



# **HEALTHYFOODAFRICA PROJECT REPORT (2021)**

**SUBMITTED BY THE**

**CSIR-FOOD RESEARCH INSTITUTE TEAM**

Amy Atter, Ethel Juliet Blessie, Stephen Nketia, Anthonia Andoh-Odoom, Jolene Nyako, Margaret Owusu, Papa Toah Akonor, Hayford Ofori, Jonathan Ampah, Kwabena Bugyei, Mary Obodai, Wisdom Amoa-Awua

## **Project Title**

Healthy Food Africa Project (HFA)- Improving nutrition in Africa by strengthening the diversity, sustainability, resilience, and connectivity of food systems funded by the European Union.

## **Introduction**

The HealthyFoodAfrica initiative is a research and innovation project aiming at more sustainable, equitable and resilient food systems in 10 African cities. The project is a collaborative effort by 17 partners in Europe and Africa, funded by the European Union Horizon2020 programme.

The Council for Scientific and Industrial Research (CSIR) entered into an agreement with the Natural Resources Institute of Finland to implement the EU Horizon 2020 project in Ghana. The CSIR-FSL is represented jointly by the Water Research Institute and the Food Research Institute. The project began in June 2020, and it is expected to be completed in December 2024.

The CSIR-Food Research Institute is actively participating in work packages 2, 4 and 6. The main goal of work package two (2) is to improve nutrition and health through transformation of consumption patterns towards sustainable healthy diets. The activities planned under this work package include collection and analysis of primary and secondary data on food consumption, food choices and dietary patterns, qualitative measurements of nutrient adequacy, and dietary diversity scores among others. Activities under work package four (4) are geared towards the development of innovative post-harvest technologies to improve food safety and reduce food waste. Against this backdrop, the following are some strategies earmarked to be accomplished under this work package, identification of current post-harvest and food safety issues, further development and piloting of relevant technologies and processes and more. Similarly, work package six (6) will focus on the development of novel food products, tools, and processes to support innovative agri-business models. Activities under this work package include participatory identification of innovative foods products, processes, and agri-business models, based on plant-based proteins and local agrobiodiversity. Also, there would be design and piloting of innovative foods products, processes, and agri-business models.

The general project design, therefore, seeks to take a multi-stakeholder network approach where scientists together with stakeholders' co-design the solutions through multi-actor teams. Also, the project will pilot the strategies, innovation, and tools from these studies to improve the supply of sustainable nutritious food products and the dietary habits of urban dwellers. This initiative will focus, identify, and promote the use of indigenous and local underutilized crops, fish, and animal species and encourage the consumption of minimally processed foods. Finally, lessons learned through these pilots will continuously be communicated to a larger range of stakeholders to enable the implementation of best practices.

## **Key activities and achievements**

### **Renovation works completed at the fish processing hall**

Renovation works which began in the year 2020 on the fish processing hall was necessary to provide an ideal working space for smoking experiments to be carried out and for pilots on processes (fish processing) to be implemented under WP6. A stakeholders meeting was held on May 27th, 2021 to update stakeholders on the progress made with the on-going work and seek their views, suggestions and in-person inspection of the facility as they were mostly updated via a WhatsApp platform created. Their expert inputs were implemented to put the facility in a better shape and the hall have been completed. The fish processing unit will house the improved ovens and serve as a centre of excellence where groups and individuals especially women processors would be trained in hygienic fish handling and processing (smoking, drying, canning, packaging etc) as part of the piloting activities under WP6. Fish is mostly (about 80 %) processed by smoking in Ghana. Nevertheless, the improved oven (ahotor) currently used to smoke fish are fraught with many challenges limiting the attainment of zero Polycyclic aromatic hydrocarbons (PAH) in smoked fish in the country. Therefore, the goal of the fish processing unit is to review the smoking process, identify constraints and find ways to mitigate these challenges.



Fig 1 Processing Hall at the start of renovation works.



Fig 2. Tour of the renovated fish processing unit by the HFA project team members and stakeholders

### **Development of Novel Food Products**

To accomplish the objectives of work package six (6) which is a critical aspect of the EU Horizon 2020 project, scientists from the CSIR-Food Research Institute together with

stakeholders and other patterners began trials towards development of some novel foods from indigenous and local underutilised fish and crop species. These products included legume-based foods, cereal-based foods, seasoning and nutritive spices, soup base powders, fish products among others. The Accra Food Systems Laboratory (FLS-Ac) engaged stakeholders and potential product up-takers on the newly developed food products in Accra. The workshop offered enough opportunities for women, men, and youth participants to contribute to the conversations and the matters presented. Mrs. Evelyn Buckman described all the 45 developed food products, the nutritional objective of each product, the challenges encountered during production, and their business prospects. In the end, participants identified about ten (10) different sustainable products that should be further studied for Introduction onto the market. CSIR-FRI has already added some of these products including pancake mix/soy pancake mix, Prekese pellets and koose mix to the range of products on sale at the shop. Some of the products developed are shown below and a full list of the products in the table below.







Fig 3. Some of the novel products developed.

**Table 1. List of products develop and displayed at up-takers/stakeholders meeting**

# Number	Product Name	# Number	Product Name
1	Fish nuggets	25	Brown rice and tigernut pudding
2	Fish floats	26	Pickled tomatoes
3	Fish chips	27	Pickled onions
4	Fish base cereal mix	28	Picked tomatoes and onions
5	<i>Koobi</i> in olive oil	29	Pancake mix with desiccated coconut
6	Tofu	30	Pancake mix with mango
7	Tofu sausage	31	Soy pancake mix/Fruity soy pancake mix
8	Soya bean sausage	32	Instant fruity cereal
9	Soya bean 5% noodles	33	Vacuum packed <i>ademe</i>
10	Soya bean 10% noodles	34	Cut garden eggs
11	Moringa noodles	35	Vacuum packed okro and <i>ademe</i>
12	Moringa base cereal mix	36	Vacuum packed okro and garden eggs
13	Mushroom noodles	37	Vacuum packed betor
14	Mushroom in vinegar	38	<i>Prekese</i> powder/cubes/pellets
15	Mushroom in tomato sauce	39	Watermelon juice
16	Mushroom and dry herrings soup base	40	Pineapple and watermelon juice
17	Turkey berry soup base	41	Pineapple and orange juice
18	Tomato ketchup	42	<i>Koose</i> mix
19	Bambara in tomato ketchup	43	Frozen fish drops
20	Bambara in syrup	44	Baobab yoghurt
21	Bambara base cereal mix	45	Soup tablet
22	Bambara soup base thickener		
23	Bambara and tigernut pudding		
24	Tigernut, bambara and brown rice pudding		



Fig 4. Mrs Amy Atter (Co-PI of the project) explaining the goals of the product development workshop



Fig 5. Mrs Evelyn Buckman explaining the nutritional benefits of each product.





Fig 6. A group of stakeholders at the product development workshop.

#### **Site Identification and Selection in the Eastern and Greater Accra Regions of Ghana**

Under work package 4 of the project, the deliverables include investigating food safety indicators of tilapia (*Oreochromis niloticus*) and catfish (*Clarias gariepinus*), utilisation of tilapia waste such as scales and characterisation of oils from the gut as well as preserving tilapia with indigenous spices. The site identification trip was therefore embarked upon to educate farmers on the Healthy Foods Africa Project and to identify sites involved in tilapia and catfish farming within the Eastern and Greater Accra Regions of Ghana from the 7th to the 12th of April 2021 and the 26th and 27th of April 2021. The site identification activity was very successful with the assistance of Fisheries Commission officers. Some 16 farms practicing the caged, earthen, and wild system of production within the Greater Accra and Eastern Regions were visited.



Fig 7. Interaction with some local fishermen.



Fig. 8 Inspecting dug-out ponds at some farms.

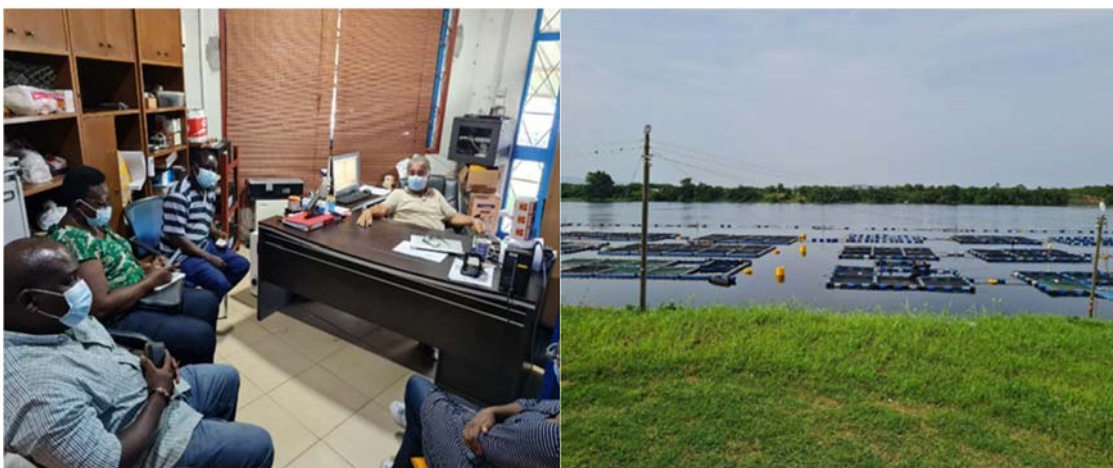


Fig. 9 Team and Mr. Roger Aboujaoude (Managing Director) of Maleka Farms having a dialogue concerning the scope of the Project.





Fig. 10 Inspecting fish smoking shed at some farms.

### Surveys conducted on the project

#### Food safety and nutrition related surveys

Questionnaires developed for surveys under WP4 and 6 were pretested to assess the clarity of the questionnaires to provide the appropriate answers from respondents, after which the questionnaires were modified appropriately. Following the site visits, fish were sampled from the Greater Accra and Eastern regions of the country. The surveys were in three parts: - **(1)** Assessment of food safety knowledge and practices of tilapia fish mongers, processors, and quantification of waste generated in tilapia processing (161 respondents), **(2)** Assessment of food safety knowledge and practices of tilapia fish farmers and fishermen (206 respondents) and **(3)** Taste preferences and food safety knowledge and concerns among consumers (157 respondents). The data collected is currently being analysed. Similarly, fish were sampled from 16 farms in both regions for further studies. Microbiological/Molecular and Chemical analyses are currently being performed on the sampled tilapia from the 16 farms. The 16S sequence data obtained for microbial diversity studies are ready and bioinformatics analyses are being performed on the data. Survey to assess consumer use, consumption patterns of tilapia, and interest/willingness to patronize filleted, spice-preserved and packaged tilapia is completed (960 respondent). Survey on the fish consumption/dietary patterns on fish intake and preferences among Ghanaians in selected communities with Greater Accra and Eastern Regions is still ongoing.



Fig. 11 Fish farmers being interviewed at some sites



Fig. 12 Members of a community being interviewed on food consumption patterns







Fig. 13 Sampling of fish from sites in the Greater Accra, Eastern and Western Region for Microbial analysis, Pesticide residues and Heavy Metal analysis.



Fig. 14 Studies have commenced on sampled tilapia fish to determine the Microbial analysis, Pesticide residues and Heavy Metal analysis.

## Survey on improved stove (Ahotor) performance evaluation

Data was collected from the Greater Accra, Central and Volta regions of Ghana on the existing fish smoking ovens with special focus on the Ahotor Oven. In general, all respondents who used the improved stove (Ahotor) frequently were satisfied with its use of less fuelwood. Thus, saves fuelwood. The improved stove produced less smoke, smoked fish tastes good and gives the fish a golden – brown colour. Furthermore, improved stove (Ahotor) users recorded less or no burns and accidents and less irritation of the eye during operation and were willing to purchase more or recommend to other fish processors. However, despite the advantages of the improved stove (Ahotor) respondents were not willing to discard the Chorkor smoker. 50% of respondents said they will use the Chorkor smoker to support or supplement the improved one. 95% of respondents were of the view that the Chorkor smoker can smoke large capacity than the improved stove (Ahotor) and other 5% said the Chorkor smoker is faster than the improved one in terms of speed. In the future, 85% of respondents asserted that they will be happy and interested to own an improved version of the current improved stoves (Ahotor) particularly when the problem of heat distribution, speed and capacity is solved.







Fig 15. Administering of questionnaires on improved smoking oven.

### **Refurbishment of the sensory laboratory and digitalisation of the unit**

During the year, the project refurbished the sensory laboratory unit. This refurbishment is to present a new and modern sensory laboratory in the Institute, which is more digitalised and environment- friendly. Also, it was expected to be more supportive for research and creative activities following the highest scientific and industry standard methods. The old sensory laboratory did not provide a welcoming and user-friendly environment anymore because of its inability of supplying enough computing workstation and multimedia tools. It was for this reason the project provided the following equipment: computer, computer tablets (9), a printer and an Uninterruptible Power Supply (UPS) as computing workstation to the refurbished laboratory to help with the sensory activities to be carried out on the developed novel food products under work package (WP) 6.



Fig 16. The old sensory laboratory at the CSIR-Food Research Institute before the refurbishment.



Fig 17. The new digitalised sensory laboratory at the CSIR-Food Research Institute after the refurbishment.

### **The procurement of equipment**

During the year the following equipment were procured for the smooth running of the project activities under WP 4 and 6. They include Bead Genie/homogenizer, BIORAD thermal cycler T 100 complete with accessories, BIORAD sub-cell tank system with electrophoresis power supply, Memmert water bath with gabled lid. These were obtained to enhance all the microbiological analysis aspect of the project. Other items also acquired were tablets (6) for data collection and field activities, chest freezer, ice chests (2), printer, packaging/sealing machine and packaging materials to facilitate the improved product packaging drive of the developed products.



### **Visit by project team members from the Tamale Food System laboratory (FSL)**

On the 17th of September 2021, team members from the Tamale-FSL visited the Accra-FSL to learn about the activities of the Accra FSL and find opportunities to collaborate. The principal investigator at the FSL Dr. Victor Yakubu explained the activities of the Tamale-FSL which included the cultivation of cowpea and soyabean. He added that it was their hope to discover avenues to collaborate with the Accra FSL and share knowledge. Another member of the team Dr. Nashiru indicated that they were aware of the innovations under WP6 the Accra FSL publicized on Tiimeri and for this reason decided to visit the FSL to learn first-hand the innovations, with the hope of introducing some of the novelties to their stakeholders and also identify their preference for piloting activities. In the end team members were taken through the novel food products developed by the Accra-FSL, knowledge was shared and many avenues for collaboration were suggested.



Fig 18. Team members from the Accra and Tamale Food System Laboratories (FSLs) interacting during the visit.