



Birth Outcomes of the CCREOH - Nickerie subcohort in Suriname: Preliminary Results

Poster No.: Sat_14.06
Congress: 9th CUGH
Type: Scientific Poster
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Orleans/US
Keywords: Public Health, Maternal /Child Health, Environment / Climate
Change/ One Health, Planetary Health, One Health, Environmental
Health, Climate & Health

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Background

- The Caribbean Consortium for Research in Environmental and Occupational Health (CCREOH) addresses high priority Environmental and Occupational Health (EOH) risks among indigenous & other health disparate populations in Suriname and the impact of exposures to neurotoxicants on maternal & child health.
- The Nickerie District is high in agricultural activity especially rice production and has an abundant use of pesticides. In this district CCREOH examines the effect Mobile Health Technology-enabled CHWs on birth Outcomes and the therapeutic relationship between participants and CHWs.
- The aim for this phase of the study is to assess the birth outcomes of the CCREOH-Nickerie subcohort.

Images for this section:

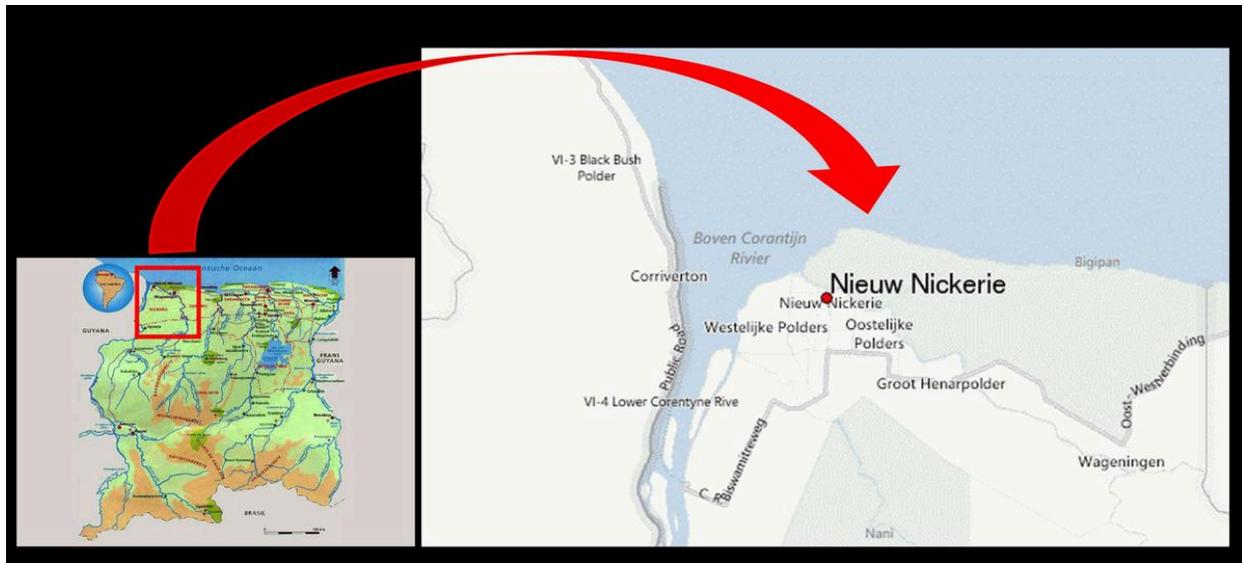


Fig. 1: Map Nickerie-Suriname

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Methods

- This is a cohort study among 200 pregnant women in Nickerie.
- During December 2016 - January 2018,
- 155 pregnant women have been recruited
- 135 have been included in this study (target is 200 pregnant women).
- Standardized questionnaires have been completed by Mobile Health Technology-enabled Community Health Workers (CHW) twice during the pregnancy.
- Biospecimen collection (blood, urine, hair, buccal swab) is provided by them, while
- Cord blood samples and birth outcomes data are collected by midwives.
- 56 hair samples has been analyzed for methyl mercury, where hair methyl mercury level $> 1.1 \mu\text{g/g}$ is defined as above the US EPA guidance values for mercury in hair.
- 90 deliveries in this period has been analyzed on birth outcomes.

This study has been approved by the IRB Tulane University (USA) and the Ethics Board of the Ministry of Health (Suriname)

Findings

The preliminary findings after 1 year of this study shows that

- Of the total Suriname cohort women > 30 years and of Asian descent (compared to African descent) has higher mercury levels.
- In Nickerie the methyl mercury levels of the analyzed hair samples were between 0.0 - 21.7 µg/g.
- 26.8% of the women had mercury levels of > 1.1 µg/g (mean 1.3; SD 2.8).

Results of the 90 deliveries

- The majority of the mothers (60%) are of Asian descent.
- 6% of them did not completed primary school, while 80% did complete either primary or secondary education.
- There is statistically a significant difference between age groups of the mothers and the mean birth weight ($p=0.004$) and birth length ($p=0.020$) of the newborns.
- The mean birth weight between age group 25 < 30 years and \geq 30 years differs significantly ($p=0.004$).
- The mean birth length between age group 25 < 30 years and \geq 30 years differs significantly ($p=0.014$).
- 27.8% of the newborns have adverse birth outcomes.

Images for this section:

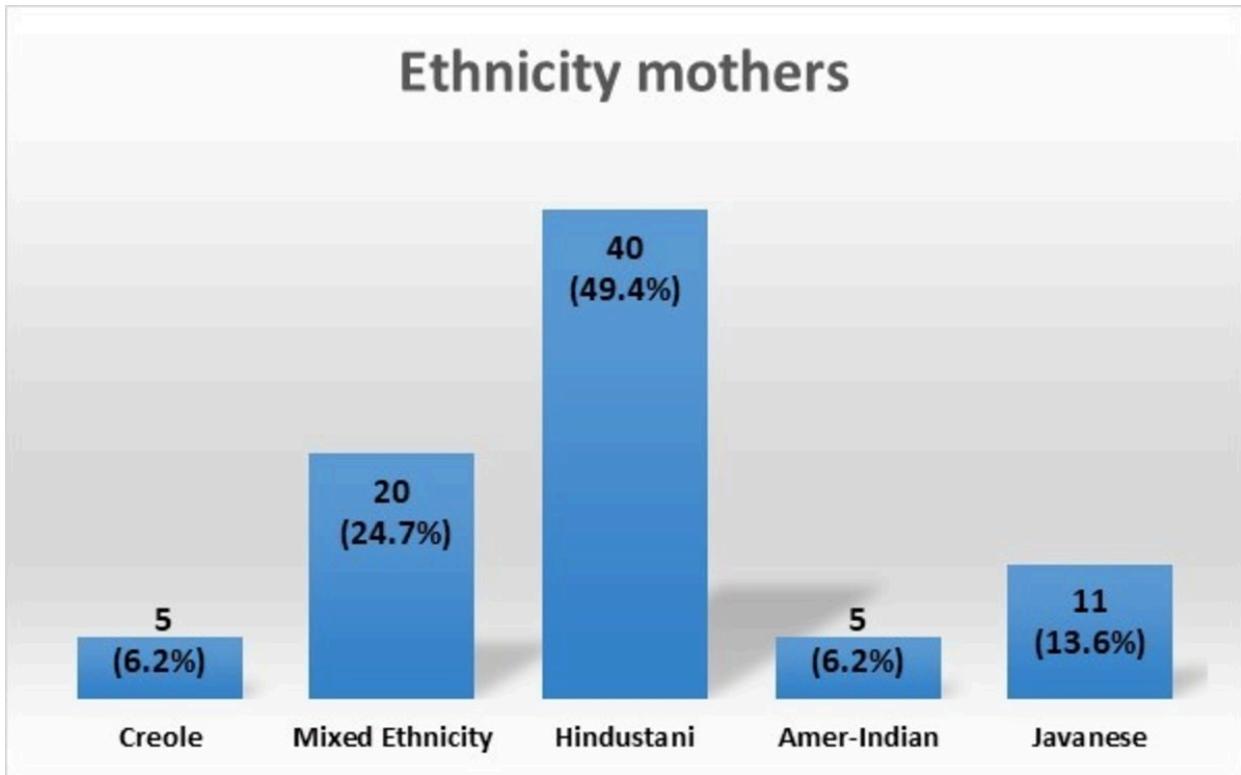


Fig. 2: Ethnicity Mothers

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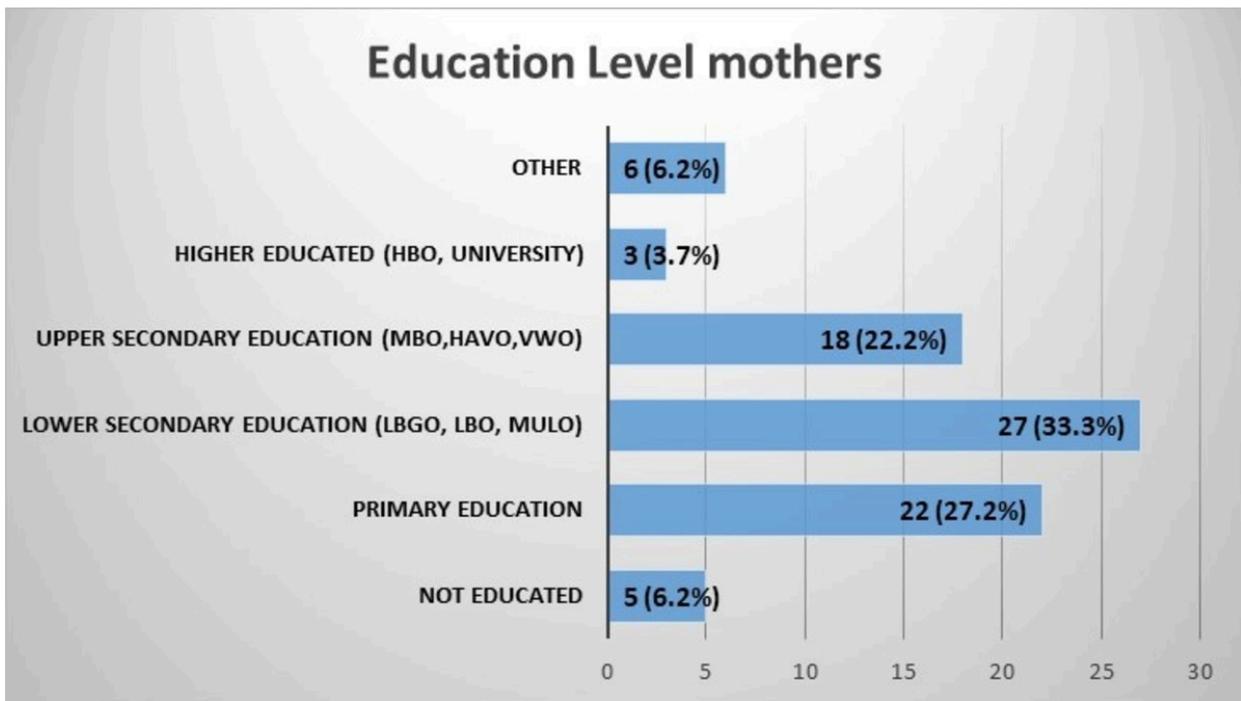


Fig. 3: Education Mothers

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	Unit	Mean	Standard Deviation	Min	Max
Birth weight	grams	2955.38	724.749	400	5270
Birth length	cm	47.975	4.2432	24.0	57.0
Gestational age at birth	weeks	38.2	2.632	26	42
Maternal age at birth	years	26.58	5.823	18	45
Sex Newborn	Male: 43 (51.2%)		Female: 41 (48.8%)		
Low birth weight (< 2500 gram)	17 (18.9%)				
Birth weight for gestation: SGA & LGA	SGA 5 (6%)		LGA 9 (10.7%)		
Preterm Delivery (< 37 weeks gestation)	10 (11.1%)				
Number of previous pregnancies	None: 30 (35.7%); One 27 (32.1%); > Two 27 (32.1%)				
Number of adverse outcomes per newborn	None 65 (72.2%); One 15 (16.7%); Two 3 (3.3%); > Three 7 (7.8%)				
Congenital anomaly	6 (6.7%)				

Fig. 4: Table 1 Characteristics of mothers and newborns CCREOH-Nickerie

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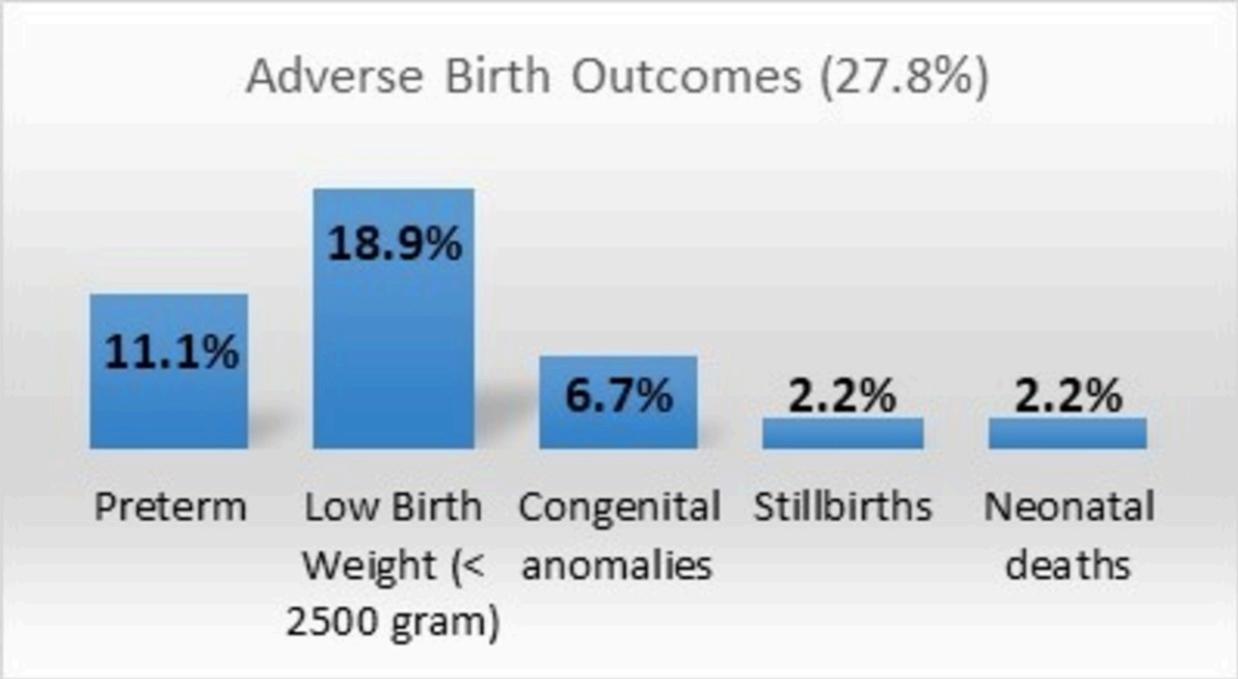


Fig. 5: Adverse birth outcomes

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Interpretation

Mercury (N=56)

- One third of the pregnant women in Nickerie had hair mercury levels above the internationally accepted threshold.

Birth outcomes (N=90)

- One third of the newborns in the CCREOH Nickerie subcohort had adverse birth outcomes.
- There is a correlation between the age group of the mothers and birth weight and birth length of the newborn.

This is of significant concern, even with this small sample size.

Our findings are higher because of the small sample size, which is a limitation; however, according to UNICEF, Suriname has the 3rd highest neonatal mortality rate of South America.

We will further explore the correlation of heavy metal and pesticide exposure and the adverse birth outcomes after completion of recruitment and analyses of biospecimen.

Additional research is underway to examine the neurodevelopmental effects and the impact of the participant/CHW relationship on adverse birth- and neurodevelopmental outcomes.

Images for this section:

Condition	POPZiS	CCREOH Nickerie
Adverse Birth Outcome	20%	27.8%
Neonatal Death/Perinatal Death	50%	50%
LBW (Min Social Affairs, 2014)	14%	18.9%

Neonatal Mortality Rate/1000 live births	
Worldwide	20
Latin America & Caribbean	9
Suriname	12
CCREOH- Nickerie	22

Fig. 6: Adverse Birth Outcomes

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Funding:

This research was supported by the Fogarty International Center of the National Institutes of Health under Award Number U01TW010087-01 and U2RTW010104-01.

The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

Short Bio (max. 150 words or less)

Dr. Radha Ramjatan is a MD in Suriname since 1994. Her medical degree and MSc. in Public Health degree were conferred by the Faculty of Medical Sciences of the Anton de Kom (ADEK) University of Suriname. Working as a General Practitioner for the Regional Health Services (RGD) in Nickerie, Suriname, her research focuses on adverse health outcomes associated with exposures to pesticides including pesticide-induced suicide. She has trained 25 CHWs to promote safe pesticide use in the absence of national environmental policies. She is a co-investigator in the GEOHealth-funded Caribbean Consortium for Research in Environmental Health (CCREOH), and is pursuing her PhD degree in Environmental Health Sciences in the context of the ongoing CCREOH environmental epidemiological study. She has presented her research at regional and international conferences including the Consortium of Universities for Global Health and the Caribbean Public Health Agency research conferences. She chairs the Pesticide Task Force Nickerie.