

# PRENATAL EXPOSURE TO MERCURY AND EFFECTS ON BIRTH OUTCOMES OF WOMEN FROM SURINAME'S INTERIOR

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# DISCLAIMER

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# OBJECTIVES

- Background
- Methods
- Results
- Discussion
- Future directions





# BACKGROUND

- Mercury (Hg) has high toxic potential - especially for developing children – and is widely used in Suriname's interior for artisanal gold mining
- Suriname is a middle upper income country in the north-east of South America
- The study population is a subset of the Caribbean Consortium of Environmental and Occupational Health environmental epidemiologic cohort study (CCREOH) aimed at examining the effects of chemical and non-chemical stressors on birth outcomes and pediatric neurodevelopment



# STUDY AIM

- To determine prenatal Hg exposure and explore the potential association of Hg exposure and birth outcomes in pregnant women living in Suriname's interior
- Objectives:
  - measure the Hg level in Interior pregnant women
  - analyze the association between Hg level and birth outcome



# MEDICAL MISSION



- White dots MM health centers
- Population:  $\pm 50.000$
- 15 recruitment areas (red dots)

# METHODS

- Hair samples from pregnant women were collected and analyzed for total Hg using Cold Vapour Atomic Absorption Spectrometry (CVAAS)
- Data on birthweight (BW), and adverse birth outcomes categorized as low birthweight (LBW<2,500g) and preterm birth (PTB<37 weeks) were collected from pregnant women seeking care at the Medical Mission health centers
- Women were prospectively recruited from April 2017-December 2018



# METHODS- CONT'D

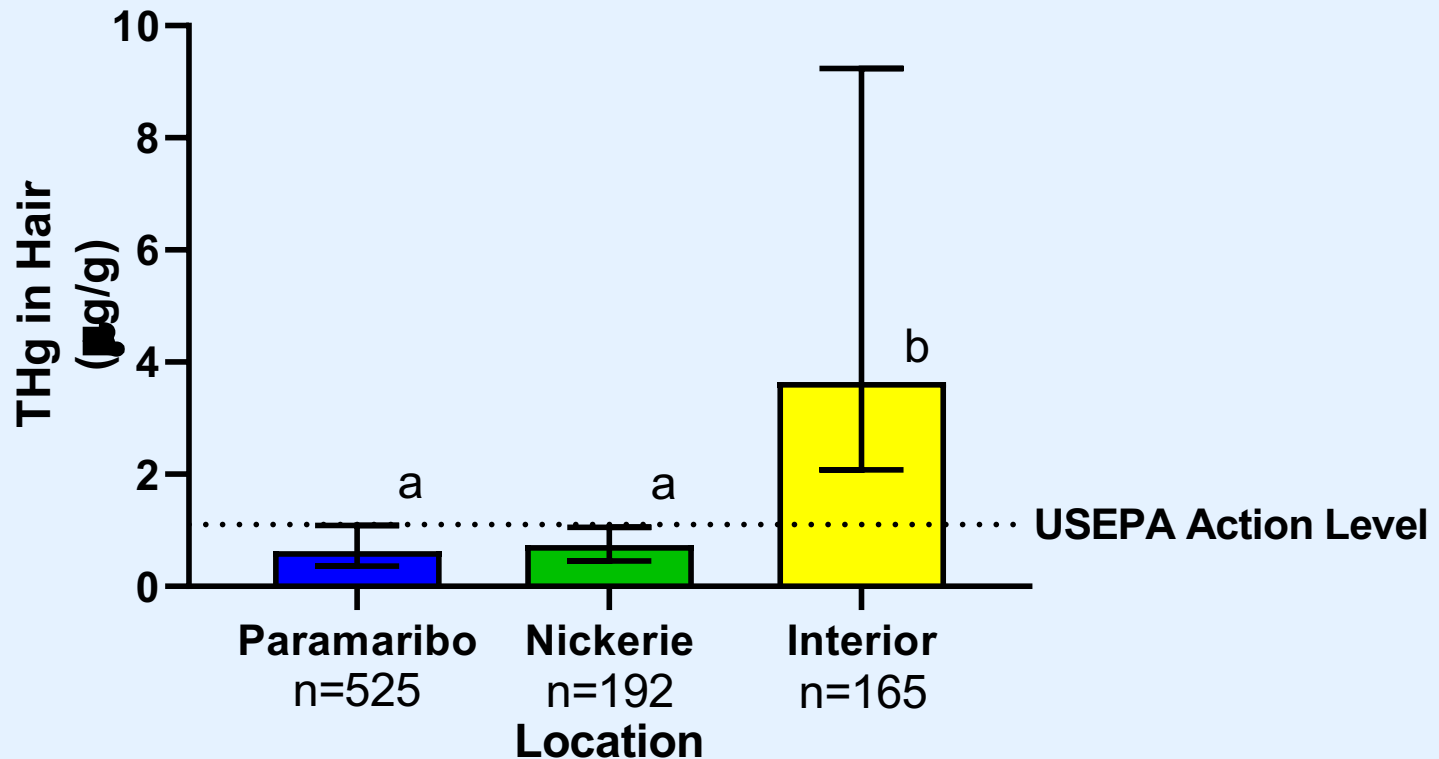
- 76 live births out of 79 singleton births were included
  - 2 stillbirths and 1 miscarriage
- Simple correlation analysis between hair-Hg and BW treating both as continuous variables
- Exposures were categorized as below or above the median
- Fisher's exact test and odds ratios to evaluate associations with LBW and PTB





# RESULTS

## TOTAL HAIR HG PER REGION



- Total mercury in hair from pregnant women in Suriname
- Letters indicate significant differences between regions at  $p < 0.0001$  (Kruskal-Wallis)
- USEPA action level 1.1 µg/g hair



# RESULTS

## HAIR HG INTERIOR

	Median (ug/g)	Min	Max	25 <sup>th</sup> percentile	75 <sup>th</sup> percentile
[Hg] in hair	2.42	0.6	18.20	1.55	6.64

Table 1. Hair Hg concentration of interior women

- Adverse birth outcomes:
  - 8.6% LBW
  - 15.2% PTB



# RESULTS

## HAIR HG EXPOSURE LEVELS BY AGE (1)

Age (yrs)	Below median (% , n )	Above median* (% ,n)
16 -19	5.3 (4)	7.9 (6)
20 - 24	11.8 (9)	15.8 (12)
25 - 34	15.8 (12)	19.7 (15)
35 - 44	14.5 (11)	7.9 (6)
≥ 45	1.3 (1)	0
	48.7% (37)	51.3% (39)

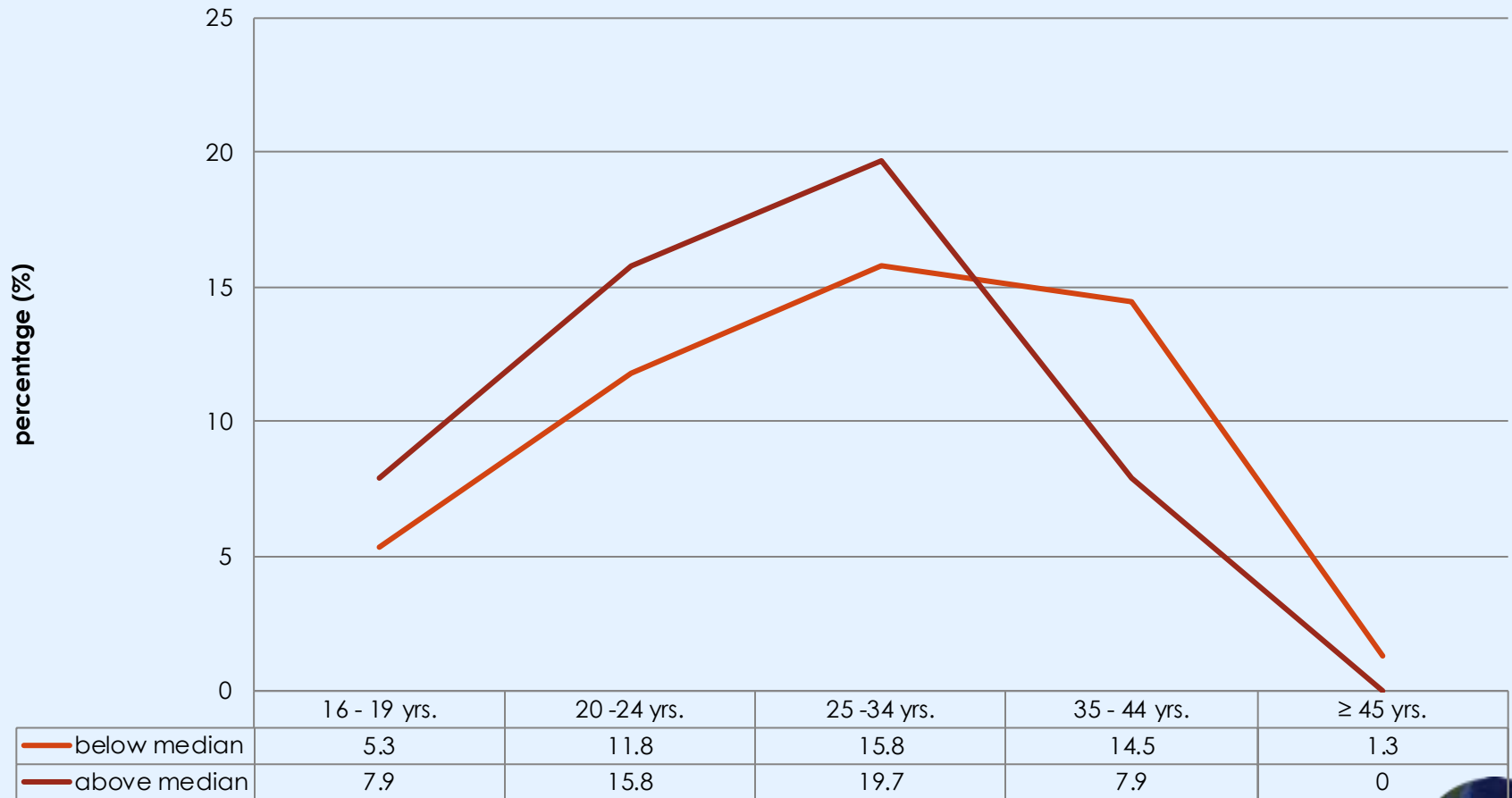
Table 2. Age distribution in the study population (n=76)

\*71.8% of the Indigenous women were above the median  
53.8% live in far remote areas only accessible by air



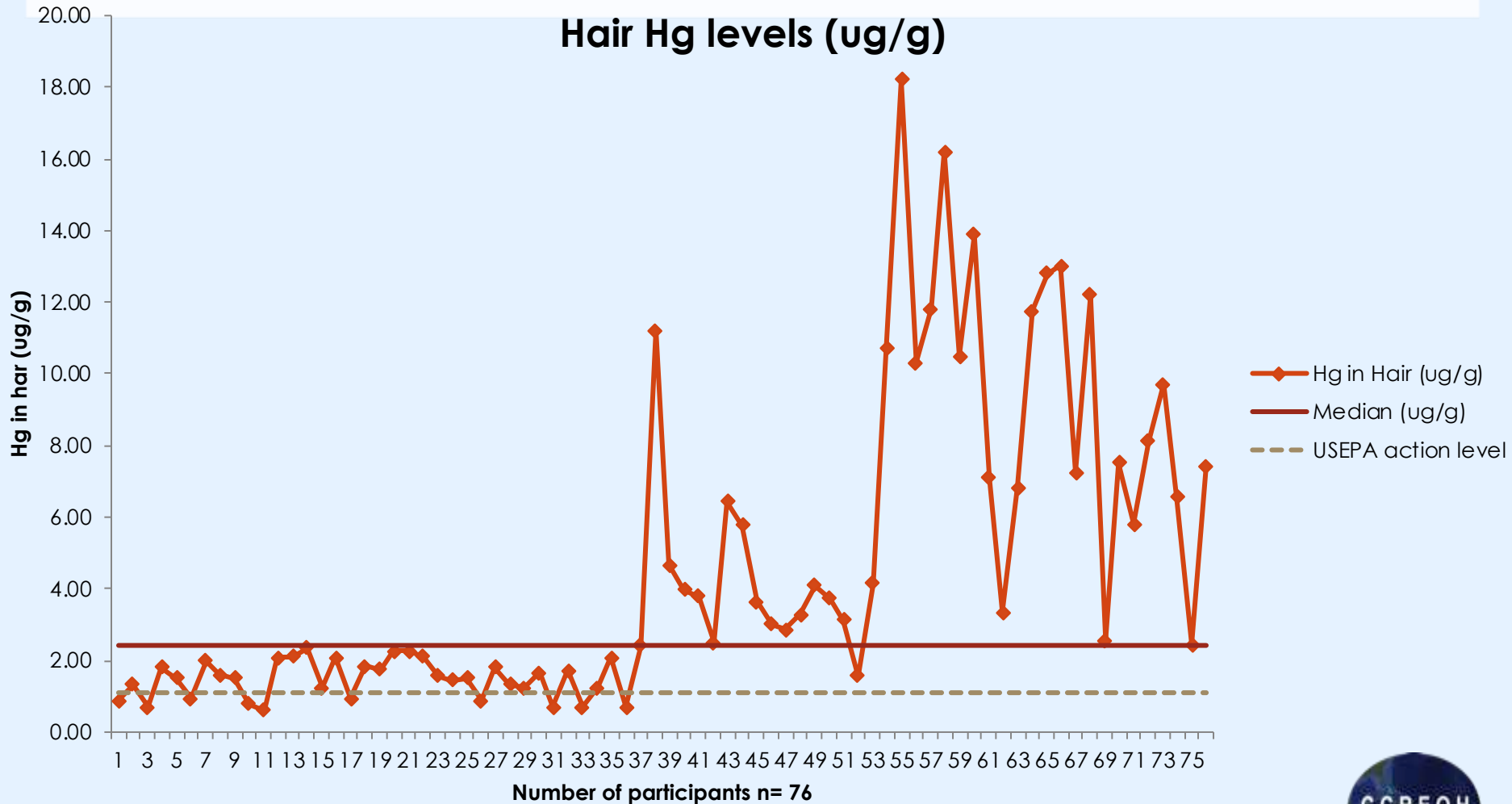
# RESULTS

## HAIR HG EXPOSURE LEVELS BY AGE (2)



# RESULTS

## TOTAL HAIR HG COMPARED TO USEPA ACTION LEVELS



# RESULTS

## STATISTICAL TESTS

- There was **no significant correlation** between
  - **Hair Hg and LBW** (Fisher's exact test,  $p < 0.43$ , OR=0.45 95%CI--0.08-2.04) or
  - **Hair Hg and PTB** (Fisher's exact test,  $p < 0.51$ , OR=0.59 95%CI--0.18-2.12).



# DISCUSSION

- Hair Hg levels in the interior are well above the USEPA action levels
- Even though interior women have higher Hg concentrations compared to the coastal area, prevalence of adverse birth outcomes is lower than the coastal area; health system MM
- High Hg is most likely due to consumption of contaminated food, predominantly locally caught fish
- Our results are consistent with the literature regarding exposure to Hg during pregnancy at these concentrations



# FUTURE DIRECTIONS

- The findings related to birth outcomes in this sub-cohort will be validated by ongoing analyses of the larger study cohort of the interior (n=200)
- Ongoing monitoring of Hg in both humans and fish is necessary to ensure the effectiveness of public health risk management
- Suriname has no national standards on Hg concentration levels in blood or hair





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