Using policy simulation games to better prepare epidemic-response strategies

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Introduction

Emerging infectious disease outbreaks require combinations of public-health countermeasures. However, these measures differ not only in their expected epidemiological impact, but also in their acceptability to the population. This study uses a Participatory Value Evaluation experiment to examine how individuals compose portfolios of countermeasures against different epidemic threats.

Objectives

1. To test a new method for eliciting public preferences: "Participatory Value Evaluation", which -by gamification- request respondents to simulate a policy decision task
2. To examine how individuals compose portfolios of countermeasures against different epidemic threats, once their expected epidemiological effects are accounted for

Method

Expert-based design. Countermeasures and epidemic scenarios were first identified using a RAND/UCLA Appropriateness Method. Experts identified four disease families and rated the appropriateness of candidate countermeasures for each scenario on a 1-9 scale. Three of these scenarios are presented in this poster.

Portfolio-choice experiment. We then designed preference-elicitation tasks in which respondents composed a portfolio of countermeasures to reduce projected hospital occupancy below a validation threshold. For each countermeasure, respondents could either exclude the measure or select a level of implementation. Each selected level had an experimentally varied marginal effect on hospital occupancy (sample representative of the French population, $N = 4166$)

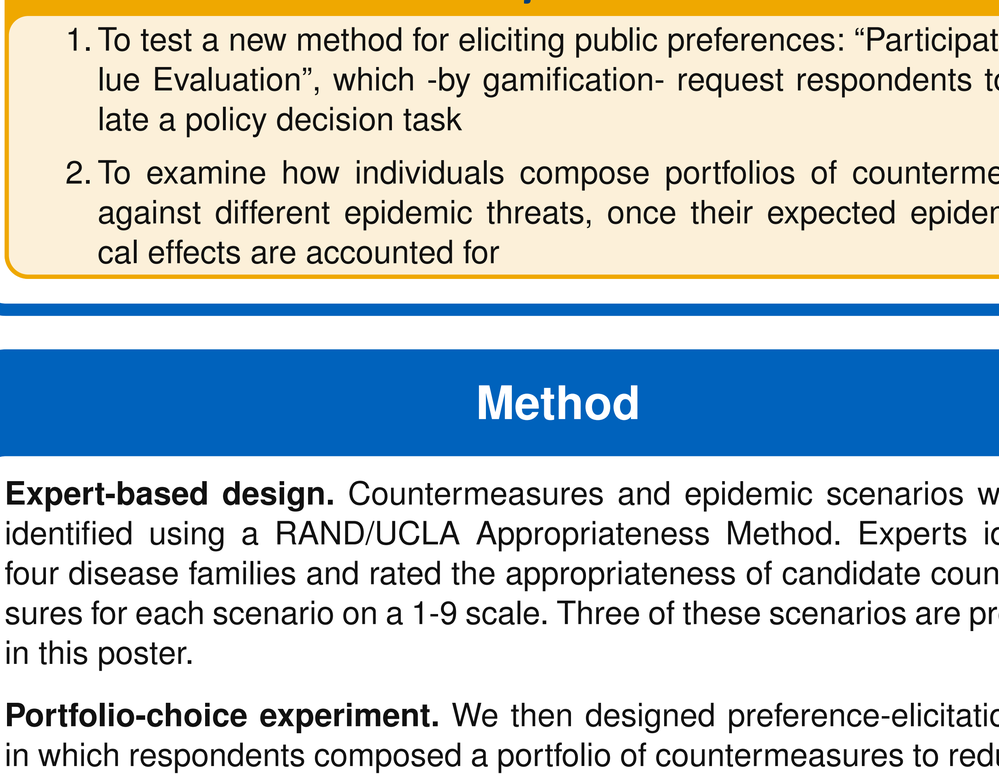

Figure 1 : Screenshot of a portfolio-choice task presented in the survey

Portfolio choice model. Multinomial logit portfolio choice models were estimated separately by epidemic scenario : $U_{ic} = \sum_{j=1}^{n} \beta_j x_{cj} + \sum_{a=1}^{3} \gamma_a s_c^a + \varepsilon_{ic}$ The coefficients β_j indicate how selecting a given countermeasure and level changes the utility of a portfolio, conditional on its expected effect on hospital occupancy.

Want to learn more ?

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← Scan for the simulation game, methods, supplementary results and contact information (*ADELF EPITER 26* tab)

Results : Preference estimates

Reading note

Points show estimated multinomial logit coefficients for each countermeasure level, with "not selected" as the reference category. Positive coefficients indicate countermeasures that increase the utility of a portfolio and are therefore more likely to be selected, conditional on expected hospital occupancy reduction.

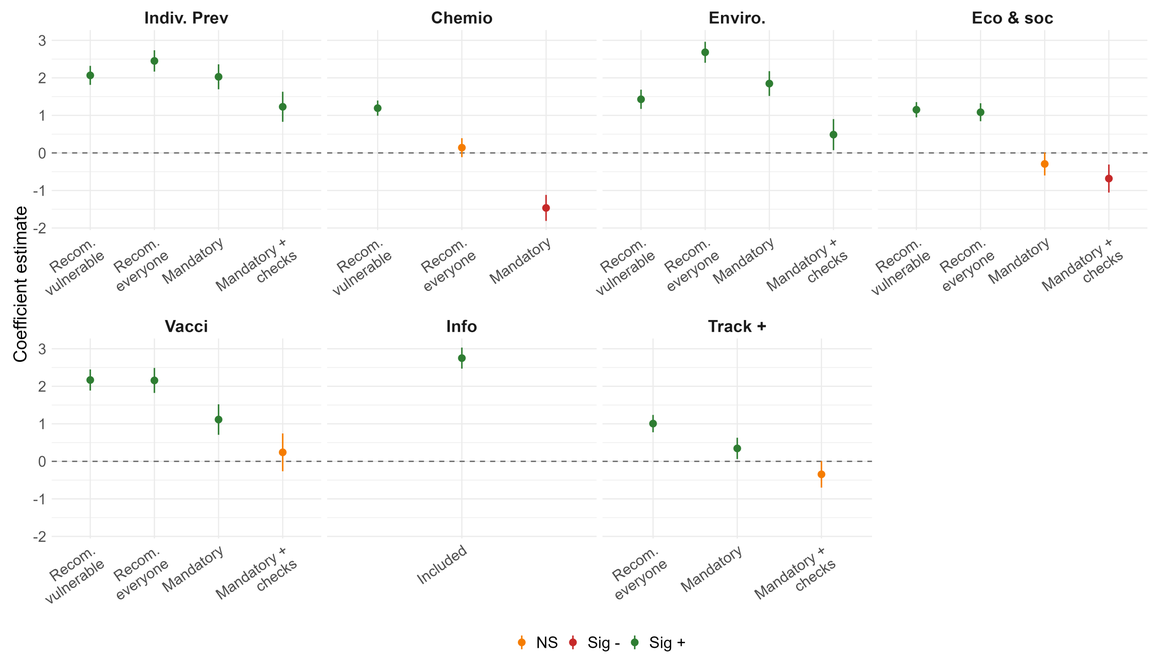

Figure 2 : Estimated preferences for countermeasures in the event of a **respiratory disease** outbreak

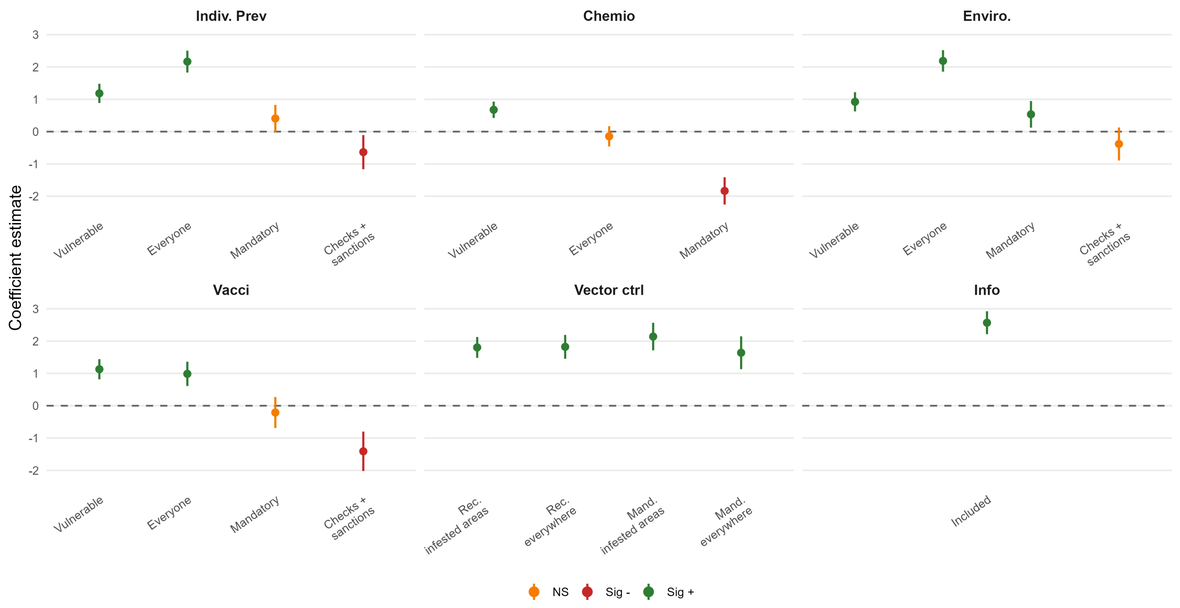

Figure 3 : Estimated preferences for countermeasures in the event of a **vector-borne disease** outbreak

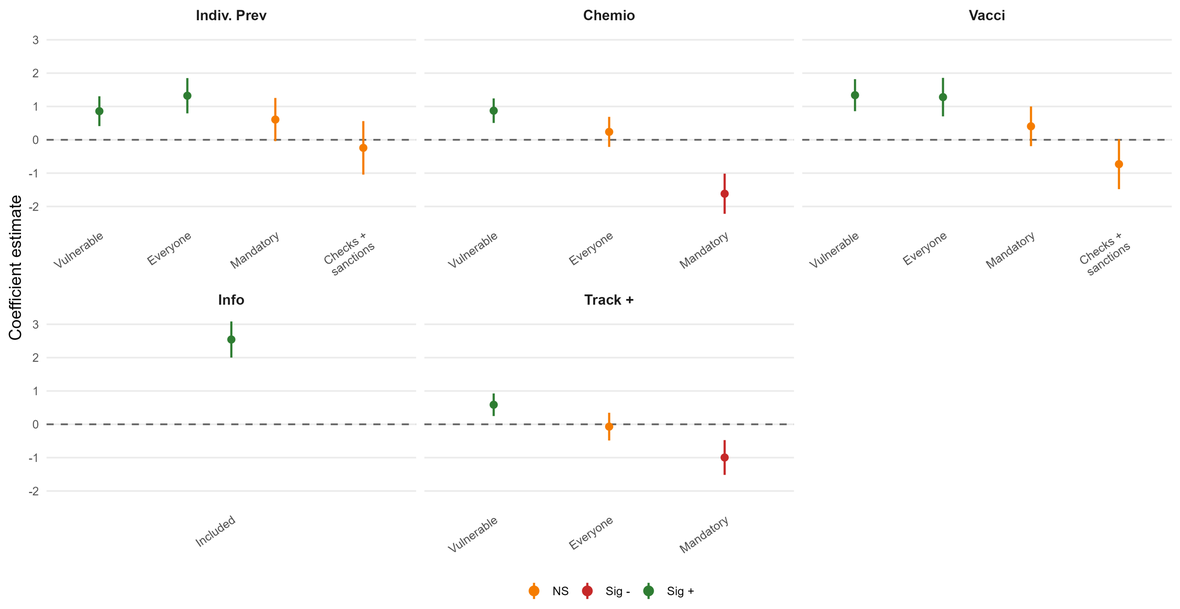

Figure 4 : Estimated preferences for countermeasures in the event of a **food- and water-borne** disease outbreak

Main takeaway

Public acceptability depends on the composition of the response package, not only on its expected epidemiological impact. **Implication :** preparedness strategies should combine epidemiological expertise with preference evidence to design epidemic-response packages that are both effective in real life and acceptable.