

## CO1. ASSOCIATION BETWEEN ULTRA-PROCESSED FOOD CONSUMPTION AND SUSTAINABLE HEALTHY DIETS USING NOVA CLASSIFICATION AND SHED INDEX

**Bebiana Marques<sup>1</sup>; Margarida Liz Martins<sup>2,4</sup>; Margarida Ribeiro<sup>1</sup>; Maria Figueiredo<sup>4</sup>; Mariana Matias<sup>5</sup>; Sandra Abreu<sup>1,5,6</sup>**

<sup>1</sup> Research Centre in Physical Activity, Health and Leisure, Faculty of Sport, University of Porto

<sup>2</sup> Polytechnic Institute of Coimbra, Coimbra Health School

<sup>3</sup> GreenUPorto - Sustainable Agrifood Production Research Centre, Biology Department, Faculty of Sciences, University of Porto

<sup>4</sup> Centre for the Research and Technology of Agro-Environmental and Biological Sciences, University of Trás-os-Montes and Alto Douro

<sup>5</sup> School of Life Sciences and Environment, University of Trás-os-Montes and Alto Douro

<sup>6</sup> Laboratory for Integrative and Translational Research in Population Health

**INTRODUCTION:** High ultra-processed food (UPF) consumption is linked with negative impacts for both human and planet health. However, evidence on the relationship between UPF consumption and Sustainable Healthy Diets adherence is limited.

**OBJECTIVES:** To assess the association between UPF consumption and Sustainable and Healthy Diet (SHED) Index among Portuguese adults (aged 18-65 years).

**METHODOLOGY:** This cross-sectional study was a secondary analysis of data from a validation study carried out between October and December 2022 using a self-reported questionnaire administered by interview. Dietary intake was recorded using a semi-quantitative food frequency questionnaire validated for the Portuguese adult population and UPF were identified according to the NOVA classification. Sustainable Healthy Diets adherence were assessed using the SHED Index, a tool for measuring healthy dietary patterns and pro-sustainability behaviours, developed by Tepper *et al.* (2021). It was calculated the UPF proportion (%) in the diet by the ratio between the amount of food consumed from fourth NOVA group and the total weight of food and beverages consumed (g/d). The association between UPF proportion and SHED Index was evaluated through linear regression models, adjusted for sex, age, education level, urbanization degree and physical activity.

**RESULTS:** A total of 296 participants were included (36±16 years old; 31.4% men). Mean UPF proportion was 7.9% corresponding to 155 g/day. After adjustments, we found a negative association between UPF proportion and total SHED index score (B=-0.858, confidence interval (CI) 95%: -1.136, -0.580). Higher UPF proportion was also associated with lower Healthy Eating (B=-0.308, CI 95%: -0.390, -0.225), Sustainable Eating (B=-0.075, CI 95%: -0.140, -0.010), Ready-Meals (B=-0.176, CI 95%: -0.272, -0.080) and Soda (B=-0.266, CI 95%: -0.318, -0.214) sub-scores.

**CONCLUSIONS:** These findings suggest that a higher UPF proportion is inversely associated with SHED index score and sub-scores, highlighting the significant role of UPF consumption on diets sustainability and healthiness.

## CO2. TRENDS IN ULTRA-PROCESSED FOOD CONSUMPTION IN PORTUGAL

**Taíssa Pereira de Araújo<sup>1,2</sup>; Milena Miranda de Moraes<sup>2</sup>; Cláudia Afonso<sup>1,2</sup>; Sara Rodrigues<sup>1,2</sup>**

<sup>1</sup> Faculty of Nutrition and Food Sciences, University of Porto

<sup>2</sup> Laboratory for Integrative and Translational Research in Population Health - Institute of Public Health, University of Porto

**INTRODUCTION:** Broad changes in dietary and physical activity patterns are part of the concept of nutritional transition. A fourth nutritional transition has as main characteristic the change of consumption of processed foods for ultra-processed foods (UPF).

**OBJECTIVES:** This study aims to evaluate trends of UPF availability in the Portuguese population.

**METHODOLOGY:** Data from the Household Budget Surveys (HBS) conducted by the National Statistics Institute (INE) each 5 years within a national representative sample of households was obtained from DAFNE-Anemos Software. All the existing data sets were used: years 1990, 1995, 2000 and 2005. The food processing classification system used was NOVA. The percentage of UPF was calculated based on the total household daily amount of food and beverages available per capita (in grams).

**RESULTS:** As shown in table 1, between 1990 and 2005, the UPF availability increased from 3.9% to 13.8%. Over the years, with the exception of vegetables and added lipids, all other food and beverages categories increased its UPF availability contribution, mainly noticeable for milk products, sugar products, cereal products and meat products.

**CONCLUSIONS:** Increasing trends in UPF availability in Portugal were observed. At the same time, there is a trend towards a decrease in unprocessed availability and home-prepared foods. The Portuguese population should be made aware of the health risks resulting from excessive consumption of UPF.

**TABLE 1**

Trends in food availability in Portugal, using HBS data and NOVA classification System

YEAR	UNPROCESSED OR MINIMALLY PROCESSED FOOD (%)	PROCESSED CULINARY INGREDIENTS (%)	PROCESSED FOOD (%)	ULTRA-PROCESSED FOOD (%)
1990	68.0	4.1	24.0	3.9
1995	67.8	5.2	20.5	6.4
2000	66.0	4.7	19.1	10.2
2005	65.4	4.0	16.8	13.8

Note: Percentages calculated from total *per capita* household daily amounts of food and beverages availability (1990 - 1799 g, 1995 - 1659 g, 2000 - 1620 g and 2015 - 1518 g)

## CO3. CONSUMPTION OF ULTRA-PROCESSED FOODS THROUGHOUT CHILDHOOD AND ADIPOSITY TRAJECTORIES: DATA FROM THE GENERATION XXI BIRTH-COHORT

**Vânia Magalhães<sup>1,3</sup>; Milton Severo<sup>1,2,4</sup>; Sofia Vilela<sup>1,2</sup>; Duarte Torres<sup>1,2,5</sup>; Carla Lopes<sup>1,3</sup>**

<sup>1</sup> EPIUnit - Institute of Public Health, University of Porto

<sup>2</sup> Laboratory for Integrative and Translational Research in Population Health, University of Porto

<sup>3</sup> Department of Public Health, Forensic Sciences and Medical Education, Faculty of Medicine, University of Porto

<sup>4</sup> School of Medicine and Biomedical Sciences, University of Porto

<sup>5</sup> Faculty of Nutrition and Food Sciences, University of Porto

**INTRODUCTION:** Ultra-processed foods (UPF) consumption has been associated with worse health outcomes. However, the literature lacks robust longitudinal studies, particularly in young populations.

**OBJECTIVES:** To evaluate the relationship between UPF consumption throughout childhood and adiposity trajectories.

**METHODOLOGY:** Participants from the Generation XXI population-based birth cohort (Porto, Portugal) were included. Food frequency questionnaire items at 4, 7 and 10 years were classified according to the processing degree using the NOVA classification. To define groups of UPF consumption (grams) throughout childhood, a probabilistic Gaussian mixture model was applied using the 4203 participants with three assessments. As 79% of the total sample (n=8647) had information on at least one wave, trajectories were imputed to the remaining sample using naïve bayes To assess if the adiposity trajectories [body weight, height, body mass index z-scores (zBMI), waist circumference (WC)] depend on the UPF clusters, a mixed-effects model with linear and quadratic terms for age-adjusted for confounders (sex, birth weight, mother's pre-pregnancy BMI and education, and remaining food groups according to processing level) was used. For the outcomes, participants with at least one measurement at 4, 7, 10 or 13 years were included (nWeight=5227, nHeight=5183, nBMI=05047, nWC=5044).

**RESULTS:** Four UPF consumption clusters were identified: constant lower consumption (15.4%), constant intermediate consumption (56.4%), intermediate consumption at 4 and 7 years old and high at 10 years old (17.2%), and constant higher consumption (17.1%). Compared to the constant lower consumption of UPF, the constant higher consumption cluster was associated with greater acceleration in body weight ( $\beta$ : 0.123; 95% CI: 0.024;0.221), BMI ( $\beta$ : 0.013; 95% CI: 0.003;0.024), and WC ( $\beta$ : 0.221; 95%CI: 0.128;0.314).

**CONCLUSIONS:** High UPF consumption throughout childhood was associated with worse adiposity indicators. It is of high priority to define strategies to reduce UPF consumption and promote fresh/minimally processed foods.

## CO4. ASSESSMENT OF FOOD WASTE AMONG URBAN AND RURAL PUBLIC PRESCHOOL AND PRIMARY SCHOOLS IN THE MUNICIPALITY OF FARO

**Daiane Moura<sup>1</sup>; Ana Brito<sup>2</sup>; Ana Solá<sup>2</sup>; Cláudia Nunes<sup>3</sup>; Filipa Ferreira<sup>2</sup>; Inês Sousa<sup>1</sup>; Patrícia Grelha<sup>2</sup>; Duarte Vidinha<sup>3</sup>**

<sup>1</sup> School of Health, University of the Algarve

<sup>2</sup> Community Care Unit of Faro, Regional Health Administration of the Algarve

<sup>3</sup> Unit of Shared Care Resources of ACeS Central, Regional Health Administration of the Algarve

**INTRODUCTION:** School meals represent a challenge to the environment sustainability and are an opportunity to tackle food waste (FW). In this setting, FW plays a major role in children's healthy development since it can compromise their nutritional intake.

**OBJECTIVES:** To assess the FW, in the form of leftovers and plate waste, produced at lunchtime in preschool and primary school canteens located in the Municipality of Faro.

**METHODOLOGY:** In this cross-sectional study the FW was assessed during three non-consecutive days in five school canteens. The food produced and wasted were separated and weighed by aggregated components (soup, carbohydrate source, protein source and vegetables). Schools were stratified into urban or rural based on geographical location. FW was classified according to the result of the leftovers and plate waste indexes, using the categorisations of Vaz (2006) and Aragão (2005), respectively. Data collection was performed in December of 2022.

**RESULTS:** A total of 2751 meals were served during the study period (69% from urban area schools). The mean percentage of FW was high (45.2%), and the mean of leftovers and plate waste exceeded the acceptable limits (18.3% and 28.7%, respectively). The soup (32.7%) and vegetables (76.7%) presented the lowest and highest FW, respectively. Comparing the results according to schools'

location, it was found that the amount of plate waste was significantly higher in urban area schools when compared to the rural area schools (33.5% and 22.5%, respectively;  $p = 0.036$ ). Additionally, a higher production of leftovers was observed for vegetables in rural area schools ( $p=0.030$ ).

**CONCLUSIONS:** These results highlight the need to implement urgent corrective measures to reduce FW in schools from the Municipality of Faro. Particularly, future approaches should consider the training of canteen workers, menu improvement and promoting children's and their family's food consumption, especially with regard to vegetables food group.

## CO5. FERMENTEDVEGALGAE: LACTIC ACID FERMENTATION PROCESSES TO CREATE INNOVATIVE AND NUTRITIVE PRODUCTS FROM SURPLUS VEGETABLES AND MACROALGAE

**Ana Catarina Costa<sup>1</sup>; Maria Ramos<sup>4</sup>; Daniela Correia<sup>2</sup>; Mayumi Delgado<sup>3</sup>; Diogo Castelo Branco<sup>4</sup>; Diogo Figueira<sup>4</sup>; Anabela Raymundo<sup>1</sup>; Catarina Prista<sup>1</sup>**

<sup>1</sup> Linking Landscape, Environment, Agriculture and Food Research Center, High Institute of Agronomy

<sup>2</sup> MC Shared Services, S.A.

<sup>3</sup> Modelo Continente Hipermercados S.A.

<sup>4</sup> Mendes Gonçalves

**INTRODUCTION:** Fermentation works in symbiosis with sustainability in the food sector transforming non-valued raw materials otherwise discarded.

**OBJECTIVES:** FermentedVegAlgae project aims to create innovative and nutritive added-value products by fermenting surplus vegetables and macroalgae, following plant-based, low-salt and clean label trends.

**METHODOLOGY:** Six lactic-acid fermented prototypes were developed: two macroalgae sauerkraut (*Palmaria palmata* and *Alaria esculenta*) and four vegetable-based products, including a vegan fermented sauce and a spread. For vegetable fermentations, a consortium of 4 lactic acid bacteria (LAB) species, and salt concentrations between 0.3% and 2.0% were tested. Probiotic bacteria (*Bacillus coagulans*) addition after pasteurization was also tried. A consortium of LAB and yeast was used for macroalgae fermentations and ultrasonic pre-treatment was required. All the fermentations were performed at room temperature. To follow the fermentation performance, titrable acidity (%), total soluble solids (TSS) (°brix) and pH were evaluated. After the end of the fermentations, products were evaluated for total and soluble proteins and phenolic compounds, antioxidant capacity and shelf-life.

**RESULTS:** For vegetable fermentations, the most successful trials were obtained with 1% NaCl, achieving stable pH and titrable acidity after 21 days (3.37-3.54 and 1.35-1.76% lactic acid). In the case of macroalgae, ultrasonic pre-treatment allowed successful fermentations with 0.3% NaCl after 7 days. For *P. palmata*, final and stable pH and TSS were obtained (3.72 and 5.5 °brix), while *A. esculenta* fermentation stabilizes at 3.95 and 3 °brix. For both macroalgae, soluble protein increased after fermentation (*P. palmata* – 7.082 to 12.660 g/100 g, *A. esculenta* – 17.970 to 23.447 g/100 g fresh biomass). After 30 days, the pH and °brix remain stable at room temperature without pasteurization.

**CONCLUSIONS:** Fermentation by LAB consortium showed to be promising processes to obtain stable and gut friendly products, from less valued plant raw materials aligned with consumer demands.

## CO6. CHARACTERIZATION OF NEW MISOS PRODUCED FROM PORTUGUESE PULSES

**Rafaela Santos<sup>1</sup>; Mariana Mota<sup>1</sup>; Anabela Raymundo<sup>1</sup>; Catarina Prista<sup>1</sup>**

<sup>1</sup> Linking Landscape, Environment, Agriculture and Food Research Center, Instituto Superior de Agronomia, University of Lisbon