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The U.S. Government's Global Hunger & Food Security Initiative

# FishFirst! Zambia: Research for Development and Scaling Staple-Fish Products for Enhanced Nutrition in the First 1,000 Days of Life

## FishFirst! Zambia Phase III (2023): Focus Group Discussion Results Report


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## Project Description and Highlights

Supported by USAID through the Feed the Future Innovation Lab for Fish, FishFirst! Zambia is a joint initiative of researchers at Mississippi State University and WorldFish (which leads the CGIAR initiative on Aquatic Foods). FishFirst! Zambia is focused on research for developing and scaling staple-fish products for enhanced nutrition in the first 1,000 days of life (from conception until age two years). FishFirst! Zambia's goal is to increase the quality and quantity of fish benefitting nutrition and food security in Zambia, particularly for infants and young children (IYC) in the first 1,000 days of life (from conception until age 2 years) and for pregnant and breastfeeding women. A primary outcome of FishFirst! Zambia was development of a novel locally sourced, high-quality dried fish-based protein/micronutrient blend, **Complementary Food for Africa+Dried Fish Powder** (**ComFA+Fish**). Important project outcomes included a nutrient analysis of Kapenta dried fish powder and three sensory panel evaluations of ComFA+Fish-fortified foods. These outcomes are outlined below:

- **Nutrient Analysis** determined that Kapenta dried fish powder is very nutritious. Results are available at https://tinyurl.com/n77x8kwj.
- **ComFA+Fish Sensory Panel I** determined that mothers (*N*=42) found ComFA+Fish Complementary Maize Porridge, ComFA+Fish Chibwabwa Fisashi highly acceptable and that they found ComFA+Fish Bean-Vegetable Soup acceptable. Results are available at https://tinyurl.com/n77x8kwj.
- **ComFA+Fish Sensory Panel II**, wherein mothers (*N*=42) determined that their 6-23 month-olds (*N*=42) found ComFA+Fish Complementary Maize Porridge highly acceptability. Results are available at https://tinyurl.com/n77x8kwj.

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- **ComFA+Fish Sensory Panel III** determined that adults (*N*=40) found ComFA+Fish Plain Instant Porridge highly acceptable and adults (*N*=38) found ComFA+Fish Vanilla Instant Porridge highly acceptable. These results are important as both instant porridges only require hot water to prepare. Results are available at https://tinyurl.com/2sejjudx.

FishFirst! Zambia Phases I–III were implemented in three Southern Province districts in Zambia's Lake Kariba region, including Gwembe, Siavonga, and Sinazongwe. The world's largest artificial lake and reservoir by volume, Lake Kariba is Zambia's primary source of the pelagic small fish known as Kapenta (*Limnothrissa miodon* and *Stolothrissa tanganicae*). As the current study was conducted at Lake Kariba, we used Kapenta dried fish powder sourced from Lake Kariba as the key ingredient of ComFA+Fish. However, it is expected that the nutritional content of a variety of small pelagic fish consumed across Zambia and sub-Saharan Africa—such as Chisense (*Potamothrissa acutirostris* and *Poecilothrissa moeruensis*) and Dagaa (*Rastrineobola argentea*)—would make them suitable for use in ComFA+Fish protein/micronutrient blends.

During Phase I, the FishFirst! Zambia team administered a battery of six survey instruments to a random sample **(*N*=485)** of men and women fishers, processors, and traders at Lake Kariba. The instruments included: 1) our adapted version of the Women Empowerment in Fisheries Index-FishFirst! Zambia (WEFI-FFZ); 2) our adapted version of the Household Hunger Scale II (HHS-II); 3) our novel Post-Harvest Fish Loss Assessment for Smallscale Fisheries (PHFL); 4) the Minimum Dietary Diversity-Women of Reproductive Age Questionnaire (MDD-WRA); 5) the Minimum Dietary Diversity-Infants & Young Child Module (MDD-IYC); and Anthropo-metric Data (weight and height) for 6-23 month-olds.

During Phase II, the FishFirst! Zambia team conducted six activities/trainings. Details include:
- **Nutrition Training (*N*=66):** Components of this fish-focused 3-hour interactive training included: 1) nutrition concepts and importance of nutrition in the First 1,000 Days of Life; 2) serving sizes for infants; 3) Kapenta dried fish powder's nutritional benefits; 4) home-production and use of Kapenta dried fish powder; 5) Water, Sanitation and Hygiene (WASH); 6) UNICEF video, "What to Feed Your Young Child," which we translated into Tonga and is available at http://sendanywhe.re/90I5KALP.
- **ComFA+Fish Cooking Demo/Kapenta Nutrition Training (*N*=66):** We conducted one cooking demo/Kapenta nutrition training that: 1) showcased four ComFA+Fish dishes (see below); 2) focused on Kapenta dried fish powder's benefits; and 3) featured using dried fish powder and other local ingredients (e.g., groundnut powder) to make the four ComFA+Fish dishes. These dishes included: 1) ComFA+Fish Complementary Maize Porridge; 2) ComFA+Fish Chibwabwa Fisashi; 3) ComFA+Fish Kapenta Chutney; and 4) ComFA+Fish Bean-Vegetable Soup. This activity focused on dishes suitable for IYC and for household consumption. Participants were recruited from the Districts of Gwembe, Siavonga, and Sinazongwe and included the following three groups: 1) Mothers/Community Health Workers; 2) Entrepreneurs/Business Owners; and 3) Government Officials (e.g., District-Level Ministry of Health personnel, Department of Fisheries and Livestock personnel, and governmental personnel).
- **ComFA+Fish Microenterprise/Entrepreneur Training (*N*=77):** The training: 1) promoted microenterprises/income-generation through producing/selling ComFA+Fish-fortified foods; 2) showcased ComFA+Fish Cassava Bites and ComFA+Fish Nutri-Biscuits

for producing/selling at local markets and for household consumption; 3) focused on Kapenta dried fish powder's benefits; and 4) featured using dried fish powder and other local ingredients (e.g., cassava flour) to make the dishes. Participants include individuals who had participated in the ComFA+Fish Cooking Demo/Kapenta Nutrition Training, including: 1) Mothers/Community Health Workers; 2) Entrepreneurs/Business Owners; and 3) Government Officials.

- **ComFA+Fish Sensory Panel I (*N*=42):** Participants included women ages 18-49 years who were mothers of 6-23 month-olds evaluated the acceptability of four ComFA+Fish dishes for household consumption: 1) ComFA+Fish Complementary Maize Porridge; 2) ComFA+Fish Chibwabwa Fisashi; 3) ComFA+Fish Kapenta Chutney; and 4) ComFA+Fish Bean-Vegetable Soup. Women were recruited from the Districts of Gwembe (*n*=14), Siavonga (*n*=14), and Sinazongwe (*n*=14). The Sensory Panel I results are available at https://tinyurl.com/n77x8kwj.
- **ComFA+Fish Sensory Panel II (*N*=84):** Participants included the same group of mothers as above (*n*=42), plus their 6-23-month-olds (*n*=42). Mothers evaluated whether their IYC found ComFA+Fish Complementary Maize Porridge acceptable. The Sensory Panel II results are available at https://tinyurl.com/n77x8kwj.
- **Kapenta Dried Fish Powder—Sampling and Nutrient Analysis:** We collected four samples of whole dried Kapenta sourced from Lake Kariba from four separate smallscale vendors at open markets in Lusaka. Each sample weighed a minimum of 0.5 kg and was inspected for wholesomeness (i.e., no degradation associated with spoilage). Emulating the traditional process used in Zambian home kitchens, each sample was roasted and the four samples were combined into one 2-kg sample. This sample was ground into Kapenta dried fish powder by a smallscale miller at an open market, shipped to the U.S., and distributed to two accredited commercial labs for nutrient analysis, including Mérieux NutriSciences and the Mississippi State Chemical Laboratory. The nutrient analysis results are available at https://tinyurl.com/n77x8kwj.

During Phase III, we conducted the FishFirst! Zambia Learning Event and Workshop, in which attendees participated in: 1) Learning Event 1(ComFA+Fish Sensory Panels I-II Results); 2) Learning Event 2 (Household Hunger Scale II Results: Fisher Families and Food Insecurity); 3) Learning Event 3 (Scaling Readiness Assessment for ComFA+Fish Instant Porridges); 4) ComFA+Fish Recipe Booklet Launch (drafts of English- and Tonga-versions); 5) Focus Group Discussions among: i) Mothers/Community Health Workers (CHW); ii) Entrepreneurs/ Business Owners; and iii) Government Officials; 6) ComFA+Fish Scaling Readiness Assessment among: i) Mothers/CHW, and ii) Entrepreneurs/Government Officials); and 7) Sensory Panel III evaluations of: i) ComFA+Fish plain instant porridge (*N*=40) and ii) ComFA+Fish vanilla instant porridge (N=38). These two ComFA+Fish instant porridges were developed in collaboration with Sylva Food Solutions, a multisectoral Zambian enterprise that produces, brands, markets, and exports prepackaged foods for African and European markets. The FGD results are presented in this document. The Sensory Panel III results are available at https://tinyurl.com/2sejjudx.

## Data Description

This qualitative data is based on a Focus Group Discussions (FGD) conducted in June 2023 as part of the FishFirst! Zambia's Phase III Learning Event and Workshop. The purpose of the FGD

was to gather feedback from diverse stakeholders on the use of dried fish powder and Complementary Food for Africa+Dried Fish Powder (ComFA+Fish) products/recipes to enhance nutrition for IYC and other household members (e.g., adolescents, adults, elders). The FGD participants (N=28) were drawn from three districts in Zambia's Lake Kariba region, including Gwembe (n=6), Siavonga (n=16) and Sinazongwe (n=6), which are located in the Southern Province. All participants provided consent at the beginning of the discussions and identifiers were not collected.

## FGD Participant Description and Objectives

Participants were divided into three groups that included:1) mothers and community health workers, 2) entrepreneurs/business owners, and 3) government officials.

- **Mothers and Community Health Workers (Mothers/CHW):** This group included eight mothers and community health workers (CHW) recruited from the study's three districts. All eight Mothers/CHW who participated in this FGD—which was conducted during FishFirst! Zambia Phase III (2023)—had participated in FishFirst! Zambia Phase II (2022), including the three-hour interactive Nutrition Training (held at Freshview Hotel) and ComFA+Fish Cooking Demo/Kapenta Nutrition Training (held at Indaba Pub & Grill).
- **Entrepreneurs/Business Owners (Entrepreneurs):** The group included five entrepreneurs/businesses owners recruited from the study's three districts. Three of the five Entrepreneurs who participated in this FGD—which was conducted during FishFirst! Zambia Phase III (2023)—had participated in FishFirst! Zambia Phase II (2022), including the three-hour interactive Nutrition Training (held at Freshview Hotel) and ComFA+Fish Cooking Demo/Kapenta Nutrition Training (held at Indaba Pub & Grill).
- **Government Officials:** This group included thirteen District-Level Ministry of Health personnel, Department of Fisheries and Livestock personnel, and other governmental personnel recruited from the study's three districts. Eight of the thirteen Government Officials who participated in this FGD—which was conducted during FishFirst! Zambia Phase III (2023)—had participated in FishFirst! Zambia Phase II (2022), including the three-hour interactive Nutrition Training (held at Freshview Hotel) and ComFA+Fish Cooking Demo/Kapenta Nutrition Training (held at Indaba Pub & Grill).

| Participant Category | Objectives |
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| Mothers and Community Health Workers (Mothers/CHW) | ▪ Collect data among Mothers/CHW on perceptions of dried fish powder for child and household nutrition.<br>▪ Collect data among Mothers/CHW on experiences using dried fish powder for home use in children's and household's regular meals.<br>▪ Collect data among Mothers/CHW on how useful dried fish powder is (or has the potential to become) in terms of regular use to fortify IYC's complementary foods and to fortify the regular meals of other household members. |
| Entrepreneurs/Business Owners (Entrepreneurs) | ▪ Collect data among Entrepreneurs on experiences marketing fish-based protein/micronutrient blends such as ComFA+Fish.<br>▪ Collect data among Entrepreneurs on potential profitability of ComFA+Fish. |

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| | ▪ Collect data among Entrepreneurs on challenges of developing and marketing ComFA+Fish. |
| Government Officials | ▪ Collect data among Government Officials on national-, local-, and agency-level priorities related to IYC nutrition.<br>▪ Collect data among Government Officials on how government agencies can support nutrition initiatives such as ComFA+Fish. |

# FGD Results – Executive Summary

**FGD 1 Summary: Mothers/Community Health Workers (CHW) (*N*=8)**

Child nutrition practices are highly gendered in rural Zambian communities and Mothers/ CHW play important roles in promoting nutrition at the community- and household-levels. As stated above, all eight Mothers/CHW reported that participating in FishFirst! Zambia Phase II (2022)—which included the three-hour interactive Nutrition Training (held at Freshview Hotel) and ComFA+Fish Cooking Demo/Kapenta Nutrition Training (held at Indaba Pub & Grill)—increased their knowledge of the nutritional benefits of local foods in their community, particularly Kapenta dried fish powder, groundnut, and dark green leafy vegetables (DGLV) such as pumpkin leaves. They emphasized the need for continued community-level initiatives/ programs that underscore the importance of consuming Kapenta to increase IYC nutrition, particularly when combined with other nutrient-dense locally sourced foods. In 2023, which was a year after FishFirst! Zambia Phase II was implemented in 2022, the Mothers/CHW reported continued production of three of the four ComFA+Fish dishes for their IYC and other household members, which indicates a high potential for successful adoption and scaling. These dishes included: 1) ComFA+Fish Complementary Maize Porridge; 2) ComFA+Fish Chibwabwa Fisashi; and 3) ComFA+Fish Kapenta Chutney. The continued production of these ComFA+Fish dishes in 2023—a year after the recipes where showcased in 2022—suggests a level of trust in the quality and effectiveness of ComFA+Fish in providing essential protein and micronutrients for optimizing IYC's growth and cognitive development, as well as high acceptability of the dishes among IYC and other household members.

**FGD 2 Summary: Entrepreneurs/Business Owners (*N*=5)**

As stated above, three of the five Entrepreneurs who participated in this FGD—which was conducted during FishFirst! Zambia Phase III (2023)—had participated in FishFirst! Zambia Phase II (2022), including the three-hour interactive Nutrition Training (held at Freshview Hotel) and ComFA+Fish Cooking Demo/Kapenta Nutrition Training (held at Indaba Pub & Grill). This group of participants were keenly aware that local entrepreneurs/businesses can play a vital role in promoting and strengthening sustainable nutrition interventions in hard-to-reach areas and among vulnerable populations. Overall, the entrepreneurs reported an optimistic outlook towards the scaling of ComFA+Fish. The participants highlighted several factors that made ComFA+Fish an appealing investment: 1) As a new product in the local market, ComFA+Fish presents an opportunity for entrepreneurs to establish their presence and gain a competitive advantage; 2) ComFA+Fish has a wide target market—including IYC, older children and adolescents, pregnant and breastfeeding women, adults, and elders—which can serve to expand entrepreneurs' customer base and market reach; 3) The high nutritional value of ComFA+Fish makes it attractive to consumers seeking nutritional food options, thereby offering a compelling selling point for entrepreneurs.

**FGD 3 Summary: Government Officials (*N*=13)**

This group of participants included district-level Ministry of Health personnel, Department of Fisheries and Livestock personnel, and governmental personnel, which are collectively referred to as Government Officials. As state above, eight of the thirteen Government Officials who participated in this FGD—which was conducted during FishFirst! Zambia Phase III (2023)—had participated in FishFirst! Zambia Phase II (2022), including the three-hour interactive Nutrition Training (held at Freshview Hotel) and ComFA+Fish Cooking Demo/Kapenta Nutrition Training (held at Indaba Pub & Grill). These Government Officials—particularly from agencies such as the Ministry of Health and Department of Fisheries and Livestock—were keenly aware that their organizations are key partners in bringing sustainable health and wellbeing outcomes to the rural and resource-limited communities they serve. These participants emphasized a number of nutritional barriers that they regularly encountered, including: 1) Inconsistent supply of Ready-to-Use Therapeutic Foods (RUTF) for treating severe malnutrition in IYC; 2) Delays in referrals of IYC for timely malnutrition treatment; 3) Deficits in local fish production; and 4) Lack of regular consumption of pelagic small fish among vulnerable households, including among resource-limited Lake Kariba fishing families who may feel compelled by economic concerns to sell their entire Kapenta catch. Government Officials reported that ComFA+Fish should easily garner support from governmental agencies because of its appealing characteristics, including: 1) ComFA+Fish has cost-effectiveness, as it is an affordable yet high-quality animal source protein; 2) Ease of integration of ComFA+Fish into traditional Zambian dishes such as complementary maize porridge and chibwabwa fisashi); and 3) Pre-existing high acceptability among local communities of dried fish powder—which is the key ingredient of ComFA+Fish protein/micronutrient blends. Thinking long-term, Government Officials highlighted existing government infrastructures and resources that can be leveraged to support the promotion and scaling of ComFA+Fish. This includes: 1) Utilizing existing network of **Community Health Workers** to educate and raise awareness about the nutritional benefits of ComFA+Fish in their local communities; 2) Incorporating ComFA+Fish into government initiatives such as the **Outpatient Community Referral Initiative**; 3) Integrating information about ComFA+Fish into routine "growth monitoring sessions" at **Growth Promotion Centers** and other health facilities, and 4) Incorporating ComFA+Fish into government initiatives such as **school feeding programs**. This positive feedback from Government Officials highlights the potential for buy-in from key governmental agencies of ComFA+Fish to address the nutritional needs of resource-limited populations, including vulnerable IYC.

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## Abbreviations and Acronyms

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| CHW | Community Health Workers |
| ComFA+Fish | Complementary Food for Africa+Dried Fish Powder |
| DGLV | Dark green leafy vegetables |
| FDA | Food and Drug Administration |
| FGD | Focus Group Discussions |
| IYC | Infants and Young Children |
| RUTF | Ready-to-Use Therapeutic Foods |
| USAID | United States Agency for International Development |
| WASH | Water, Sanitation, and Hygiene |

**FishFirst! Zambia Phase III (June 2023)**
**Complementary Food for Africa+Dried Fish Powder (ComFA+Fish) Focus Group Discussion Results**
**Site: Siavonga Town, Lake Kariba**

# Mothers and Community Health Workers (N=8)

| Question | Direct Quotes/Paraphases | Key Results |
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| **Mothers/CHW – Section 1: Nutrition Priorities** | | |
| 1. How important is it for you as a mother to provide nutritious food for your children on a regular basis?<br>a. Why is it important to you? (PROBE for any anticipated adverse effects of poor nutrition for children) | – **Mothers/CHW:** "Nutritious food are very important since this makes our children grow healthy and not suffer from malnutrition and other diseases." | a) Mothers/CHW expressed that it is very important to them to provide nutritious food for their IYC on a regular basis. They mentioned that providing nutritious food helps their children grow healthy and reduces the risk of malnutrition and other diseases.<br>b) Mothers/CHW are aware of the adverse effects of poor nutrition on children, including stunted growth, cognitive impairment, and increased susceptibility to infection and illness. |
| 2. Do you feel that most children in <u>your village</u> receive an adequate amount of nutritious food on a regular basis?<br>a. Why or why not? | – **A Mother/CHW:** "Yes, because we have learnt about nutrition. We were trained on the importance of nutritious foods for our children. And we have moved on to train others in our communities."<br>– **She continued:** "On the other hand, there are still a lot of children still not receiving adequate nutritious foods, since we have not yet managed to reach out to many other women [in our communities."]."<br>– **A Mother/CHW:** "In some cases, some mothers are just too busy to prepare and feed their children nutritious food, even when it's available. Others are too busy; Like working mothers and marketeers who end up leaving their children in the care of nannies and older siblings, who may not feed children correct and adequate foods." | a) **Nutrition Awareness and Capacity Development:** Mothers/CHW reported that they received trainings* on the importance of nutritious foods for IYC during FishFirst! Zambia Phase II (2022). They also discussed their ongoing efforts by to disseminate the knowledge and skills from the 2022 Phase II ComFA+Fish training activities to educate other caregivers on the importance of IYC nutrition and how IYC nutrition can be supported using locally available nutrient-dense foods.<br>b) **Limited Reach:** Mothers/CHW reported that—despite efforts to train and raise awareness—many IYC in their communities are not receiving adequate amounts of nutritious foods. Mothers/CHW acknowledged that they have not been able to reach a large number of women in their communities, which indicates the need for further education/training to ensure more mothers can attend training and more IYC benefit from nutritious diets.<br>c) **Barriers to Optimal IYC Nutrition:** Mothers/CHW highlighted two main barriers to providing nutritious foods to IYC.<br>i. Firstly, the extreme time poverty** of resource-limited women in their communities is a barrier to producing nutritious meals for IYC as mothers often lack the time to hand-process local ingredients during the complementary feeding stage. For example, to grind dried Kapenta into a fine powder by hand: 1) is labor- and time-intensive, 2) entails using a mortar and |

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| | | pestle and repeated sieving to produce a uniformly fine powder, and 3) produces small batches.<br>ii. Secondly, mothers engaged in income-generating activities conducted beyond the homestead (e.g., as market sellers) must rely on their older children or nannies for IYC care, and such caregivers may lack sufficient IYC nutrition/feeding knowledge.<br>d) Mothers/CHW feedback highlights their ongoing efforts to spread information and skills on IYC nutrition to other mothers in their communities, while also acknowledging some of caregivers' existing challenges to providing optimal IYC nutrition.<br>*__Note:__ Phase II trainings the Mothers/CHW received included: 1) Fish-focused Nutrition Training (held at Fairview Hotel); 2) ComFA+Fish Cooking Demo/Kapenta Nutrition Training (held at Indaba Pub & Grill); and 3) ComFA+Fish Microenterprise/Entrepreneur Training (held at Indaba Pub & Grill).<br>**__Note:__ The extreme time poverty of resource-limited women across sub-Saharan Africa is well-documented. |
| 3. Which foods do you think are the most important foods you can provide for your children? (PROBE: Why? (PROBE for micronutrients) | – **Mothers/CHW:** "Kapenta and other fishes like Tilapia, groundnuts, and dark green leafy vegetables." | a) Mothers/CHW highlights the importance of specific nutritious foods, including Kapenta, Tilapia, groundnuts, and dark green leafy vegetables (DGLV). These locally available foods are recognized for their nutritional value and are commonly recommended among mothers/CHV to improve the nutritional content of IYC's diets. |
| 4. What challenges do you face trying to provide nutritious food for your children on a regular basis?<br>a. What are the reasons for these challenges? | – Some caregivers lack/have limited knowledge and skills related to nutrition and how to prepare nutritious meals.<br>– Some caregivers lack/have limited access to nutritious foods due to poverty and vulnerability to food insecurity.<br>– Some caregivers lack/have limited access to nutritious foods during certain periods of the year when some nutritious seasonal foods—such as sweet potatoes—become scarce and/or unaffordable for vulnerable households. | Mothers/CHW identified three barriers to optimizing IYC nutrition.<br>a) **Knowledge and Skills:** Mothers/CHW noted that some caregivers continue to lack or have limited knowledge and skills related to IYC nutrition and how to prepare nutritious complementary foods. This indicates the need for continued education/training to enhance understanding and practical skills that optimize IYC nutrition.<br>b) **Economic Challenges:** Some caregivers face economic challenges in accessing nutritious foods for IYC. Poverty-related factors such as food insecurity and limited resources contribute to less access to a variety of nutritious foods that can help optimize IYC nutrition.<br>c) **Seasonal Availability:** Mothers/CHW stressed that there is limited access to nutritious foods during specific periods of the year, particularly for seasonal foods such as sweet potatoes. This highlights the **importance of considering seasonal variations in food availability** and implementing strategies to ensure a year-round supply of diverse and nutritious options in rural communities. |

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| 5. What resources would help you provide nutritious food for your children on a regular basis? | – **Mothers/CHW:** "Information packs with nutrition messages."<br>– **Mothers/CHW:** "More capacity building efforts."<br>– **Mothers/CHW:** "Start-up capital to invest in farming and purchasing of fishing nets and other fishing equipment."—particularly targeting women.<br>– **Mothers/CHW:** "Fish powders with other ingredients." | Mothers/CHW suggest possible intervention to improve nutrition for children.<br>a) **Nutrition-Focused Information Packets/Brochures:** Providing information packets/brochures that contain educational materials and nutrition messages can help increase knowledge and awareness about healthy eating habits and the importance of dietary diversity.<br>b) **Increased Capacity Development Efforts:** Mothers/CHW called for more investment in capacity building to enhance the skills and knowledge base of caregivers related to food preparation, particularly food safety and handing, to ensure nutritious meals are prepared and consumed.<br>c) **Start-up Capital for Farming and Fishing:** Providing financial support for Mothers/CHW interested in fish farming can facilitate increased production of fish-based nutritious foods and making them more accessible to communities.<br>d) **Dried fish powder combined with other ingredients:** Introducing innovative products like dried fish powder and other nutritious ingredients can offer convenient and affordable alternatives to incorporate essential nutrients into meals, especially in areas where access to fresh fish may be limited. |
| 6. Are you currently using any nutrition supplements for your children? | – **Mothers/CHW:** "Fish powders with other ingredients." | a) All Mothers/CHW reported using ""[f]ish powders with other ingredients" as complementary food for their IYC. The consistent use of dried fish powder and other fish-based products can play a vital role in providing bioavailable micronutrients to enhance nutritional outcomes for IYC.<br>b) Although the sample is small, Mothers/CHWs' reported enthusiasm for ComFA+Fish, reported its initial adoption, and reported its continued regular use. These reports suggest that ComFA+Fish adoption and scaling at the community level holds promise, given that Mothers/CHW reported that they have continued regular use of "[f]ish powder with other ingredients" in the foods they prepare for IYC and other household members. |
| 7. Are you currently using a FISH-BASED protein/micronutrient blend similar to ComFA+Fish for your children? | – **No Mother/CHW** reported using any products other than "[f]ish powders with other ingredients." | a) Mothers/CHW reported using ComFA+Fish products as the exclusive complementary food for their children. This indicates that Mothers/CHW found ComFA+Fish acceptable and suitable for meeting their children's nutritional needs.<br>b) By relying exclusively on ComFA+Fish products for their children during the complementary feeding stage, Mothers/CHW are demonstrating their trust in the product's quality and effectiveness in |

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| | | providing essential protein and nutrients for their children's growth and development during the complementary feeding stage. |
| **Mothers/CHW – Section 2: Adoption of ComFA+Fish Recipes & Nutrition Training** | | |
| 8. After attending the Nutrition Training (Freshview Hotel) and ComFA+Fish Cooking Demo/Kapenta Nutrition Training (Indaba Pub & Grill) last JUNE:<br>– Do you know how to make dried fish powder in your home that you can add to children's weaning porridge and other dishes? | – **Mothers/CHW** reported : "Yes, since we were trained [during these events]." | a) Mothers/CHW reported that they now know how to make dried fish powder at home, suggesting that they have acquired the necessary knowledge and skills to prepare dried fish powder and incorporate it into their children's foods.<br>b) This demonstrates Mothers/CHWs' ability to enhance the nutrition of their children's food by producing dried fish powder at the household-level. Mothers/CHW ability to use locally available foods to prepare ComFA+Fish is essential to minimizing economic barriers to adequate child nutrition, particularly among resource-limited caregivers in rural and remote communities. |
| 9. After attending the Nutrition Training (Freshview Hotel) and ComFA+Fish Cooking Demo/Kapenta Nutrition Training (Indaba Pub & Grill) last JUNE:<br>– Do you know how to make ComFA+Fish protein/ micronutrient blends in your home by combining dried fish powder with other local ingredients, such as powdered pumpkin leaves and powdered mushrooms? | – **Mothers/CHW**: "Yes, we know now!" | a) Feedback from Mothers/CHW suggests that – while some of these participants were somewhat familiar with dried fish powder prior to the two ComFA+Fish training activities – many of these participants:<br>i. Did not know how to produce dried fish powder themselves.<br>ii. Did not know how to combine dried fish powder with other nutrient-dense local ingredients to produce ComFA+Fish protein/micronutrient blends to add to traditional dishes regularly consumed by their children and other household members.<br>b) Mothers/CHW reported that – after participating in the two ComFA+Fish training activities – "we know now" the process of making ComFA+Fish blends at home by combining dried fish powder with a variety of other nutrient-dense local ingredients, including groundnut powder, soya flour, pumpkin leaves (fresh, dried, or powdered) or other dark green leafy vegetables (DGLV), and powdered mushrooms. |
| 10. **On Day 1 of the Cooking/Nutrition Demo (Indaba Pub & Grill) last JUNE:** We made four ComFA+Fish dishes for you: 1) Fortified Chibwabwa Fisashi, 2) Kapenta Chutney, 3) Fortified Maize Porridge, and 4) Fortified Bean-Vegetable Soup.<br>– **On Day 2, we made two ComFA+Fish dishes for you:** | – **Mothers/CHW:** "Yes, we did." | Yes. |

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| 1) Fortified Cassava Bites and 2) Fortified Nutri-Biscuits. After attending these cooking demonstrations:<br>– Did you make any of the six dishes for your children / family?<br>– YES (N=8) | | |
| 11. If YES, which of the six dishes did you make for your children / family at least once? (Show of hands _: | – ComFA+Fish Complementary Maize Porridge (N=8)<br>– ComFA+Fish Chibwabwa Fisashi (N=8)<br>– ComFA+Fish Kapenta Chutney (N=8)<br>– ComFA+Fish Bean-Vegetable Soup (n=1)<br>– ComFA+Fish Cassava Bites (n=1)<br>– ComFA+Fish Nutri-Biscuits (n=0) | a) All Mothers/CHW produced three of the four dishes showcased during the **Phase II ComFA+Fish Cooking Demo/Kapenta Nutrition Training** (2022), and one produced the fourth dish. These dishes* included:<br>i. ComFA+Fish Complementary Maize Porridge (N=8)<br>ii. ComFA+Fish Chibwabwa Fisashi (N=8)<br>iii. ComFA+Fish Kapenta Chutney (N=8)<br>iv. ComFA+Fish Bean-Vegetable Soup (N=1)<br>b) One Mother/CHW reported that she produced one of the two "snack foods" showcased during the **Phase II ComFA+Fish Microenterprise/Entrepreneur Training** (2022). These dishes included:<br>i. ComFA+Fish Cassava Bites (n=1)<br>ii. ComFA+Fish Nutri-Biscuits (n=0)<br>c) Reasons behind these outcome warrant further exploration.<br>***Note:** The four dishes were evaluated during ComFA+Fish Sensory Panels I-II (2022) and results are available at https://tinyurl.com/n77x8kwj |
| 12. If YES, which of the six dishes have you continued to make for your children/family on a regular basis? | – ComFA+Fish Complementary Maize Porridge (N=8)<br>– ComFA+Fish Chibwabwa Fisashi (N=8)<br>– ComFA+Fish Kapenta Chutney (N=8)<br>– ComFA+Fish Bean-Vegetable Soup (n=1)<br>– ComFA+Fish Cassava Bites (n=0)<br>– ComFA+Fish Nutri-Biscuits (n=0) | a) All Mothers/CHW reported that they continued to regularly make three of the four dishes showcased during the **Phase II ComFA+Fish Cooking Demo/Kapenta Nutrition Training** (2022), and one regularly made the fourth dish, as follows:<br>i. ComFA+Fish Complementary Maize Porridge (N=8)<br>ii. ComFA+Fish Chibwabwa Fisashi (N=8)<br>iii. ComFA+Fish Kapenta Chutney (N=8)<br>iv. ComFA+Fish Bean-Vegetable Soup (N=1)<br>b) The regular adoption of three of the four dishes suggests that: 1) these recipes were well-received by the participants' IYC and other household members; and 2) participants recognized the nutritional benefits of these dishes for their IYC and other household members. **The high acceptability of these dishes suggest they should be prioritized for scaling efforts.** The ComFA+Fish Bean- |

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| | | Vegetable Soup recipe will need to be modified in order to increase adoption.<br>c) The Mother/CHW who produced one of the two "snack foods" showcased during the **Phase II ComFA+Fish Microenterprise/ Entrepreneur Training** (2022) did not continue to regularly make this food. The snack foods included:<br>i. ComFA+Fish Cassava Bites (n=0)<br>ii. ComFA+Fish Nutri-Biscuits (n=0)<br>d) Reasons behind the snack foods' outcomes warrant further exploration, as this sample of eight women may be involved in other income-generating activities and/or may not view these snack foods as locally marketable, etc. |
| 13. If YES: For each dish: Did you adapt/change the dish's ingredients in any way?<br>14. How did you adapt/change the recipe<br>15. Why did you adapt/change the recipe? | **ComFA+Fish Complementary Maize Porridge**<br>– Modification: Substituted Tilapia dried fish powder for Kapenta dried fish powder.<br>– Reason: Unavailability and/or to accommodate allergies to Kapenta.<br>**ComFA+Fish Chibwabwa Fisashi**<br>– Modification: Substituted Tilapia dried fish powder for Kapenta dried fish powder.<br>– Reason: Unavailability and/or to accommodate allergies to Kapenta.<br>– Modification: Other DGLV were substituted for pumpkin leaves.<br>– Reason: Seasonal unavailability of pumpkin leaves and/or taste preference for other DGLV.<br>**ComFA+Fish Kapenta Chutney**<br>– Modification: Substituted groundnut powder for the oil.<br>– Reason: Unavailability and/or taste preference.<br>– Modification: Omitted the garlic and/or curry powder.<br>– Reason: Unavailability and/or taste preference. | a) Mothers/CHWs' feedback suggest they adapted the ComFA+Fish recipes to reflect local ingredient availability and/or the taste preferences, etc., of their IYC and other household members. Their modifications reflect Mothers/CHWs' capacity and resourcefulness in utilizing available ingredients, accommodating allergies, and personalizing the recipes to suit their preferences and circumstances.<br>b) **ComFA+Fish Complementary Maize Porridge:** Mothers/CHW adapted the recipe by substituting Tilapia dried fish powder for Kapenta dried fish powder due to ingredient unavailability and/or to accommodate allergies to Kapenta.<br>c) **ComFA+Fish Chibwabwa Fisashi:** Mothers/CHW adapted the recipe by substituting Tilapia dried fish powder for Kapenta dried fish powder due to ingredient unavailability and/or to accommodate allergies to Kapenta. They substituted other DGLV for pumpkin leaves due to seasonal unavailability and/or taste preference for other DGLV.<br>d) **ComFA+Fish Kapenta Chutney:** Mothers/CHW adapted the recipe by substituting groundnut powder for the oil and omitting the garlic and/or curry powder due to ingredient unavailability and/or taste preference.<br>e) **ComFA+Fish Bean-Vegetable Soup:** One Mother/CHW adapted the recipe by omitting the garlic, adding a small amount of sugar to the recipe, and adding water or broth to thin the soup due to taste and texture preferences.<br>f) **ComFA+Fish Cassava Bites:** One Mother/CHW adapted the recipe by substituting maize meal for cassava flour due to ingredient unavailability. She reported that maize meal was readily available and served as a suitable alternative. |

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| | **ComFA+Fish Bean-Vegetable Soup**<br>– Modification: Omitted the garlic, added bit of sugar.<br>– Reason: Taste preference.<br>– Modification: Added water or broth to "make the soup lighter [thinner]."<br>– Reason: Texture preference.<br>**ComFA+Fish Cassava Bites**<br>– Modification: Replaced cassava flour with maize meal.<br>– Reason: Unavailability, as "Cassava is not readily available in our communities, but maize meal is available."<br>**ComFA+Fish Nutri-Biscuits**<br>– Modification: None noted.<br>– Reason: Was not applicable to them. | g) **ComFA+Fish Nutri-Biscuits:** According to Mothers/CHW, this dish was not applicable to them and, therefore, the recipe was not replicated or modified. |
| 16. Would additional cooking demonstrations make you more likely to use dried fish powder to fortify dishes you make on a regular basis? Why or why not? | – **Mothers/CHW**: "Yes, additional cooking demonstrations would be helpful, since they will act as reminders and add emphasis on the value of using dried fish powder and how to prepare the dishes." | a) Mothers/CHW reported that additional **ComFA+Fish Cooking Demo/Kapenta Nutrition Training** would make them more likely to use dried fish powder to fortify the dishes that they regularly make for IYC and other household members. They believe that these demonstrations would serve as reminders and reinforce the value of using dried fish powder in their cooking.<br>b) Additional **ComFA+Fish Cooking Demo/Kapenta Nutrition Trainings** would provide further guidance on how to effectively incorporate dried fish powder into various dishes, ensuring that Mothers/CHW prepare the dishes correctly and in such a way as to derive maximum nutritional benefits from regularly using dried fish powder to fortify foods for IYC and other household members.<br>c) Mothers/CHW see the value in receiving continuous reminders and reinforcement through **ComFA+Fish Cooking Demo/Kapenta Nutrition Trainings**, as such trainings would enhance their knowledge and skills in utilizing dried fish powder, ultimately leading to increased usage in their regular cooking routines. |
| 17. How helpful was the training on dried fish powder in helping you integrate dried fish powder into dishes you can make, especially for | – **Mothers/CHW**: "The training on dried fish powder has provided knowledge and skills regarding high levels of nutrients contained in fish—especially Kapenta and other | a) Mothers/CHW found the training on dried fish powder very helpful as it provided valuable new knowledge on the high nutritional value of fish, particularly small pelagics like Kapenta caught in Lake Kariba. |

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| children? (PROBE for new skills or knowledge) | small fish—and skills on how to prepare the powder and nutritious dishes for our children and families." | b) They gained essential knowledge and skills on how to prepare dried fish powder and incorporate it into nutritious dishes for IYC and other household members.<br>c) They appreciated the new knowledge and skills acquired through the training, as it has empowered them to provide healthier and more nutritious meals for IYC and other household members. |
| 18. Did you incorporate any of the knowledge or skills from last year's nutrition cooking demonstration into your family's diet?<br>– YES (N=8): what knowledge or skills did you incorporate? | – **All Mothers/CHW** replied: "Yes."<br>– **Mothers/CHW:** "Adding fish powder to a number of regular dishes." | a) Mothers/CHW responded affirmatively. The combined responses to Q10 and QII indicate that the Mothers/CHW had applied the knowledge and skills gleaned from the three **FishFirst! Zambia Phase II** nutrition-related activities into their family's diets. These three activities included:<br>i. Fish-Focused Nutrition Training (3-hours; interactive)<br>ii. ComFA+Fish Cooking Demo I + Kapenta Nutrition Training<br>iii. ComFA+Fish Cooking Demo II + Kapenta Nutrition Training<br>b) These responses suggest that Mothers/CHW actively implemented the knowledge and skills they acquired during the three nutrition-related activities they participated in during FishFirst! Zambia Phase II (see above), which can potentially result in nutritional improvements in the meals of IYC and other household members. |
| 19. If YES, can you share any specific changes you have made to your children or household diet as a result of the nutrition training? | – **Mothers/CHW:** "Integrating fish powder in maize meal porridge and in vegetables." | Mothers/CHW shared specific changes they have made to the diets of their IYC and other household members as a result of the Cooking Demo/Nutrition Training (2022), including:<br>a) **Integrating dried fish powder into IYC's complementary maize porridge:** Mothers/CHW reported that they now incorporate dried fish powder into IYC's maize meal porridge in order to enrich it with essential nutrients in pelagic small fish.<br>b) **Integrating dried fish powder into vegetable-based dishes:** Mothers/CHW also reported that they now incorporate dried fish powder into their vegetable dishes (e.g., chibwabwa fisashi).<br>c) These specific changes reflect Mothers/CHWs' active application of the knowledge and skills gained from the cooking demo/nutrition trainings. By integrating dried fish powder into staple foods like IYC's complementary maize porridge and vegetables dishes, they have taken steps to improve the nutritional quality of the diets of IYC and other household members. |
| 20. Would additional nutritional training make you more likely to use the knowledge or skills on a regular basis? Why or why not? | – **Mothers/CHW:** "It will remind and encourage us to continue preparing nutritious foods for our families." | a) Mothers/CHW expressed that additional nutritional training would make them more likely to continue to use the knowledge and skills on a regular basis. They believe that such training would serve as a reminder and encouragement to continue preparing nutritious fish-based foods for IYC and other household members. |

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| | | b) Mothers/CHW recognized the value of continuous learning and are motivated to apply their knowledge and skills consistently to ensure the health/well-being of their IYC and other household members. |
| 21. Have you shared the knowledge or skilled gain from the nutritional training with others – such as a family member, a business, or other community members.<br>– YES (N=8): What knowledge or skilled did you share?<br>– YES (N=8): Why did you choose to share that knowledge or skill? | – **Mothers/CHW:** "Yes, we did." Shared with: Family members (N=8); community members (N=8); business owners (n=4).<br>– **Mothers/CHW:** "Nutrition messages, WASH, nutritious fish-based dishes and how to prepare them."<br>– **Mothers/CHW:** "Because we needed them [others] to also benefit from the good news and begin implementing [the knowledge from the nutritional training]." | a) Mothers/CHW reported sharing the knowledge and skills gained from the three **FishFirst! Zambia Phase II** (2022) nutrition-related activities (see Q11) with family members, community members, and business people. Specifically, they shared knowledge and skills related to nutrition messaging, WASH (Water, Sanitation, and Hygiene), nutritious fish-based dishes, and recipe preparation.*<br>b) Mothers/CHW reported that it was important to sharing their new knowledge/skills as they wanted others to benefit from the information they received and begin implementing healthier practices in their own daily lives. An example was WASH information on the importance of hand-washing as key times (e.g., before preparing a meal; after handling an infant's soiled diaper).<br>c) Mothers/CHW recognized that by distributing information about IYC and household nutrition and WASH to others, they contribute to improving the health and nutritional outcomes of their families, businesses, and communities.<br>***Note:** As participants continue to spread information and skills from the nutrition training and encouraging adoption, they will increase the value of the capacity development investment of FishFirst! Zambia Phase II (2022). |
| **Mothers/CHW – Section 3: Perceptions of ComFA+Fish as New Product for Purchase** | | |
| 22. What specific features or benefits for your children would you look for in a protein/micronutrient blend like ComFA+Fish? (PROBE for affordability, taste, nutritious ingredients, convenience) | – **Mothers/CHW:** "It must be nutritious, affordable, taste good, and be easy to make." | Mothers/CHW mentioned some specific features or benefits they would look for in a protein/micronutrient blend like ComFA+Fish:<br>a) **Nutrition:** Mothers/CHW emphasized the importance of the product being highly nutritious to support IYC's healthy growth.<br>b) **Affordability:** Mothers/CHV mentioned this as a key factor in terms of ensuring the product was accessible to a broad population.<br>c) **Taste:** Mothers/CHW highlighted the importance of the product having an appealing taste to ensure that IYC enjoy consuming it. A pleasant taste can encourage regular consumption and make it easier for parents to incorporate it into their IYC's diet.<br>d) **Easy to Prepare:*** Convenience was mentioned as a desirable feature. Mothers/CHW preferred a product that is easy to prepare, requiring minimal time and effort. This aspect is crucial for busy caregivers who want to provide nutritious meals for their IYC. |

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| | | *__Note:__ Two ComFA+Fish instant porridges (plain and vanilla) – both of which only require hot water to prepare – were evaluated as high acceptability during ComFA+Fish Sensory Panel III (2023) among the FishFirst! Zambia's Phase III Learning Event and Workshop participants. The results are available at https://tinyurl.com/2sejjudx |
| 23. Are there any specific flavors or taste preferences your children typically enjoy that you would like to see reflected in ComFA+Fish? (PROBE for aroma, appearance, texture, flavor, sweetness) | – **Mothers/CHW:** "It should look nice [be visually appealing] and have a good smell [aroma]."<br>– **Mothers/CHW:** "It should have a good consistency [texture], flavor, and be sweet—but not overly sweet." | Mothers/CHW expressed their preferences for specific flavors or taste preferences they would like to see in ComFA+Fish dishes for children:<br>a) **Visually Appealing:** Mothers/CHW mentioned that ComFA+Fish dishes for children should have an attractive appearance, so that they are visually appealing to children. Appealing colors or other visual elements – e.g., product packaging – can make ComFA+Fish dishes more enticing and enjoyable for children to consume.<br>b) **Pleasant Aroma:** A pleasant aroma was mentioned by Mothers/CHW as an important sensory attribute in ComFA+Fish dishes targeting children. Mothers/CHW preferred ComFA+Fish dishes with an aroma that would stimulate children's appetite and make the experience of consuming the foods more enjoyable.<br>c) **Texture:** Mothers/CHW emphasized the importance of a desirable texture in ComFA+Fish dishes targeting children. A nutrition product that has a smooth and consistent texture is much appealing for children.<br>d) **Flavor:** Mothers/CHW expressed their desire for a flavorful blend. A ComFA+Fish must have taste that their children find enjoyable and satisfying.<br>e) **Sweetness:** Some Mothers/CHW mentioned a preference for some sweetness in ComFA+Fish dishes targeting children, as they felt that some sweetness could enhance a food's taste and make it more appealing to IYC.<br>f) By incorporating these flavors and taste preferences, ComFA+Fish dishes can become more appealing to IYC, increasing the likelihood of their acceptance and enjoyment of ComFA+Fish-fortified foods. |
| 24. What packaging and portion sizes would be most suitable and convenient for you when it comes to everyday use of ComFA+Fish? (PROBE for single-serving sachets? Powder you can scoop from a tin (e.g., like baby formula)? | – **Mothers/CHW:** "Use polythene zip-lock bags as opposed to [plastic] bottles, because the shelf life seems longer in bags than bottles."<br>– **Mothers/CHW:** "Sell it in single serving sachets of about 100 to 200 grams." | Mothers/CHW insights regarding packaging and portion size preferences included:<br>a) **Packaging:** Preference for using polythene bags (vs. bottles) as they believed that bags prolong the content's shelf life.<br>b) **Portion Size:** Single-serving sachets of 100-200 grams.<br>c) Adopting these packaging and portion size preferences can help ensure that ComFA+Fish is a more suitable and convenient product for everyday use. |

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| 25. Is there a specific price range that may make ComFA+Fish something mothers where you live would likely purchase? | – **Mothers/CHW:** "Sell it [in sachets] for 5 to 10 Kwacha." | a) Mothers/CHW suggested a specific price range of ZMW5-ZMW10 would increasing the likelihood that mothers in their communities would purchase ComFA+Fish. |
| 26. What features of ComFA+Fish make it most appealing to mothers for use in children's daily meals? (PROBE for affordability, taste, nutritious ingredients, convenience) | – **Mothers/CHW:** "It must be nutritious, affordable, tasty, easy to prepare." | Mothers/CHW prioritized some features of ComFA+Fish to make it appealing to mothers for use in their children's daily meals, including:*<br>a) **Nutritious ingredients:** Mothers/CHW valued the nutritional content of ComFA+Fish, as it provides essential nutrients to support IYC's growth and development.<br>b) **Affordability:** The price of ComFA+Fish is an important factor for mothers. It should be affordable, ensuring that it fits within their budget of ZMW5 to ZMW10.<br>c) **Taste:** Mothers/CHW want a product that their children will enjoy consuming, as it encourages regular usage and helps ensure that children receive the necessary nutrients.<br>d) **Ease of Preparation:** Convenience is another key feature participants mentioned. Mothers/CHW appreciate products that are easy and quick to prepare, as it saves time and effort in busy households and where time poverty is likely high.<br>***Note:** This is not a rank-ordered list of priorities. |
| 27. What should be changed about ComFA+Fish to make it more appealing to mothers and other caregivers? (PROBE for cost, taste, convenience, norms, etc.) | – **Mothers/CHW** agreed that ComFA+Fish should be: "Low cost for even the vulnerable to afford."<br>– **Mothers/CHW** agreed that ComFA+Fish should be: "Readily available and produced from local materials."<br>**Mothers/CHW** agreed that ComFA+Fish should be: "Tasty and easy to prepare." | Mothers/CHW agreed that ComFA+Fish should be:<br>a) **Affordable:** Mothers/CHW emphasize the need for ComFA+Fish to be affordable, particularly for vulnerable populations. Ensuring that the cost of ComFA+Fish is low enough that resource-limited households can afford it would ensure that more IYC benefit from it. Mothers/CHW suggested that this could be accomplished by selling ComFA+Fish in single-serving sachets of approximately 100-200 grams in a price range of ZMW5-10 (see Q24-Q26).<br>b) **Readily Available:** This is important for rural communities that experience supply chain disruptions due to—for example—a lack of adequate, reliable road systems/infrastructure.<br>c) **Use Locally Sourced Ingredients:** Mothers/CHW agreed that ComFA+Fish should be produced from local ingredients. This would not only support local economies but also contribute to the sustainability and accessibility of ComFA+Fish.<br>d) **Taste:** Mothers/CHW agreed that mothers value the taste of ComFA+Fish as it influences their children's acceptance and enjoyment of ComFA+Fish products, such as the ComFA+Fish |

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| | | instant porridges (plain and vanilla). Making it more appealing and palatable to children would encourage regular consumption.<br>e) **Ease of Preparation:** Mothers/CHW agreed that convenience is an essential factor for busy caregivers and in households where time poverty is high. Making ComFA+Fish easy to prepare can encourage daily use, save time and effort among caregivers. |
| 28. What should be changed about ComFA+Fish to make it more appealing to infants and young children? (PROBE for aroma, appearance, texture, flavor, sweetness) | – **Mothers/CHW:** To ensure that ComFA+Fish is appealing to IYC, "Don't use spices, garlic, and other ingredients that may be too strong."<br>– **Mothers/CHW:** To ensure that ComFA+Fish is appealing to IYC, "It should be easy to swallow without much chewing, smooth in the mouth, and sweet." | According to Mothers/CHW, to make ComFA+Fish more appealing to IYC, the products/recipes should consider the following:<br>a) **Aroma:** IYC may prefer a mild and pleasant aroma in their food. Avoiding the use of strong spices or ingredients such as garlic that may be overwhelming can make the product less appealing to IYC.<br>b) **Texture:** IYC may prefer a smooth and soft texture that is easy to swallow without much chewing can make the product more appealing.<br>c) **Sweetness:** Participants emphasized sweetness of the product in their feedback, as IYC often have a natural preference for sweetness. Incorporating sweetness can make the product more enjoyable for IYC, but as a Mother/CHW mentioned in Q23, it should be "sweet—but not overly sweet." |
| 29. How likely would other mothers be to regularly use a fish-based protein/micronutrient blend like ComFA+Fish?<br>– LIKELY (N=8): Would mothers be more likely to make it at home or to purchase it?<br>– LIKELY (N=8): What would make mothers more likely to regularly use ComFA+Fish? | – **Mothers/CHW** agreed: "Likely."<br>– **Mothers/CHW:** In terms of whether mothers would be more likely to produce the product at home or purchase it, they reported: "Both! For working mothers and traders and in times of missing ingredients or [when ingredients are] off-season, then both. Otherwise, mothers would be more likely to make at home."<br>– **Mothers/CHW:** "When they see their children and families liking it. And when they see children's improved health. And when they see that ComFA+Fish is readily available and affordable." | a) According to Mothers/CHW, depending on mothers' particular situations, they may prefer to purchase protein/micronutrient blend like ComFA+Fish or they may prefer to make it at home.<br>b) Mothers would be more likely to make protein/micronutrient blend like ComFA+Fish at home when they have access to the necessary ingredients.<br>c) However, mothers who engage in income-generating activities outside the homestead—such as market sellers—who may have limited time for food preparation may prefer to purchase a protein/micronutrient blend like ComFA+Fish.<br>d) Likewise, mothers may prefer to purchase a protein/micronutrient blend like ComFA+Fish during periods when certain ingredients are unavailable or out of season.<br>e) They suggested that mothers would be more likely to regularly use ComFA+Fish if they observe positive outcomes in their children's health and if the product is readily available and affordable. |

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| 30. Would mothers be more likely to regularly use ComFA+Fish if healthcare providers or trusted community members recommend it? (PROBE for why or why not?) | – **Mothers/CHW:** "Yes, because they have the confidence that these people are professionally trained." | a) Mothers/CHW affirmed that mothers would be more likely to regularly use ComFA+Fish if healthcare providers or trusted community members recommend it. This is because when healthcare providers or trusted community members—such as CHW—endorse a product, mothers perceive it as a reliable and trustworthy option for their children's nutrition.<br>b) Additionally, healthcare providers and trusted community members are seen as experts in their field, so their recommendations hold weight and exert influence on mothers' decision-making. Thus, the endorsement of ComFA+Fish by healthcare providers and trusted community members (e.g., CHV) would likely increase the likelihood of mothers regularly using it. |
| 31. Would mothers be more likely to buy and use ComFA+Fish if it is made locally? (PROBE for why or why not?) | – Yes, because Mothers/CHW trust the source and it will be less costly | a) Mothers/CHW affirmed that mothers would be more likely to buy and use ComFA+Fish if it is made locally. They believe when a product is produced locally, it instills a sense of trust among mothers because they feel more confident in the quality and safety of the product.<br>b) Mothers/CHW believe that locally produced products may be less costly to purchase. |
| 32. What specific features or benefits would you look for in a protein/ micronutrient blend like ComFA+Fish that is specifically focused on child nutrition? (PROBE for affordability, taste, nutritious ingredients, convenience) | – It must be nutritious, affordable, tasty, easy to prepare | Mothers/CHW reported that when considering a protein/micronutrient blend like ComFA+Fish for child nutrition, mothers would look for the following features:<br>a) **Nutritious:** Mothers would prioritize a blend that contains essential nutrients to support the healthy growth and development of their children.<br>b) **Affordability:** The product should be affordable, as impoverished mothers seek cost-effective options to provide nutritious meals for their children.<br>c) **Taste:** Mothers/CHW believe a blend that is appealing in taste can encourage children to consume the product willingly, and therefore, such a product would be more desirable.<br>d) **Ease of Preparation:** Mothers/CHW reported that mothers prefer products that are easy to prepare and integrate into their daily routine. Convenience factors such as: 1) quick preparation time and 2) minimal cooking steps can increase demand for protein/ micronutrient blends such as ComFA+Fish. |
| 33. Do you have any concerns or reservations about trying new | – No. | None noted. |

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| nutritional products for your children? | | |
| 34. What might prevent mothers from buying or trying ComFA+Fish for children? (PROBE for cost, taste, norms, religion, etc.) | – "If it is not just available. If it's too costly, if the raw materials or ingredients used are against religious doctrines." They noted that consuming catfish is prohibited among Seventh Day Adventists and Muslims). | Mothers/CHW reported that mothers may face certain barriers or concerns that could prevent them from buying or trying ComFA+Fish for their children. These may include:<br>a) **Cost:** If the product is perceived as expensive or beyond the budget of mothers, they may hesitate to purchase it regularly.<br>b) **Taste:** If the taste of the product is not appealing to children or if it is not compatible with local preferences, mothers may be reluctant to introduce it into their children's meals.<br>c) **Cultural Norms and Religious Considerations:** Some mothers may have dietary or cultural norms that restrict the consumption of certain ingredients or specific types of fish. For example, consuming catfish is prohibited among Seventh Day Adventists and Muslims.<br>d) **Availability:** If the product is not readily available in local markets or stores, mothers may find it difficult to access it. |

# Entrepreneur/Business Owners (N=5)

| Questions | Direct Quotes/Paraphrases | Key Results |
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| **Entrepreneurs – Section 1: Your Entrepreneurial Experiences** | | |
| 1. Tell us about your business: | – **Entrepreneur/Business Owner 1**: One year in business; three employees. Buys and sells **dried fish products.**<br>• Client type: Retailers and consumers<br>• Client size: 200,000<br>• Frequency: Bi-monthly<br>• Location: Lusaka<br>– **Entrepreneur/Business Owner 2**: Thirteen years in business; 6 employees. Owned and runs a restaurant/catering business that cook and serves local dishes including Nshima with various fish-based meals such as charcoal grilled fish, boiled fish, fried fish, fried Kapenta, fried Kapenta without cooking oil. Serves traditional meals covering local traditional foods like *chibwabwa* (pumpkin leaves), *kalembula* | a) **Entrepreneur/Business Owner 1:** Has been in business for one year and operates a dried fish products business. His clients include retailers and consumers, and he serves a client size of 200,000. Client frequency of purchase is bi-monthly and is located in Lusaka.<br>b) **Entrepreneur/Business Owner 2**: Has been in business for thirteen years and runs a restaurant/catering business in Siavonga. Her restaurant specializes in local dishes, including various fish-based meals. She serves the general public, is open daily, and serves 500 customers per day.<br>c) **Entrepreneur/Business Owner 3**: Has been in business for nine years and sells fishing equipment such as bream fishing nets and predator nets. His clients include small, medium, and large-scale fishers. He serves a client size of 20-50 clients and conducts business on a daily basis. His operations cover areas in Lusaka, Lake Tanganyika, and all over Zambia.<br>d) **Entrepreneur/Business Owner 4**: Has been in business for 8 years and is a fish farmer specializing in cage farming. He sells both |

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| | (sweet potato leaves), *impwa* (white garden eggs/white eggplant), okra soup, *ya mpuzi* (goat meat stew)<br>• Client type: General public<br>• Client size: 500<br>• Frequency: Daily<br>• Location: Siavonga<br>– **Entrepreneur/Business Owner 3**: Nine years in business; three employees. Sells fishing equipment such as bream fishing nets, predator nets like crocodiles.<br>• Client type: small-, medium- and large-scale fishers<br>• Client size: 20-50 clients<br>• Frequency: Daily<br>• Location: Lusaka, Lake Tanganyika, and all over Zambia<br>– **Entrepreneur/Business Owner 4**: Eight years in business; six employees. Sells fresh and dried fish. He is a fish farmer engaged in cage farming.<br>• Client type: Companies and organizations<br>• Client size: 4<br>• Frequency: six-month interval<br>• Location: Siavonga<br>– **Entrepreneur/Business Owner 5**: Did not provide data. | fresh and dried fish. His clients mainly consist of companies and organizations, with a client size of 4. Frequency of purchase from client is a six-month interval and is located in Siavonga.<br>e) **Entrepreneur/Business Owner 5**: Did not provide data.<br>f) Local businesses play important roles in nutrition-sensitive value chains. Their products and services can contribute to the availability and accessibility of fish-based products in the market, meeting the needs and preferences of different customers. |
| 2. After attending the ComFA+ Fish Cooking Demo/Kapenta Nutrition Training (at Indaba Pub & Grill) last June, did you make any steps towards developing or marketing dried fish powder or a fish-based protein/micronutrient blend like ComFA+Fish? | – **Entrepreneur (M):** "I made a demonstration with around 20 women at Shimatika Health Post. I prepared Kapenta porridge to demonstrate to women who came for the Under-Five Health Clinic. They liked it."<br>– **Entrepreneur (F):** "I prepare Kapenta powder for my grandchildren in Lusaka and I send it to them from time to time. They like Kapenta powder, but I know their | Two of the five Entrepreneurs had produced dried fish powder and/or a fish-based protein/micronutrient blend. The reason for the lack of action include:<br>a) Entrepreneur (M) reported that he conducted a demonstration of a "Kapenta porridge" for approximately 20 women at Shimatika Health Post attending the Under-Five Health Clinic. He reported that they liked the demonstration and the Kapenta porridge.<br>b) Entrepreneur (F) reported that she prepares Kapenta powder and sends it to her grandchildren in Lusaka, who enjoy it.<br>Reason for the lack of action among entrepreneurs include: |

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| – YES (n=2): Please explain the steps you have made, so far<br>– NO (n=3): Why not? | mother is too busy to prepare it [from scratch]. You know, people in town, people in Lusaka, are just too busy. I have spoiled them because I can send it for them. And their babies, my grandchildren, are enjoying it, which makes me happy."<br>– **This Entrepreneur (F)** reported that she sells fish-based meals at her restaurant, but she has not tried to prepare fish-based dishes that she learned about during the cooking demo/training because she is not sure of whether her customers would purchase these dishes.<br>– **Entrepreneur (M):** "In Sinazongwe, we have challenges with growing pumpkin and sweet potato leaves. They tend to be difficult to grow in our areas due to issues of climate change and drought."<br>– **Entrepreneur (M)**: "I haven't done anything from the training, but there are some foods, like groundnuts, which are commonly consumed at home. We buy them from our usual markets in Soweto [in Johannesburg, South Africa], where groundnuts are readily available. But I have not done it [produced fish powder] products for business. There are a lot of reasons why we haven't done it [produced fish powder/products] for business, starting with the fact that Kapenta is expensive and there are issues to do with equipment to grind Kapenta. If I do that [start producing fish powder/products], I have to think about starting a different kind of business. And switching businesses can be challenging and expensive in terms of raw materials and equipment. And I also have to think about having a target market. Just like her fears [referring to another FGD member], I | a) Entrepreneur (F) reported that she sells fish-based meals at her restaurant but has not tried to prepare the dishes she learned about during the ComFA+Fish Cooking Demo/Kapenta Nutrition Training (2022), as she is unsure whether her customers would buy them.<br>b) Entrepreneur (M) mentioned challenges in growing crops that produce DGLV (e.g., pumpkin leaves, sweet potato leaves) in his area due to "climate change and drought." He recognizes potential supply chain issues of key ingredients needed to produce certain fish powder-based products.<br>c) Entrepreneurs also mentioned several barriers to begin producing dried fish powder and/or fish powder-based products, including that Kapenta has risen in cost, the need for equipment to grind it, and the challenges of switching to a different business. Additionally, they expressed concerns about ensuring that they had a target market for dried fish powder and/or fish powder-based products and whether there is a sufficient customer based "in Siavonga" and other local areas who have the financial means to purchase the fish powder-based products that they might produce.<br>d) These responses indicate the various barriers and considerations that individual Entrepreneurs face when it comes to undertaking a new business to produce and market food products, including fish-based products. |

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| | also have fears, as I should know I have a target market [for fish powder/products]. In Lusaka, people have a wide variety of nutritional products available. Here in Siavonga, people may like my [fish powder] products—but do they have the money to buy them?" | |
| 3. Have you ever developed or marketed any nutritional product?<br>a. If YES (#___), what products?<br>b. If YES, who are the target customers?<br>c. NO (N=5): Is there a particular reason why you have not? | – None noted. | None noted. |
| **Entrepreneurs – Section 2: Potential Profitability of Marketing ComFA+Fish** | | |
| 4. What factors do you consider when evaluating new investment opportunities, particularly in a nutritional product such as ComFA+Fish? (List all factors mentioned by participants, discuss as necessary.) | – **Entrepreneur (M):** "I always look at the market first—will there be customers to buy my products. Actually, I should start with looking at the steady supply of fish.<br>– **Entrepreneur (F)** added: "Are we able to win enough people who have knowledge of ComFA+Fish products—have we done enough sensitization? You know, it is not easy to introduce a new product. So you need to win your customers over, introduce them [to the new product], and win their willingness to buy and eat it. We have to consider: 'How do we send the message to everyone around the community to know that fish is good for nutrition?' "<br>– **Entrepreneur (M) built on her previous response:** "Look at Trade Kings, for example. They do rigorous advertisements to sell a new product, to ensure that customers know it." | According to Entrepreneurs, when evaluating new investment opportunities, key factors include the following:<br>a) **Market Demand:** Assessing whether there will be enough customers to buy the products and if there is a market for the nutritional product.<br>b) **Fish Supply:** Ensuring a steady and reliable supply of fish, as it is a key ingredient in ComFA+Fish.<br>c) **Customer Awareness and Sensitization:** Considering the level of knowledge and awareness among potential customers about nutrition products. They emphasize the importance of conducting effective sensitization and education campaigns to introduce and win customers' willingness to buy and consume the product.<br>d) **Advertising and Promoting Products:** Participant recognized the need for robust advertising and promotional strategies to inform and attract customers. They cited examples of successful companies like Trade Kings that invest in rigorous advertisements to promote new products.<br>e) **Packaging and Affordability:** participant emphasized the importance of packaging the product in small, affordable "packs" to make it accessible to a wider range of people and increase affordability. |

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| | – **Entrepreneur (F) reported:** "In as much as you want to produce a product, you should be able to package it in small packs [sachets] so that they are affordable and people are able to buy [afford] it."<br>– **Another Entrepreneur (M) added:** "I have been in the fisheries business for a long time and sometimes I look at the [Lake Kariba*] fishing ban, and ask myself, 'What kind of business I can do during the fishing ban when fish are not easily accessible?' I get into other forms of business such as selling maize during fishing ban periods." | f) **Diversification During Times of Low Fish Availability:** Exploring alternative business opportunities or diversification during periods when fish is not easily accessible, such as selling other products like maize.<br>g) The factors enumerated by participants reflect the considerations participants have when evaluating investment opportunities in a nutritional product like ComFA+Fish. They take into account key factors such as market demand, supply chain, customer awareness, packaging, advertising, and adaptability during periods of limited fish availability, such as fishing bans.*<br>***Note:** At Lake Kariba each month, there is a fishing ban during the full moon. This lunar moratorium on fishing was initiated to allow pelagic and other fish populations to recover from overfishing. Source: Chomba, C. & Silwimba, E. (2022). Did the lunar moratorium (fishing ban) have any positive impact on catch per unit effort of Kariba Sardines (Limnothrissa miodon) on the Zambian side of Lake Kariba? *IAR J Agri Res Life Sci, 3*(3), 1-17. doi: 10.47310/iarjals.2022.v03i03.001 |
| 5. What factors of ComFA+Fish are most appealing to you as an entrepreneur? (List all factors mentioned by participants, discuss as necessary) | – **Entrepreneur (M):** "It [ComFA+Fish] is a new product on the market, which may make it attractive for businesses before other people [entrepreneurs] jump on it."<br>– **Entrepreneur (F):** "ComFA+Fish products can be consumed by everyone except those who may have allergies to fish. As adults, women, and children can all consume these products, ComFA+Fish has more potential customers and this can translate to a bigger market."<br>– **Entrepreneur (M):** "Looking at the value—the nutritional value that you get from ComFA+Fish—makes it more appealing and attractive to consumers."<br>– **Entrepreneur (M):** "These things [ComFA+Fish ingredients] are available within our areas, so you don't have to import anything to produce it." | Entrepreneurs list several factors about ComFA+Fish that are most appealing to entrepreneurs, this includes:<br>a) **Novelty:** Being a new product on the market, it presents an opportunity for entrepreneurs to establish their presence and gain an advantage over potential competitors who have not yet entered the market.<br>b) **Wide Target Market:** ComFA+Fish can be consumed by IYC, older children and adolescents, pregnant and breastfeeding women, adults, and elders. This broadens the potential customer base and expands the market opportunity.<br>c) **Nutritional Value:** The high nutritional value of ComFA+Fish makes it attractive to consumers who are seeking healthier food options. The product's nutritional benefits can be a selling point for entrepreneurs.<br>d) **Local Availability:** Participants highlighted that all the necessary ingredients for producing ComFA+Fish are locally available, eliminating the need for importation. This can lead to cost savings and a more sustainable business model.<br>Entrepreneurs believe that these factors collectively make ComFA+Fish appealing to entrepreneurs, offering opportunities for broader market and customer base, nutritional value, and utilizing local resources effectively. |

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| 6. What factors of ComFA+Fish would be most appealing to your clients? (list all factors mentioned by participants, discuss as necessary) | – **Entrepreneur (M):** "I think packaging would be one of the most appealing things. Before you buy a product, usually packaging is the most attracting thing. So packaging would be a big thing. Secondly, I think pricing. The way you price should go with the market trends. I have seen that Kapenta powder looks like a spice. And I have seen most shops that sale spices packs in small units for everyone to afford. And people can also buy it [ComFA+Fish] as a spice because that one is something you can put in porridge or relish to make it taste nice."<br>– **Entrepreneur (F):** "For me, it is the preparation method. If I am serving it [ComFA+Fish] in a dish [at my restaurant], the preparation method will be important, as the more the dish looks attractive, the more it is appealing to customers. The way it is prepared, they [customers] would say, 'This looks nice!', and they would taste it." | Entrepreneurs list several factors that will make ComFA+Fish appealing to a wide range of potential clients:<br>a) **Packaging:** Participants highlighted that attractive packaging is important in capturing the attention of customers. Packaging that is convenient and available in small units or portions may also make the product more accessible and affordable to a wider range of customers.<br>b) **Pricing:** The pricing of ComFA+Fish was mentioned as a key factor. It should align with market trends and in line with customers' expectations.<br>c) **Preparation Method:** The way ComFA+Fish is prepared and presented as a dish can greatly influence its appeal to customers.* Participants emphasized the importance of making the product look visually appealing and appetizing.<br>***Note:** Two ComFA+Fish instant porridges (plain and vanilla) – both of which only require hot water to prepare – were evaluated as high acceptability during ComFA+Fish Sensory Panel III (2023) among the FishFirst! Zambia's Phase III Learning Event and Workshop participants. They particularly appreciated the 'convenience' of preparing the instant porridges. The Sensory Panel III results are available at https://tinyurl.com/2sejjudx |
| 7. Are there any current market trends or consumer demands that could be fulfilled by ComFA+Fish?<br>– YES (n=1), please explain. | – **Entrepreneur (F):** "One thing happening now in groundnut markets, is that you will find that if you are buying groundnut, there is a machine [on-site] to grind the groundnut into powder. So it is up to the customer to decide how they want the groundnut. Whole or pounded groundnut can be bought with ease in markets. So when a consumer buys groundnut and wants to have it in powdered form, they can easily do so [at the point of purchase]. Secondly, repackaging a product into smaller units makes it affordable to everyone, depending on their level of income. This is happening with a lot of products such as sugar, cooking oil, and washing paste. All these products are repackaged into what people can afford. | Entrepreneurs affirmed that there are current market trends and consumer demands that could be fulfilled by ComFA+Fish. Participants mentioned several trends that could be relevant to scaling ComFA+Fish:<br>a) **Grinding into Powder Form:** The trend of grinding ingredients into powder form, such as groundnuts, allows consumers to have more flexibility in how they use the product. This trend indicates a demand for convenience and customization in food preparation.<br>b) **Prepackaging in Smaller Units:** Many products, including sugar, cooking oil, and washing paste, are being repackaged into smaller units to make them more affordable and accessible to a wider range of consumers. This trend reflects the need for affordable options and portion control.<br>c) **Rising Interest in Novel Spices and Spice Blends:** Consumers are increasingly interested in enhances the flavor of dishes by adding novel spices and spice blends. Dried fish powder – which is noted for adding umami to dishes – could be a valuable "spice" to enhance the flavor AND the nutritional content of dishes. |

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| | The other thing that is happening now is people are also into trying new spices, which adds value to a dish [enhances flavor]. So dried fish powder could be one of a spice blend's ingredients." | d) These market trends and consumer demands suggest that there is potential for ComFA+Fish to align with current preferences and cater to the evolving needs and taste preferences of consumers. |
| 8. On a scale of 1-10, how likely are you to develop and market ComFA+Fish?<br>– What is the reason for your response?<br>– What would increase your likelihood? | – **Entrepreneur (F), who is a restaurant owner:** "For me, it [ComFA+Fish] is a 9 or 10 because I sell food, so it would be an added product to what I'm already selling at the restaurant.<br>– **Entrepreneur (M):** "For me, it is an 8 to10, because I already have all the ingredients needed to produce the product."<br>– **Entrepreneur (M):** "Availability of the fish and the other ingredients would increase my likelihood of producing ComFA+Fish. Capital also plays an important role, as money is needed to invest in these products." | Entrepreneurs reported high likelihood of developing and marketing ComFA+Fish, with rating that range between 8 and 10. The reasons for their responses include:<br>a) A restaurant owner mentioned a likelihood of 9/10 because adding ComFA+Fish to their menu would be an additional product to what they already sell, potentially expanding their offerings and attracting more customers.<br>b) Another participant expressed a likelihood of 8/10 because they already have all the necessary ingredients to produce the product, suggesting that they have the resources and capabilities to enter the market.<br>These responses indicate a positive inclination towards developing and marketing ComFA+Fish, driven by the potential for business expansion, existing resources, and a favorable market outlook.<br><br>To increase the likelihood of developing and marketing ComFA+Fish, Entrepreneurs mentioned the following factors:<br>a) **Availability of Fish and Other Ingredients:** Entrepreneurs highlighted the importance of having a consistent and reliable supply of fish and other necessary ingredients. Having access to these resources ensures the feasibility and sustainability of producing ComFA+Fish.<br>b) **Sufficient Capital:** Entrepreneurs noted that adequate financial resources are crucial for investing in the production and marketing of ComFA+Fish. Sourcing capital to cover expenses such as equipment, packaging materials, and marketing activities would increase their likelihood of pursuing the venture.<br>By addressing these factors to ensure a steady supply of fish/other ingredients, and of securing the necessary capital, Entrepreneurs' likelihood of developing and marketing ComFA+Fish would be increased. |
| 9. What support would you need to move forward with developing and marketing ComFA+Fish? (PROBE, marketing, financial, | – **Entrepreneur (M):** "Here, we are talking about machinery, financial support, equipment, and training. What machines do we need? Those for grinding fish. What about training? What training do we want? | **NOTE:** Although no Entrepreneurs mentioned issues of/need for training in food safety and handling, FishFirst! Zambia recognizes such training is crucial for all tiers of in-country partners with whom FishFirst! Zambia may establish collaborations to produce and scale ComFA+Fish |

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| equipment, nutrition training) | Training in operating grinding machines, packaging, branding, as well as training on sensitization/advertisement to attract customers." | at national (e.g., school feeding programs), regional (entrepreneurs), and village levels across Zambia and sub-Saharan Africa.<br>**NOTE:** FishFirst! Zambia recognizes that machinery and equipment that is "food grade quality" is equally crucial for all tiers of in-country partners with whom FishFirst! Zambia may establish collaborations to produce and scale ComFA+Fish at national (e.g., school feeding programs), regional (entrepreneurs), and village levels across Zambia and sub-Saharan Africa.<br><br>Entrepreneurs expressed the need for various types of support to move forward with developing and marketing ComFA+Fish. The support areas mentioned include:<br>a) **Machinery:** Entrepreneurs highlighted the need for machines specifically designed for grinding fish to produce dried fish powder. Having access to appropriate machinery would enable efficient production.<br>b) **Other Equipment:** Entrepreneurs mentioned the need for additional equipment – such as packaging equipment – and training on how to use the equipment. Having suitable equipment would enable product development.<br>c) **Financial Support:** Entrepreneurs emphasized the importance of financial assistance to cover various expenses associated with developing and marketing ComFA+Fish.<br>d) **Marketing Support:** Entrepreneurs identified the need for support in marketing and promoting ComFA+Fish. This would include assistance in branding and marketing the product. |
| 10. What type of clients do you think would find ComFA+Fish most appealing? (PROBE mothers, businesses, regions, etc.) | – **Entrepreneur (M):** "Households, health clinics, supermarkets, restaurants."<br>– In response to interviewer's follow-up question: "How do supermarkets come in?"<br>– **Entrepreneur (M) replied:** "I can take ComFA+Fish products to supermarkets to get into an agreement with them to supply these products for their stores and get a payment from them, once the supermarket has sold the products." | Entrepreneurs mentioned various ComFA+Fish clients, including:<br>a) **Households:** ComFA+Fish would appeal to individual households as it a tasty, convenient, and nutritious option for daily meals.<br>b) **Health Clinics** could be interested in ComFA+Fish as a nutritional supplement for patients, particularly IYC with specific dietary needs.<br>c) **Supermarkets** were potential clients that could considerably widen entrepreneurs customer base.<br>d) **Restaurants:** Entrepreneurs who own or run restaurants mentioned that ComFA+Fish could be appealing to their customers. |
| **Entrepreneurs – Section 3: Potential Challenges of Marketing Protein/Micronutrient Blends such as ComFA+Fish** | | |

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| 11. Are there any current market trends or consumer demands that may pose a challenge to marketing nutrition products such as ComFA+Fish?<br>– YES (n=1): Please explain | – **Entrepreneur (M):** "Yes. Lack of knowledge on the prices of commodities. Take Kapenta, for example: The price of Kapenta is relatively high, even in the fishing communities where Kapenta is being produced. We also need better information on when fishing ban are active as well, as fish is more expensive during fishing bans." | Challenges to producing/marketing products like ComFA+Fish include:<br>a) **Lack of Pricing Knowledge for Commodities**, which can impact entrepreneurs 'bottom line.'<br>b) **Relatively High Price of Kapenta** is a potential challenge.<br>c) **Fishing Bans:*** Fish availability—and fish prices—are impacted by 'supply and demand' market forces. Fish is often more expensive and less accessible during fishing bans, which may affect the consistent supply and affordability of fish for producers of fish-based products.<br>***Note:** As previously mentioned (see Q4), at Lake Kariba each month, there is a fishing ban during the full moon to allow pelagic and other fish populations to recover from overfishing. Source: Chomba, C. & Silwimba, E. (2022). Did the lunar moratorium (fishing ban) have any positive impact on catch per unit effort of Kariba Sardines (Limnothrissa miodon) on the Zambian side of Lake Kariba? *IAR J Agri Res Life Sci, 3*(3), 1-17. doi: 10.47310/iarjals.2022.v03i03.001 |
| 12. What factors of ComFA+Fish might make it a challenge for you to develop and market? (list all factors mentioned by participants, discuss as necessary). | – **Entrepreneur (M):** "Limited knowledge and exposure of the products to potential customers or consumers makes it a challenge to develop and market products like ComFA+Fish because people may not buy it." | Factors that could pose challenges in developing and marketing ComFA+Fish reported by Entrepreneurs included:<br>a) Limited knowledge and exposure: The lack of awareness and familiarity with the product among potential customers or consumers was identified as a challenge.<br>b) Participants believe without adequate knowledge about the benefits of ComFA+Fish, people may be hesitant to purchase or try it. |
| 13. Are there any specific regulations or compliances that must be met before you would be able to develop and market ComFA+Fish? | – **Entrepreneur (M):** "Yes. The Zambia Bureau of Standards regulations would be important to meet, especially in terms of weight and quality control requirements, including packaging." | a) Entrepreneurs reported that specific regulations—such as those set by the Zambia Bureau of Standards (http://www.zabs.org.zm/) – must be met before marketing ComFA+Fish. Compliance may include specific weight, quality control, and packaging requirements. |
| 14. Is there anything about ComFA+Fish that could be changed to make it more appealing to you as an entrepreneur? (PROBE for cost, taste, convenience, norms, knowledge, etc.) | – **Entrepreneur (M):** "Incentives to reduce the initial cost of investment, such as the ability to source machinery at "pay slow" agreements that let you buy equipment and slowly pay for it over a longer period of time." | a) Entrepreneurs reported that offering incentives to reduce initial cost of investment in equipment (e.g., installment payment plans or lowering equipment costs) could help alleviate the financial burdens associated with 'startups' businesses. Reducing up-front investment costs can be a significant factor in encouraging entrepreneurs to pursue the development and marketing of ComFA+Fish. |
| 15. Is there anything about ComFA+Fish that could be changed to make it more appealing to your clients? (PROBE for aroma, | – None noted. | None noted. |

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| appearance, texture, flavor, price, convenience) | | |

# Government Officials (N=13)

| Questions | Direct Quotes/Paraphrases | Key Results |
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| **Government Officials – Section 1: Government Priorities on Nutrition** | | |
| 1. Based on your professional experiences, what do you see as the MOST PRESSING NUTRITION CHALLENGES faced the population that you serve, particularly infants and young children?<br>– PROBE: Causes? Who are those most affected?) | – **Government Official:** "Inadequate metric equipment, as scales are breaking and have to be replaced after a couple months."<br>– **Government Official:** "The links between community activities and health activities. There is a need to link with other departments and to community programs."<br>– **Government Official:** "Therapeutic foods [RUTF] are in erratic supply at the hospitals and delay in the referrals."<br>– **Government Official:** "Lack of nutrition data to identify early signs of sickness. Because when kids are showing signs of being sick [due to malnutrition], it may be too late to act."<br>– **Government Official:** "In fisheries, there is the issue of production. There is a deficit in fish production. Most fish will go out of the community and be utilized. Not knowing how much fish is being consumed locally, but knowing how much is exported. Fish is sought after outside the village because of high demand. Villages are not consumers. Higher fish production may not lead to more village consumption, but right now, fishing is more for money [income] than consumption."<br>– **Interviewer:** "Only 10 grams of Kapenta powder is enough to cover the daily needs of children. That is not a lot, so using Kapenta powder are not going to consume the money needed for school fees, etc."<br>– **Government Official:** "There is a need to change the mindset of people, so that they keep a small amount of the fish they catch, instead of selling off | Participants mentioned several nutrition challenges that confront the population they served. This includes:<br>a) **Inadequate equipment:** There is a lack of proper metric equipment, such as scales, which are essential for accurately measuring and monitoring the nutritional status of infants and young children. The existing equipment is often inadequate and needs frequent replacement.<br>b) **Need for improved integration between community and health activities:** There is a need for better coordination and collaboration between different departments and community programs to effectively address nutrition challenges. Linking community actions with health activities can help ensure a comprehensive and holistic approach to addressing nutrition issues.<br>c) **Erratic supply of therapeutic foods:** There are challenges in ensuring a consistent and reliable supply of therapeutic foods, which are crucial for treating malnutrition in hospitals.<br>d) Delays in referrals of malnourished children. When malnourished children are not referred in a timely manner, it can hinder their access to appropriate and timely treatment, further exacerbating their nutritional status.<br>e) **Lack of nutrition data:** The absence of reliable and timely nutrition data makes it difficult to identify early signs of malnutrition and intervene promptly. Without accurate nutrition data, it becomes challenging to detect and address nutrition-related issues in infants and young children in a timely manner.<br>f) **Deficit in fish production:** There is a deficit in fish production, with a significant portion of the fish being exported rather than consumed locally. This imbalance between production and local consumption affects the |

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| | everything. There is a need to teach them the importance of consuming the fish."<br>– **Government Official:** "People produce the food, but end the day with nothing. The biggest challenge has to do with resources in nutrition. There is a lack of information and a need to have meetings regularly in communities to talk about nutrition."<br>– **Government Official:** "We have enough manpower to reach more populations [with nutrition information]."<br>– **Government Official:** "But we need to focus more on men because they have decision making power and do not appreciate the information the women have. So when it comes to keeping [some of the catch] versus selling all the fish, the women getting information do not have a voice."<br>– **Government Official:** "Fishers have to be closely monitored because of low fish population" to prevent overfishing. | availability and accessibility of fish, which is a valuable source of nutrition.<br>g) **Mindset and behavior change:** There is a need to change the mindset and behavior of individuals, particularly regarding the importance of consuming fish. Encouraging fishers to keep a portion of the fish they catch for their own consumption rather than selling it all can help improve access to nutritious food and enhance the nutritional status of infants and young children.<br>h) **Engaging men in nutrition:** It is important to focus on engaging men, as they often hold decision-making power and influence household choices. Involving men in nutrition education and empowering them with relevant information, can lead to better nutritional outcomes for infants and young children.<br>i) **Monitoring to prevent overfishing:** Close monitoring of fishers is necessary to ensure sustainable fishing practices and prevent overfishing in Lake Kariba, which can have negative consequences on the availability of fish as a source of nutrition. |
| 2. Are you aware of any government programs that are effectively addressing these nutrition challenges?<br>– If YES, What are the programs?<br>– If YES, Is the program national, local, or agency-based?<br>– If YES, What is the target population? | – **Government Official:** "RUTF for nutrition management."<br>– **Government Official:** "Training of community health workers."<br>– **Government Official:** "Community-based adolescent and infant feeding practices and growth promotion."<br>– **Government Official:** "Integrated malnutrition management."<br>– **Government Official:** "Identification and referrals of malnutrition cases." | Government programs effectively addressing nutrition challenges include:<br>a) **Ready-to-Use Therapeutic Foods (RUTF):** The government of Zambia and the UN agencies provide RUTF, a specialized food product designed to treat severe acute malnutrition. These therapeutic foods are provided to malnourished children at health centers by government to help restore their nutritional status and promote recovery.<br>b) **Training of Community Health Workers:** Government nutrition programs include training of community health workers who play a crucial role in identifying, treating, and preventing malnutrition at the community level. These trainings equip health workers with the knowledge and skills necessary to provide nutrition education, conduct screenings, and refer malnourished individuals for appropriate care.<br>c) **Community-Based Adolescent and Infant Feeding Practices and Growth Promotion:** For example, such government programs focus on promoting optimal feeding practices for IYC, such as exclusive breastfeeding during the |

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| | | first six months of life, appropriate complementary feeding after 6-months of age, and micronutrient supplementation.<br>d) **Integrated Malnutrition Management:** Integrated management of malnutrition programs is a comprehensive approach by government to address all forms of malnutrition, including severe acute malnutrition (e.g., SAM, marasmus, kwashiorkor, severe wasting), moderate acute malnutrition (e.g., MAM, wasting), and micronutrient deficiencies (e.g., hidden hunger). These programs typically include a combination of therapeutic, supplementary, and micronutrient interventions tailored to the specific needs of individual IYC.<br>e) The Zambian government runs programs that effectively identify and refer cases of malnutrition, such as the **Community-Based Management of Acute Malnutrition (CMAM) Program**. These programs improve early detection and management of malnutrition to ensure timely intervention and treatment. |
| **Government Officials – Section 2: Governmental Support for ComFA+Fish** | | |
| 3. Are you aware of any government initiatives that may support and/or include protein/micronutrient blends such as ComFA+Fish?<br>– If YES, What are the program?<br>– If YES, Is the program national, local, or agency-based?<br>– If YES, Who is the target population? | – None noted. | None noted. |
| 4. What existing government infrastructure or resources are in place that could aid in the promotion of ComFA+Fish among vulnerable infants and children? (PROBE: expedited | – **Government Official:** "The Community Health Volunteers System [also known as Community Health Workers] and outpatient community referrals."<br>– **Government Official:** "Weighing and managing children using measurements to refer children to clinics. Children come to the clinic every two weeks | Government Officials reported that existing government infrastructure and resources that could aid in the promotion of ComFA+Fish among vulnerable IYC include:<br>a) **Community Health Workers:** The existing system of community health workers can play a vital role in promoting and distributing ComFA+Fish. They can educate and raise awareness about the product, its benefits, and how to incorporate it into IYC's diets. Community health |

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| licensing, distribution, quality and safety support, etc.) | for two months. Interventions to target children who are on the borderline of being malnourished." | workers can also facilitate referrals and provide support in monitoring the nutritional status of IYC.<br>b) **Outpatient Community Referrals:** The system of outpatient community referrals is a government initiative where IYC are referred to clinics interventions, by community agents and clinic staffs. This system can be leveraged to promote ComFA+Fish. Health workers can provide information and guidance on the benefits of ComFA+Fish and how it can be used to improve the nutritional status of IYC.<br>c) **Weighing and Growth Promotion:** Growth promotion centers and health facilities can incorporate information about ComFA+Fish into their routine growth monitoring sessions. This provides an opportunity to educate parents/caregivers about the product and its role in supporting the healthy growth and development of IYC. |
| 5. Are there any specific regulations or compliances that must be met before government agencies like yours could support a ComFA+Fish initiative?<br>– If YES, please explain. | – **Government Official:** "The FDA has to approve foods before they are put on the market. They have to meet health service compliances such as labeling contents, and approval does not take a long time." | Government Officials reported that there are specific regulations and compliances that must be met before government agencies can support a ComFA+Fish initiative, including:<br>a) **Regulatory Approval:** Before a product like ComFA+Fish can be supported by government agencies, it must undergo regulatory approval process to "meet health service compliances." For example, the Food and Drug Administration (FDA) has to approve products to ensure they meets safety and quality standards.<br>b) **Health Service Compliances:** Compliance with health service regulations is important for ComFA+Fish (e.g., proper product nutrition labeling, product serving size, food safety guidelines for proper handling and storage, etc.). |
| 6. Do government agencies like yours require any scientific evidence or research results before they could support a ComFA+Fish initiative?<br>– If YES, please explain. | – None noted. | a) The **Food and Drugs Control Laboratory (FDCL)** of Zambia is a governmental food safety unit within the Ministry of Health in the directorate of Disease Surveillance Control Research. The mandate of FDCL is to protect the public against health hazards and fraud in the manufacture, sale and use of foods, drugs, water. As part of this mandate, FDCL is tasked with ensuring that the foods, drugs and water consumed in Zambia conform to the Food and Drugs regulations of 2001 and World Health Organization |

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| | | (WHO) standards. (Source: https://dlca.logcluster.org/12-zambia-regulatory-departments-quality-control) |
| 7. What factors of ComFA+Fish make it appealing to government agencies like yours? (List all factors mentioned by participants, discuss as necessary) | – **Government Official:** "Kapenta is a cheap source of protein compared to beef and poultry, and having it in powder form makes it easy to consume. Other appealing factors are that consuming Kapenta powder is already well-accepted in the community, and Kapenta is easy to dry [process] here because we have a lot of sunlight." | Factors that Government Officials positively associated with ComFA+Fish – whose key ingredient is locally sourced dried fish powder (made, in this case, using Kapenta) include:<br>a) **Cost-effectiveness: As** Kapenta, being a cheap source of protein, makes ComFA+Fish an affordable option for addressing nutritional needs.<br>b) **Ease of Consumption:** The powder form of ComFA+Fish makes it convenient and easy to incorporate into various dishes, allowing for easy consumption by individuals, including vulnerable populations.<br>c) **Acceptability:** ComFA+Fish has been well accepted by the community, indicating that it has the potential to be embraced by a wider population.<br>d) **Ease of Local Processing:** The availability of ample sunlight facilitates drying Kapenta, making it easier to produce the dried fish powder needed for ComFA+Fish. |
| 8. What factors of ComFA+Fish might make it a challenge for a government agency like yours to support a ComFA+Fish initiative? (List all factors mentioned by participants, discuss as necessary.) | – **Government Official:** "Being able to manage Kapenta fisheries in terms of food and sustainable fishing is important. There's a need for capacity to manage Kapenta harvesting. If we increase community effort [demand] for Kapenta, we may have a deficit in Kapenta supply."<br>– **Government Official:** "We need to know the nutritional contents of different ComFA+Fish foods, so as to not overfeed children."<br>– **Government Official:** In terms of supporting an initiative like ComFA+Fish, "We will need to follow normal processes in our agency and seek guidance from agency officials on what are the right things [procedures]." | Factors that might pose challenges for a government agency to support a ComFA+Fish initiative include:<br>a) **Management of Kapenta Fisheries:** There is a need for capacity-building and effective management of Kapenta fisheries to ensure sustainable fishing practices and adequate supply. If consumption increases without proper management, it could lead to a depletion of fish stocks.<br>b) **Nutritional Quantities:** Ensuring accurate information on the nutritional content of ComFA+Fish is crucial to prevent overfeeding and ensure appropriate portions for children. Guidelines and standards need to be established to provide clear information on the nutritional quantities of the product.<br>c) **Regulatory Compliance:** For an initiative like ComFA+Fish to succeed, there is a critical need to follow established processes and seek guidance and buy-in from agency leaders to ensure that all necessary regulations and compliance requirements are met. |
| 9. Is there anything about ComFA+Fish that could be changed to make it more suitable for government- | – **Government Official:** "There's a need to modify the color of the [ComFA+Fish] Bean-Vegetable Soup to be more appealing." | Some potential changes that could make ComFA+Fish more suitable for government-supported initiatives include: |

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| supported initiatives? (PROBE cost, taste, convenience, norms, knowledge, etc.) | – **Government Official:** "Make recipes more acceptable in communities by having more variety. Give them [community members] different flavors to choose from, so there is a wider range of options."<br>– **Government Official:** "Paying attention to the final cost of the product to [resource-limited] mothers is important, as mothers often have to find ways to supplement the food available to make it more affordable" for the household.<br>– **Government Official:** "There may be a need for price regulations for fisheries. Right now, it's a free market and Zambia follows laws of supply and demand" to set prices for fish.<br>– **Government Official:** "There is a need to standardize the measurement system so that things are measured in kilos." | a) **Variety of Flavors:** Providing a wider range of flavors and recipe options can increase acceptability and cater to diverse preferences within communities.<br>b) **Cost Considerations:** Ensuring that ComFA+Fish remains affordable and cost-effective for mothers is important, as they often need to supplement food to make it more affordable.<br>c) **Standardized Measurements:** Implementing standardized measurements, particularly in terms of weight (e.g., selling and buying by kilos), can bring consistency and transparency to the fish market. |
| 10. Is there anything about ComFA+Fish that could be changed to make it more appealing to the population you serve? (PROBE aroma, appearance, texture, flavor, price, convenience) | – **Government Official:** "Nothing, other than that the color of the [ComFA+Fish] Bean-Vegetable Soup needs to be improved, and considerations regarding the price of the product [ComFA+Fish] must be guiding factors.<br>– **Government Official:** "This new program is welcomed. The government is ready to support the ComFA+Fish initiative if the citizens are."<br>– **Government Official:** "Developing [information] materials for fishers and fish farmers is needed. There are other species that do not sell for good prices, and encourage consumption of those species for nutrition is important.<br>– **Government Official:** "The cost of the product is important. If it [ComFA+Fish] is not affordable, it will not reach every household. And the packaging shouldn't be too expensive because packaging adds to the price of the product. Ten Kwacha for a bag of dried fish powder is affordable." | Participants suggest some potential changes that could make ComFA+Fish more appealing to the population they serve:<br>a) **Price/Affordability:** Keeping the price of ComFA+Fish products affordable is crucial to ensure accessibility for every household. If the price is too high, it may limit the reach and adoption of the product.<br>b) **Material Development:** Exploring the utilization of other fish species that may not sell for high prices but can still contribute to nutrition can broaden the options and encourage consumption. This can help diversify the available choices for consumers.<br>c) **Packaging Considerations:** Packaging plays a role in the final price of the product. Finding ways to minimize packaging costs while maintaining quality and product integrity can contribute to affordability. |