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nstitut national

Instituts thématiques Comparing the effectiveness of interventions in early life and in adulthood on health and social inequalities in health

Results of microsimulation models

Introduction: translation from research to policy



- Quantitative information is needed to fuel the debate and inform decision
- Health impact assessment models can help to obtain some quantitative information
 - Assess the potential impact of possible policies on population health, as well as on social inequalities in health
 - Policies defined according to rather broad characteristics
 - At different times during life
 - According to socio-economic position
 - Can include policies outside the institutional health sector

Objective



- To compare the effects of two main possible strategies
- 1. In childhood and adolescence
 - Intervention to reduce Adverse Childhood Experience (ACE)
 - Intervention to improve Education
 - or both
- 2. In adulthood
 - Intervention to modify health behaviours

For example : reduce smoking in adulthood

- Using:
 - Individual data from cohorts
 - Counterfactual models and causal assumptions
 - Interventions defined as a counterfactual modification of the level of exposure to the social factors under study, or to smoking





DATA	Outcome: potential effect on mortality
NCDS 58 cohort	- Mortality before 55 years old in men and women
GAZEL cohort	 Mortality before 65 years old in men Mortality before 60 years old in women

Counterfactual intervention which reduce by 50% the level of exposure to:



Methods (2) – Assumed causal model for the analysis of NCDS 58 cohort



Comparing the effectiveness of interventions in early life and in adulthood *Results of microsimulation models*



Comparing the effectiveness of interventions in early life and in adulthood *Results of microsimulation models*

Methods (4)

Outcome

• Relative differences in mortality

Analyses

- Stratified by sex
- In the whole population,
 - or in subgroups to assess social inequalities, according to
 - "parent's educational level" (NCDS 58)
 - "father's occupation" (Gazel)

Statistical method

- G-computation, to estimate the effect of "counterfactual stochastic interventions"
- R software (stremr package) and Stata





Results: Improving parent's education



NCDS 58

Gazel

Average decrease in mortality if an intervention reduces by 50 % parent's short educational level or father's manual occupation



Results: Reducing Adverse Childhood Experience

NCDS 58

Gazel

Average decrease in mortality if an intervention reduces by 50 % the exposure to ACE



Results:

Improving member's educational level

NCDS 58 Educational attainment (less than A level) **Gazel** Educational level (< tertiary school)

Average decrease in mortality if an intervention reduces by 50 % exposure to low educational level



Results: Reducing smoking



NCDS 58

Smoking at 33 years old

Gazel Current smoker at baseline (44 y.o.)

Average decrease in mortality if an intervention reduces by 50 % exposure to smoking



Results:

combined intervention in early life



NCDS 58

Reducing ACE and

improving member's edu. level

Average decrease in mortality if an intervention reduces by 50 % both exposure to ACE and exposure to low educational level



Not estimated

Results: social inequalities in health Lifepath

Effect on social inequalities, defined from parent's socio-economic position. In NCDS 58 cohort:



In Gazel, only very small differences according to father's occupation

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Discussion (1) – In summary



Common conclusions from NCDS 58 and GAZEL

Policies promoting interventions in early life

- on ACE and member's educational attainment in NCDS 58
- on member's educational attainment in GAZEL

might have about the same effect as policies promoting interventions on smoking for adults

- Stronger effects in men than in women
- Results observed in NCDS 58 only
 - Stronger effects of ACE, education, and smoking among members whose parents have low educational level
 - In Gazel = very small differences according to father's occupation

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Discussion (2) - Strengths



- Methods help to compare the potential long-term effect of different possible policies
- Based on
 - Real data from cohorts
 - More or less complex causal models, transparent communication of causal assumptions
- Comparison with other approaches
 - Markov models: versatile, but based on aggregated data
 - Attributable risks estimations: easier international comparisons, but more difficult to take into account complex causal structures

Discussion (3) - Limitations



- Cohorts are anchored in a specific context
 - the country, the regions
 - the historical time period
- Some methodological differences between the cohorts
 - Measurement error for ACE
 - Prospective *versus* retrospective
 - Underestimation of the association with prospective measure?
 - Under or overestimation with retrospective measures?
 - Gazel is a workers cohort
 - Example: larger proportion of « vocational school » regarding education level
 - Healthy worker bias?
 - Some baseline confounders can be missing
 - ⇒ Further work should include sensitivity analyses for confounding and measurement errors

Discussion (4) - Interpretation



- Replication of the results?
 - Both cohorts cannot be strictly compared
 - Measurement validity and error (example: ACE)
 - If some results are different, is it ...
 - ... because cohorts, methods, variables are different? examples: measure of parent's socioeconomic position healthy worker effect, prospective, retrospective measures
 - ... because of **uncertain**, **unstable results?**
 - Are estimations transferable from one context to the other?

Discussion (5) - Interpretation



These estimations give « what could be expected » = general policy objective

- by intervening on social characteristics early in life,
- or behaviours during adulthood

They do not give answers to more practical questions about the policy instruments that could be used

- What practical intervention, with a clear definition?
- What dimension associated to « educational level » are we targeting?
- How much of the exposure can be reduced?

Comparing different cohorts: toward a transferability of knowledge on interventions and policies?

Clarifying the distinction between key-function and context

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Conclusions



Based on these models:

Policies promoting interventions in early life on ACE and education...

- could have effects as large as the effects expected by interventions on smoking in adulthood
- could help to reduce social inequalities in health

Implementation and transfer of interventions have to be defined

- according to the context
- based on other complementary approaches