Projecting the prevalence of obesity and alcohol-related non-communicable diseases in France from 2020 to 2030 using multi-risk microsimulation methods

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Introduction

Obesity is increasing across Europe, and together with alcohol consumption, is contributing to rising rates of chronic liver diseases. Quantifying the epidemiological and economic burden of obesity and alcohol-related conditions will provide evidence for appropriate interventions and policies to be implemented. This study develops an existing microsimulation model to account for body mass index (BMI) and alcohol as interacting joint risk factors to quantify the burden of liver diseases, stroke, and coronary heart disease (CHD), in France, from 2020 to 2030. The impact of hypothetical scenarios are quantified.

Methods

A validated multi-risk microsimulation model was employed [1]. A dynamic, representative virtual population of France was generated based on United Nations population data. Epidemiological and cost data for liver diseases, CHD, and stroke in France were extracted from published sources and databases. The morbidity, mortality, and costs of liver diseases, CHD, and stroke were projected to 2030 based on changing trends in alcohol consumption and obesity among adults (Figure 1). The illustrative impact of an annual 5% reduction in alcohol consumption, and an annual 1% BMI reduction was estimated as an optimistic, hypothetical scenario.

Table 1. Projected increase in cases by 2030

Disease	New cases by 2030
Liver cirrhosis	73,000
Chronic liver disease	61,000
Liver cancer	55,000
CHD	425,000
Stroke	550,000

Figure 1. Model schematic

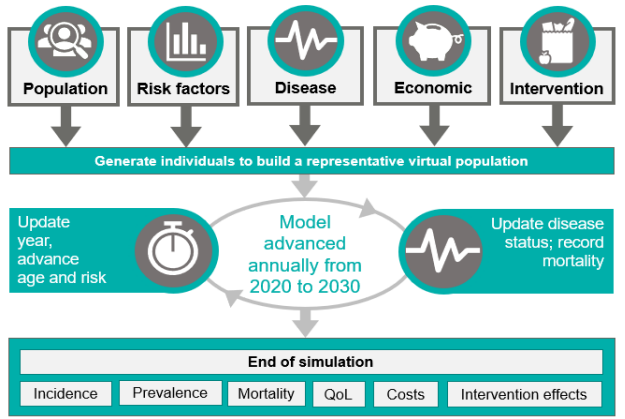
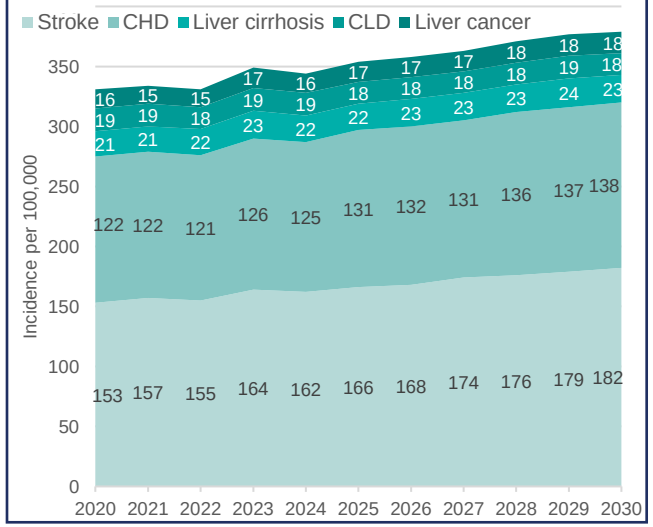


Figure 2. Baseline annual incidence projections



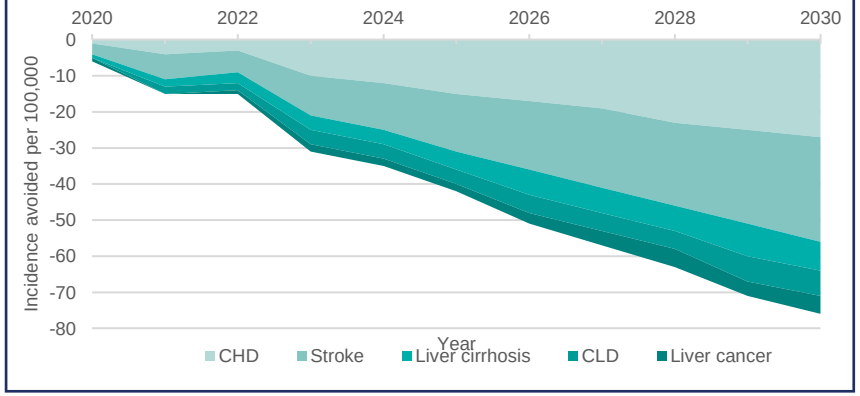
Results: Epidemiological Projections

BMI and alcohol projections. Obesity is projected to increase in men, from 17.8% to 27.3%; and women, from 19.3% to 31.3%, between 2020 to 2030 in France if no new policies are implemented. Static alcohol trends were used in the model, with approximately 31% of men and 14% of women drinking over 52.5 and 35 units of alcohol per-week respectively at population-level.

Baseline disease projections. As a result of trends in risk factors, our preliminary results forecast that there will be approximately 189,000 new cases of liver diseases and almost one million cases of CHD and stroke between 2020 and 2030 (Table 1; Figure 2).

Intervention disease projections. If France achieves a 1% annual BMI reduction and 5% annual alcohol consumption reduction, preliminary results show that France could prevent 16,000 cases of liver cirrhosis; 13,000 cases of CLD; and 9,000 cases of liver cancer. Furthermore, 57,000 cases of CHD and 51,000 strokes could be avoided between 2020 and 2030 (Figure 3). These reductions in disease incidence incur a gain of approximately 20,000 QALYs in the French population by 2030 compared to baseline.

Figure 3. Annual incidence avoided under scenario relative to baseline



Results: Economic Projections

The economic burden of liver diseases is expected to grow between 2020 and 2030, with preliminary results showing the direct healthcare costs of liver cirrhosis increasing by 5.3% to €3.5Bn; and liver cancer by 21% to €2.6Bn. The costs of CHD and stroke are projected to increase by 17% and 18% respectively. If France were to achieve the hypothetical BMI and alcohol consumption reduction, the country could save €1.5Bn by 2030 compared to the baseline scenario (Table 2). Under the intervention scenario, 160,000 and 120,000 hospitalisations from liver cirrhosis and liver cancer, respectively, could be avoided by 2030.

Table 2. Projected cost savings under the illustrative scenario (millions)

Disease	2025	2030
CHD	€104.25	€328.61
Liver cirrhosis	€196.05	€518.96
Liver cancer	€143.49	€376.67
Stroke	€82.63	€259.42

Conclusion

This microsimulation modelling study predicts increases in the incidence of liver diseases, CHD and stroke if current alcohol and BMI trends continue. Policy measures that reduce these risk factors in the French population could mitigate the expected increase in the health burden and costs of alcohol- and BMI-related non-communicable diseases.

[1] L. Pimpin et al [2018]. Estimating the costs of air pollution to the National Health Service and social care: An assessment and forecast up to 2035. PLOS Medicine 15(7): e1002602 DOI: 10.1371/journal.pmed.1002602

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