

# Investigation of potential migratables from paper and board food contact materials intended for takeaway

Mélanie Di Mario
Sciensano
University of Liège

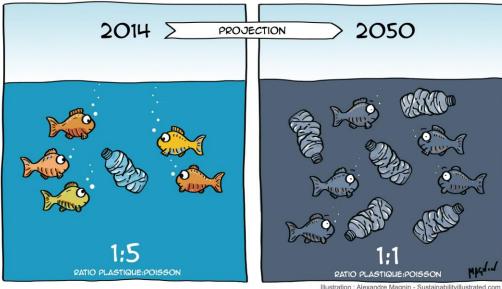
# Do you remember your childhood?







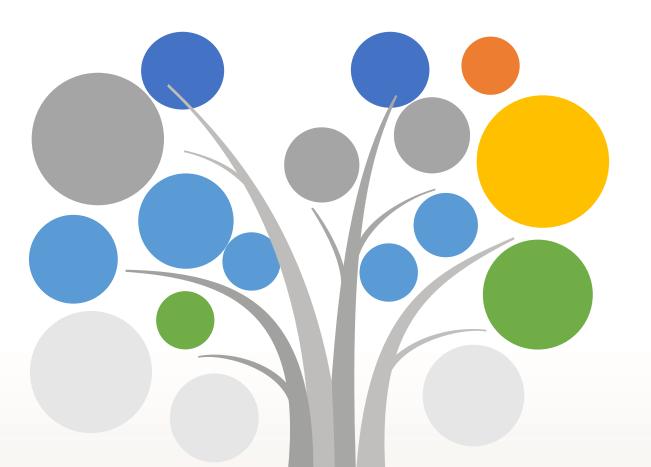








#### Action & alternatives

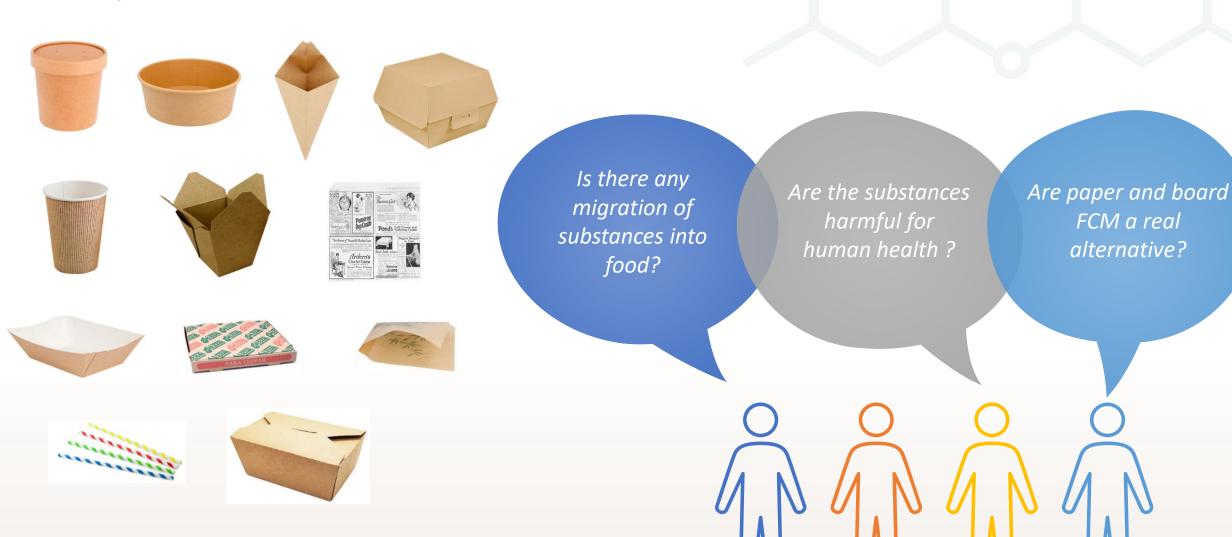


- July 2021: Ban on single-use plastics in the EU (plates, straws, cutlery, cups, etc.)
- Reusable packaging options, limit overpackaging
- Decrease the need for virgin materials
  - 40% of plastic
  - 50% of paper
- 4 Boosting Europe's **recycling** capacity

Need for greener alternatives



# Paper and board FCM





# Objectives











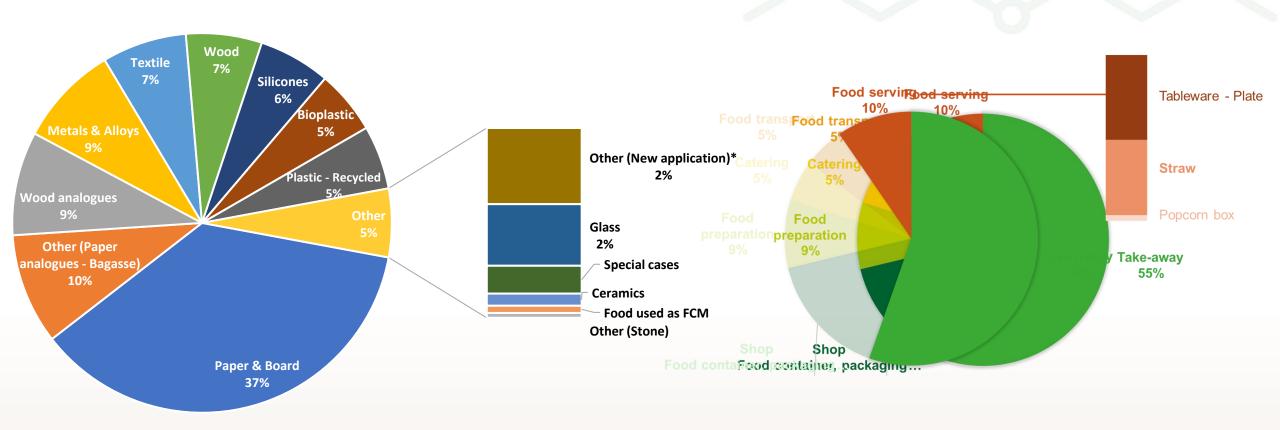
**EXTRACTION EXPERIMENTS** 

**TARGETED ANALYSES** 

**RISK ASSESSMENT** 



# Sampling





Ciano S, Di Mario M, Goscinny S, Van Hoeck E. Towards Less Plastic in Food Contact Materials: An in-depth overview of the Belgian Market. Foods. 2023 Jul 18;12(14):2737.

# Sampling





78 samples



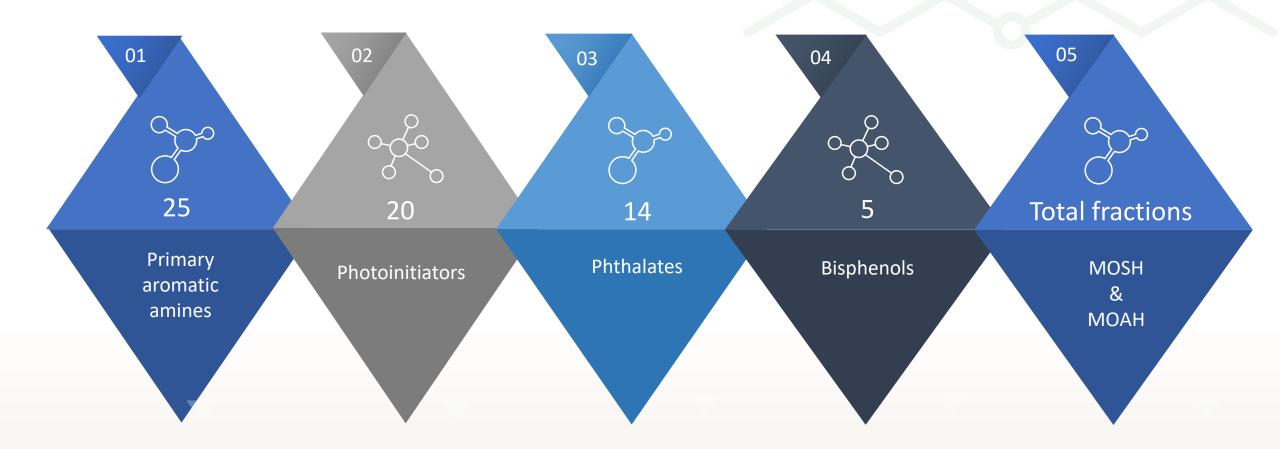








# Targeted substances



Total: 66 compounds



## Experimental strategy

#### **EN 645**

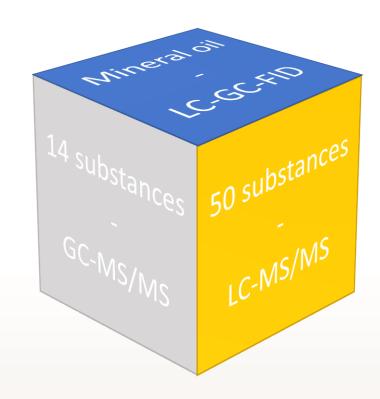
Paper and board intended to come into contact with foodstuffs; Preparation of a cold water extract

#### **EN 15519**

Paper and board intended to come into contact with foodstuffs; Preparation of an organic solvent extract

#### **Bfr procedure**

Determination of hydrocarbons form mineral (MOSH & MOAH) or plastics (POSH & POA) in packaging materials and dry foodstuffs by solid phase extraction and GC-FID

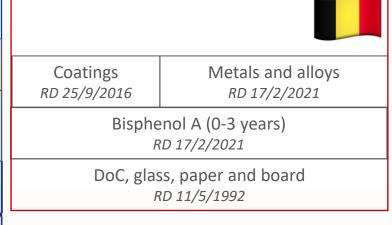


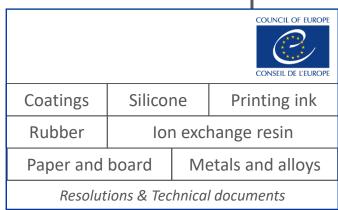






Specific material		
Plastics		Recycled Plastics
Regulation No. 10/2011		Regulation No. 282/2008
Ceramics		Regenerated cellulose
Directive No. 84/500/EC –		Directive 2007/42/EC –
RD 1/5/2006		RD 23/11/2004
Active and intelligent materials  Regulation No. 450/2009		
Nitrosamines		BADGE/NOGE/BDFGE
Directive 93/11		Regulation 1895/2005
Bisphenol A Regulation 2018/213		Specific substances



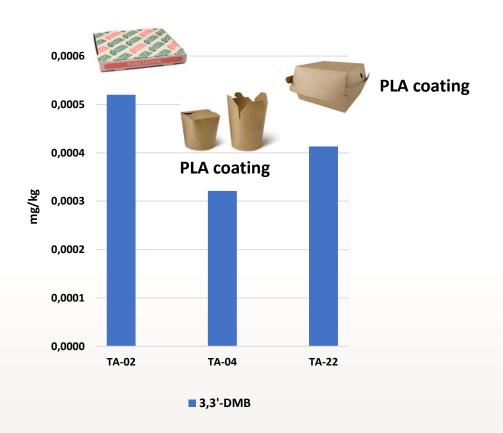




National recommandations

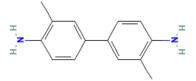


# Primary aromatic amines





1 amine found out of 25 in 3 samples out of 78 (3.8%)





3,3-DMB is carcinogenic

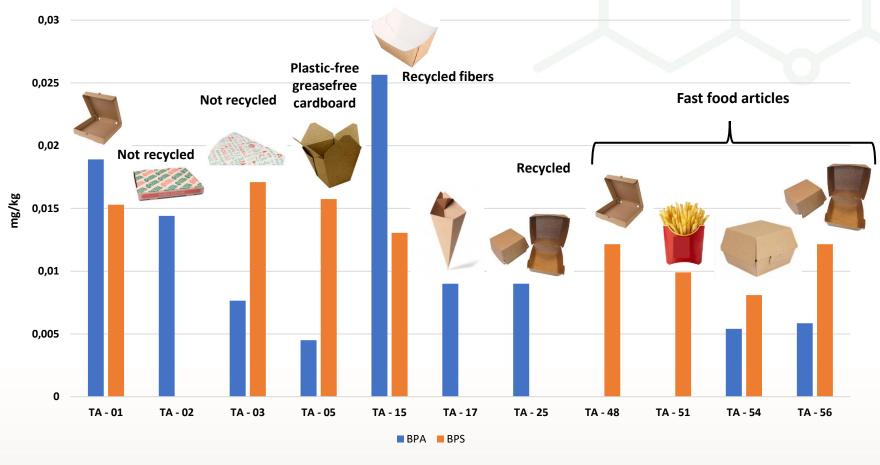


Can be use in the production of azo dyes and insoluble pigments in the paper industries

Is used in the production of plastics for coating



# Bisphenols





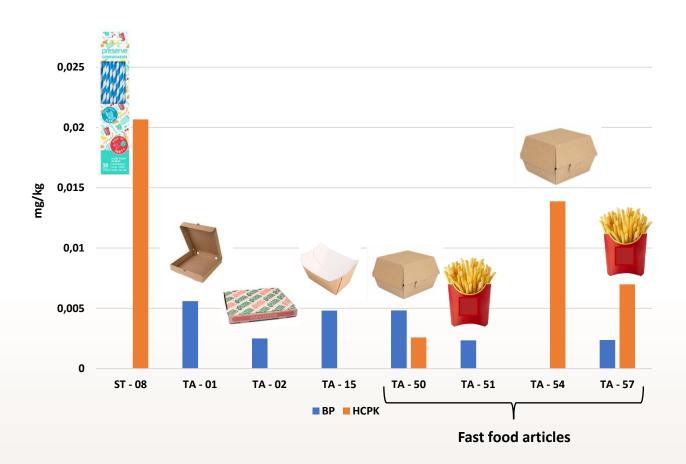
2 bisphenols found out of 5 11 samples out of 78 (14.1%)



BPS ranging from 0.008 up to 0.017 mg/kg BPA ranging from 0.004 up to 0.026 mg/kg



#### Photoinitiators





2 photoinitiators found out of 20 8 samples out of 78 (10.2%)



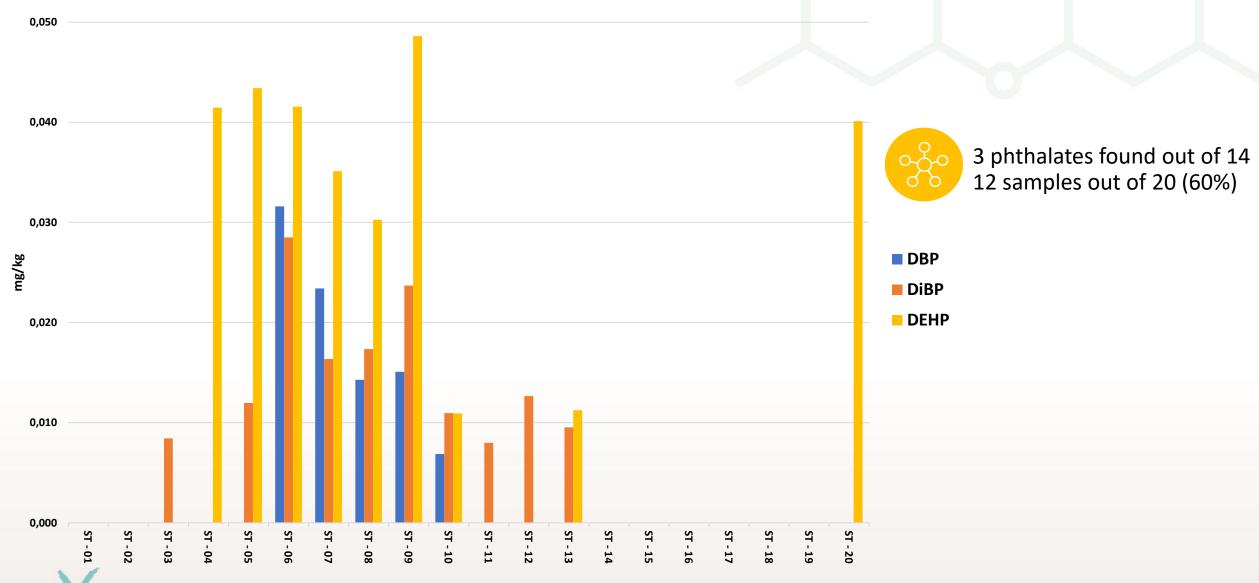
Benzophenone ranging from 0.0023 up to 0.005 mg/kg HCPK ranging from 0.003 up to 0.02 mg/kg



Photoinitiators are used in the UV curing processes of inks and lacquers applied to the packaging surface, mainly cardboard boxes

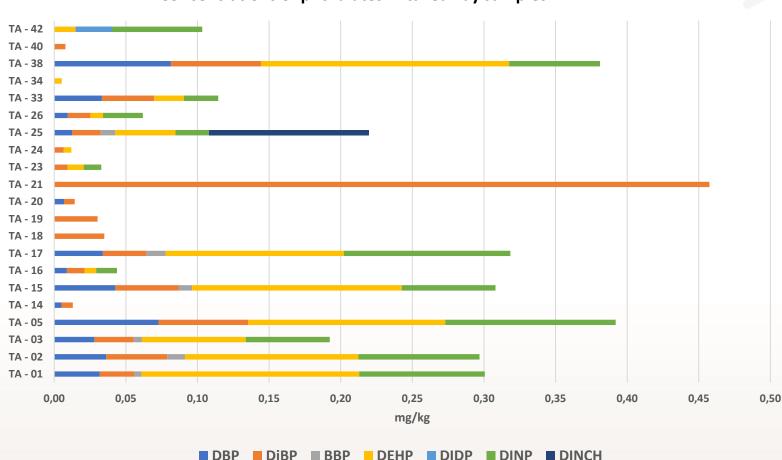


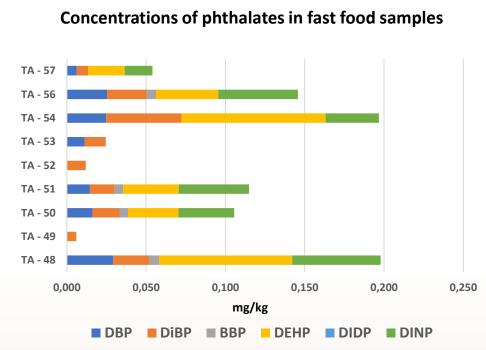
## Phthalates in straws



# Phthalates in takeaway articles

#### **Concentrations of phthalates in takeaway samples**



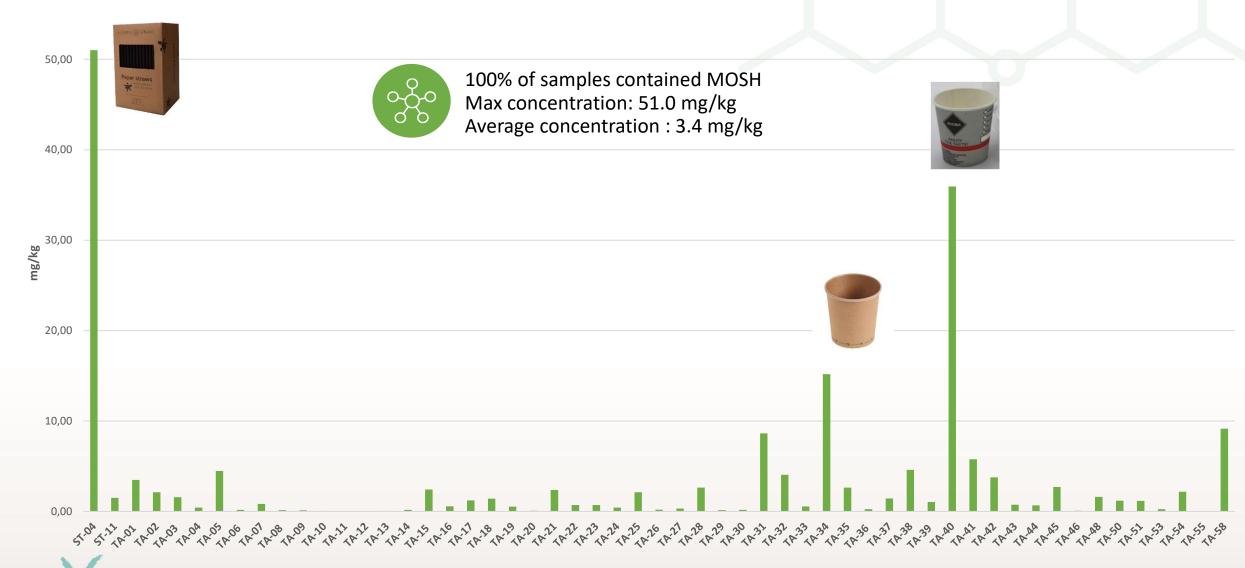




7 phthalates found out of 14 38 samples out of 20 (51.7%)

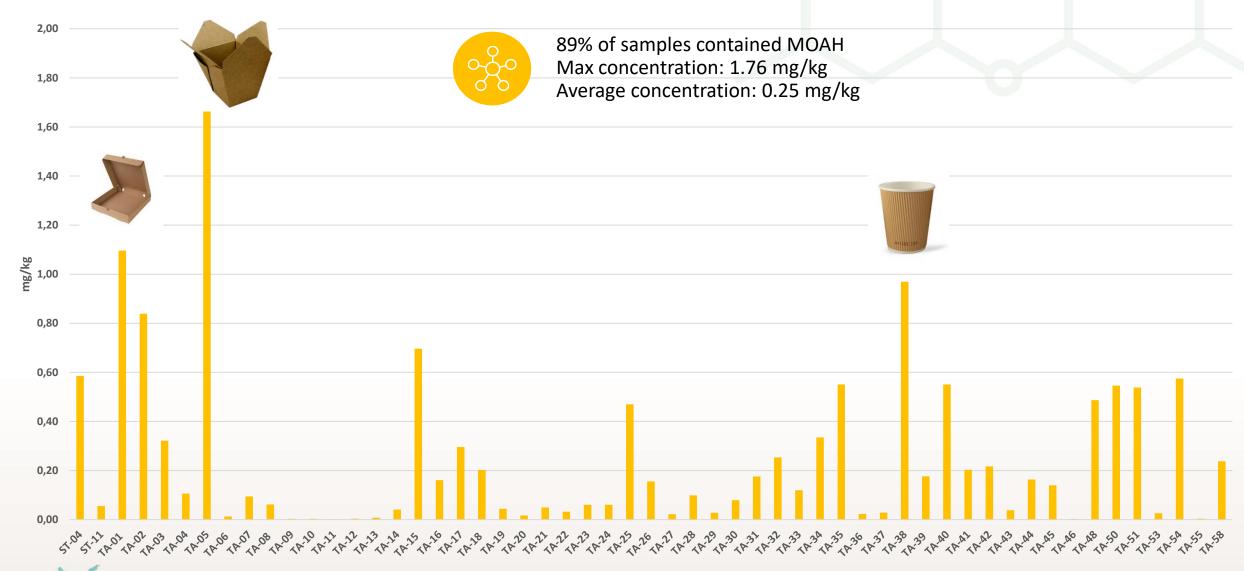


#### Mineral oil - MOSH



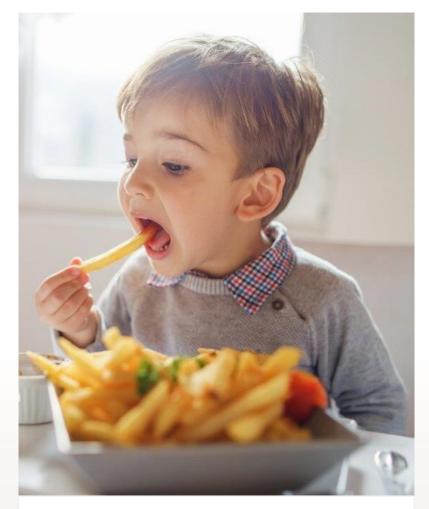


#### Mineral oil - MOAH





# Targeted populations



Children (3-10 years old, 23 kg)



Teenagers (14-18 years old, 61 kg)



Adults (18-64 years old, 70 kg)

# Evaluation according to the RACE tool

Determination of the hypotheses of If no reference point was available: consumption per population category → TTC was used If no toxicological information available: → Reference point (NOAEL, BMDL)

Literature search for toxicological

information (e.g., TDI)



- Quantity of substance
- Weight of the population
- Hypothesis of consumption

→ Exposure in mg/kg bw/day



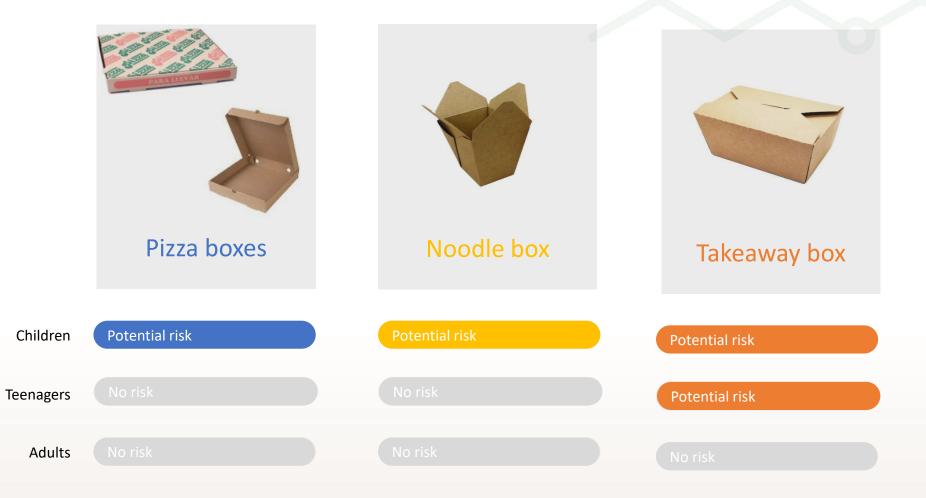
Determination of the amount of

substance that could potentially

migrate from the FCM

Fürst P, Milana MR, Pfaff K, Tlustos C, Vleminckx C, Arcella D, et al. Risk evaluation of chemical contaminants in food in the context of RASFF notifications. EFSA Support Publ. 2019;16(5).

# Risk assessment: DBP, DiBP, DEHP

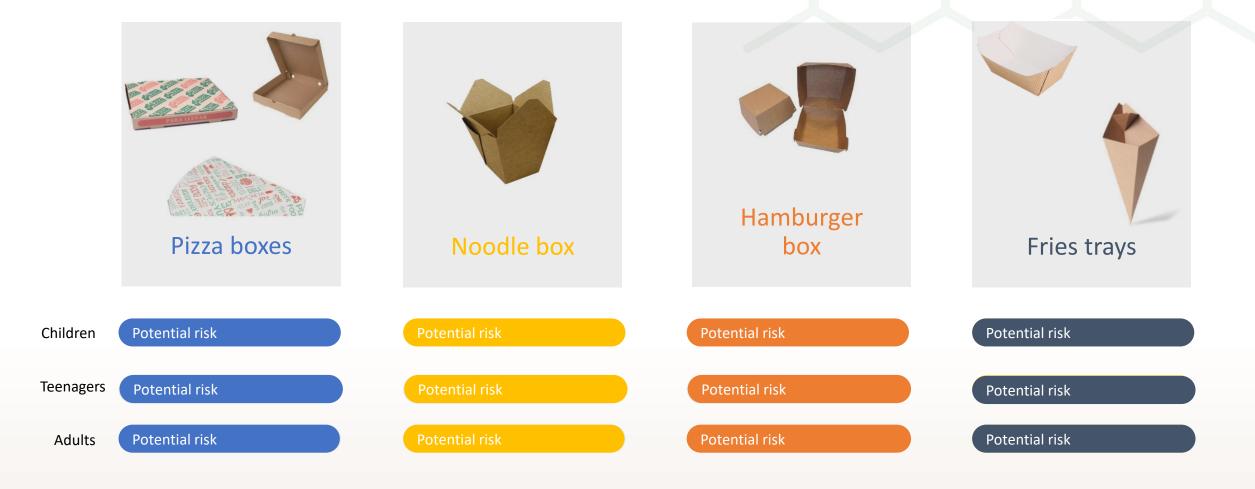




TDI:

DBP/DiBP: 10 μg kg<sup>-1</sup> bw day DEHP: 50 μg kg<sup>-1</sup> bw day

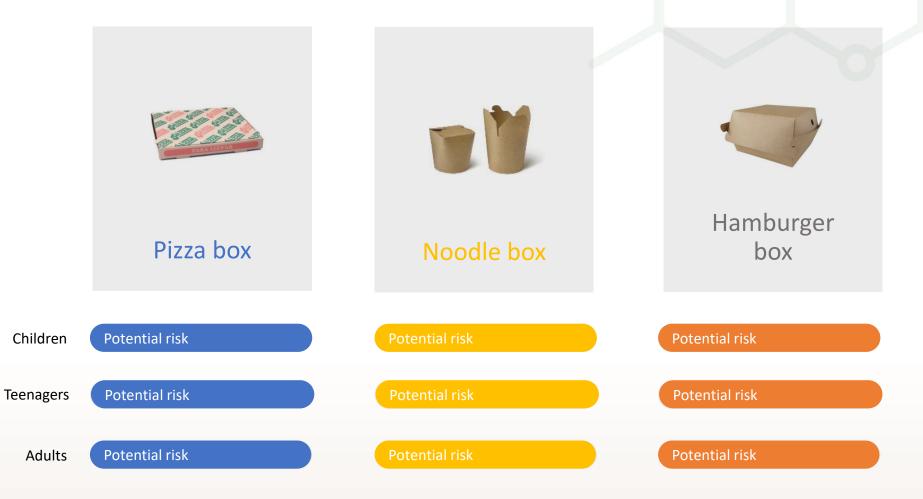
### Risk assessment: BPA





TDI:  $0.0002 \ \mu g \ kg^{-1} \ bw \ day$ 

# Risk assessment: 3,3-DMB





TTC:  $0.0025 \mu g kg^{-1} bw day$ 

## Risk assessment: MOSH





NOAEL: 236 mg kg<sup>-1</sup> bw day

## Risk assessment: MOAH

**Scenario 1:10%** 



BMDL10 : 0.49 mg kg<sup>-1</sup> bw day

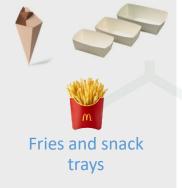


#### Scenario 1:1%













Children

Potential risk

Teenagers Potential risk

Adults

Potential risk





Children

Teenagers

Adults

Potential risk

Low concerr

ow concern

Potential risk

Low concern

Low concern



## Conclusion

Thank you

14 substances out of66 found

**88,5%** of samples with a detection

**78** samples analysed

**7** substances at concern for human health for multiple types of article

Need for harmonized analytical guidelines

Need for EU legislation