Quantifying the impact of policies

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What is already known on this topic

Priority of the problem: Empirical evaluations of the impact of policies may vary depending on the evaluation methods and their underlying assumptions. More systematic and transparent approaches will make evaluations more reliable.

Data availability: Policy evaluation has been hindered by data gaps, but the range and detail of available data is growing rapidly, opening the way to more sophisticated evaluations (e.g. scanner data from retailers and households).

Evaluation methods:
Experimental studies are often considered the gold standard in science, but their application to policy evaluation is not straightforward, especially when the aim is to generalize the finding to the wider population.

Observational studies are a desirable alternative and complement to experiments, but causal identification requires rigorous implementation of quasi-experimental methods and appropriate tests of their assumptions. The 2021 Nobel Prize in economic sciences was awarded in recognition of the relevance of these methods. They are not yet widely implemented in relation to nutrition and physical activity policies because some adjustments are necessary.

Simulation models open the way to capture the distribution of health and economic impacts, but have heavy requirements in terms of inputs and assumptions.

Fig. 1. The 2021 Nobel Prize in Economic Sciences for contributions that are key to policy evaluation

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What our studies add

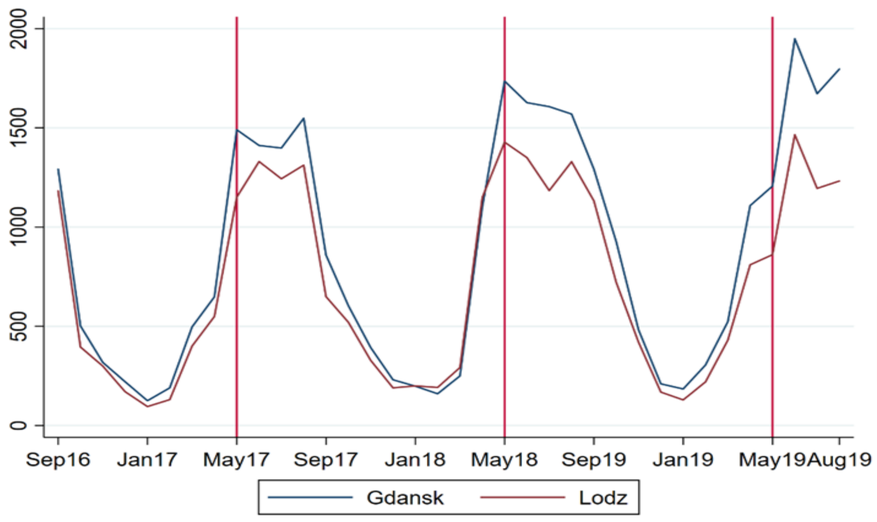

Fig. 2. Impact of the Gdansk Cycling May campaign

Review of evaluation methods
We have reviewed the assumptions, strengths and limitations behind the quantification of policy impacts using experiments[1], observational data or natural experiments[2], and complex simulation models[3,4].

Applications
We have implemented empirical applications on real policies and real data:

- Price and consumption effects of the Catalunya soda tax
- Cycling May campaign to promote cycling to school in Poland
- Evaluation of alternative nutritional labelling strategies in France
- SImulation of the effect of a price-changing sugar policy in Italy
- Vitamin-D fortification effects in Europe

Recommendations

Based on our research, we emphasize some priority directions for methodological research and empirical evaluations:

- Assumptions behind models must be transparent and credible. This implies rigorous testing and validation through recognized robustness/sensitivity checks;
- Nutrition and physical activity policies may act rapidly on behaviors, but the ultimate health effects may be delayed and only become apparent in the longer term. Methods based on experimental and observational data are powerful in identifying immediate behavioural effects, simulation models are a better tool to project these behavioral changes into health outcomes;
- The growing interest in personalized interventions, and the variability in individual compliance to interventions, call for the proper application of these methods to allow for variability in responses to policy, go beyond average policy effects, and consider the distribution of impacts across different population sub-groups;
- Multi-component lifestyle policies pose a major challenge in estimating the impact of individual measures. The joint application of quasi-experimental and simulation methods has the potential to generate new evidence on multi-component policies.

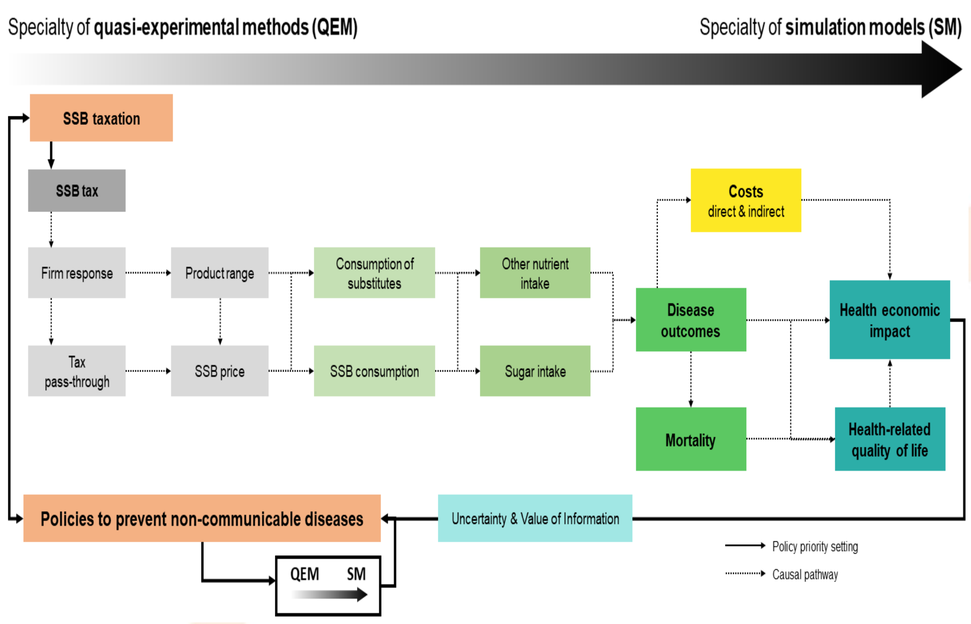

Fig. 3. PEN recommendations on the integration of quasi-experimental methods and simulation models

Literature references
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Summary

There is a growing demand for the credible estimation of policy impacts and evidence on the real-world effectiveness and cost-effectiveness of different population-based strategies addressing nutrition and physical activity.[1, 2] Yet, relative to drug trials and medical studies, public policies are hard to randomize and it is thus a challenge to control for confounding factors and behavioral biases.[3] Hence, quasi-experimental methods (QEM) using observational data for policy evaluation have become increasingly popular. Despite the availability of this quantitative toolbox, which is successfully applied in the social sciences, especially labor economics (see the 2021 Nobel prize in Economics, Royal Swedish Academy of Sciences, 2021), its application to identify causal effects of nutrition and physical activity policies on health outcomes is complex and potentially not fully exploited.[4] Because the policy-behavior-health causal link is probabilistic, delayed over time and the required data, particularly in the case of many confounding factors, may not be available, QEM cannot provide evidence on the long-term impact on health outcomes.[5] Consequently, mathematical disease simulation models (SM) projecting the long-term health and economic consequences are increasingly considered by scholars and policy makers.[6, 7]

Within the PEN project, we have reviewed different methodologies for the evaluation of nutrition and physical activity policies, their strengths and limitations, as well as their underlying general methodological assumptions. We have explored the potential and the limitations of the various methods through different reviews and applications, specifically:

- We conducted a laboratory and field experiments for the ex-ante assessment of policy impact through experimental methods, with an empirical case study comparing an “in vitro” and an “in vivo” experiments to assess the impact of alternative nutritional labelling strategies in France.[8]
- We produced a critical review on the application of quasi-experimental methods to evaluate the impact of nutritional policy with observational data[9]. The main methods were explored with two applications: the Catalunya soft drink tax[10], and the Cycling May campaign in Gdansk.[10]
- We conducted a scoping review on the implementation of simulation models.[7]
- An empirical framework for the evaluation of the indirect effects of policies was developed and applied to simulate the effects of agricultural and/or trade policies reform affecting the cost of raw sugar on prices and consumption of sugar-sweetened beverages in Italy.[11]
- We produced a simulation of the effect of vitamin D food fortification and/or supplementation on cancer mortality in Europe[12].

Based on the PEN work, we draw a selected list of key implications/recommendations for impact evaluation. QEM and SM have strengths and limitations as standalone frameworks to estimate the impact of nutrition and physical activity policies. We analyzed a selective list of critical elements and assumptions to be considered when implementing these methodologies and propose to synergistically combine QEM and SM to overcome their limitations. [13]

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