

# Biomarkers Dried Blood Spots and Health

SHARE Health Area Coordinator  
SHARE Biobank Coordinator  
Karen Andersen-Ranberg, MD, PhD  
Danish Ageing Research Centre  
University of Southern Denmark

# This is SHARE !

Health

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

Wealth

Social network

# This is SHARE !

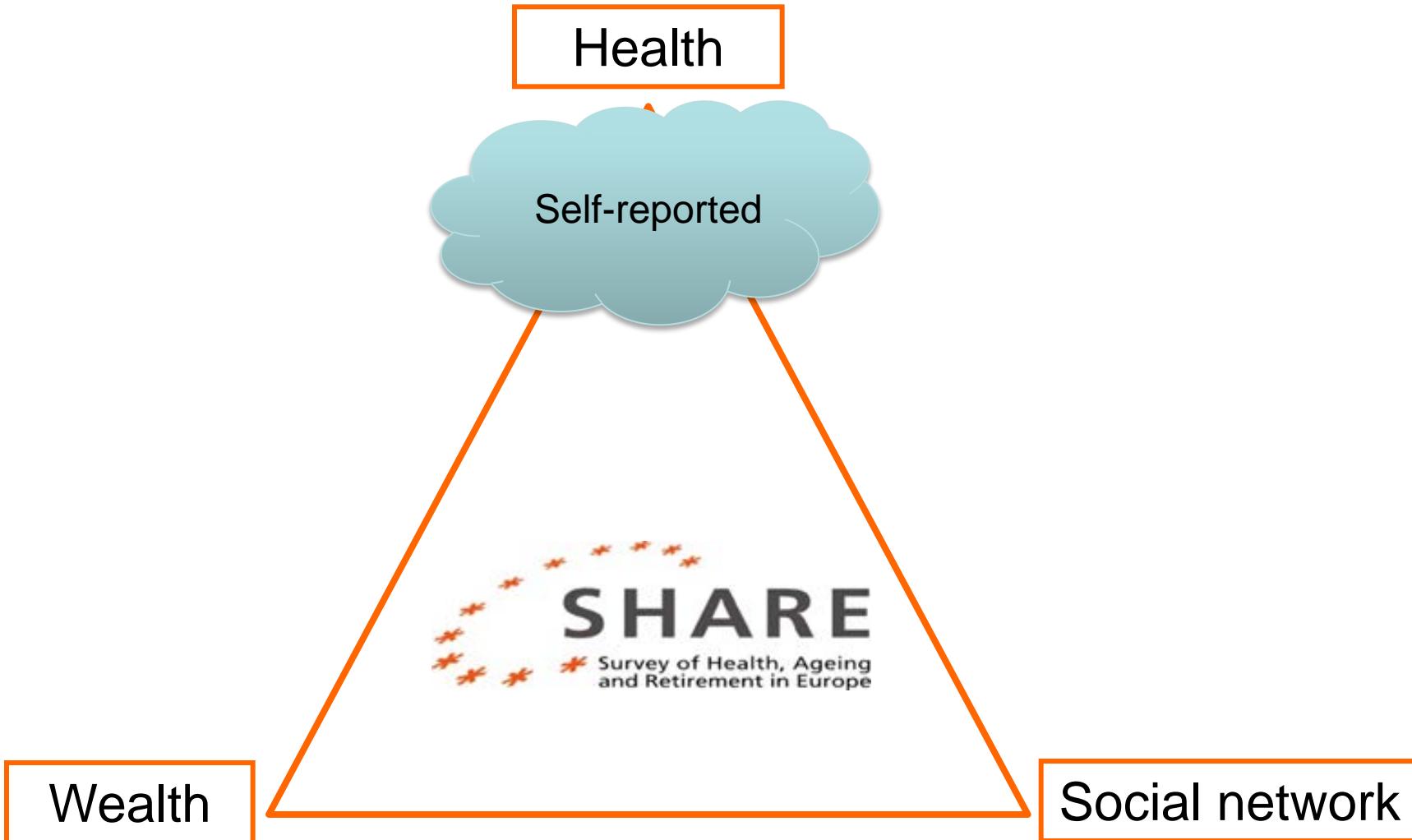
Health

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



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

Wealth

Social network

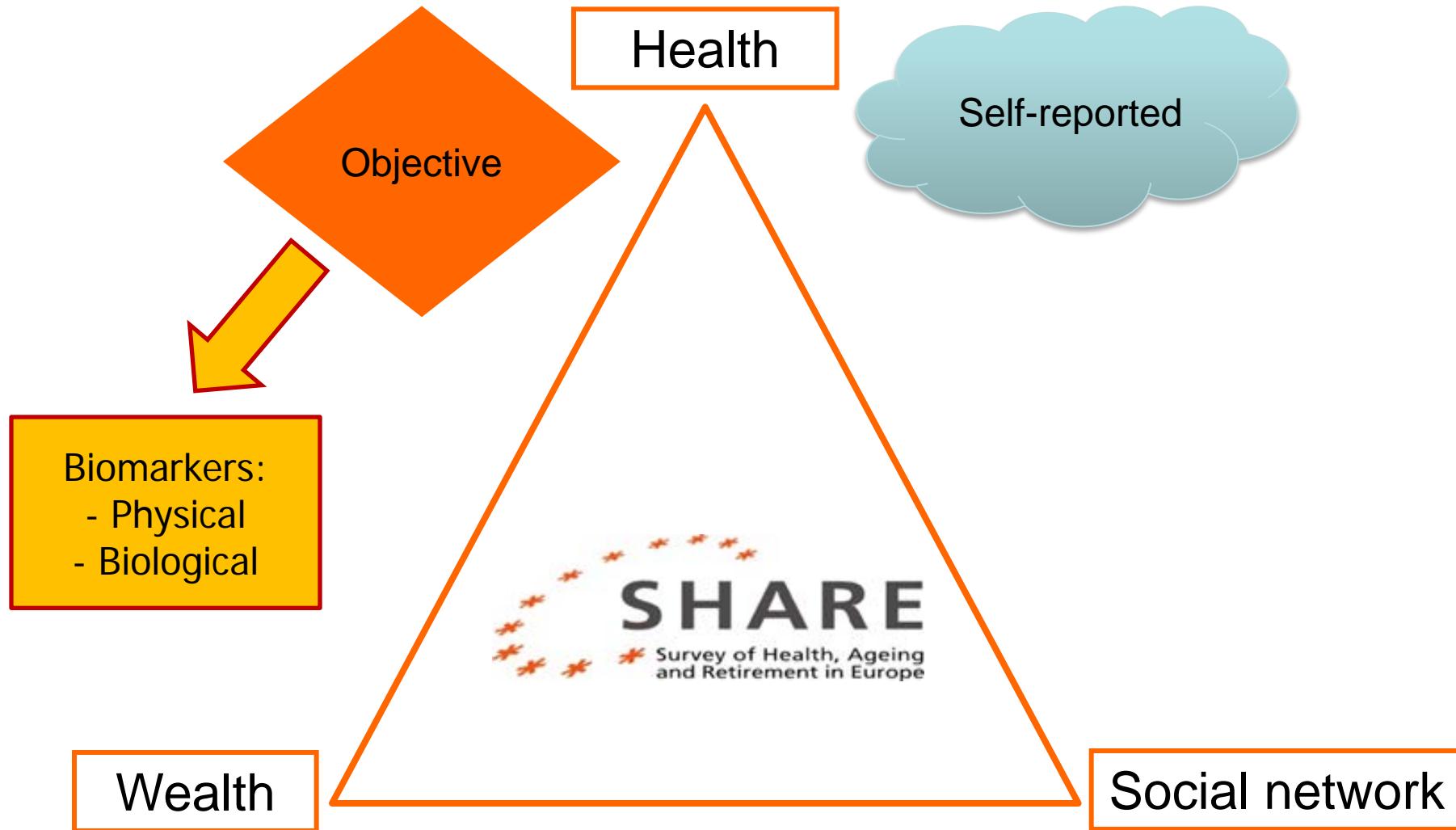
# "How is your health in general?"



# "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)

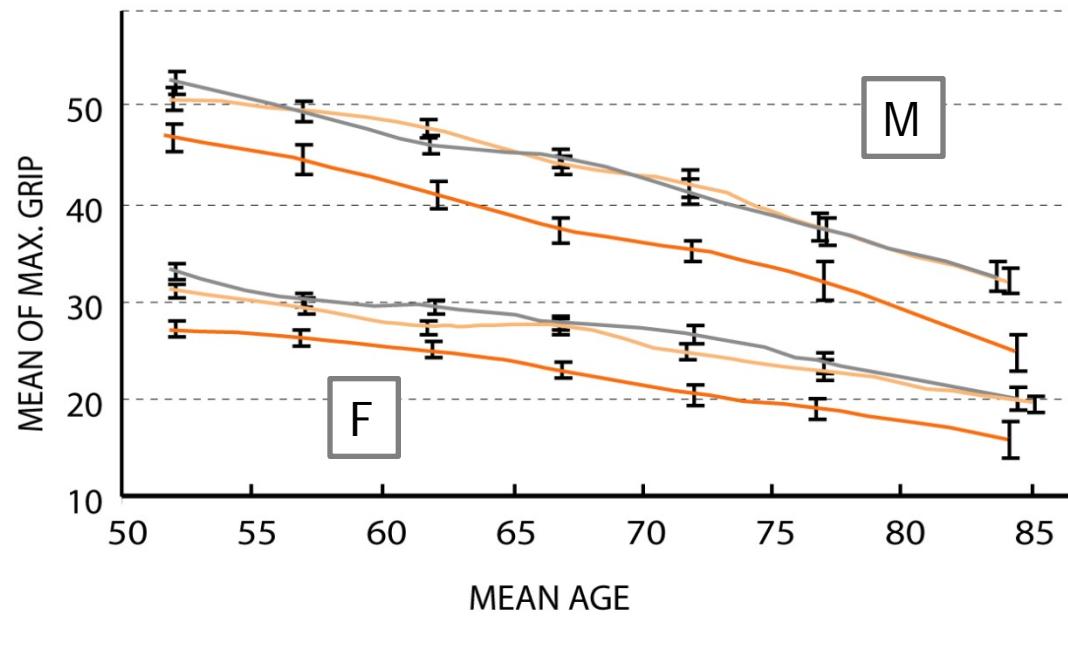


## Age dependent decline, - but compared to your peers:

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



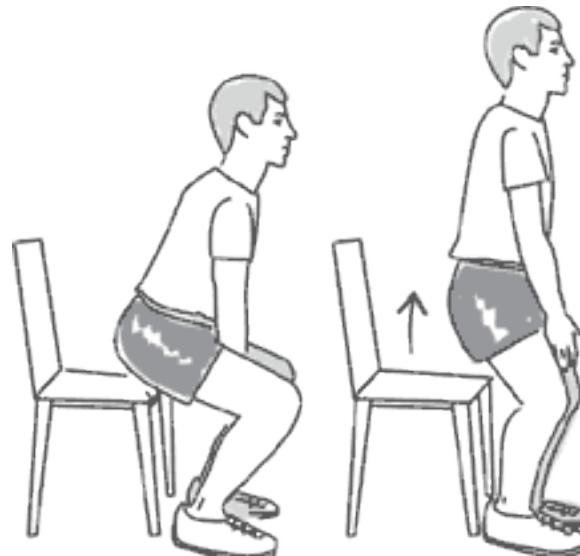
Andersen-Ranberg et al. Eur J Ageing 2009



SHARE has shown a European geographical difference in grip strength

**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:**

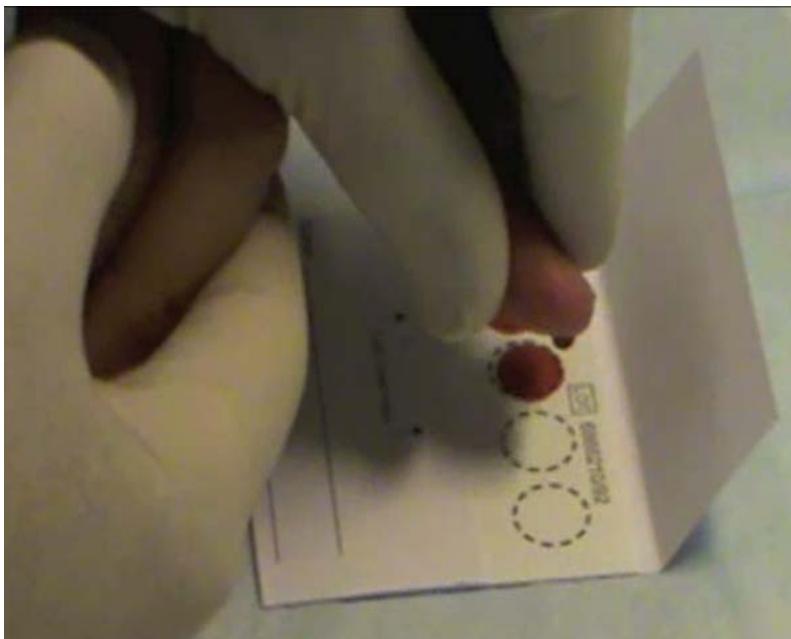
- ▶ A valuable marker for chronic lung disease
- ▶ Measures lung strength (capacity)
  - ▶ Predicts mortality



# 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?



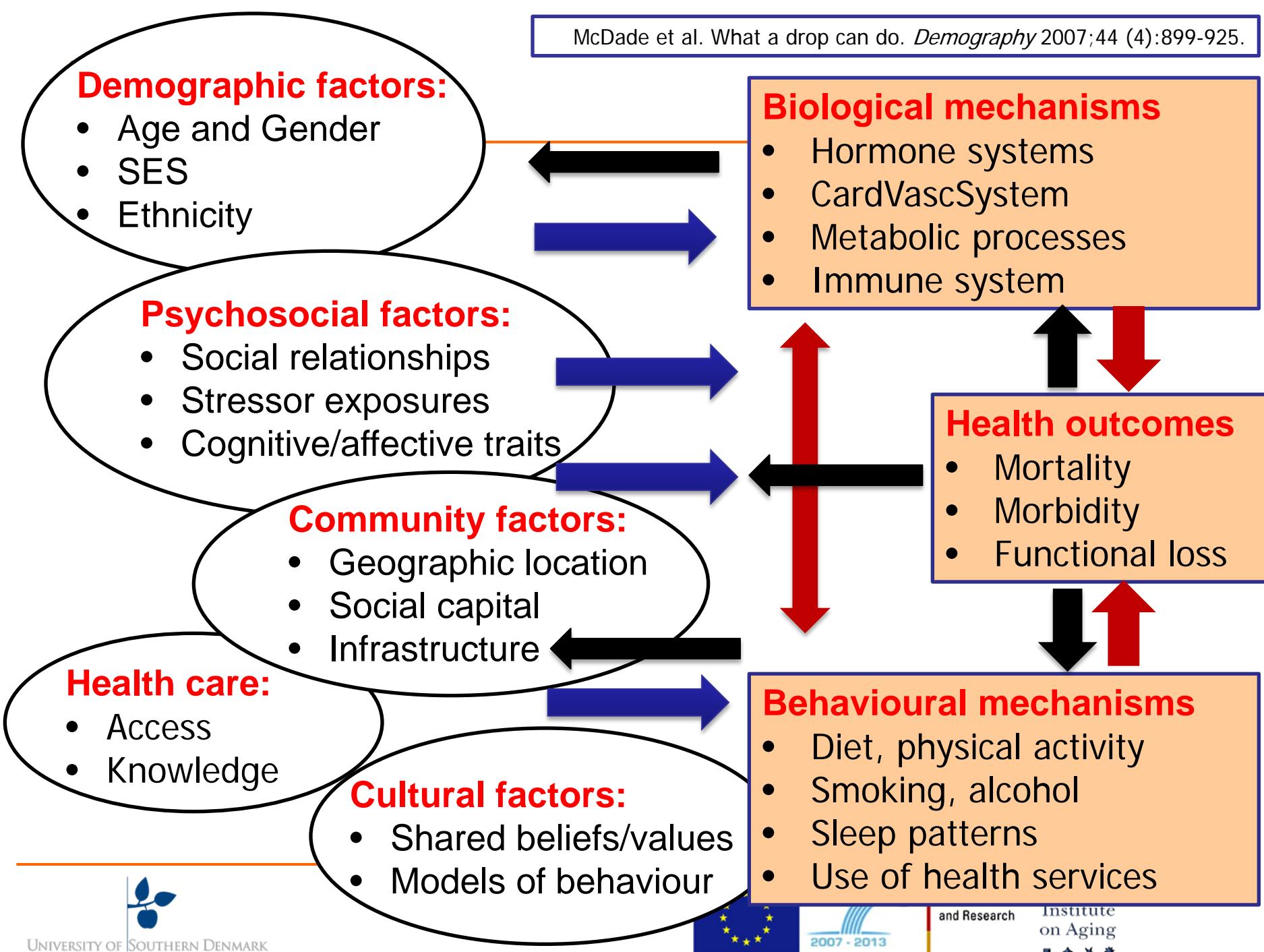
All newborn infants are screened for Phenylketonuria (PKU)  
– a treatable genetic disease

PKU is analysed in Dried Blood Spots (DBS)

Other biochemical markers can be analysed as well!

# WHY DO WE WANT BLOOD ?





# Low grade inflammation/"inflammaging"

Consistent findings in cohorts of older people

**increased levels of TNF- $\alpha$ , 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



### ► Lower SES

- greater risk for poorer cognition and physical functioning
- associated ↑ CRP, IL-6, TNF- $\alpha$
- 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- $\alpha$  being significant covariates

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

### ► 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**

## ► 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- $\alpha$

- Occupation status (Steptoe 2002)



## ► CRP - IL-6 - TNF- $\alpha$

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

## ► IL-6

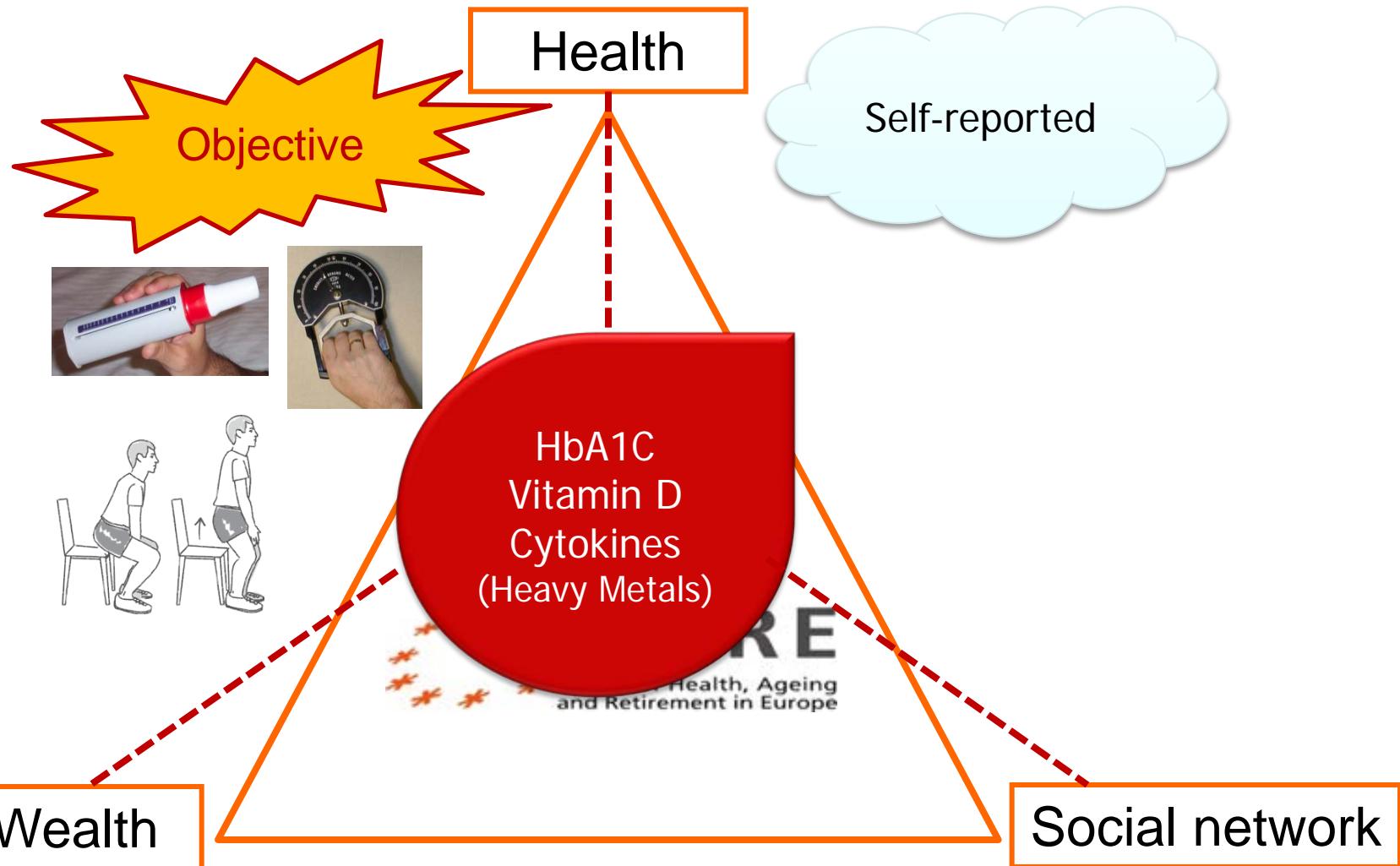
- Chronic stress and caregiving to a demented spouse (Kiecolt-Glaser 2003)



# 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

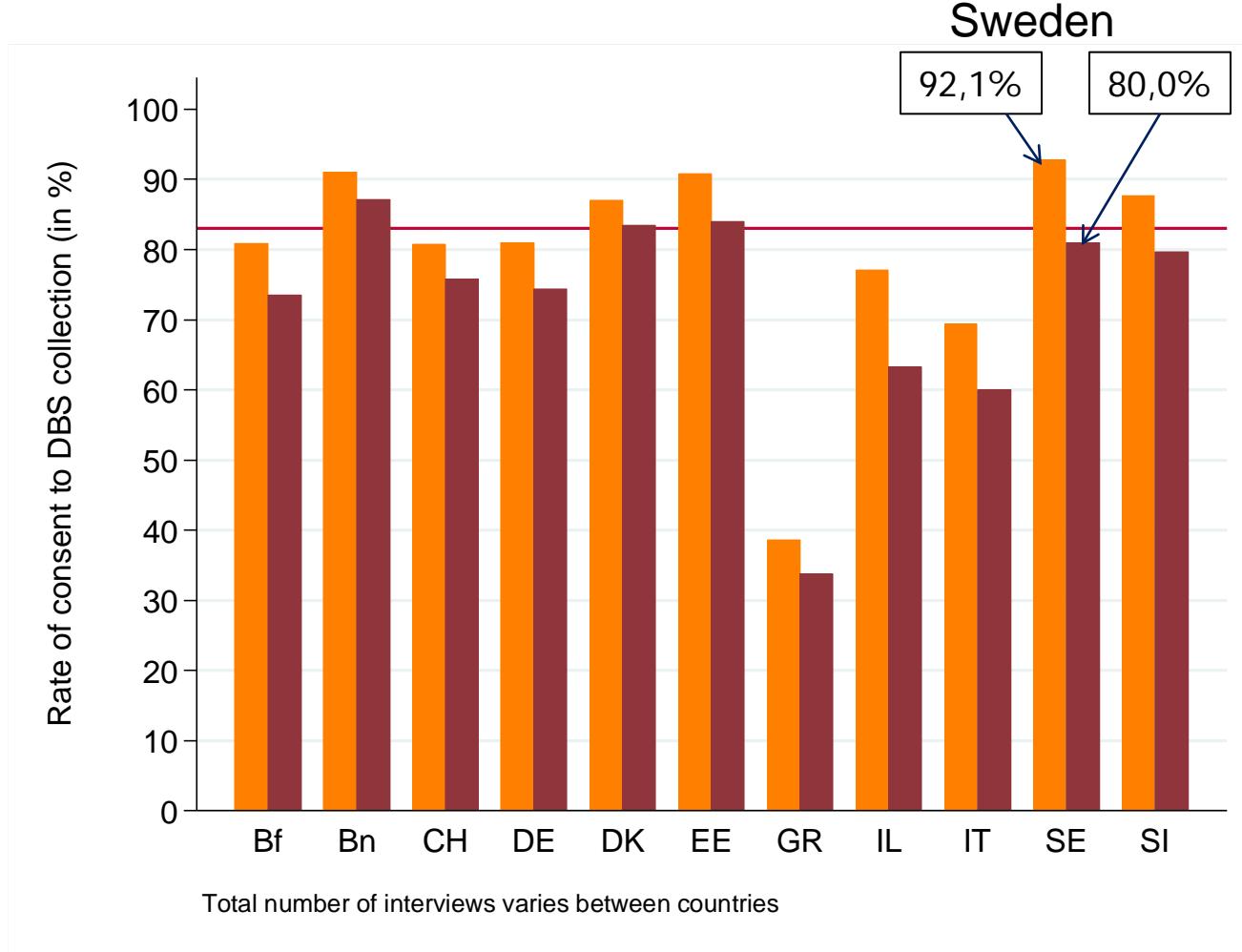
# DBS analyses in SHARE



# 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

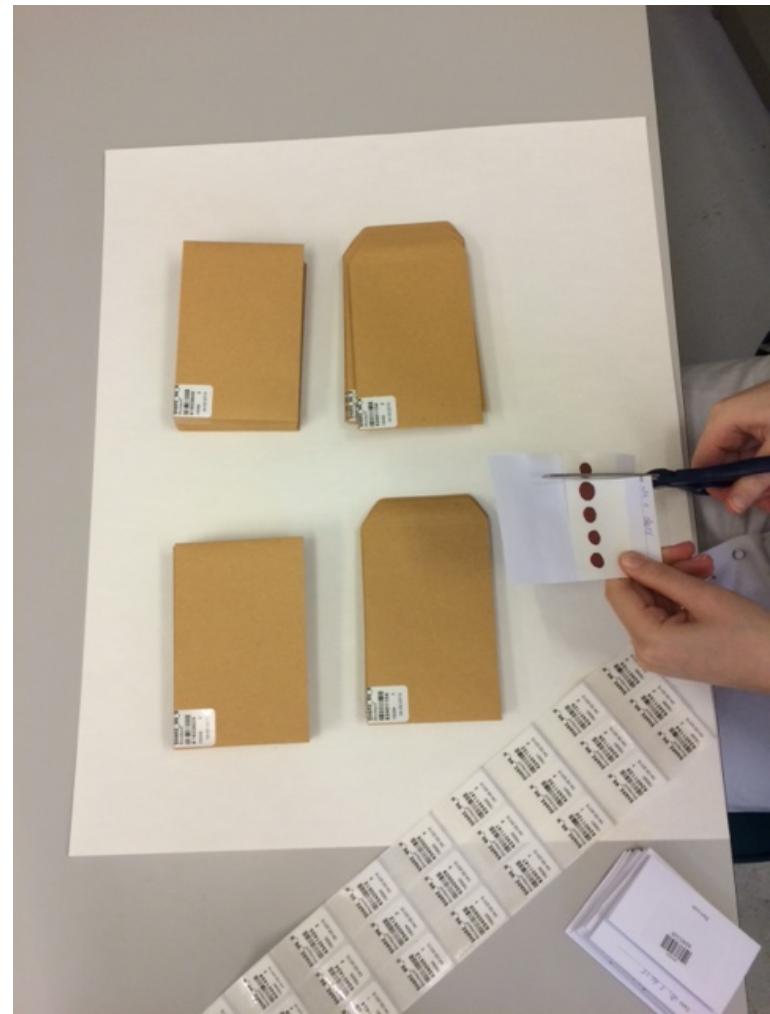
# DBS consent rates



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

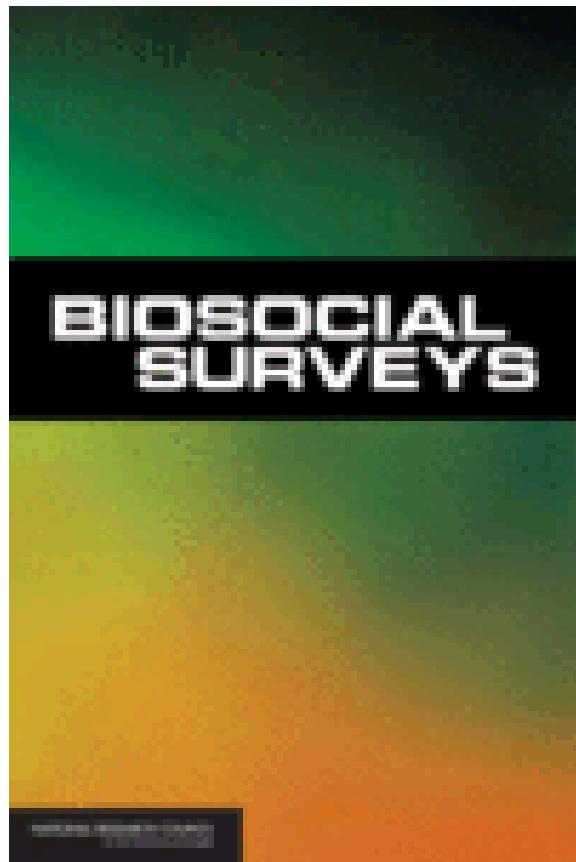


# A future biomarker in SHARE ??

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



# NAP publication (2007)



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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 integrating 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 disease: applications to the panel study of income dynamics*. Biodemography and Social Biology 2009;55 (2):178-205

# And a special publication on DBS

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- ▶ 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**

