



**Open national SIMSAM meeting
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Panel discussion on Causal inference in register-based research

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Observational studies based on register data

Strengths:

- Total population
- No recall bias
- No reporting bias
- Complete follow-up

Weaknesses:

- Limited number of variables
- Left truncation
- Often complicated data structure
- Lack of documentation
- Confidentiality and permissions

Registers reflect clinical practice

Treatment for cervical dysplasia:

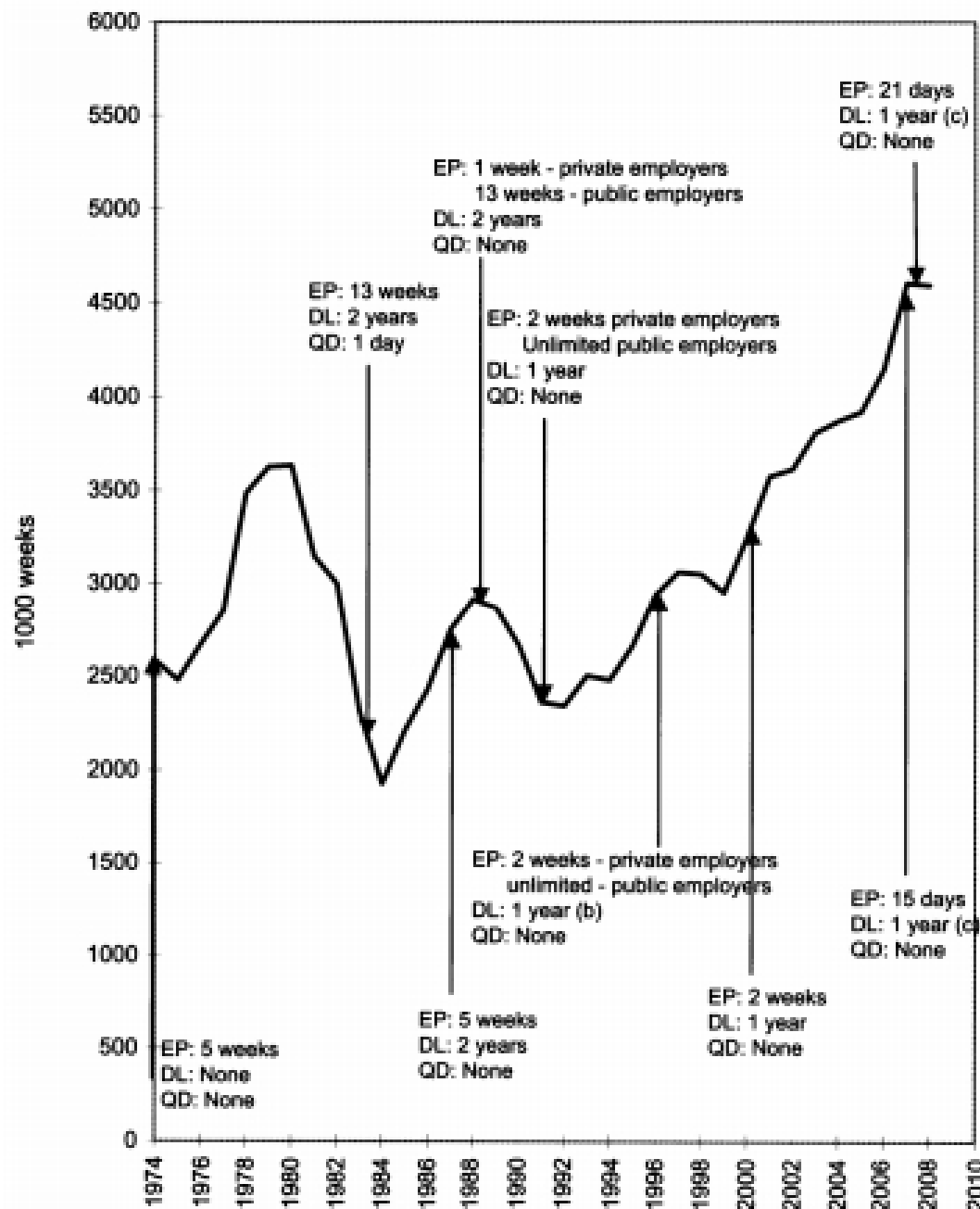
- Hysterectomy – hospital days required – 1977+
- Cold knife conization – hospital days required – 1977+
- LLETZ – no hospital days required – 1995+, BUT this can also be undertaken by private gynecologists

So, to get the full picture it is necessary to combine data from the National Patient Register and National Health Insurance Register

Registers reflect legislation

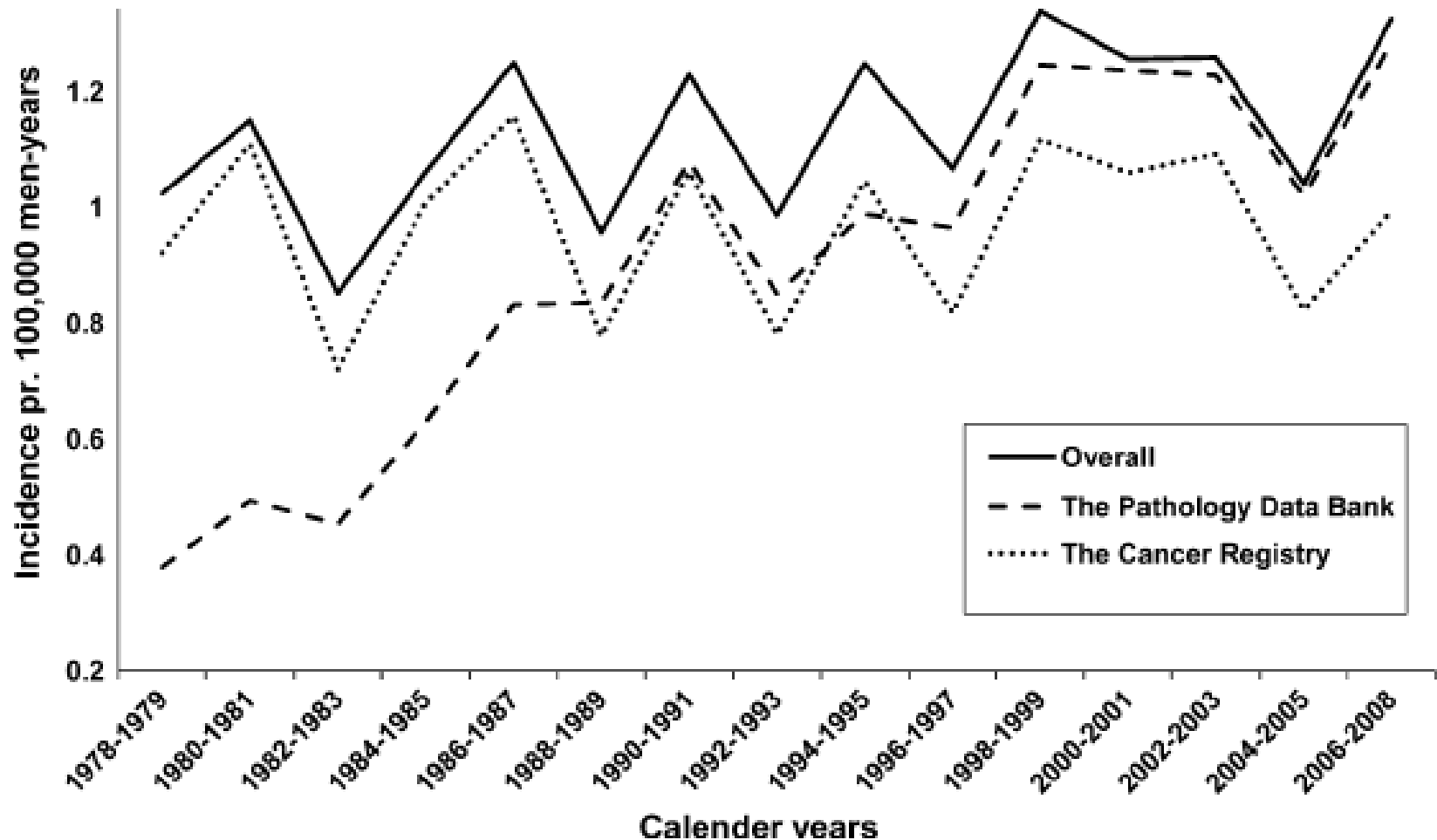
Number of weeks of sickness benefit reimbursement from municipalities in Denmark

Johansen et al, 2009



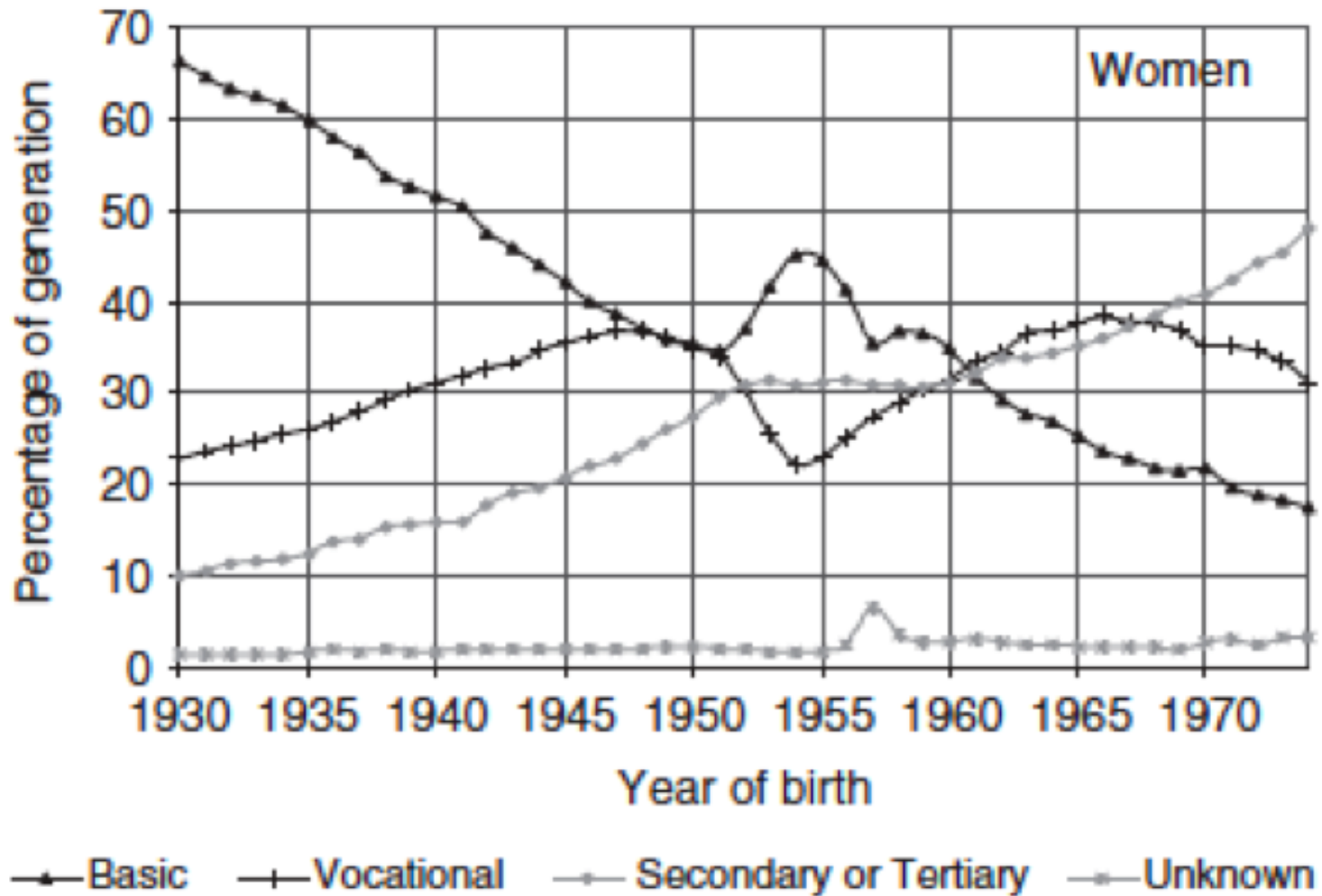
Registers are left truncated

Age-standardised incidence of penile cancer
in Denmark 1978-2008

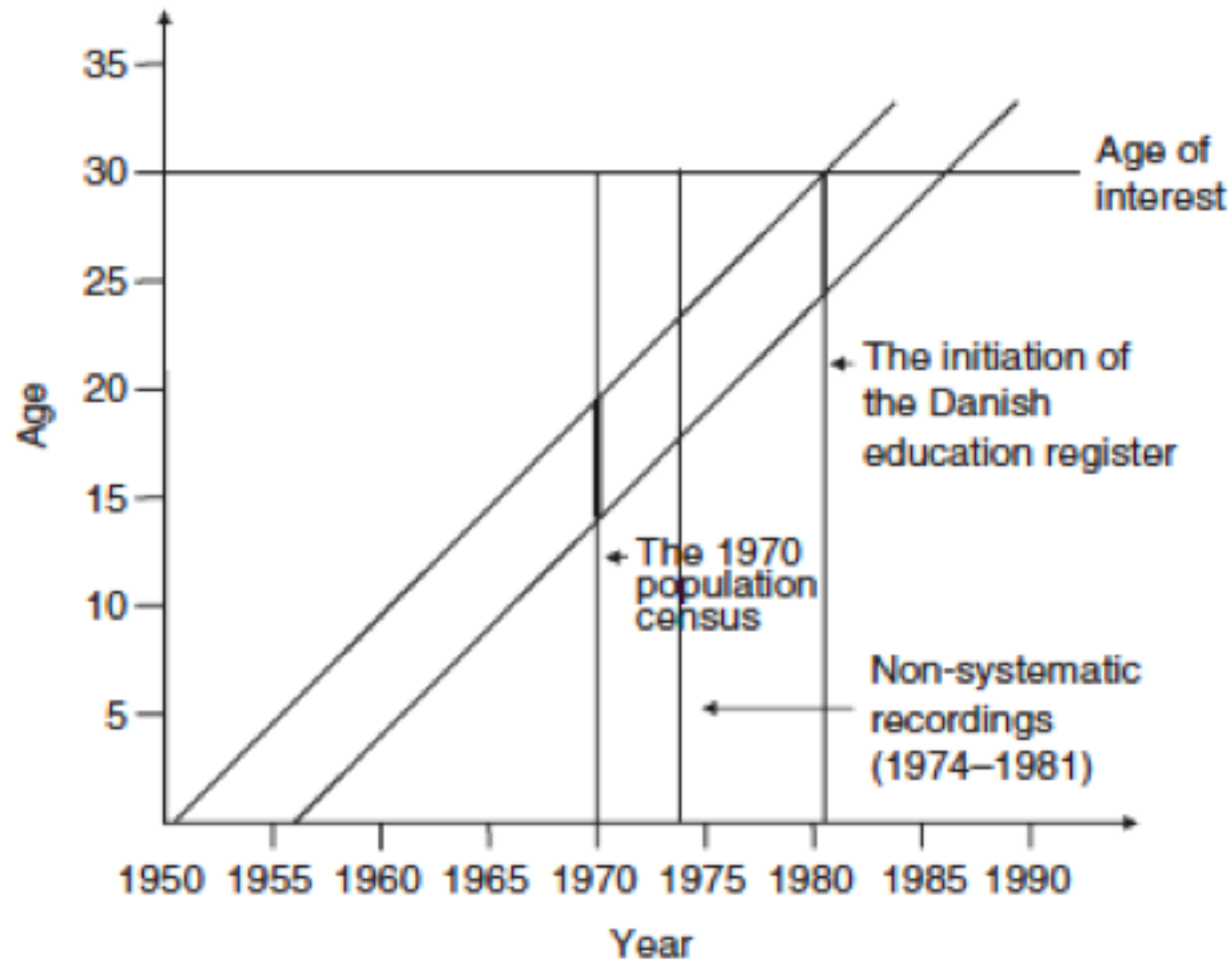


Registers reflect data sources

Births cohorts by level of education at age 30 in Denmark



Structure of education register in Denmark



Long-term outcome

Denmark had 17 years between first and last screened regions

	Before screening	During screening
Screening region (Copenhagen and Fyn)	Historical Control group	Study group
Non-screening region (Rest of Denmark)	Historical, regional control group	Regional Control group

RRR: ((Study group/Historical control group)/
(Regional control group/Historical regional control group))

Long-term outcome

Individual cohort data

	Copenhagen	Fyn
Reduction in breast cancer mortality		
- Invited women	25%	22%
- Screened women	37%	28%
Increase in breast cancer incidence*		
- Invited women	3.4%	0.7%
- Screened women	5%	1%

* With at least 8 years post-screening follow-up

Olsen et al, 2005; Njor et al, 2013; Njor et al, 2015

Association or causation?

Bradford Hill, 1965

1. Strength of the association
 2. Consistency – seen by others?
 3. Specificity
 4. Temporality
 5. Biological gradient – dose-response
 6. Biological plausibility
 7. Coherence – not conflict with existing facts
 8. “Experiment” – if exposure disappear?
 9. Analogy - similarity with other observations
- “No formal test of significance can answer those questions”

Hill AB. The environment and disease: association or causation? J R Soc Med 2015;108:32-37.

Thank you for your attention



Copenhagen Old Municipality Hospital, now part of University of Copenhagen