Fruit and vegetable intake plays a key role in pesticide exposure of Latvian citizens

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INTRODUCTION

Food is one of the pesticide exposure routes. Previous research of HBM4EU data on Latvia shows that seven pesticides and/or their metabolites were detected in more than 10% of the study samples [1]. Three from the detected pesticides (Acetamiprid, Chlorpropham and Pyrimethanil) were not registered and/or allowed for national usage at the time of the sampling [2] indicating that the exposure is linked to other sources, not agricultural activities. Furthemore, Chlorpropham is a growth inhibitor used to treat vegetables (f.ex. potatoes, onions, garlic) against sprouting (applied after harvesting) and Pyrimethanil is a fungicide used to control grey mould fruit, vegetables and ornamentals pre- and postharvest on various crops. This study aims to identify the pesticide exposure linked to fruit and vegetable intake.

METHODS AND MATERIALS

To assess the role of intake of fruit and vegetables on pesticide exposure in Latvia, in 2020, 402 urine samples from children and their parents were gathered and analyzed in association with 24 h food diaries prior to urine sample collection. A suspect screening approach with full-scan High-Resolution Mass Spectrometry was used to detect pesticide mixtures in the samples. Fieldwork was done in two seasons (winter/early spring of 2020 and summer of 2020).

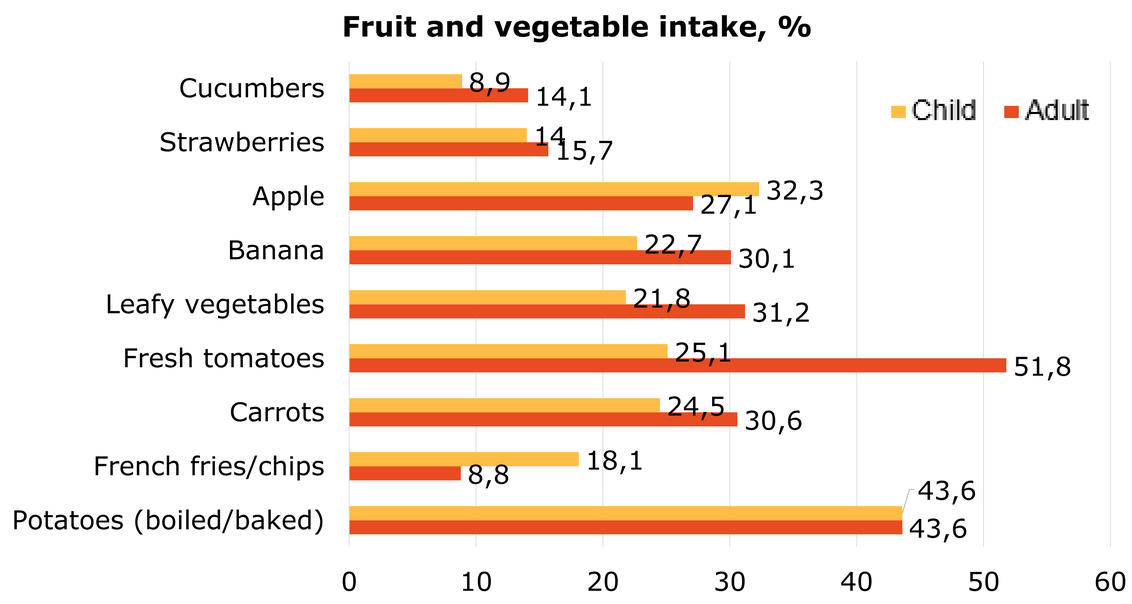
The association of the results on pesticide and their metabolite (Acetamiprid (N-desmethyl-Acetamiprid), Chlorpropham (Chlorpropham O-SO3) and Pyrimethanil (Pyrimethanil O-SO3) detection (detected/not detected) and fruit and vegetable intake (eaten in the past 24 hours prior urine sample collection/not eaten) were analysed using Pearson Chi-Square and Fisher`s exact tests.

This study focuses on the comparison between participants that reported not eating and eating produce that is not biological or homegrown, therefore respondents indicating biological or homegrown food intake were excluded from the data analysis.

All data was analysed using IBM SPSS Statictics (version 29.0.0.0).

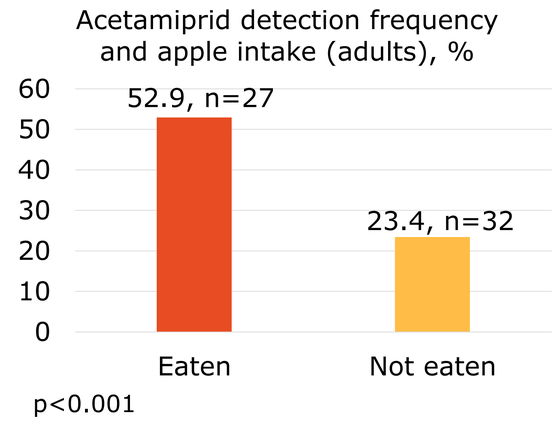
RESULTS AND CONCLUSIONS

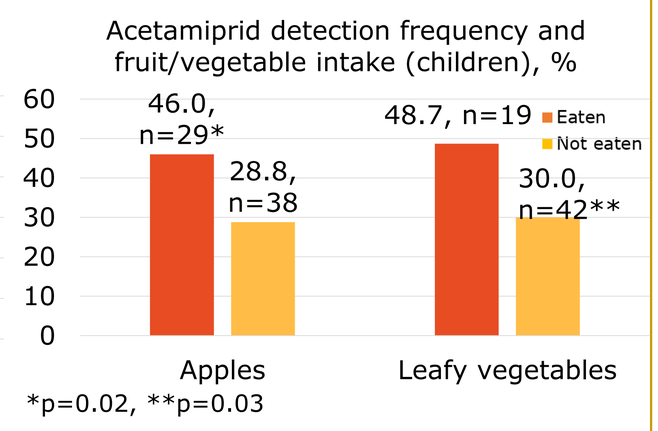
The most commonly eaten vegetables among adults and children were potatoes, carrots, fresh tomatoes and leafy vegetables, and fruit – banana, apples and strawberries. Below is the frequency of vegetables and fruit consumed (percentage from respondents that answered to this question):



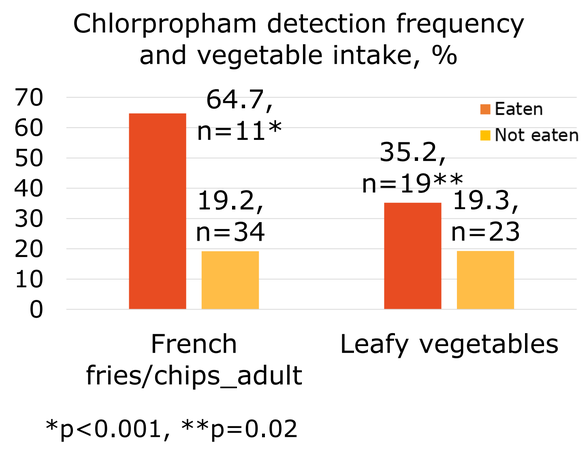
Further association analysis was carried out and the results of detected Acetamiprid, Chlorpropham and Pyrimethanil. Only results where differences between groups were statistically significant, are displayed in the following charts:

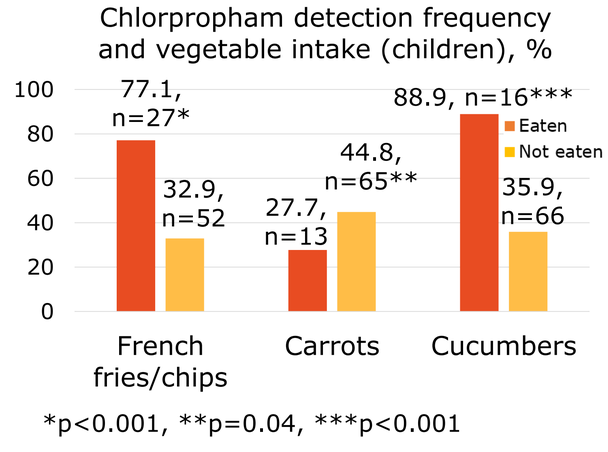
ACETAMIPRID



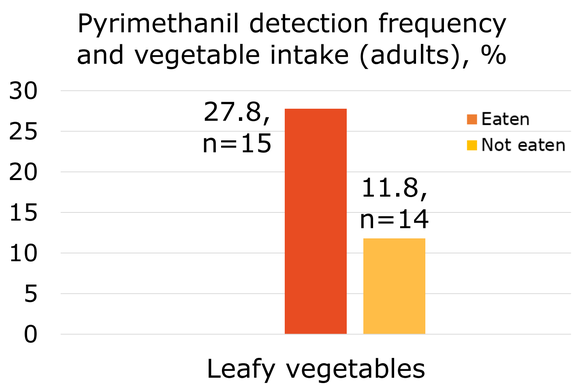


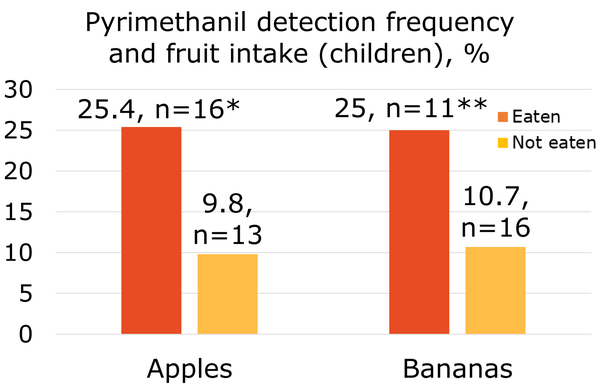
CHLORPROPHAM





PYRIMETHANIL





Despite not being registered and allowed for national use, pesticides Chlorpropham, Acetamiprid and Pyrimethanil are detected in urine samples of Latvian citizens. This indicates the need for national human biomonitoring programs to not only monitor substances that are registered and used nationally, but take into account other possible substances that are used in other countries. Results show that substance detection frequency is associated with fruit and vegetable intake. Acetamiprid and Pyrimethanil are systemic substances and both can penetrate the skin further into pulp and its removal might not be effective. Therefore the use of self-grown or biological produce consumption should be encouraged to lessen the exposure to pesticides.

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