

by an additional 0.06 (95% CI, 0.04 to 0.08) kg/m<sup>2</sup>, 0.03 (95% CI, 0.01 to 0.05) kg/m<sup>2</sup>, 0.20 (95% CI, 0.11 to 0.28) kg and 0.17 (95% CI, 0.11 to 0.22) cm per year among those in the highest quintile of ultra-processed food consumption compared with their lowest quintile counterpart. Evidence of dose-response relationships were consistently observed with those in the two highest quintiles of ultra-processed food consumption showing significantly more rapid progression of body mass index, weight, and waist circumference.

**Conclusion** These findings provide important and novel evidence that higher consumption of ultra-processed foods is associated with more rapid progression of adiposity from childhood to early adulthood. Radical and effective public health actions that reduce children's exposure and consumption of ultra-processed foods and encourage greater consumption of minimally processed foods are urgently needed to counteract the growing burden of obesity in England and globally.

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### FRUIT AND VEGETABLES FISCAL POLICIES FOR REDUCING CARDIOVASCULAR MORTALITY AND RELATED INEQUALITIES: A MODELLING STUDY IN A LARGE SOUTHERN EUROPEAN URBAN POPULATION

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**Background** Fruit and vegetable (F&V) intake is an important modifiable risk factor for cardiovascular disease (CVD). Fiscal policies have been recommended to increase F&V consumption, but their potential impact on health and inequalities are not well described.

We therefore explored the potential benefits of five different fiscal policies on F&V consumption, CVD mortality and associated socio-economic inequalities in Madrid, Spain (total population ~6,700,000 residents).

**Methods** A modelling study using a comparative risk assessment approach.

We compared five policy options:

Option 1) reducing F&V Value Added Tax (VAT) from 4% to 0%;

Option 2) a F&V price discount of 10%;

Option 3) a targeted F&V subsidy of 50% for low-income families;

Option 4) a mass media campaign promoting F&V consumption, and

Option 5) The combination of Options 3 and 4.

We computed F&V intake, CVD deaths prevented or postponed (DPPs), and CVD mortality inequalities between quintiles of area-level socio-economic status (SES) in 2021–2035, compared to a no-intervention scenario based on observed trends in F&V intake and CVD mortality. We used estimates for price elasticities, pass-through of policies, and F&V effect measures from relevant sources. We conducted sensitivity analyses through 5,000 Monte Carlo iterations with wide margins using the statistical software R.

**Results** A combined mass media campaign and 50% targeted discount could prevent or postpone approximately 700 CVD deaths (95% UI: 50 – 1000) in 2021–2035, representing a 1% reduction in total CVD mortality. A 50% targeted discount alone might generate some 450 DPPs, (95%UI: 300 – 700), a 10% universal subsidy approximately 300 DPPs, (95% UI: 100 – 450), a mass media campaign some 200 DPPs, (95%UI: 150 – 400), and 0% VAT 100 DPPs, (95%UI: 50 – 200). Every option would modestly reduce socio-economic inequalities in CVD mortality, with the combined policy achieving the greatest reduction, approximately 10 DPPs/100,000 population between highest- and lowest-SES areas.

**Conclusion** Fiscal policies and mass media campaigns targeting F&V consumption applied singly, or ideally in combination, could reduce CVD mortality and decrease social inequalities in a large southern European urban population.

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### ESTIMATING GEOGRAPHICAL INEQUALITIES IN FRUIT AND VEGETABLE INTAKE IN LIVERPOOL, UK: A SPATIAL MICROSIMULATION APPROACH

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**Background** Individual-level data of health outcomes and their drivers are rarely available at a neighbourhood-level. While national-level surveys may provide insights at a regional scale, these data do not help us understand how complex problems such as poor diet affect communities within cities where policies can be leveraged for better health outcomes. Spatial microsimulation (SMS) can be used to approximate individual-level data for small areas. The aim of our study is to estimate small area fruit and vegetable intake for Liverpool (UK) to explore geographical inequalities in diet.

**Methods** Spatial microsimulation leverages individual level data and fits it to distinct spatial data. The fitting is based on selected constraint variables contained within both data sets. We perform the SMS using individual-level data extracted from the National Dietary and Nutritional Survey (2014–2018, n=2018) and aggregated data from 2011 UK Census at Lower Super Output Area (LSOA). Our outcome variable is daily servings of fruits and vegetables consumed. Constraint variables include age, sex, highest level of qualifications, self-reported health, and national statistics-socioeconomic classification. Constraints were chosen based on literature of key determinants of dietary predictors existing across both data sets. An iterative proportional fitting approach is executed in R to estimate fruit and vegetable intake for each LSOA. We use internal validation via model fit statistics and external validation through comparing estimates to an Eating Habits Survey (n=1724) with partial representation of Liverpool.

**Results** We estimated that 25% of adults aged 16 and up in Liverpool meet their daily recommendation of fruit and vegetable intake (5 or more servings), with 7% consuming fewer than 1 serving a day. Fruit and vegetable consumption was unevenly distributed across the city, with consumption of 5 or more servings ranging from 18% to 37%. There were higher levels of fruit and vegetable consumption among populations in the least deprived neighbourhoods with 35% meeting daily