Heavy Metal (Pd, Cd, Fe, Zn And Mn) Levels in Shrimp By- Catch Spp From Industrial Shrimp Trawl Fishery in Nigerian Coastal Waters

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Introduction

- By-catch is non-target mostly fish species which are got from Industrial Shrimp Trawl Fishery in Nigerian Coastal Waters. Millions of people in Lagos feed on fish by-catch because it is affordable, small and tasty and women are involved in commercial aspect.

  Fishes being one of the main aquatic organisms in the food chain may often accumulate large amounts of certain metals (Mansour and Sidky, 2002).

- Ecotoxicologists and environmental scientists use the term "heavy metals" to refer to metals that have caused environmental problems. The metals which have been studied extensively the last decades are: Cadmium(Cd), Mercury (Hg), Zinc (Zn), Copper (Cu), Nickel (Ni), Chromium (Cr), Lead (Pb), Cobalt(Co), Vanadium (V), Titanium (Ti), Iron (Fe), Manganese (Mn), Silver (Ag) and Tin (Sn).

Justification

- Seafood safety
- Paucity of data.

- **Fish Collection**

  Total sample of 500 by-catch species (*Cynoglossus senegalensis, Galeoides decadactylus, Pseudotolithus senegalensis, Pteroscion peli and Trichurus lepturus*) was randomly collected from commercial shrimp trawlers monthly from March 2010 to October 2011, at the by-catch landing port at Apapa Liverpool, Lagos, Nigeria. The samples were taken to the Nigerian Institute for Oceanography and Marine Research Laboratory where it was digested

Schneider (1990) was used in identifying the fish species. Three samples of representative size of each species were used in heavy metal analysis.

- **Metal Analysis**

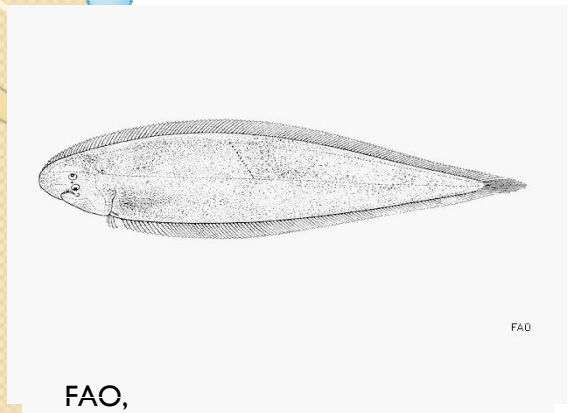
  The fish tissue samples were digested using the methods of GEF GCLME(2009). All the samples were analyzed in five replicates for heavy metals (Pb, Cu, Fe, Mn and Zn) using Varian AA 600 Atomic Absorption Spectrometer. All reagents used during analysis were of analytical grade and deionized water was used throughout the study.

MATERIALS AND METHODS

Fig 1: Map of Nigeria

Map source- www.geographic.org used with permission.

DATA COLLECTION



FAO, 2007

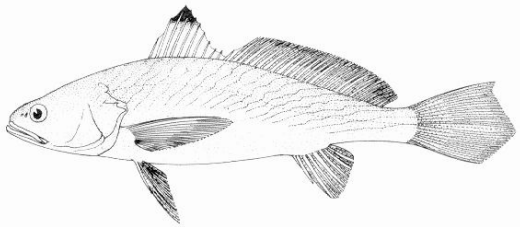
Fig 2: Cynoglossus senegalensis

Found on sand and mud bottoms of coastal waters. Feeds on mollusks, shrimps, crabs and fish

http://eol.org/

Fig 3: *Galeoides decadactylus*

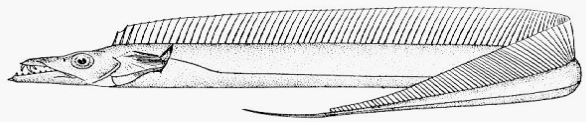
Occurs over sandy and muddy bottoms in shallow waters, frequently in brackish habitats. Feeds on benthic invertebrates.



FAO, 2007

Fig 4: Pseudotolithus senegalensis

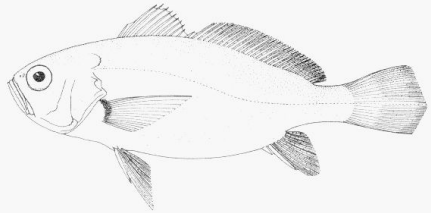
Found in coastal waters over muddy, sandy or rocky bottoms. Smaller individuals found in shallow waters, but rarely entering estuaries. Feed on fish, shrimps and crabs Most economically important demersal fish in West African waters.



FAO, 2007

Fig 5: Trichiurus lepturus

Generally over muddy bottoms of shallow coastal waters. Often enter estuaries



FAO, 2007

Fig 6: Pteroscion peli

Found in mid-water, over mud and sand bottoms in coastal waters. One of the most abundant sciaenids in shallower waters Feeds on fish, cephalopods, shrimps, and annelids .

Lead is a toxic metal whose widespread use has caused extensive environmental contamination and health problems in many parts of the world. It is a cumulative toxicant that affects multiple body systems, including the neurologic, hematologic, gastrointestinal, cardiovascular, and renal systems.

Cadmium exerts toxic effects on the kidney, the skeletal and the respiratory systems, and is classified as a human carcinogen.

A high-**zinc** diet has been shown to induce hypocalcaemia and bone resorption in rats.

Manganese (Mn) is a naturally occurring element that is found in rock, soil, water, and food. Thus, all humans are exposed to manganese, and it is a normal component of the human body. Food is usually the most important route of exposure for humans.

SORTING, DIGESTION AND ANALYSIS

Fig 7: Sorting and preparation of fish for digestion

Fig 8: Digest ready to be analysed in the laboratory

Results

Table 1: Concentration of heavy metals (mg l^{-1}) in shrimp trawl by-catch spp

Fish spp	Pb	Cd	Fe	Zn	Mn
Galeoides decadactylus	0.032	0.1076	1.3166	2.7705	0.267
Pseudotolithus senegalensis	0.03	0.066	1.201	1.013	0.143
Pteroscion peli	0.0404	0.011	1.23	2.202	0.105
Trichurus lepturus	0.032	0.111	1.023	2.661	0.105
Cynoglossus senegalensis	0.039	0.088	0.817	2.603	0
WHO prescribed limits	1.2	<25	3	5	3

Discussion

- *Pseudolithus senegalensis* had the highest concentration (mg l^{-1}) of lead (0.0404 ± 0.074)

- Galeoides decadaetylus had the highest concentration of Cd (0 .1076 ± 0.01151) and Fe (1.3166 ± 0.3171), Zn (2.7705 ± 0.2115) and Mn(0.2677 ± 0.1376).

- These are all within WHO and FEPA prescribed limits, the implication is that the fish is safe to eat; further monitoring is needed to ensure food safety of fish.

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