
MONITORING SOCIAL INEQUALITIES IN CANCER SCREENING USING THE SWISS HEALTH INTERVIEW SURVEY

Vladimir Jolidon & Stéphane Cullati

#Pop
Health
Lab

UNI
FR
■

Population Health Laboratory (#PopHealthLab), University of Fribourg

PLAN

- Population-based cancer screening
 - Screening participation & inequalities
 - Screening programmes
- Swiss Health Interview Survey
- Studies on inequalities in cancer screening participation

POPULATION-BASED CANCER SCREENING

Cancer screening guidelines have recommended **population-based** screening for:



Cervical cancer

**gynécologie
suisse**



Breast cancer

**swiss
cancer
screening**



Colorectal cancer

= Systematic screening of asymptomatic individuals/ populations
Screening as secondary prevention

**European Council
recommendations (2003)**



**AGAINST
CANCER**

**Cancer Screening in
the European Union (2017)**

POPULATION-BASED CANCER SCREENING

Cancer screening guidelines have recommended **population-based** screening for:



Cervical cancer

21-70 y/o women
every 3 years



Breast cancer

50-69 y/o women
every 2 years



Colorectal cancer

50-69 y/o men & women
every 2 years

INEQUALITIES IN CANCER SCREENING PARTICIPATION

Past research...

- **Lower socioeconomic status**
 - Education level
 - Income
 - Occupation status



Lower cancer screening participation



- **Inequalities** in cancer screening participation across and within European countries were evidenced

METHODOLOGY – STATISTICAL ANALYSES

Using regression models...

Predictors of interest / control variables:

- **Education / income level**
- Employment status
- Marital status, living with a partner
- Age
- Perceived social support
- Rural/ urban
- Doctor visit, health status



Outcome variable:

Cancer screening uptake



SWISS HEALTH INTERVIEW SURVEY (SHIS): CANCER SCREENING QUESTIONS

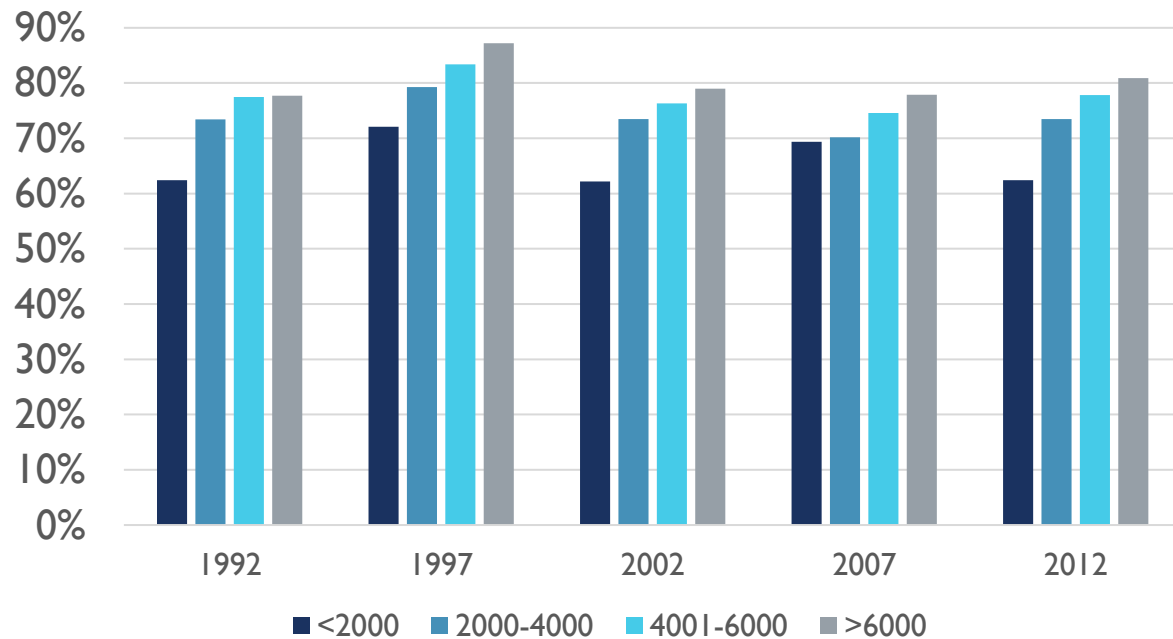
	1992	1997	2002	2007	2012	2017	2022
Mammography Women >20	✓	✓	✓	✓	✓	✓	✓
Pap Smear Women >20	✓	✓	✓	✓	✓	✓	✓
FOBT / Colonoscopy	N/A	N/A	N/A	✓	✓	✓	✓
Prostate Men > 40	✓	✓	✓	✓	✓	✓	✓
Skin	N/A	✓	✓	✓	✓	✓	✓

SHIS: CANCER SCREENING PARTICIPATION

Variable	1992-1997	2002-2012	2017	2022
1) Ever screening	Have you ever done a...?	Have you ever done a...?	Have you ever done a...?	Have you ever done a...?
2) Screening within recommended period	When was the last time you had...? Month: _____ Year: _____ - Do not know - Did not answer	When was the last time you had a...? Month: _____ Year: _____ - Do not know - Did not answer	When was the last time you had a...? Month: _____ Year: _____ - Do not know - Did not answer	When was the last time you had a...? 1 – In the last 12 months 2 – 1 year ago to less than 2 years ago 3 – 2 years ago to less than 3 years ago 4 – 3 years ago to less than 5 years ago 5 – 5 years ago or more
		If the person does not answer or does not remember the date... Was it: 1 – In the last 12 months	If the person does not answer or does not remember the date... Was it: 1 – In the last 12 months 2 – 1 year ago to less than 2 years ago 3 – 2 year ago or more	

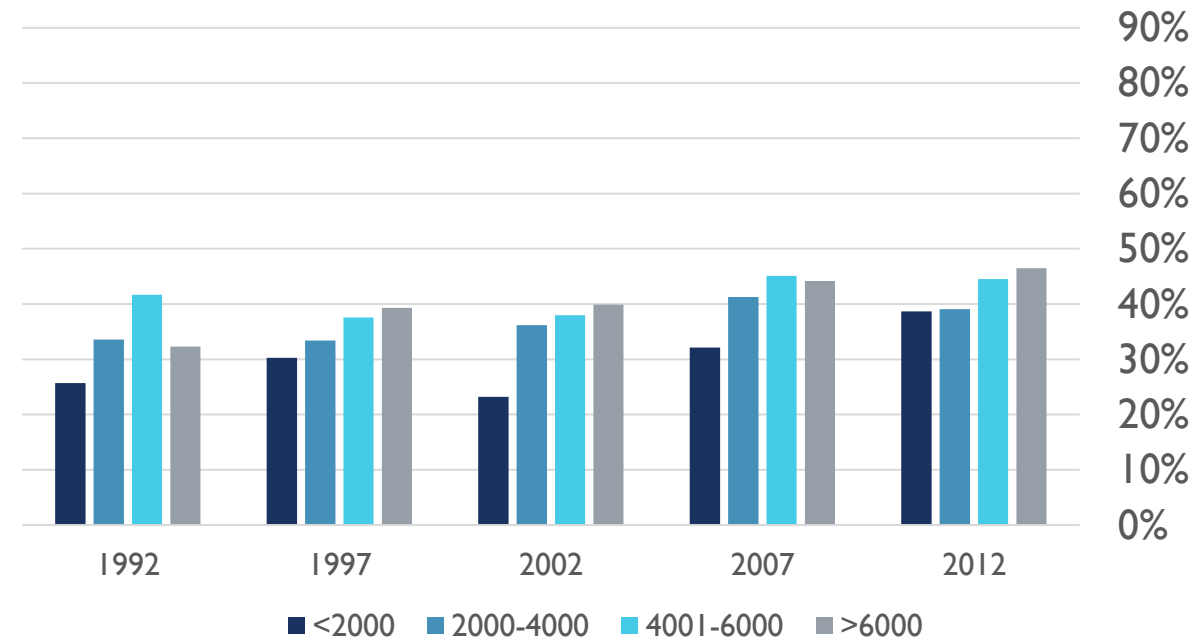
SOCIAL INEQUALITIES IN CANCER SCREENING (SHIS 1992-2012)

Cervical cancer screening
(women aged 25-70)



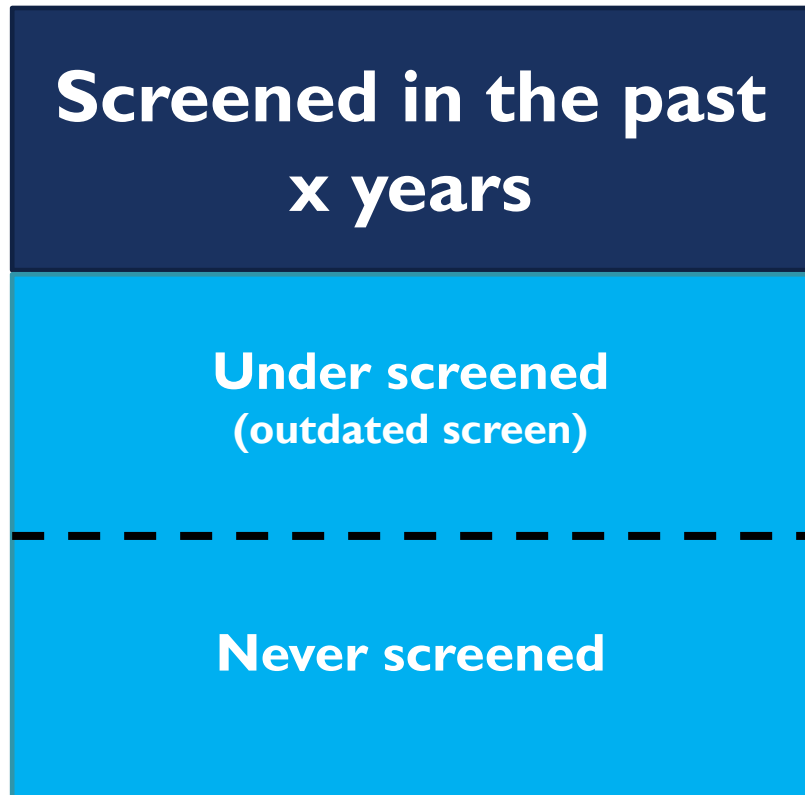
Burton-Jeangros et al, *Eur J Public Health* 2017

Prostate cancer exam in the past two years
(men aged 50+)



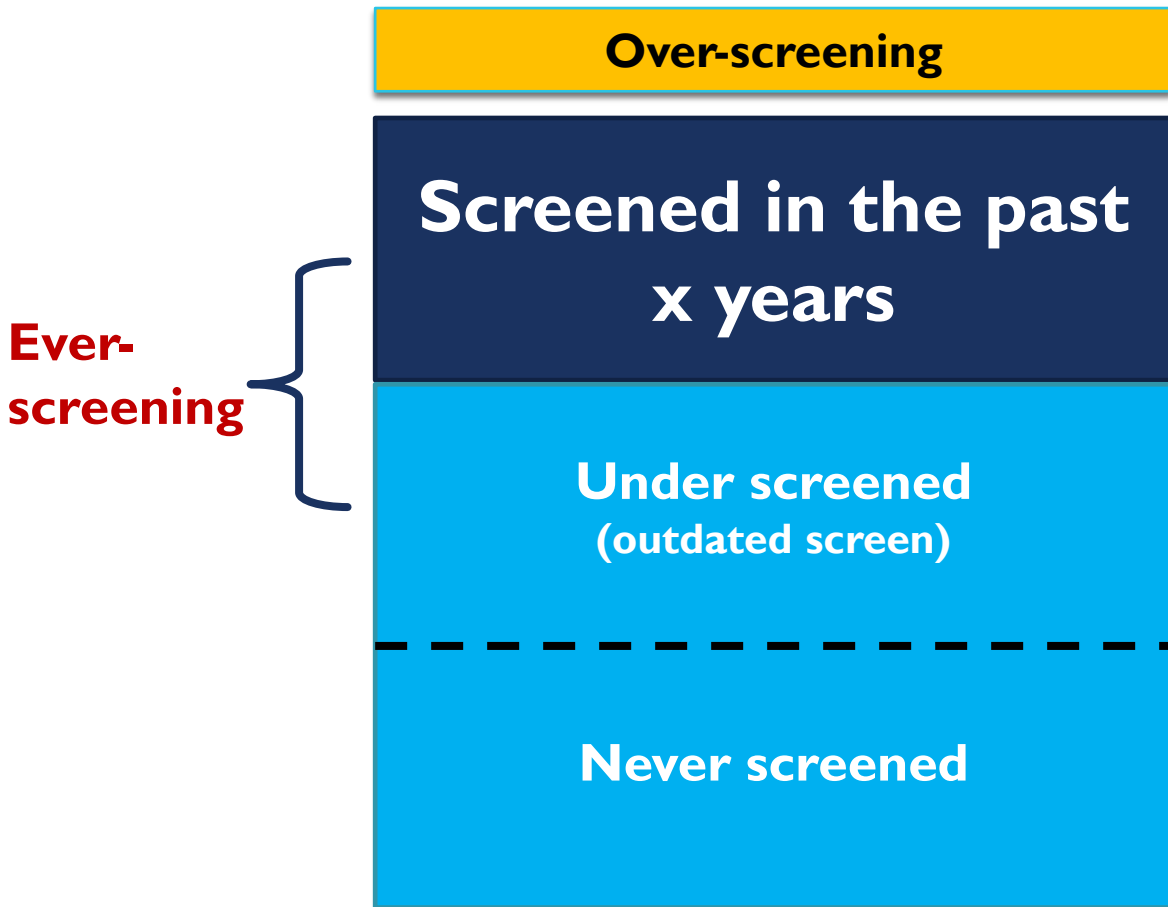
Guessous et al. *Prev Med* 2016

SCREENING PARTICIPATION OUTCOMES



Studies usually focus on screening within the **recommended period** (“up-to-date screening”)

SCREENING PARTICIPATION OUTCOMES



De Prez V, et al. Cervical cancer **(over) screening** in Belgium and Switzerland: trends and social inequalities. European journal of public health. 2020 Jun 1;30(3):552-7.

Few studies have considered other screening outcomes

e.g. **never**, **under**, **over-screening**

INEQUALITIES IN NEVER SCREENING (SHIS 1992-2017)

	<u>Pap smear</u>	<u>Mammography</u>
	<u>APR</u>	<u>APR</u>
Education (ref. primary)		
Upper secondary	0.72***	0.89**
Tertiary	0.62***	0.93
Employment (ref. employed)		
Out of labour force	1.03	1.01
Unemployed	1.11	1.05
Income (ref. 1st quintile)		
2nd quintile	0.85***	0.87**
3rd quintile	0.85***	0.84***
4th quintile	0.81***	0.84***
5th quintile	0.77***	0.78***
Age (ref. 20-29)		
30-39	0.59***	
40-49	0.43***	
50-59	0.38***	(ref.)
60-70	0.49***	0.94
Living in couple	0.70***	0.81***
Living w/ children	0.73***	1.10
Rural (ref. urban)	1.11**	1.19***
Foreigner (ref. Swiss)	1.59***	0.99

NEVER screening was...

- lower among higher **incomes**
- followed a **gradient** (higher income, less never screened)
- lower among 'living in **couple**'
- higher among 'living in **rural** areas'

APRs: < | negative association; > | positive association

*** p<0.001 **p<0.01 *p<0.05

INEQUALITIES IN UNDER SCREENING (SHIS1992-2017)

	<u>Pap smear</u>	<u>Mammography</u>
	<u>APR</u>	<u>APR</u>
Education (ref. primary)		
<i>upper secondary</i>	0.94	0.94
<i>tertiary</i>	1.01	0.99
Employment (ref. employed)		
<i>out of labour force</i>	1.09*	1.00
<i>unemployed</i>	0.86	0.89
Income (ref. 1st quintile)		
<i>2nd quintile</i>	0.95	0.93
<i>3rd quintile</i>	0.9	0.95
<i>4th quintile</i>	0.79***	0.91
<i>5th quintile</i>	0.77***	0.91
Age (ref. 20-29)		
<i>30-39</i>	1.77***	
<i>40-49</i>	3.11***	
<i>50-59</i>	4.72***	(ref.)
<i>60-70</i>	7.40***	1.14***
Living in couple	0.93	0.99
Living w/ children	0.91	0.99
Rural (ref. urban)	1.19***	1.05
Foreigner (ref. Swiss)	0.99	0.95

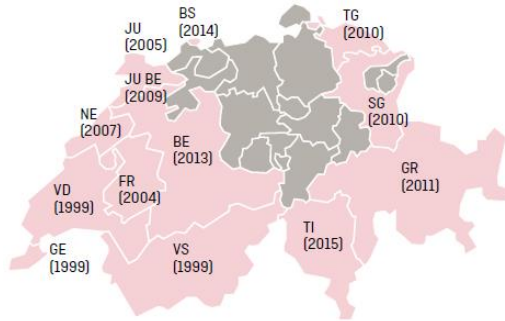
UNDER screening was...

- higher among **older age** groups in both tests
- increases with age (Pap smear)

Less socioeconomic inequalities among UNDER-screeners, compared to NEVER-screeners

UNDER: screened at least once = more acquainted with prevention
NEVER: barriers to undertake a very first screen

ORGANISED (PROGRAMME) / OPPORTUNISTIC SCREENING



Screening programmes send invitation to target population



"ORGANISED" screening



No screening programme in Switzerland

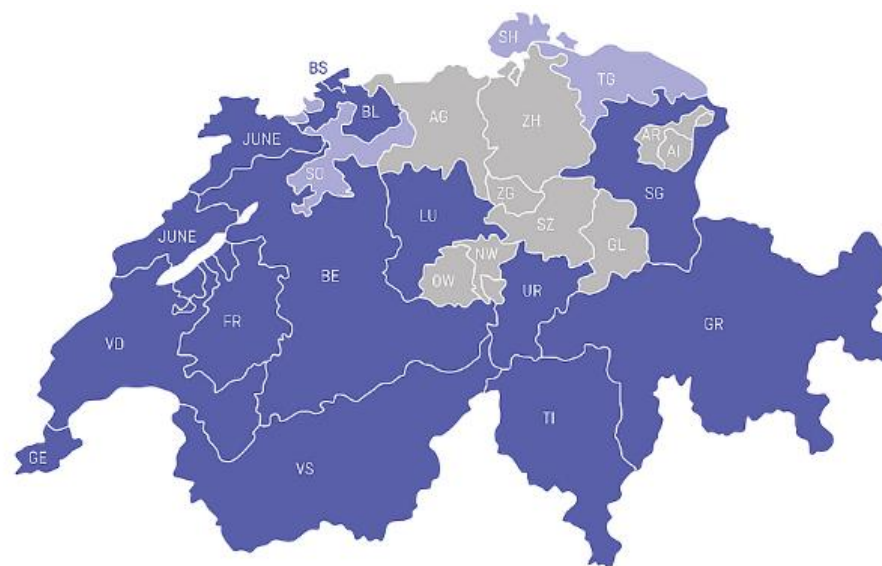


Individual initiative & doctors' recommendation



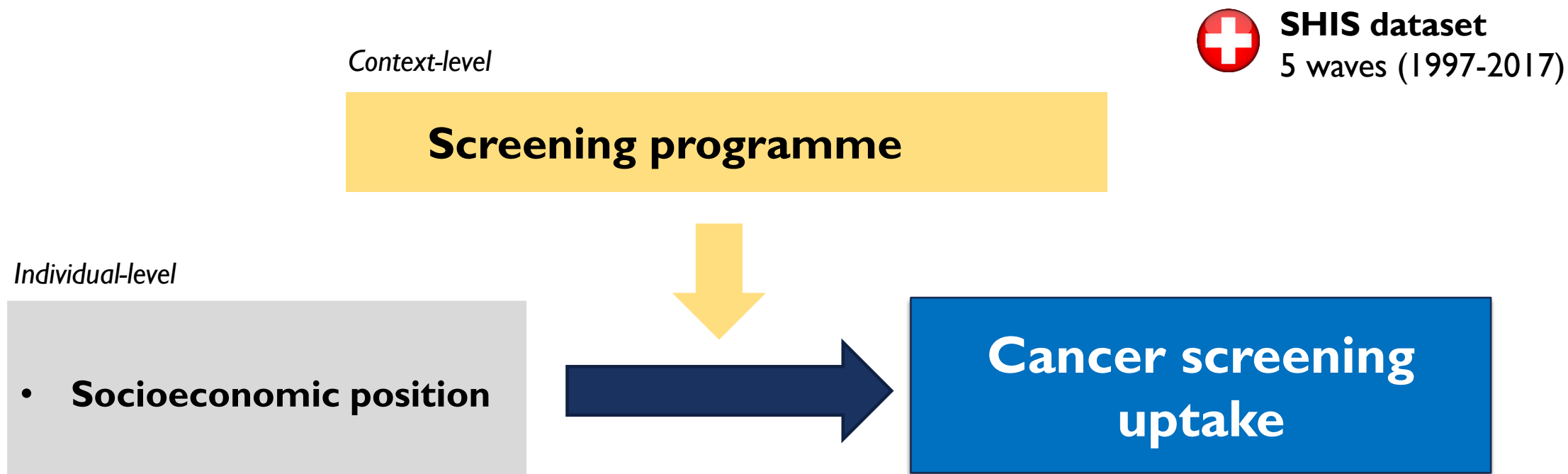
"OPPORTUNISTIC" screening

ORGANISED (PROGRAMME) / OPPORTUNISTIC SCREENING

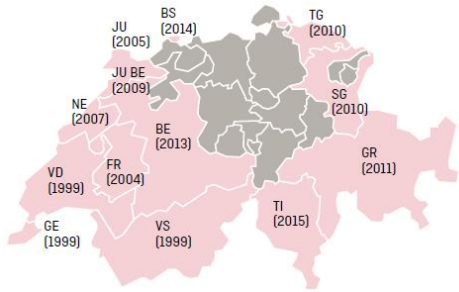


- Programme en place ou introduction en 2023
- Introduction prévue
- Dépistage hors programme

MODELLING THE EFFECT OF SCREENING PROGRAMMES



MAMMOGRAPHY PROGRAMMES & SCREENING INEQUALITIES



Mammography programmes
of Swiss cantons 1999→2017




SHIS dataset
5 waves (1997-2017)

1. Income level
2. Marital status



Mammography uptake



- 
- Moderation effect of **programmes** on **marital status & income inequalities** in screening
 - Statistical design: **within-canton (over time) effect** of programmes on screening inequalities

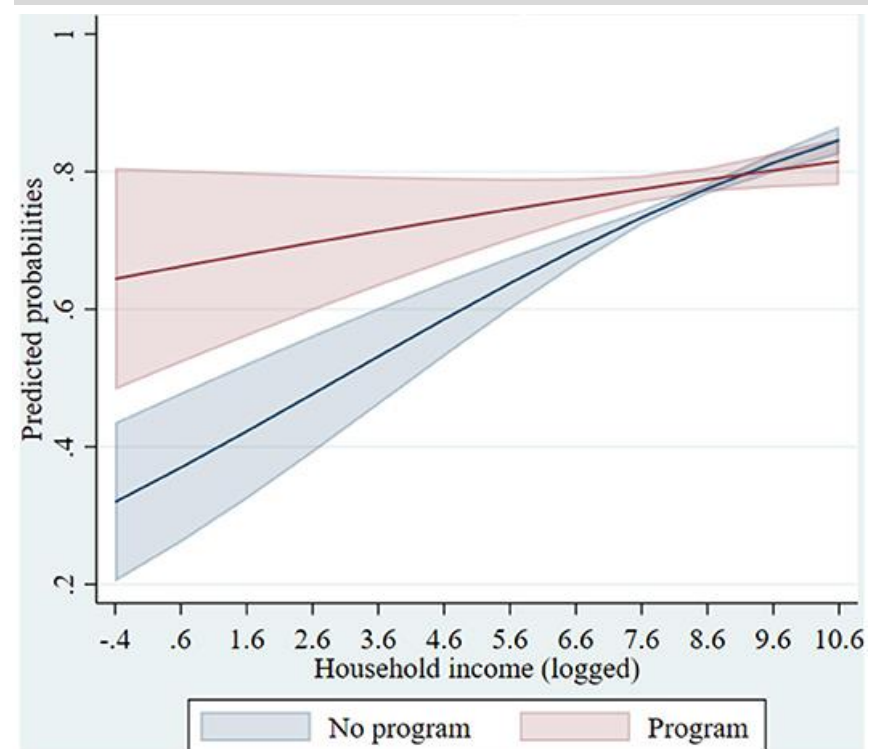
PROGRAMMES & INCOME INEQUALITIES IN SCREENING

Women with **higher income**
= higher probability of ever-screening

In cantons with mammography
programme

→ **Lower-income** women have
increased screening ever-screening,
thereby reducing inequalities

Probability of mammography ever-screening

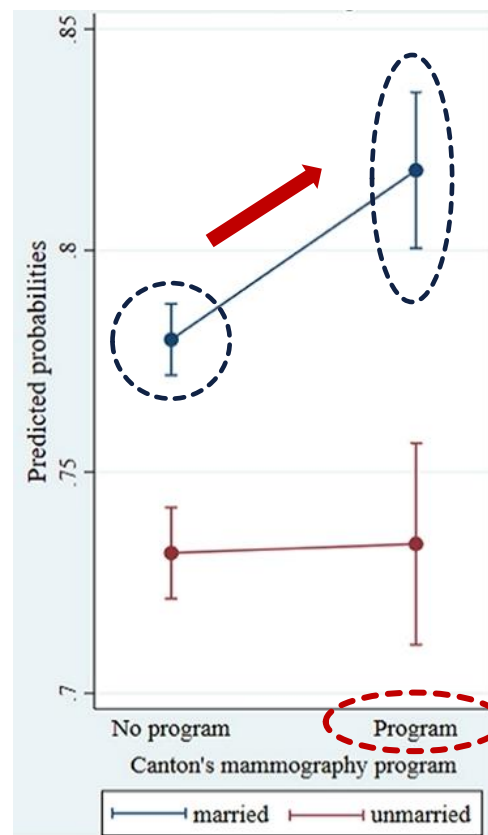


PROGRAMMES & MARITAL STATUS INEQUALITIES IN SCREENING

Married women = higher probability of mammography uptake than not married women

In cantons with mammography programme

→ **Married** women's screening uptake increases more than not married women



SOCIAL INEQUALITIES IN A COUNTRY COMPARATIVE PERSPECTIVE



Swiss Health Interview Survey



...appending Swiss and European datasets



eurostat

European Health Interview Survey

HARMONISING SHIS & EHIS

- Some SHIS questions follow the Eurostat methodology...

Jolidon V, Bracke P, Burton-Jeangros C. Macro-contextual determinants of cancer screening participation and inequalities: A multilevel analysis of 29 European countries. *SSM-Population Health*. 2021 Sep 1;15:100830.

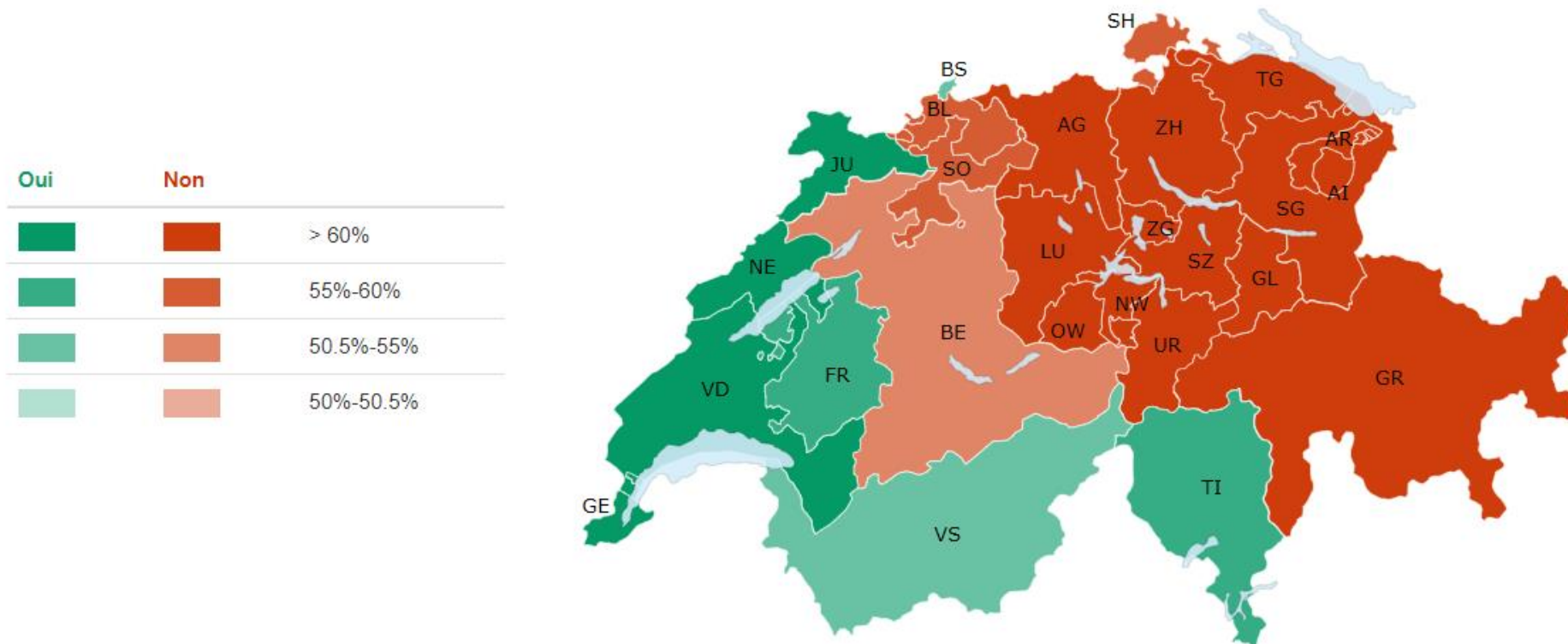
Table S.1 Comparison and harmonisation of variables in the European Health Interview Survey (EHIS) and the Swiss Health Interview Survey (SHIS)

Variable	EHIS	SHIS
Pap smear uptake	Respondents were asked when they last had a Pap smear: 'within the past 12 months, 1 to less than 2 years ago, 2 to less than 3 years ago, more than 3 years ago, or never'. We recoded as: had a Pap smear in the past 3 years, (0) no, (1) yes.	Respondents were asked for the date of their last Pap smear. The SHIS subtracts it from the interview date and provides the time since last smear test of the respondent. We recoded as: had a Pap smear in the past 3 years, (0) no, (1) yes.
Mammography uptake	Respondents were asked when they last had a mammography: 'within the past 12 months, 1 to less than 2 years ago, 2 to less than 3 years ago, more than 3 years ago, or never'. We recoded as: had a mammography in the past 2 years, (0) no, (1) yes.	Respondents were asked for the date of their last mammography. The SHIS subtracts it from the interview date and provides the time since last mammography of the respondent. We recoded as: had a mammography in the past 2 years, (0) no, (1) yes.
Education	Followed ISCED classification	Followed ISCED classification
Age	5-year age groups	Age (continuous), we recoded in 5-year age groups
Cohabitation status	Followed Eurostat "Core Social Variables".	Followed Eurostat "Core Social Variables"
Self-rated health	Followed EHIS "Minimum European Health Module"	Followed EHIS "Minimum European Health Module"
Area of residence	Followed Eurostat "degree of urbanisation" based on LAUs (Local Administrative Units): 'cities (densely populated areas), towns and suburbs (intermediate density areas), rural areas (thinly populated areas)'. We recoded as: (0) urban, (1) rural.	Followed Swiss Federal Statistical Office (OFS) "Swiss Geographic Levels" ^a , which is harmonised with Eurostat's LAUs (Local Administrative Units), provided as: (0) urban, (1) rural.
Work status	Followed Eurostat "Core Social Variables"	Followed Eurostat "Core Social Variables"
Country of birth	Followed Eurostat "Core Social Variables": 'native-born, born in another EU Member State, born in non-EU country'. We recoded as: (0) native, (1) born abroad.	Followed Swiss Federal Statistical Office (OFS) classification, provided as: (0) Swiss national, (1) Foreign national.
Last GP visit	Last visit to a general practitioner or family doctor: 'less than 12 months ago, more than 12 months ago, never'. We recoded as: (0) GP visit less than 12 months ago, (1) more than 12 months ago.	Number of visits to a general practitioner or family doctor in the past 12 months. We recoded as: (0) GP visit less than 12 months ago, (1) more than 12 months ago.

MAMMOGRAPHY PROGRAMMES & CULTURAL REGIONS

- Does culture influence health behaviours?
- How to measure culture?
 - Language may be a proxy of culture → Switzerland
 - Sapir and Whorf hypothesis: linguistic differences in the perception of the world

THE LAST SWISS NATIONAL VOTATION (9 JUNE 2024)



Question: introduction of a maximum rate (10%) for household expenditure on health insurance (Yes or no)

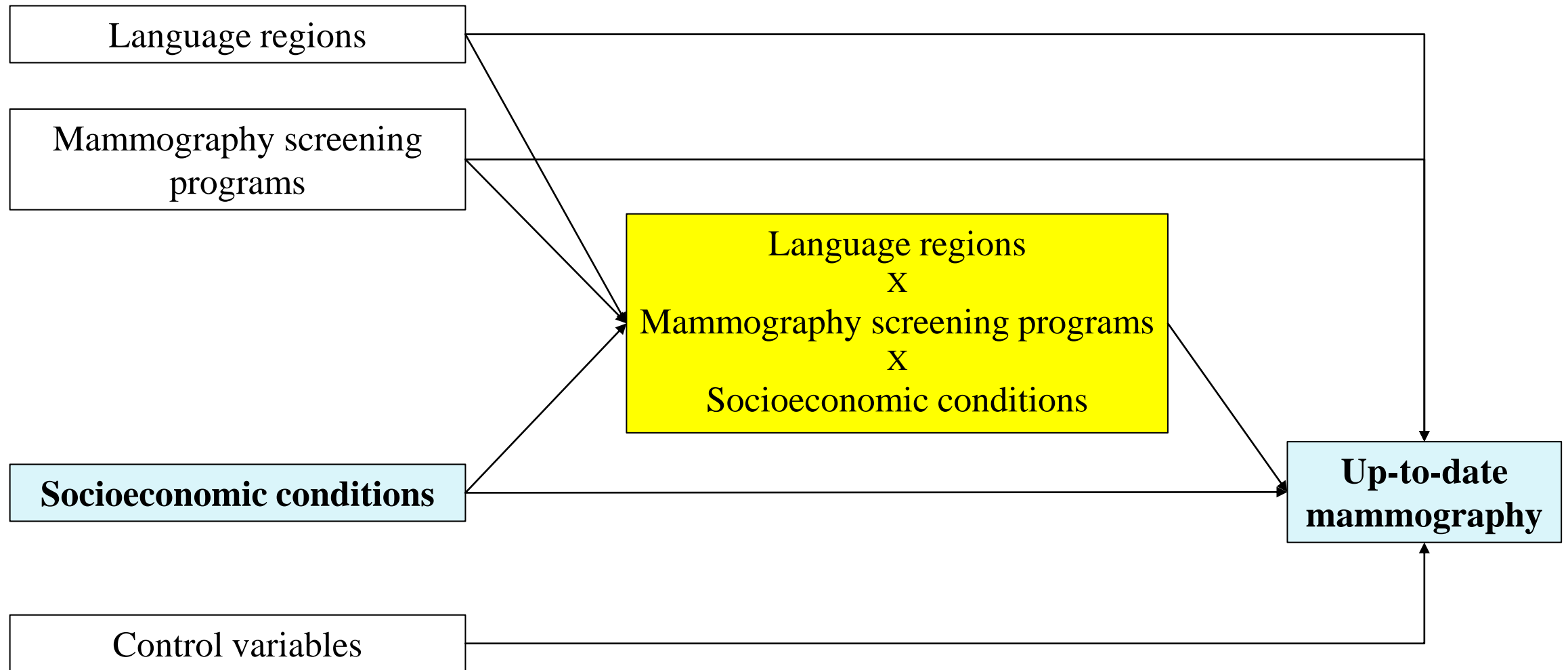
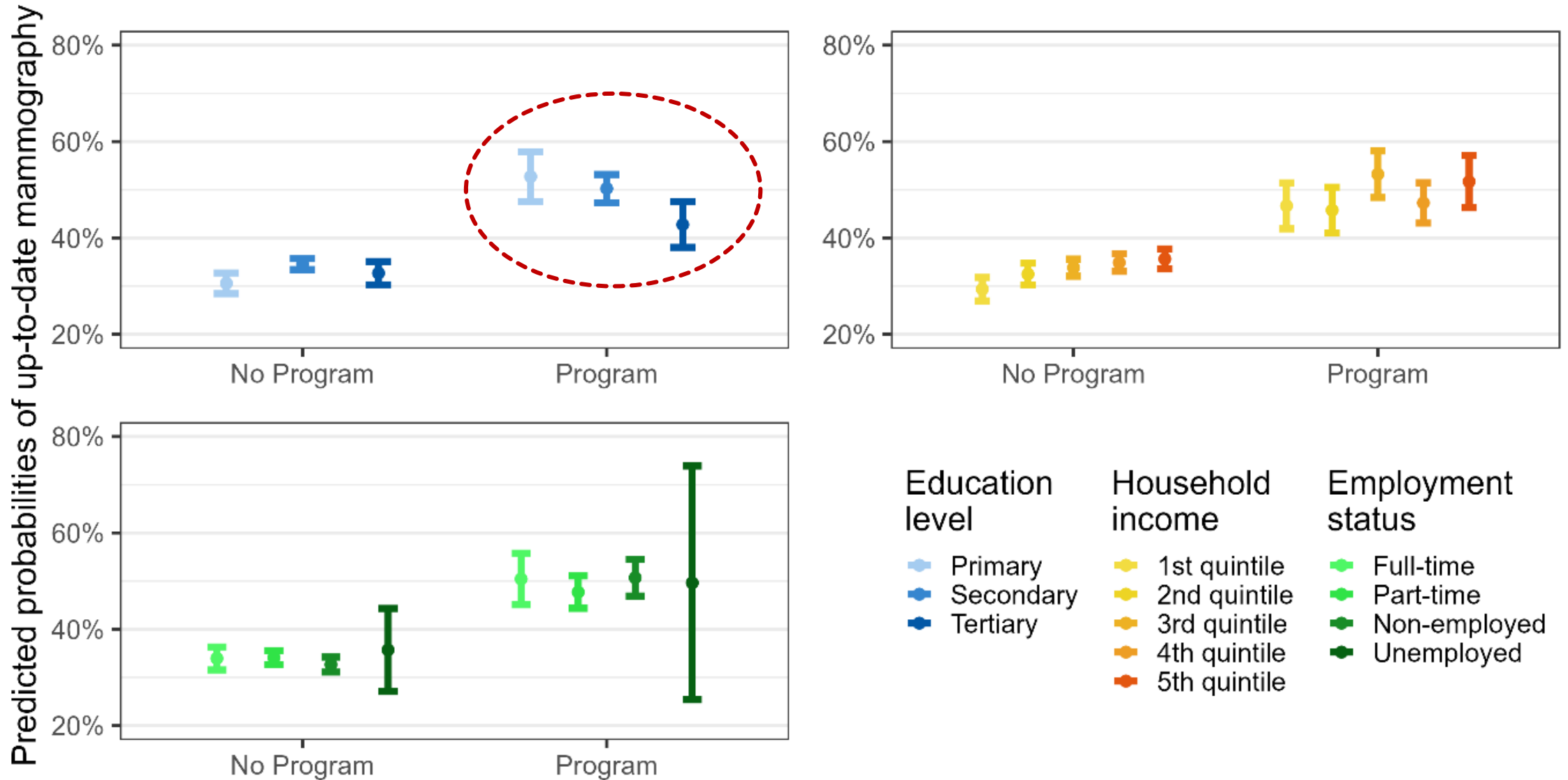
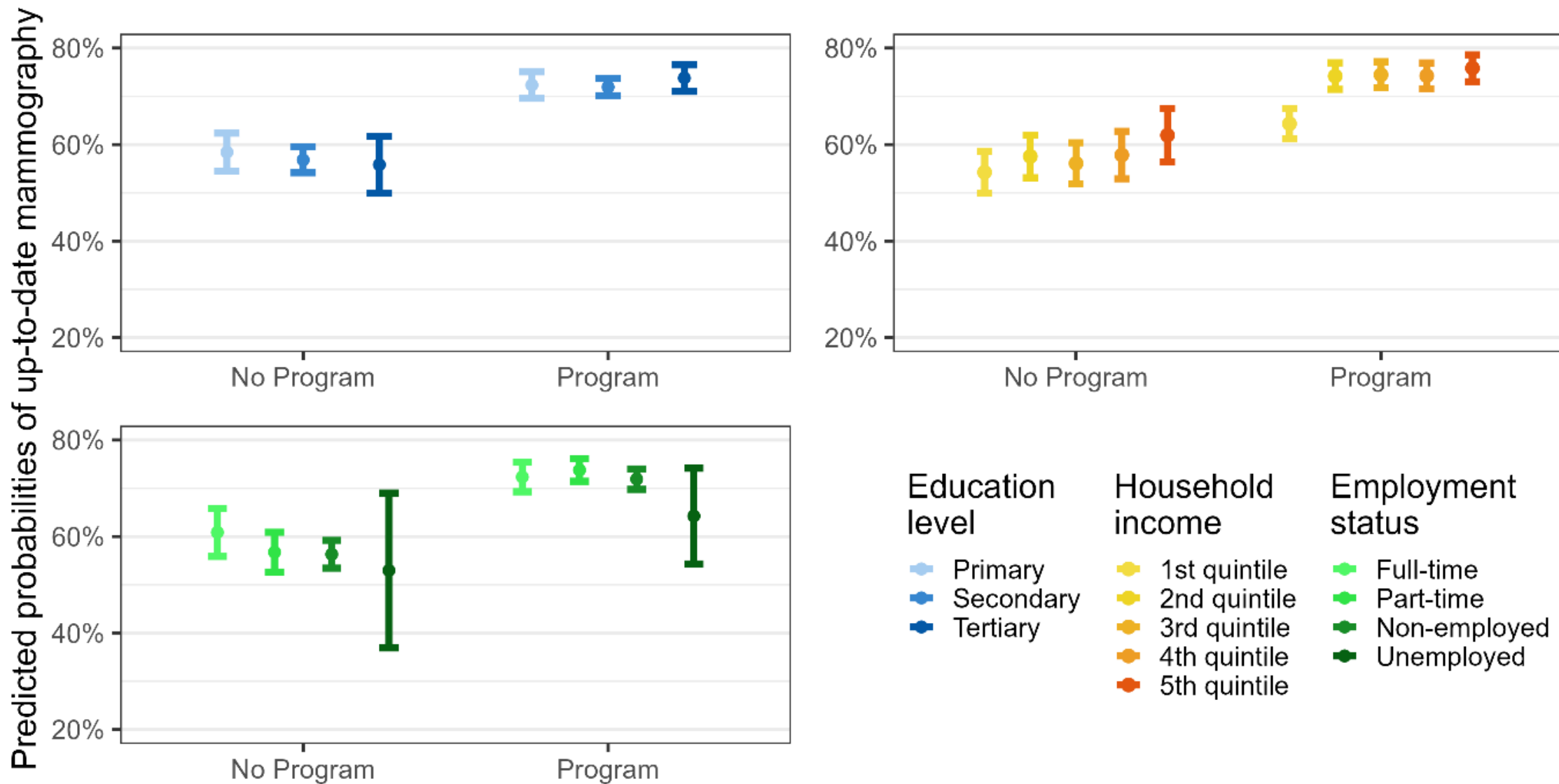


Figure 2 Directed acyclic graph depicting the underlying causal model for the hypothesis, i.e. language regions modify (effect modification) the effects of organized mammography screening programs on socioeconomic inequalities in up-to-date mammography screening. Socioeconomic conditions is the main exposure. Mammography screening program and language region are effect modifiers.

Adjusted model for the German speaking region



Adjusted model for the Latin region



STUDIES: INEQUALITIES IN MAMMOGRAPHY UPTAKE



- Buclin CP, et al. **Linguistic difference** in the effect of **organized programs** on socioeconomic **inequalities** in breast cancer screening: ecological study in Switzerland. *European Journal of Cancer Prevention*. 2024;10-97.
- Jolidon V, et al. Revisiting the effects of organized mammography **programs** on **inequalities** in breast screening uptake: a multilevel analysis of nationwide data from 1997 to 2017. *Frontiers in Public Health*. 2022 Feb 7;10:812776.
- Cullati S, et al. Organised population-based **programmes** and **change** in socioeconomic **inequalities** in mammography screening: A 1992–2012 nationwide quasi-experimental study. *Preventive medicine*. 2018 Nov 1;116:19-26.
- Fenner L, et al. **Trends in the use** of mammography for early breast cancer detection in Switzerland: Swiss Health Surveys 2007 and 2012. *Swiss medical weekly*. 2018 May 14;148:w14603.
- Pletscher M. The effects of organized screening **programs** on the demand for mammography in Switzerland. *The European Journal of Health Economics*. 2017 Jun;18:649-65.
- Fontana M, Bischoff A. Uptake of breast cancer screening measures among **immigrant** and Swiss women in Switzerland. *Swiss medical weekly*. 2008 Dec 13;138(4950).

PAP SMEAR



- Burton-Jeangros C, et al. Cervical cancer screening in Switzerland: cross-sectional **trends** (1992–2012) in social **inequalities**. The European Journal of Public Health. 2017 Feb 1;27(1):167-73.
- De Prez V, et al. Cervical cancer **(over) screening** in Belgium and Switzerland: trends and social inequalities. European journal of public health. 2020 Jun 1;30(3):552-7.
- Jolidon V, et al. **Never** and **under** cervical cancer screening in Switzerland and Belgium: trends and inequalities. BMC Public Health. 2020 Dec;20:1-1.

COLORECTAL CANCER SCREENING



- Braun AL, et al. Association between colorectal cancer testing and **insurance type**: Evidence from the Swiss Health Interview Survey 2012. Preventive medicine reports. 2020 Sep 1;19:101111.
- Schneider R, et al. **Ten-year changes** in colorectal cancer screening in Switzerland: The Swiss Health Interview Survey 2007, 2012 and 2017. Preventive Medicine Reports. 2022 Jun 1;27:101815.
- Spaeth A, Zwahlen M. Use of lower gastrointestinal **endoscopy** and **fecal occult blood test** in the 2007 Swiss Health Interview Survey respondents aged 50 years and older. Endoscopy. 2013 Jul;45(07):560-6.
- Fedewa SA, et al. Colorectal cancer screening in Switzerland: cross-sectional **trends** (2007-2012) in **socioeconomic disparities**. PloS one. 2015 Jul 6;10(7):e0131205.

PROSTATE & SKIN CANCER SCREENING



- Guessous I, et al. Prostate cancer screening in Switzerland: **20-year trends and socioeconomic disparities**. Preventive medicine. 2016 Jan 1;82:83-91.
- Dumont S, et al. Skin cancer screening in Switzerland: **Cross-sectional trends (1997–2012) in socioeconomic inequalities**. Preventive medicine. 2019 Dec 1;129:105829.



THANK YOU FOR LISTENING

Vladimir Jolidon & Stéphane Cullati



Population Health Laboratory (#PopHealthLab), University of Fribourg