EPA
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Meta-analyses on Fish consumption for US general and American Indian populations

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Introduction

- Concerns of health risks from fish consumption are a priority of tribes
- There are risks as well as benefits for fish consumption
- Important to assess fish intake and exposure of PCBs and MeHg
- Meta-analyses helps to integrate various studies for tribal fish consumption

Daily fish intake for NHANES and Tribal populations

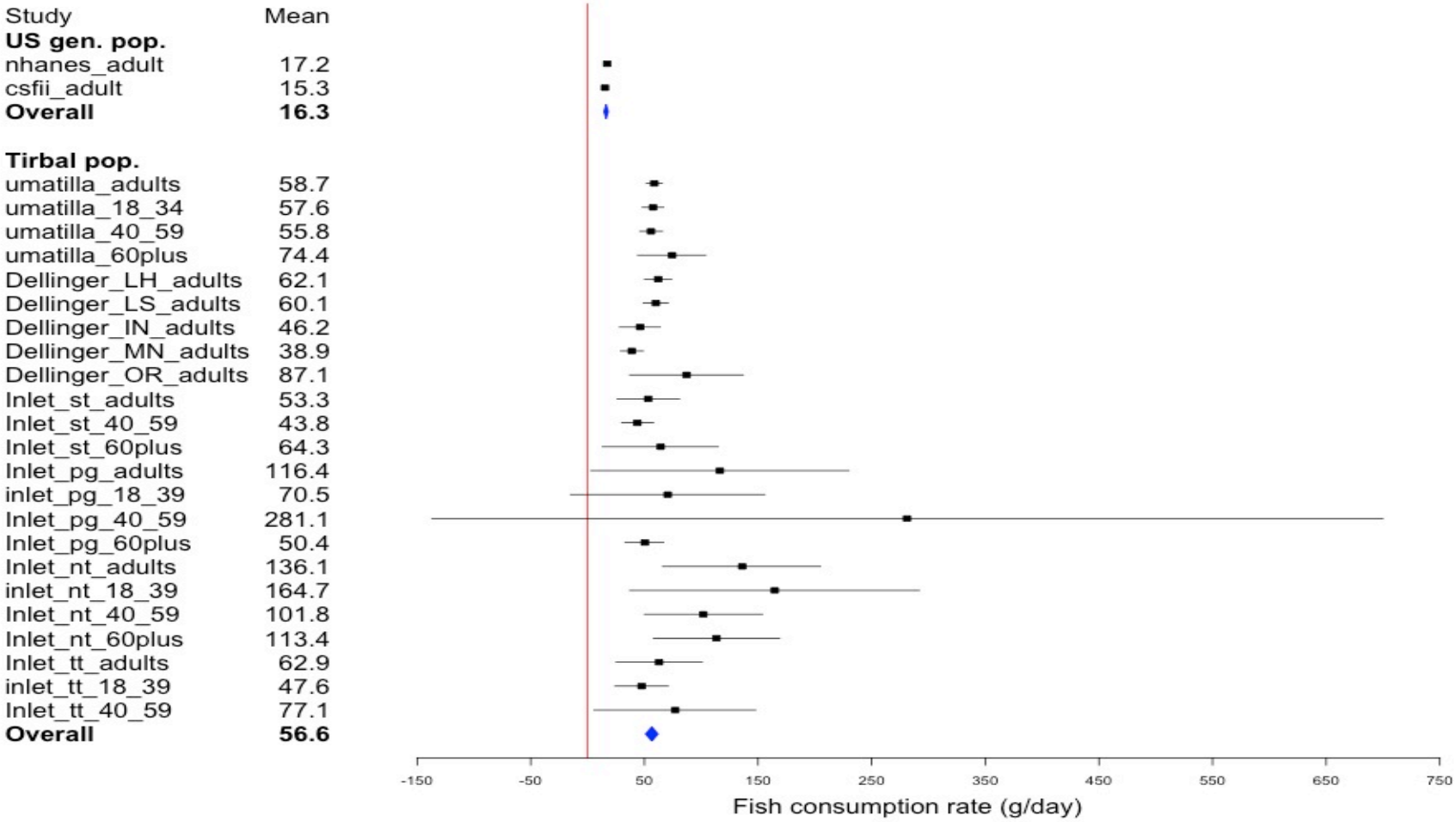
	g/kg bw/day			g/day		
Group	Mean	90th	95th	Mean	95th	99th
Mexican American (0-19)	0.18	0.00	1.05	6.0	36.7	146.5
Mexican American (20+)	0.24	0.73	1.74	17.9	128.0	297.8
Non-Hispanic White (0-19)	0.14	0.00	0.86	5.1	31.8	127.6
Non-Hispanic White (20+)	0.21	0.73	1.45	16.7	113.4	260.5
Non-Hispnaic Black (0-19)	0.22	0.41	1.55	8.3	55.8	168.7
Non-Hispnaic Black (20+)	0.26	0.91	1.59	21.7	133.0	291.6
Other Hispanic (0-19)	0.18	0.00	0.99	5.8	40.0	150.7
Other Hispanic (20+)	0.24	0.81	1.56	16.9	110.6	262.8
APNM (0-19)	0.33	0.96	2.20	10.3	62.8	184.1
APNM (20+)	0.46	1.69	2.53	30.7	167.8	327.9
Toy, K.A 1996	0.89	2.31	2.94			
Suquamish 2000	2.71	6.19	10.09			
Columbia River Inter-Tribal Fish Commission. (1994)				58.7	170.0	389.0

Table 2

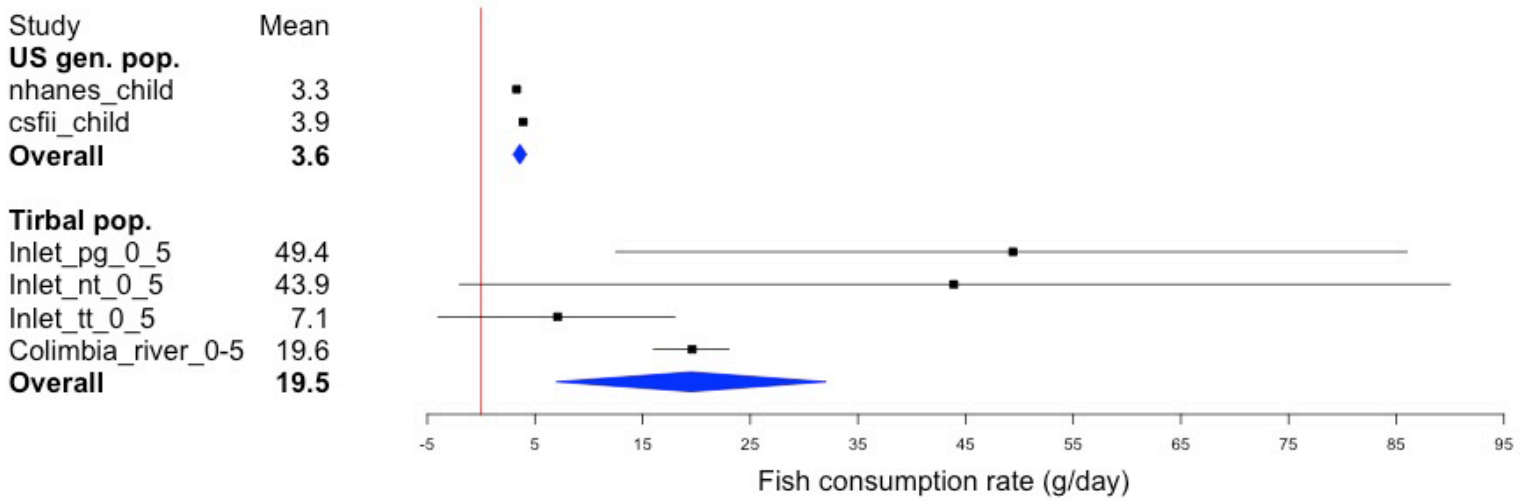
Meta analysis for fish consumption of different age groups (g/day)

Age group	Population	Sample Size	Lower Limit	Upper Limit	Mean	Ratio
Adult	U.S. General population	70310	14.4	18.2	16.3	
	Tribal population	1972	50.9	62.4	56.6	3.47
Children	U.S. General population	33315	2.9	4.3	3.6	
	Tribal population	211	7.0	31.9	19.5	5.42
0 to 10	U.S. General population	43029	4.0	4.4	4.2	
	Tribal population	211	6.9	31.9	19.5	4.64
0 to 20	U.S. General population	66337	3.8	6.2	5.0	
	Tribal population	228	17.9	46.2	32.1	6.42
20 to 30	U.S. General population	11109	9.9	16.7	13.3	
	Tribal population	310	43.9	69.2	56.6	4.26
30 to 40	U.S. General population	11552	15.2	19.1	17.2	
	Tribal population	23	43.9	69.2	56.6	3.29
40 to 50	U.S. General population	11238	12.2	22.8	17.5	
	Tribal population	495	46.6	63.5	55.0	3.14
50 plus	U.S. General population	31007	16.1	19.0	17.5	
	Tribal population	264	47.5	70.7	59.1	3.38

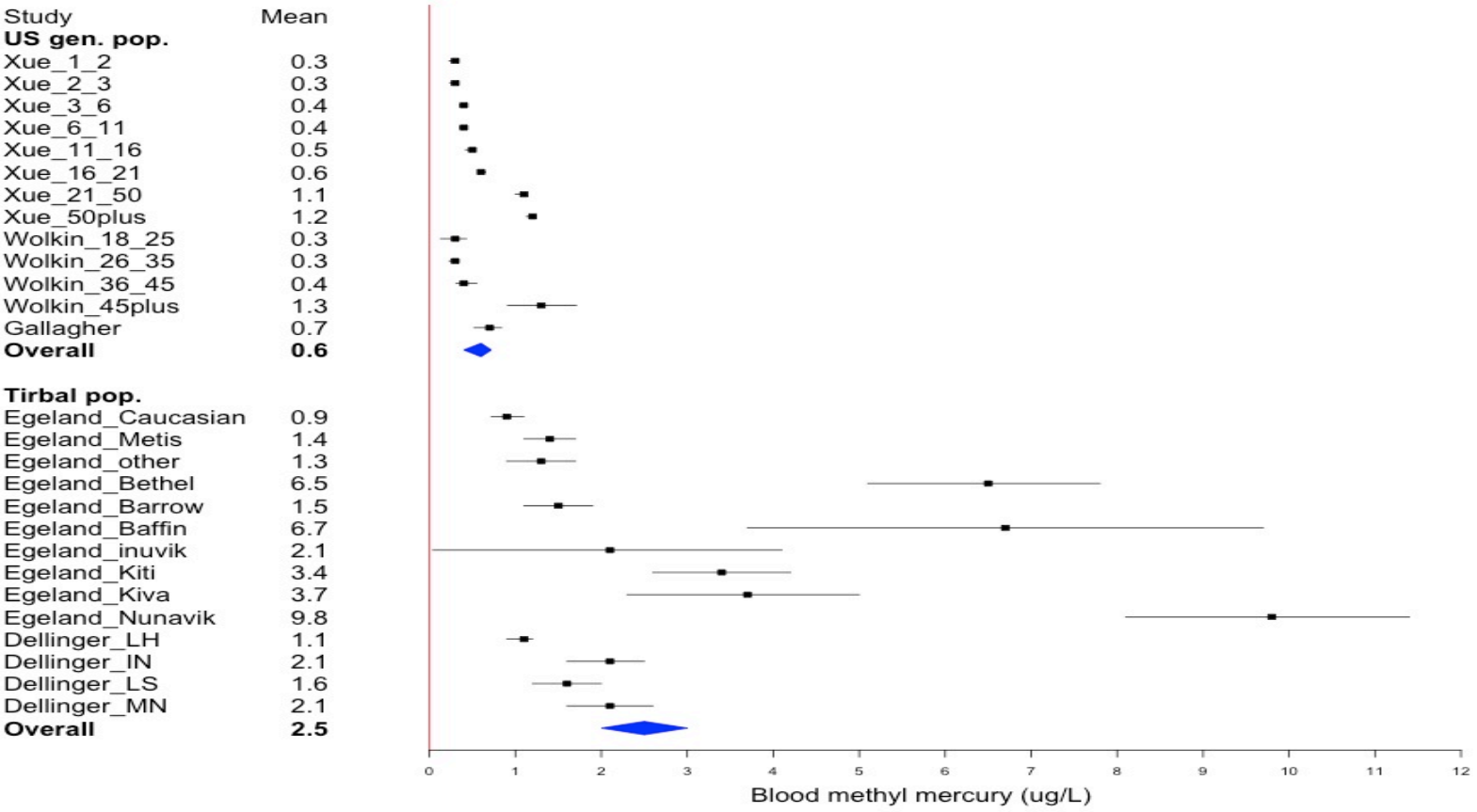
Daily fish consumption rate of U.S. general and tribal adult (18+ years old) populations



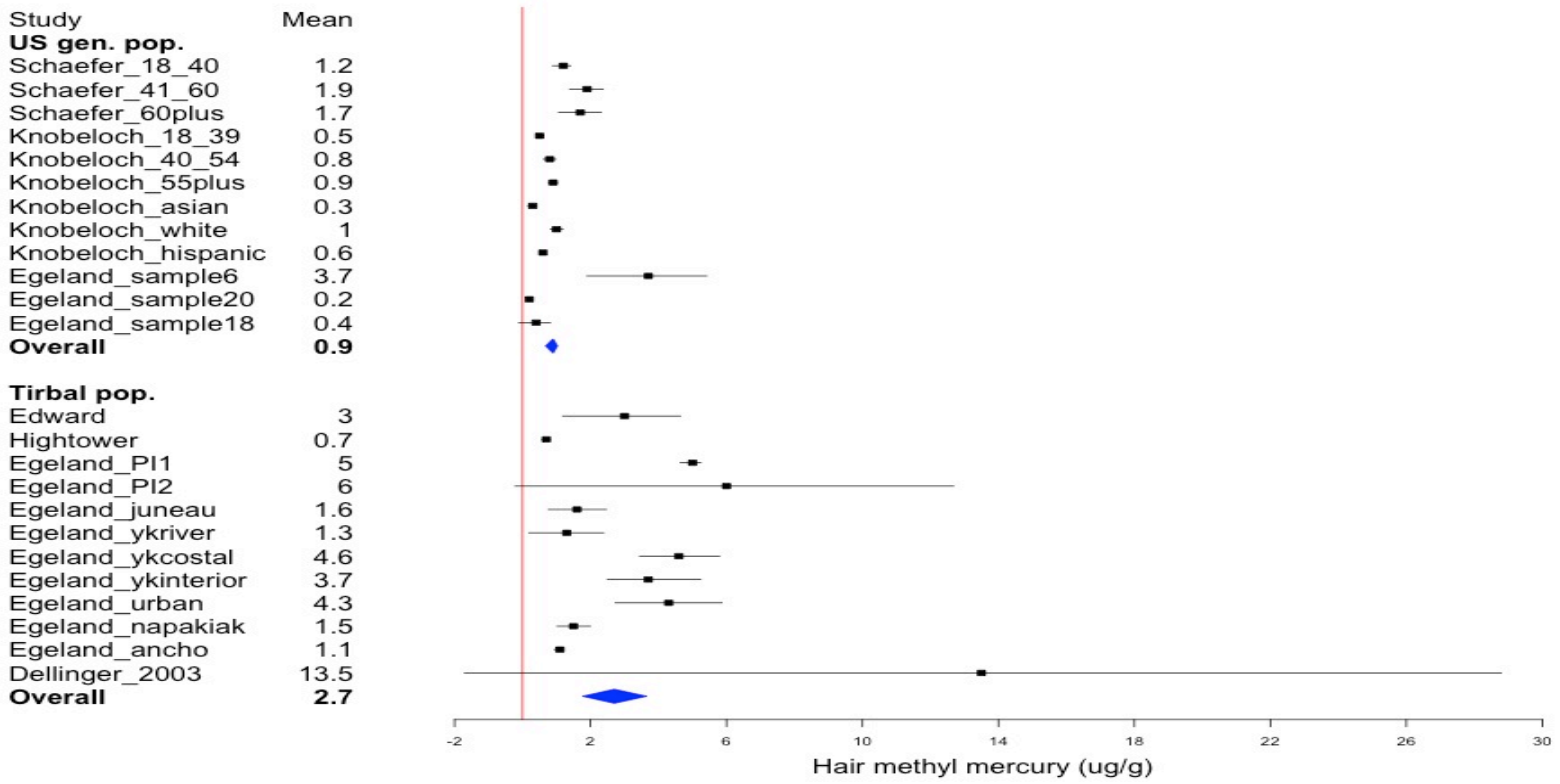
Daily fish consumption rate of U.S. general and American Indian children (0-6 years old) populations



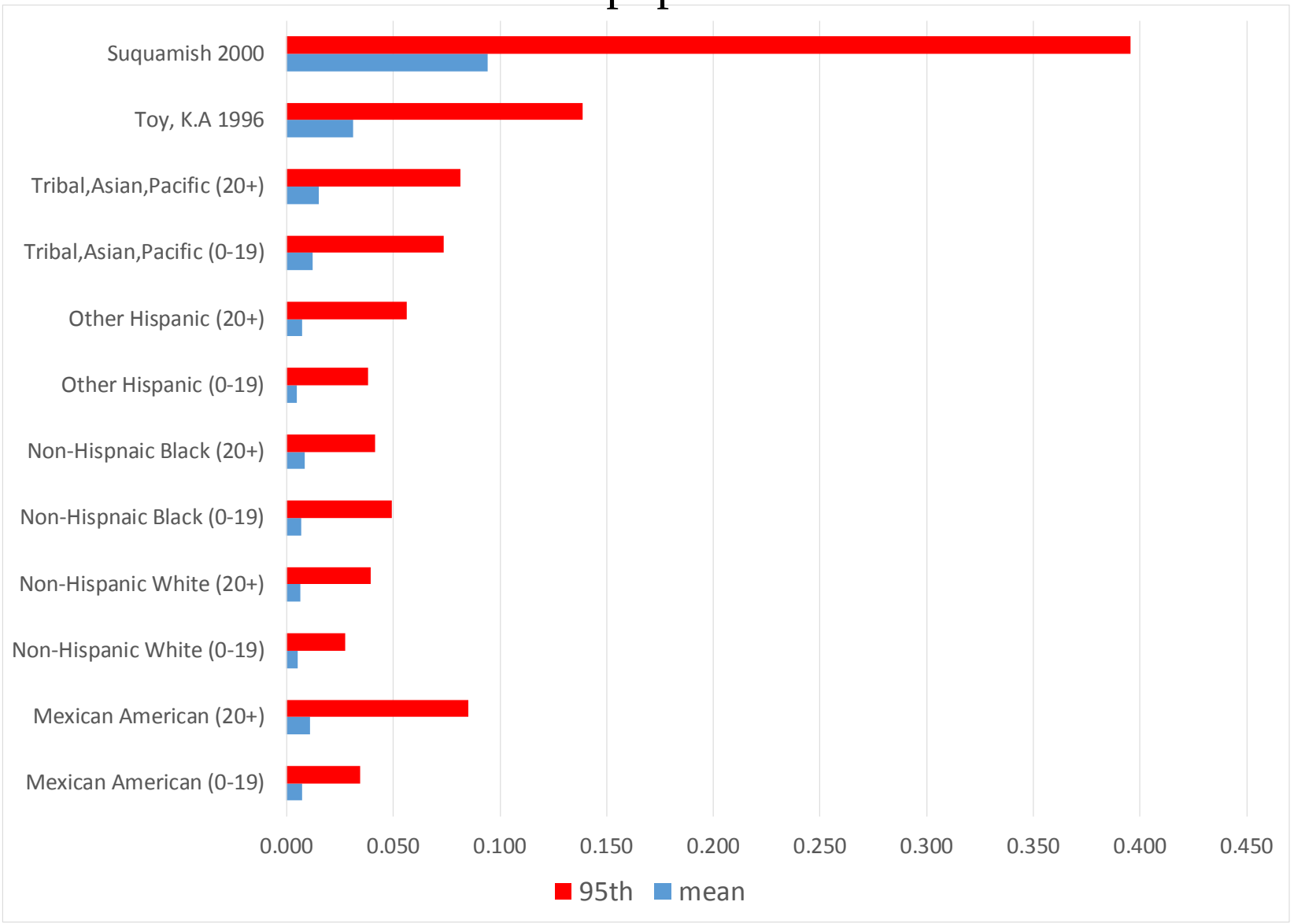
Blood MeHg level of U.S. general and tribal populations



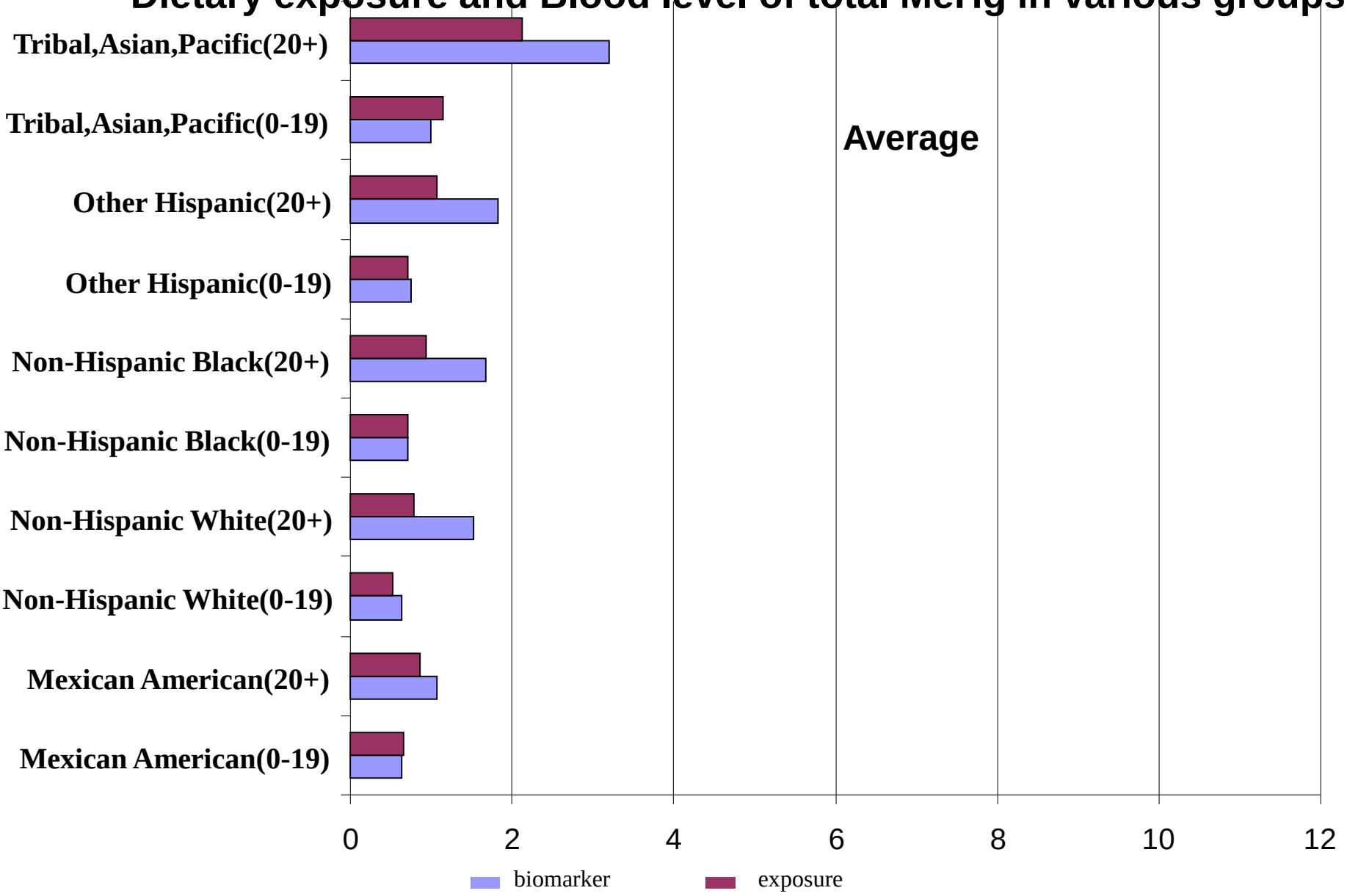
Hair MeHg level of U.S. general and tribal populations



Total PCBs exposures by percentiles for U.S. (NHANES) and Tribal populations



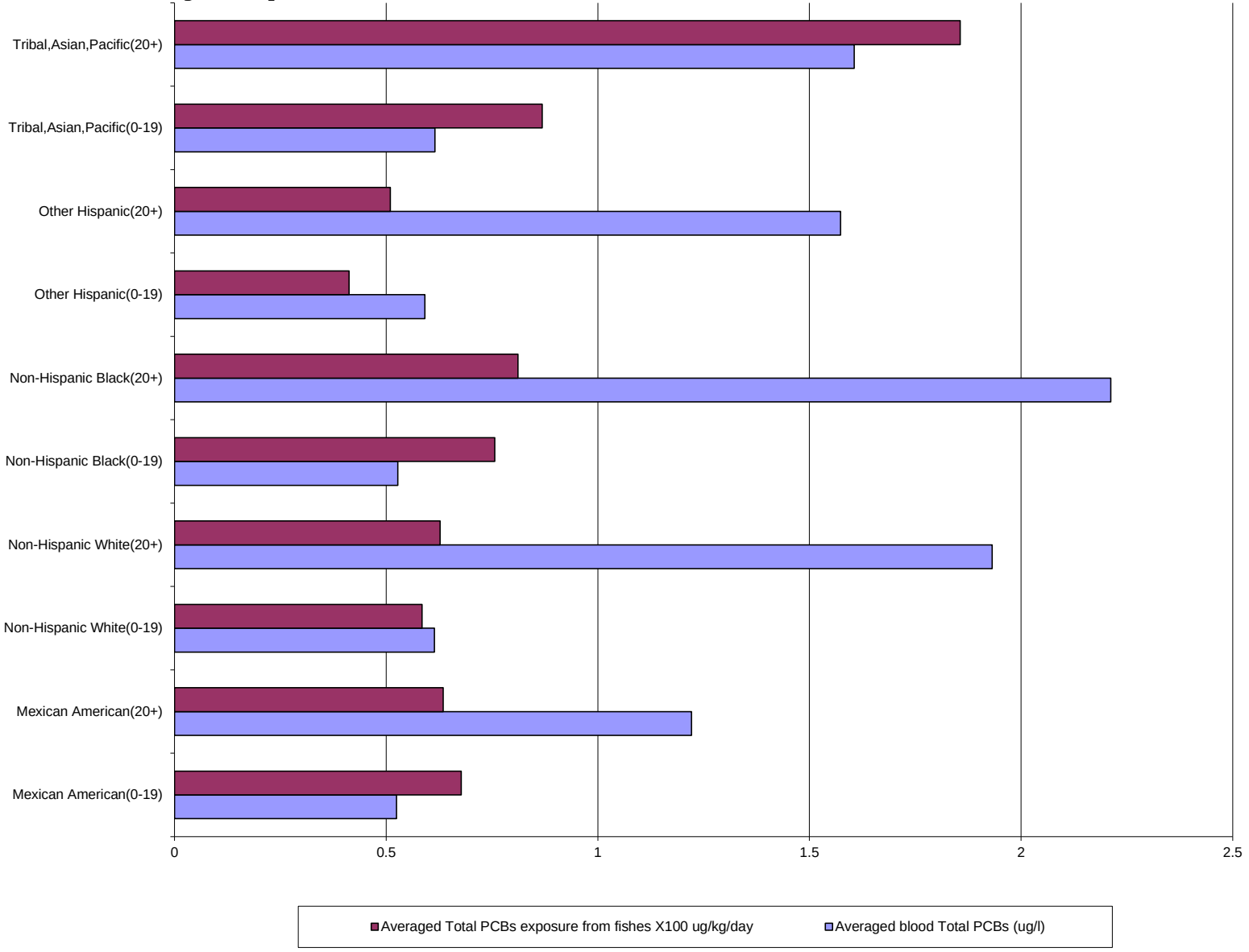
Dietary exposure and Blood level of total MeHg in various groups



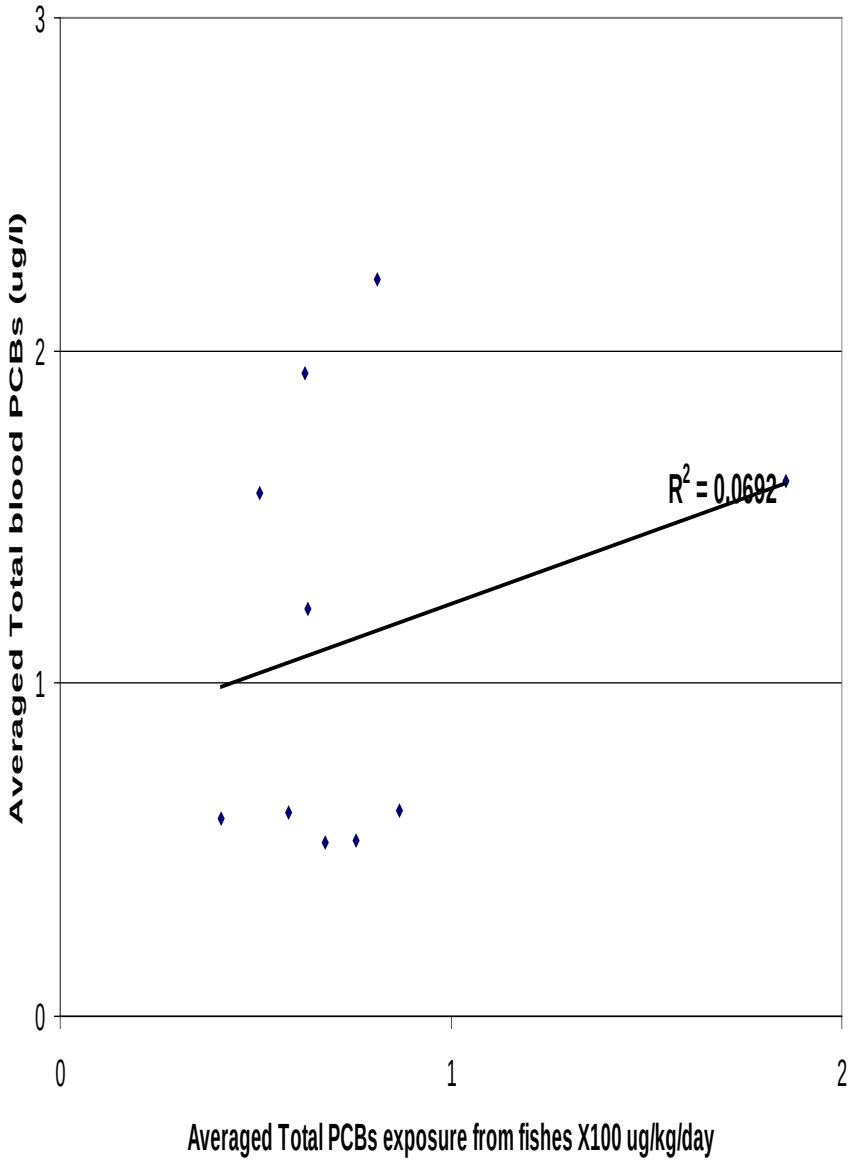
Biomarker: total blood hg (ug/l)

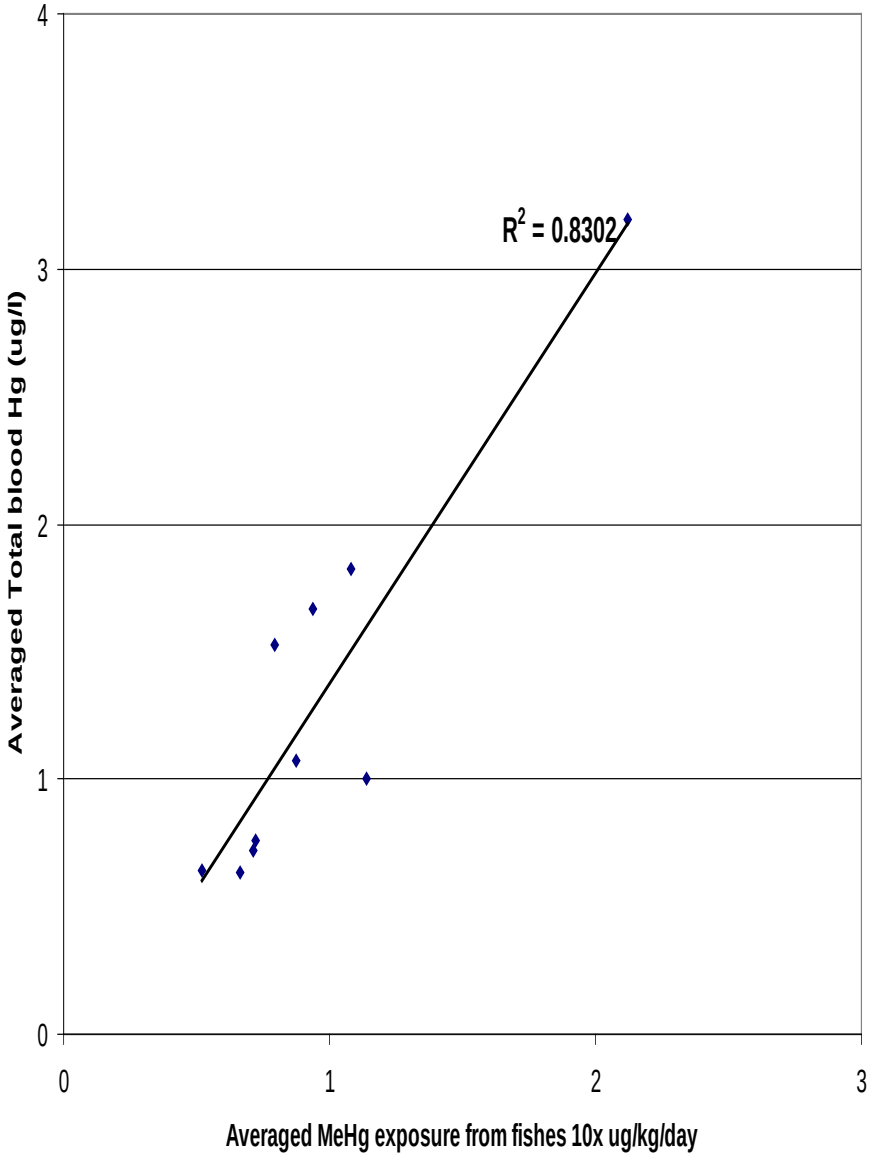
Exposure: MeHg exposure from fishes 10 x ug/kg bw/day

Dietary exposure and Blood level of total PCBs in various groups



Correlations between dietary intakes and blood biomarkers





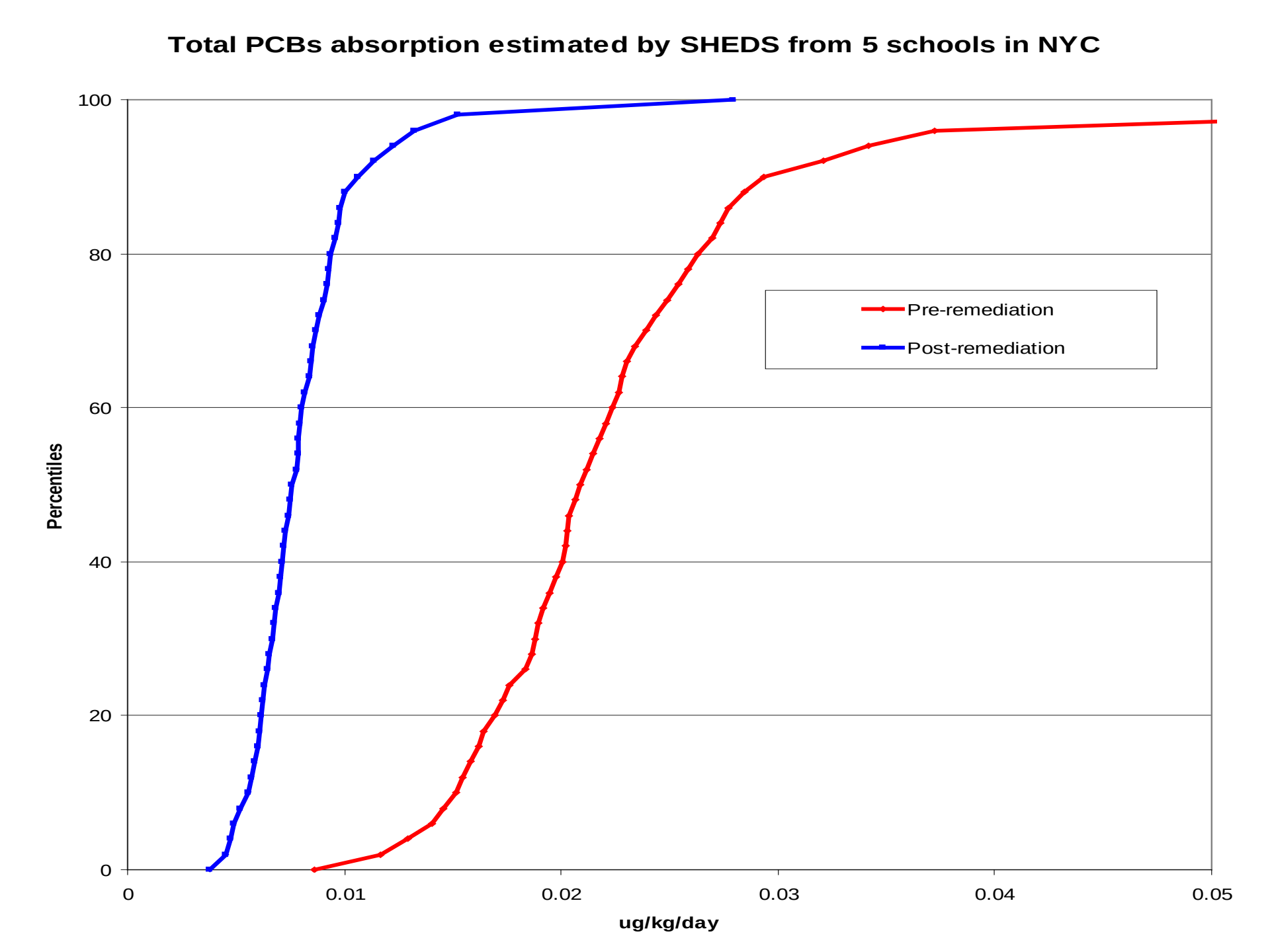
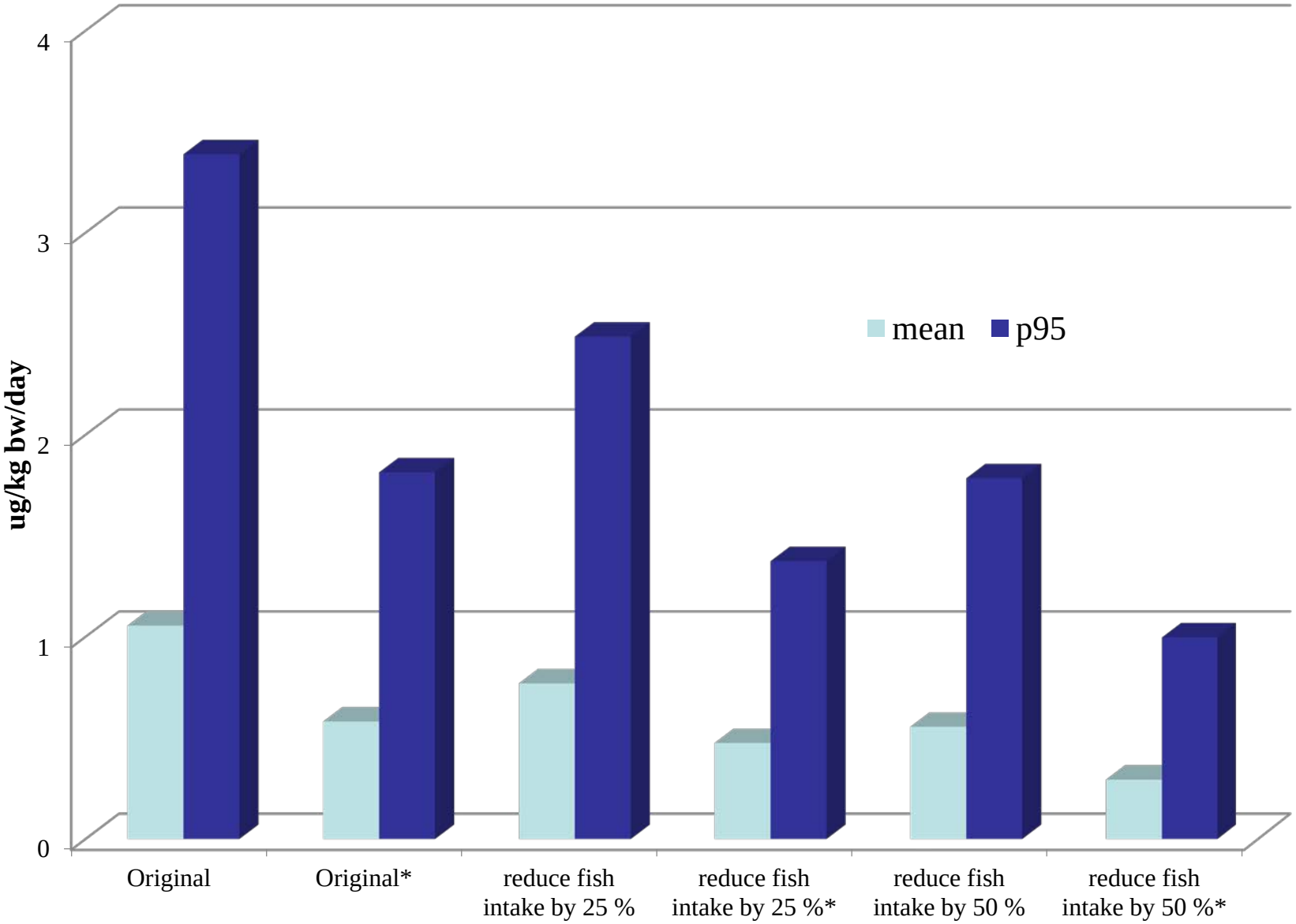
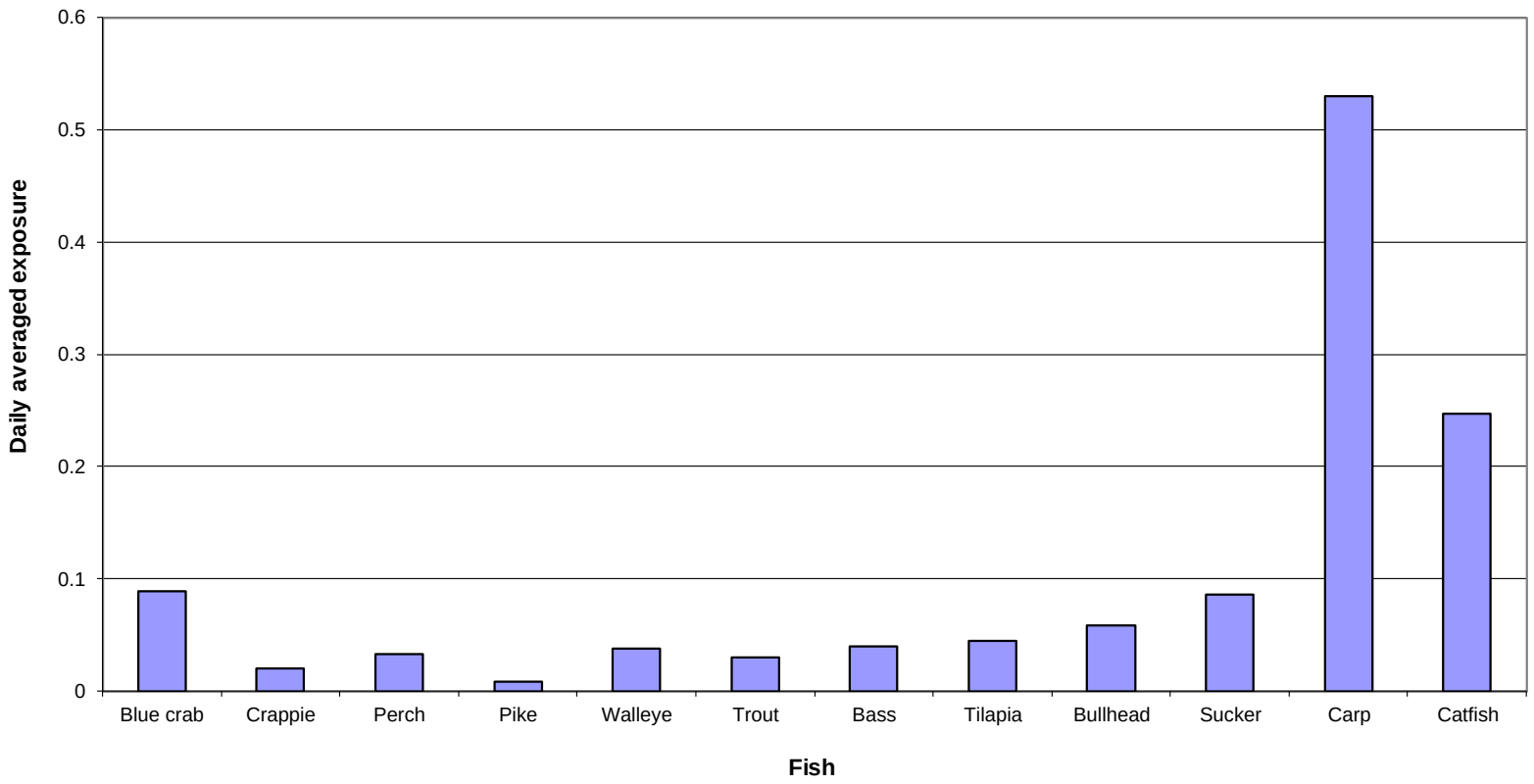

Total PCBs absorption estimated by SHEDS from 5 schools in NYC
100
80
60
40
20
0
Percentiles
0
0.01
0.02
0.03
0.04
0.05
ug/kg/day
Pre-remediation
Post-remediation

Figure 4



*High-concentrated MeHg fishes such as bowfin and walleye are removed



Simulation with averaged fish intake and distribution of various fish PCB concentration

Conclusions

- Fish consumption rate of tribal populations about 3-5 times of US general population
- Exposure of PCBs and MeHg of tribal populations is 3 times of US general population
- Biomarkers of MeHgs in tribal pop'n is about 3 times of US general pop'n
- Fish intake could be main pathway of MeHg exposure
- Avoiding eating carp and cat fish could reduce PCBs dietary exposure, shark and sword fish and other fishes can reduce the exposure of MeHg

Future analyses

- Detailed fish consumption data focus on fish species
- Cost-benefit analyses on fish consumption
- Holistic assessment of cumulative risks for tribal population