

Mercury monitoring activities and plans in Fiji

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Institute of Applied Sciences

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Overview

- Introduction
- Limitation and knowledge GAPS
- Future activities
- Concluding remarks



Introduction

- **Background**

- The Institute of Applied Sciences (IAS) of the University of South Pacific is a research and commercial entity of the university that provides service to its 14 Pacific Island member Countries in the Pacific Island Region (PIR)
- One of six regional reference laboratories for POPs under the Stockholm Convention (ambient air, human milk, plasma and water)
- The Analytical Laboratory of IAS has 4 units (Water, Food, Microbiology and Biofuel) that is accredited under ISO17025 and IANZ (International Accreditation of New Zealand).
- Total mercury (accredited test under compliance with IANZ requirements)



Pacific Islands

REGIONAL REPORT

Regionally Based Assessment of Persistent



The importance of the aquatic environment to the people of the Pacific cannot be overstated. The ocean is a primary source of food and revenue for most nations in the region, and it is important that this not be adversely affected by chemical contaminants.

The amount of available data on environmental levels of PTS in the **Pacific Islands Region** is extremely limited. Many Pacific Island countries appear to have had no PTS analyses performed.



Global Mercury Assessment 2013

Sources, Emissions, Releases and Environmental Transport

Further increases in atmospheric emissions will have long-term consequences for commercial fisheries and all consumers of marine and freshwater foods.

HUMAN MERCURY EXPOSURE IN RELATION TO FISH CONSUMPTION IN FIJI

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participants from Dravuni and Daku villages of Kadavu. The method used for the determination of total Hg in human hair used was similar to that for fish tissue digestion mentioned earlier. The background total Hg in hair was $0.17 \mu\text{g/g}$ determined in the control group. In the total fish consuming population the men ($n = 20$) had total hair [Hg] of $5.06 \mu\text{g/g}$ and consumed an average of 7 serves of fish meals/week, women ($n = 56$) had hair [Hg] of $2.73 \mu\text{g/g}$ and consumed an average of 5 serves of fish meals/week and children ($n = 6$) had hair [Hg] of $3.09 \mu\text{g/g}$ and consumed average of 5 serves of fish meals/week. The mean total [Hg] in hair of

The total hair [Hg] in all men exceeded the USEPA safety limit of approximately $1 \mu\text{g/g}$ in hair and 85% of them exceeded the recommended FAO/WHO safety limit of $3 \mu\text{g/g}$ in hair. Only 69% of the childbearing age women had total hair [Hg] below the FAO/WHO safety limit and 6% of the childbearing age women had hair [Hg] above WHO safety limit of $10 \mu\text{g/g}$, an earlier safety limit derived from the Iraqi data which estimated level at which health effects occur but did not include some uncertainty factors included in later safety limit. In the total fish consuming population 44% of the participants have exceeded the FAO/WHO safety limit.

Table 8a. PIC HEAVY METAL ANALYSES

Location & Reference	Substrate & Sample Numbers	Level (Range, Median)		Units ^a
		Pb	Hg	
Solomon Islands Naidu et al, 1991	sediment (12)	18.7 - 79.5 53.1	-	ppm DW
Fiji Tamata & Thaman, 2000	sediment (5)	0.03 - 0.08 0.03	<0.001	ppm WW
Fiji, contaminated site Naidu & Morrison, 1994	sediment (5)	0.21 - 116,000	0.2 - 1.34	ppm DW
Fiji Gangaiya et al, 1988	sediment (6)	6.8 - 10 7.7	<0.2	ppm DW
Fiji Morrison et al, 1997	sediment (7)	3 - 17 5	0.029 - 0.240 0.034	ppm DW
Fiji Morrison et al, 2001	sediment (25)	3.32 - 13.25 7.54	0.061 - 0.185 0.111	ppm DW
American Samoa AECOS, 1991	sediment (6)	25 - 54 27	0.02 - 0.09	ppm WW
Fiji Naidu et al, 1991	sea water (35)	<10 - 19 <10	<1 - 8.8 1.0	µg/L
Fiji Tamata & Thaman, 2000	sea water (21)	<1 - 1.3 <1		µg/L
Fiji Morrison et al, 1997	sea water (36)	0.3 - 3.0 0.6	<2	µg/L
American Samoa AECOS, 1991	sediment (6)	0.050 - 0.060 0.055	<0.01	ppm WW

Fiji Naidu et al, 1991	<i>Crassostrea mordax</i> (32)	<0.5 - 5.48 0.63	<0.001 - 0.061 0.017	ppm WW
Vanuatu Naidu et al, 1991	<i>Anadara sp.</i> (2)	<0.5 - 0.6	0.02 - 0.04	ppm WW
Vanuatu Naidu et al, 1991	<i>Crassostrea mordax</i> (4)	0.72 - 0.94 0.90	0.01 - 0.04 0.02	ppm WW
Kiribati Naidu et al, 1991	<i>Anadara sp.</i> (3)	0.2 - 0.5 0.2	<0.1 - 5.6 5.5	ppm WW
Tonga Naidu et al, 1991	<i>Gafrarium tumidum</i> (5)	<0.50	0.022 - 0.191 0.043	ppm WW
Fiji contaminated site Naidu & Morrison, 1994	<i>C. mordax</i> (5)	5.6 - 12.7	0.55 - 0.95	ppm DW
Fiji Gangaiya et al, 1988	<i>G. tumidum</i> (20)	0.45 - 0.90 0.60	0.05 - 0.20 0.10	ppm DW
Fiji Morrison et al, 1997	<i>Anadara sp.</i> (4)	<5	0.32 - 0.56 0.34	ppm DW
Fiji Morrison et al, 2001	<i>Anadara sp.</i> (5)	2.9 - 4.6 3.7	0.037 - 0.099 0.046	ppm DW
American Samoa AECOS, 1991	fish (11)	0.1- 7.9 2.1	<0.01 - 0.08 0.03	ppm WW
“Acceptable” levels	soils ^b	400	6.1	ppm
	drinking water ^b	15	3.6	µg/L
	shellfish ^c	2.0	0.5	ppm

Notes:

(a) WW = wet weight, DW = dry weight

(b) Preliminary Remediation Guidelines, USEPA Region 9

(c) Australia New Zealand Food Standards Code

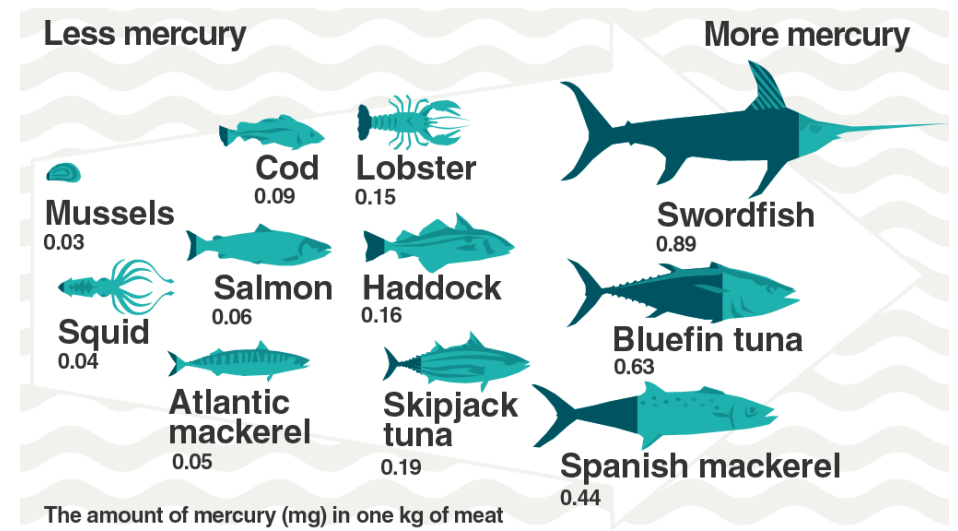
Fiji IAS, 1992	canned tuna (15)	-	0.07 - 0.97 0.21	-	ppm WW
Fiji IAS, 1992	canned tuna (13)	-	0.01 - 0.27 0.12	-	ppm WW
Solomon Islands Kannan et al, 1995	fish flesh (3) fish liver (2)	-	-	0.2 - 1.4 0.8 89 - 120	ppm WW
Tonga Morrison & Brown, 2000	shellfish (80)	<2	<2	<2	ppm DW
Samoa Govt. of Samoa, 1993	shellfish (4)	0.005 - 0.30	<0.002 - 0.03	0.13 - 0.45	ppm DW
Guam USEPA, 2001	fish (30)	0.16 - 6.01	<0.009 - 0.045	<0.42 - <0.79	ppm WW
"Acceptable" levels	soils ^b	400	6.1	180	ppm
	drinking water ^b	15	3.6	110	µg/L
	Shellfish ^c	2.0	0.5	25	ppm

Notes:

(a) WW = wet weight, DW = dry weight

(b) Preliminary Remediation Guidelines, USEPA Region 9

(c) Australia New Zealand Food Standards Code



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IAS Laboratory Staff undergo Mercury Sampling Training

18.01.2018 10:52 Age: 230 days
Category: IAS News

The Institute of Applied Sciences (IAS) Laboratory Services staff were trained on Mercury Sampling by the IDEA Inc Consultants from Japan who visited Fiji in December 2017. The training which was held at the IAS laboratory is part of an initiative by the Ministry of Environment of Japan on monitoring mercury levels in the Pacific Island Region. Apart from Fiji, the consultants had also visited Samoa and Papua New Guinea to gain better understanding on such activities in the Pacific region and to develop long-term monitoring networks on mercury levels in the regional environment and populations.

IAS is one of the six global regional reference laboratory for persistent organic pollutants (POPs) and IDEA had explored establishing a partnership with IAS (along with JICA and the Government of Japan)



IAS Laboratory Services Manager, Dr Vincent Lal and staff pose with the IDEA Consultants team

Limitation and knowledge GAPS

- Lack of capacity (air quality assessment for Hg)
- No monitoring program in place for Hg
- No baseline on wet deposition (levels of Hg)
- Lack of capacity methyl mercury (biological and environmental)
- Lack of inventory (storage, disposal and emission sources of Hg)
- Trends for Hg in Fiji and the PIR

Future activities

- Networking (joining the APMMN and “expert laboratories”)
- Capacity building and training (Hg in air and wet deposition)
- Establishment of Hg monitoring sites (active and passive samplers)
- USP-IAS service to regional member Islands Countries that are signatories to the “Minamata Convention”
- Article 19 (Research Development and Monitoring)
- Article 22 (Effectiveness Evaluation)
- Extension of compliance for Hg accredited tests
- Data towards “baseline” for Hg in fish, water, air and population

Conclusion remarks

- The amount of available data on Hg in Fiji and other PICs is very limited
- Capacity building (sampling and testing Hg and methyl mercury)
- Developing monitoring and assessment capacity in a regional centre

Thank you...any questions.