



Swiss TPH



Why we need cohorts and biobanks

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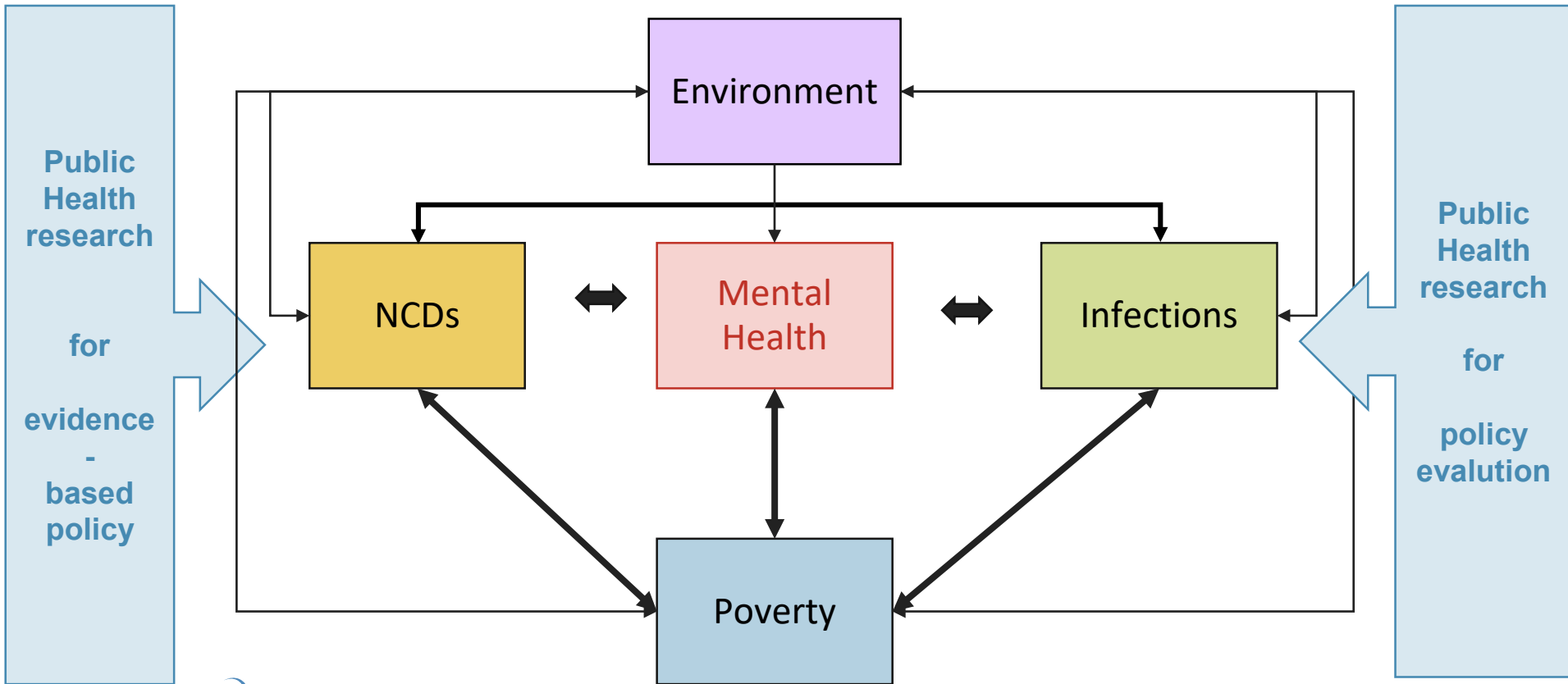


Swiss TPH



Why do we need
citizen cohorts?

Citizen cohorts for independent public health research an integrated view on parallel pandemics



Cohorts and Biobanks

A Public Health Task – A Public Health Research Infrastructure

1. Who stays healthy – who turns ill

- **Long-term cohorts provide the evidence for successful primary prevention**

There is a pressing need to put more emphasis on improving quality of life and less on extending life

More emphasis will need to be put on primary prevention and health promotion through health-in-all-policies

Comparative Contribution of Different Risk Factors to Global Deaths

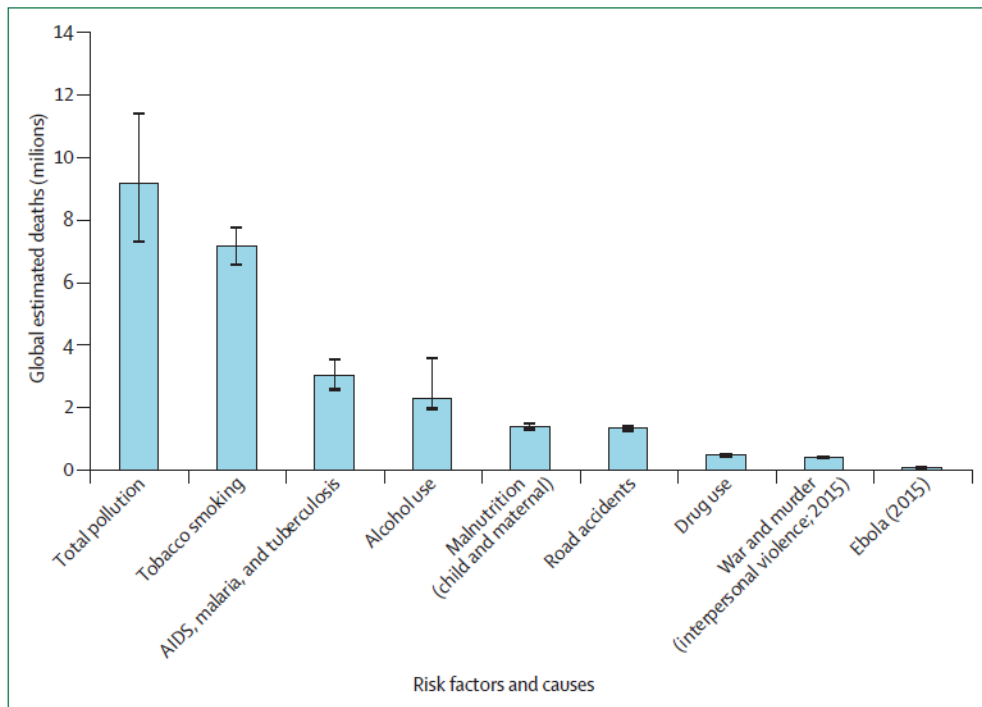


Figure 5: Global estimated deaths by major risk factor and cause, 2015
Using data from the GBD Study, 2016.⁴¹

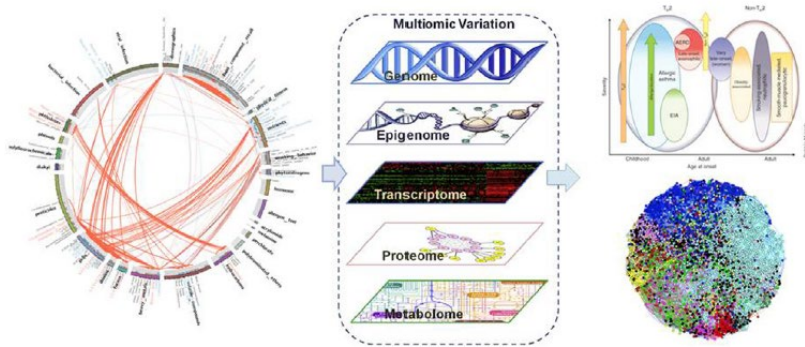
~7 Mio
air pollution
related deaths
EACH YEAR
vs
~7 Mio
COVID-19
related deaths

New chemicals must be
marketed without evidence
on adverse long-term effects
in humans
-
need for human biomonitoring
for post-marketing surveillance
and mixture effects

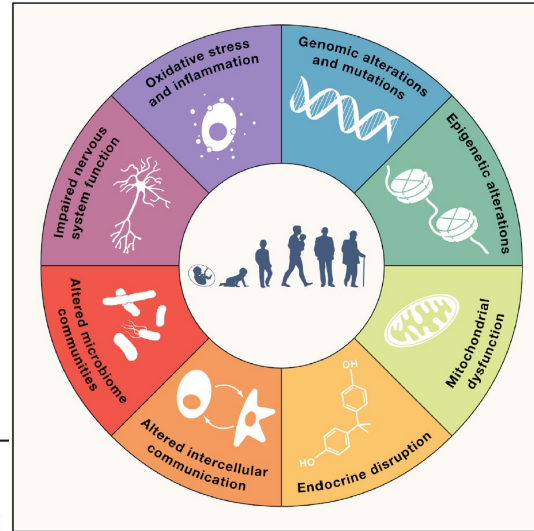
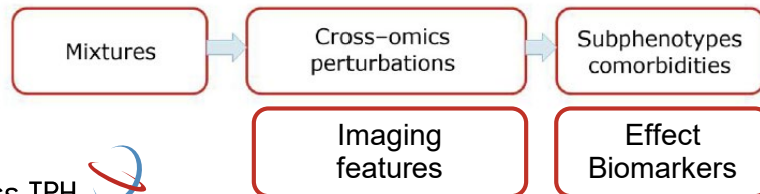
Exposom Science – Towards Improved Causal Inference

*Probst-Hensch N. In: Patrinos GP, (ed). Applied Genomics and Public Health 2020;
Peters, Cell 2021*

Systems epidemiology



Meet-in-the-middle concept—prospective biosampling



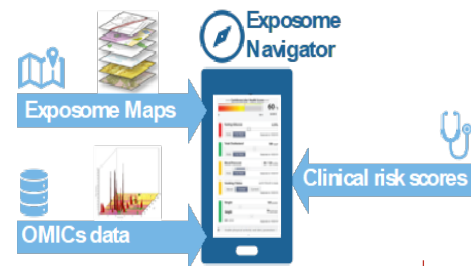
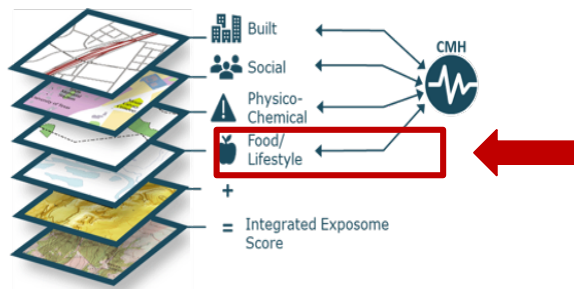
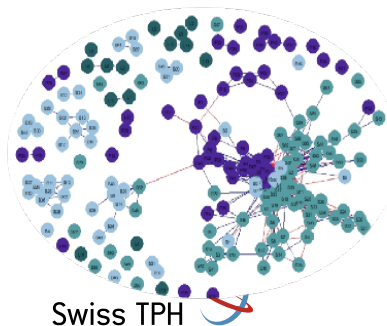
EXPANSE with SAPALDIA - a new era of epidemiological research

PI: R. Vermeulen; <https://expanseproject.eu/>

55 million cohort participants of **all ages** 12 countries – inkl. **SAPALDIA**

>25,000 biosamples for DNA methylation, transcriptomic, proteomic, microbiomics, chemical profiles – inkl. **SAPALDIA**

Linking exposome to cardiometabolic and respiratory health – inkl. **SAPALDIA**



Cohorts and Biobanks

A Public Health Task – A Public Health Research Infrastructure

2. Who carries what risk for a disease – who has preclinical disease?

- **Long-term cohorts provide the evidence for the development of molecular and digital screening and diagnostic instruments of public health utility**

There is a growing need for a shift to value-conscious innovation instead of the “progress at any price” attitude that has dominated biomedical innovation until now

The long-term utility and cost-effectiveness of innovations must be assessed

Biomarker Measured while Healthy: What Keeps Us Healthy?



Blood lipids and cardiovascular diseases



The Lancet Neurology Publication
Pascal Benkert, PhD
Prof. Jens Kuhle

Neurofilaments as biomarkers for neuronal damage may become as frequently applied as cholesterol



Brain image patterns and Alzheimer's

«The Death Valley of Healthy Citizens» in the «Bench-to-Bedside» Era



130 out of 215 Mio US\$ Investments for U.S. Precision Medicine for 1 Mio Citizens **“All of Us” cohort**

November 2015

Implementation of the “Swiss Personalized Health Network” (SPHN) Initiative

*Report
of the mandated Core Project Group (CPG)*

consisting of the following members:

*Peter J. Meier-Abt (SAMS/chair), Ron Appel (SIB), Urs Frey (SNSF),
Detlef Günther (ETHZ), Vincent Mooser (CHUV), Nicole Probst-Hensch (UniBas),
Michael Röthlisberger (SAMS), Daniel Vonder Mühl (ETHZ)*

submitted to SERI, approved by the Steering Committee on January 7, 2016

- 5) In a second phase, there is a need for a large healthy population based reference cohort. Thereby, coordination and interoperability with the planned HBCP is of utmost importance.

➤ **In the absence of citizen cohorts & biobanks. Swiss Personalized Health research will remain marginalized and of unknown utility**

Cohorts and Biobanks

A Public Health Task – A Public Health Research Infrastructure

3. How well are health care systems functioning?

- **Long-term cohorts and evolving patient subcohorts provide the evidence-base for evaluating strengths and weakness of the health care system**

What are the long-term consequences of delayed diagnosis of diabetes, hypertension, depression and genetic disorders?

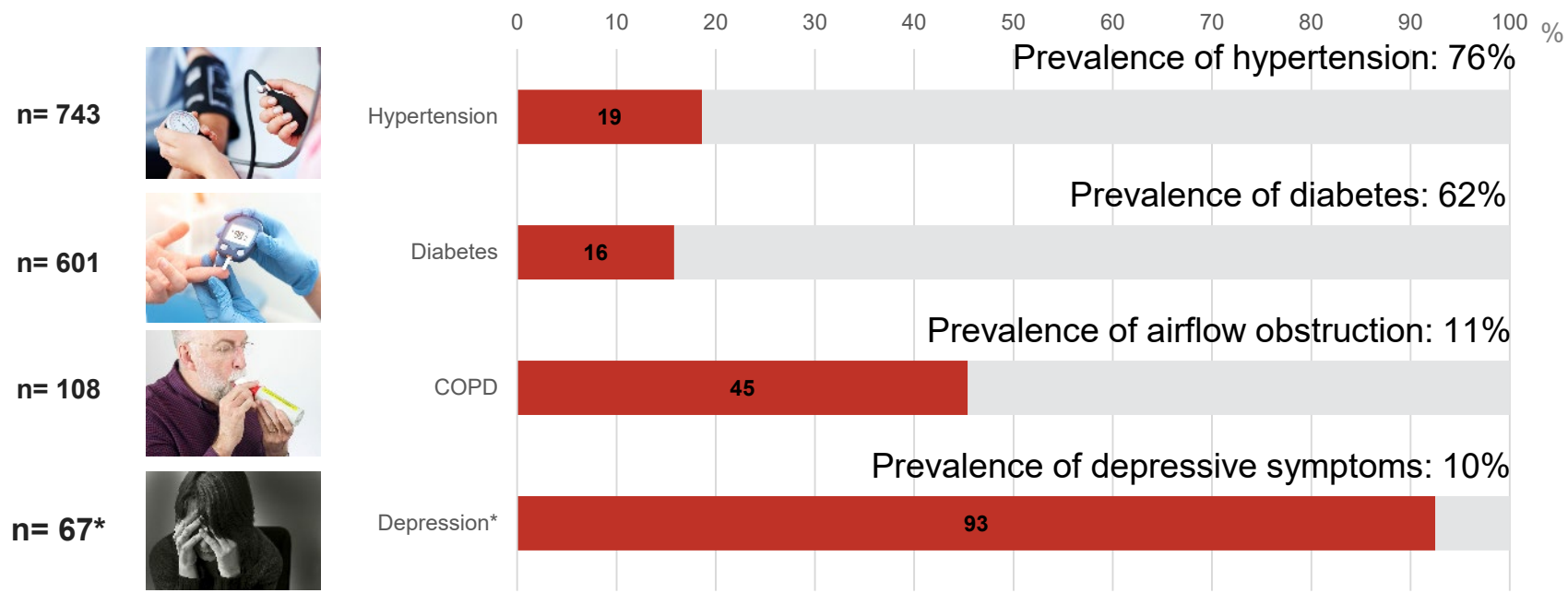
What is the long-term effect of antibiotics over prescription?

Do health interventions improve population morbidity and mortality in the longer-term?

What is the long-term public health utility & cost-effectiveness of novel personalized drugs?

Disease Detection in the Kosovo Public Primary Health Care System

Obas, Gerold, Zahorka, Probst-Hensch, Front Public Health 2022



*Data from follow-up 3 (September 2020- February 2021, n=679)

■ Undetected ■ Detected

Cohorts and Biobanks

A Public Health Task – A Public Health Research Infrastructure

4. How well does health-in-all-policy work?

- **Long-term cohorts provide the evidence-base for improving health promotion**

What are entry doors and targets for health promotion in all policies:

- What do urban planners need to consider towards healthy city planning?
- What must policy makers consider for healthy and health promoting agriculture?

Competence Centre Urban Public Health

Cohorts as Living Labs – Remaining in Touch with Citizens over Time



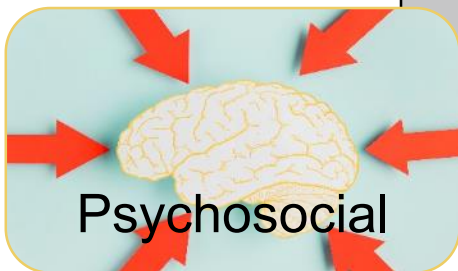
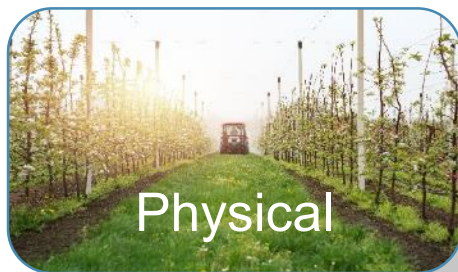
Professorship Urban
Public Health:

Collaboration with urban
planning & architecture

Junior Professorship Agricultural Health

Swiss Farmer Cohort

TRAPEGO 



Protective Factors
&
Risk Factors





Swiss TPH



Where does Swiss TPH
cohort (relevant) research
stand nationally?

Only Swiss-wide
citizen cohort

-
> 30 years of
follow-up

-
Basis and
protocols for
Swiss Health
Study pilot

-
First Swiss-wide
genome

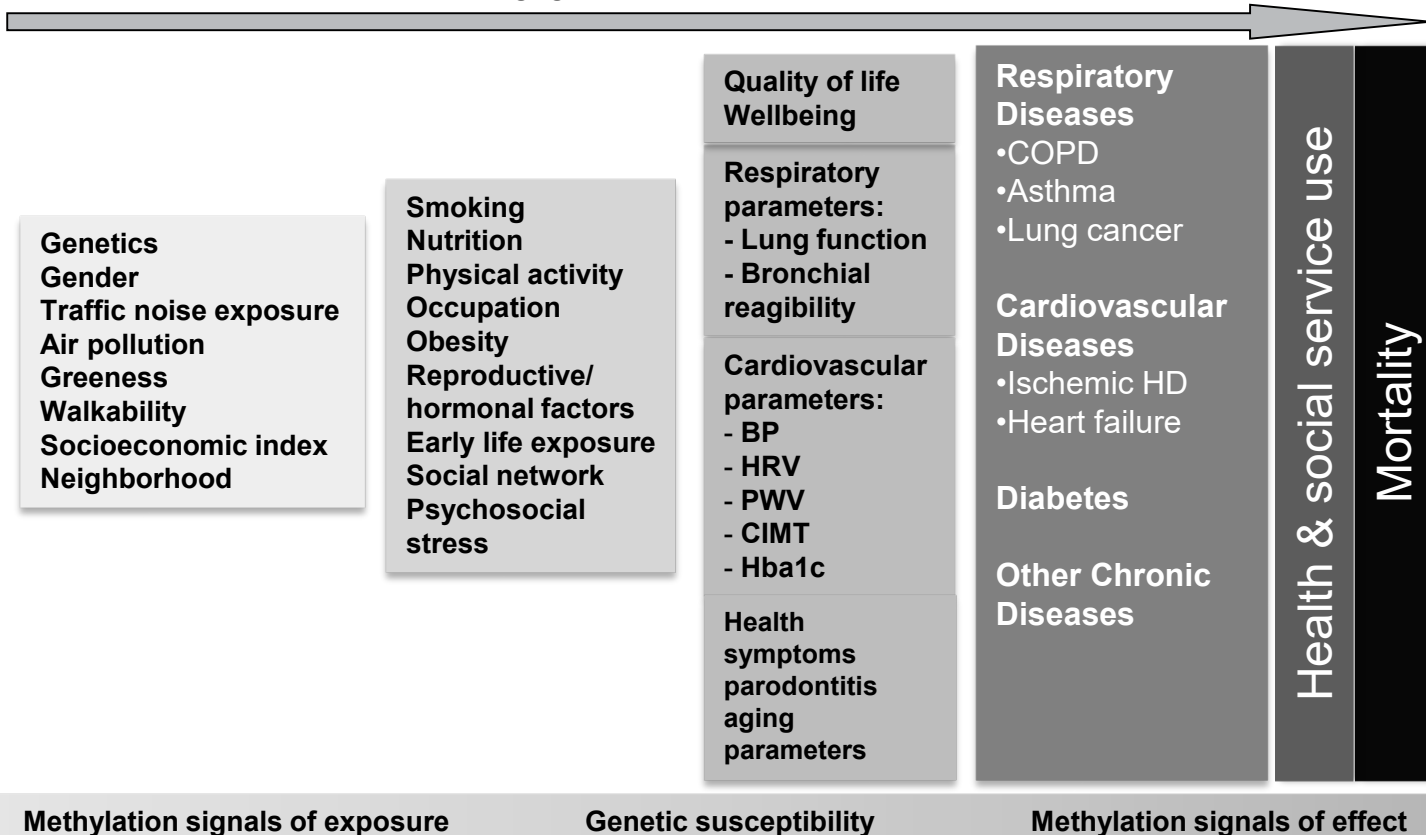
-
~40 Mio CHF
research funds

Not personally
modifiable
risks

Personally
modifiable
risks

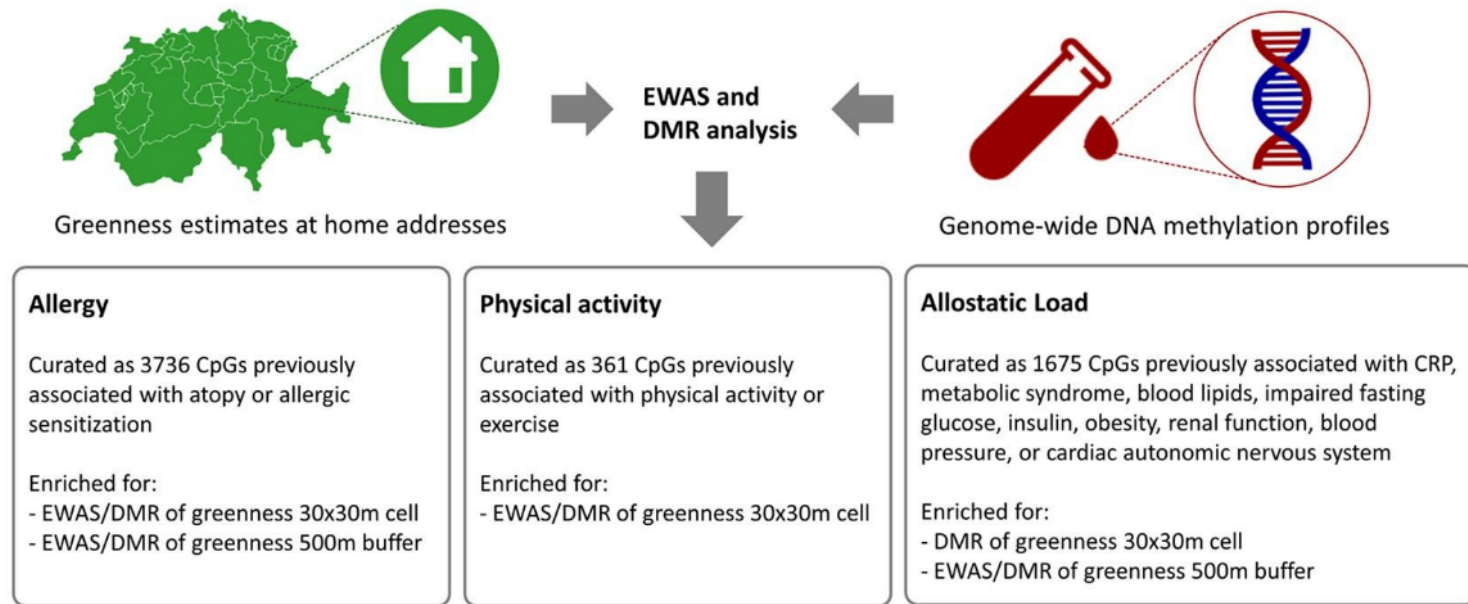
Preclinical
phenotypes

Clinical
phenotypes



Pathways from residential greenness to health - SAPALDIA

Residential greenness-related DNA methylation changes



Residential greenness may have health impacts through allergic sensitization, stress coping, or behavioral changes

Jeong et al Environ Int 2021

Swiss TPH Cohort Activity as Part of Pandemic Preparedness

Corona Immunitas – A National Public Health Cohort Success Story

Impact of SARS-CoV-2 Virus



Impact of Containment Measures



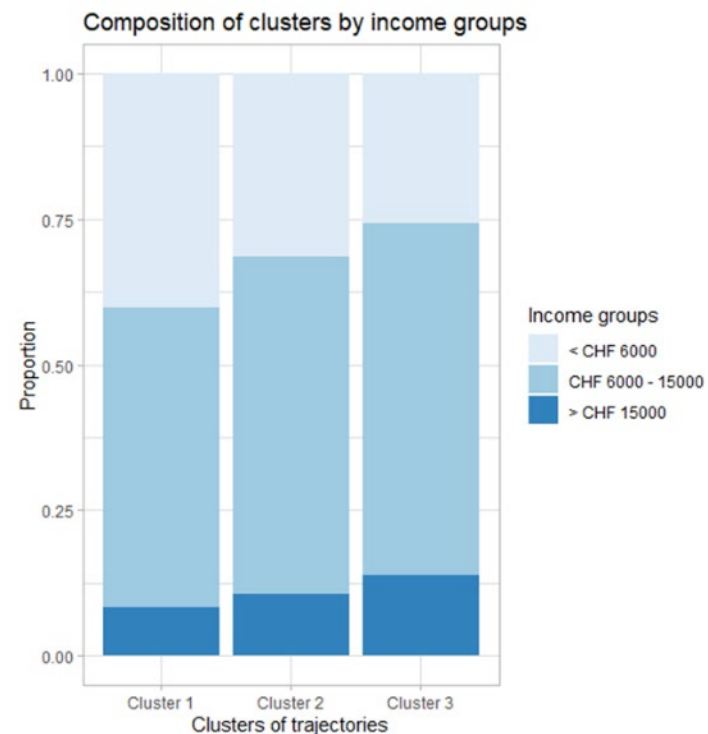
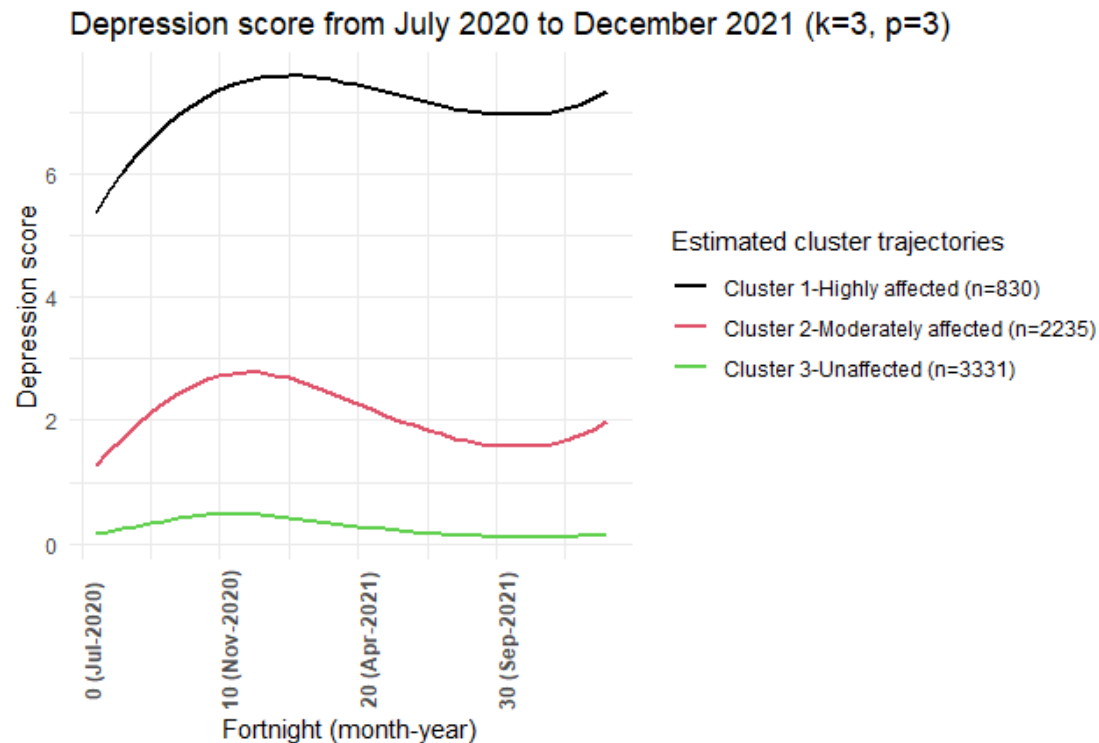
CORONA
IMMUNITAS



CoVCO
BASEL

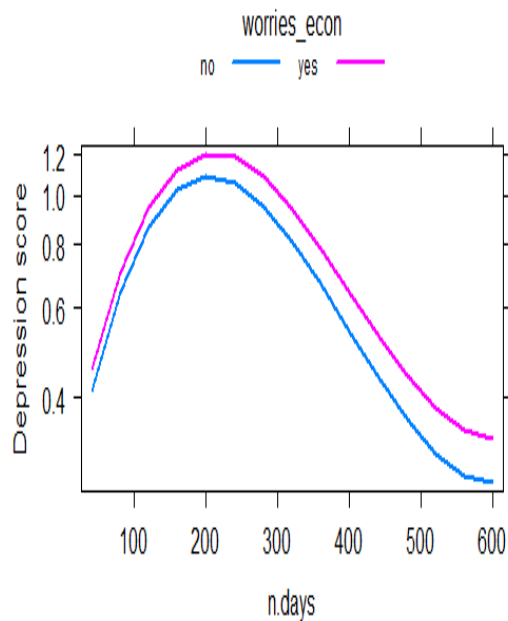
Mental Health Trajectories during COVID-19 Pandemic in COVCO-Base

Probst-Hensch, Jeong, Imboden, Lovison submitted

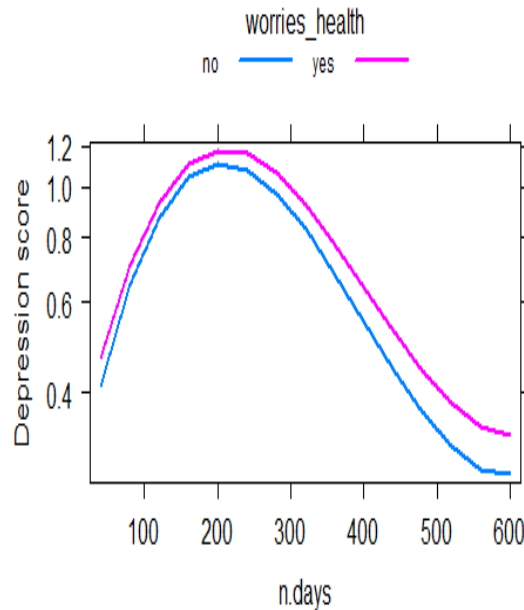


Estimated trajectories of average depression score by economic, health and social worries in Corona Immunitas Program

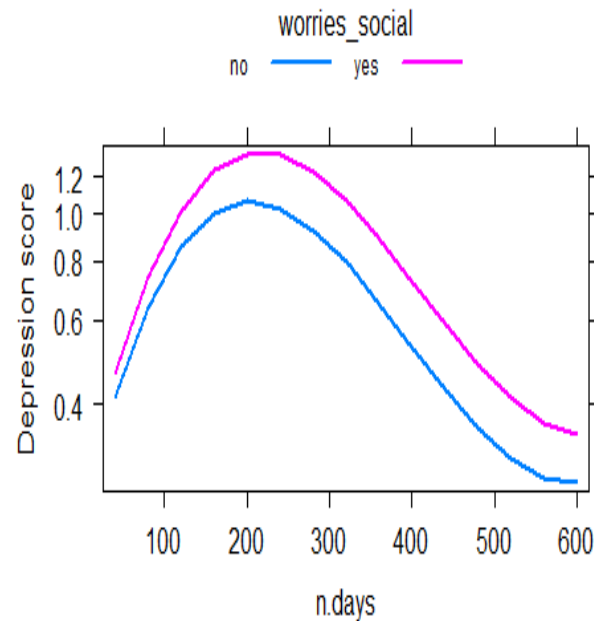
Trajectories of Depression score by economic worries



Trajectories of Depression score by health worries

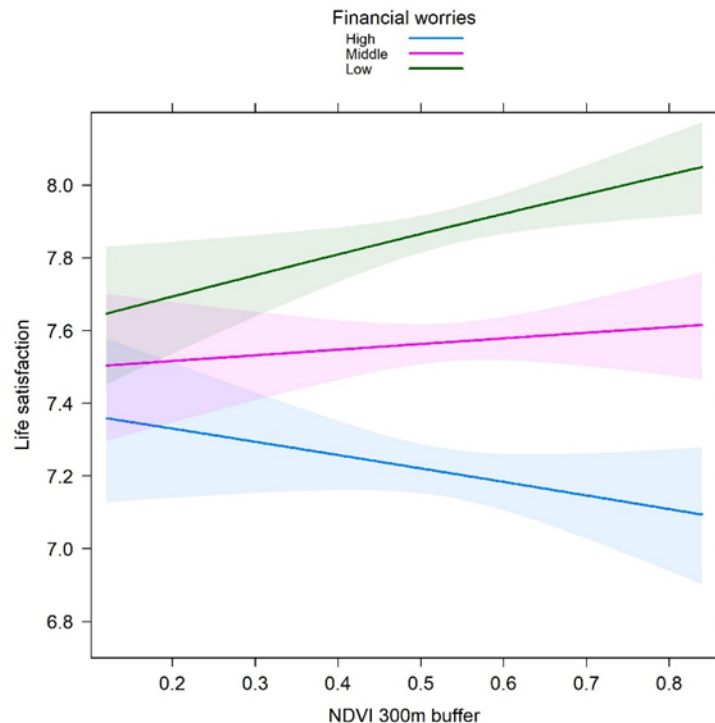


Trajectories of Depression score by social worries



Residential greenness and life satisfaction during COVID-19 pandemic in COVCO-Basel

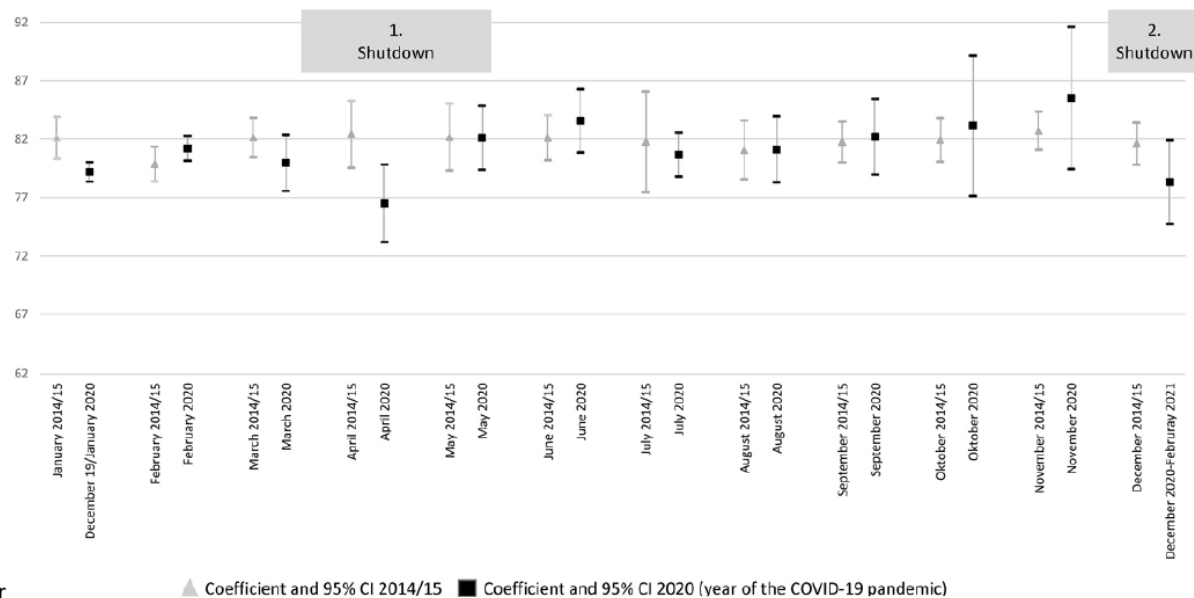
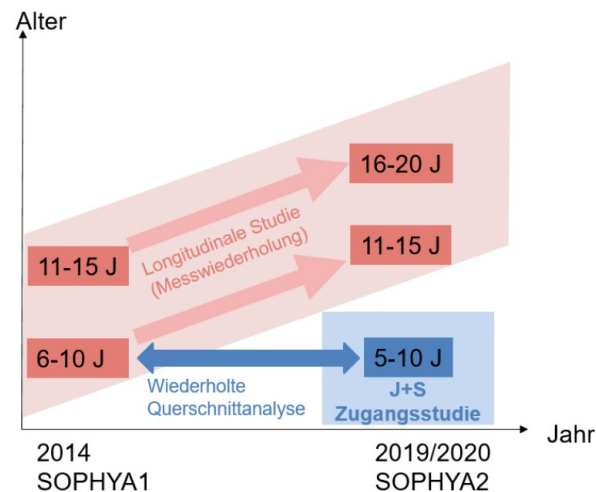
Jeong/Probst-Hensch SwissMedWkly in press



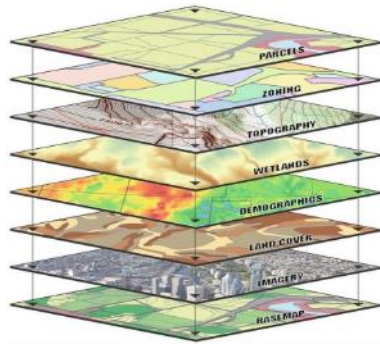
COVID-19 Pandemic and Health-Related Quality of Life in Swiss Primary Schoolchildren

Bringolf, Hänggi, Probst-Hensch Swiss Med Wkly 2021

SOPHYA cohort on objectively measured physical activity in Swiss children



Swiss TPH Citizen Cohort Relevant Expertise



Exposom research urban-rural
Biostats & mathematical modelling
NCDs & infections

Cohorts/biobanks
Local to national to global

Health systems/economics research
Social science research
Diagnostics
Molecular science

Swiss TPH Citizen Cohort Infrastructure in Basel

Epidemiological Lab

Mobile Clinic

- Building on 30 years of SAPALDIA biobank expertise
- Experienced staff
- Broad vision
- Public Health partnership
- Broad academic and clinical partner network

Biobanking Infrastructure in Close Proximity to Epi Lab & Biosampling

- State-of-the art infrastructure
- State-of-the art sample processing
- Proximity to biosampling
- High quality biospecimens



Swiss TPH



Public Health united for a
large Swiss citizen cohort

Switzerland is not able to contribute a sufficiently large cohort to the international cohort and biobank research community consortium as of today. In the era where health data is the “new gold”, this will jeopardize the scientific and also digital and economic success of the country

Switzerland needs its own large scale cohort

For **Swiss citizens** to benefit directly from high-quality research for health and wellbeing

For the **Swiss policy makers** for evidence-based health- and wellbeing related policies

For **Swiss researchers** to be internationally competitive

For **Swiss academic career promotion** in various research domains including digital and e-health

For **Swiss citizen science** to benefit from research conducted in close collaboration with citizens

For **Swiss public-private partnerships** to benefit from ample opportunities offered by a large citizen biobanks in life sciences and life science technology

Swiss Public Health Community: towards national citizen cohort as a research infrastructure

White Paper Swiss Cohort & Biobank

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Swiss Society for Public Health; Nino Künzli *, SSPH+ and
Board Swiss 11 Society for Public Health; Milo Puhon *, EBPI
Uni Zurich; L. Suzanne Suggs, USI *; Corina Wirth, 12 Swiss
Society for Public Health

Roadmap Research Infrastructure IOP4CH Imaging and Omics Platform for Swiss Citizen Health



Epidemiological Study Center



Biobanking Infrastructure



MRI and Ophthalmology Imaging Park