UNEP PROJECT REPORT

Supporting the Implementation of the Global Monitoring Plan of POPs in Latin American and Caribbean Countries

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Venue: Dazzler Hotel, Montevideo, Uruguay.

National Team (Jamaica)

- National Coordinator for Jamaica: Professor Tara Dasgupta
- National Focal Point: Ministry of Health (Gillian Guthrie)
- Analysts: Sherine Whyte/Raymond Reid

UNEP Air Sample (PUFs) 2010-2011

- Air sample monitoring was done using polyurethane foams (PUF).

- The exposures of the PUFs were done in four (4) rounds between August 26, 2010 and July 8, 2011

UNEP Air Sample (PUFs) 2010-2011

- There were eight (8) PUF samples per round, four (4) of which were analysed for Persistent Organic Pollutants (POPs by the designated local laboratory (**Pesticide Research Laboratory, PRL, Jamaica**) and the other four (4) samples were analysed by a designated laboratory in Spain (CSIC) for the same parameters.

UNEP PUF Sampling Schedule (2010-2011)

Sampling		Round Number	PUF samples analysed by Spain	PUF samples analysed by PRL
Installation date	Time			
**August 26, 2010	9:24 am	1	1, 2, 5 and 7	3, 4, 6, 8 and (the "reserve" was analysed by Bennin)
October 1, 2010	12:20 pm – 12:57 pm	2	1, 2, 5 and 6	3, 4, 7, 8 and "reserve"
January 3, 2011	5:26 pm – 6:02 pm	3	1, 2, 5 and 6	3, 4, 7, 8 and "reserve"
April 8, 2011	3:45 pm – 4:30 pm	4	1, 2, 5 and 6	3, 4, 7, 8 and "reserve"

** Due to late arrival of the PUFs from Spain, the first exposure of the PUFs was not done as proposed. (The proposed date was July 1, 2010). So, the first round of samples was only exposed for one (1) month instead of three (3) months.

The final round of PUF exposure ended on July 8, 2011 between 3:30 pm and 3:45 pm .

Passive Air Sampler (PAS)

Item Description	Status
Mounting of PAS	Completed (August 26, 2010)
Removal and analysis of PUFs	Completed (July 8, 2011)

Installation of PAS

Successful installation of PAS

Extraction and clean-up procedures

- Liquid-liquid extraction using standard SOP (GLIER/UNEP) with solvents such as methylene chloride and heaxane.

- Florisil clean-up

- Concentration of extract to about 1 mL.

Instruments

- Agilent GC-MS Single Quadrupole
- Agilent GC-MS QQQ
- Agilent GC-MS with Purge and Trap Accessories
- Agilent GC-MS with Head Space Accessories
- Agilent LC with Pickering System (Glyphosate)
- Agilent LC-MS QQQ

Agilent 6890N Gas Chromatograph attached to 5973 Network Mass Selective Detector

UNEP PUF Results_Rounds #1&2_B

Matrix	AIR	
Date	4/26/2011	9/27/2011
No.	1	2
Sample-ID	JAM-1-I	JAM-1-II
Country	JAMAICA	JAMAICA
Fat (%)		
Unit	ng filter^{-1}	ng filter^{-1}
Aldrin	0.214	0.065
Dieldrin	0.179	0.0004
Endrin	0.014	0.003
Sum drins	0.407	0.068
a-Chlordane	0.0004	0.0004
g-Chlordane	0.115	0.026
Oxychlordane	0.0004	0.0004
cis-Nonachlor	0.149	0.0004
trans-Nonachlor	0.0004	0.0004
Sum chlordanes	0.265	0.028
Sum chlordane equivalent		

UNEP PUF Results_Rounds #1&2_C

Matrix	AIR	AIR
Date	4/26/2011	9/27/2011
No.	1	2
Sample-ID	JAM-1-I	JAM-1-II
Country	JAMAICA	JAMAICA
Fat (%)		
Unit	ng filter^{-1}	ng filter^{-1}
o,p'-DDT	0.021	0.017
p,p'-DDT	0.068	0.0004
o,p'-DDD	0.0004	0.0004
p,p'-DDD	0.007	0.015
o,p'-DDE	0.0004	0.0004
p,p'-DDE	0.079	0.020
Sum DDTs	0.176	0.053
Sum DDT equivalent		
Heptachlor	0.062	0.255
cis-Heptachlorepoxide	0.0004	0.0004
trans-Heptachlorepoxide	0.0004	0.034
Sum heptachlor	0.063	0.289
Sum heptachlor equivalent		

UNEP PUF Results_Rounds #1&2_D

Matrix	AIR	AIR
Date	4/26/2011	9/27/2011
No.	1	2
Sample-ID	JAM-1-I	JAM-1-II
Country	JAMAICA	JAMAICA
Fat (%)		
Unit	ng filter^{-1}	ng filter^{-1}
HCB	0.188	0.226
Mirex	0.022	0.0004
Parlar 26		
Parlar 50		
Parlar 62		
Sum toxaphene	0	0
a-HCH	0.009	0.053
b-HCH	0.044	0.0004
g-HCH	0.0004	0.030

UNEP PUF Results_Rounds #1&2_E

Matrix	**AIR**	**AIR**
Date	4/26/2011	9/27/2011
No.	1	2
Sample-ID	JAM-2-I	JAM-2-II
Country	JAMAICA	JAMAICA
Fat (%)	-	-
Unit	ng filter^{-1}	ng filter^{-1}
PCB #28	6.20	6.51
PCB #52	4.26	4.46
PCB #101	2.55	2.51
PCB #118	1.34	1.34
PCB #138	1.49	2.29
PCB #153	2.16	1.36
PCB #180	0.560	0.794
Sum PCB_7	18.56	19.26
PCB-105	0.0760	0.0760
PCB-156	0.0206	0.0206

UNEP PUF Results_Rounds #1&2_F

Matrix	AIR	AIR
Date	4/26/2011	9/27/2011
No.	1	2
Sample-ID	JAM-7-I	JAM-7-II
Country	JAMAICA	JAMAICA
Fat (%)		
Unit	pg filter^{-1}	pg filter^{-1}
PCDD/PCDF		
2378-Cl_4DD	1.75	3.77
12378-Cl_5DD	9.03	14.20
123478-Cl_6DD	5.98	7.74
123678-Cl_6DD	11.24	16.56
123789-Cl_6DD	10.06	14.51
1234678-Cl_7DD	88.08	128.65
Cl_8DD	362.82	573.68
2378-Cl_4DF	7.34	16.36
12378-Cl_5DF	0.101	0.196
23478-Cl_5DF	8.94	17.93
123478-Cl_6DF	8.17	12.10
123678-Cl_6DF	10.22	14.57
123789-Cl_6DF	9.47	13.47
234678-Cl_6DF	0.49	3.59
1234678-Cl_7DF	45.57	68.77
1234789-Cl_7DF	0.171	0.211
Cl_8DF	32.75	54.71

UNEP PUF Results_Rounds #1&2_G

Matrix	AIR	AIR	AIR
Date	4/11/2011	4/26/2011	9/27/2011
No.	1	1	
Sample-ID	0111/2011-IV	JAM-7-I	JAM-7-II
Country	JAMAICA	JAMAICA	JAMAICA
Fat (%)			
Unit	pg filter^{-1}	pg filter^{-1}	pg filter^{-1}
dl-PCB			
PCB 77	264.92	264.92	309.16
PCB 81	44.16	44.16	32.74
PCB 126	36.07	36.07	40.42
PCB 169	21.21	21.21	9.02
PCB 105	562.83	562.83	599.75
PCB 114	39.55	39.55	46.89
PCB 118	229.55	229.55	232.02
PCB 123	139.67	139.67	144.80
PCB 156	106.18	106.18	121.58
PCB 157	29.58	29.58	30.62
PCB 167	52.05	52.05	51.16
PCB 189	17.03	17.03	10.50
WHO_{1998}-$TEQ_{no\text{-}PCB}$	3.850	3.85	4.17
WHO_{1998}-$TEQ_{mo\text{-}PCB}$	0.1831	0.183	0.199
WHO_{1998}-TEQ_{PCB}	4.033	4.03	4.37
WHO_{1998}-$TEQ_{PCDD/PCDF/PCB}$	26.96	26.96	43.24

UNEP Human Breast Milk Project 2010-2011

- The UNEP Human Breast Milk Project entailed the collection and analysis of fifty (50) human breast milk samples from urban and rural areas. Some of these samples were pooled samples. The total number of samples analysed was 21. The details of sample collection are outlined in table 1. The sample collection started on December 1, 2010 and concluded on January 15, 2011.

UNEP Human Breast Milk Project 2010-2011

- A composite sample which comprised all the samles was prepared and sent to a designated laboratory in Spain (CSIC) for analysis of Persistent Organic Pollutants (POPs) including dioxins and furans while several pooled samples were prepared according to the categories listed in table 2 and the samples were analysed by the designated local laboratory (**Pesticide Research Laboratory, PRL, Jamaica**) for the same parameters indicated above.

Table 1: Sample Classification

Location/ Description of Pool	Number of samples	Pool number/individual samples
Rural mother	11	11
Vegetarian	1	1
Smoking/exposed to smoke	2	2
Older mothers	14	1
Teen mothers	18	1
Second time mothers	3	1
Fish eater	1	1
Inner city mothers	15	1
Uptown mothers	3	1
Composite sample	1	1
Total		**21**

Table 2

SAMPLE NUMBER	SAMPLE CODES	CATEGORIES
1	JM-BM-01	Fish Eater
2	JM-BM-02	Smoker or worked in an environment with smoke
3	JM-BM-03	Vegetarian
4	JM-BM-36	Smoker or worked in an environment with smoke
5	JM-BM-37	Smoker or worked in an environment with smoke
6	JM-BM-08	Rural areas
7	JM-BM-12	Rural areas
8	JM-BM-13	Rural areas
9	JM-BM-22	Rural areas
10	JM-BM-24	Rural areas

Table 2 (cont'd)

SAMPLE NUMBER	SAMPLE CODES	CATEGORIES
11	JM-BM-34	Rural areas
12	JM-BM-41	Rural areas
13	JM-BM-43	Rural areas
14	JM-BM-49	Rural areas
15	JM-BM-50	Rural areas
16	JM-BM-P06	Older mothers
17	JM-BM-P07	Teenaged mothers
18	JM-BM-P08	Second time mothers
19	JM-BM-P10	Middle aged mothers
20	JM-BM-P11	Inner city mothers
21	JM-BM-P12	Uptown mothers

Status of the Breast Milk Project

Item Description	Status
Submit proposal for ethical approval by the Jamaican Ministry of Health.	Completed
Lobby with health clinics and hospital staff for further approval to access files and patient data in order to recruit eligible mothers for milk collection.	Completed
Distribution of questionnaires and breast milk collection.	Completed
Analysis of breast milk	Completed
Analysis of mirror samples (fish and cow's milk)	Completed
Promoting of exclusive breastfeeding as well as informing mothers of the importance of breast milk to the growth and well being of the infant at the post natal clinics.	Completed

Status of the Breast Milk Project (cont'd)

Item Description		**Status**
Home visits (for mothers who could not be reached at the clinics).		Completed
Laboratory Training		Completed Administrators: Two representatives from Spain (Drs. Benin and Encara) Participants: Sherine Whyte, Raymond Reid and two representatives from the National Environment and Planning Agency.
Chemicals and glassware	Sample bottles: 100mL (120), 1000 mL (2) and 2000 mL (2)	Received
	Capillary Columns	Received in March 2011
	Reference Standards	Received in March 2011
	Soxhlet Apparatus and other requested items	Yet to be received

UNEP Inter-calibration 2010-2011 (Part 1)

UNEP Intercalibration 2010					
Code:	**Ash** (ng/kg)	**Sediment** (ng/kg)	**Fish** (µg/kg)	**Mothers' Milk** (µg/kg)	**Standard 1 C** (ng/µl)
Date Received: October 26, 2010					
Date Analyzed: January 13-18, 2011					
(Wet) Weight received: 9.974g					
Lipid weight:	*		4.69E+06	5.50E+06	*
% Lipids:	*		0.47	0.55	*
Drins					
Aldrin	*		9.88	10.11	
Dieldrin	*		10.02	9.98	
Endrin	*		10.09	10.02	
Sum Drins Lower Bound (ND = 0)	*				
Sum Drins Upper Bound (ND = LOD)	*				

Notes

* not applicable

All values should be reported in ng/kg or pg/µl

ND: not detected < than value expected

NA: not analyzed

UNEP Inter-calibration 2010-2011 (Part 2)

UNEP Intercalibration 2010					
Code:	**Ash** (ng/kg)	**Sediment** (ng/kg)	**Fish** (µg/kg)	**Mothers' Milk** (µg/kg)	**Standard 1 C** (ng/µl)
Date Received: October 26, 2010					
Date Analyzed: January 13-18, 2011					
(Wet) Weight received: 9.974g					
Lipid weight:	*		4.69E+06	5.50E+06	*
% Lipids:	*		0.47	0.55	*
Chlordanes					
trans-Chlordane	*		10.06	10.14	
cis-Chlordane	*		10.02	10.12	
trans-Nonachlor	*		9.86	10.06	
cis-Nonachlor	*		9.92	10.08	
Oxychlordane	*		10.01	10.01	
Heptachlor	*		10.04	9.96	
cis-Heptachlorepoxide	*		10.05	9.87	
trans-Heptachlorepoxide	*		10	9.82	
Sum Chlordane Lower Bound (ND = 0)	*				
Sum Chlordane Upper Bound (ND = LOD)	*				

Notes

* not applicable

All values should be reported in ng/kg or pg/µl

ND: not detected < than value expected

NA: not analyzed

UNEP Inter-calibration 2010-2011 (Part 3)

UNEP Intercalibration 2010					
Code:	**Ash** (ng/kg)	**Sediment** (ng/kg)	**Fish** (µg/kg)	**Mothers' Milk** (µg/kg)	**Standard 1 C** (ng/µl)
Date Received: October 26, 2010					
Date Analyzed: January 13-18, 2011					
(Wet) Weight received: 9.974g					
Lipid weight:	*		4.69E+06	5.50E+06	*
% Lipids:	*		0.47	0.55	*
DDTs					
p,p'-DDT	*		10.04	10.16	
o,p'-DDT	*		10.07	10.15	
p,p'-DDE	*		10.04	10.04	
o,p'-DDE	*		10.04	10.07	
p,p'-DDD	*		10.04	9.94	
o,p'-DDD	*		10.04	10.01	
Sum DDTs Lower Bound (ND = 0)	*				
Sum DDTs Upper Bound (ND = LOD)	*				
Mirex	*		9.92	10.17	
Hexachlorobenzene			9.98	10.12	

Notes

* not applicable

All values should be reported in ng/kg or pg/µl

ND: not detected < than value expected

NA: not analyzed

UNEP Inter-calibration 2010-2011 (Part 4)

		UNEP Intercalibration 2010			
Code:	**Ash** (ng/kg)	**Sediment** (ng/kg)	**Fish** (ug/kg)	**Mothers' Milk** (ug/kg)	**Standard 1 B** (ng/µl)
Date Received: October 26, 2010					
Date Analyzed: January 14-18, 2011					
(Wet) Weight received: 9.974g					
Lipid weight:	*	*	4.69E+06	5.50E+06	*
% Lipids:	*	*	0.47	0.55	*
Marker PCBs					
PCB #28			2.008	2.012	
PCB #52			1.984	1.992	
PCB #101			2.01	2.018	
PCB #118			2.002	2.009	
PCB #138			2.016	2.023	
PCB #153			1.984	1.998	
PCB #180			1.994	2.002	
Sum Marker PCB Lower Bound (ND = 0)					
Sum Marker PCB Upper Bound (ND = LOD)					

Notes

* not applicable

All values should be reported in ng/kg or ng/µl

ND: not detected < than value expected

NA: not analyzed

Basic POPs Results
Sample type: Human milk
Country: Jamaica
Sample no. 11012943
Date: 27/04/11
Lipid content [%]: 4.4

Parameter	**Concentration g/g lipid weight**
Aldrin	nd
Chlordane group	2.7
alpha-chlordane	nd
gamma-chlordane	nd
gamma-chlordane	2.8
Trans-nonachlor	4.5
Dieldrin	2.4

Basic POPs Results (cont'd)
Sample type: Human milk
Country: Jamaica
Sample no. 11012943
Date: 27/04/11
Lipid content [%]: 4.4

Parameter	**Concentration g/g lipid weight**
DDT group	173.0
o,p'-DDD	nd
p,p'-DDD	nd
o,p'-DDE	nd
p,p'-DDE	147.4
o,p'-DDT	1.0
p,p'-DDT	7.7
Endrin group	nd
Endrin	nd
Endrin ketone	nd

Basic POPs Results (cont'd)
Sample type: Human milk
Country: Jamaica
Sample no. 11012943
Date: 27/04/11
Lipid content [%]: 4.4

Parameter	**Concentration g/g lipid weight**
Heptachlor group	nd
Heptachlor	nd
Heptachlor-epoxide cis	nd
Heptachlor-epoxide trans	nd
Hexachlorobenzene	3.5
Hexachlorocyclohexane (HCH) group	
alpha-HCH	nd
beta-HCH	1.5
gamma-HCH	nd

Basic POPs Results (cont'd)

Sample type: Human milk
Country: Jamaica
Sample no. 11012943
Date: 27/04/11
Lipid content [%]: 4.4

Parameter	**Concentration g/g lipid weight**
Parlar (toxaphene) group	1.3
Parlar 26	0.5
Parlar 50	0.8
Parlar 62	nd
Mirex	nd

Explanations: nd = not detected (< 0.5 ng/g fat)
1) sum of alpha-chlordane, beta-chlordane and oxychlordane, calculated as chlordane
2) sum of o,p'-DDT, p,p'-DDT, p,p'-DDE and p,p'-DDD, calculated as DDT
3) sum of endrin and endrin ketone, calculated as endrin
4) sum of heptachlor and heptachlor-epoxid (cis/trans), calculated as heptachlor
5) sum of parlar 26, parlar 50 and parlar 62

PCDD/Fs Results
Sample type: Human Milk
Country: Jamaica
Sample no. 11012943
Date: 27/04/11
Lipid content [%]: 4.4

2,3,7,8-substituted PCDF/PCDD	**Concentration pg/g lipid weight**
2,3,7,8-TCDF	0.417
1,2,3,7,8-PeCDF	0.204
2,3,4,7,8-PeCDF	1.71
1,2,3,4,7,8-HxCDF	1.19
2,3,4,6,7,8-HxCDF	1.16
1,2,3,7,8,9-HxCDF	0.457
1,2,3,4,6,7,8-HpCDF	0.0352
1,2,3,4,7,8,9-HpCDF	2.09
OCDF 0.181	0.109

PCDD/Fs Results (cont'd)
Sample type: Human Milk
Country: Jamaica
Sample no. 11012943
Date: 27/04/11
Lipid content [%]: 4.4

2,3,7,8-substituted PCDF/PCDD	**Concentration pg/g lipid weight**
2,3,7,8-TCDD	0.436
1,2,3,7,8-PeCDD	1.81
1,2,3,4,7,8-HxCDD	1.38
1,2,3,6,7,8-HxCDD	6.74
1,2,3,7,8,9-HxCDD	2.00
1,2,3,4,6,7,8-HpCDD	14.0
OCDD	56.9

Explanations:
< [LOQ] Below limit of quantification (LOQ)

PCB Results
Sample type: Human Milk
Country: Jamaica
Sample no. 11012943
Date: 27/04/11
Lipid content [%]: 4.4

Indicator PCB	**Concentration ng/g lipid weight**
PCB 28	0.955
PCB 52	0.317
PCB 101	0.688
PCB 138	7.94
PCB 153	10.1
PCB 180	3.87
Sum Indicator PCB	23.8

PCB Results (cont'd)
Sample type: Human Milk
Country: Jamaica
Sample no. 11012943
Date: 27/04/11
Lipid content [%]: 4.4

Mono-ortho PCB	**Concentration ng/g lipid weight**
PCB 105	1.94
PCB 114	0.256
PCB 118	5.75
PCB 123	0.0780
PCB 156	1.54
PCB 157	0.362
PCB 167	0.468
PCB 189	0.0717

PCB Results (cont'd)

Sample type: Human Milk
Country: Jamaica
Sample no. 11012943
Date: 27/04/11
Lipid content [%]: 4.4

Non-ortho PCB	**Concentration ng/g lipid weight**
PCB 77	0.00447
PCB 81	0.00174
PCB 126	0.01303
PCB 169	0.00526

Explanations:
< [LOQ] Below limit of quantification (LOQ)

Benefits of the project

- Capacity building: training of analysts who will be able to train other analysts from the national and regional countries to analyse PUFs, breast milk, fish, water, soil, vegetable matter etc.
- Supply data for the global project.
- Education of the targeted breast feeding mothers.

Challenges faced with the project

(1) Mothers' reluctance to participate due to local folklore and superstitious beliefs.

For example some mothers believe that by donating some of their breast milk will cause harm to them and their babies. Some declined for unknown reasons.

Challenges faced with the project (cont'd)

(2) Sample collection

- Late approval of project by Ministry of Health (Jamaica)
- Inaccurate address (only to find out upon reaching the address provided)
- Accurate information provided but declined to participate (this was found out only after travelling long times and distances).
- In certain urban communities, persons are not known by their registered names.
- Cooperation depends on the dress code of the sample collectors and the mode/type of transportation employed.
- Inadequate sample volumes

Challenges faced with the project (cont'd)

(3) Instrument failures

(4) Pooling – there was not sufficient samples from most of the proposed categories e.g. diet, smoking habits, geographic locations etc.

(5) Communication – lack of clear communication between UNEP and the National Coordinator/Focal Point seemed to be the major cause for us not receiving the requested chemicals and glassware to start the project on time.

Things to be done and recommendations

(1) If the outstanding requested items received e.g. the automatic Soxhlet apparatus, the analyses would have been completed more quickly. So, it would be good to invest in this apparatus (~US$500).

(2) Sampling should be extended to more rural areas in order to get data that is more representative of Jamaica. More samples should be collected from the other proposed categories along with education of breast feeding mothers on the subject in question.

(3) Installation of two new GC-MS (one triple quad).

Acknowledgements

- UNEP
- National Coordinator for Jamaica: Professor Tara Dasgupta
- National Focal Point: Ministry of Health (Gillian Guthrie)
- Analysts: Sherine Whyte/Raymond Reid
- All other participants e.g. doctors, nurses, breast feeding mothers etc.

Thank you for your attention.

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