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The effect of sociodemographic factors on energy intake by time of day in the Italian over-50 population: a multilevel approach

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Chrononutrition studies the effect of timing, regularity and frequency of eating on body metabolism and health. Diurnal eating patterns may be obtained based on time-of-day and regularity and its association with health outcomes investigated in national representative samples^(1,2).

In this study we focus on the Italian population over 50 and we aim to study how their sociodemographic characteristics, such as sex, civil and professional status, geographical area of residence, affect their energy intake at different times of the day.

We used INRAN-SCAI national representative survey conducted in 2005/2006⁽³⁾, including sociodemographic information from questionnaires and 3-day-diet-diaries on 1317 over-50 subjects. The energy intake has been aggregated according to Italian dietary habits into 6 time-slots (6-9am/9am-12/12-3pm/3-7pm/7-10pm/10pm-6am). For each time-slot, we applied multilevel analysis including 3 levels (repeated measures within individuals, between individuals and due to specific sociodemographic strata), to estimate the respective components of intake variability. The third-level stratification resulted in 40 clusters based on sex, professional status, geographic region of residence and civil status. The study further applied multilevel analysis of individual heterogeneity and discriminatory accuracy (MAIHDA)⁽⁴⁾ to analyze how sociodemographic factors influence daily calorie intake, comparing two mixed effect models, one “null” model including also fixed effects of other potential confounders (age, smoking, alcohol, total intake) as well as the day of data collection, and one “main” model, which, additionally, included the main effects for the variables determining the strata.

In terms of fixed effects, results showed significant energy intake variations in energy at different time-slots, depending on the area of residence (on average 47 kcal less at breakfast and 164 kcal more at lunch in the South compared to North-West, $p < 0.001$) and data collection day (122kcal more at lunch on the third day falling in the weekend, compared to first day in the week, $p < 0.001$). Furthermore, people who worked (on average 29 kcal more at dinner) and those who didn't live alone (26 kcal more at lunch) tended to consume more calories during some main meal times while those living alone were more likely to have out-of-meal eating patterns (13 kcal more at afternoon and night snacking times).

MAIHDA demonstrated that only dinner and night times had an intersectional effect, i.e. 56% and 86% percent of their variability respectively was not explained by main effects and was therefore attributable to the interaction among sex, region, professional and civil status.

Our study offered a detailed description of how selected social and demographic factors were related to dietary behaviors held during the 24-hours. The findings are critical for crafting tailored nutritional advice to help mitigate the health threats faced by an aging population. The analysis will be extended to more recent survey samples of the Italian population, when available.

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