

Bisphenol urine levels and determinants in teenagers and young adults in the Czech Republic

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Do you have a reusable water bottle?

Do you drink water from a water cooler?

Do you use cosmetics?

Do you like eating canned food?

What is common between a reusable bottle, a water cooler, cosmetics and canned food?

All these items could contain **bisphenols**.

Introduction

Bisphenols are **environmental contaminants** widely used in a range of consumer products. The most abundant ones are **bisphenol A, S and F**.

Bisphenols became a fundamental component in the manufacturing of **some plastics**.

Manufacturers found **bisphenols** very useful in production of clear and shatter-proof **polycarbonate plastic** as well as flexible **polyvinyl chloride (PVC)** and **epoxy resin**.

Bisphenol A (BPA) is classified as an **endocrine-disrupting chemical**. Endocrine disorders influence male and female **fertility** as well as leading to **obesity** and **diabetes**. Moreover, BPA has harmful effects on the **cardiovascular, central and peripheral nervous systems**. Since **2010s** manufacturers have started **replacing BPA** with analogues such as **bisphenol S and F (BPS and BPF)**. Recent studies showed that – like BPA – these novel bisphenols **could adversely affect human health**.

What did we do?

In this study, we **measured BPA, BPS and BPF** in spot urine of **teenagers and young adults**, compared the bisphenols levels among other **European countries** within the same age groups and **attempted to estimate associations** between the concentrations and questionnaire data that could reflect potential sources of exposure.

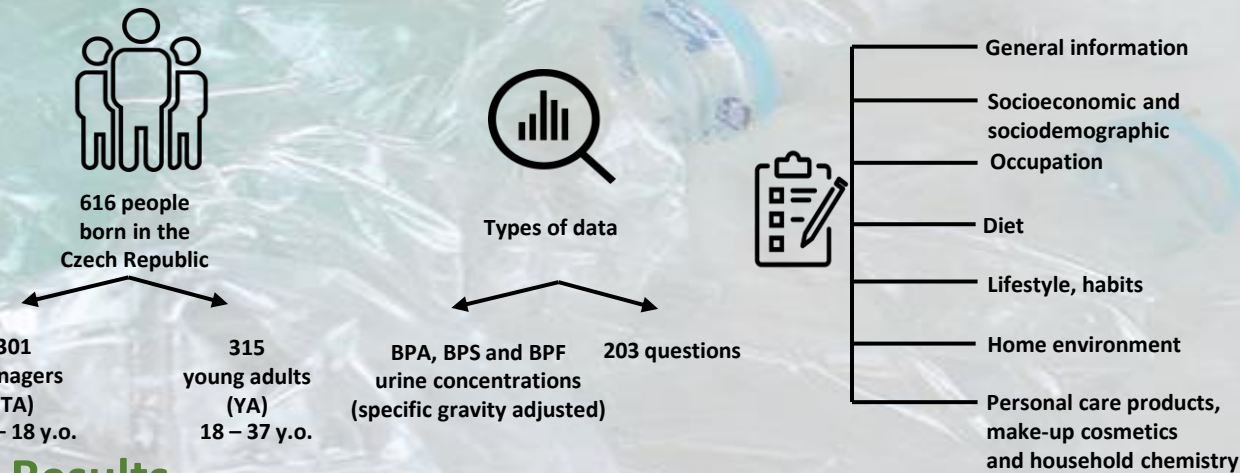
Methods

In this study, within the CELSPAC program, **participated 616 people born in the Czech Republic**.

Statistical data treatment

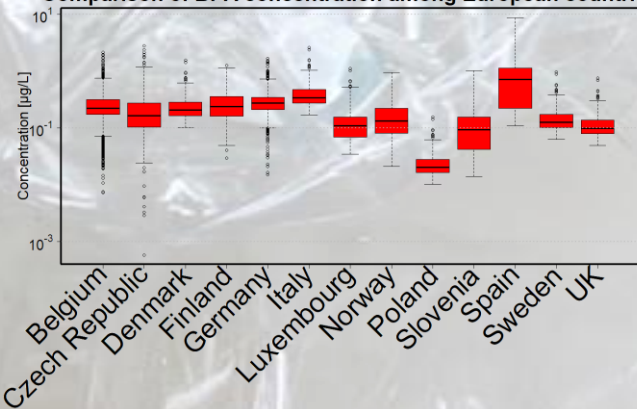
Bisphenol data were supplemented by **203 variables**. They were considered as **predictors** of bisphenol exposure and associations between the predictors and bisphenols exposure were tested using **various non-parametric tests**. The variables were divided into clusters with various subcategories within each.

In case of continuous frequency variables, only the **clusters with multiple significant associations** were further investigated. This **helped us to prevent false positive results** typical for multiple testing of numerous variables as well as handle potentially dependent variables within a cluster.

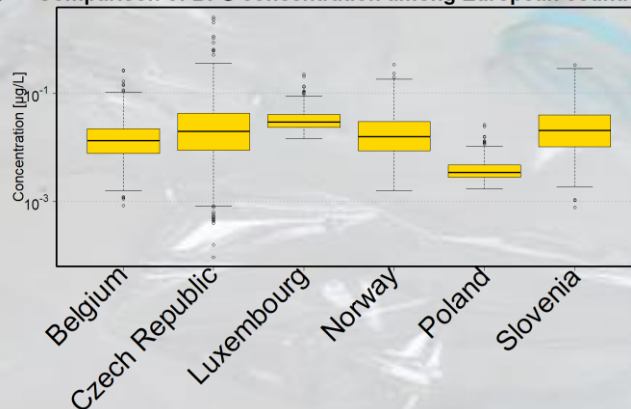


Results

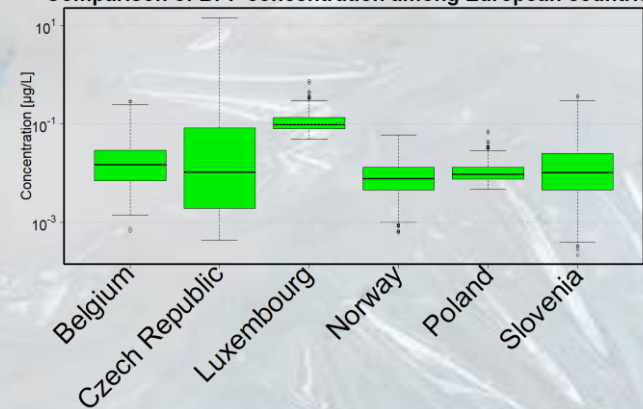
Comparison of BPA concentration among European countries



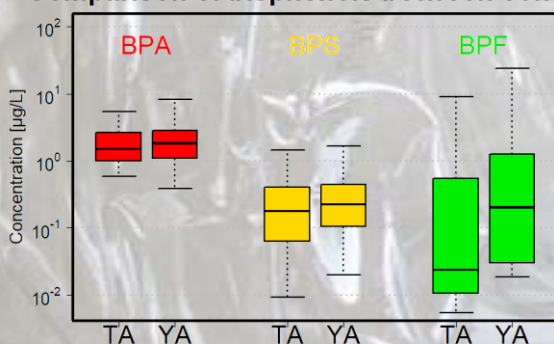
Comparison of BPS concentration among European countries



Comparison of BPF concentration among European countries



Comparison of bisphenols between cohorts



Comparison of bisphenols concentration in the Czech Republic with other European countries demonstrated that **the Czech population is exposed at the average level**.

Our study demonstrated that **BPA in the Czech teenager and young adult populations still dominates** compared to its replacements BPS and BPF. **BPA and BPS levels were slightly higher and BPF levels were significantly higher in the young adults cohort (YA)** compared to the teenagers cohort (TA).

We observed a **significant difference in BPS levels** between **females and males in the YA cohort** with concentration in females being about **18 % higher**.

In this study **the cosmetic category** demonstrated **the most comprehensive result** and was verified for **BPS**. Cosmetic items which mostly contributed to the BPS levels were **eye make-up, foundation, lipstick, skin cosmetics and lip balm**. The results were mostly explained by females of the young adults cohort.

In this study, **dietary variables were not identified as significant exposure determinants of BPA**. However, **BPS was positively associated with tropical fruits and non-alcoholic beverages**. **Smoking** was correlated with the **higher BPA and BPS concentrations**, and **alcohol consumption** – with the **higher BPS levels**. In case of **smoking** the correlation was mostly explained by age.