased opportunities and improved livelihoods for both women and men involved in fisheries.

7.3. Time use

Table 59 shows how satisfied respondents are with the amount of leisure time they have. The vast majority of respondents across the countries are either satisfied or very satisfied with the amount of time they have to do the things they enjoy, without any considerable difference by gender. In Nigeria, the percentage is higher among adult men than young men.

More women in Nigeria and Zambia are very satisfied with their amount of leisure time than those in Kenya, but Kenya has the highest percentage of satisfied respondents overall. Zambia has the largest number of dissatisfied women. There is no other stark difference by age and gender across countries.

How satisfied are you with the amount of leisure time you have?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Dissatisfied	2%	0%	1%	10%	5%	8%	3%	5%	4%
Neither satisfied nor dissatisfied	22%	25%	23%	10%	7%	9%	7%	6%	7%
Satisfied	58%	56%	57%	65%	61%	64%	80%	85%	82%
Very satisfied	18%	19%	19%	13%	23%	16%	7%	4%	6%
Prefer not to answer				3%	5%	3%	4%	0%	2%

Table 59. Satisfaction level with the amount of time to do things.

Table 60 shows the amount of leisure time respondents have per day. In general, respondents in Nigeria and Zambia have significantly more leisure time per day than do those in Kenya, with very little variation between women and men. About one-third of women and men in both Nigeria and Zambia say they have more than 3 hours per day of leisure, roughly triple that for Kenya, where the largest share respondents say they only have 1 hour per day.

Significantly more adult women have more leisure time in Nigeria than do young women, while the reverse is true in Zambia and Kenya. Similarly, adult men have more leisure time in Nigeria than young men, while the reverse is true in Kenya and, especially, Zambia.

How much leisure time do you have per day?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
None				14%	25%	18%	9%	3%	6%
30 minutes	7%	19%	12%	3%	0%	2%	13%	15%	14%
1 hour	20%	17%	19%	10%	9%	10%	43%	40%	41%
2 hours	20%	6%	14%	15%	14%	15%	15%	21%	18%
3 hours	15%	25%	19%	19%	18%	19%	8%	10%	9%
More	38%	33%	36%	39%	34%	37%	12%	12%	12%

Table 60. Leisure time per day.

Overall, respondents across the board express a high level of satisfaction with the amount of leisure time they have. In general, individuals in these communities feel that they have an adequate amount of time for personal activities and relaxation. This means that male and female respondents of all ages should have enough time to attend training and events for the FASA project.

In Kenya, however, the majority of respondents from both genders report having only 1 hour of leisure time. This indicates a relatively limited amount of free time for personal activities and relaxation, which could be due to factors specific to the communities in Kenya, such as work demands, household responsibilities or other time-consuming commitments. Section 7.3 shows that Nigeria has the highest number of boys and girls helping their parents with chores. As such, the program will still need to take care not to use too much of the respondents' time because it could have an adverse effect, such as increasing child labor, school drop-outs, etc.

7.4. Access to and control over resources and information

In the multifaceted world of aquaculture, a critical undercurrent of gender inequality shapes the opportunities and challenges faced by women and youths. This section delves into the intricate web of barriers that hinder their participation, perpetuating disparities in land ownership, water access, finance and decision-making power.

7.4.1. Access to resources

7.4.1.1. Land

Among the key informants, land ownership emerged as the leading structural barrier for women and youths in participating in aquaculture. Women's access to land and other productive resources is through marriage, among other factors such as age and motherhood, as the following quotes illustrate:

"One major barrier preventing women from accessing fish feed products includes the lack of land and water resources."

— male extension officer, Zambia

"One crucial asset is land, which unfortunately many women lack access to. In the Yoruba clan and other parts of the country, land ownership is primarily associated with men, hindering women's opportunities."

— male project officer, Nigeria

Gender intersects with cultural and religious beliefs to restrict women from owning or inheriting land and other immovable properties, making them dependent on male family members, especially their spouses. For example, men primarily own the land where ponds and water tanks are constructed, and they have the decision-making rights over these ponds even though women shoulder the majority of the labor involved in their maintenance and operation.

7.4.1.2. Water resources

Women often play a significant role in feeding the fish and managing the ponds, particularly in small-scale homestead aquaculture ponds. This is because fish farming is viewed as an extension of domestic duties, so women's role and contribution goes unrecognized and unrewarded. It is also worth noting that the location of the ponds and water resources often constrains women's engagement in fish farming. When ponds are situated far from their household, women take more time and travel farther to feed the fish and manage the ponds. Furthermore, customary tenure systems governing land and water use have an impact on aquaculture activities, particularly when it comes to access to water for fish farming. For example, women in Kenya are culturally excluded from deep sea fishing and restricted to onshore farming.

7.4.1.3. Finance

Women and youths identified several challenges to successfully undertaking fish feed production, including the lack of adequate farm tools, equipment (aerators and diffusers), stocking materials (fingerlings, juvenile fish, shrimp, or other fish feeds) and stable electricity supply. However, one of the main reasons was their inability to access finance. Similarly, fish farmers, regardless of gender, incur high prices and face stiff competition for raw materials and fluctuations in the supply and prices of farm inputs, such as fish feeds and,

especially, protein. This was further cited by government officials.

"Women often lack the appropriate machinery to efficiently produce high-quality feed, as they produce feed manually on a small scale," said a male government official in Nigeria. "They need mixers and pallet machines."

The distribution of productive assets is highly gendered across all three countries, with men having more access than women to capital and other financial resources. This limitation further constrains women's ability to access financial resources and credit facilities, as they lack ownership of land and other fixed assets that form collateral for loans. Furthermore, women's lower educational and financial literacy prevent them from accessing credit from formal institutions because of high interest rates and banking procedures. Consequently, women tend to rely on informal sources, such as family, friends or personal savings, as sources of finance.

7.4.1.4. Decision-making

Women are underrepresented in decision-making and leadership roles in aquaculture cooperatives, which further reinforces gender inequality and disempowers women in the sector. This is because social norms and gender power dynamics give men dominance and authority when it comes to decision-making. Furthermore, women are often concentrated at the nodes of the value chain, which require fewer resources to operate. In most cases, women earn less profit than their male counterparts. Furthermore, women have fewer rights and privileges and have limited control over markets, how prices are set and interactions within value chains. However, a few case studies of successful women in aquaculture were also cited, demonstrating that gender norms are not rigid and are malleable to positive change over time.

7.4.2. Access to skills, information and knowledge

For women to successfully adopt the use of local ingredients as fish feeds, they would need the knowhow and the skills to do so. Therefore, the key informants identified skills development and access to information as essential. However, women explained that being able to access such information and skills development is a major barrier because they live in rural areas with limited connectivity and educational opportunities. In most cases, women lack reliable transportation, making it difficult for them to attend training centers.

The key informants identified a diverse range of information channels catering to the different preferences and needs of fish farmers. First, they perceive formal training through aquaculture extension services to be an essential source of information, training and technical support for fish farmers. Notably, the farmers expressed an interest in appropriate fish feed formulations to meet the nutritional requirements of local species that they farm.

"Extension agents are the best communication channel," said a male agricultural engineer in Nigeria. "If women are in groups, they can easily contact these agents who can provide them with the necessary information."

However, this study found that women are culturally restricted from participating in public spaces and prohibited from interacting with male extension officers. Cultural norms often dictate the behavior and interactions deemed appropriate for men and women. Women engaging with male extension officers might be viewed as transgressing these norms, leading to social stigma and ostracization. Consequently, women are discouraged or outright prohibited from seeking assistance or guidance from male officers. This cultural restriction not only limits women's access to knowledge and resources provided by extension officers but also hampers their ability to adopt modern agricultural or fisheries practices. Furthermore, women lack autonomy over their own mobility, as they are not allowed to travel alone by public transportation or ride a motorbike to the training venues. This means women need to get permission from their spouses to move about and travel in groups or with a chaperone. This takes longer to arrange and can be a barrier to women having the energy to move about and attend training.

The key informants also raised issues such as women's comprehension of training and extension knowledge.

"Sometimes, when engaging in discussions regarding production, it can be challenging to communicate directly with married women farmers," said a male extension officer in Zambia. "And it becomes apparent that their husband's presence or involvement is necessary."

These types of situations often result in male extension workers not proactively reaching women directly. This compounds their exclusion and lack of information.

Farmers cooperatives are an effective platform for promoting the adoption of improved technologies in aquaculture production and other value chain activities, especially for women. Cooperatives also act as intermediaries between farmers and the government, facilitating information sharing regarding policy regulations, certifications and other guidelines on fish feeds. It was recommended that women can benefit from forming cooperatives to collectively address their needs and explore various funding options, including loans and seeking funding from organizations or grants, to support their initiatives and acquire the necessary equipment. Moreover, facilitating the formation of women's groups presents a viable strategy to surmount the barriers highlighted. Learning collectively, these groups not only foster a conducive environment for education but also mitigate mobility challenges that individual woman face. Group training not only enhances learning outcomes but also represents an effective approach for the program to engage and educate women, making it a practical solution for outreach and training initiatives.

"Women work well together in groups, and they are happy to teach and share their knowledge with others," said a female fisheries officer in Kenya. "This way, their valuable expertise can reach many people in their communities."

Another solution to reach more women is broadcasting relevant information through radio and television programs. Although radio programs provide general information about fish farming, there is a lack of specific programs focused on fish feed. This presents an opportunity to develop targeted content in this area. It was further noted that women farmers are particularly interested in feed formulation methods, feed management strategies and market prices. Women also need technical support in determining appropriate feeding schedules and maintaining production records. Newspapers, pamphlets and brochures also constitute alternative sources of agricultural information. To maximize effectiveness, it is essential that educational content is presented in local languages and incorporates pictures or illustrations to cater to the lower literacy levels among women.

"Some women simply lack knowledge or awareness of where and how to access these assets," said a male extension officer in Zambia. "So they may benefit from sensitization programs that provide information on available resources and their locations."

Fish farmers can also access information through SMS services and WhatsApp. However, the accessibility of these information channels can vary according to gender, as women might have limited access than men to smartphones. For instance, digital platforms might require smartphone access, while radio and television broadcasts are limited to those with the necessary devices. It is important to be aware of the availability and timing of the information, as accessing it can sometimes be challenging.

"There should be less focus on media promotion and more on delivering quality products," said a male feed miller in Nigeria. "When I produce high-quality goods, word-of-mouth and customer satisfaction will naturally create awareness for the business. Currently, the main promotional strategy is through WhatsApp."

The sociocultural context is often influenced by power dynamics that shape the gendered difference in the access to, use and adoption of innovative technologies and practices between men and women.

7.4.2.1. Sources of information

The survey delved into the various channels through which respondents gathered information, offering valuable insights into their information-seeking behavior and preferences. Table 61 shows who and where respondents get most of their information about opportunities in their community. Although the internet is one of the most common sources in Nigeria, local leaders play a significant role in Zambia and Kenya.

In Nigeria, people mostly rely on the internet for information, while in Zambia it is local leaders, especially among women. Local leaders are also the main source of informants for respondents in Kenya, but more so among men than women. To a lesser extent, radio is also a source of information in all three countries, though friends edged it out in Nigeria as did other sources in Kenya.

For word of mouth, women in Nigeria largely get their information in group meetings, while men tend get it at work. In Kenya, respondents get theirs from group meetings and, to a lesser extent, from church. In Kenya, nearly two-thirds of the respondents report group meetings as their source of information.

Young women and men use the internet more than adults. In Kenya, young women are more likely than adult women to view local leaders as a source of information, while the reverse is true for men. There are no other stark differences by age across countries.

Where and from whom do you get most of your information about opportunities in your community?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Television	2%	6%	3%	8%	11%	10%	24%	6%	16%
Radio	16%	22%	19%	18%	18%	18%	14%	16%	15%
SMS	2%	0%	1%	1%	0%	1%			
Internet	36%	44%	40%	7%	25%	14%	11%	15%	13%
Spouse	2%	6%	3%				4%	0%	2%
Local leaders	7%	3%	6%	40%	16%	31%	36%	59%	47%
Neighbors	2%	0%	1%	1%	0%	1%	1%	1%	1%
Friend	26%	11%	20%	0%	2%	1%	10%	3%	7%
Other	7%	8%	8%	24%	27%	25%	1%	0%	1%

Table 61. Sources of information.

Overall, women identified skills development and access to information as crucial, but they face barriers because of rural living conditions, limited connectivity and lack of reliable transportation. Cultural norms restrict women from interacting with male extension officers, limiting their access to knowledge and resources. Women's mobility is also restricted, requiring permission from spouses to attend training. Farmer cooperatives serve as effective platforms, facilitating information sharing and acting as intermediaries between farmers and the government. Also, SMS services and WhatsApp are viable channels, though accessibility might vary based on gender because of differences in smartphone access. The survey data indicates a diverse distribution of information sources among respondents. In Nigeria, friends are a significant information channel for women, contrasting sharply with the men who use this source. Notably, more men rely on the internet for information than women do. Although the internet is crucial for both genders, women value interpersonal connections, relying on friends and group meetings. In Zambia, local leaders appear to be a source, particularly for women, suggesting the importance of community-based communication strategies. The gender gap in internet use highlights the need for targeted digital literacy initiatives for women. In Kenya, the data emphasizes the critical role of local leaders for both genders, as well as television, especially for women, in disseminating information.

7.4.3. Preferred training times

Table 62 outlines the preferred training schedules of the respondents. In Nigeria, nearly half of respondents, with no difference between women and men, prefer 10:00. In Zambia, nearly half of men prefer 08:00, while preferences among women are largely spread across 08:00, 10:00 and 14:00, at about one-quarter each. In Kenya, both women and men say either 09:00 or 10:00 are best.

If you were to attend a training session, what would be the best time of day to hold it?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
07:00	0%	3%	1%	3%	14%	7%	1%	0%	1%
08:00	2%	8%	4%	24%	43%	31%	12%	15%	13%
09:00	22%	3%	14%	17%	16%	16%	30%	41%	35%
10:00	47%	47%	47%	25%	9%	19%	38%	28%	33%
11:00	4%	19%	10%	0%	2%	1%	5%	8%	6%
12:00	9%	14%	11%	1%	0%	1%			
13:00							1%	0%	1%
14:00	4%	3%	3%	28%	16%	23%	13%	9%	11%
15:00	2%	0%	1%	3%	0%	2%	1%	0%	1%
16:00	6%	0%	3%						
17:00	2%	0%	1%						
18:00	2%	0%	1%						
19:00	0%	3%	1%						
20:00	2%	0%	1%						

Table 62. Best time of the day to hold training sessions.

Overall, morning is the most preferred training time for women and men across the three countries, except in Zambia, where respondents, especially women, also list 14:00 as a good time.

7.4.4. Group membership

Tables 63–66 list the affiliations respondents have with various groups, encompassing agricultural cooperatives, savings and credit unions, microfinance institutions, or any similar entities. Fish feed farmers are members of income generating groups such as agricultural cooperatives, savings and credit unions, and microfinance institutions.

Overall, results are mixed. In Nigeria, nearly two-thirds of respondents are members of an agricultural cooperative or savings and credit union, with little variation by gender. In Zambia, over half are members of an agricultural cooperative, especially women, many of whom are also members of a savings and credit union. In Kenya, more than two-thirds are members of a savings and credit union, but many also members of microfinance institutions and agricultural cooperatives or another income generating group.

In Nigeria, one-third of adult women are members of agricultural cooperatives and savings and credit unions, with a few in microfinance institutions. Older women are twice as likely than younger women to be members of savings and credit unions. In contrast, young men are heavily involved in savings and credit unions followed by agricultural cooperatives and about one-third are in formal microfinance institutions.

Are you a member of any of the following groups?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Agricultural cooperative	31%	36%	33%	60%	43%	53%	42%	44%	43%
Savings and credit union	26%	36%	30%	36%	5%	24%	71%	65%	68%
Microfinance institution	7%	11%	9%	13%	18%	15%	53%	41%	47%
Other income generation group	4%	0%	2%	8%	2%	6%	36%	48%	41%

Table 63. Group membership.

Are you a member of any of the following groups?	Nigeria			
	Young women	Adult women	Young men	Adult men
Agricultural cooperative	26%	33%	40%	35%
Savings and credit union	16%	31%	60%	27%
Microfinance institution	5%	8%	30%	4%
Other income generation group	0%	6%	0%	0%

Table 64. Group membership in Nigeria, by age and gender.

In Zambia, twice as many older women are members of microfinance institutions compared to younger women. Young men feature most in microfinance institutional membership.

Are you a member of any of the following groups?	Zambia			
	Young women	Adult women	Young men	Adult men
Agricultural cooperative	53%	62%	33%	45%
Savings and credit union	35%	36%	33%	0%
Microfinance institution	6%	15%	50%	13%
Other income generation group	0%	11%	17%	0%

Table 65. Group membership in Zambia, by age and gender.

Two-thirds of young women in Kenya are involved in savings and credit unions, informal microfinance institutions and other income generating groups, but few are involved in agricultural cooperatives. Adult women and both adult and young men are well represented across all four categories, though rates are highest for savings and credit unions.

Are you a member of any of the following groups?	Kenya			
	Young women	Adult women	Young men	Adult men
Agricultural cooperative	13%	44%	46%	43%
Savings and credit union	63%	71%	64%	66%
Microfinance institution	63%	52%	46%	40%
Other income generation group	63%	34%	46%	48%

Table 66. Group membership in Kenya, by age and gender.

Overall, the study reveals distinct patterns of group membership across the three countries. In Kenya, microfinance institutions predominantly empower women economically, while men are more involved in diverse income generating activities beyond traditional agriculture. Zambia demonstrates a strong presence of agricultural cooperatives, fostering collective productivity and effective resource use. In Nigeria, both agricultural cooperatives and savings and credit unions are popular, offering inclusive opportunities for community members to enhance their economic prospects. Despite variations, a consistent trend across the countries is the active participation of adult women and young men in savings and credit unions and agricultural cooperatives, highlighting the diverse roles undertaken by different gender and age groups in these economic activities.

7.4.5. Group satisfaction

Table 67 reveals the satisfaction levels among the survey participants regarding the benefits they gain from their group membership. Most respondents who are group members are either satisfied or very satisfied with the benefits they get, with Kenyans being the most satisfied, though men appear more satisfied than women. Zambia has the highest percentage of dissatisfied members but also the highest percentage of very satisfied respondents, suggesting inequities between and within groups.

Adult women are more satisfied than young women across the three countries, whereas young men in Nigeria and Zambia and adult men in Kenya are more satisfied than their counterparts.

Additionally, Nigeria and Zambia have a large number of women who are not members of a group. This reflects the point above that more women need access to savings and credit unions.

How satisfied are you with the benefits you gain from your group membership?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Not a member of any group	40%	36%	39%	31%	41%	35%	10%	9%	9%
Very satisfied	4%	8%	6%	13%	18%	15%	8%	8%	8%
Satisfied	49%	50%	50%	33%	27%	31%	72%	83%	78%
Neither satisfied nor dissatisfied	2%	6%	3%	11%	5%	9%	7%	0%	4%
dissatisfied	4%	0%	2%	11%	9%	10%	2%	0%	1%
Very dissatisfied				1%	0%	1%			
Prefer not to answer	2%	0%	1%				1%	0%	1%

Table 67. Level of satisfaction with group membership.

Overall, the data reflects the fact that group members often self-select to participate in a group. As such, a significant portion of individuals express satisfaction with the advantages they receive from their group membership. Thus, groups generally meet the expectations and needs of their members.

7.4.6. Group leadership

Table 68 outlines the roles of the respondents within their respective groups. Zambia is the only country with more women than men in leadership roles, which include chairs, secretaries or treasurers.

Young women in Nigeria and, especially, Zambia hold leadership positions more than adult women, while the reverse is true in Kenya. In Kenya and, particularly, Nigeria, more adult men are in leadership positions as compared to young men, while the reverse is true in Zambia.

Do you hold any leadership role in your group?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Yes	15%	19%	17%	33%	27%	31%	38%	41%	39%

Table 68. Leadership position.

Overall, young women in Nigeria and Zambia are more actively engaged in leadership positions than adult women. However, the trend is different in Kenya, where more adult women hold leadership roles than young women. Conversely, adult men in Nigeria and Kenya are more likely to occupy leadership positions than young men. Zambia, on the other hand, shows a higher percentage of young men than adult men in leadership roles. The distribution of leadership roles varies across the three countries.

7.4.7. Desire for group membership

Table 69 reveals the level of desire among respondents to join additional groups. In general, not many of them overall want to join any other groups. Zambia has the highest percentage, especially among women, but only about one-quarter. A lack of time and an inability to raise entrance or recurring fees are the most common reasons given, with younger women struggling the most to raise entrance fees.

Are there other groups that you would like to join?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Yes	15%	14%	14%	28%	16%	23%	12%	9%	10%

Table 69. Additional groups to join.

In Nigeria, among women, 25% cited 'no time' and 'unable to raise entrance fees' as reasons for not wanting to join new groups, while 13% mentioned 'not interested' as a barrier. For men, 20% highlighted 'no time', and 40% mentioned 'unable to raise entrance fees' as reasons for not joining the group. In Zambia, among women, 10% mentioned 'no time', 40% cited 'unable to raise entrance fees', and 30% stated 'unable to raise recurring fees' as reasons for not being a member. For men, 14% highlighted 'no time', 14% mentioned 'unable to raise entrance fees', and 29% cited 'group meeting location not convenient' as reasons for not joining the group. In Kenya, among women, 46% cited 'unable to raise entrance fees', 23% stated 'unable to raise recurring fees', and 23% as 'group meeting location not convenient' for not being a member. For men, 22% cited 'unable to raise entrance fees', 33% stated 'unable to raise recurring fees', and 22% as 'group meeting location not convenient' for not being a member.

In Nigeria and Zambia, higher percentages of young women are unable to raise entrance or recurring fees as compared to adult women, while the reverse is true for men. In Kenya, there were no age differences.

Overall, the survey findings in this section shed light on the various sources of information and communication channels that individuals use in Nigeria, Zambia and Kenya. Cultural norms hinder interactions with male extension officers and restrict mobility, requiring spousal permission for training attendance. Farmer cooperatives and digital platforms like SMS and WhatsApp serve as valuable channels. The survey data reveals varied information sources. In Nigeria, women rely on friends and group meetings, in contrast to men who prefer the internet. Local leaders are important in Zambia, especially for women, suggesting community-focused strategies. Targeted digital literacy initiatives are crucial for bridging the gender gap. In Kenya, local leaders and television play pivotal roles in information dissemination for both genders. Understanding these dynamics is crucial for designing effective information dissemination strategies and training programs that align with the preferences and schedules of community members, fostering better communication and knowledge sharing.

Additionally, participants generally prefer to attend training in the morning, both men and women, except in Zambia where respondents, especially women, indicated a preference for 14:00.

The research uncovers unique trends in group participation in Kenya, Zambia and Nigeria. In Zambia, there are significant gender disparities, with more women than men in agricultural cooperatives and microfinance institutions in particular. Kenya stands out for its high female participation in savings and credit unions and microfinance institutions, indicating a potentially robust financial inclusion mechanism for women. Nigeria, overall, presents a more balanced scenario, with moderate participation from both genders across different groups.

Leadership roles within these groups vary, with Kenya having the highest percentage of individuals in such positions (especially men), followed by Zambia (especially women) and then Nigeria (especially men). Additionally, the study reveals a small desire among respondents to join other groups beyond their current affiliations. However, obstacles such as time constraints and financial limitations hinder this desire.

7.5. Norms and beliefs

7.5.1. Cultural and gender norms and beliefs

The cultural norms and beliefs prevalent in rural fishing communities play a significant role in perpetuating gender inequities, particularly in terms of women's access to technology and opportunities in the fishing industry. The following norms are prominent from the key informant interviews:

- One prominent cultural norm is the belief that women are incapable of learning new farming techniques and operating mechanized equipment. This deep-rooted belief system creates a substantial barrier for women, as it fosters the perception that they are not suited for adopting innovative fishing practices and technologies.
- Another prominent norm is that women should do the bulk of the unpaid domestic work, while men should do paid and physically strong work.
- Women have low self-esteem and internalize the belief that they lack capacity. They begin to believe that they are not capable

of embracing new technologies or taking on roles that men traditionally dominate. These attitudes become invisible but powerful barriers that hinder women from pursuing opportunities for growth and advancement in the fishing industry.

"Mrs. [...] is regarded as an inspiring pillar and a model for many women," said a male government official in Nigeria. "She is actively engaged in the entire fish farming value chain, including hatchlings production, grow-out fish production, and marketing of fish products. Moreover, she assists other women by facilitating the sale of their harvest in the market. Her dedication and contributions have been recognised and appreciated by the ministry. Mrs. [...] serves as an exemplary figure, motivating and inspiring numerous women to participate in fish farming in the state."

7.5.1.1. Mobility restrictions

In Nigeria, societal expectations restrict women's mobility and require them to seek permission from their husbands or family members before engaging in activities outside their homes. For many women, their education journey is cut short, as they marry before completing secondary school, which impacts their ability to absorb information and take advantage of opportunities. Furthermore, women face gender bias in business interactions, where they are sometimes perceived as less patient and more inclined to negotiate for lower prices. This negative perception impacts their bargaining power to negotiate effectively and secure fair deals.

In Zambia, gender societal expectations negatively influence the roles and responsibilities assigned to women, resulting in limitations when it comes to exploring novel, affordable and local fish feed ingredients. Additionally, women encounter difficulties accessing fish feed products because of a lack of financial resources, while lower education levels affect their confidence and engagement. The traditional roles of women as household caretakers coupled with their lower education levels can further restrict their access to resources and opportunities.

In Kenya, gender norms also disadvantage women by restricting their participation in the aquaculture sector. Societal expectations dictate that women prioritize their roles as caregivers and homemakers, limiting their mobility and ability to engage in activities beyond their homes. This hampers their access to training and information crucial for their success in the aquaculture industry.

In the survey, a vignette (story) was presented to the participants to gauge their understanding of existing norms within their community. Following the narrative, respondents were asked a series of follow-up questions to gather insights and perceptions related to these norms.

Box 4. Survey vignette on social norms.

I will now read you a story about an imaginary couple in your community and ask you some questions about this couple. Ogwang[14] recently got married. Ever since he started living with his wife, they have been sharing work responsibilities at home. They do the housework and the farming together. When they come home from the field, he carries the vegetables and she carries some firewood, and they both go and fetch water whenever they need it. Although his wife usually does the cooking, Ogwang helps her chop vegetables and clean the kitchen and compound.

The survey respondents were then asked the following:

- What do you think about the way Ogwang and his wife divide tasks?
- What do you think other people in your community would think about the way Ogwang and his wife divide tasks?
- At home, do you divide tasks like Ogwang does with his wife, or do you do things differently?

Table 70 shows the data taken from the opinions of the participants regarding the way Ogwang and his wife divide tasks at home, specifically in regard to housework, farming and other responsibilities. The overwhelming majority of respondents across the three countries approve or strongly approve, indicating that sharing household tasks is widely supported. However, more men than women disapprove, with the strongest disapproval coming from Kenya. There is no considerable difference between young and adult men and women.

What do you think about the way Ogwang and his wife divide tasks?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Strongly approve	42%	33%	39%	33%	11%	25%	23%	12%	18%
Approve	58%	56%	57%	51%	71%	59%	58%	65%	62%
Disapprove	0%	11%	4%	11%	16%	13%	17%	23%	20%
Strongly disapprove	0%	0%	0%	4%	2%	3%	2%	0%	1%

Table 70. Perception on divided tasks.

Table 71 highlights the respondents' perception of how other people in their community would think about the way Ogwang and his wife divide tasks. The survey results highlight the concept of injunctive norms, which are people's beliefs about what others in their community approve of or expect them to do. Injunctive norms can significantly influence behavior because the opinions of others might matter to them more than their own. Some people will not want to transgress the opinions of others for fear of facing sanctions.[15] Based on this concept, community perceptions of Ogwang and his wife's task division strategy vary widely across the three countries. In Nigeria, there is more community approval than disapproval, particularly among women. In Zambia and Kenya, community disapproval is prevalent, with only a minority expressing approval. As such, there is a belief that the wider society does not agree with sharing tasks between the sexes.

What do you think other people in your community would think about the way Ogwang and his wife divide tasks?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Strongly approve	20%	11%	17%	0%	2%	1%	0%	4%	2%
Approve	69%	58%	65%	13%	27%	18%	33%	33%	33%
Disapprove	9%	28%	17%	57%	36%	49%	49%	52%	50%
Strongly disapprove	2%	3%	2%	31%	34%	32%	18%	12%	15%

Table 71. Perception of how other people in the community view divided tasks.

In Nigeria, the vast majority of the respondents feel other people would either approve or strongly approve of Ogwang and his wife's task division strategy. Over a quarter of men, especially adult men, thought the community would disapprove of the couple sharing tasks, more than triple the rate among women.

"The community will think he is a laborer to his wife according to our norms," said a male respondent.

"They will say the man is doing what is meant for women," said a female respondent.

"Things are changing unlike before, when a woman is responsible for all the chores," said another female respondent. "But now, it's a shared responsibility."

In Zambia, twice the amount of men than women think that other people in the community would approve of Ogwang and his wife sharing tasks. However, there were a larger number of respondents who felt the opposite. More than half of women feel community members would disapprove of task sharing, while about one-third of both women and men feel they would strongly disapprove.

"Community members believe that house chores are for women, not men," said a male respondent.

"In our culture, women's work is in the kitchen," said a female respondents. "And when a man is seen doing housework he will be seen that he has been bewitched or the woman has put charms for him. Even his friends will discourage him."

"Our cultural norms guide the behavior of both men and women in terms of responsibilities," said another female respondent. "But we are slowly adjusting."

In Kenya, about one-third of the respondents feel the community would strongly approve or approve of Ogwang and his wife's task sharing, while about two-thirds felt the community would disapprove, with no significant difference by gender. In Kenya, disapproval and strong disapproval are highest among young women, as compared to adult women, as well as young and adult men.

"According to culture, men are not allowed to do duties like chopping vegetables when the wife is still there," said a male respondent.

"According to the culture, men are not allowed to cook when the wife is there," said a female respondent. "And this is termed as overpowering, which is bad."

"The community perceives this as not normal responsibilities for a man," said another male respondent. "And this can cause the man to lose dignity in the community."

Overall, the results indicate that community perceptions of Ogwang and his wife's task division strategy vary widely across the three countries. In Nigeria, there is more approval than disapproval, particularly among women. In Zambia and Kenya, disapproval is prevalent, with only a minority expressing approval. Additionally, young women in Kenya stand out as a group with particularly high disapproval rates. These findings reflect the complex interplay of cultural norms, gender dynamics and community attitudes toward gender roles and task division.

Table 72 reveals whether respondent households divide tasks similarly to Ogwang and his wife or if they follow a different approach. The findings suggest that there is diversity in how individuals divide tasks in their own households.

In Nigeria, a slightly higher percentage of respondents do things different or very different from Ogwang and his wife than those who do things similar or very similar. Although percentages are higher among men in former and higher among women in the latter, there is no considerable difference between the genders when broken down by age.

One-third respondents in Nigeria are those who say they do things similar while another one-third are those who say they do things differently. In both Zambia and Kenya, percentages are higher among those who say they do things similar or very similar, especially in Kenya. Although there is no significant difference by gender in Zambia, more than half of adult women report being similar or very similar to only about one-third of young women, while there is no considerable difference between young and adult men. In Nigeria and Kenya, there is no considerable difference by age between the genders.

At home, do you divide tasks like Ogwang does with his wife, or do you do things differently?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Very different	18%	19%	19%	15%	2%	10%	10%	15%	12%
Different	29%	44%	35%	36%	41%	38%	33%	31%	32%
Similar	38%	22%	32%	43%	48%	45%	54%	52%	53%
Very similar	15%	14%	14%	6%	9%	7%	4%	3%	3%

Table 72. Divided tasks at home.

Overall, the gender norms question reveals that while there are some variations in how tasks are divided within households, people do not always act on their beliefs, because sometimes the community's opinion has an influence on their practices.

The majority of male and female respondents in Nigeria approve of sharing tasks within a household, but only a third of them do so within their own homes. Almost a third of male respondents thought their community would disapprove of sharing tasks, which may explain why it is not widely practiced within the homes of respondents despite them believing it is a

good idea. In Zambia, a majority of respondents approve of the practice, but a majority thought the community would disapprove, with more women than men feeling this way. About half the respondents do share tasks within their own homes with their spouse. In Kenya, although the majority of respondents themselves approve of sharing tasks, a majority thought their community would disapprove. Despite this, half the respondents do share tasks within their own homes with their spouse.

The results suggest that it will be possible to have men do more unpaid domestic tasks, because they agree it is a good idea, so long as it is not publicly talked about.

7.5.1.2. Perception of life and aspirations

To understand if people are content with their current life and if they have aspirations for improvements in the future, the participants were asked to imagine a ladder with steps numbered from 0 at the bottom to 10 at the top. The top of the ladder represents the best possible life for them, and the bottom of the ladder represents the worst possible life for them. They were then asked the following: On which step of the ladder would you say you personally feel you stand at this time? On which step of the ladder would you say you will stand on in the future, say about 5 years from now? The results are listed in Table 73.

Regarding current life satisfaction, levels are highest in Nigeria followed by Zambia and then Kenya, among both women and men. However, the variation is not significant.

When looking at future expectations, women and men in Nigeria anticipate a much better improvement in their lives, with a significant decrease in Zambia and a further drop in Kenya.

Overall, the data suggests that Nigerians, both women and men, have higher current life satisfaction and more optimistic future expectations compared to their counterparts in Zambia and Kenya. Furthermore, women tend to be slightly more optimistic about the future than men in all three countries.

What step on the ladder do you see yourself on currently and in the future?	Nigeria		Zambia		Kenya	
	Women	Men	Women	Men	Women	Men
Steps of ladder now (mean)	5.0	4.9	4.4	4.7	4.3	4.4
Steps of ladder future (mean)	9.1	9.1	7.4	7.3	6.6	6.5

Table 73. Perception of life, both current and future.

Overall, in rural fishing communities across Nigeria, Zambia and Kenya, deeply ingrained cultural norms and beliefs perpetuate gender inequities, especially concerning women's access to technology and opportunities in the fishing industry. The study reveals several prominent norms. Traditional expectations dictate that women bear the brunt of unpaid domestic work, limiting their involvement in paid and physically demanding tasks. Community attitudes about task division between genders vary widely. Although many respondents express approval for shared tasks, a significant portion believe their communities would disapprove. Young women in Kenya exhibit particularly high rates of disapproval, indicating deeply entrenched societal norms.

Despite respondents approving of task sharing in principle, the study reveals that these beliefs do not always translate into practices within households. Although the majority of both men and women in Nigeria endorse the concept, the gap between approval and practice remains substantial. The reluctance, especially among men, driven by the fear of community disapproval, underscores the deep-rooted influence of societal perceptions. In Zambia, despite widespread approval for sharing tasks, a significant portion of both men and women anticipate community disapproval. However, the fact that nearly half of the respondents still engage in shared responsibilities showcases a willingness to challenge societal expectations, highlighting a potential shift in attitudes. Kenya, too, portrays a complex picture. Despite approval of sharing tasks, a notable proportion, particularly among men, envisions societal disapproval. Yet, the fact that half of the respondents continue to share tasks within their homes demonstrates a resilience to traditional norms, indicating a gradual transformation in gender dynamics.

When it comes to current and future life satisfaction, Nigerians, both women, and men, are more satisfied with their present situation and more optimistic about future expectations. Zambian women and men exhibit moderate levels, while Kenyan women and men report the lowest.

7.6. Patterns of power and decision-making

This section explores patterns of power and decision-making about aquaculture production especially at confidence in decision-making.

7.6.1. Confidence in decision-making

The respondents were asked to rate their level of agreement with each of the following three statements on decision-making:

1. "I feel confident in my ability to make decisions about what I feed my fish."
2. "I feel confident in my ability to make money from fish."
3. "I am confident that I could deal efficiently with shortages in fish feed ingredients."

As shown in Tables 74 and 75, the vast majority of fish farmers in all three countries feel knowledgeable and capable of determining appropriate feeding practices for their aquatic livestock. Men feel more confident than women (strong agreement to the statement). In general, young men (across three countries) and adult women (especially in Zambia and Kenya) are more confident than their counterparts.

I feel confident in my ability to make decisions about what I feed my fish	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Strongly agree	44%	56%	48%	35%	55%	42%	23%	42%	32%
Agree	56%	42%	51%	42%	39%	41%	67%	52%	60%
Neither agree or disagree				13%	2%	9%	8%	6%	7%
Disagree	0%	3%	1%	11%	0%	7%	2%	1%	1%
Prefer not to answer/DK				0%	5%	2%			

Table 74. Confidence level on decision-making.

I feel confident in my ability to make decisions about what I feed my fish	Nigeria				Zambia				Kenya			
	Young women	Adult women	Young men	Adult men	Young women	Adult women	Young men	Adult men	Young women	Adult women	Young men	Adult men
Strongly agree	58%	36%	80%	46%	21%	38%	67%	51%	0%	25%	46%	41%
Agree	42%	64%	20%	50%	50%	40%	22%	43%	75%	66%	36%	53%
Neither agree or disagree					21%	10%	0%	3%	25%	7%	9%	6%
Disagree	0%	0%	0%	4%	7%	12%	0%	0%	0%	2%	9%	0%
Prefer not to answer or do not know					0%	0%	11%	3%				

Table 75. Confidence level on decision-making, by age and gender.

As shown in Tables 76 and 77, respondents in all three countries are confident in their ability to make money from fish farming. However, confidence levels are higher in Nigeria and Zambia than in Kenya. Again, men appear more confident women in this regard (strong agreement to the statement). In general, young men and adult women (especially in Zambia and Kenya) are more confident than their counterparts.

I feel confident in my ability to make money from fish	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Strongly agree	53%	64%	57%	57%	61%	59%	22%	43%	32%
Agree	42%	33%	39%	29%	30%	29%	71%	54%	63%
Neither agree or disagree	4%	3%	3%	6%	0%	3%	4%	3%	3%
Disagree	2%	0%	1%	7%	7%	7%	3%	1%	2%
Prefer not to answer or do not know				1%	2%	2%			

Table 76. Confidence level on ability to make money.

I feel confident in my ability to make money from fish	Nigeria				Zambia				Kenya			
	Young women	Adult women	Young men	Adult men	Young women	Adult women	Young men	Adult men	Young women	Adult women	Young men	Adult men
Strongly agree	63%	47%	70%	62%	43%	60%	67%	60%	13%	23%	55%	41%
Agree	32%	47%	20%	39%	21%	31%	33%	29%	63%	72%	36%	56%
Neither agree or disagree	0%	6%	10%	0%	21%	2%	0%	0%	0%	4%	0%	3%
Disagree	5%	0%	0%	0%	7%	7%	0%	9%	25%	1%	9%	0%
Prefer not to answer or do not know					7%	0%	0%	3%				

Table 77. Confidence level on ability to make money, by age and gender.

As shown in Tables 78 and 79, there is a notable portion of respondents in Nigeria and Kenya who are neutral about their confidence level in dealing efficiently with fish feed ingredient shortages. Zambia shows the highest level of agreement with Nigeria and Kenya, demonstrating more balanced distributions between agreement and disagreement. Learning more about how to deal with fish feed ingredient shortages and building the confidence of women and youths in fish-related decisions is an area of focus for the FASA project.

In Nigeria, young women agree more than adult women, while the reverse is true for men. In Kenya, adult women agree more than young women, while the reverse is true for men. In Zambia, the younger generation across gender agrees more than adults.

I am confident that I could deal efficiently with shortages in fish feed ingredients	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Strongly agree	6%	11%	8%	7%	2%	5%	6%	11%	9%
Agree	22%	19%	21%	36%	41%	38%	30%	26%	28%
Neither agree or disagree	47%	50%	48%	15%	21%	17%	48%	43%	46%
Disagree	18%	11%	15%	32%	16%	26%	11%	19%	15%
Strongly disagree	7%	8%	8%	1%	0%	1%	2%	0%	1%
Prefer not to answer or do not know				8%	21%	13%	4%	2%	3%

Table 78. Confidence level on efficiency dealing with ingredient shortages.

I am confident that I could deal efficiently with shortages in fish feed ingredients.	Nigeria				Zambia				Kenya			
	Young women	Adult women	Young men	Adult men	Young women	Adult women	Young men	Adult men	Young women	Adult women	Young men	Adult men
Strongly agree	5%	6%	10%	12%	6%	7%	0%	3%	0%	7%	27%	9%
Agree	26%	19%	10%	23%	53%	31%	50%	40%	0%	32%	18%	27%
Neither agree or disagree	42%	50%	60%	46%	12%	16%	17%	21%	75%	46%	36%	43%
Disagree	21%	17%	20%	8%	24%	35%	0%	18%	13%	11%	18%	19%
Strongly disagree	5%	8%	0%	12%	0%	2%	0%	0%	0%	2%	0%	0%
Prefer not to answer or do not know					6%	9%	33%	18%	13%	3%	0%	2%

Table 79. Confidence level on efficiency dealing with ingredient shortages, by age and gender.

7.6.2. Current level of involvement in decision-making

The survey collected data on how participants perceive their roles in household decision-making across various aspects of their lives. They were asked to rate their level of involvement, out of all their household members, in making the decisions regarding the following eight areas:

1. fish feed ingredients
2. fish sold versus kept
3. spousal or partner earnings
4. respondents' own earnings
5. surplus income
6. group memberships
7. attendance at community meetings and training sessions
8. technological purchases.

The data for each area is broken down by country in Tables 80–87. By analyzing these ratings, program interventions can gain insights into the dynamics of power and decision-making within households, including any potential gender-related disparities.

7.6.2.1. Fish feed ingredients

Most of the respondents in Nigeria have the final decision on how to use fish feed ingredients followed by just over half in Zambia and only one-quarter in Kenya, with higher rates among men, especially in Zambia. Across the three countries, Nigeria is the least consultative, while the most is Kenya, which is the only one of the three countries where consultation is higher than sole decision-making.

In Nigeria, women and men overwhelmingly responded that they make the final decision regarding fish feed ingredients, with slightly higher rates among adults. Large percentages of young women and men in Zambia also make the final decision, but less so into adulthood. Rates decrease in Kenya, where half of young women in Kenya have the final say and less than one-quarter of adult women.

What is your level of involvement in deciding how fish feed ingredients are used?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
I make the final decision	80%	89%	84%	44%	68%	53%	23%	28%	25%
I am consulted and make the decision jointly	16%	8%	13%	54%	30%	45%	69%	67%	68%
I am consulted but do not have the final say	2%	3%	2%	1%	2%	2%	7%	3%	5%
I am not consulted	2%	0%	1%				1%	2%	1%

Table 80. Decision-making about how fish feed ingredients are used.

What is your level of involvement in deciding how fish feed ingredients are used?	Nigeria			
	Young women	Adult women	Young men	Adult men
I make final decision	74%	83%	80%	92%
I am consulted and make the decision jointly	21%	14%	10%	8%
I am consulted but do not have the final say	0%	3%	10%	0%
I am not consulted	5%	0%	0%	0%

Table 80a. Decision-making about how fish feed ingredients are used, Nigeria.

What is your level of involvement in deciding how fish feed ingredients are used?	Zambia			
	Young women	Adult women	Young men	Adult men
I make the final decision	59%	40%	83%	66%
I am consulted and make the decision jointly	41%	58%	17%	32%
I am consulted but do not have the final say	0%	2%	0%	3%
I am not consulted				

Table 80b. Decision-making about how fish feed ingredients are used, Zambia.

What is your level of involvement in deciding how fish feed ingredients are used?	Kenya			
	Young women	Adult women	Young men	Adult men
I make the final decision	50%	21%	36%	27%
I am consulted and make the decision jointly	38%	71%	55%	69%
I am consulted but do not have the final say	13%	7%	0%	3%
I am not consulted	0%	1%	9%	1%

Table 80c. Decision-making about how fish feed ingredients are used, Kenya.

7.6.2.2. Fish sold versus kept

Across the three countries, there are variations in decision-making dynamics. In Nigeria, a significant number of respondents make the final decisions themselves, and almost a quarter of women are consulted in one form or another. Zambia demonstrates a more balanced distribution between final and joint decision-making, with little gender disparity. Kenya showcases a trend where fewer individuals make final decisions, and the majority of respondents, irrespective of gender, are involved in joint decision-making.

In Nigeria, young women and men both overwhelmingly making the final decisions, a trend that remains relatively stable into adulthood. In Zambia, youths tends to make the final decisions alone, while levels among adults tend more toward being consulted. In Kenya, consultations levels are higher than sole decision-making among both genders and increase as they get older.

What is your level of involvement in deciding how fish feed ingredients are used?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
I make the final decision	78%	86%	81%	43%	48%	45%	21%	28%	24%
I am consulted and make the decision jointly	18%	8%	14%	49%	50%	49%	71%	70%	70%
I am consulted but do not have the final say	4%	6%	4%	8%	2%	6%	6%	1%	4%
I am not consulted							2%	1%	1%

Table 81. Decision-making about how much fish to sell versus keep.

What is your level of involvement in deciding how much fish to sell versus keep?	Nigeria			
	Young women	Adult women	Young men	Adult men
I make the final decision	79%	78%	90%	85%
I am consulted and make the decision jointly	16%	19%	0%	12%
I am consulted but do not have the final say	5%	3%	10%	4%
I am not consulted				

Table 81a. Decision-making about how much fish to sell versus keep, Nigeria.

What is your level of involvement in deciding how much fish to sell versus keep?	Zambia			
	Young women	Adult women	Young men	Adult men
I make the final decision	50%	41%	67%	43%
I am consulted and make the decision jointly	43%	50%	33%	54%
I am consulted but do not have the final say	7%	9%	0%	3%
I am not consulted				

Table 81b. Decision-making about how much fish to sell versus keep, Zambia.

What is your level of involvement in deciding how much fish to sell versus keep?	Kenya			
	Young women	Adult women	Young men	Adult men
I make the final decision	50%	19%	36%	27%
I am consulted and make the decision jointly	50%	72%	55%	72%
I am consulted but do not have the final say	0%	7%	0%	1%
I am not consulted	0%	2%	9%	0%

Table 81c. Decision-making about how much fish to sell versus keep, Kenya.

7.6.2.3. Spousal or partner earnings

Regarding spousal or partner earnings, Nigeria is less consultative than the other countries. In Zambia, distribution between final and joint decision-making is more balanced. Joint decision-making is the prevalent approach in Kenya, where fewer individuals make final decisions.

In Nigeria, youths are largely not consulted, with a slightly higher rate among young men. Adult women are twice as likely to make the final decisions than are young women, while there is no significant difference among men. Consultation is more the norm in Zambia than is sole decision-making, especially as people age. In Kenya, youths tend to lose their grip on decision-making as they age, more or less at the same rate for women and men. Rates of consultation jump significantly for women as they get older but barely change for men, at about two-thirds. A significant chunk of women are still not consulted at all during the decision-making process.

What is your level of involvement in deciding how to use income from your spouse or partner?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
I make the final decision	18%	22%	20%	31%	32%	31%	14%	21%	17%
I am consulted and make the decision jointly	29%	31%	30%	47%	55%	50%	54%	63%	58%
I am consulted but do not have the final say	13%	11%	12%	15%	9%	13%	15%	12%	14%
I am not consulted	40%	36%	39%	7%	5%	6%	17%	4%	11%

Table 82. Decision-making about how spousal or partner earnings are used.

What is your level of involvement in deciding how to use income from your spouse or partner?	Nigeria			
	Young women	Adult women	Young men	Adult men
I make the final decision	11%	22%	20%	23%
I am consulted and make the decision jointly	26%	31%	20%	35%
I am consulted but do not have the final say	16%	11%	10%	12%
I am not consulted	47%	36%	50%	31%

Table 82a. Decision-making about how spousal or partner earnings are used, Nigeria.

What is your level of involvement in deciding how to use income from your spouse or partner?	Zambia			
	Young women	Adult women	Young men	Adult men
I make the final decision	29%	31%	33%	31%
I am consulted and make the decision jointly	36%	50%	44%	57%
I am consulted but do not have the final say	36%	10%	22%	6%
I am not consulted	0%	9%	0%	6%

Table 82b. Decision-making about how spousal or partner earnings are used, Zambia.

What is your level of involvement in deciding how to use income from your spouse or partner?	Kenya			
	Young women	Adult women	Young men	Adult men
I make the final decision	38%	13%	36%	19%
I am consulted and make the decision jointly	25%	56%	64%	63%
I am consulted but do not have the final say	13%	15%	0%	13%
I am not consulted	25%	16%	0%	4%

Table 82c. Decision-making about how spousal or partner earnings are used, Kenya.

7.6.2.4. Respondent earnings

Regarding how respondents' own income is used, a mixed pattern emerges by age and gender. Although higher percentages of adult women and young men in Nigeria make the final decision on the use of their earnings than their counterparts, adult men and women in Zambia make the final decision on the use of their earnings than their counterparts, and young women and men do so in Kenya. In Nigeria, there is a substantial proportion of respondents who make the final decisions themselves, with men taking a more prominent role in this regard. In Zambia, distribution is more equitable between final and joint decision-making, with no notable gender disparities. Kenya displays a pattern where fewer individuals make final decisions, and joint decision-making is the predominant approach, with women slightly more involved in this process.

In Nigeria, more women tend to have the final decision as they get older, while there is a significant drop in the percentage men who do so as they age. The trend is similar among women in Zambia, though less pronounced. In Kenya, women and men both lose decision-making authority as they become adults, though rates of consultation increase to about two-thirds.

What is your level of involvement in deciding how your income is used?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
I make the final decision	64%	75%	68%	50%	52%	51%	30%	39%	34%
I am consulted and make the decision jointly	33%	25%	30%	47%	48%	47%	66%	60%	63%
I am consulted but do not have the final say	4%	0%	2%	3%	0%	2%	5%	1%	3%

Table 83. Decision-making about how respondents' own earnings are used.

What is your level of involvement in deciding how your income is used?	Nigeria			
	Young women	Adult women	Young men	Adult men
I make the final decision	58%	67%	90%	69%
I am consulted and make the decision jointly	32%	33%	10%	31%
I am consulted but do not have the final say	11%	0%	0%	0%

Table 83a. Decision-making about how respondents' own earnings are used, Nigeria.

What is your level of involvement in deciding how your income is used?	Zambia			
	Young women	Adult women	Young men	Adult men
I make the final decision	43%	52%	44%	54%
I am consulted and make the decision jointly	57%	45%	56%	46%
I am consulted but do not have the final say	0%	3%	0%	0%

Table 83b. Decision-making about how respondents' own earnings are used, Zambia.

What is your level of involvement in deciding how your income is used?	Kenya			
	Young women	Adult women	Young men	Adult men
I make the final decision	63%	27%	46%	38%
I am consulted and make the decision jointly	38%	68%	55%	61%
I am consulted but do not have the final say	0%	5%	0%	1%

Table 83c. Decision-making about how respondents' own earnings are used, Kenya.

7.6.2.5. Surplus income

Across all three countries, there is no significant gender disparity in the division of decision-making roles regarding how surplus income is used, as both men and women are equally involved in making final decisions or they share the decisions. These findings emphasize the prevalence of shared decision-making about surplus income within households.

Among women in Nigeria, age appears to be a nonfactor in making sole decisions or joint decisions, while there is a slight decrease in sole decision-making authority for men corresponding to a similar increase in consultation levels. In Zambia, women tend to play a greater role in decision-making as they age, while there is almost no change for men. In Kenya, there are steep drops in final decisions among both adult women and men, though consultation levels do increase some.

What is your level of involvement in deciding how surplus income is used?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
I make the final decision	44%	44%	44%	31%	32%	31%	21%	26%	24%
I am consulted and make the decision jointly	53%	53%	53%	67%	64%	66%	66%	73%	70%
I am consulted but do not have the final say	2%	2%	2%	3%	5%	3%	11%	1%	6%
I am not consulted	2%	0%	1%				2%	0%	1%

Table 84. Decision-making about surplus income is used.

What is your level of involvement in deciding how surplus income is used?	Nigeria			
	Young women	Adult women	Young men	Adult men
I make the final decision	42%	44%	80%	65%
I am consulted and make the decision jointly	53%	53%	20%	35%
I am consulted but do not have the final say	5%	0%	0%	0%
I am not consulted	0%	3%	0%	0%

Table 84a. Decision-making about surplus income is used, Nigeria.

What is your level of involvement in deciding how surplus income is used?	Zambia			
	Young women	Adult women	Young men	Adult men
I make the final decision	21%	33%	33%	31%
I am consulted and make the decision jointly	71%	66%	67%	63%
I am consulted but do not have the final say	7%	2%	0%	6%
I am not consulted				

Table 84b. Decision-making about surplus income is used, Zambia.

What is your level of involvement in deciding how surplus income is used?	Kenya			
	Young women	Adult women	Young men	Adult men
I make the final decision	50%	19%	46%	23%
I am consulted and make the decision jointly	50%	67%	55%	76%
I am consulted but do not have the final say	0%	12%	0%	1%
I am not consulted	0%	2%	0%	0%

Table 84c. Decision-making about surplus income is used, Kenya.

7.6.2.6. Group membership

Across all three countries, there is no significant gender disparity in the decision making about group membership, as both men (slightly higher percentage) and women are involved in making final decisions or they share the decisions.

Across the three countries, a higher percentage of young men make decisions themselves than do adult men, while adult women in Nigeria and young women in Zambia and Kenya do so more than their counterparts. Women in Nigeria tend to gain sole decision-making authority as they age, while those in Zambia and, especially, Kenya, tend to lose it. In all three countries, there is a slight drop among men as they get older.

What is your level of involvement in deciding which groups to join?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
I make the final decision	60%	78%	67%	64%	66%	65%	44%	52%	47%
I am consulted and make the decision jointly	38%	22%	32%	31%	34%	32%	50%	49%	49%
I am consulted but do not have the final say				3%	0%	2%	5%	0%	2%
I am not consulted	2%	0%	1%	3%	0%	2%	2%	0%	1%

Table 85. Decision-making about group membership.

What is your level of involvement in deciding which groups to join?	Nigeria			
	Young women	Adult women	Young men	Adult men
I make the final decision	53%	64%	80%	77%
I am consulted and make the decision jointly	42%	36%	20%	23%
I am consulted but do not have the final say				
I am not consulted	5%	0%	0%	0%

Table 85a. Decision-making about group membership, Nigeria.

What is your level of involvement in deciding which groups to join?	Zambia			
	Young women	Adult women	Young men	Adult men
I make the final decision	71%	62%	78%	63%
I am consulted and make the decision jointly	29%	31%	22%	37%
I am consulted but do not have the final say	0%	3%	0%	0%
I am not consulted	0%	3%	0%	0%

Table 85b. Decision-making about group membership, Zambia.

What is your level of involvement in deciding which groups to join?	Kenya			
	Young women	Adult women	Young men	Adult men
I make the final decision	75%	41%	55%	51%
I am consulted and make the decision jointly	25%	52%	46%	49%
I am consulted but do not have the final say	0%	5%	0%	0%
I am not consulted	0%	2%	0%	0%

Table 85c. Decision-making about group membership, Kenya.

7.6.2.7. Attending meetings or training sessions

Across all three countries, especially in Nigeria, men are more likely than women to have the final decision on whether to attend meetings or training sessions. However, levels among women are still significant. In Nigeria and Zambia, about two-thirds of respondents are sole decision-makers and about one-third make decisions jointly, while levels are more or less split between the two in Kenya.

In Nigeria, women make significant gains in control over final decisions as they get older, while rates among men, which are high, remain almost unchanged. In Zambia and Kenya, women and men both become more consultative as they become adults.

What is your level of involvement in deciding whether to attend community meetings or training sessions?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
I make the final decision	60%	81%	68%	61%	71%	65%	45%	55%	49%
I am consulted and make the decision jointly	33%	19%	28%	32%	30%	31%	49%	43%	46%
I am consulted but do not have the final say	6%	0%	3%	7%	0%	4%	5%	2%	3%
I am not consulted	2%	0%	1%				2%	1%	1%

Table 86. Decision-making about attendance at community meetings or training sessions.

What is your level of involvement in deciding whether to attend community meetings or training sessions?	Nigeria			
	Young women	Adult women	Young men	Adult men
I make the final decision	42%	69%	80%	81%
I am consulted and make the decision jointly	47%	25%	20%	19%
I am consulted but do not have the final say	5%	6%	0%	0%
I am not consulted	5%	0%	0%	0%

Table 86a. Decision-making about attendance at community meetings or training sessions, Nigeria.

What is your level of involvement in deciding whether to attend community meetings or training sessions?	Zambia			
	Young women	Adult women	Young men	Adult men
I make the final decision	71%	59%	89%	66%
I am consulted and make the decision jointly	29%	33%	11%	34%
I am consulted but do not have the final say	0%	9%	0%	0%
I am not consulted				

Table 86b. Decision-making about attendance at community meetings or training sessions, Zambia.

What is your level of involvement in deciding whether to attend community meetings or training sessions?	Kenya			
	Young women	Adult women	Young men	Adult men
I make the final decision	63%	43%	64%	53%
I am consulted and make the decision jointly	38%	50%	27%	44%
I am consulted but do not have the final say	0%	5%	0%	2%
I am not consulted	0%	2%	9%	0%

Table 86c. Decision-making about attendance at community meetings or training sessions, Kenya.

7.6.2.8. Technological purchases

When it comes to decisions about whether to buy new electronics or farm equipment, respondents in Nigeria, both women and men, have by far most autonomy among the three countries in this regard. More than half of respondents in Zambia and one-third respondents in Kenya do so as well, across both genders.

Women in Nigeria assume more control over these decisions as they age, and the same is true among women in Zambia, though to a lesser extent. In Kenya, however, levels among adult women are less than half that for young women.

For men, rates in Nigeria remain very high regardless of age, while levels decline in Kenya and, especially, Zambia as men get older.

What is your level of involvement in deciding whether to buy new technology?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
I make the final decision	78%	89%	82%	51%	59%	54%	34%	44%	39%
I am consulted and make the decision jointly	20%	11%	17%	49%	41%	46%	58%	53%	55%
I am consulted but do not have the final say	2%	0%	1%				6%	2%	4%
I am not consulted							2%	2%	2%

Table 87. Decision-making about whether to buy new technology.

What is your level of involvement in deciding whether to buy new technology?	Nigeria			
	Young women	Adult women	Young men	Adult men
I make the final decision	63%	86%	90%	89%
I am consulted and make the decision jointly	32%	14%	10%	12%
I am consulted but do not have the final say	5%	0%	0%	0%
I am not consulted				

Table 87a. Decision-making about whether to buy new technology, Nigeria.

What is your level of involvement in deciding whether to buy new technology?	Zambia			
	Young women	Adult women	Young men	Adult men
I make the final decision	43%	53%	78%	54%
I am consulted and make the decision jointly	57%	47%	22%	46%
I am consulted but do not have the final say				
I am not consulted				

Table 87b. Decision-making about whether to buy new technology, Zambia.

What is your level of involvement in deciding whether to buy new technology?	Kenya			
	Young women	Adult women	Young men	Adult men
I make the final decision	63%	32%	55%	42%
I am consulted and make the decision jointly	38%	60%	27%	56%
I am consulted but do not have the final say	0%	7%	9%	1%
I am not consulted	0%	2%	9%	1%

Table 87c. Decision-making about whether to buy new technology, Kenya.

The Table 88 summarizes and concludes the key findings from this section.

Level of involvement in decision-making	Key observations
How fish feed ingredients are used	A significant portion of respondents in Nigeria, including women, make independent final decisions, but many women also participate in joint decision-making. Men in Zambia are more likely to make final decisions, while women are actively involved in joint decision-making. In Kenya, both men and women actively engage in joint decision-making, with fewer individuals making independent final decisions. Generally, a higher percentage of adults than youths in Nigeria and youths in Zambia and Kenya prefer making final decisions independently.
How much fish to sell versus keep	In Nigeria, many respondents, including women, make independent final decisions, but a significant number also participate in joint decision-making. In Zambia, decision-making is fairly balanced between final and joint decisions, with minimal gender disparity. In Kenya, fewer individuals make independent final decisions, and most respondents, regardless of gender, engage in joint decision-making. Overall, youths are more inclined than adults to make independent final decisions.
How spousal or partner earnings are used	A significant portion of respondents in Nigeria are not consulted in household decisions, and there is a notable difference in decision-making patterns between adult men and women. Decision-making in Zambia is fairly evenly distributed between final and joint decisions, with no significant difference by age and gender. Fewer individuals in Kenya make final decisions, and joint decision-making is the dominant approach. Youths are more likely than adults to make independent final decisions in Kenya.
How respondents' earnings are used	A significant portion of respondents in Nigeria make final decisions themselves, with men playing a more prominent role. Decision-making in Zambia is fairly evenly distributed between final and joint decisions, with no significant gender disparities. Fewer individuals in Kenya make final decisions, and joint decision-making is prevalent, with a slight edge for women. Overall, there is a mixed pattern regarding age and gender, with Kenyan youths more likely to make the final decision, while adults in Nigeria (except men where young men are more involved) and Zambia are more involved in this aspect.
How surplus income is used	Across Nigeria, Zambia and Kenya, there is no significant gender disparity in decision-making roles within households. Both men and women are equally involved in making final decisions or participating in joint decision-making. This highlights the prevalence of shared decision-making within these communities, where both partners have a say in important family matters. Additionally, a higher percentage of young than adult men tend to make decisions themselves.
Which groups to join	There is a noticeable gender disparity in decision-making roles within households across the three countries, with men being more likely to make final decisions than women. In Kenya, respondents are involved in making final decisions, while joint decision-making is more prevalent. Additionally, a higher percentage of young than adult men tend to make decisions themselves. However, it is worth noting that adult women in Nigeria and young women in Zambia and Kenya make more decisions than their counterparts.
Attendance at community meetings or training sessions	There continues to be a distinct gender disparity in decision-making roles within households in Nigeria, Zambia and Kenya, with men more frequently making final decisions. Although joint decision-making is prevalent, especially among women, the gender gap persists. Furthermore, a higher percentage of young men make decisions themselves across these countries compared to adult men. Interestingly, adult women in Nigeria and young women in Zambia and Kenya take on more decision-making responsibilities than their counterparts in the same age groups.
Buying technology	Men tend to have a higher likelihood of making final decisions, though joint decision-making is more common and slightly favored by women in some cases. Additionally, a higher percentage of young men make these decisions themselves across these countries than do adult men. Interestingly, adult women in Nigeria and Zambia and young women in Kenya appear to take on more decision-making responsibilities than their counterparts in the same age groups.

Table 88. Key observations.

7.6.3. Preferred level of involvement in decision-making

As shown in Tables 89a–h, the survey also inquired into whether respondents would like to change their level of involvement in these decisions.

Women and, especially, men in Nigeria and Zambia want to be more involved in decisions about how to use fish feed ingredients. In Kenya, respondents are generally content with their level of decision-making authority.

Respondents in Nigeria and Zambia want to get more involved in how much fish is sold versus kept. In Kenya, respondents are generally content with their level of decision-making authority.

The majority of respondents in Kenya and, to a slightly lesser extent, Nigeria want their level of involvement in deciding how to use spousal or partner income to remain the same. In Zambia, results are roughly split between maintaining their level of involvement and wanting more.

Respondents in Nigeria and Kenya tend to be content with their level of involvement in how their own income is spent, while a significant percentage of both women and men in Zambia want more input in this regard.

What is your preferred level of involvement in deciding how fish feed ingredients are used?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
I want to be less involved							0%	2%	1%
I want my level of involvement to remain the same	47%	33%	42%	43%	27%	37%	55%	62%	59%
I want to be more involved	51%	64%	56%	57%	73%	63%	44%	36%	40%
Prefer not to answer or do not know	2%	3%	2%				1%	0%	1%

Table 89a. Preferred level of involvement in decision-making about how fish feed ingredients are used.

What is your preferred level of involvement in deciding how much fish is sold versus kept?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
I want to be less involved				1%	0%	1%	0%	3%	1%
I want my level of involvement to remain the same	49%	42%	46%	42%	39%	41%	56%	61%	59%
I want to be more involved	49%	56%	52%	56%	61%	58%	42%	36%	39%
Prefer not to answer or do not know	2%	3%	2%	1%	0%	1%	2%	0%	1%

Table 89b. Preferred level of involvement in decision-making about how much fish is sold versus kept.

What is your preferred level of involvement in deciding how to use spousal or partner income?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
I want to be less involved	15%	17%	15%	3%	16%	8%	10%	11%	10%
I want my level of involvement to remain the same	55%	56%	55%	42%	39%	41%	58%	63%	61%
I want to be more involved	15%	11%	13%	49%	39%	45%	26%	22%	24%
Prefer not to answer or do not know	16%	17%	17%	7%	7%	7%	6%	4%	5%

Table 89c. Preferred level of involvement in decision-making about decisions about how spousal or partner income is used.

What is your preferred level of involvement in deciding how to use your own income?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
I want to be less involved							0%	1%	1%
I want my level of involvement to remain the same	49%	64%	55%	38%	34%	36%	54%	62%	58%
I want to be more involved	46%	33%	41%	61%	64%	62%	46%	37%	41%
Prefer not to answer or do not know	6%	3%	4%	1%	2%	2%	1%	0%	1%

Table 89d. Preferred level of involvement in decision-making about how respondents' own income is used.

The majority of respondents in Nigeria and Kenya are content with their level of involvement in how surplus income is used, with a slightly higher percentage among Nigerian women and Kenyan men. In Zambia, slightly more women want to increase their involvement, while men are evenly split between wanting to maintain their level of involvement and wanting to increase it.

About two-thirds of women and men in Nigeria are happy with their level of involvement in which groups to join, as are two-thirds of men in Kenya and a little over half of women. Two-thirds of women in Zambia want a greater say in such decisions.

In Nigeria, two-thirds of respondents want to maintain their level of involvement in decisions related to joining groups and attending meetings. In Kenya, the situation is quite similar. In Zambia, however, respondents want a greater say in such decisions. Within each country, there is little variation between women and men.

In Nigeria, about two-thirds of respondents want to maintain their level of involvement in decisions related to buying technology, whether electronics or farm equipment, and the situation is similar in Kenya. In Zambia, however, almost two-thirds of both women and men want greater involvement.

What is your preferred level of involvement in deciding how surplus income is used?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
I want to be less involved				1%	0%	1%	0%	3%	1%
I want my level of involvement to remain the same	64%	58%	62%	46%	50%	47%	56%	62%	59%
I want to be more involved	33%	36%	34%	53%	50%	52%	43%	35%	39%
Prefer not to answer or do not know	4%	6%	4%				1%	0%	1%

Table 89e. Preferred level of involvement in decisions about how surplus income is used.

What is your preferred level of involvement in deciding which groups to join?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
I want to be less involved							0%	6%	3%
I want my level of involvement to remain the same	66%	61%	64%	35%	48%	40%	55%	64%	60%
I want to be more involved	27%	36%	31%	65%	50%	60%	44%	30%	37%
Prefer not to answer or do not know	7%	3%	6%	0%	2%	1%	1%	0%	1%

Table 89f. Preferred level of involvement in decisions about group memberships.

What is your preferred level of involvement in deciding whether to attend meetings or training sessions?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
I want to be less involved							1%	3%	2%
I want my level of involvement to remain the same	62%	61%	62%	36%	34%	35%	56%	65%	61%
I want to be more involved	31%	36%	33%	64%	64%	64%	42%	32%	37%
Prefer not to answer or do not know	7%	3%	6%	0%	2%	1%	1%	0%	1%

Table 89g. Preferred level of involvement in decisions about whether to attend meetings and training sessions.

What is your preferred level of involvement in deciding whether to buy new technology?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
I want to be less involved	2%	0%	1%				1%	2%	1%
I want my level of involvement to remain the same	64%	67%	65%	40%	39%	40%	57%	63%	60%
I want to be more involved	31%	31%	31%	60%	61%	60%	41%	35%	38%
Prefer not to answer or do not know	4%	3%	3%				1%	0%	1%

Table 89h. Preferred level of involvement in decisions about whether to buy new technology.

Overall, the findings on respondents' preferred level of involvement reveals several key trends:

- In Nigeria and Zambia, there is a strong desire, particularly among men, to be more involved in decisions about how fish and fish feed ingredients are used. In Kenya, men are generally content with their current level of decision-making authority, but women express a desire for greater involvement. Youths across all three countries wish to have more say in these decisions, except in Zambia, where adult men seek increased involvement over young men.
- Respondents in Nigeria report similar desired levels of involvement in decisions related to earnings and income. Notably, women in both Nigeria and Kenya want more involvement, as do respondents in Zambia, especially in spending their own income. Women are particularly keen on increased participation in these decisions.
- In Nigeria and Kenya, approximately two-thirds of respondents are content with their level of involvement in decisions related to joining groups or attending meetings. Zambia stands out, with respondents indicating a strong need for greater involvement in these decisions, particularly among women. Youths in general express a desire for more involvement.
- Around two-thirds of respondents in Nigeria and Kenya want their level of involvement in decisions related to buying technology to remain the same. Zambia shows a stronger desire for more involvement, particularly among women. As with other decisions, youths generally want more say in buying technology, except in Zambia, where adult men seek increased involvement.
- Overall, the findings highlight the nuanced preferences for decision-making authority within households and communities, shaped by gender, age and specific decision categories. They underscore the importance of recognizing and addressing these variations to promote more inclusive decision-making processes.

For each of these decisions, the survey participants were further asked what they think would happen if they did not consult their spouse. The vast majority of the respondents across the three countries reported that nothing would happen if they made these decisions on their own.

7.6.3.1. Statements related to fish or fish feed

In Nigeria, almost all of the respondents reported that nothing would happen if decisions related to fish or fish feeds are made without consulting their spouses. In Zambia, almost all respondents reported the same for how ingredients are used, as did the vast majority for how much fish to sell versus keep for own consumption. Rates for the same two categories were slightly lower in Kenya, but still well over three-quarters, with slightly higher percentages among men than women.

7.6.3.2. How to use earnings/income

Across the three countries, the vast majority of respondents reported that nothing would happen if decisions regarding earnings and income are made without consulting their spouses. In Nigeria, more than 80% of both women and men said that nothing would happen if they decide how to use their spouse or partner's earnings, while more than 90% said the same for decisions regarding how to use their own earnings as well as any surplus income. In Zambia, nearly three-quarters of respondents reported that nothing would happen if they make decisions on how to use their spouse or partner's earnings, nor on any surplus income. More than 90% said the same if they make such decisions regarding their own earnings. Rates were higher among men than women for all three categories. In Kenya, more than three-quarters of respondents said that nothing will happen if they decide how to use their spouse or partner's earnings, while slightly more said the same for making such decisions on their own earnings as well as any surplus income.

Around 12% of respondents, especially women, reported that there would be fights if decisions related to earnings and income are made without consulting their spouses, while 5%–6% of women also reported violence.

7.6.3.3. Joining groups/attending meetings

More than 90% of respondents across the three countries reported that nothing would happen if they decide which savings, producer or other types of groups to join or which community meetings/training to attend.

7.6.3.4. Buying technology

Across the three countries, respondents reported that nothing would happen if decisions about buying technology, such as a new phone or farm equipment, are made without consulting their spouses. Responses were highest in Nigeria (98%), followed by Zambia (91%) and Kenya (88%), with slightly higher rates among men than women in each country. In Kenya, 11% of women said that there would be a fight.

7.6.4. Speaking up in public

Respondents were asked to rate their comfort level with speaking up in public to help make decisions on infrastructure to be built in their community, such as small wells, roads and water supplies.

As shown in Table 90, Zambia shows a high level of comfort to speak up about such decisions, while Nigeria and Kenya demonstrate gender disparities in this regard. In all three countries, men generally feel more comfortable than women when it comes to speaking in public. In Zambia, there appears to be a higher overall comfort level with public speaking, with little gender disparity. It is important to consider that individual experiences, cultural norms and educational backgrounds likely contribute to these variations in comfort levels across different contexts. There is no stark difference by age and gender.

Respondents were also asked to rate their level of comfort in regards to speaking up in public to protest the behavior of authorities or elected officials. As shown in Table 91, Nigeria shows a significant gender disparity, with men being more comfortable with public protests. Zambia and Kenya exhibit a higher overall comfort level with public protests, with gender differences present but not as pronounced as in Nigeria.

In essence, although there are variations in comfort levels with public protests across these three countries, gender disparities in comfort levels, particularly in Nigeria, are evident. Zambia and Kenya exhibit higher overall comfort with public protests, but gender differences persist.

In Nigeria, adults are more comfortable than youths. In Zambia, adult women are more comfortable than younger women, while the reverse is true for men. In Kenya, younger women are more comfortable than adult women, with a negligible difference by age among men.

Overall, when it comes to public speaking, comfort levels vary across countries, with gender disparities, indicating a need for communication and confidence-building programs. Zambia stands out with higher overall comfort levels in public speaking.

How comfortable are you with speaking up in public about decisions related to infrastructure in your community?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Not comfortable at all	26%	3%	17%	3%	0%	2%	17%	0%	9%
Not very comfortable	16%	17%	17%	11%	0%	7%	4%	2%	3%
Somewhat comfortable	22%	17%	20%	3%	2%	3%	10%	4%	7%
Fairly comfortable	22%	22%	22%	33%	11%	25%	30%	29%	30%
Very comfortable	13%	42%	24%	49%	86%	63%	39%	65%	52%
Prefer not to answer	2%	0%	1%	1%	0%	1%			

Table 90. Level of comfort speaking up in public about decisions related to infrastructure.

How comfortable are you with speaking up in public about the behavior of authorities or elected officials?	Nigeria			Zambia			Kenya		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Not comfortable at all	51%	25%	41%	25%	7%	18%	28%	22%	25%
Not very comfortable	16%	11%	14%	8%	5%	7%	7%	5%	6%
Somewhat comfortable	15%	11%	13%	13%	9%	11%	9%	6%	8%
Fairly comfortable	7%	25%	14%	22%	16%	20%	30%	31%	30%
Very comfortable	6%	17%	10%	29%	61%	41%	25%	36%	30%
Prefer not to answer	6%	11%	8%	3%	2%	3%	2%	1%	1%

Table 91. Level of comfort to publicly protest the behavior of authorities or elected officials.

8. Conclusion

In conclusion, the comprehensive GESI assessment conducted across Nigeria, Zambia and Kenya as part of the Norad-funded FASA project provides invaluable insights into the intricacies of gender dynamics, social norms and decision-making processes within rural fishing communities. This research, facilitated by Includovate, illuminates the multifaceted challenges and opportunities present in the aquaculture sector, laying a robust foundation for targeted interventions aimed at promoting GESI.

8.1. Fish feed ingredients

The study delved into the complex landscape of fish feed ingredients and their use, revealing multifaceted challenges faced by both men and women, including limited access to funds, inputs and information. There is some competition for the use of common fish feed ingredients across the studied regions. In Nigeria, the study revealed that respondents, regardless of gender, use maize powder, GMPs and various brans and cakes as fish feed ingredients, though women's use is slightly lower than men's. These ingredients are chosen for availability, affordability and nutritional value. In Zambia, respondents use chicken manure and feathers, along with GMPs as fish feed ingredients. Notably, women tend to use chicken manure and feathers more than men because of their availability. Women emphasized the affordability and availability of GMPs as key factors influencing their choice. In Kenya, respondents use plant leaves and various brans and cakes as fish feed ingredients. Plant leaves are a common choice, with a higher percentage of men using them because of their availability, though there are periods of scarcity during dry seasons. Brans and cakes are another significant input, with a higher percentage of women using them because of their nutritious value. Understanding these fish feed dynamics is vital for designing effective strategies that cater to the specific needs of different gender and age groups within these communities.

8.2. Understanding policy disparities and opportunities

The assessment of fisheries policies in Nigeria, Zambia and Kenya underscores the existing gender disparities within legal frameworks and regulations. Although each country demonstrates unique challenges, ranging from incongruent policies in Kenya to deeply entrenched traditional norms in Nigeria, there are overarching opportunities for the FASA project to bridge these gaps. By aligning interventions with national gender policies and the SDGs, the project can advocate for policy reforms that promote inclusivity and equality.

8.3. Sociodemographic realities and occupational patterns

The study illuminates the diverse sociodemographic backgrounds of aquaculturists, highlighting the critical roles played by both men and women in fish farming. Although certain tasks are traditionally gendered, such as pond construction being primarily men's work, research shows a significant overlap in responsibilities. It also emphasizes the vital role of women in fish processing and marketing, underscoring the economic contributions they make to their households and communities.

8.4. Challenges in access to resources and information

Access to resources and information remains a substantial challenge, particularly for women and youths. The study identifies the varied channels through which communities receive information, emphasizing the need for tailored communication strategies. Cultural norms often hinder women's access to technology and decision-making processes, highlighting the importance of community-based approaches that address these barriers.

8.5. Norms, beliefs and decision-making patterns

Deeply ingrained societal norms continue to shape the experiences of men and women in aquaculture. Although there is a theoretical acceptance of shared responsibilities, the gap between approval and practice is substantial, particularly in Nigeria and Kenya. Young individuals express a desire for greater participation, emphasizing the importance of nurturing these aspirations. Decision-making processes, both within households and communities, exhibit a preference for collaboration, indicating an openness to inclusive practices.

8.6. Pathways to empowerment

The assessment identifies pathways to empowerment, including economic initiatives such as microfinance institutions and agricultural cooperatives that actively involve women and youths. These initiatives serve as catalysts for economic independence and community development. Additionally, the findings emphasize the importance of targeted training programs that address specific needs, enhance communication skills and build confidence, particularly among women and youths.

The GESI assessment not only highlighted existing disparities but also pointed toward potential avenues for positive change. By addressing these challenges through targeted programs, there is a significant opportunity to transform gender dynamics, enhance economic prospects and foster better communication and collaboration within these communities. These findings serve as a foundation for informed policymaking and the development of inclusive initiatives that can create lasting impact and promote gender equality in the fisheries sectors of Nigeria, Zambia and Kenya.

Notes

[1] For more details, see https://www.washingtongroup-disability.com/question-sets/wg-short-set-on-functioningwg-ss/

[2] Norwegian Ministry of Foreign Affairs. 2016. Freedom, Empowerment and Opportunities: Action Plan for Women's Rights and Gender Equality in Foreign and Development Policy 2016–2020. https://www.regjeringen.no/globalassets/departementene/ud/vedlegg/fn/womens_rights.pdf. Accessed on February 15, 2023.

[3] Ganguly S, Drucza K, Esayas B, Bikketi E, Yossa R and McDougall C. 2021. Affordable local ingredients for fish feeds in low-income contexts: A social and gender risk and opportunity analysis. Penang, Malaysia: CGIAR Research Program on Fish Agri-Food Systems. Working Paper: FISH-2021-22.

[4] Enyidi UD, Pirhonen J, Kettunen J and Vielma J. 2017. Effect of feed protein: Lipid ratio on growth parameters of African catfish clarias gariepinus after fish meal substitution in the diet with bambaranut (*Voandzeia subterranea*) meal and soybean (Glycine max) meal. Fishes 2(1):1.

[5] Singh P, Paul BN and Giri SS. 2018. Potentiality of new feed ingredients for aquaculture: A review. Agricultural Reviews 39(4):282–91.

[6] Kantor P, Morgan M and Choudhury A. 2015. Amplifying outcomes by addressing inequality: The role of gender-transformative approaches in agricultural research for development. Gender, Technology and Development 19(3):292–319. doi: 10.1177/0971852415596863

[7] Ganguly S, Drucza K, Esayas B, Bikketi E, Yossa R and McDougall C. 2021. Affordable local ingredients for fish feeds in low-income contexts: A social and gender risk and opportunity analysis. Penang, Malaysia: CGIAR Research Program on Fish Agri-Food Systems. Working Paper: FISH-2021-22.

[8] Barclay K, Leduc B, Mangubhai S, Vunisea A, Namakin B, Teimarane M and Leweniqila L. 2019. Module 1: Introduction. In Barclay K, Leduc B, Mangubhai S and Donato-Hunt C, eds. Pacific handbook for gender equity and social inclusion in coastal fisheries and aquaculture. City: Country: Pacific Community.

[9] Barclay K, Mangubhai S, Leduc B, Donato-Hunt C, Makhoul N, Kinch J and Kalsuak J, eds. 2021. Pacific handbook for gender equity and social inclusion in coastal fisheries and aquaculture. Second edition. Noumea, New Caledonia: Pacific Community.

[10] Adam R and Njogu L. 2023. A review of gender inequality and women's empowerment in aquaculture using the reach-benefit-empower- transform framework approach: A case study of Nigeria. Front. Aquac. 1:1052097. doi:10.3389/faquc.2022.1052097

[11] The text uses "fishermen" and makes no reference to fisherwomen.

[12] No information is provided on whether women can hold these roles.

[13] Republic of Kenya (2019) National Policy On Gender And Development: Towards creating a just, fair and transformed society free from gender based discrimination in all spheres of life practices, Kenya.

[14] The names were changed for each country to resemble common names used locally.

[15] UNICEF. 2021. Defining social norms and related concepts. https://www.unicef.org/media/111061/file/Social-norms-definitions-2021.pdf

Annex 1. Consent forms

KII consent form

Client: WorldFish
Research firm: Includovate
Lead researcher: Dr. Kristie Drucza (kristie.drucza@includovate.com)

Thank you for participating in this interview. My name is ……...…… I am from Includovate, which is a social enterprise. WorldFish, an international, nonprofit research and innovation organization, has contracted Includovate to conduct a gender and social inclusion assessment because the needs, risks and opportunities associated with the use of novel ingredients are gendered and socially differentiated. These assessments will enable WorldFish to identify such risks and to ensure that women, youths and other marginalized groups are prioritized throughout implementation of the FASA project and ensure the same access to project opportunities as nonmarginalized groups.

We would like to interview you, as you are a part of this program. The information you provide will be useful to draw out some conclusions and lessons and to put forward possible recommendations. Therefore, your kind cooperation with honest responses to the questions will be vital for the overall success of the study. Although you may not directly benefit from taking part in this study, the information you provide could lead to improved inclusion strategies and interventions. You will *not be* compensated for your participation in this study.

The interview should take about 60 minutes of your time. Your participation in the study is voluntary and you will not be affected in any way if you decide not to participate. If you agree to participate, you can choose to stop at any time or to skip any topics you do not want to answer without any consequence. During the interview, we will be taking notes, and with your permission, we would like to audio record the interview. These materials will be kept completely confidential and any personal identifying information will not be used in any reports, publications or presentations resultant from this research. The data collected and results drawn from the study will not be used for any other reason than the study's purpose. Every effort will be made to protect the anonymity and confidentiality of respondents in this study, unless and otherwise under mutual agreement between the concerned parties.

In accordance with ethical research practice, you will keep one copy of this consent form in case you want to enquire further about the study. If, in the future, you have any questions or concerns regarding the study and the interview, we welcome you to contact the chair of Includovate's ethics committee Andrea Mrazova (andrea.mrazova@includovate.com), Includovate's study technical lead Kristie Drucza (kristie.drucza@includovate.com) or FASA's project lead from WorldFish Rodrigue Yossa (r.yossa@cgiar.org).

Do you agree to participate in this study?
(Enumerator: If they agree, indicate below that the oral informed consent has been obtained. Then proceed with the question below regarding audio recording. If they decline to be a part of this interview, thank them for their time and cancel the interview.)
☐ Oral informed consent received

Do you agree to be audio recorded?
(Enumerator: If they agree, indicate below. If the participant declines proceed with the interview without recording.)
☐ Consent to audio record interview received

Signature of interviewer: _____Date: _____/_____/_____
Location of respondent:_____
Mode of interview: (e.g. face to face)_____

Survey consent form

Client: WorldFish
Research firm: Includovate
Lead researcher: Dr. Kristie Drucza (kristie.drucza@includovate.com)

We are inviting you to participate in a research study. Participation is completely voluntary. If you agree to participate, you can always change your mind and withdraw. There are no negative consequences, whatever you decide.

What is the purpose of this study?
WorldFish, an international, nonprofit research and innovation organization, has contracted Includovate to conduct a gender and social inclusion assessments because the needs, risks and opportunities associated with the use of novel ingredients are gendered and socially differentiated. These assessments will enable WorldFish to identify such risks and to ensure that women, youths and other marginalized groups are prioritized throughout implementation of the FASA project and ensure the same access to project opportunities as nonmarginalized groups.

Risks
- Well-being: Some questions may be very personal. You can skip any questions you do not want to answer or stop the survey entirely.
- Breach of confidentiality: There is a chance your data could be seen by someone who should not have access to it. We are minimizing this risk in the following ways: (i) all identifying information is removed and replaced with a study ID in the publication of results, (ii) we will store all electronic data on a password-protected, encrypted computer, and (iii) we will keep your identifying information separate from your research data, but we will be able to link it to you.

Possible benefits: Although you may not directly benefit from taking part in this study, the information you provide could help to draw out some conclusions and lessons and to put forward possible recommendations. Therefore, your kind cooperation with honest responses to the questions will be vital for the overall success of the study.

How long will it take? Approximately 60–90 minutes

Cost: None

Compensation: None

Future research: De-identified data (all identifying information removed) may be shared with other researchers at the WorldFish's discretion.

Funding source: WorldFish.

Confidentiality and data security: Data will be extracted without your personal information. No other identifying information will be collected. Demographic questions will only be used for disaggregation and cannot be tracked back to you.

For more information on Includovate's privacy policy see here.

Where will data be stored? The data will be stored on Includovate's server. It will be downloaded without your email and other identifying information and stored on a secure server.

How long will it be kept? The data will be securely kept by WorldFish in its monitoring, evaluation and learning portal.

Who can see the data? We (the researchers) will have access to your responses. We will share our findings in publications or presentations. If we do, the results will be aggregated data with no individual results.

Contact information:
If, in the future, you have any questions or concerns regarding the study and the interview, we welcome you to contact the chair of Includovate's ethics committee Andrea Mrazova (andrea.mrazova@includovate.com), Includovate's study technical lead Kristie Drucza (kristie.drucza@includovate.com) or FASA's project lead from WorldFish Rodrigue Yossa (r.yossa@cgiar.org).

For questions about your rights as a research participant, complaints or problems: Should you wish to make an anonymous complaint, please refer to Includovate's online anonymous complaints process here.

Agreement to participate
If you would like to participate in this study, please select the appropriate responses below:

- I understand that my participation in this research is voluntary, and that I am free to withdraw at any time without consequences.
- I understand that the information I provide will be treated as confidential and any identifying information, such as my name and occupational position will be anonymized.
- I agree to the use of anonymized direct quotes from my survey responses in publications and presentations arising from this research.
- I agree to take part in the survey.

1=Yes 2=No
Completion and submission of the survey is considered your implied consent to participate in this study. Please print this form for your records.

Photo and video consent form

Introduction
Includovate requests for your permission and consent to mention you and/or use your image, video or quotes on our website, printed publications and speaking engagements in connection with our work. If you have any questions, please ask a member of the Includovate team. Thank you.

Consent
I hereby consent to Includovate without expectation of compensation or other remuneration to mention me, use my image, video and/or quote me in a printed publication, speaking engagements and/or on its website and to be used now or in the future for the purpose of external communications, including advertising and marketing as well as posted on the company's social media account(s), including Facebook, Instagram, Twitter, Medium, YouTube and LinkedIn.

I acknowledge that Includovate owns all copyright to materials featuring me. I understand that my image and my story will be stored safely in Includovate's records. This document shall have no bearing on the ownership of any copyrights in these materials between Includovate and any third party. I understand I can withdraw the above consent at any time by advising Includovate in writing via email to info@includovate.com.

I have read and understand this notice, and consent to the collection, use and disclosure of my image, including disclosure to overseas recipients, as outlined.

We prefer to use real names, but if you prefer not to, we will use a pseudonym (fake name) instead.
☐ Please tick here if you would prefer a pseudonym.

This consent is given in perpetuity, and does not require prior approval by me.

Name: **Signature/Thumbprint**:

Date: **Location**:

Name of parent/legal guardian in case of minor:

Annex 2. Risk to participants

Inconvenience: There's a minimum likelihood of any discomfort or inconvenience for the participants. The local researcher will provide prior notice to the participants and seek their availability for the study. The facilitators will also take the initiative to meet the experts at a convenient location of their choice to avoid any inconvenience in movement or safety. The focus group discussion participants will also meet at a known, safe, convenient and communal location.

Safeguarding for young women: Includovate recognizes its duty of care to keep young women safe and is committed to the rights and well-being of young women to ensure that they are treated with dignity and respect. Includovate has a Youth Safeguarding Policy and has ample previous experience working with young women, with robust procedures in place to protect minors throughout all the steps of our data collection. We consistently carry out safety measures to make sure the needs of these groups in society are considered in all that we do. We also have a safeguarding buddy system in place where each project is attached to a buddy to support them throughout the engagement to ensure that we do no harm and that the vulnerable groups are considered and taken care of. Furthermore, we will hold a safeguarding training session with the research team to help them understand and adhere, and cause no harm to the participants, particularly young women.

Discomfort: Although most questions present minimal chance of causing discomfort, it is likely that some respondents may find some questions uncomfortable to answer. To counter this, it will be stressed during the consent process that participants are at liberty to skip any questions they do not wish to answer or to discontinue their participation in the study at any time with no consequences.

Context sensitivity: We will ensure utmost sensitivity to the beliefs, manners and customs of our research participants. The local researchers, including facilitators and notetakers, have been recruited from the countries of study, have conducted research in the regions or districts before, and some have prior work experience with Includovate. So they have lived experience, understanding of and sensitivity to the local and cultural context.

About WorldFish

WorldFish is a leading international research organization working to transform aquatic food systems to reduce hunger, malnutrition, and poverty. It collaborates with international, regional, and national partners to co-develop and deliver scientific innovations, evidence for policy, and knowledge to enable equitable and inclusive impact for millions who depend on fish for their livelihoods. As a member of CGIAR, WorldFish contributes to building a food- and nutrition-secure future and restoring natural resources. Headquartered in Penang, Malaysia, with country offices across Africa, Asia, and the Pacific, WorldFish strives to create resilient and inclusive food systems for shared prosperity.

For more information, please visit www.worldfishcenter.org