

Organochlorine exposure and pregnancy: the role of maternal body mass index, weight gain and fish consumption

L. Takser¹, N. Abdelouahab¹ and D. Mergler²

¹Université de Sherbrooke, Québec, Canada

²Université du Québec à Montréal, Québec, Canada

Introduction

Organochlorine compounds (OCs) such as polychlorinated biphenyls (PCB) and organochlorine pesticide (OCP) are cumulative lipophilic substances bound to circulating lipids. In pregnant women, blood PCB and OCP levels are still determinants of foetal exposure.

Fish consumption and age are known to be strong predictors of circulating levels of OCs. In non pregnant populations, relation between Body Mass Index (BMI) and blood PCB and OCP levels still unexplored. The obesity rate is increasing in the general North American population including women of child-bearing age, but maternal obesity effects on blood OCs during pregnancy remain unknown.

Objective

Explore the association between maternal blood and cord blood at delivery and:

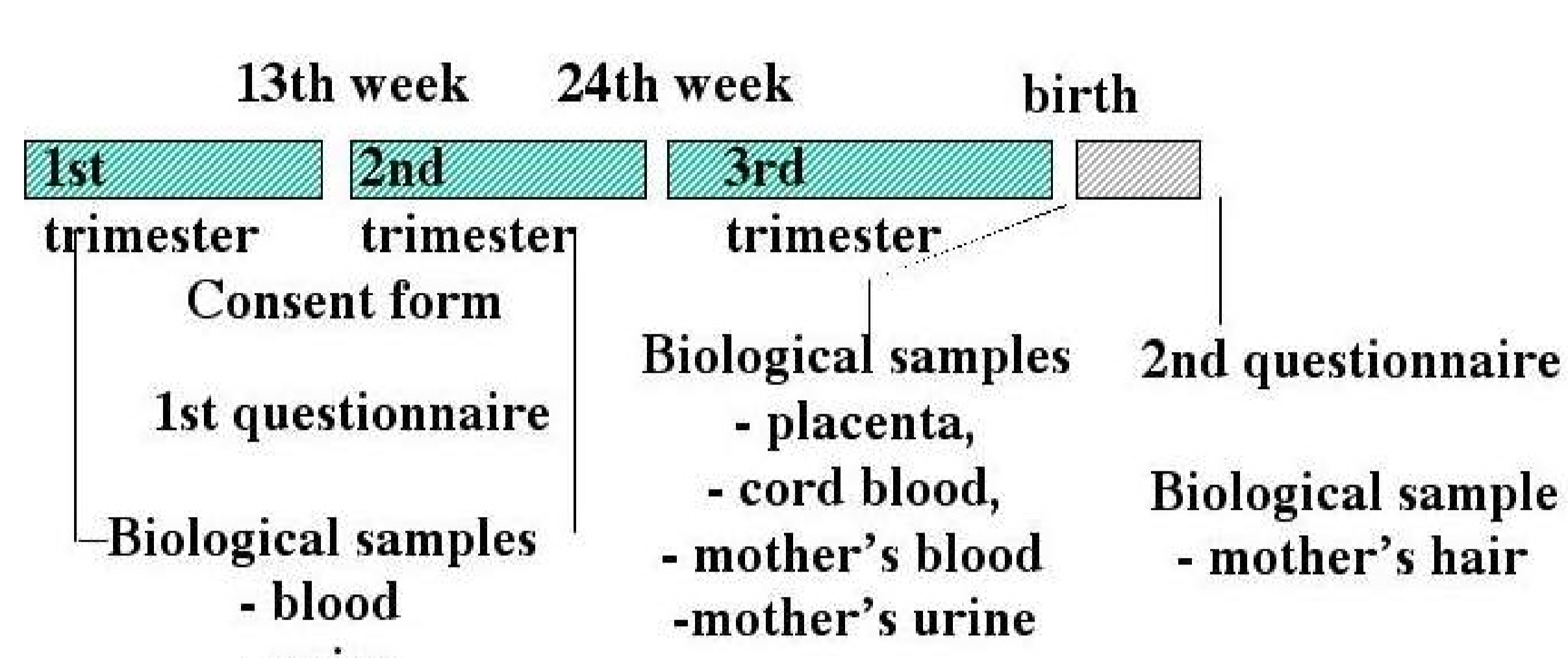
- maternal BMI before pregnancy,
- weight gain during pregnancy,
- fish consumption

Statistical Analysis

SAS version 9.2:

- Analysis of variance (ANOVA)
- Analysis of covariance (ANOVA)
- General Linear Model Procedure
- Mixed model for repeated measures

Study design



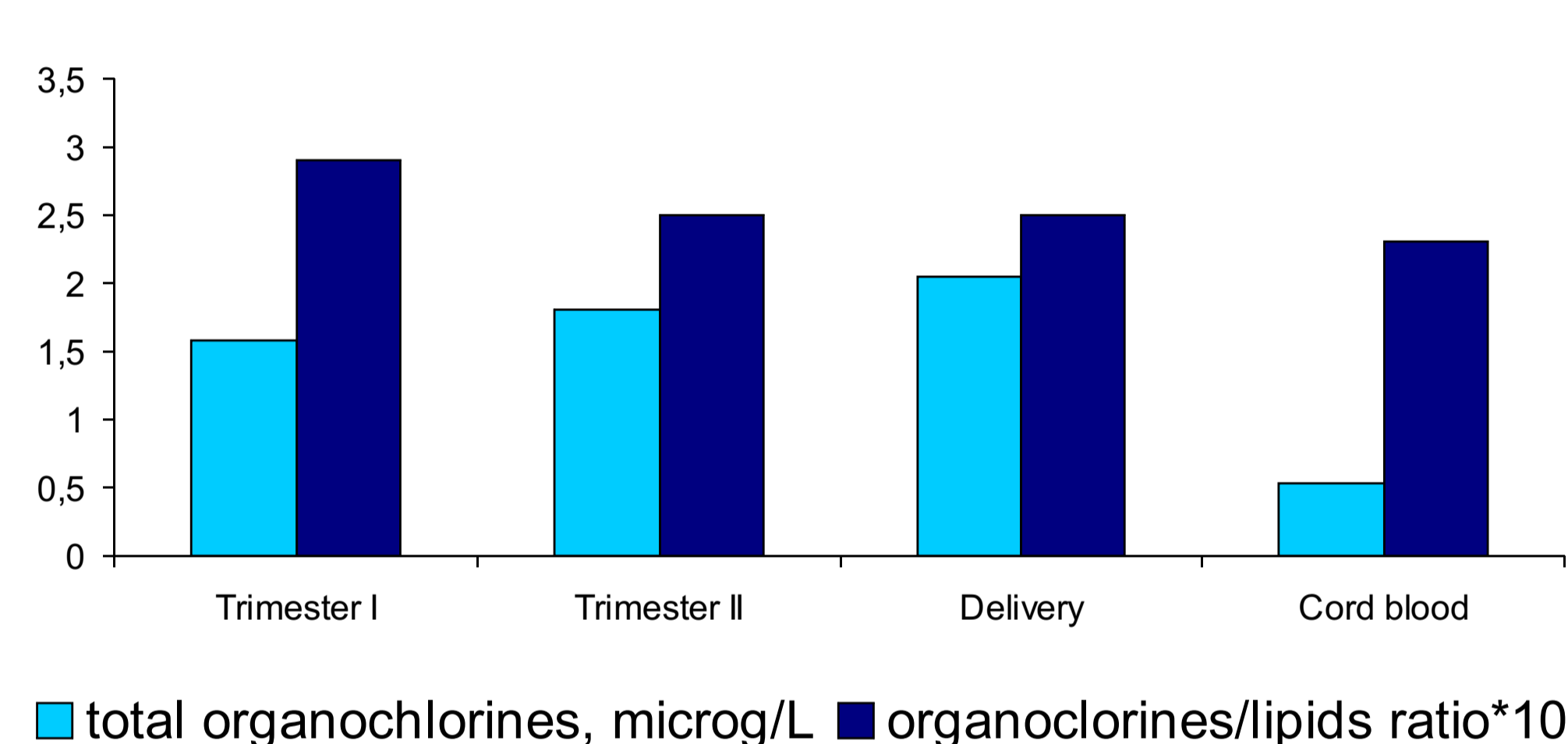
Recruitment was carried out at the Center of Local Community Services (CLSC) in the South-western region of Quebec. Pregnant women (n=101) were recruited at their first or second prenatal visit and followed up to delivery.

Population characteristics

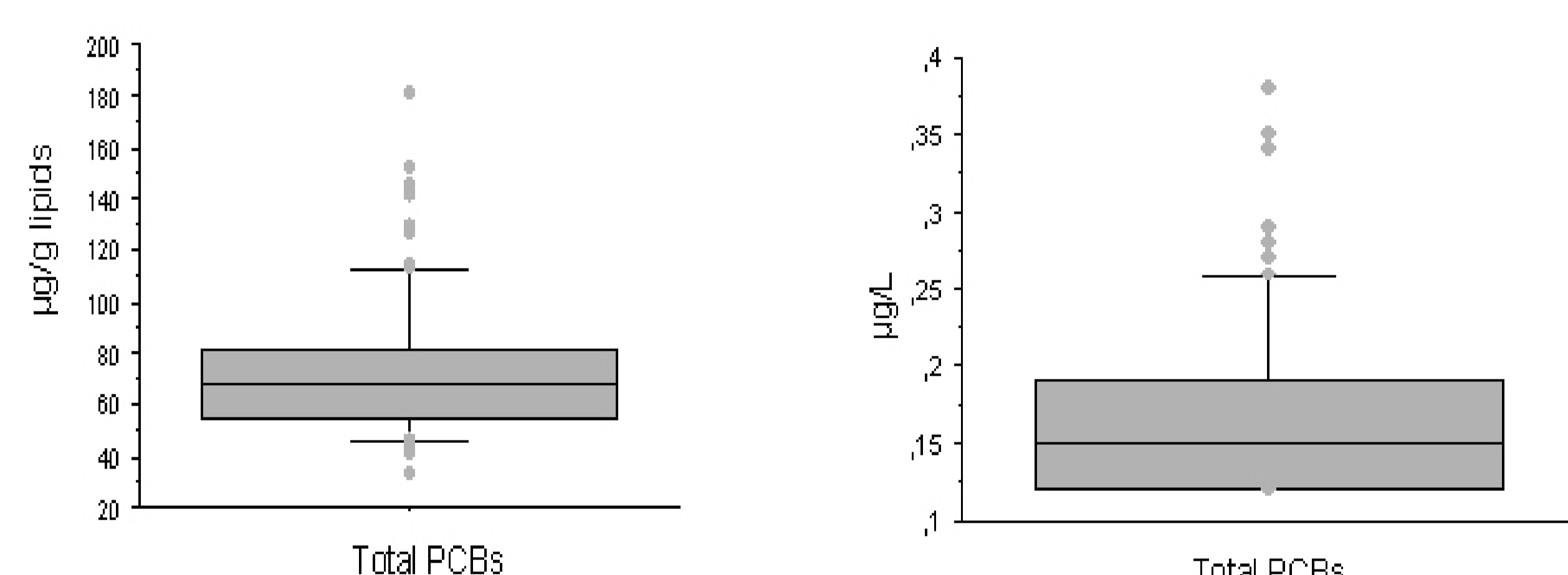
	Mean ± SD	Range
Age (year)	27	15 – 39
BMI (kg/m)	24.7	15.1 – 39.5
Weight gain (kg)	16.7	- 3.6 – 48.1
Fish consumption before pregnancy (meal/month)	3.6	0 - 19.5
Fish consumption during pregnancy (meal/month)	3.1	0 – 31.5
	Percentage (%)	
Alcohol	8	
Gestational diabetes	11	
Delivery before 37 weeks	5	

Results

PCBs and pesticides



Sum PCB distribution



Plasma pesticide concentrations (µg/L)

	Median and 5 th -95 th percentiles or % of samples over detection limit value			
	I trimester (n=39)	II trimester (n=145)	At delivery (n=101)	Cord blood (n=92)
Trans-nanochlor	0.03 [nd-0.09]	0.04 [0.02-0.10]	0.05 [nd-0.15]	14%
Oxy-chlordane	0.02 [nd-0.06]	0.03 [0.02-0.07]	0.03 [0.02-0.08]	10%
Mirex	19%	15%	20%	1%
Hexa-chlorobenzene	0.04 [0.03-0.10]	0.06 [0.03-0.11]	0.06 [0.04-0.12]	0.02 [0.01-0.05]
DDT	0.01 [nd-0.04]	0.03 [nd-0.05]	0.04 [nd-0.07]	11%
pp'-DDE	0.38 [0.16-0.90]	0.43 [0.22-0.97]	0.47 [0.20-1.20]	0.16 [0.08-0.40]
Cis-nanochlor	0%	1%	20%	0%
Trans-chlordane	0%	0%	0%	0%
Cis-chlordane	0%	0%	0%	0%

Blood OC during pregnancy versus age, BMI, weight gain, and fish consumption

OC, µg/L	Age, years	BMI, kg/m ²	Gain, kg	Fish consumption, meal/month
Sum of PCB	0.03***	-0.01*	NS	NS
Sum of mono-ortho-coplanars (CB105, CB118, CB156)	0.004***	0.00	NS	NS
Sum of non-coplanars (CB138, CB153, CB180)	0.02***	-0.008*	NS	NS
Oxy-chlordane	0.002***	NS	NS	NS
DDT	NS	NS	-0.0002*	0.0006 (p=0.05)
pp'-DDE	0.03***	-0.009**	-0.02*	NS
β-BHC	0.002***	NS	NS	NS
Hexa-chlorobenzene	0.002***	NS	-0.0002*	NS

Mixed model slope for repeated measures adjusted for gestational age at sampling and total lipid concentrations during pregnancy
*p<0.05; ** p<0.01; ***p<0.001

The results obtained at delivery are similar to results shown above

CONCLUSIONS

Maternal age is the best predictor of circulating OC concentrations during pregnancy as well as cord blood OC levels. Foetuses of older pregnant women are exposed to higher level of environmental OC than those of younger women.

Maternal BMI before pregnancy has significant, but relatively small impact on maternal OC levels. Maternal BMI and weight gain during pregnancy are negatively correlated to OC.

No relation with cord blood OC levels was observed in relation with maternal BMI.

Fish consumption before pregnancy was positively related to PCB concentrations at delivery.

Fish consumption during pregnancy in our population was not related to most OC, which can be partly explained by low fish consumption.