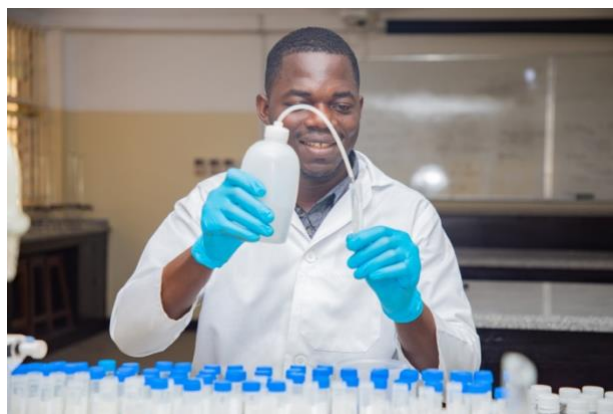


OYSTERS' POTENTIAL AS A RICH SOURCE OF MICRONUTRIENTS IN GHANA MAY BE THREATENED BY HEAVY METAL CONTAMINATION

By Seth Adu-Afarwuah and Brietta M. Oak

In June-July 2022, Francis Zinenuba Taabia collected hundreds of oyster samples from three estuarine sites in Ghana including the Bortianor area (Densu Estuary, Greater Accra Region), Ekumfi Narkwa (Narkwa Lagoon, Central Region), and New Amanful-Apremdo-Beahu area (Whin Estuary, Western Region). He carefully shucked the oysters, extracted and hand-cleaned the meat, packed, and labelled them individually in polystyrene bags and headed for the laboratory in the Department of Nutrition and Food Science at the University of Ghana.



Taabia's photo was taken while helping with the analysis of the oyster samples. (Photo by Samuel Bioh)

Taabia, a 34-year-old PhD candidate in the Department of Nutrition and Food Science at the University of Ghana, assisted in the analysis of a total of 915 oyster samples in the lab over the next few months. Working on an activity led by Brietta Oaks from the University of Rhode Island and Seth Adu-Afarwuah from the University of Ghana, Taabia's work has helped determine the concentration of essential minerals in these oysters, identifying oysters as a key food that could be used to address micronutrient deficiencies common in Ghana. This analysis has also led to the discovery that heavy metal contamination is a concern in the area. High levels of mercury are evident in the oysters as well as contamination with arsenic, cadmium, and lead.

The Feed the Future Innovation Lab for Fish (Fish Innovation Lab), alongside the University of Ghana and the University of Rhode Island, is conducting this research in Ghana to examine the potential contribution of oysters to the iron and zinc intakes of women shellfishers 15-49 year of age across three estuarine sites in Ghana and to assess whether heavy metal contamination of oysters is a concern at these sites. This Fish Innovation Lab activity is supporting Taabia's dissertation research with funding for field work, laboratory analysis of the oyster samples, and write-up of results.

In Ghana, harvesting and processing of oysters are the mainstay of household subsistence and income for many women (i.e., women shellfishers), living along estuarine sites where oysters are consumed frequently. Despite a substantial reduction during the last few decades, the prevalence of anemia in the country remains high, partly because of low iron intakes from animal-source foods. In 2017, 36% of children 6-59 months of age and 22% women 15-49 years of age were anemic, and 22% of children 6-59 months of age and 14% women 15-49 years of age had iron deficiency. Oysters might provide an easily accessible source of protein and micronutrients to contribute to anemia prevention among women shellfishers in Ghana, but the health risks of their consumption due to heavy metal contamination has not been well-investigated.

"For the oyster samples analyzed, the average concentration per 100 g wet weight was 12.5 mg for iron, 8.2 mg for zinc, and 0.54 g for selenium," Taabia said. "These are relatively high mineral concentrations, which

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suggest that oysters could provide an accessible and rich source of these micronutrients to address anemia among women and children living along the estuarine sites.”

When Francis enrolled in the PhD program in 2021, he was not sure he could complete the program on time, knowing how difficult it is for students at the University of Ghana to find research support. Now, after completing the mineral and heavy metal analysis of the oyster samples thanks to the assistance from the Fish Innovation Lab activity, he is on track to finish his PhD on time while also getting to work in his area of interest, which is maternal and child nutrition.

“The problem is that nearly all the oysters collected from the three sites exceeded the EU/FAO regulatory maximum limit for arsenic, cadmium, lead, and mercury,” he said. “The combined Hazard Index for these four heavy metals was high at all three sites, with mercury being the primary driver. Unfortunately, this indicates that women shellfishers at the three sites may be at risk of adverse health effects from oyster consumption due to heavy metal contamination.”

Francis agrees that the potential sources of heavy metal contamination of oysters in Ghana include artisanal gold mining, which involves panning soil with elemental mercury, and lead battery manufacturing and recycling.

“I hope the results from these analyses will help in the advocacy to reduce heavy metal contamination (especially mercury) in the country’s estuary waters,” Taabia said, “through increased use of mercury-free mineral processing equipment.”

ABOUT THE FISH INNOVATION LAB

The Fish Innovation Lab supports the United States Agency for International Development’s agricultural research and capacity building work under Feed the Future, the U.S. Government’s global hunger and food security initiative. Mississippi State University is the program’s management entity. The University of Rhode Island, Texas State University, Washington University in St. Louis, and RTI International serve as management partners.

www.feedthefuture.gov
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