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환경호르몬으로부터 안전한 아시아 EDC free ASIA

금융산업공익재단-노동환경건강연구소 국제 컨퍼런스
FIPIF-WIOEH International Conference

Contact

poyeon.wioeh@gmail.com

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In Partnership with



목차

1. 인사말

Hong Bae Park

- **Korea Financial Industry Union Presidents** (Korea Financial Industry Public Interest Foundation) 4

Yun-Keun Lee

- **Director of Institute** (Wonjin Institute for Occupational and Environmental Health) 5

2. 아시아공동조사의 성과와 과제

EDCs in Consumer Products at Asian Countries

- **Inja Choi** (Wonjin Institute for Occupational and Environmental Health) 7

Siddika Sultana

- **Executive Director** (Environment & Social Development Organization - ESDO) 23

Oktaviani Ikasari

- **Green City Program Officer****Executive Director** (Gita Pertiw) 28

Hiroshi Tsuchida

- **Part-time director** (The Toxic Watch Network) 30

Hatijah Hashim

- **Research Officer** (Consumers Association of Penang) 37

Ram Charitra Sah

- **Executive Director** (Center for Public Health and Environmental Development (CEPHED)) 41

Chalani Rubesinghe

- **Project planning and management officer** (Centre for Environmental Justice)

43

Than Nguyen Phuong Hai

- **Program Officer** (Research Centre for Gender, Family and Environment in Development (CGFED))

46

3. 화학물질로부터 안전한 아시아를 위한 협력 방안

Kyungho Choi

- **Professor** (Graduate School of Public Health, Seoul National University)

51

Won Kim

- **Director of Research** (Wonjin Institute for Occupational and Environmental Health)

66

Jitka Straková

- **Global Researcher** (IPEN (International Pollutants Elimination Network))

80

Jong-Hwan KIM

- **Executive Director, Sustainable Lifestyle & Welfare(Health) Headquarter**

(Headquarter Korea Environmental Industry & Technology Institute (KEITI))

87

Domyung Paek

- **Professor Emeritus** (Seoul National University)

91

Pong Gyun PARK

- **Director** (Ministry of Environment, Environment Industry and Technology Institute)

금융산업공익재단-노동환경건강연구소국제컨퍼런스

“환경호르몬으로부터 안전한 아시아”

금융산업공익재단 박홍배 이사

안녕하십니까?

대한민국 금융산업공익재단 이사 박홍배입니다.

재단을 2018년에 설립한 대한민국의 전국금융산업노동조합 위원장입니다.

금융산업공익재단은 대한민국 금융산업에서 일하는 10만 노동자와 33개 금융기관이 공동으로 기금을 조성해서 만들었습니다. 차별과 불평등을 해소하고 보다 안전하고 건강하고 지속가능한 사회를 만드는 것이 우리의 목표입니다.

대한민국은 1950년대 전세계에서 가장 가난한 나라에서 여러 아시아 이웃국가들의 도움을 받으며 OECD에서도 주목받는 국가로 성장해 왔습니다. 그 성장 과정에서 수많은 투쟁을 통해서 노동 환경과 생활환경을 개선해 왔습니다.

우리 재단은 대한민국의 노동계와 시민사회가 쌓은 소중한 자산을 아시아 전체 지역의 시민사회 및 정부와 공유하고 각국의 발전 과정에서 시행착오를 줄이려는 실천적인 노력에 도움을 주어야 한다고 판단했습니다.

노동환경건강연구소와 IPEN(International Pollutants Elimination Network, 유해물질추방 국제네트워크)가 우리 재단의 든든한 글로벌 ESG 협력 파트너가 되어주실 것을 기대합니다.

‘환경호르몬, 수은 중독, 맹독성 농약으로부터 안전한 아시아’를 함께 만들어 갑시다. 아시아의 모든 어린이와 청소년들이 안전하고 건강하게 자라날 수 있도록 미래를 열어갑시다.

오늘 컨퍼런스에 참여해 주신 여러 나라의 실천가들에게 깊은 존경을 담아 감사드립니다. 각 국가의 경험을 공유하고 실천적 모티브를 찾는데 오늘의 컨퍼런스가 도움이 되리라 확신합니다.

우리 재단은 여러분의 노력을 계속 지지하고 응원하겠습니다.

감사합니다.

“유해물질로부터 안전한 사회”, 모든 이들의 소중한 권리입니다.

노동환경건강연구소 소장 이윤근

노동환경건강연구소(WIOEH)는 이황화탄소 노출에 의한 직업병 피해자들의 보상금으로 1999년에 설립된 민간연구소입니다. 연구소는 그 동안 노동자들의 직업병과 시민들의 환경오염 문제에 대한 전문적인 연구와 노동자 시민들의 건강권 확보를 위한 사회적 활동을 지속적으로 하고 있습니다.

2021년부터는 금융산업공익재단의 지원을 통해 아시아 지역의 NGO들과 함께 대표적인 환경오염 취약계층인 어린이들의 환경호르몬 노출에 대한 프로젝트를 진행하고 있습니다.

오늘 이 컨퍼런스는 그 프로젝트의 1차적인 결과를 발표하고 토론하는 자리입니다. 다시 한번 이 사업을 적극 지원해 주신 금융산업공익재단 박흥배 이사님과 이 사업에 적극 참여해주신 아시아 국가 NGO들에게 깊은 감사를 드립니다.

이 사업이 기업의 ESG 활동의 중요성을 인식하고, 환경오염으로부터 소외된 아시아 지역 노동자 시민들의 건강권 확보를 위한 국제적 연대의 출발점이 되길 기원합니다.

감사합니다.



EDCs in Consumer Products at Asian Countries

Inja Choi

team leader/
Wonjin Institute for Occupational
and Environmental Health

EDCs in Consumer Products at Asian Countries

Inja Choi

Wonjin Institute for Occupational and Environmental Health

Contents

1. Background

2. Methodology

3. Results

4. Conclusion and Recommendations

I. Background



Protect SEA from Endocrine Disrupting Chemicals

- There are interest and concerns on EDCs, worldwide.
- Knowledge and information on EDCs are based on studies conducted in Europe and the United States. There is little research or information on the health effects and exposure to EDCs in developing countries, including Southeast Asia.
- Exposure to EDCs in everyday is ubiquitous. It is important to identify and to assess the contamination in various consumer products.

Regulations across ASIA Countries

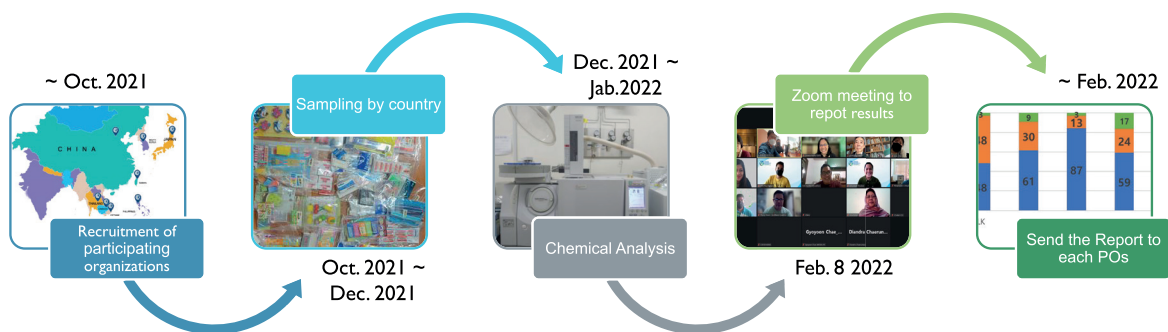
Country	BPA	Phthalate
Vietnam	<ul style="list-style-type: none"> Plastic packaging for food(Bisphenol A (SML = 3 mg/kg), Bisphenol S (60 mg/kg or 10 mg/dm²)) PC plastic packaging: < 500µg/g BPA Plastic packaging and tools for small children: not use 	<ul style="list-style-type: none"> Phthalate limit in children's toys: DEHP, DBP or BBP not in excess of 0.1% Phthalate limit in toys that may be placed in the mouth by children: DINP, DIDP, or DNOP not exceeds 0.1%
Philippine	<ul style="list-style-type: none"> Ban on BPA in baby feeding bottles and sippy cups as childcare articles 	
Japan	<ul style="list-style-type: none"> Plastic ingredients and additives for food utensils: BPA content limit according to synthetic resin type 	<ul style="list-style-type: none"> Toy: < 0.1% DBP, DEHP or BBP Part in contact with the mouth of infants : < 0.1% DIDP, DINP or DNOP
Nepal	<ul style="list-style-type: none"> Children Toys Standards 2017 BPA(free) 	<ul style="list-style-type: none"> Children Toys Standards 2017 Phthalates (<100 ppm)
Malaysia	<ul style="list-style-type: none"> Section 27A of the Food Regulations 1985 Ban on bottles containing BPA 	<ul style="list-style-type: none"> Unclear
Bangladesh	<ul style="list-style-type: none"> No 	<ul style="list-style-type: none"> No
Sri Lanka	<ul style="list-style-type: none"> No 	<ul style="list-style-type: none"> No
Indonesia	<ul style="list-style-type: none"> BPA migration limit of 0.6 bpj (600 micrograms/kg) from PC packaging 	<ul style="list-style-type: none"> Regulation No. 20 of 2019 concerning Food Packaging / Unclear
Korea	<ul style="list-style-type: none"> Plastic packaging and tools for small children: not use Plastic packaging for food(Bisphenol A: 60 mg/kg) 	<ul style="list-style-type: none"> Phthalate content limit in some sanitary products, cosmetic, medical products, and tools, package, and vessels including products for small children Phthalate limit in articles for children: DEHP, DBP, BBP, DINP, DIDP, DNOP, and DiBP not exceeds 0.1% in total weight

Objectives

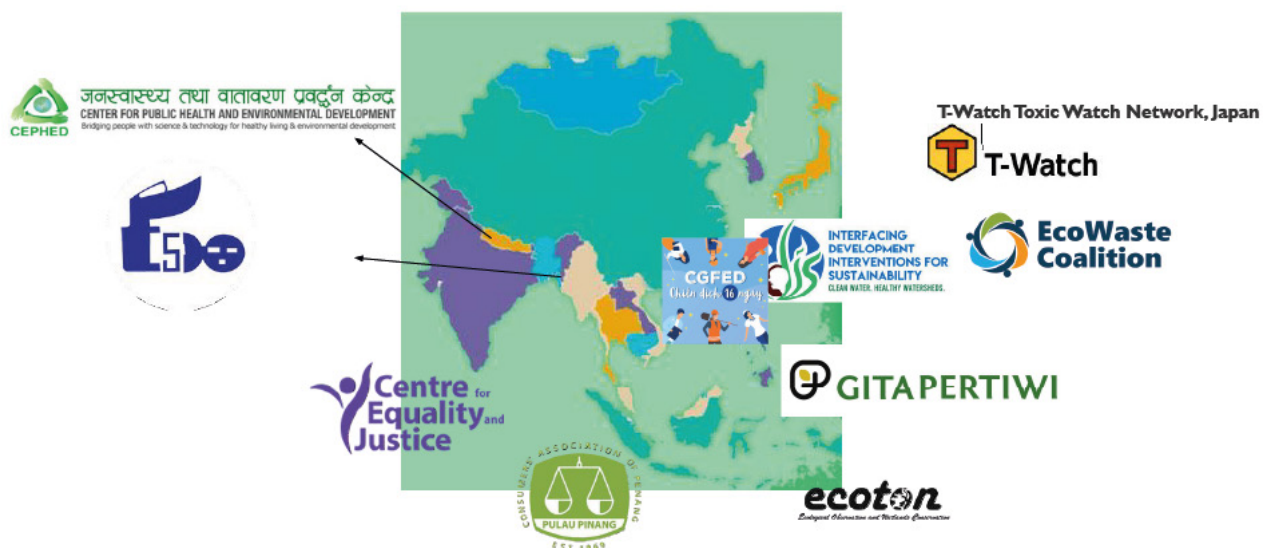
1. Investigate the level and type of bisphenol analogues in thermal papers
 2. Investigate the level of phthalate plasticizers in erasers
- Gathering data to support regulation on phthalates in children products and Bisphenol analogues in thermal paper.

2. Methodology

Procedure of the study



11 Participating Organizations from 8 countries



Sample Information

Country	Organization	ID	Thermal receipts		Erasers
			Collected	After excluding normal paper	
Bangladesh	ESDO	BD	40	39	47
Indonesia	Gita Pertiwi & ECOTON	ID	52	45	40
Sri Lanka	CEJ	LK	41	31	40
Malaysia	CAP	MY	44	44	40
Nepal	CEPHED	NP	42	30	53
Philippine	IDIS & EWC	PH	59	54	40
Vietnam	CGFED	VN	41	40	42
Japan	TWN	JP	36	35	39
Total			355	318	341

Bisphenol analogues analysis

1st Chemical analysis

- Target compounds
 - BPA, BPS, BPF, BPB, BPAF
- Samples were extracted with methanol and analyzed LC/MS/MS(LC-MS 8050, Shimadzu, Japan)

2nd Screening

- Some samples are considered as plain normal paper, **Not Thermal paper**
- As a result of the analysis, samples without detectable bisphenols were reconfirmed using a hot plate at 200°C
 - If no color change is observed, it is determined that it is not thermal paper.
 - 37 samples are excluded from the result data.



Phthalates analysis

1st PVC screening

- Portable XRF used for determination of chlorine content as an indicator of PVC.
- If content of Cl exceeded 1%, it was considered as PVC.



Fig. portable-XRF
(Innov-X, Olympus, USA)

2nd Chemical analysis

- Target compounds
 - 7 phthalates : DBP, DiBP, BBzP, DEHP, DINP, DIDP and DnOP
- Samples were extracted and analyzed according to the method of CPSC(Consumer Product Safety Commission, USA)'s SOP.
- Chemicals analyzed using GC/MS(GCMS 2010 plus, Shimadzu, Japan) with SIM mode

Bisphenol Analogues; EU REACH

ANNEX XVII TO REACH – Conditions of restriction

Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles

Entry 66
Bisphenol A
CAS No 80-05-7
EC No 201-245-8
Conditions of restriction
Shall not be placed on the market in thermal paper in a concentration equal to or greater than 0,02 % by weight after 2 January 2020.

Phthalates; Safety standards refer to Korean Regulation

- Special Act on The Safety Of Children's Products (Jan.27. 2017)
 - Common safety standards for children's products (June.04. 2015~)
 - Toys, school supplies are included

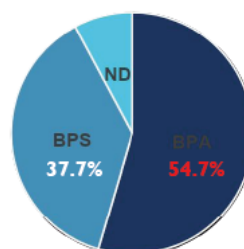
Abbre.	Limit	Compounds
DEHP	Sum of 7 phthalates ≤ 0.1%	Di-(2-ethylhexyl) phthalate
DBP		Dibutyl phthalate
BBP		Benzyl butyl phthalate
DINP		Diisononyl phthalate
DIDP		Diisodecyl phthalate
DnOP		Di-n-octyl phthalate
DiBP		Diisobutyl phthalate

3. Results

Bisphenol Analogues – Result(I)

Analytes	Detection Frequency		AVE	Min.	Max.	Unit: %, Wt
	(N=318)	(%)				
BPA	174	54.7	1.26	0.76	2.44	
BPS	120	37.7	0.69	0.36	1.23	
BPF	0	0	-	-	-	
BPB	0	0	-	-	-	
BPAF	0	0	-	-	-	
*ND	25	7.9	-	-	-	

* ND: Not detected(<LOD)

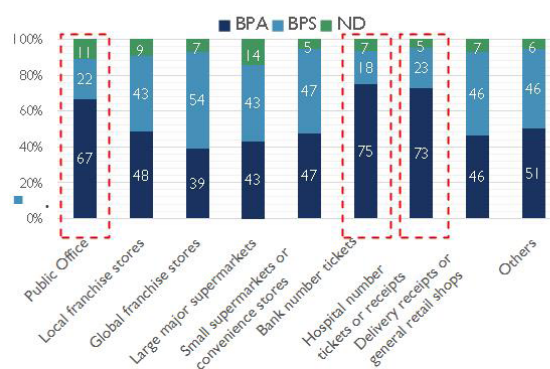


- All samples detected BPA exceeded EU regulatory standards.(EU BPA regulation: < 0.02%)

Bisphenol Analogues – Result(2)

Table. Detection Frequency by Category. unit: %(N)

Category	Total N	BPA	BPS	ND
Public Office	18	67(12)	22(4)	11(2)
Local franchise stores	54	48(26)	43(23)	9(5)
Global franchise stores	28	39(11)	54(15)	7(2)
Large major supermarkets	35	43(15)	43(15)	14(5)
Small supermarkets or convenience stores	38	47(18)	47(18)	5(2)
Bank number tickets	60	75(45)	18(11)	7(4)
Hospital number tickets or receipts	22	73(16)	23(5)	5(1)
Delivery receipts or general retail shops	28	46(13)	46(13)	7(2)
Others	35	51(18)	46(16)	6(2)
Total	318	174(54)	120(38)	25(8)

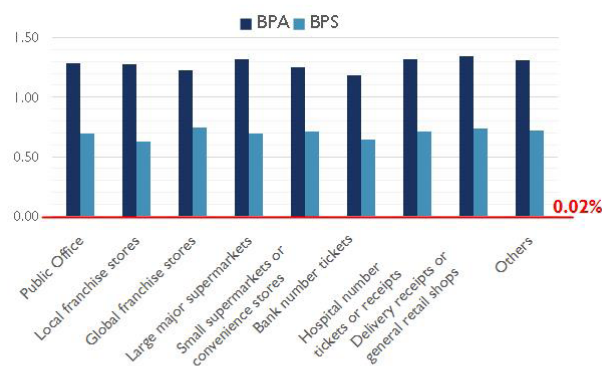


- Thermal papers from Public Office, Bank and Hospital were revealed to have a higher detection frequency of BPA than BPS.

Bisphenol Analogues – Result(3)

Table. Mean Concentration of BPA & BPS by Category.

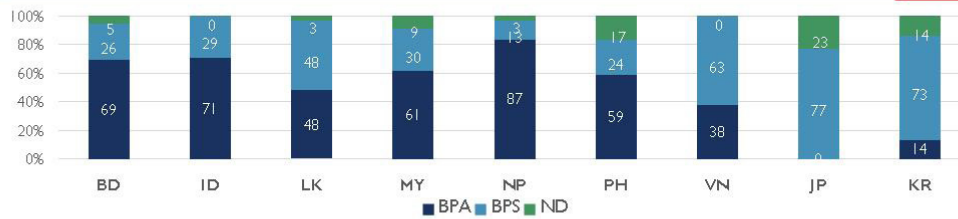
Category	Total N	BPA(%)	BPS(%)
Public Office	18	1.28 ± 0.35	0.69 ± 0.14
Local franchise stores	54	1.28 ± 0.24	0.62 ± 0.10
Global franchise stores	28	1.22 ± 0.33	0.74 ± 0.19
Large major supermarkets	35	1.31 ± 0.29	0.69 ± 0.15
Small supermarkets or convenience stores	38	1.25 ± 0.18	0.70 ± 0.21
Bank number tickets	60	1.18 ± 0.20	0.64 ± 0.12
Hospital number tickets or receipts	22	1.31 ± 0.24	0.70 ± 0.11
Delivery receipts or general retail shops	28	1.34 ± 0.29	0.75 ± 0.15
Others	35	1.30 ± 0.36	0.72 ± 0.24
Total	318	1.26 ± 0.27	0.69 ± 0.17



- The mean concentrations of BPA and BPS for each category were similar.

Bisphenol Analogues – Result(4)

	BD	ID	LK	MY	NP	PH	VN	JP	KR
Total N	39	45	31	44	30	54	40	35	51
BPA	69(27)	71(32)	48(15)	61(27)	87(26)	59(32)	38(15)	0	14(7)
BPS	25(10)	29(13)	48(15)	30(13)	13(4)	24(13)	63(25)	77(27)	73(37)
ND	5(2)	0	3(1)	9(4)	3(1)	17(9)	0	23(8)	14(7)



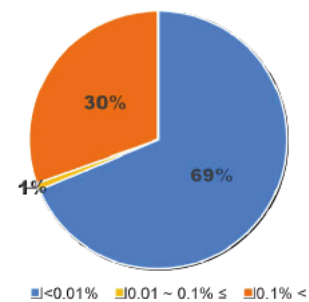
- Detection frequency of **BPA** was higher in most Southeast Asian countries (BD, ID, MY, NP, PH)
- In Japan, Korea and Vietnam, the detection frequency of **BPS** was higher.

Phthalates – Result(1)

Table. Result summary of phthalate plasticizers in Eraser samples.

Analytes	Detection Frequency		Conc. Range					
			ND ~ <0.01%		0.01 ~ ≤0.1%		0.1% <	
	N	%	N	%	N	%	N	%
DiBP	44	12.9	321	94.1	6	1.8	14	4.1
DBP	108	31.7	317	93.0	7	2.1	17	5.0
BBP	6	1.8	335	98.2	6	1.8	0	0.0
DEHP	159	46.6	209	61.3	35	10.3	97	28.4
DnOP	0	0.0						
DINP	15	4.4	326	95.6	2	0.6	13	3.8
DIDP	0	0.0						
Σ(7)*			234	68.6	3	0.9	104	30.5

[* Num. of Σ(7) can be less than the num. of individual phthalates. This is because two or more phthalates may exceed 0.1% in the same product.]



Phthalates – Result(2)

Table. Phthalate concentrations in Eraser samples.

	LOD<(N)	LOD	Median	GM	Min.	Max.	Unit
DiBP	44	3.5	65.5	262.6	5.0	137113.3	mg/kg
DBP	108	3.0	43.7	121.9	10.4	145813.6	mg/kg
BBP	6	2.8	128.2	136.8	119.8	167.0	mg/kg
DEHP	159	4.5	188157.7	11406.0	5.0	470087.4	mg/kg
DnOP	0	1.4					mg/kg
DINP	15	7.3	11370.1	11712.6	617.5	784434.1	mg/kg
DIDP	0	16.0					
Σ(7)*	180		17.1	0.8	0.001	78.5	%(Wt)

[* Num. of Σ(7) can be less than the num. of individual phthalates. This is because two or more phthalates may exceed 0.1% in the same product.]



[JP-13: DINP78.4%]



[MY-40: DEHP 47.0%]



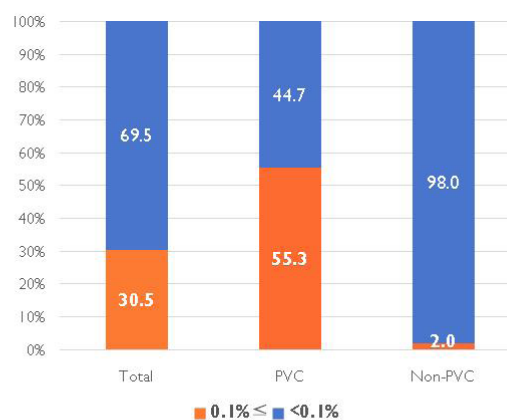
[IN-32: DEHP 42.3%]

Phthalates – Result(3)

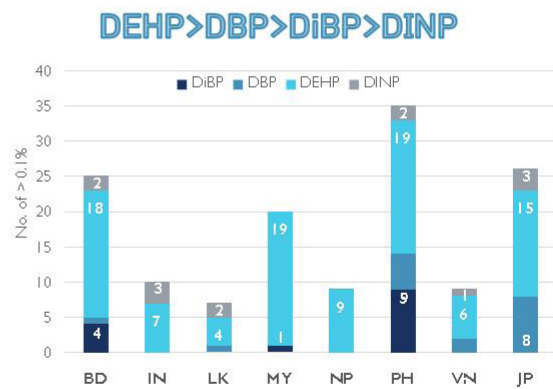
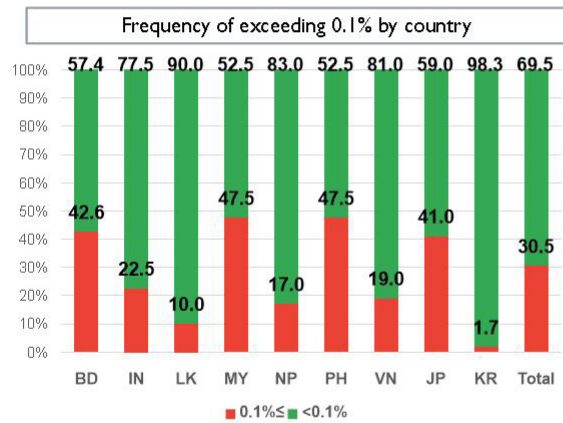
Table. Comparison of PVC and non-PVC

	0.1% ≤	PVC (N=188)	Non-PVC (N=153)
DiBP	14	13	1
DBP	17	17	0
BBP	-		
DEHP	97	95	2
DnOP	-		
DINP	13	13	
DIDP	-		
Σ (7)*	104	101	3

[* Num. of Σ(7) can be less than the num. of individual phthalates. This is because two or more phthalates may exceed 0.1% in the same product.]



Phthalates – Result(4)



- DEHP was the most frequently found phthalate in erasers and was followed by DBP

Phthalates – Result(5)

Table. Comparison of the results by the country of Brand and the origin of manufacture (Num. of exceeding 0.1%)

Country of Brand	Origin of Manufacturer	Origin of Manufacturer											Total (254)	
		Bangladesh	China	Germany	India	Indonesia	Japan	Korea	Malaysia	Taiwan	Vietnam	N	%	
Country of Brand	Bangladesh	13	8										8	61.5
	China	53	2	10		1							13	24.5
	Germany	32			2	1			1				4	12.5
	India	34				10							10	29.4
	Indonesia	10					4						4	40.0
	Japan	28		1				4					5	17.9
	Korea	4							1				1	25.0
	Malaysia	5		1								2	3	60.0
	Vietnam	10										3	3	30.0
	Total (189)	N	10	12	2	11	5	4	1	3	0	3		
	%	66.7	11.9	22.2	26.8	41.7	12.1	25.0	21.4	0.0	21.4			

- Country of Brand; Bangladesh> Malaysia> Indonesia
- Origin of Manufacturer; Bangladesh> Indonesia

Table. Summary of Korean samples

Country of Brand	Origin of Manufacture	N	PVC		DEHP	Σ(7)
			N	Y		
Korea	China	23	19	4	1	1
	Korea	11		11		
	No data	2		2		
Japan	Japan	5	1	4		
	Taiwan	2	1	1		
	Vietnam	1		1		
	Korea	1		1		
Germany	Germany	2		2		
	Taiwan	1	1			
	Malaysia	1		1		
NA	-	10	7	3		
Total	N	59	29	30	1	1
	%		49.2	50.8	2.8	1.7

- Of the 59 products, 61%(N=36) were identified as Korean brand.
- Regulations and management of imported products are applied equally.

4. Conclusions and Recommendations

Conclusions

1. Most thermal receipts collected from Asian countries contained BPA(54.7%) or BPS(37.7%).
 - Thermal receipt might be the one of the main exposure sources for BPA/BPS in Asian countries.
 - The latest studies have shown that BPS has similar toxicity as BPA. There are no regulation that ban the use of BPA (and BPS) in thermal paper across Asia countries.
2. The total amount of phthalates exceeded the Korea limit(=0.1%) in 30.5%(N=104) of the samples analyzed.
3. DEHP was the phthalate most frequently found in eraser samples, followed by DBP and DiBP. DEHP, DBP and DiBP were identified as Endocrine Disrupting Chemicals, and their use in children's products has already been restricted in EU and the USA.
 - Regulation on Children's products differ for each country.
 - A comprehensive definition for children's products is needed. (ex: toy, school supplies etc.)
4. According to the country of Brand information, the proportion of imported products was high. It seems necessary to regulate and manage imported products as well as domestic products.

Recommendations ;The strongest restriction

BPA & BPS in thermal paper

- Shall not be placed on the market in thermal paper in a concentration equal to or greater than 0.02% by weight.(EU REACH)

Phthalate plasticizers in children's products

- Any **children's toy or child care articles** that contains concentrations of more than 0.1 percent of the following phthalates is prohibited(USA CPSIA)
 - DEHP, DBP, DiBP, BBzP, DINP, di-n-pentyl phthalate (DPENP), di-n-hexyl phthalate (DHEXP), and dicyclohexyl phthalate (DCHP)
- Restrictions on the manufacture, placing on the market and use of certain dangerous **substances, mixtures and articles** (EU REACH)
 - individually or in any combination of DEHP, DBP, BBzP and DiBP in a concentration equal to or greater than 0,1 % by weight of the plasticised material in the article



Thank You

This project was funded from Financial Industry Public Interest Foundation(FIPIF) in Korea.



Siddika Sultana

Executive Director

Environment & Social Development Organization - ESDO



**International Conference on
Hazardous Chemical Free Asia –
*Experience from Bangladesh***



Hello!

I am Siddika Sultana
Executive Director, ESDO



Phthalates in Erasers

1

Findings

Among the 47 tested erasers 27 of them were PVC erasers & 20 of them were Non PVC Erasers

In 30 samples four major phthalates were found which were DiBP, DBP, DEHP_1, DEHP_2 and DiNP

In 30 samples in which phthalates were found, 5 of them were non-pvc erasers

Ranges of Detected Phthalates in Non-PVC erasers are from 0.001% - 0.180%

Ranges of Detected Phthalates in PVC erasers are from 0.01% - 37.38%, whereas 0.1% is considered safe according to Korea's regulation



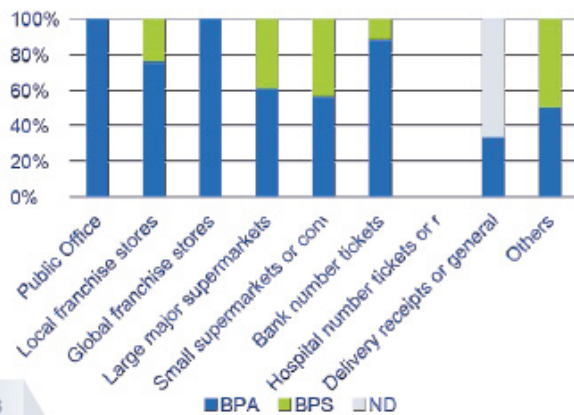
BPA in Cash Receipts

2

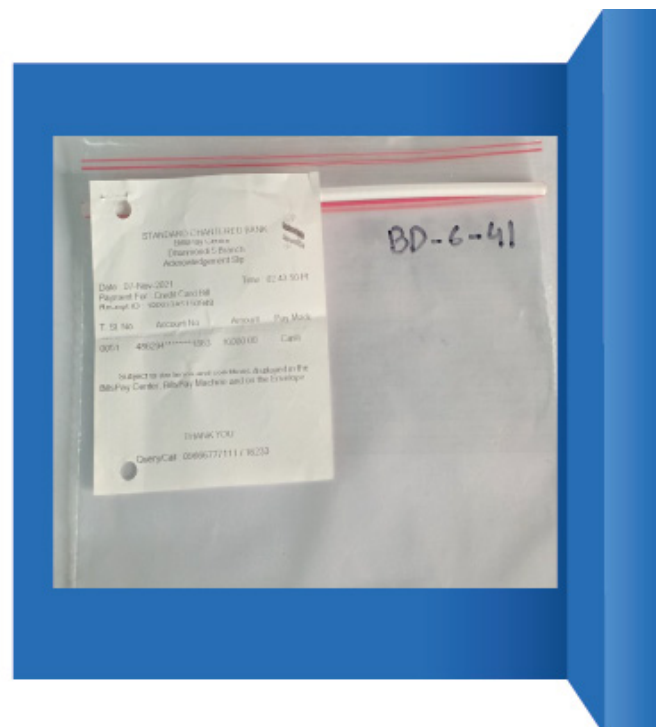
Findings

Among the 99 total samples, 69 samples had BPA, 25 samples had BPS & 5 were non detected.

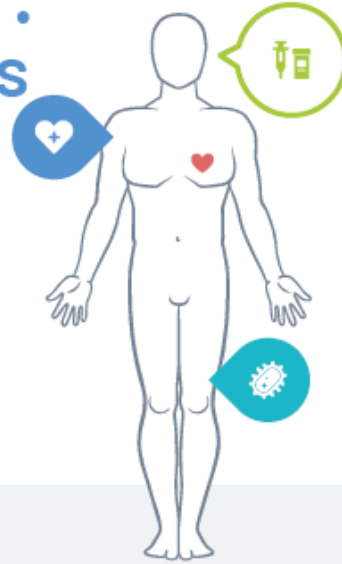
In Bangladesh, BPA detection frequency was higher in most categories and All samples detected exceeded EU regulatory standards. (EU BPA regulation: <0.02%)



6



Phthalates & BPA : Endocrine Disruptors



Proper legislation should be imposed

7

Lets Make A Toxic Free Environment For Our Next Generation

Thank You!

8



Oktaviani Ikasari

**Green City
Program Officer**

Gita Pertiwi

Hello everyone, my name is Diandra and there's also my colleague Chlara.

For research from Indonesia, it was carried out by 2 organizations namely Gita Pertiwi and Ecoton.

Follow-up of this research will be carried out by two organization in two cities in Indonesia namely Gita Pertiwi in Surakarta and Ecoton in Gresik. For the follow-up to the city of Surakarta, the results of the chemical content test of BPA, BPS and phthalates in Indonesia will be disseminated to the public by holding an online webinar and will invite teachers parents and also the city government.

The 'environmental police' and 'little doctors' in school will also be given new insights about the dangers of thermal paper and erasers.

Education to the public will be also carried out via social media with short, interesting and easy-to-understand information.

For wider publication, radio broadcasting activities will be carried out at one of the major trusted radio stations in city of Surakarta as a form of our campaign to the public.

Hello everyone. So in this opportunity, I would like to deliver our future plan for future campaigns which relates to our campaigns before, so firstly, we would do an advanced research where in this activity we would make a Google form or do a direct interview with society to find out their perceptions about erasers which are for students and thermal papers for all ages. And the output of this activity is the release an infographic.

After that we would educate the society about the harm of thermal papers and about the harm of erasers, through our social media and our event in our mobile plastic exhibition, we will educate the society.

Lstly from the research and from the perceptions of the society, we will combine them together and the results of that we will use it to notify the producers to not use the dangerous materials for their products anymore and to notify the government to watch the distribution of the dangerous materials and also to give alternative to thermal use.



Hiroshi Tsuchida

Part-time director

The Toxic Watch Network

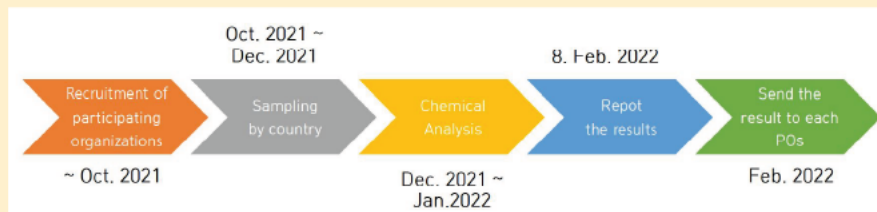
EDC Sampling Project Results in Japan

- Phthalates in Erasers
- Bisphenol analogues in Thermal paper

March 31, 2022

This survey was conducted by the Wonjin Institute of Occupational and Environmental Health in South Korea (노동환경 건강 연구소 WIOEH) and was attended by 9 organizations from Southeast Asian countries.

The **Toxic Watch Network** participated it from **Japan**.



1

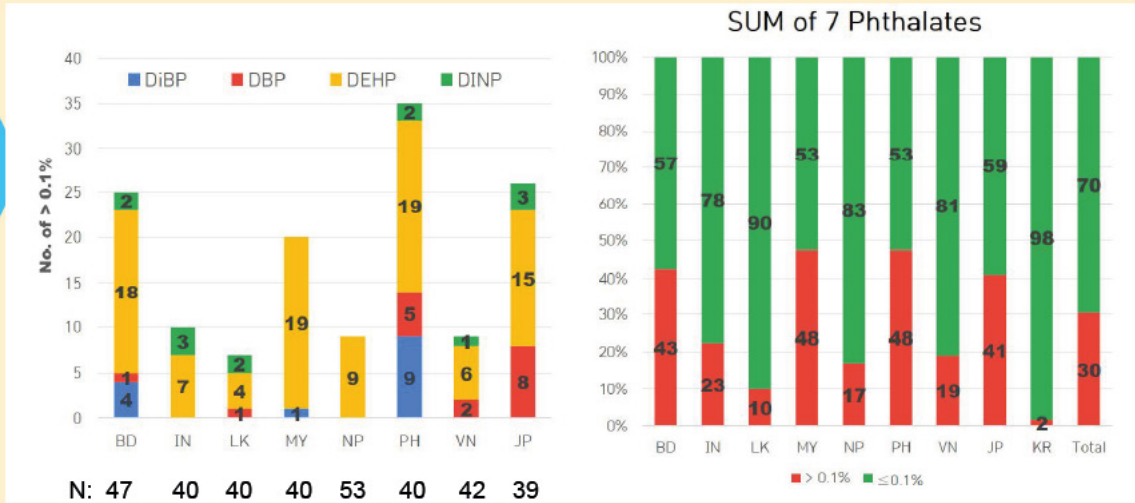
Participation status in Japan

In early October 2021	The Toxic Watch Network in Japan decided to participate in this project and signed a contract with WIOEH.
from 15 th October to 27 th October	We recruited volunteers from all over Japan. As a result, 16 people participated in this project.
In early November	We held three Zoom meetings with all the participants to share the purpose of this project and coordinate the details of the samples to be collected. Each participant purchased 2 to 4 types of erasers, and collected 2 to 4 types of thermal paper. They paid 500 yen per person for the purchase of the erasers and the international mail fee.
By 16 th November	We had collected all the samples at the secretariat, numbered each sample and prepared to send it to South Korea.
On 17 th November	All samples were shipped to WIOEH Korea.
On 23 ^{ed} November	It arrived at WIOEH Korea.



2

Results①-1 Phthalates in Erasers

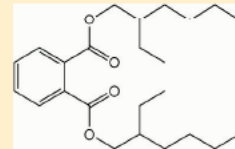


3

Results①-2 Phthalate (DEHP) in Erasers

DEHP: Bis(2-ethylhexyl)phthalate $C_{26}H_{44}O_4$

In Japan, it was detected from 15 out of 39 erasers.



JP-21		JP-29		JP-27	
CUTE MODEL(Peanuts) (Kamio Japan)		Eraser for study notes (SHOWA NOTE)		STYLE GIRL (Cracks)	
DEHP: 34.6%		DEHP: 32.8%		DEHP: 31.7%	



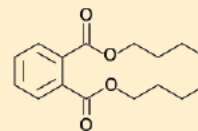
4




JAPAN

Results①-3 Phthalate (DBP) in Erasers

DBP: Dibutyl phthalate $C_6H_4(COOC_4H_9)_2$

In Japan, it was detected from 8 out of 39 erasers.



<p>JP-05</p> 	<p>JP-18</p> 	<p>JP-24</p> 
<p>Matomarukun (Hinodewashi)</p> <p>DBP: 12.9% DEHP: 21.1%</p>	<p>Matomaru eraser Gekiochi kun (Daiso Sangyo)</p> <p>DBP: 12.7% DEHP: 23.7%</p>	<p>Sumikko Gurashi Matomaru-kun (San-X)</p> <p>DBP: 12.6% DEHP: 23.6%</p>



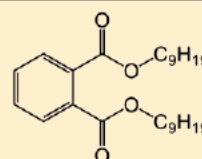
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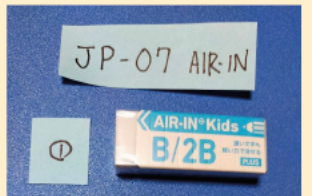

JAPAN

Results①-4 Phthalate (DINP) in Erasers

DINP: Diisononyl Phthalate $C_6H_4(COOC_9H_{19})_2$

In Japan, it was detected from 3 out of 39 erasers.



<p>JP-13</p> 	<p>JP-07 AIR-IN</p> 	<p>JP-15</p> 
<p>Juicy fruit eraser (Seed)</p> <p>DINP: 78.4% DEHP: 0.1%</p>	<p>AIR-IN Kids (PLUS)</p> <p>DINP: 0.3% DBP: 12.6% DEHP: 21.5%</p>	<p>Zi-Keshi Magnetic Eraser (KUTUWA)</p> <p>DINP: 0.1% DEHP: 25.2%</p>



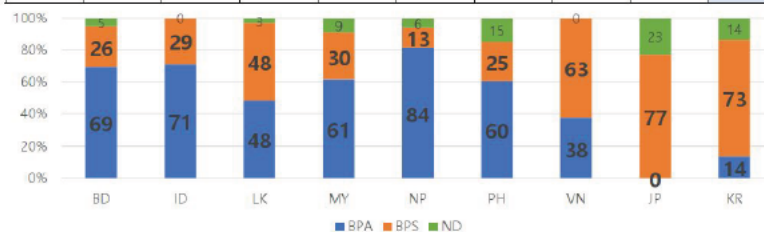
6

Results②-1 Bisphenol analogues in Thermal paper

Country-Detection Frequency

* Pilot study

%(N)	BD	ID	LK	MY	NP	PH	VN	JP	KR
Total N	39	45	31	44	31	53	40	35	51
BPA	69(27)	71(32)	48(15)	61(27)	84(26)	60(32)	38(15)	0	14(7)
BPS	25(10)	29(13)	48(15)	30(13)	13(4)	25(13)	63(25)	77(27)	73(37)
ND	5(2)	0	3(1)	9(4)	6(1)	15(8)	0	23(8)	14(7)



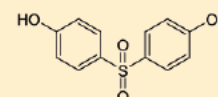
- **BPA** detection frequency was higher in **most Southeast Asian countries (BD, ID, MY, NP, PH)**
- In **VN, JP, KR**, the detection frequency of **BPS** was higher.



7

Results②-2 Bisphenol-S in Thermal paper

Bisphenol-S 4,4'-Sulfonyldiphenol (HOC₆H₄)₂SO₂



In Japan, it was detected from 27 out of 35 thermal papers.

JP-7-1	JP-6-5	JP-3-1
Sphygmomanometer In a hospital	Chugoku Bank Nishiachi Branch ATM	Can Do (Higashijujo store) 100-yen shop
BPA: ND BPS: 0.89%	BPA: ND BPS: 0.83%	BPA: ND BPS: 0.82%



8

History of EDC regulation in Japan

1998	<p>The Environment Agency (currently the Ministry of the Environment) in Japan has announced the "Strategic Programs on Environmental Endocrine Disruptors '98 (SPEED'98)". In this plan, about 70 kinds of substances that may be endocrine disruptors are listed substances that should be investigated with priority. Japanese researchers conducted a national survey of environmental pollution, and also investigated the amount of endocrine disruptors accumulated in fish and amphibians that are susceptible to endocrine disruptors and the status of reproductive abnormalities.</p> <p>As a result, the public and private sectors have taken steps to reduce dioxins, bisphenol A and organic tin compounds(tributyltin, triphenyltin) in Japan.</p> <p>◆ bisphenol A ⇒ bisphenol S</p>
2004	<p>Substances suspected of being endocrine disruptors were rapidly withheld from use, even though they were not confirmed to be endocrine disruptors. Therefore, the list has been deprecated.</p> <p>In particular, phthalates were excluded from the countermeasures because there was no evidence of endocrine disrupting effects.</p>
2005	<p>The Ministry of the Environment in Japan has announced the "EXTEND2005".</p>
2010	<p>The Ministry of the Environment in Japan has announced the "EXTEND2010".</p>



What to do in Japan?

- **Inform the public** of the results of this survey.
 - Erasers and toy erasers that children use every day contain a large amount of endocrine disruptors.
 - The material of the eraser and toy eraser is polyvinyl chloride, and incineration of the eraser residue may generate dioxins.
 - Bisphenol A, an endocrine disrupter, is not used in thermal paper, but bisphenol S, which has a similar effect, is used.
- **Learn** about endocrine disruptor regulations in the EU and other countries, and **recommend** that Japan implement appropriate regulations.



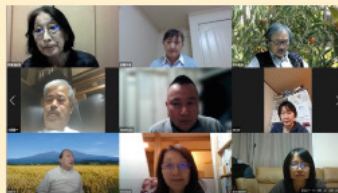
Thank you all.



First Meeting 2nd Nov. 2021



2nd Meeting 6th Nov. 2021



3rd Meeting 9th Nov. 2021



NPO Toxic Watch Network in JAPAN.
Director Dr.Hiroshi Tsuchida.
E-mail: tsuchida@toxwatch.jp
Web: <https://toxwatch.net/>





Hatijah Hashim

Research Officer

Consumers Association of Penang

VIDEO MESSAGE SCRIPT FROM CEPHED NEPAL

EDCs Studies in Nepal (Phthalates in Eraser & BPA in Thermal Papers)

Executive Director & Environment
Scientist

Center for Public Health and Environment Development
(CEPHED) Nepal

ANROEV Coordinator

Tel/Fax : +977-1-5201786, Mobile: +977 9803047621

Email: info@cephed.org.np, ramcharitra@gmail.com

Web: www.cephed.org.np

31st March , 2022 (17th Chaitra 2078 BS)

EDC International Conference



ABOUT CEPHED

- First of all, Center for Public Health and Environmental Development (CEPHED), Nepal highly acknowledge the support from Wonjin Institute for Occupational and Environmental Health (WIOEH) with fund from Financial Industry Public Interest Foundation (FIPIF) in Korea.
- CEPHED is a national level research based NGO working in the field of Environment Conservation, Chemical Safety and Public Health since 2004 with the vision of **Bridging people with science and technology for healthy living and environment safety.**
- **CEPHED work has been nationally and internationally recognized based on following achievements.**

CEPHED RESEARCH BASED CAMPAIGN LEADS TO:

- Ban Import, Purchase and uses of Mercury based equipment , 2013
- Lead Paint Standard 2014
- Ban all form of ASBESTOS & ASBESTOS containing products 2014.
- Ban use of Dental Amalgam 21st August 2019
- **Children Toys Standard 2017 (Phthalates and BPA limits)**
- Cosmetic Standards 2019
- Banning of dozen of Highly hazardous Pesticides
- Contributed to several Plans, Policies, Standards, Act & Regulations related to Environment and Public Health.

EDCs studies in Nepal: Findings & Future Strategies

- 38% eraser (20 of 53), schools stationary found contaminated with Phthalates and 94% Thermal Papers (29 of 31) contain BPA like EDCs, toxic to public health and environment.
- Sum of all 7 Phthalates in 9 Eraser Samples [19 % of Total & 45% of Detected one] exceed Korean Safety Limit Phthalates limits of 0.1 %. Max up to 25.62%, 256 times more than Korean limits.
- All sample detected BPA among Nepalese samples exceeded EU regulatory standards (EU BPA regulation: <0.02%), Max up to 2.44% (122 times more than EU limit)

EDCs FUTURE STRATEGIES & CAMPAIGN PLAN IN NEPAL

- Nepalese industry produced Eraser did not detected with Phthalates and hence needs to be promoted.
- Phthalates and BPA should be banned in children and daily products in Nepal, like in many developed countries.
- Enact Standards of Phthalates & BPA for Children and Daily products & effectively implement it.
- Massive Public Awareness including schools/academic sectors
- CEPHED Nepal will , in fact already initiated the awareness raising and policy advocacy with the concerned government, private and media agencies for banning contaminated products, envisioning mandatory Phthalates and BPA standards and robust regulating mechanism (institutional and legislative framework)in place.



Ram Charitra Sah

Executive Director

Center for Public Health and
Environmental Development (CEPHED)

EDC Conference

First of all I would like to take this opportunity to thank Wonjin Institute of Occupational and Environmental Health for this project.

We are glad that we are able to test erasers and thermal papers for the presence of EDCs.

The issue on EDCs was first taken up by CAP in 1998.

During that time in a joined project with Japan Offspring Fund (JOF) we published posters and publication. We also organized an International Conference on PCB (Polychlorinated Biphenyl) which was held in Penang in 2003. It was attended by participants from 10 countries in the Pacific Rim.

Following to that CAP presented a memorandum to the Malaysian government to take action on the EDCs especially on the disposal of hazardous waste.

In the study on Thermal papers from Malaysia out of 44 samples 27 were found to contain BPA and 13 samples BPS.

In the study on erasers out of 40 samples from Malaysia, phthalates were detected in 26 of them.

Presently in Malaysia there are no standards for BPA analogues in Thermal papers and phthalates in erasers.

Following to this study we will highlight the issue in the media and will be calling on the government to come out with the standards.

The results from this study is an eye opener as we are able to present to the Malaysian government the details on the levels of Bisphenol analogues and phthalates in products sold in the country.



Chalani Rubesinghe

**Project planning and
management officer**

Centre for Environmental Justice

Good morning! Good Afternoon and Good evening to you, depending on where you are joining from,
I'm Chalani Rubesinghe from Centre for Environmental Justice, Sri Lanka.

The Centre for Environmental Justice is a national-level environmental organization in Sri Lanka working towards the vision of “justice for all” through law and science.

Our main focus areas include;

- Environmental Justice Program that includes most of our litigation work
- Environmental Literacy and Networking
- Natural Resource Governance and Advocacy Campaigning and
- Citizen Science and Environmental Monitoring Program that includes most of our scientific research and awareness-raising among the general public.

In all our programs we make sure that men and women are equally represented and civil society engagement is strengthened.

This study result is important for Sri Lanka because we don't have any regulation for levels of BPA or its harmful alternatives on thermal papers.

Also, with regard to Phthalates in erasers, Sri Lanka does not have strict regulations or surveillance to protect children from exposure to harmful chemicals through these stationery products.

Also, EDCs is one of the least discussed chemical contamination matters in Sri Lanka, and therefore, we believe that this is a good opportunity to draw the attention of regulatory bodies to the matter of EDCs while emphasizing possible toxic chemicals found in plastics.

We also plan to incorporate these results in emphasizing the contamination of children's products with EDCs as revealed by the BPAs found in feeding bottles

First I would like to thank Tripti from IPEN regional hub and the Wonjin Institute for Occupational and Environmental Health (WIOEH) for getting CEJ involved in the study and gratefully acknowledge the funds from FIPIF.

I will just highlight the key findings on samples sent from Sri Lanka.

As for the bisphenols, the testing detected BPA and BPS in the samples. One chemical in almost 50% of the samples. But none of the samples contained both and only one sample detected negative for both chemicals.

As for the categories of samples, we observed almost 50 % distribution of the two chemical types in all categories.

Unfortunately, all these samples had BPA exceeding the EU BPA regulatory limit; <0.02%

Interestingly, we found that around 10 samples we collected were non-thermal papers and we hope that the use of those types of papers could be the solution to avoid spreading this toxic chemical.

As for the Phthalates in erasers, out of the 40 samples, only 2 – 5 samples had one or more of the types of Phthalates tested. However, some of them were found to have exceeded the most accepted standard of 0.1% or 1000 mg/kg.

Although this seems like a small number, we believe that the lack of proper regulation has some negative impacts on Sri Lanka as well. Because as you can see on this slide, the sample sold in Vietnam had no phthalate. Whereas the same brand sold in Sri Lanka had higher levels of phthalate, being an evident for double standard.

So, with these results actually, we first plan to document the results to a research paper or a small report, because we find it really useful to have a document to refer to when we talk about these contamination data, explained in a simple language.

With that we plan to have a stakeholder discussion to highlight, all these toxic chemical studies related to consumer products, to highlight the necessity of going for alternatives as well as having regulated limits for the country and a surveillance system to monitor their implementation.

Of course, we also expect challenges such as slow response and difficulty to convince these regulators, but we will try our best!.

With that I would conclude my presentation and thank you.



Than Nguyen Phuong Hai

Program Officer

Research Centre for Gender, Family and
Environment in Development (CGFED)

PHTHALATE IN ERASERS & BPA/BPS IN THERMAL PAPERS

VIETNAM RESULTS



INTERNATIONAL CONFERENCE ON HAZARDOUS
CHEMICAL FREE ASIA

ABOUT CGFED – WHO WE ARE?



- Research Centre for Gender, Family and Environment in Development (CGFED)
- A local Vietnamese NGO, established in 1993
- Working field: Social Sciences, focusing on Gender, Family and Environment in Development.
- CGFED applies the Human Rights theoretical framework of the International Convention for the Elimination of All Forms of Discrimination against Women (CEDAW) to build gender activities based on the values of diversity and freedom:
 - ❖ Inspiring Gender Equity and Justice
 - ❖ Using a Diversity Approach in Qualitative Research
 - ❖ The Participating and Learning Approach
 - ❖ Explore, discover and develop new ideas

ABOUT CGFED – WHY THIS PROJECT?



Towards a non-toxic environment is one of our main target of CGFED's action.

Since 2008, CGFED's effort has to raise awareness of bad impact of pesticides use on human, especially women and children, as well as living environment in rural areas of Vietnam.

From 2015-present: research on lead content in paint, impacts of lead paint on children's health and lobby the Vietnamese government to promulgate regulations to manage lead in paint

CGFED has actively participated in programs/project relating to elimination of EDCs and POPs in Asia - for protecting human and environment from toxic substance with regional and international networks, organizations In recent years.

Thus, this small project is new area and in line with our action strategy.

Result and Insights of analysis of Vietnam

Analytical Methods

	Bisphenol Analogues	Phthalate Plasticizers
Target compounds	BPA, BPS, BPF, BPB, BPAF	DiBP, DBP, BBP, DEHP, DnOP, DINP, DIDP
Method	modified Bjornsdotter et al.(2017) (Bisphenol A alternatives in thermal paper from the Netherlands, Spain, Sweden and Norway. Screening and potential toxicity)	CPSC-CH-C1001-09.4 (Standard Operating Procedure for Determination of Phthalates)
Instrument	LC/MS/MS	GC/MSD

Sample Information

No.	Type	Number (N)	Analyte
1	Thermal receipts	41	Bisphenol Analogues
2	Erasers	42	Phthalate Plasticizers



Result and Insights of analysis of Vietnam

1. Phthalate in Erasers

- 55% (23/42) were detected one or more phthalate including DEHP(N=18, 43%), DBP(N=10, 24%), BBP(N=6, 14%) and DINP(N=1, 2%).
- 19% (8/42) of phthalate exceeded Korean safety limit (= 0.1%)



2. BPA/BPS in Thermal Papers

- One out of 41 samples was considered normal paper and excluded from the analysis of the results.
- 38% (15/40) were detected BPA, and 63% (25/40) were detected BPS.
- The concentration range of BPA was 1.13~1.73%, and BPS was 0.47~1.01%.
- The concentration of all samples in which BPA was detected exceeded the EU standard of 0.02%.



Vietnam's situation around EDC and future plans

	BPA	Phthalates
Regulations in Vietnam	<ul style="list-style-type: none"> •Plastic packaging for food(Bisphenol A (SML = 3 mg/kg), Bisphenol S (60 mg/kg or 10 mg/dm²)) •PC plastic packaging: < 500µg/g BPA •Plastic packaging and tools for small children: not use 	<ul style="list-style-type: none"> •Phthalate limit in children's toys: DEHP, DBP or BBP not in excess of 0.1% • Phthalate limit in toys that may be placed in the mouth by children: DINP, DIDP, or DNOP not exceeds 0.1%

Vietnam's situation around EDC and future plans

Next plans

- Prepare Vietnamese report on Phthalate in erasers and BPA/BPS in thermal papers
- Prepare communication materials of the study to be ready for communication activities
- Public the Vietnam results on CGFED's website, facebook + sharing with media to raise their interest and concern



THANK YOU!

phuonghai@cgfed.org.vn



"This project was supported by Wonjin Institute for Occupational and Environmental Health(WIOEH) with fund from Financial Industry Public Interest Foundation(FIPIF) in Korea"



Kyungho Cho

Professor

Seoul National University
Graduate School of Public Health

EDCs exposure in children of Asia

One approach to reduction

최경호 (Kyungho Choi)
Seoul National University
Graduate School of Public Health

Everywhere with diverse use

Plastics

Disposable containers, toys
School supplies



Antimicrobial

Cosmetics and hygiene products
Pesticides



Housing

Flooring
Upholstery



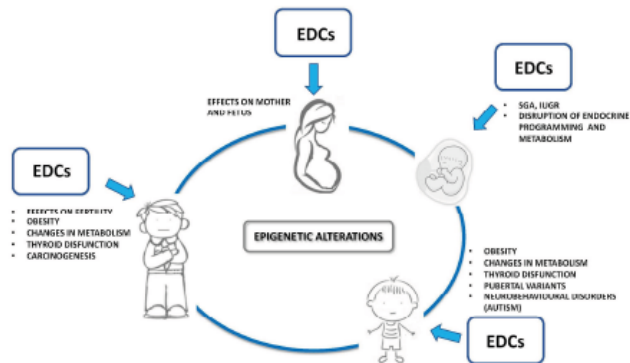
Other purposes

UV filters
Coating
Thermal papers



Greater impacts on children

- Specific life stages as a vulnerable window



<https://www.mdpi.com/1422-0067/19/6/1647/htm>

Varying characteristics

- Various physicochemical characteristics



Persistent

DDTs (OCPs), PCBs
PBDEs, PFASs
New POPs

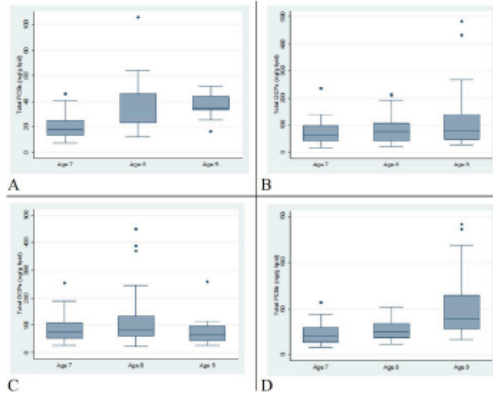


Non-persistent

Phthalates and plasticizers
Bisphenols and other phenolics
Antimicrobials, UV filters, etc.

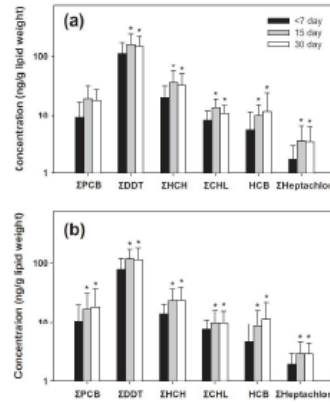
Persistent EDCs, *hard to control*

Serum OCP & PCBs of Korean children



Park et al. Environ Sci Pollut Res 2015

Breastmilk of Korean women Sampled in 2011



Lee et al. Chemosphere 2013

Non-persistent EDCs, *easy to control*

우해활동 저지 실행
실시간 건강
추경 통상 10배
1% 사용(2016.9.6)

간접적인 생활에서
수행되어야 할 것
물리적으로 분리
가능한 것
생활 속 물리적으로
분리 가능한 것
가능하다

실생활에서
수행되어야 할 것
물리적으로 분리
가능한 것
생활 속 물리적으로
분리 가능한 것
가능하다

간접적인 생활에서
수행되어야 할 것
물리적으로 분리
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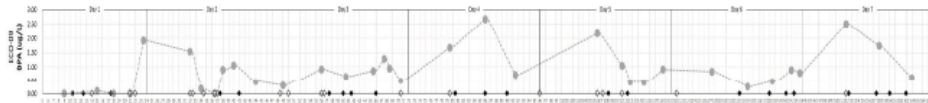
항목	1일	5일	10일	15일	20일	25일	30일	비고
비닐제품	1.0~1.8	4.7~8.8	3.7~12.7	4.0~12.8	1.7~1.7	3.1~2.0	2.3~1.8	60.1 50%
우유제품	1.9~2.9	4.0~1.6	0.2~1.4	3.0~1.6	1.6~0.5	4.6~0.7	1.0~1.4	24.3 60%
커피/차	1.7~2.0	1.7~1.8	2.5~1.1	4.4~2.6	3.1~1.5	7.25~2.5	1.0~1.6	33.4 40%
음식/음료	3.0~3.3	1.7~1.8	1.0~1.8	1.0~1.9	4.0~4.6	4.2~1.8	4.2~2.4	31.4 50%
화장품	1.0~1.0	1.0~1.0	0.8~1.0	2.0~1.8	1.8~3.0	1.1~0.7	0.8~1.6	16.1 50%
인쇄/인쇄물/인쇄물	5.6~11.0	2.4~11.7	3.0~1.0	3.0~12.0	3.0~1.0	3.0~4.7	9.0~1.0	42.8 60%
인쇄/인쇄물/인쇄물	11.0~11.0	0.0~3.0	3.0~3.0	1.0~20.0	0.4~0.0	7.4~11.0	0.0~1.0	86.2 50%
인쇄/인쇄물/인쇄물	11.0~11.0	1.0~1.0	3.0~3.0	1.0~3.0	3.0~1.7	3.0~2.7	0.0~1.0	25.5 60%
인쇄/인쇄물/인쇄물	4.0~2.0	1.0~3.0	3.0~2.0	1.0~1.1	1.0~1.5	1.0~1.5	3.0~1.0	51.2 70%

Changing behaviors for 5 days reduced up to 200 times several urinary EDC metabolites!

Kyunghyang Daily 2016.9.6

Non-persistent EDCs are important and rewarding target

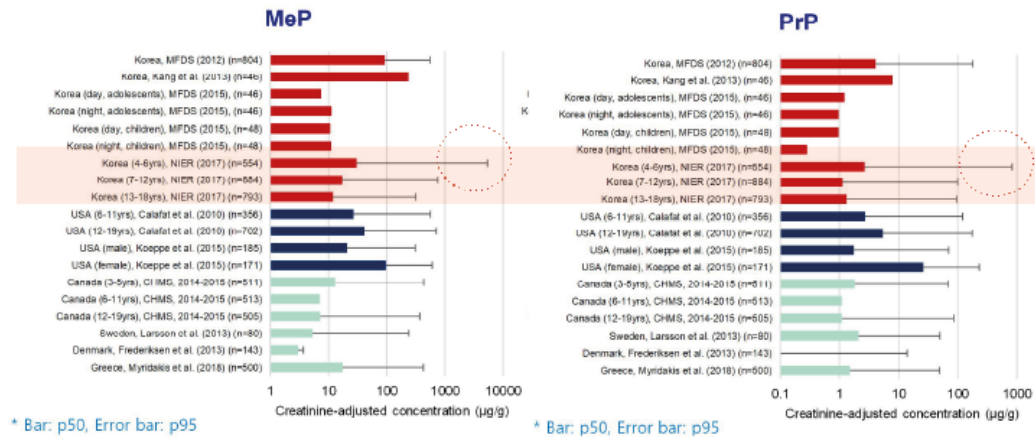
- Toxicology, health outcomes
 - Thyroid and sex hormone disruption
 - Neurodevelopment, metabolic outcomes
- Easy control, direct benefits
 - Short biological half-lives



Mitigation of EDCs in children

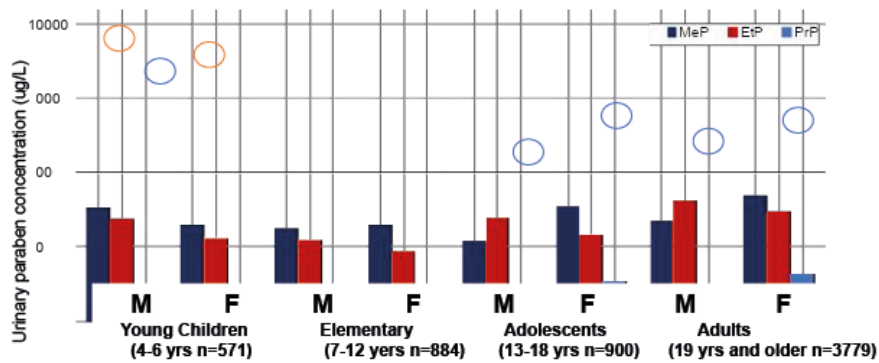
- What are the EDCs of priority concern?
- What are the sources of exposure?

Paraben in children of Korea



Korean National Environmental Health Survey of 2015-2017

Young children are even higher



Liquid pain reliever as source?

• Tylenol (Acetaminophen)

PrP up to 40 mg/100 mL



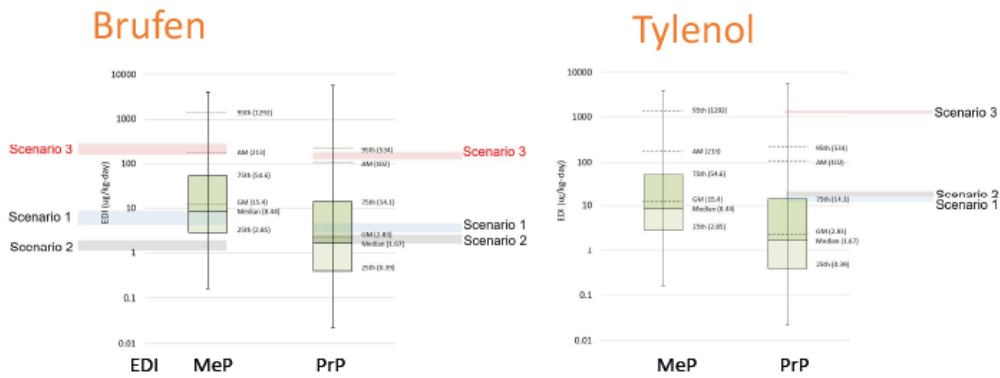
• Brufen (Ibuprofen)

PrP up to 20, MeP 30 mg/100 mL



		MeP	EtP	PrP	BuP
KO021	소아용 프리마란 시럽	ND	ND	ND	ND
KO022	코니콜 시럽	202.9	ND	96.2	ND
KO023	알스린 시럽	680.0	ND	70.8	ND
KO024	아루사루민 액	39.4	ND	4.8	ND
KO025	액티피드 시럽	425.3	83.1	ND	ND
KO026	하미돈 현탁액	556.7	ND	317.5	ND
KO027	개비스론 더블액션 현탁액	2660.8	ND	350.2	ND
KO028	Brufen syrup	195.6	ND	133.3	ND
KO030	개비스론 쿼피민트 현탁액	2572.9	ND	291.5	ND
KO032	가스탈열수-큐 액	ND	ND	ND	ND
KO033	다이콜 현탁액	545.4	ND	177.6	ND
KO034	대원 초산히게스트롤 현탁액	ND	ND	ND	ND
KO035	듀피락 시럽	ND	ND	ND	ND
KO036	디안타 현탁액	ND	ND	ND	ND
KO037	라미나지 액	457.1	ND	102.7	ND
KO039	볼그레 액	415.2	203.1	79.9	ND
KO042	알마겔 현탁액	ND	ND	ND	ND
KO044	Tylenol syrup	ND	ND	343.7	233.4
KO045	옵비디 액	ND	ND	ND	ND

Medication may explain paraben exposure



- Scenario 1: Amount of sale *minus* 50% unused portion
- Scenario 2: Number of hospital visit with cold, rhinitis, pharyngitis (KCDC db)
- Scenario 3: Extreme case during medication

KoNEHS data also support

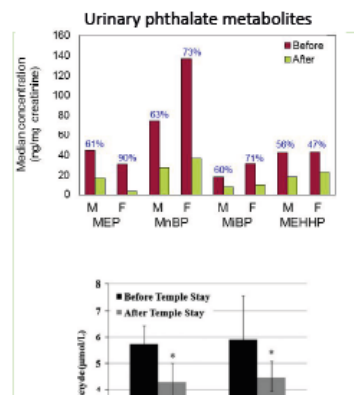
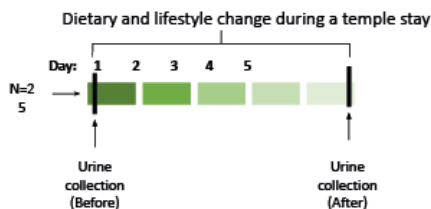
Table 5
Medication intake due to disease, and multiple linear regression and 95% confidence.

	N (%)	Weighted N (%)	Methyl paraben			Ethyl paraben			Propyl paraben		
			β	95% CI		β	95% CI		β	95% CI	
Take a medication											
Due to fever											
No	2185 (92.8)	6839186 (93.2)	ref.			ref.			ref.		
Yes	170 (7.2)	498039 (6.8)	-2.139	1.698	2.581	-0.542	-0.918	-0.167	2.019	1.495	2.544
Due to dermatitis											
No	2232 (94.8)	6951773 (94.7)	ref.			ref.			ref.		
Yes	123 (5.2)	385452 (5.3)	0.887	0.409	1.365	0.349	-0.167	0.864	1.162	0.570	1.755
Due to gastroenteritis											
No	2346 (99.6)	7316474 (99.7)	ref.			ref.			ref.		
Yes	9 (0.4)	20751 (0.3)	0.004	-2.261	2.269	-0.695	-1.287	-0.104	0.287	-2.452	3.027
Other reasons											
No	2323 (98.6)	7242916 (98.7)	ref.			ref.			ref.		
Yes	32 (1.4)	94308 (1.3)	0.395	-0.504	1.293	0.415	-0.160	0.990	0.387	-0.817	1.591

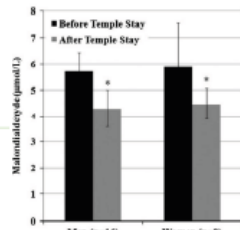
Medication for fever showed positive correlation with urinary MeP and PrP in Korean children

Hong et al., 2021. Int J Hyg Environ Health, 113781

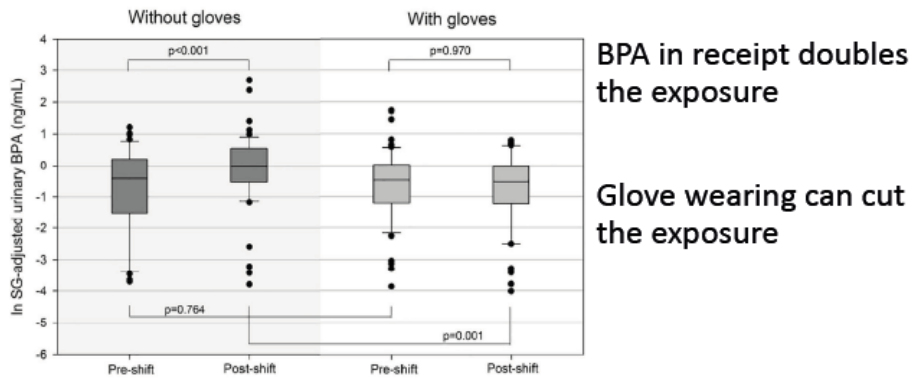
Sources can be identified (case study on phthalates)



Oxidative stress markers after a temple stay
Ji et al., Environ Res 2010



Recommendation can be made (case study on bisphenol)



Lee IA et al., Environ Int 2018

Priority EDCs in Asia?

EDCs biomonitoring in children (Pubmed 23 March 2022)

	Bisphenol	Phthalates	Paraben
Korea	27	38	8
China	72	97	19
Japan	6	9	1
Thailand	2	3	0
Indonesia	0	1	0
Bangladesh	1	0	0
Vietnam	1	0	0
Malaysia	1	0	0
Nepal	0	0	0
Philippines	0	0	0
Sri Lanka	0	0	0

Urine, exposure, children *as keywords*

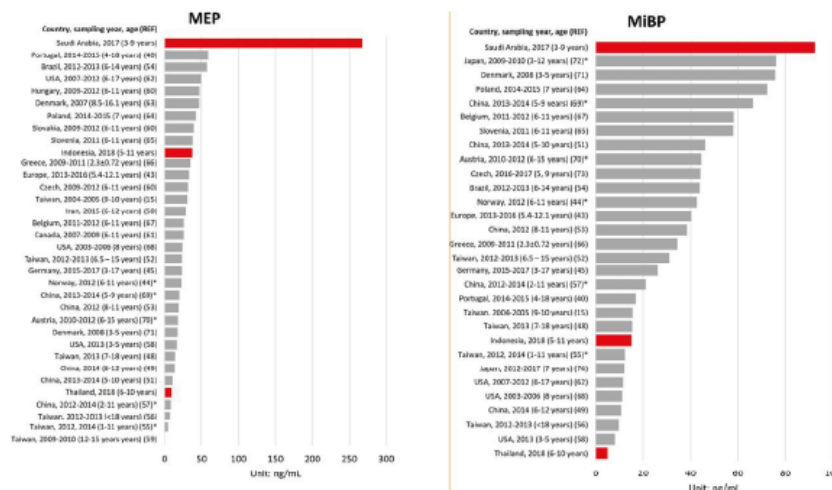
Plasticizer exposure in 3 Asian countries

- Children of similar age
 - Saudi Arabia: 3-11 years old (n=109)
 - Thailand: 6-10 years old (n=104)
 - Indonesia: 5-11 years old (n=89)
- Sampling
 - First morning urine
 - Questionnaire, measurements
- Chemicals
 - Phthalates
 - Alternative plasticizers



Lee IA et al., Environ Sci Technol 2021

Saudi children are high in LMW phthalates

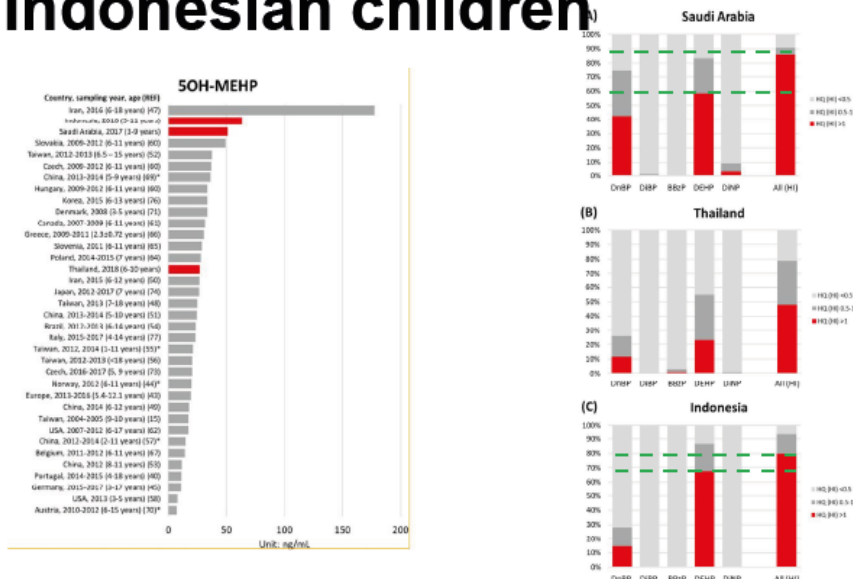


Sources of DEP and DiBP?

- DEP use in perfume
 - Highest mean 1621 ppm with a maximum 23,600 ppm
 - 68.1% use in 47 brand perfumes
- DiBP as replacement of DBP
 - Flooring, adhesives, lacquers
 - Manufacturing PVC and rubber as plasticizer



DEHP high in Saudi and Indonesian children

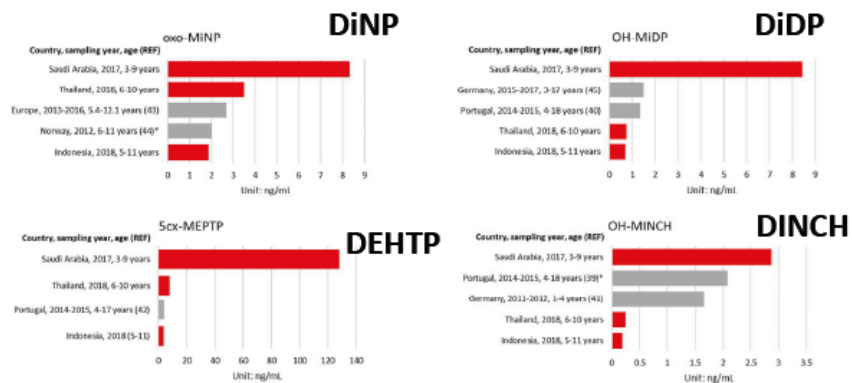


Sources of DEHP in children?



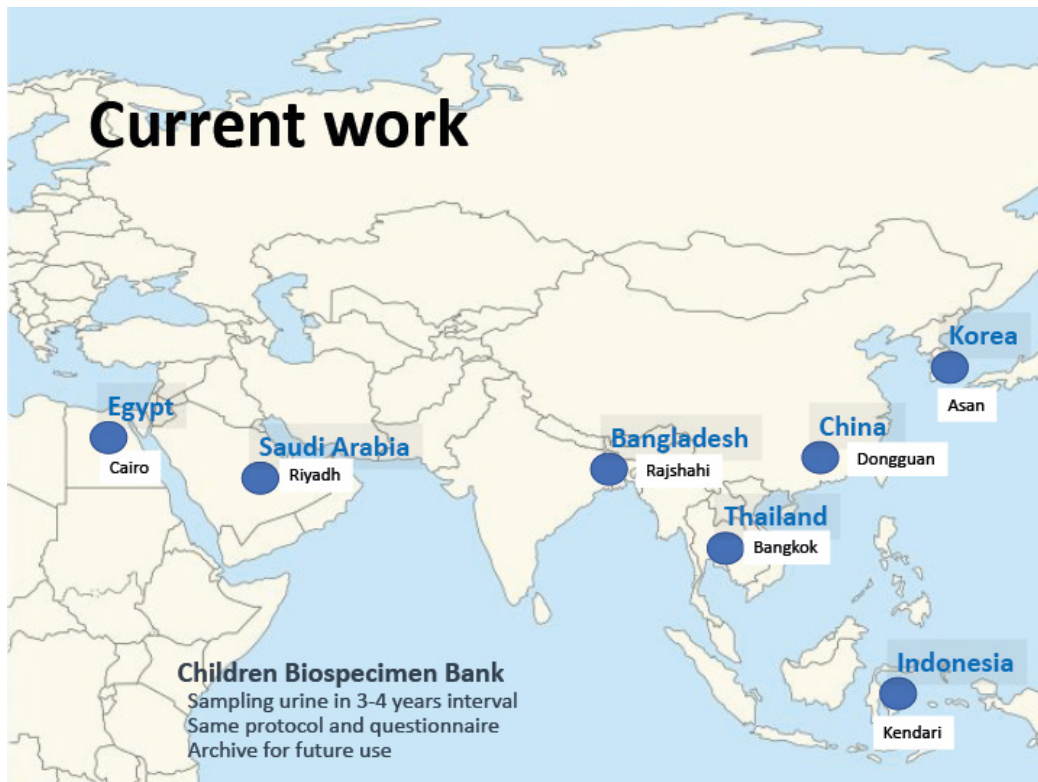
Kendari, Indonesia

DEHP substitutes are high in Saudi children



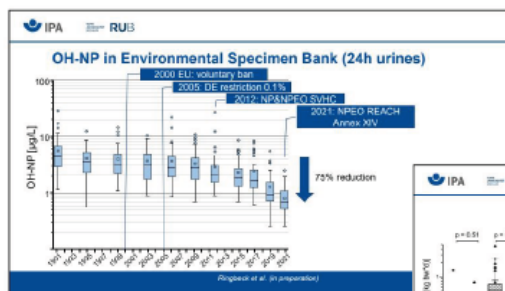
What we learned

- Exposure
 - LMW phthalates are high in Saudi children
 - DEHP is a health threat in Saudi and Indonesian children
 - DEHP replacements are heavily used in Saudi children
- A way forward
 - Potential outcomes of high exposure
 - Sources and exposure pathways?

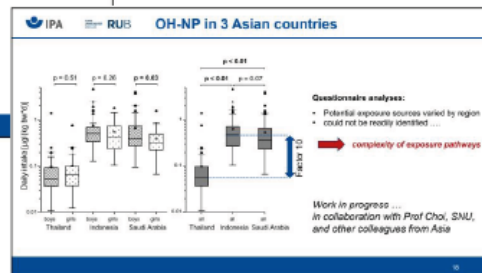


Identifying priority chemicals

Temporal trends



Spatial comparison



Holger Koch (SNU presentation)

Conclusions

- EDCs can be prioritized
 - Multi-country comparison study is effective and valuable
 - Temporal scale follow up is warranted
- Sources for priority EDCs should be identified
 - Specific to region and culture
 - Contribution can be quantified by well designed exposure assessment
- Organized efforts
 - Longer term planning are essential
 - to reduce health damages by EDCs in children

EDCs in children

Targets prioritized, sources identified, exposure under control
to protect health of our children

Kyungho Choi

Seoul National University

31 March 2022



Won Kim

Director of Research

Wonjin Institute for Occupational
and Environmental Health

Importance of Government Regulation in Controlling Hazardous Chemicals and Necessity of Cooperation between Citizen and Government

(Lessons from Project of “Making Nursery School
as Endocrine Disruptors Free Place”)

Wonjin Institute for Occupational and Environmental Health

Won Kim



Table of contents

- I. Background
- II. Objectives
- III. Process
- IV. Achievements
- V. Conclusions

I . Background

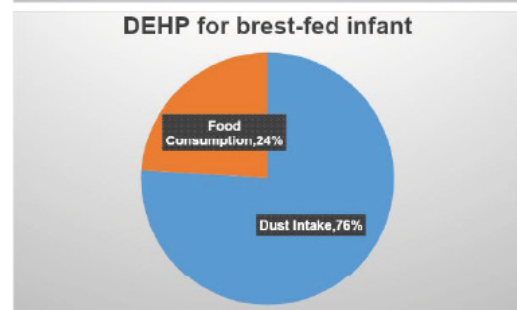
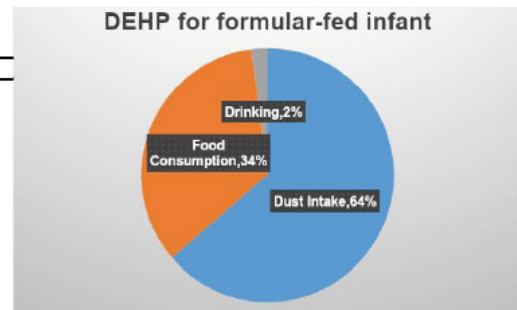
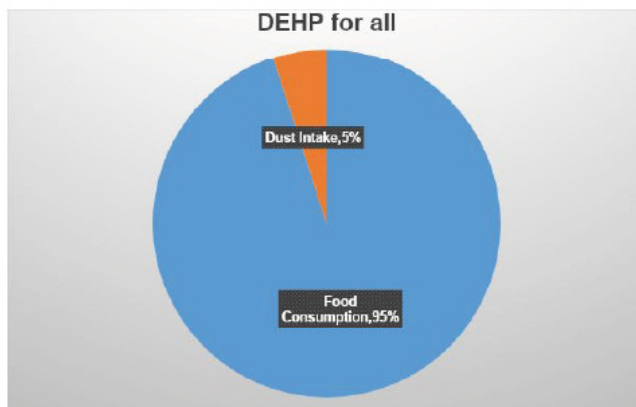
ECDs and Children's Health

3

Characteristics of EDCs

- Low Dose matter
- Early Exposure matter
- Ubiquitous Exposure

Exposure Routes to DEHP (K.E. Clark et al. 2011)



5

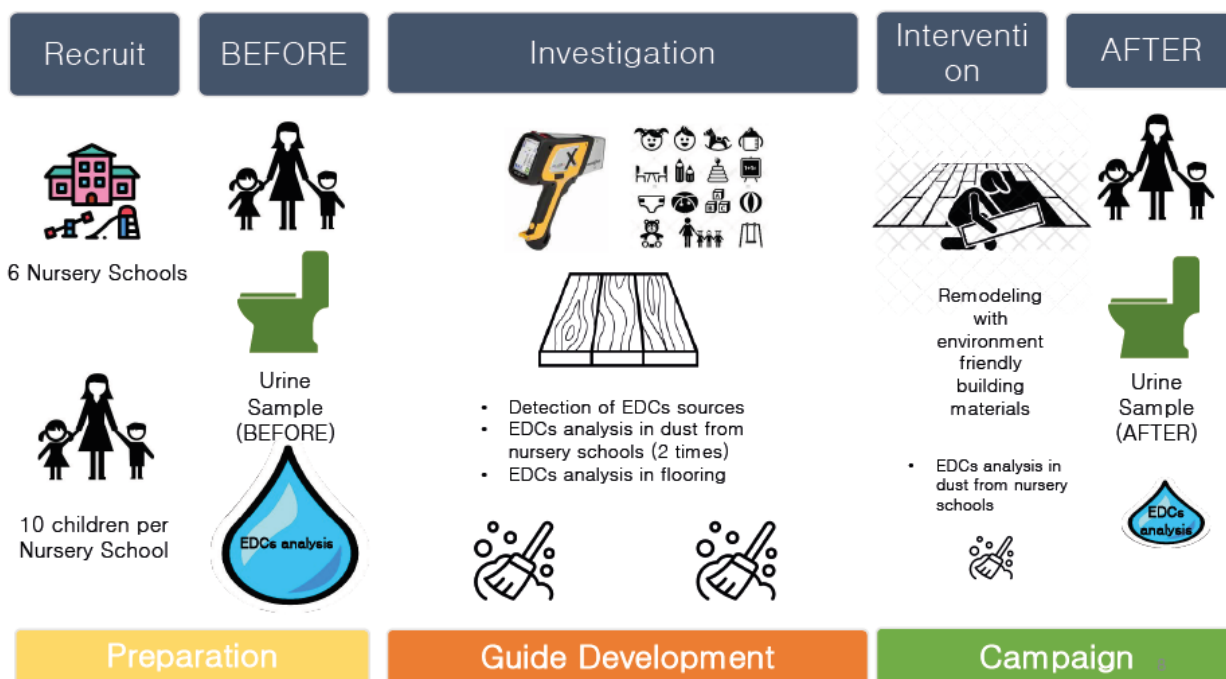
II . Objectives

- To find out sources for EDCs in nursery schools
- To eliminate the EDC sources through environment friendly remodeling
- To verify children's exposure to EDCs through fundamental remodeling
- To share the successful achievements with society

6

III . Process

7





EDC source detection with XRF analyzer

Phthalates in Dust and Phthalate metabolites in children's urine

〈표 5〉 먼지 내 분석대상 프탈레이트 종류

연번	영문명	국문명	CAS No.
1	DMP(Dimethyl phthalate)	디메틸프탈레이트	131-11-3
2	DEP(Dimethyl phthalate)	디에틸프탈레이트	84-66-2
3	DiBP(Diisobutyl phthalate)	다이이소부틸프탈레이트	84-69-5
4	DBP(Dibutyl phthalate)	다이부틸프탈레이트	84-74-2
5	BBP(Butyl benzyl Phthalate)	부틸벤질프탈레이트	85-68-7
6	DEHP(Diethylhexyl phthalate)	다이에틸헥실프탈레이트	117-81-7
7	DINP(Diisononyl phthalate)	다이이소노닐프탈레이트	28553-12-0 또는 68515-48-0
8	DNOP(Di-n-octyl phthalate)	다이엔옥틸프탈레이트	117-84-0
9	DIDP(Diisodecyl phthalate)	다이이소데실프탈레이트	26761-40-0 또는 68515-49-1

〈표 8〉 소변 중 분석 대상 프탈레이트 대사산물 종류

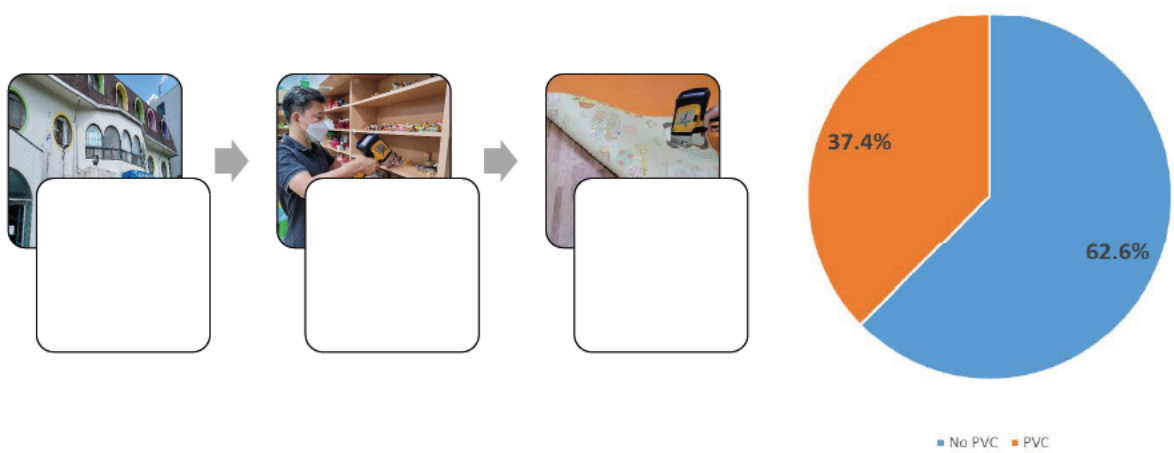
프탈레이트		대사산물
DMP(Dimethyl phthalate)	디메틸 프탈레이트	MMP(Mono-methyl phthalate)
DEP(Diethyl phthalate)	디에틸 프탈레이트	MEP(Mono-ethyl phthalate)
BBP(Butyl benzyl Phthalate)	부틸벤질프탈레이트	MzBP(Monobenzyl phthalate)
DiBP(Diisobutyl phthalate)	다이이소부틸프탈레이트	MEBP(Mono(iso-butyl)phthalate)
DBP(Dibutyl phthalate)	다이부틸프탈레이트	MnBP(Mono(n-butyl)phthalate)
DEHP(Diethylhexyl phthalate)	다이에틸헥실프탈레이트	5-OH-MEHP(Mono(2-ethyl-5-hydroxyhexyl) phthalate)
		5-oxo-MEHP(Mono(2-ethyl-5-oxohexyl) phthalate)
		5cx-MFHP(Mono(2-ethyl-5-carboxypentyl) phthalate)
		MEHP(Mono(2-ethylhexyl) phthalate)
DNOP(Di-n-octyl phthalate)	다이엔옥틸프탈레이트	MCPM(Mono (3-carboxypropyl) phthalate)
DINP(Diisononyl phthalate)	다이이소노닐프탈레이트	MINP(Mono-iso-nonylphthalate)

10

IV. Achievements

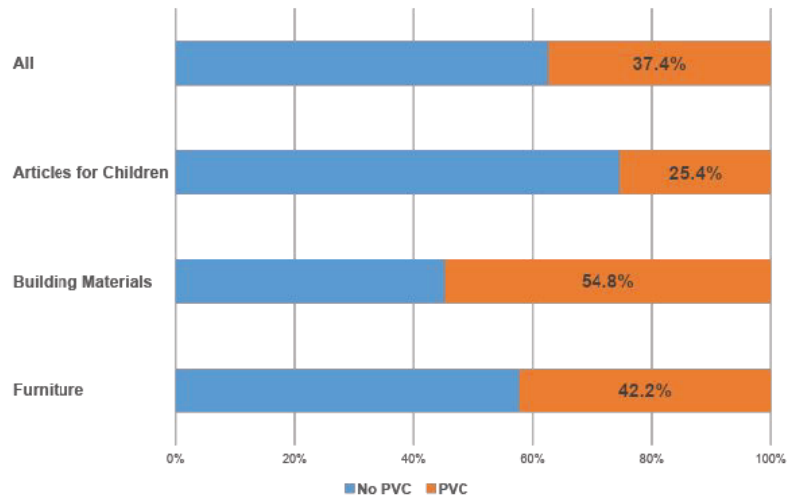
11

Detection of EDC sources in Nursery Schools



12

EDC sources in Nursery Schools



13

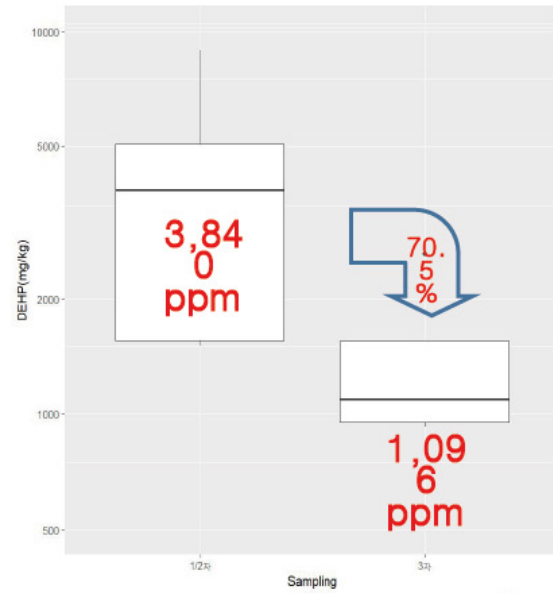
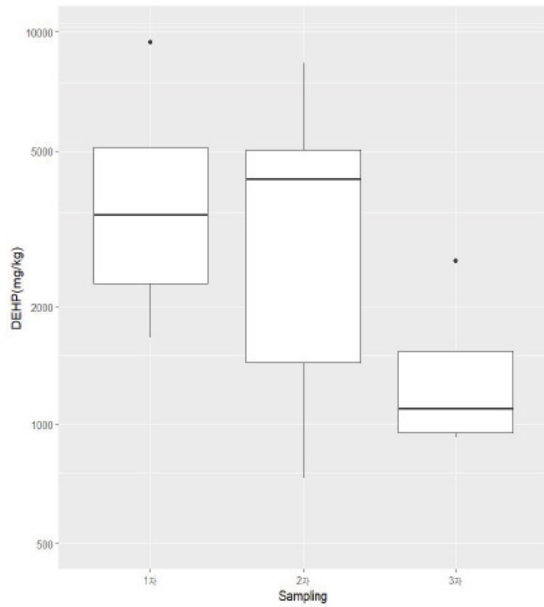
Remodeling with Environment Friendly Building Materials



<표 3> 리모델링 시공에 사용된 바닥재의 프탈레이트 함유 분석 결과(ppm)

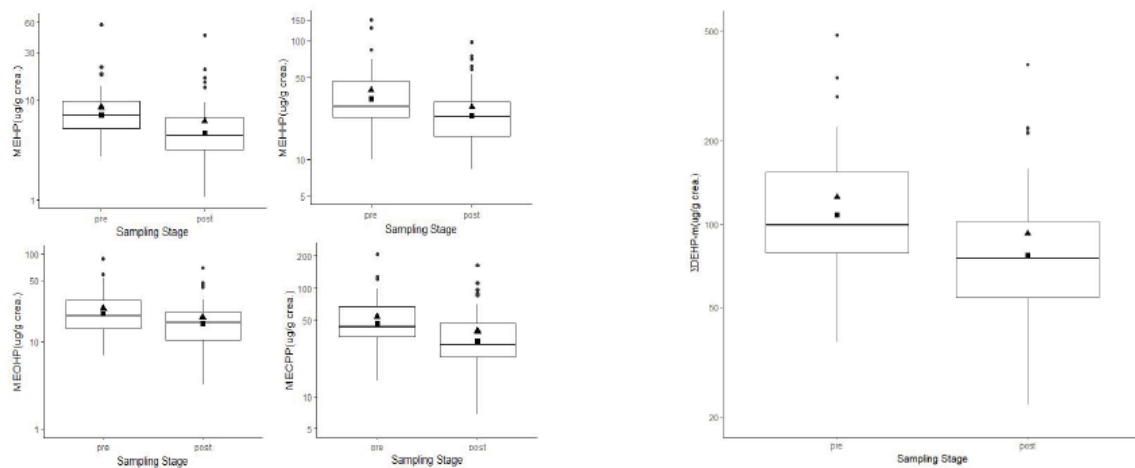
물질명	DiBP	DBP	BBP	DEHP	DnOP	DINP	DIDP
농도	7.11	10.30	ND	24.24	ND	ND	ND

ND: Not Detected, 불검출



15

Reduction of Phthalate Metabolites in Children's Urine (n=52) Across Remodeling



16

Factors Affecting Phthalate Metabolites in Urine

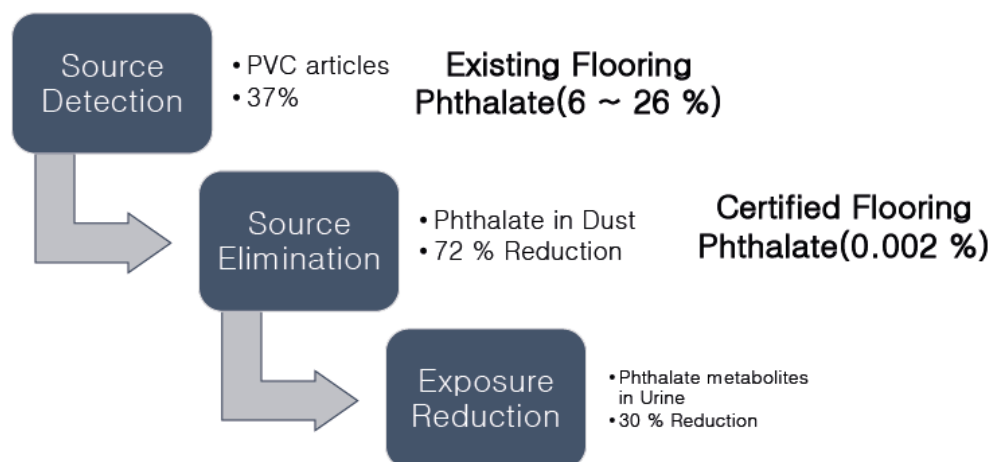
<표 22> Σ (DEHP metabolite) 농도에 영향을 미치는 요인들의 모델 분석

Variable	Level	Estimate	SE	p-value	Adjusted Proportional Change in GM		
					Est	95%CI.low	95%CI.up
	Intercept	4.894	0.311	0.000	133.43	72.50	245.57
성별	여아	0.022	0.154	0.888	1.02	0.76	1.38
연령대	8yrs+	-0.284	0.223	0.282	0.75	0.49	1.17
BMI	저체중/정상	0.184	0.176	0.300	1.20	0.85	1.70
기경.비다제	non-PVC	-0.099	0.160	0.541	0.91	0.66	1.24
가정.벽지	non-PVC	0.091	0.174	0.604	1.10	0.78	1.54
손씻기	>5	-0.135	0.096	0.163	0.87	0.72	1.05
물걸레청소	yes	-0.090	0.092	0.333	0.91	0.76	1.10
일회용기	yes	-0.067	0.098	0.497	0.94	0.77	1.13
가공육	yes	-0.006	0.093	0.951	0.99	0.83	1.19
육류	yes	0.080	0.136	0.556	1.08	0.83	1.41
유제품	yes	-0.267	0.136	0.055	0.77	0.59	1.00
찌개류	yes	-0.026	0.132	0.843	0.97	0.75	1.26
장류	yes	0.015	0.132	0.908	1.02	0.78	1.32
외식	yes	-0.034	0.116	0.772	0.97	0.77	1.21
측정차수	post	-0.352	0.070	0.000	0.70	0.61	0.81

Reduction of Phthalate Metabolite Concentration Owing to Remodeling (adjusted with other factors)
29.7 %
 (Σ (DEHP metabolites))

17

Summary of Achievements

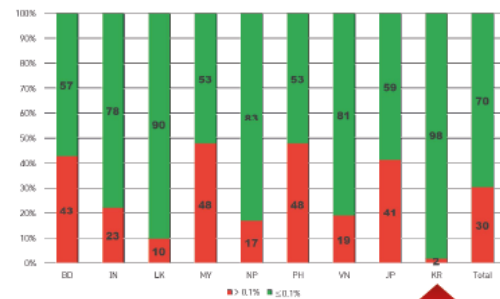


18

Regulation and Control on Hazardous Chemicals

Why Detection Rate of Phthalates in Erasers is low in Korea?

- SPECIAL ACT ON THE SAFETY OF PRODUCTS FOR CHILDREN OF PRODUCTS FOR CHILDREN
 - Common safety standards for children's products (June.04. 2015~)
 - Applied to 7 phthalates(Jan. 2022)
- Toys, school supplies are included
- Applied to imported articles



<Phthalates Plasticizer>

항목	허용치	비교
DEHP		Di-(2-ethylhexyl) phthalate, CAS No. 117-81-7
DEP		Dibutyl phthalate, CAS No. 84-74-2
BBP		Benzyl butyl phthalate, CAS No. 85-68-7
DINP	총합 0.1% 이하	Diisononyl phthalate, CAS No. 26553-12-0 또는 68515-49-0
DIDP		Diisodecyl phthalate, CAS No. 26761-40-0 또는 88515-49-1
DnOP		Di-n-octyl phthalate, CAS No. 117-84-0
DIBP		Diisobutyl phthalate, CAS No. 84-69-5

비교 합성수지계(성유기) 제품 등에 고형된 것을 포함)에 적용한다.

Total 7 phthalates ≤ 0.1%(=1000 mg/kg)

Environmental Health Act

환경보건법 시행령
일부 개정령안

Reinforced Regulation for Safe Environment at Nursery Schools

환경보건법 시행령
일부 개정령(안) 입법예고
(2021.03)

... 어린이 건강보호를 위해 어린이활동공간에 적용하고 있는 중금속 납 관리 (김출)기준을 0.06퍼센트에서 0.009퍼센트로 강화하는 한편, 내분비계장애 물질로 알려진 프탈레이트류(7종)를 합성수지 및 고무 계열 바닥재의 관리물질로 새로이 지정하고 ...

... 별표 2 제2호가목1)부터 3)까지 외의 부분 중 “합유된”을 “들어있는”으로 하고, 같은 목 2) 중 “0.06퍼센트”를 “0.009퍼센트”로 하며, 같은 목에 3)을 다음과 같이 신설한다.

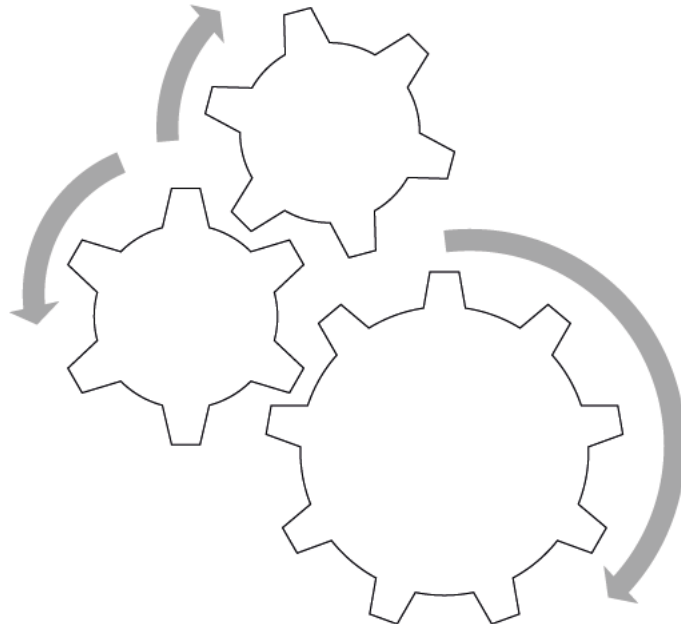
3) 실내의 활동공간에 사용되는 합성수지 계열의 바닥재(표면재료)에 들어있는 프탈레이트가소제[DEHP(Di-2-ethylhexyl phthalate), DBP(Dibutyl phthalate), BBP(Butyl benzyl phthalate), DINP(Diisononyl phthalate), DIDP(Diisodecyl phthalate), DnOP(Di-n-octyl phthalate, DIBP(Diisobutyl phthalate)를 말한다. 이하 같다] 총 함유량은 0.1 퍼센트 이하일 것

부 칙

제1조(시행일) 이 영은 2021년 7월 6일부터 시행한다. 다만 제16조 및 별표 2의 개정규정은 공포 후 9개월이 경과한 날부터 시행한다.

제2조(어린이활동공간에 대한 환경안전관리기준에 관한 특례) 제1조 단서에도 불구하고 이 영 시행전에 설치된 어린이활동공간에 대하여는 2026년 1월 1일부터 제16조 및 별표 2의 개정규정을 적용한다.

21



22



V . Conclusions

Messages

- Remodeling with environment friendly building materials could reduce children's exposure to EDCs
- Successful and exemplary model to improve childcare environment with preemptive effort from private sector before the regulation be executed
- Scientific evidence that prove the anticipated effects from strengthened regulation for childcare environment
- Precedent case that show the necessity of cooperation between NGOs and government for political efficacy

25



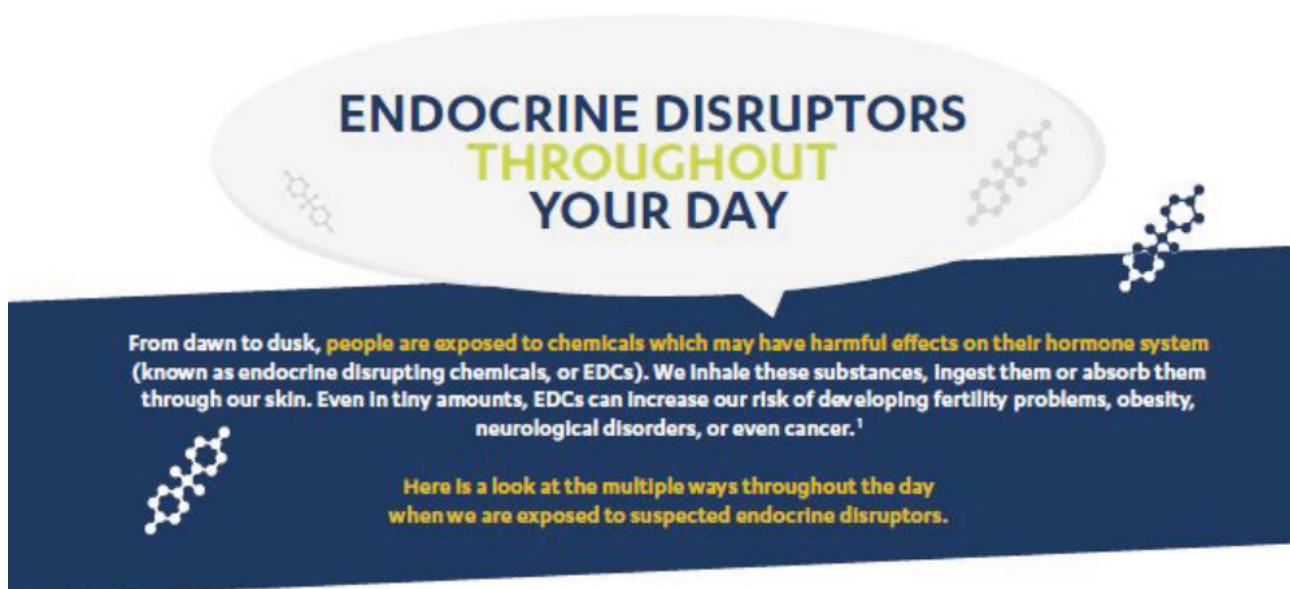
Jitka Straková

Global Researcher

International Pollutant Elimination Network (IPEN)

International trends in BPA and phthalates regulation

Jitka Straková
Global Researcher
International Pollutant Elimination Network (IPEN)



**ENDOCRINE DISRUPTORS
THROUGHOUT
YOUR DAY**

From dawn to dusk, **people are exposed to chemicals which may have harmful effects on their hormone system (known as endocrine disrupting chemicals, or EDCs).** We inhale these substances, ingest them or absorb them through our skin. Even in tiny amounts, EDCs can increase our risk of developing fertility problems, obesity, neurological disorders, or even cancer.¹

Here is a look at the multiple ways throughout the day when we are exposed to suspected endocrine disruptors.

Tests carried out between 2013 and 2018 have revealed that:

In France, 2 in 16 whitening toothpastes contained triclosan or propylparaben, chemicals linked to endocrine disruption.

50% of beauty balms tested in Italy contained propylparaben or butylparaben, suspected to contribute for example to developmental problems in unborn children.

19% of food samples – mostly fruit – tested across Europe contained one or more residues of endocrine disrupting pesticides.

3 in 6 children's jackets contained PFOA, a substance linked to cancer, as tested in Norway.

In Denmark, 2 of 16 headphones contained phthalates, substances linked to infertility.

3 in 6 children's jackets contained PFOA, a substance linked to cancer, as tested in Norway.

In Norway, phthalates, bisphenol A and other EDCs leached from 9 in 11 refillable water bottles.

In Denmark, two thirds of children's chewing gums contained additives linked to impaired development.

A third of take-away food wrappings tested across the EU contained fluorinated compounds, a group of suspected EDCs.

8 in 14 soda cans contained different types of bisphenols, including bisphenol A (in the inside coating), as tested in Denmark.

In Norway, nonylphenol ethoxylate was found

A third of take-away food wrappings tested across the EU contained fluorinated compounds, a group of suspected EDCs.

8 in 14 soda cans contained different types of bisphenols, including bisphenol A (in the inside coating), as tested in Denmark.

In Norway, nonylphenol ethoxylate was found in all the 6 teddy bears tested. This substance may contribute to cancer, impaired fertility, type 2 diabetes, obesity and hyperactivity.

In Denmark, 6 out of 11 pushchairs contained chlorinated paraffins, suspected of having endocrine disrupting properties.

4 in 21 baby wipes tested in France contained parabens, suspected to harm reproductive health.

1 in 3 anti-aging creams contained methyl-, propyl- and/or ethyl-parabens, as tested in Germany.

In Denmark, 4 out of 12 game controllers

1 in 3 anti-aging creams contained methyl-, propyl- and/or ethyl-parabens, as tested in Germany.

In Denmark, 4 out of 12 game controllers contained phthalates, chlorinated paraffins and/or an endocrine-disrupting flame retardant.

Throughout the day, indoor air and dust may contain lead, brominated flame retardants, phthalates and pesticides. These chemicals are likely to have leached from furniture, electronics, carpets, paints, etc.²

The EU must remove EDCs from our everyday products.

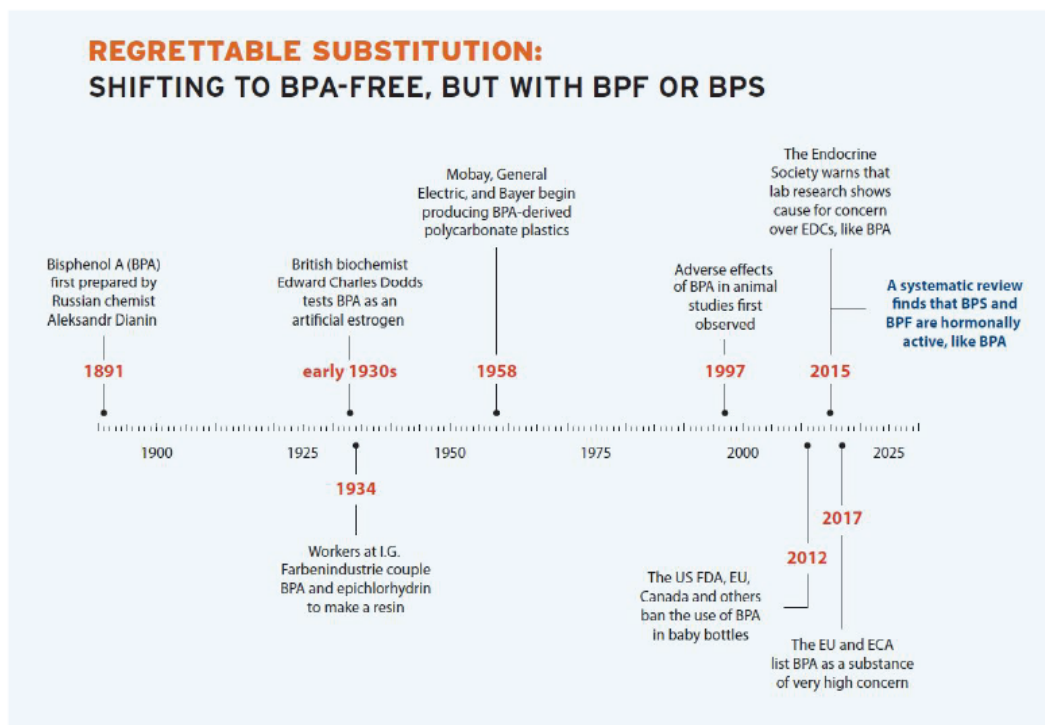
None of the examined products may present a health hazard on their own. But, taken together with all other products that surround us, they contribute to a worrisome daily total exposure called the 'chemical cocktail'.

The good news is that our members' tests found that across product groups, EDCs are present in some but not in all products. Neither price nor brand appears to be a decisive factor, which suggests that using safer alternatives is possible and does not cost an arm and a leg.



Important events in the EU at the end of 2021

- The EU food safety agency EFSA proposed a **massive 100,000-fold reduction in the safe level for BPA in foodstuffs to 0.04 ng/kg**
- the European Court of Justice **confirmed that BPA was correctly listed as a “substance of very high concern” in EU chemicals law REACH**



Legal restrictions on BPA in the EU and US

Country	Scope	Citation	Conditions
EU	Infant feeding bottles	Directive (EU) 2011/8/ EU amending Directive 2002/72/EC	Prohibited
	Bottles and packaging of food for children up to 3 years old		
	Food contact plastics and food contact varnished or coated products	Regulation (EU) 2018/213 amending Regulation (EC) 10/2011	Maximum migration of 0.05 mg/kg
	Toys - intended for use by children under 36 months or in other toys intended to be placed in the mouth	Directive (EU) 2017/898 amending 2009/48/EC	Maximum migration of 0.04 mg/L
	Thermal paper	Regulation (EU)2016/2235 amending Annex XVII of REACH	Maximum content of 0.02% by weight
US	Baby bottles, sippy cups, infant formula	Rule 77 FR 41899	Prohibited
	Epoxy resins as coatings in packaging for infant formula	Rule 78 FR 41840	Prohibited

Legal restrictions on BPA in Asia

Country	Scope	Citation	Conditions
China	Polycarbonate baby feeding bottles and other infant feeding bottles	Ministry of Health, Bulletin No. 15 of 2011	Prohibited
	Additive in adhesives and paint coatings	GB 9685-2016	Specific migration limit of 0.6 mg/kg
India	BPA in Packaging Material for baby/infant food supplements	Food Safety and Standards (Foods for Infant Nutrition) Regulations, 2020	Prohibited
	BPA in baby feeding bottles/sippy cups	IS 14625:2015, Bureau of Indian Standards (BIS), 2015	Prohibited
Indonesia	Food contact plastics	Regulation of the National Agency of Drug and Food Control (Badan Pengawas Obat dan Makanan/BPOM) Number 20 of 2019 concerning Food Packaging	Maximum permitted content of 600 µg/kg
Malaysia	Polycarbonate Baby bottles	P.U. (A) 35/12 of the Food Regulations 1985 (since March 1st, 2012)	Prohibited

A history of ineffective action on BPA, and the lessons for reform of EU chemical laws

February 18, 2022 By Pia Juul Nielsen



1. The burden of evidence is too high, preventing timely protection
2. Grouping of chemicals in assessments and restrictions can quickly and effectively increase protection
3. Generic risk assessment and management is needed to ensure efficient protection, and consistency in regulation

https://chemtrust.org/bpa_inaction/

EDCs as a SAICM* emerging issue



IPEN recommends:

- Establish a global list of chemicals with potential endocrine disrupting properties
- Raise global awareness of EDCs, through broad outreach, information exchange, labeling requirements, and capacity building campaigns, with the participation of environmental and health NGOs and scientific institutions
- Ensure that all future work on EDCs retain SAICM's multi-stakeholder nature and includes expert in endocrinology as well as representatives of public interest NGOs, trade unions, and the health sector
- Prioritize eliminating EDCs that affect the most vulnerable, particularly women of childbearing age, the unborn fetus, and children

* Strategic Approach to International Chemicals Management



A New era to end plastic pollution?

- UNEA approved a broad mandate to start talks on a legally-binding plastics treaty
- The resolution covers all types of potential pollution and the whole lifecycle of plastics
- To start discussions to create a scientific panel on chemicals, waste, and pollution prevention
- IPEN mission: ensuring that the health impacts of plastics, including microplastics and hazardous chemicals, will be covered by the future Treaty



for a toxics-free future

Thank you for your attention!

jitkastrakova@ipen.org



Jong-Hwan KIM

**Executive Director,
Sustainable Lifestyle &
Welfare(Health) Headquarter**

Headquarter Korea Environmental Industry &
Technology Institute (KEITI)

<한국환경산업기술원의 어린이 환경보건 사업 개요>

○한국환경산업기술원은 「환경보건법」에서 정의한 어린이 환경보건 관련 업무를 환경부로부터 위탁받아, 어린이 환경보건 안전관리 지원사업(19년~), 어린이 환경보건 출생코호트 사업(21년~) 등을 수행해오고 있다.

< '19~'21년도 어린이 환경보건 관련 추진현황 >

구분	목표	실적			
	'22년	'21년	'20년	'19년	
어린이활동공간 지도·점검(시설수)	4,300	4,667	5,029	4,303	
어린이용품 위해관리(제품수)	2,000	2,000	2,500	5,000	

○어린이 환경보건 안전관리 지원사업은 크게 **어린이활동공간 환경안전관리**와 **어린이용품 위해 관리**로 구분하여,

- 「환경보건법 제23조」에 따른 어린이활동공간 환경안전관리기준 준수 여부를 점검*하기 위하여 매년 지자체·교육청 관계자와 함께 현장방문을 실시하고 있다. '19년 4,303개소, '20년 5,312개소, '21년 4,667개소 등 매년 4~5천 개소를 방문하여 점검해오고 있다.

* 어린이활동공간에 사용되는 도료나 마감재료에 함유된 납, 카드뮴, 수은, 6가크롬 등 중금속류, 마감재료 표면에서 방출되는 폼알데하이드, 다른 법이 사용을 금지한 목재방 부제류 등을 점검

- 「환경보건법 제23조」에 따른 어린이용 제품의 환경유해인자를 관리하기 위하여, 매년 시중에 유통되고 있는 장난감, 문구류 등 어린이용품을 수거하여 환경유해인자(263종)의 위해 여부를 점검하고 있다. '19년 5,000개 제품, '20년 2,500개 제품, '21년 2,000개 제품을 수거하여 환경 유해인자 위해 여부를 확인하였다.

- **어린이 환경보건 출생코호트 사업**은 작년부터 환경부의 위탁을 받아 '21년부터 수행하고 있다. 본 사업에서는 상세조사(5,000명, 임상/성장인지발달/환경설문)와 대규모조사(65,000명, 환경설문)를 추진하고 있다.

<어린이활동공간 환경안전관리기준(프탈레이트) 개정>

○국내에서는 '09.2월에 「환경보건법」제정을 통해, 어린이가 이용하는 공간을 관리하는 개념으로 사용된 마감재의 환경유해인자를 관리하는 환경안전관리기준을 처음 마련하였으며,

- 최근에는 '21.7월에 환경부는 국정감사에서 지적된 어린이 환경보건 기준 강화 요구('19.10) 등을 반영하여 어린이활동공간 내 바닥재에 함유된 프탈레이트(6종 : DEHP, DBP, BBP, DIDP, DINP, DNOP)를 총합 0.1% 이하로 관리하기 위하여 '21.7월에 개정하였다.
- 이를 위해 '20년부터 관련 전문가 간담회 및 어린이집, 유치원 원장 등 어린이활동공간 관계자들의 의견을 듣고 공청회를 거쳐 최종 개정내용을 확정하였다.
- 어린이활동공간의 프탈레이트는 주로 PVC 바닥재에 함유된 프탈레이트가 실내먼지와 결합하여 어린이에게 노출되기 때문에 바닥재 관리를 강화하려는 것이 이번 환경안전관리기준 개정 주된 이유이다.

<이해관계자 협조 중요성>

- 일반적으로 급격한 규제기준 강화는 해당 이해관계자의 저항을 야기하기 때문에 유예기간을 두고 점진적으로 추진해야 한다.
- 특히, 어린이활동공간의 프탈레이트를 점검하기 위해서는 많은 분석비용 부담과 시료 채취를 위한 바닥재 훼손 문제 등으로 많은 민원이 예상된다.

<환경안전관리기준 개정 관련 후속지원>

- 이번 프탈레이트 개정 기준은 5년동안 적용 유예기간을 뒤, '26.1월부터 적용되는 데, 금년부터 해마다 어린이집, 유치원, 초등학교 등 어린이활동공간 400개소의 바닥재의 프탈레이트 함량을 미리 진단하고 규제를 맞출 수 있도록 컨설팅을 제공할 예정이다.
- 한국환경산업기술원은 바닥재의 환경표지(Eco-label) 인증업무도 담당하고 있는데 이인증기준을 어린이활동공간 환경안전관리기준과 동일하게 관리하고 있다.
- 따라서, 어린이활동공간 시설을 처음 허가할 때 '확인검사'를 통해 기준 만족 여부를 확인하고, 이후 '지도점검'을 실시할 때는 1 과거 시설에 변동이 없을 경우 지도점검 항목에서 면제, 혹은 2 시공된 바닥재가 친환경인증 받은 제품인 것이 확인되면 검사를 면제하는 등, 제도의 합리적 운영방안도 검토하고 있다.

<마치는 말>

새로운 규제는 설계와 입법 과정도 중요하지만 운영과정에서 모든 이해관계자가 큰 어려움 없이 이행할 수 있도록 준비하는 것이 필요하다. 최근 코로나-19로 많은 키즈카페, 어린이집 등 어린이활동공간과 운영시설들의 폐업이 줄을 잇는 상황이라고 한다. 어려울 때일수록 규제순응을

지원할 정책 방안을 함께 제시하는 것이 바람직하고 이를 위해 민관이 함께 다각도로 논의하고 노력하면 더 좋은 결과를 기대할 수 있을 것이다.



Domyung Paek

**Professor Emeritus
(Seoul National University)**

Wonjin Institute for Occupational and Environmental Health

EDC Regulation, a new barometer of precautionary system

Domyung Paek

Wonjin Institute for Occupational and Environmental Health

EDC in consumer products

- Toxicologist perspective
 - Acute toxicity low, but chronic repeated toxicity potentially significant
- Manufacturer perspective
 - Easy to procure and scale up (mass) production
- Consumer perspective
 - Versatile and cheap
- Health professional perspective
 - Worrisome, but no definite victims around

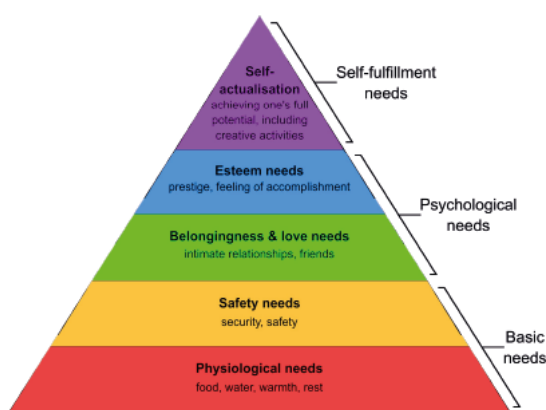
Development of what?

- Not just Economy, but rather Society or System change

Changes

- From short-term to long-term perspective
- From economical (easy to use, end-oriented) to healthful (feel good to use, process-oriented)
- From average person to vulnerable person

Maslow's hierarchy of needs



- Change in individual needs?
- How about groups?

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<https://commons.wikimedia.org/w/index.php?curid=93026655>

Change steps

- | | | |
|------------------------------------|---------------------------------------|--|
| • Alive and procreate | • Safe and healthy | • Sustainable and connected |
| • Herd mentality and pecking order | • Individuality and freedom from risk | • Wholesome and meaningful |
| • Fire and explosive prohibition | • Toxic material regulation | • Precautions |
| • Hard power, physical force | • Soft power, creativity | • Empathy, system power (social capital) |

Why regulate EDC?

- Cancer was the prime target for healthy society in developed countries.
 - Chronic, fatal, and prevalent disease, especially at old age
 - Two lessons:
 - not just long life, but healthy life is more important
 - Prevention first, cure next
- EDC becomes the next target
 - Apart from longevity, normal development becomes the issue
 - Precaution is the ultimate form of prevention
 - Best example of choice in “risk and alternative”

How regulate EDC?

- Civic society role
- From middle class concern -> to working class principle
- From one alternative to alternative systems
- From precaution to precaution -> enforcement -> precaution cycle
- Neighboring countries not as dumping grounds, but as the source of alternative models

환경호르몬으로부터 안전한 아시아 EDC free ASIA

금융산업공익재단-노동환경건강연구소 국제 컨퍼런스
FIPIF-WIOEH International Conference