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MICRONUTRIENT IMPACT OF OYSTERS IN THE DIET OF WOMEN SHELLFISHERS

In Ghana, oyster shellfishing offers a rich source of iron and other nutrients for women shellfishers who engage in oyster harvesting, processing, and marketing. Little is known about the level of oyster consumption among women shellfishers and the extent to which oysters contribute to the women's iron and zinc intakes. Additionally, data on the heavy metal contamination of oysters in Ghana are limited. This activity aimed to examine nutrition outcomes including food intake, food insecurity, dietary diversity, and anemia prevalence among women shellfishers in three estuarine areas in Ghana. The research team also aimed to determine the mineral and heavy metal concentrations of oysters from each of the three sites and to analyze the safety risks posed to the women shellfishers of reproductive age by arsenic, cadmium, lead, and mercury related to the consumption of oysters.

Woman with oysters. Photo by Seth Adu-Afarwuah

METHODS

The team conducted a cross-sectional study among 504 women shellfishers living near three oyster estuarine sites along the coastline of Ghana. The three sites were: 1) the Densu (*highly degraded* mangrove ecosystem and *underexploited* fisheries health status), 2) Narkwa (*moderately degraded* mangrove ecosystem and *overexploited* fisheries health status), and 3) Whin (*less degraded* mangrove ecosystem and *fully exploited* fisheries health status). The team collected information on the women's demographic and socioeconomic characteristics, household food security, and dietary intake. The researchers determined anemia prevalence by collecting a drop of blood by fingerprick for each woman and using an instant reading device to determine hemoglobin concentration, which is often a proxy indicator for iron deficiency. Across estuarine sites, the team examined average oyster consumption and its relationship with nutrient intakes (including iron intake from oysters), household food security, diet diversity, and anemia prevalence. The team measured the mineral and heavy metal concentrations of 915 oysters collected from the three estuarine sites and evaluated the potential health risks of exposure to heavy metals (arsenic, cadmium, lead, and mercury) by calculating the Hazard Index (HI) for oyster consumption among women shellfishers, with an HI above 1 indicating a health risk concern.

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ACTIVITY TEAM

U.S. PI
Brietta Oaks, PhD
University of Rhode Island

Ghana PI
Seth Adu-Afarwuah, PhD
University of Ghana

RESULTS

The average age of 32 (± 9 years) was generally similar for women across sites, and socioeconomic status (indicated by wealth-poverty score) was higher among Densu and Whin women than among Narkwa women. This reflected broader trends in the communities, with 63% of Densu households and 65% of Whin households reporting higher socioeconomic status compared to 37% of Narkwa households. Only 12.5% of the women shellfishers reported consuming any oysters when asked about dietary intake for the previous day on two different days. Oyster consumption was higher among women from the Densu and Narkwa than women from the Whin. Iron intake from oysters was significantly higher among the Densu women (0.4±1.3 g/day) than the Whin women (0.02±0.20), with that for the Narkwa women (0.3±1.7) not significantly different from the other sites. Approximately 92% of women were identified to have some form of household food insecurity, and the prevalence of severe food insecurity ranged from 72% in the Densu to 85% in Narkwa. A total of 20% of the women had anemia and only 21% achieved dietary diversity.

The oysters differed significantly across the sites in the concentrations of the 17 minerals and heavy metals measured. Iron concentration was highest in the oysters from Narkwa (147±142 mg/kg wet weight) and lowest in the Whin (103±87 mg/kg wet weight). None of the oysters exceeded the maximum concentration limit for arsenic, cadmium, lead, or mercury, except for one oyster sample from the Narkwa site, which exceeded the maximum concentration limit for mercury. The average cumulative HI for oyster consumption among the women shellfishers ranged from 0.04 at the Whin site to 0.13 at the Narkwa site; none of the estuarine sites had an average HI exceeding 1. At all three sites, the primary driver of the HI values among the women shellfishers was mercury followed by lead.

CONCLUSION

The level of oyster consumption among the women shellfishers at the three estuarine sites in Ghana may be too low to make any substantial impact on the women's iron and zinc intakes from oysters. More research is needed to explore how women living in estuarine areas in Ghana might use shellfishery resources to prevent anemia. Heavy metal contamination does not appear to pose a major health risk for the women shellfishers related to oyster consumption. Promoting oyster consumption may be a promising strategy to increase nutrient intakes and prevent anemia in estuarine communities. There should be regular monitoring of mercury and lead contamination of oysters and other aquatic animal foods, especially at the Narkwa area.

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.

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