

Urinary Pesticide Metabolite Concentrations in Pregnant Women from Suriname



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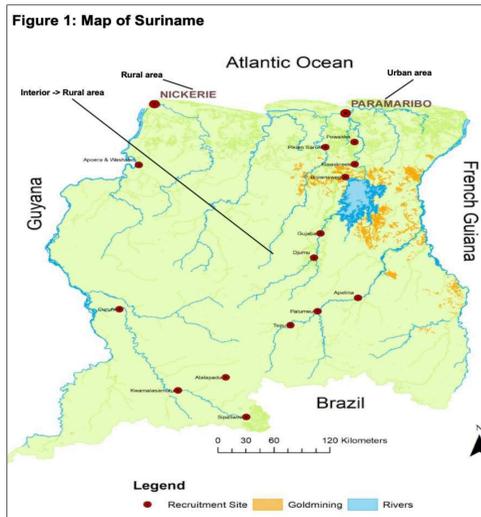
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- Pyrethroid insecticides and phenoxyacetic acid herbicide metabolite concentrations were high in rural areas of Suriname.
- Pregnant women living in an urban area of Suriname had high organophosphate insecticide metabolite concentrations.

RESULTS

- Pesticide exposures varied based on area of residence probably due to different pesticide applications (Table 1).
- Pregnant women residing in Paramaribo had higher median concentrations of organophosphate metabolites compared to those living in Nickerie and the interior (Figure 2).
- Pregnant women residing in Nickerie had higher median concentrations of phenoxy acid herbicide and pyrethroid metabolites compared to those living in Paramaribo and the interior (Figure 3).



Analyte	Analyte Code	LOD	Standard Deviation	Mean	Median	Minimum	Maximum
Chemical Class: Phenoxyacetic Acid Herbicides							
2, 4- Dichlorophenoxyacetic acid	24D	0.15 ^{1,2}	0.30 ^a , 1.27 ^b , 0.65 ^c	0.28, 1.12, 0.42	0.11, 0.74, 0.20	0.11, 0.11, 0.11	1.60, 7.50, 3.19
Chemical Class: Organophosphate Insecticides							
Malathion dicarboxylic acid	MAL	0.50 ^{1,2}	0.44 ^a , 1.11 ^b , 7.32 ^c	0.48, 0.75, 1.58	0.35, 0.35, 0.35	0.35, 0.35, 0.35	2.86, 7.34, 51.68
3,5,6-Trichloro-2-pyridinol	CPM	0.10 ^{1,2}	1.22 ^a , 2.94 ^b , 6.72 ^c	0.66, 2.08, 1.93	0.41, 0.92, 0.49	0.07, 0.07, 0.07	10.80, 17.80, 46.70
2-isopropyl-4-methyl-6-hydroxypyrimidine	OXY2	0.10 ^{2,3}	3.75 ^a , 5.88 ^b , 0.25 ^c	1.61, 1.55, 0.23	0.33, 0.49, 0.18	0.07, 0.07, 0.07	22.00, 52.00, 1.61
para-Nitrophenol	PAR	0.10	1.02 ^a , 1.60 ^b , 10.48 ^c	0.99, 0.98, 2.29	0.65, 0.52, 0.59	0.12, 0.07, 0.13	7.54, 11.90, 73.30
Diethyldithiophosphate	DED	0.10	0.01 ^a , 0.01 ^b , 0 ^c	0.07, 0.07, 0.07	0.07, 0.07, 0.07	0.07, 0.07, 0.07	0.14, 0.14, 0.07
Diethylphosphate	DEP	0.10 ^{2,3}	2.49 ^a , 8.01 ^b , 0.86 ^c	2.15, 2.91, 0.59	1.23, 0.82, 0.32	0.07, 0.07, 0.07	12.00, 52.50, 4.48
Dimethyldithiophosphate	DMD	0.10 ³	0.94 ^a , 1.60 ^b , 0.89 ^c	0.35, 0.44, 0.26	0.07, 0.07, 0.07	0.07, 0.07, 0.07	7.01, 11.70, 5.63
Dimethylphosphate	DMP	0.10 ^{2,3}	4.59 ^a , 2.32 ^b , 2.08 ^c	2.19, 1.80, 1.50	1.32, 1.06, 0.67	0.07, 0.10, 0.07	42.50, 16.60, 8.93
Dimethylthiophosphate	DMT	0.10 ^{1,2}	3.58 ^a , 3.89 ^b , 3.83 ^c	2.96, 2.36, 2.48	1.67, 0.89, 0.83	0.07, 0.07, 0.07	22.40, 25.00, 18.05
Diethylthiophosphate	DTP	0.10 ^{1,2,3}	3.49 ^a , 6.55 ^b , 0.32 ^c	1.52, 1.30, 0.26	0.57, 0.31, 0.14	0.07, 0.07, 0.07	26.10, 58.20, 1.57
Chemical Class: Pyrethroid Insecticides							
4-fluoro-3-phenoxybenzoic acid	4FP	0.10	0.02 ^a , 0.02 ^b , 0 ^c	0.07, 0.07, 0.07	0.07, 0.07, 0.07	0.07, 0.07, 0.07	0.20, 0.29, 0.07
3-phenoxybenzoic acid	OPM	0.10 ^{1,2}	1.48 ^a , 6.13 ^b , 0.88 ^c	0.94, 2.50, 0.81	0.51, 1.08, 0.43	0.07, 0.07, 0.07	10.20, 50.70, 3.77
trans-3-(2,2-Dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid	TCC	0.60	3.81 ^a , 3.51 ^b , 1.48 ^c	1.81, 1.76, 1.09	0.42, 0.42, 0.42	0.42, 0.42, 0.42	26.30, 27.20, 7.06

Limit of detection is also known as the LOD.

^aParamaribo, N= 92

^bNickerie, N= 78

^cInterior, N= 48

¹The mean difference between Nickerie and Paramaribo were statistically significant, p<.05.

²The mean difference between Nickerie and the interior were statistically significant, p<.05.

³The mean difference between Paramaribo and the interior were statistically significant, p<.05.

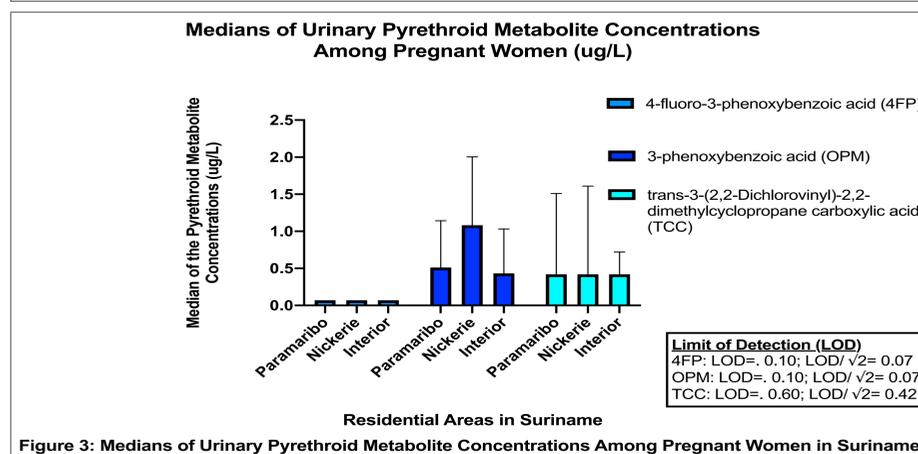
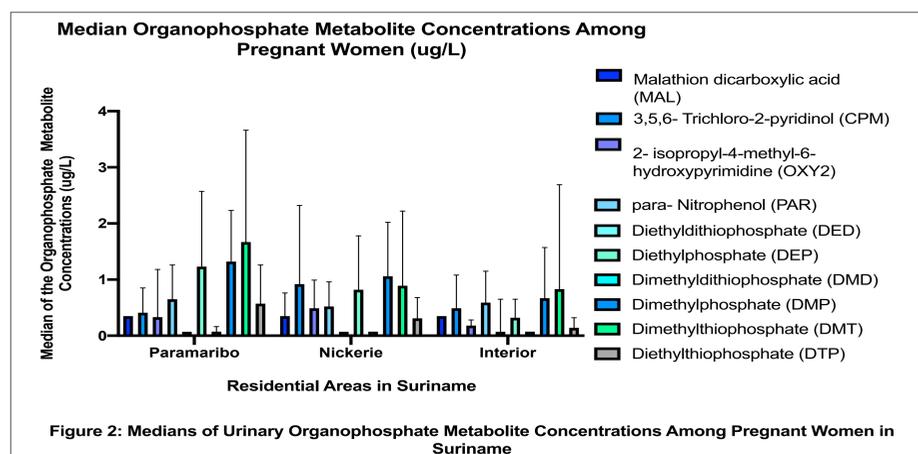


Figure 3: Medians of Urinary Pyrethroid Metabolite Concentrations Among Pregnant Women in Suriname

NEXT STEPS AND FUTURE ACTION

- An assessment of the associations between the biomarker data and potential adverse birth outcomes, as well as pediatric neurodevelopment.
- An evaluation of pesticide literacy regarding use, storage, and disposal with a primary public health goal of preventing exposures to pesticides in pregnant women.
- The development and implementation of effective interventions including strengthening policies to improve maternal and child health.

BACKGROUND

- In Suriname, pesticides are commonly used in both agricultural and residential settings.
- The Caribbean Consortium for Research in Environmental and Occupational Health (CCREOH) implemented an environmental epidemiology cohort study of 1100 pregnant women and their children residing in three areas of the country: Paramaribo, Nickerie, and the interior areas of Suriname (Figure 1).

Objective:

- To evaluate pesticide exposures in a sub-set of participants enrolled in the CCREOH cohort study.

METHODS

- Urine samples (25 ml) from 218 CCREOH participants were analyzed for 18 pesticide metabolites, representing 3 pesticide classes.
- Mann Whitney U and the Kruskal-Wallis tests were used to assess the differences between pesticide metabolite concentrations and the residential locations of the pregnant women in Suriname. Statistical significance was determined at p<0.05.