

Biomarkers Dried Blood Spots and Health

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This is SHARE !

Health

Population-based survey
Face-to-face interviews
Trained interviewers
Cross-disciplinary
Cross-cultural/national

Wealth

Social network

This is SHARE !

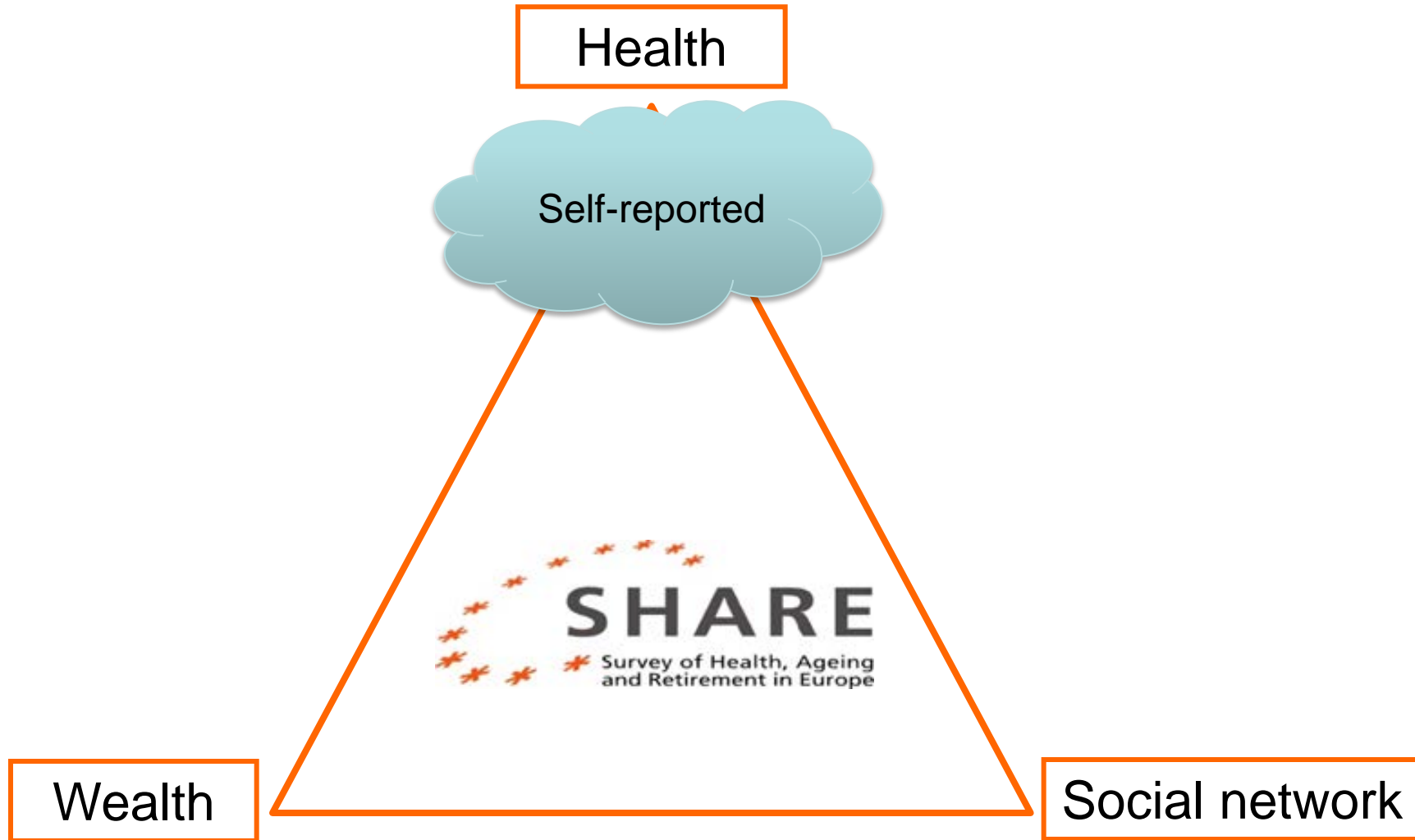
Health

Population-based survey
Face-to-face interviews
Trained interviewers
Cross-disciplinary
Cross-cultural/national

Wealth

Social network

Self-reported health



Challenges - self-reported health

- ▶ Personal interviews
- ▶ Health literacy
 - ▶ Lay interviewers
 - ▶ Respondents
- ▶ Asymptomatic disease
- ▶ Bias
 - ▶ Information
 - ▶ Recall
 - ▶ Desirability

Health

Self-reported

- ▶ Cross-national differences
- ▶ Cross-cultural differences
- ▶ Generational differences

Wealth

Social network



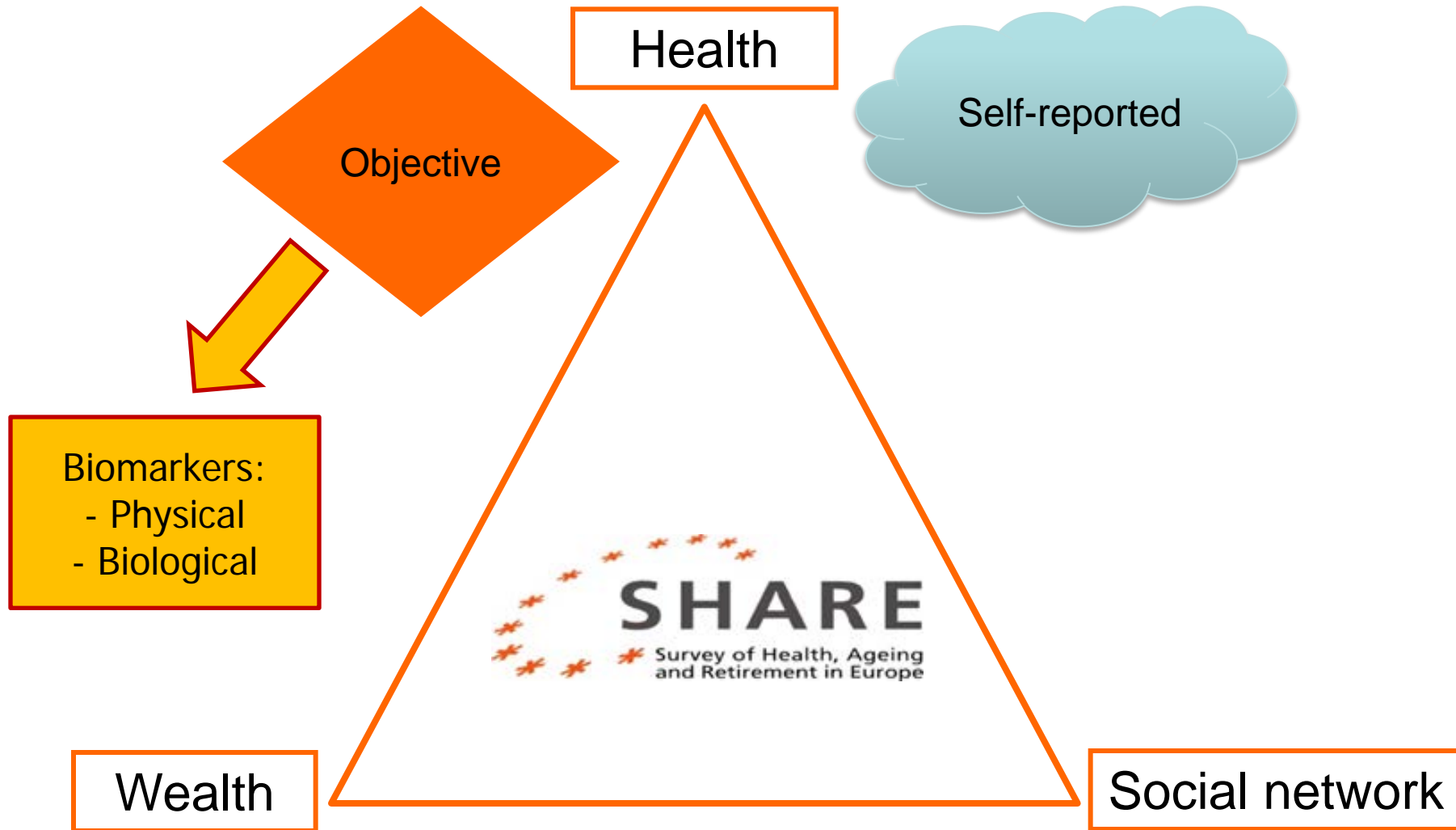
"How is your health in general?"



"How is your health in general?"



Can we increase the quality ?



SHARE collects Biomarkers

- ▶ Physical biomarkers
 - ▶ Grip strength
 - ▶ Chair stand
 - ▶ Peak Flow (lung "strength")

- ▶ Biological biomarkers
 - ▶ Dried Blood Spot Samples (DBS)

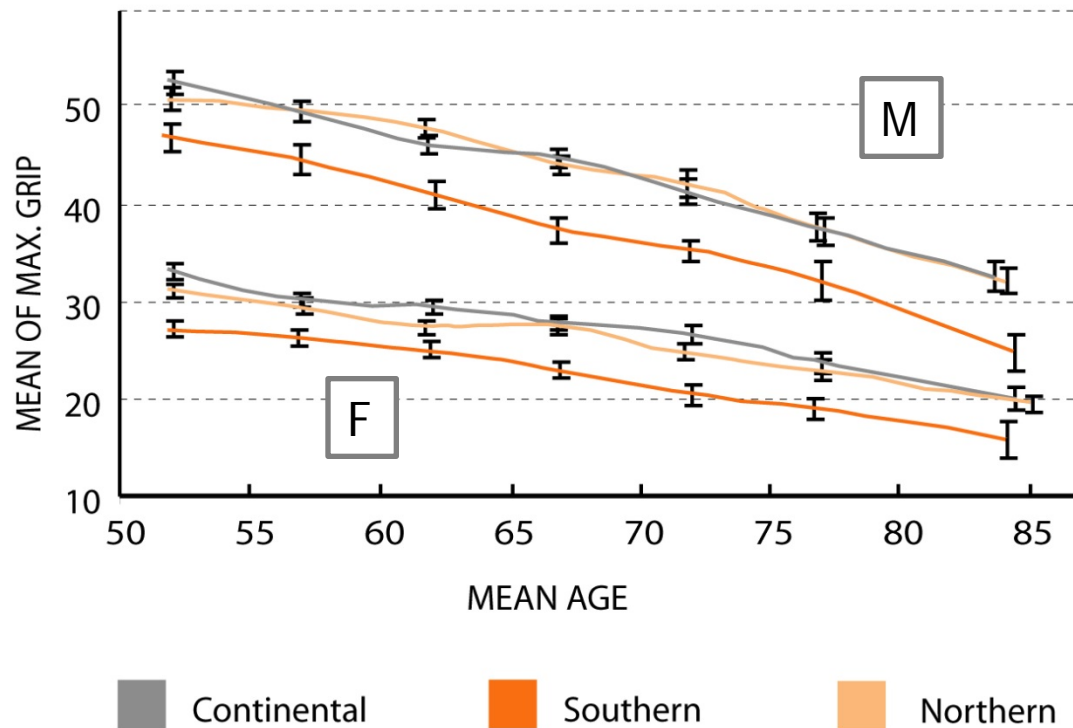
Age dependent decline, - but compared to your peers:

- ▶ Lower grip strength is associated to
 - ▶ ↑ mortality
 - ▶ ↑ disability
 - ▶ ↑ morbidity
- ▶ Predicts incident disability



Grip Strength

Andersen-Ranberg et al. Eur J Ageing 2009

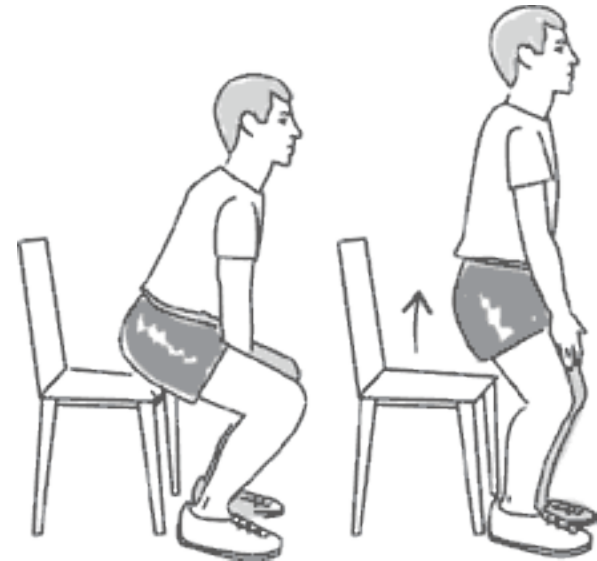


SHARE has shown a European geographical difference in grip strength

Chair Stand 5x

**Age dependent decline,
- but compared to your peers:**

- ▶ Lower performance is associated to
 - ▶ ↑ mortality
 - ▶ ↑ disability
 - ▶ ↑ morbidity
- ▶ Predicts incident disability



Rising from a chair 5 x (sec.)

Lung strength – Peak Flow

**Age dependent decline,
- but compared to your peers:**

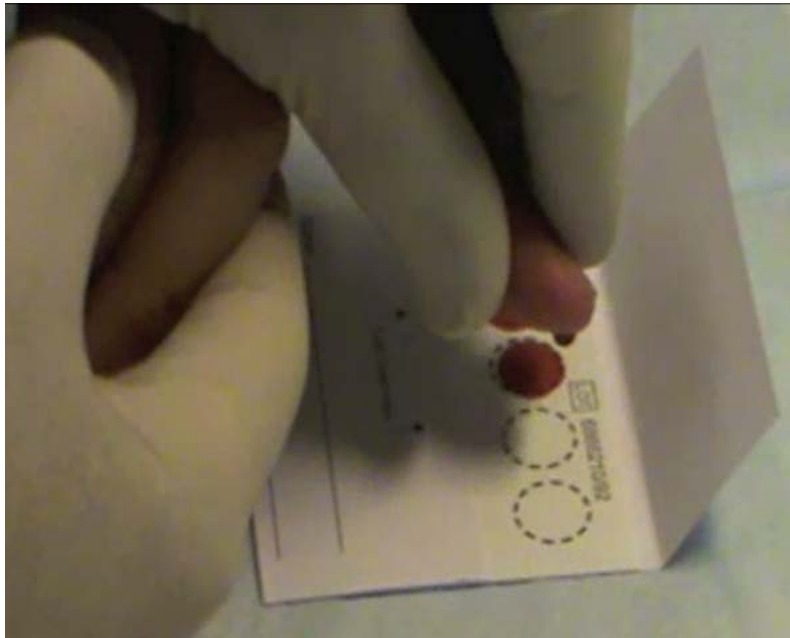
- ▶ A valuable marker for chronic lung disease
- ▶ Measures lung strength (capacity)
 - ▶ Predicts mortality



WHAT ARE DRIED BLOOD SPOTS?

WHY DO WE COLLECT THEM?

SHARE: Dried Blood Spots (DBS)



**Fingerprick blood dripping on a filter card (DBS card) and dried
= Dried Blood Spots**

What are Dried Blood Spots?



All newborn infants are screened for Phenylketonuria (PKU)
– a treatable genetic disease

PKU is analysed in Dried Blood Spots (DBS)

Other biochemical markers can be analysed as well!

WHY DO WE WANT BLOOD ?

Demographic factors:

- Age and Gender
- SES
- Ethnicity

Psychosocial factors:

- Social relationships
- Stressor exposures
- Cognitive/affective traits

Community factors:

- Geographic location
- Social capital
- Infrastructure

Health care:

- Access
- Knowledge

Cultural factors:

- Shared beliefs/values
- Models of behaviour

Biological mechanisms

- Hormone systems
- CardVascSystem
- Metabolic processes
- Immune system

Health outcomes

- Mortality
- Morbidity
- Functional loss

Behavioural mechanisms

- Diet, physical activity
- Smoking, alcohol
- Sleep patterns
- Use of health services

Consistent findings in cohorts of older people

increased levels of TNF- α , IL-6 and CRP

→ low grade activation of the inflammatory cascade

→ **low grade chronic inflammation** is associated to

- Smoking and Obesity
- Hypertension, Dementia, Cardio Vascular Diseases (CVD), atherosclerosis, T2DM (cytokines mediators?)
- Frailty and physical disability
- Stress

SES

biomarkers and health in later life

- ▶ Lower SES
 - ▶ greater risk for poorer cognition and physical functioning
 - ▶ associated ↑ CRP, IL-6, TNF- α
 - ▶ Behavioural factors (smoking, alcohol, obesity) account for a greater proportion of the associations than prevalent disease (CVD, DM)
 - ▶ greater risk developing mobility disability with CRP, IL-6, TNF- α being significant covariates

Social engagement

Biomarkers and health in later life

- ▶ Greater social integration →
 - ▶ better health and longevity
 - ▶ lower risk for cognitive decline and dementia
 - ▶ Lower risk for physical disability
 - ▶ Associated with **IL-6**

Psychological factors

Biomarkers and health in later life

- ▶ Well being →
 - ▶ Significant associations between **cholesterol** and purpose in life, positive affect, positive relations
 - ▶ Women with more positive social relations have lower levels of **IL-6**; better sleep efficiency
 - ▶ Poor sleep associated with higher **IL-6**

Inflammatory biomarkers and SES

▶ CRP

- ▶ Parental occupation status (Tabassum 2008)
- ▶ Occupation status (Rosvall 2007; Tabassum 2008)
- ▶ Job loss/unemployment (Arnetz 1991)
- ▶ Educational attainment (Loucks 2006; Muennig 2007; Ranjit 2007; Rosvall 2007)
- ▶ Income (Yarnell 2005; Muennig 2007; Ranjit 2007)

▶ IL-6

- ▶ Occupation status (Steptoe 2002)
- ▶ Income (Ranjit 2007)

▶ TNF- α

- ▶ Occupation status (Steptoe 2002)

▶ CRP - IL-6 - TNF- α

- ▶ Psychosocial stress (Appels 2000; Glaser 2003; Kiecolt-Glaser 2003 and)

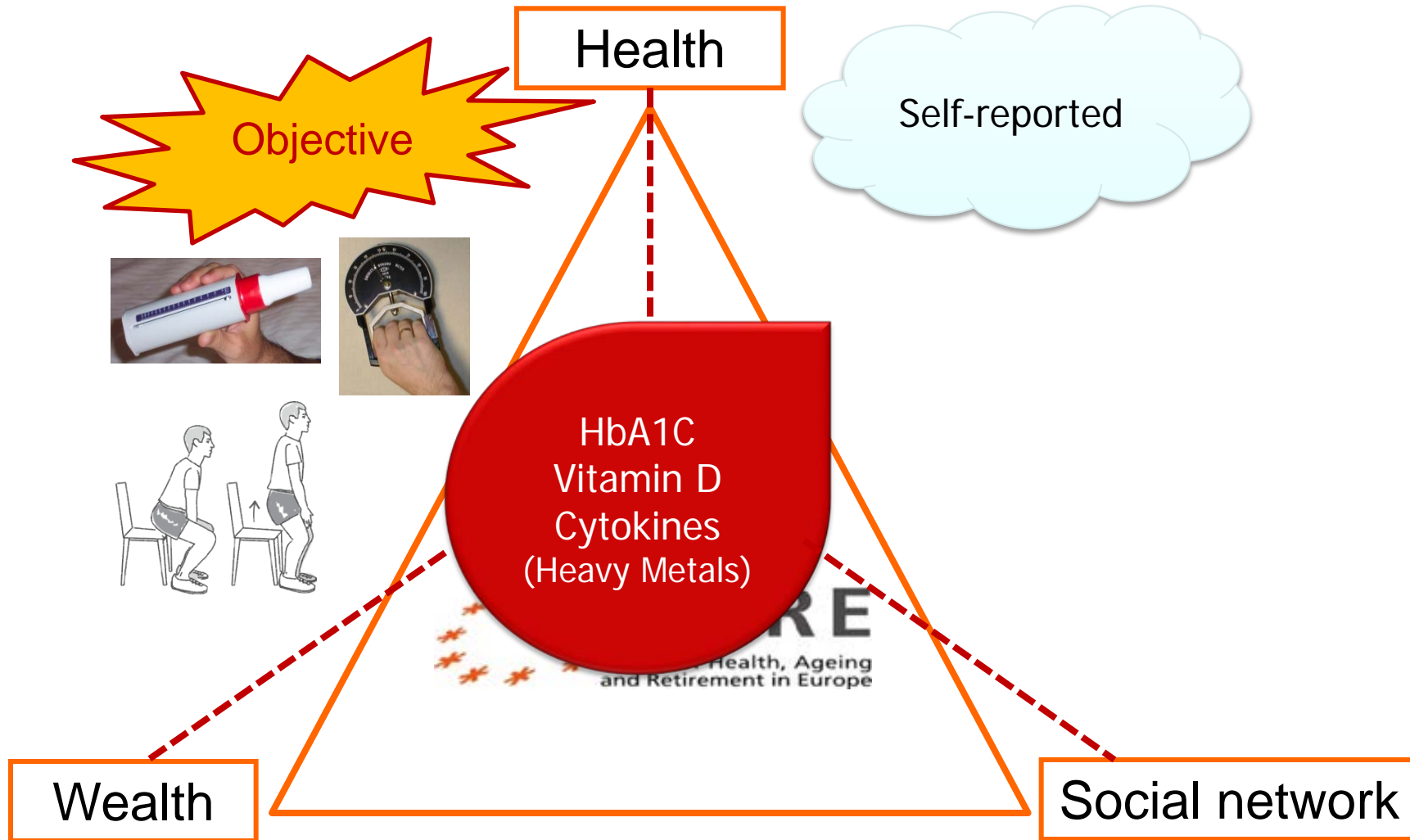
▶ IL-6

- ▶ Chronic stress and caregiving to a demented spouse (Kiecolt-Glaser 2003)

What will SHARE measure ?

- ▶ Cytokines (low grade chronic inflammation)
 - ▶ Frailty – physical impairments - disability
 - ▶ Cognitive impairment
 - ▶ Depression - Psychological stress – social relations
 - ▶ Socio-economic status – occupation - income
- ▶ Glycated Hemoglobin
 - ▶ Diabetes
- ▶ Vitamin D
 - ▶ Bone and muscle health
- ▶ Heavy metals - Lead, Cadmium, Mercury
 - ▶ Cognition, suppresses immune functions
- ▶ + others – constant development

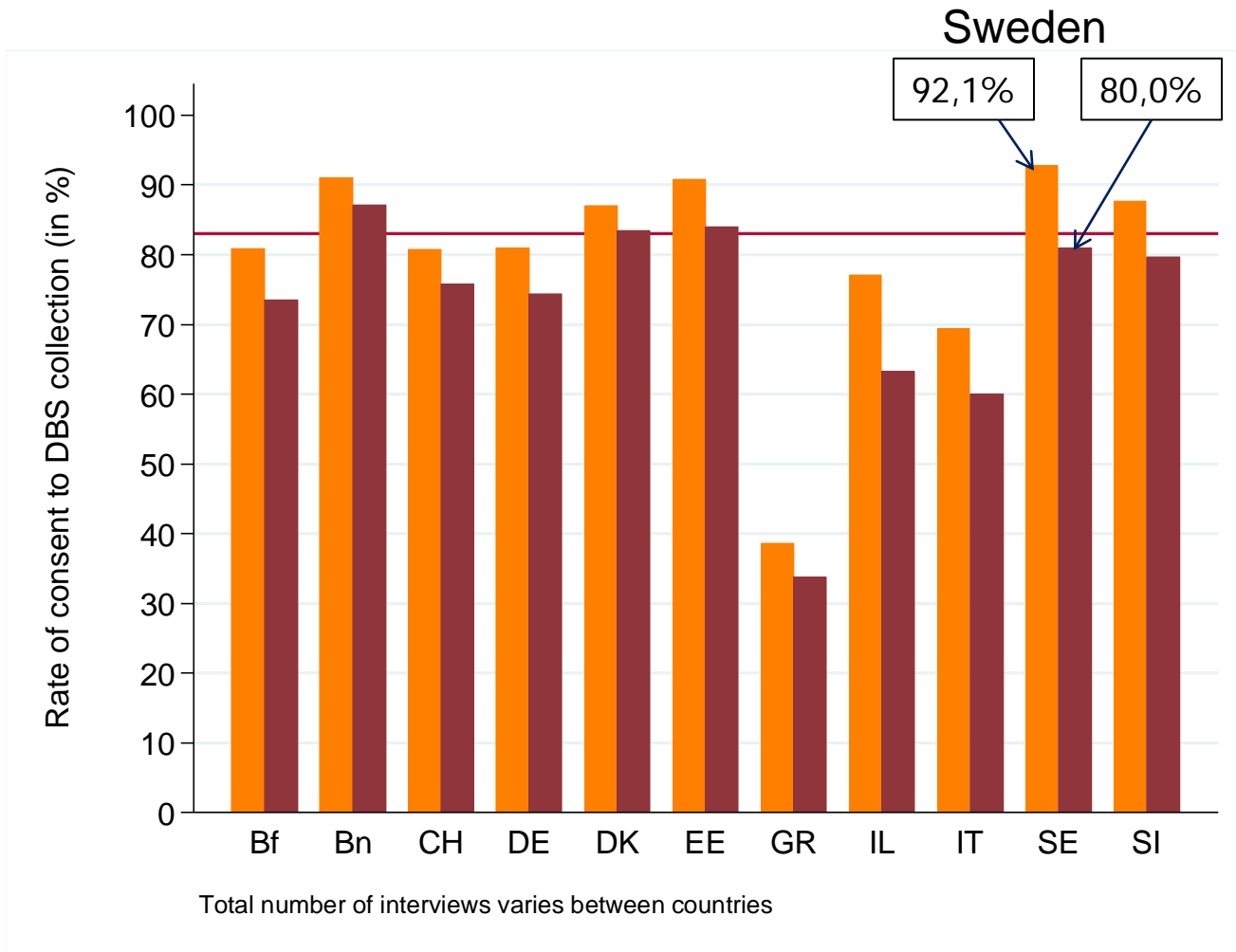
DBS analyses in SHARE



DBS in SHARE Wave 6

- ▶ SHARE wave 6: 13 countries collected DBS
- ▶ High participation rate in many countries
- ▶ SHARE has collected 27,000 DBS cards
- ▶ 23,000 DBS cards have at least one usable spots
- ▶ DBS cards stored in Denmark
In the Danish Twin Registry Biobank, at SDU

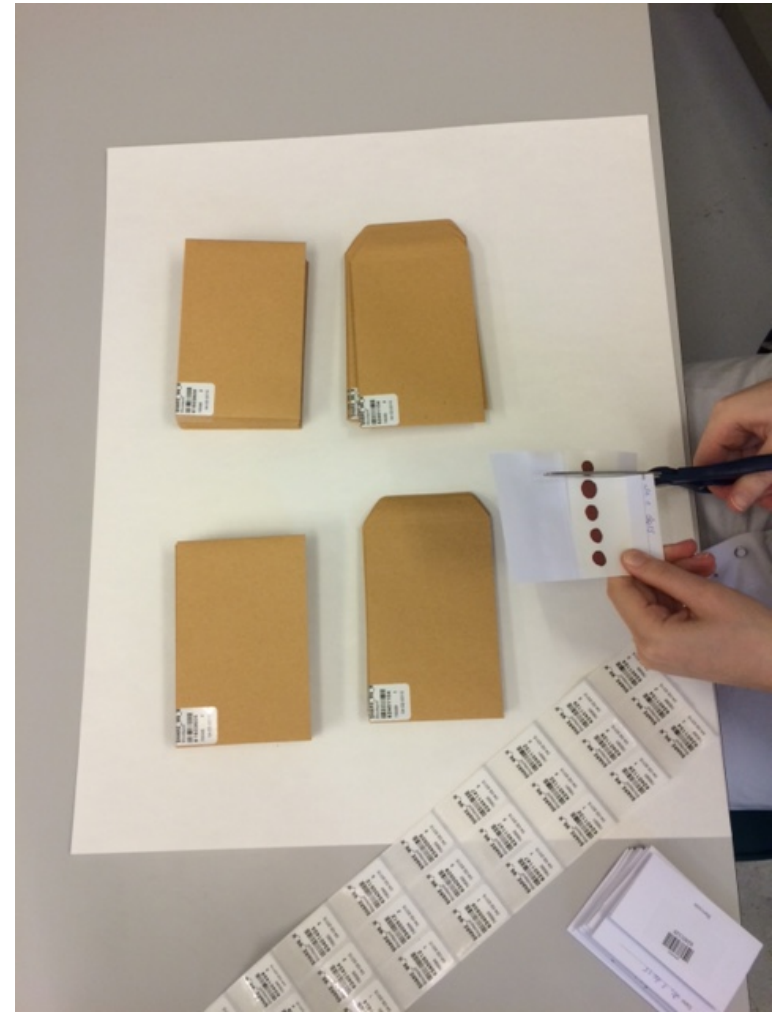
DBS consent rates



SHARE Total
consent rate:
78,7 %
(orange bars)

71,7%, if
medical
reasons are
counted as
refusal
(dark red bars)

SHARE Biobank: Arrival of DBS



Preparation for storage in Biobank

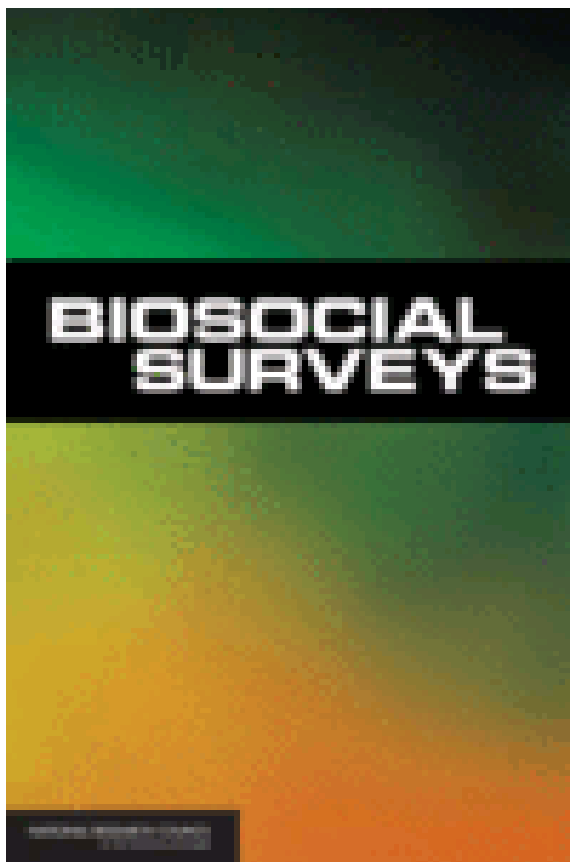
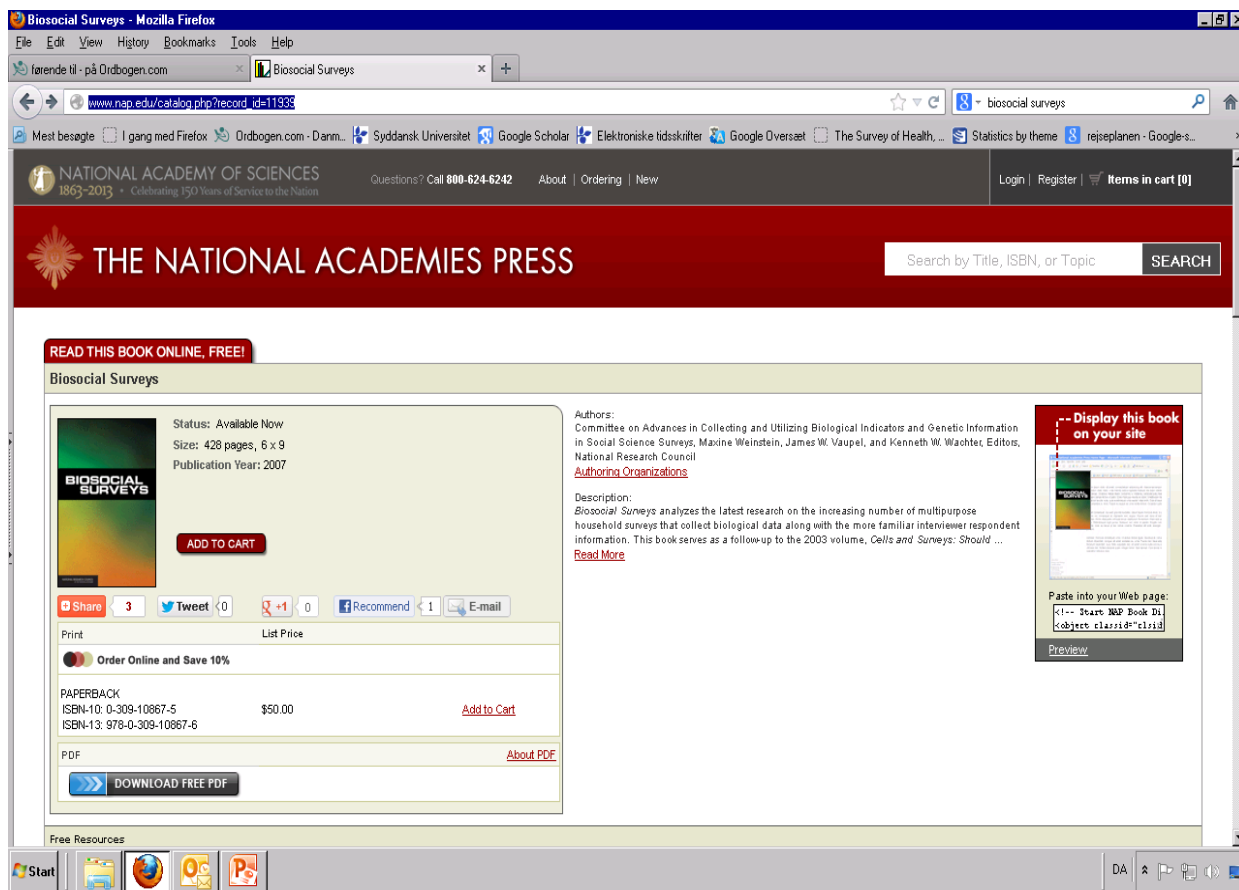


A future biomarker in SHARE ??

- ▶ Physical activity is inversely and strongly associated with CVD
- ▶ IL-6 is a likely mediator among others
- ▶ Measuring accellerometry in future SHARE waves?



NAP publication (2007)

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Committee on Advances in Collecting and Utilizing Biological Indicators and Genetic Information in Social Science Surveys, Maxine Weinstein, James W. Vaupel, and Kenneth W. Wachter, Editors, National Research Council
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Description:
Biosocial Surveys analyzes the latest research on the increasing number of multipurpose household surveys that collect biological data along with the more familiar interviewer respondent information. This book serves as a follow-up to the 2003 volume, *Cells and Surveys: Should ...*
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Relevant literature

- ▶ **Seeman T et al.** *Education, income and ethnic differences in cumulative biological risk profiles in a national sample of US adults: NHANES III (1988-1994).* Social Science and Medicine 2008;66:72-87.
- ▶ **McDade T W et al.** *What a drop can do. Dried Blood Spots as a minimally invasive method for intergrating biomarkers into population-based research.* Demography 2007;44 (4):899-925.
- ▶ **Aiello A E and Kaplan G A.** *Socioeconomic position and inflammatory and immune biomarkers of cardiovascular diseaese: applications to the panel study of income dynamics.* Biodemography and Social Biology 2009;55 (2):178-205

And a special publication on DBS

- ▶ Li, Wenkui, and Mike S. Lee, eds. *Dried Blood Spots: Applications and Techniques*. John Wiley & Sons, 2014.
- ▶ Several chapters on the use of DBS in different settings

THANK YOU FOR YOUR ATTENTION