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ENRICHING THE HEALTH INTERVIEW SURVEY

Data4Research: innoverende datakoppelingen voor innoverend mortaliteitsonderzoek

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Enriching the health interview survey

Outline:

- Overview of the Belgian health interview survey (BHIS)
- Linkage 1: BHIS – census
- Linkage 2: BHIS – health insurance data
- Linkage 3: BHIS – overall mortality
- Linkage 4: BHIS – cause specific mortality
- Conclusions

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BHIS: main component of the health monitoring system

- Since 1997, the BHIS provides detailed information on specific health conditions, risk factors and socio-demographic characteristics of the population
- The significance of the BHIS as a source of epidemiological data has increased a lot with the subsequent surveys (2001,2004,2008,2013,2018)
- Linkage of BHIS with administrative data has significantly increased the utility of the BHIS as a source of epidemiological data
  - With census data
  - With insurance data
  - With mortality data

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Characteristics of the BHIS

- Selection of households from the National Register
  - Nationally representative sample
- Stratified sampling design to allow regional comparison
  - Net sample:+/- 10,000 individuals (5,000-6,000 households)
- Matched substitution of non-participating households (matched on statistical sector, age-group reference person, household size)
- Face to face (CAPI) and self completed (PAPI) questionnaire
- Domains: health status, health behaviours, medical consumption, environmental and social topics, socio-demographic background variables

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Linkage 1: HIS- census

- Census 2001 – Census 2011
  - Census 2001: compulsory postal survey (F2F if necessary), participation: 96.5%, topics: household structure, education, employment, health, environment, etc…
  - Census 2011: administrative census, solely based on existing registers, partially an update of Census 2001 data
- Linkage between BHIS2001 * Census 2001 and BHIS2013 * Census 2011
- Studies undertaken (a.o.)
  - Socio-economic differences in participation of households in a Belgian national health survey (Demarest et al., Eur J Public Health, 2013 Dec;23(6))
  - Reliability and validity of a global question on self-reported chronic morbidity (Van der Heyden et al., J Public Health, 2014, 22)
  - Does field substitution affect the socio-economic profile of the Belgian Health Interview Survey net sample? (Demarest et al., 2018, in preparation)

Example: Impact of field substitution

- Aim: To assess, based on linked BHIS-paradata and Census data (educational level), the impact of field substitution on the composition of the net-sample, in terms of the educational level.

- Conclusions:
  - Substitution does not impact the share of HH (according to educational level) in the net-sample
  - Substitution is associated with lower response-rates across the substitution stages
  - For all substitution stages, response rates follow a similar educational pattern

Educ.	Activated HH		Participating HH		Part. rate	Diff. low educ.	p value difference
	#	%	#	%			
Initial selected HH							
Low	2,129	42.3%	1,099	39.3%	51.6 %	-	-
Middle	1,461	29.0%	804	28.8%	55.1 %	+ 3.5%	0.0541
High	1,446	28.7%	892	31.9%	61.7%	+ 10.1%	<.0001
1st Substitute HH							
Low	980	43.7%	455	40.4%	46.4%	-	
Middle	655	29.2%	327	29.1%	50.0%	+ 3.6%	0.2325
High	607	27.1%	343	30.5%	56.5%	+ 10.1%	0.0020
2nd Substitute HH							
Low	477	42.6%	190	37.1%	39.9%	-	
Middle	327	29.2%	147	28.7%	45.0%	+ 5.1%	0.2217
High	317	28.3%	175	34.2%	55.3%	+ 15.4%	<.0001
3rd Substitute HH							
Low	260	42.8%	111	40.7%	42.7%	-	
Middle	182	29.9%	85	31.2%	46.9%	+ 4.2%	0.4906
High	166	27.3%	77	28.1%	46.3%	+ 3.6%	0.4765
4th- 7th Substitute HH							
Low	264	40.4%	128	37.3%	48.3%	-	
Middle	187	28.5%	102	29.8%	54.6%	+ 6.3%	0.2288
High	204	31.1%	112	32.9%	55.2%	+ 6.9%	0.2222
All activated HH							
Low	4,111	42.5%	1,983	39.3%	48.2%	-	
Middle	2,811	29.1%	1,466	29.0%	52.2%	+ 4.0%	0.0152
High	2,740	28.4%	1,600	31.7%	58.4%	+ 10.2%	<.0001

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Linkage 2: HIS-Insurance data

- Insurance data (hosted by IMA)
  - Covers > 99 % of population
  - Contains information on all medical acts and medicines reimbursed by the Belgian health insurance
  - Includes limited socio-demographic information
- Linkage BHIS 2008, BHIS 2013 based on national register number
  - +/_ 90% of the BHIS records could be linked
- Studies undertaken (a.o.)
  - Activity limitations predict health care expenditures in the general population in Belgium (Van der Heyden et al., BMC Public Health. 2015; 15: 267.)
  - Assessing the validity of self-reported breast cancer screening coverage in the Belgian health interview survey (Berete et al., in preparation)

Example: validity of self-reported breast cancer screening

- Aim: To assess the validity of self-reported information on breast cancer screening in the BHIS 2008, using IMA medical consumption data as a gold standard.

- Conclusions:

- Evidence of over-reporting in BHIS possibly due to:
  - Inconsistent screening period – reimbursement period
  - underestimation of the timeframe since the last exam (telescoping)
  - social desirability of responses

Subgroup	Reported (BHIS) % (95% CI)	Recorded (IMA) % (95% CI)	Report-to-record ratio (95% CI)
Overall	73.14 (69.5-76.7)	64.11 (60.2-68.0)	1.14 (1.07-1.21)
Age (years)			
50-59	75.36 (70.7-80.1)	66.15 (61.0-71.3)	1.14 (1.06-1.23)
60-69	69.98 (64.3-75.7)	61.23 (55.3-67.1)	1.14 (1.04-1.26)
Educational level			
Low	67.51 (60.8-74.2)	57.88 (50.9-64.8)	1.17(1.03-1.32)
Middle	71.38 (65.0-77.8)	63.21 (56.5-69.9)	1.13 (1.01-1.26)
High	79.40 (73.6-85.2)	70.26 (63.9-76.6)	1.13 (1.04-1.23)
Place of birth			
Belgium	73.54 (69.7-77.4)	64.18 (60.7-68.3)	1.15 (1.08-1.22)
EU countries	74.99 (61.8-88.1)	71.18 (58.0-84.3)	1.05 (0.83-1.33)
Non-EU countries	53.68 (38.5-68.9)	46.23 (27.8-64.6)	1.16 (0.81-1.66)
Region			
Flemish Region	71.89 (66.8-77.0)	64.53 (59.1-69.9)	1.11 (1.02-1.22)
Brussels Region	72.33 (65.8-78.9)	59.75 (52.5-66.9)	1.21 (1.05-1.39)
Walloon Region	76.10 (71.0-81.1)	64.23 (58.5-70.0)	1.18 (1.07-1.31)
Income category			
Low	66.43 (60.7-72.1)	57.51 (51.7-63.3)	1.16 (1.05-1.27)
High	81.51 (76.3-86.7)	73.38 (67.4-79.3)	1.11 (1.02-1.21)
Health status			
Good to very good	74.02 (69.8-78.2)	64.09 (59.5-68.7)	1.15 (1.08-1.24)
Very bad to fair	71.00 (64.0-78.0)	64.45 (57.2-71.7)	1.10 (0.98-1.23)

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Linkage 3: BHIS overall mortality

- Based on a (10 years) mortality follow-up of BHIS participants
- IDBHIS ⟹ IDNR ⟹ Vital status NR ⟹ IDBHIS
- Linkage successful for 95% - 97% of all BHIS records

- Studies undertaken (a.o.)

  - Does the association between smoking and mortality differ by educational level?(Charafeddine et al., Soc Sci Med. 2012, May;74(9))
  - The effect of smoking on the duration of life with and without disability, Belgium 1997-2011 (Van Oyen et al., BMC Public Health 2014,14:723)
  - Using mortality follow-up of surveys to estimate social inequalities in healthy life years (Charafeddine et al., Popul Health Metr. 2014, May 12)

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Example: mortality follow-up of surveys

- Aim: to assess the validity of using the mortality follow-up of surveys to monitor social inequalities in HLY in Belgium:

- Conclusions:
  - No statistically significant differences for each educational category between census- and survey-based HLY estimates
  - Differences between the highest and the lowest educational levels of survey-based estimates are comparable, yet larger, with census-based estimates

HLY by SES among men and women aged 25 years , Belgium Census, BHIS

	Census		BHIS		Census-BHIS	
Education	HLY	(95% CI)	HLY	(95% CI)	Difference	(p value)
Male						
Primary education	35.5	(33.5 – 37.6)	34.0	(30.4 – 37.5)	1.5	0.72
Lower secondary	36.6	(35.0 – 38.0)	36.6	(34.6 – 38.6)	-0.1	0.96
Higher secondary	41.8	(40.4 – 43.2)	43.1	(41.1 – 45.1)	-1.3	0.40
Higher education	42.8	(41.2 – 44.5)	43.5	(41.4 – 45.6)	-0.7	0.72
Difference H-L	7.3	(p< 0.01)	9.5	(p<0.01)		
Female						
Primary education	33.7	(31.3 – 36.0)	33.5	(30.8 – 36.2)	0.2	0.96
Lower secondary	41.3	(39.6 – 43.0)	40.9	(39.0 – 42.9)	0.4	0.82
Higher secondary	42.0	(39.9 – 44.0)	42.1	(397 – 44.4)	-0.1	0.97
Higher education	48.6	(46.3 – 50.8)	49.8	(46.9 – 52.6)	-1.2	0.73
Difference H-L	14.9	(p<0.1)	16.3	(p<0.01)		

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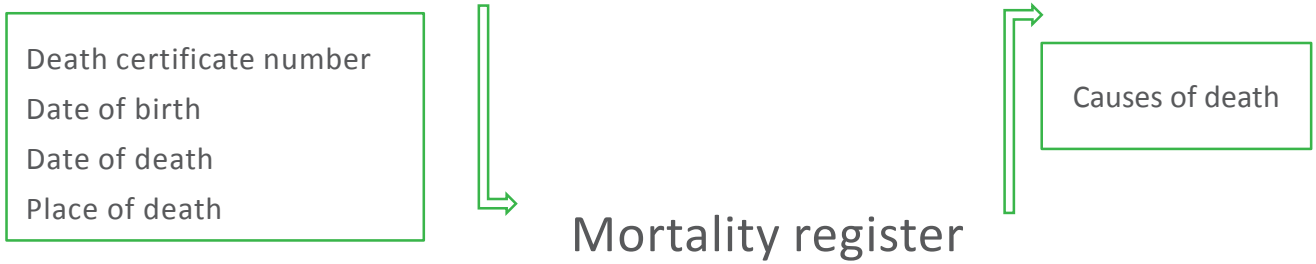
Linkage 4: BHIS and cause-specific mortality

- Based on a (10 years) mortality follow-up of the BHIS participants
- ID_{BHIS} ⟹ ID_{NR} ⟹ Vital status NR



- Studies undertaken (a.o.)
  - Contribution of chronic conditions to smoking difference in life expectancy with an without disability in Belgium (Yokota et al., Eur J Public Health. 2018 Oct 1;28(5))

Example: Contribution of chronic conditions to smoking difference in life expectancy

- Aim: To assess the contribution of smoking to the burden of diseases on disability and mortality

- Conclusions:
  - LE in both men and women is higher in never smokers
  - DFLE in both men and women is higher in never smokers
  - Difference mainly due to differences in mortality, to a lesser extent to differences in disability prevalence

Smoking differences in life expectancy (LE), disability-free LE (DFLE) and LE with disability (LED) at age 15, and contribution of mortality and disability by gender, Belgium, BHIS

	LE (years)	DFLE (years)	LED (years)
(A) Men daily smoker	57.7	51.3	6.4
(B) Men never smoker	66.5	59.8	6.7
Difference (A – B)	8.8	8.5	0.3
Decomposition by kind of effect			
Mortality contribution	8.8	6.2	2.6
Disability contribution	0	2.3	-2.3
(A) Women daily smoker	64.0	54.3	9.7
(B) Women never smoker	69.9	58.6	11.3
Difference (A – B)	5.9	4.3	1.6
Decomposition by kind of effect			
Mortality contribution	5.9	3.0	2.9
Disability contribution	0	1.3	-1.3

Higher age-adjusted mortality rates in smokers due to:
- **Lung/larynx/trachea cancer**
- **Ischaemic heart diseases**
- **Chronic respiratory diseases**

Highest age-adjusted contribution of chronic conditions to the disability prevalence in smokers:
- **Musculoskeletal conditions**
- **Chronic respiratory diseases**
- **Ischaemic heart diseases**

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Conclusions

- Data linkage has a promising future, but…
  - Considerable administrative procedures to obtain permission for linkage
  - Consequences GDPR for future linkages
  - Actualisation administrative census?

Thanks to Statbel colleagues for their continuous ‘linking efforts’!

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