

# Health Status and Mortality: A Study of the National Health Interview Survey

Dr. Natalia S. Gavrilova, Ph.D.

Dr. Leonid A. Gavrilov, Ph.D.

NORC at The University of Chicago  
Chicago, Illinois, USA

Collaborative For Innovation in Data & Measurement in Aging (CIDMA) Institute Workshop

# Health and Mortality

**We know about healthy life expectancy**

**But what about life expectancy of healthy?**

**Or unhealthy?**

This study tried to answer this question

# Main Data Source

**CDC's National Health Interview Survey (NHIS) 2010-2019, one of the largest nationally representative health surveys**

Interviews are conducted every year for about 100,000 respondents

# Methods of data analysis:

- 1) **Age-specific prevalence by health status**
- 2) **Cross-sectional age-specific mortality by health status**
- 3) **Period life tables (life expectancy)**

# Period Life Tables

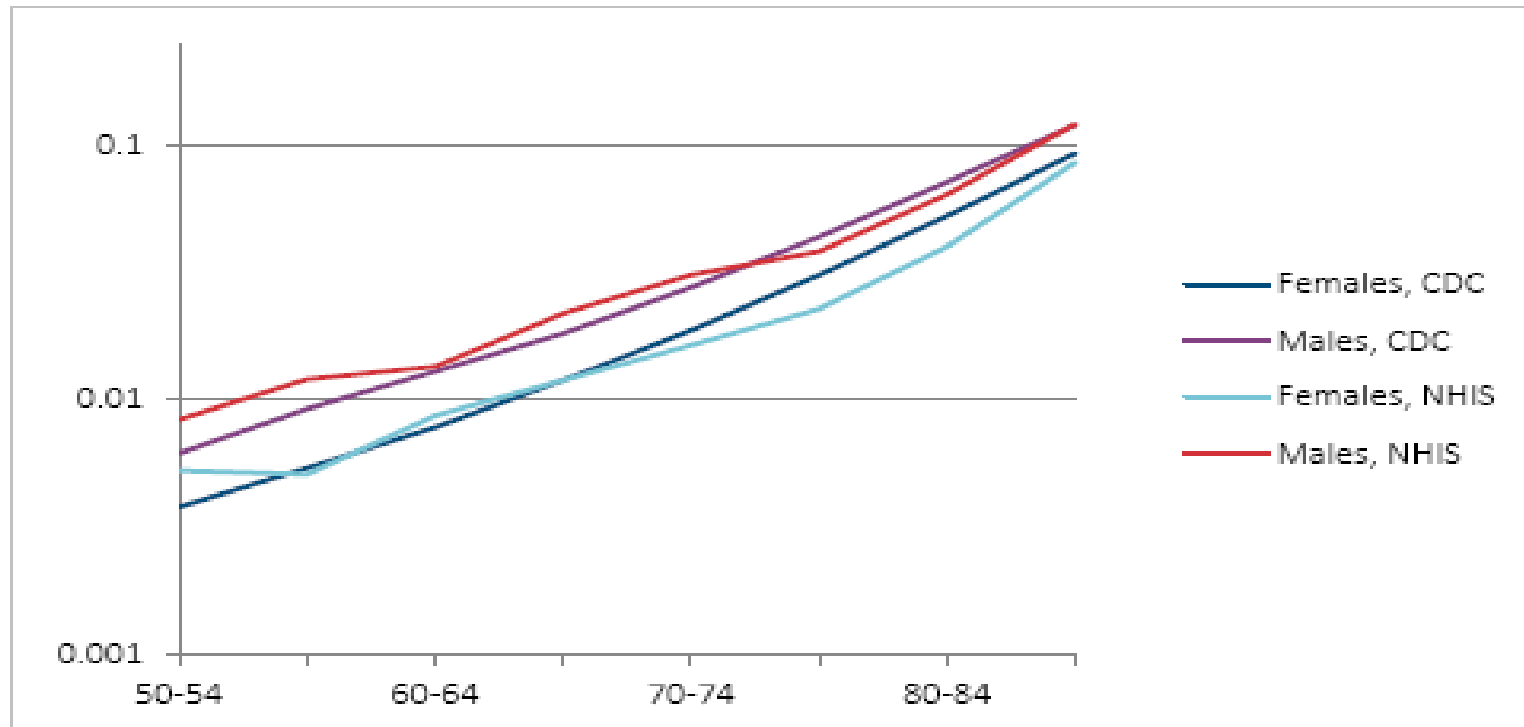
**Construction of period life tables by health status using methods applied for small areas of the population. Applied methods proposed by Chiang (1978).**

**Estimation of life expectancy and its 95% confidence intervals**

**A period life table is the most effective way of summarizing mortality experience of a population and can also be used to make statistical inferences and comparisons between different populations**

## Validation of our life table method – Comparison with official data

MORTALITY (LOG SCALE) AFTER AGE 50 FOR MALES AND FEMALES IN 2010–2014  
ACCORDING TO THE OFFICIAL CDC DATA AND ESTIMATES BASED ON THE NHIS DATA, CDC  
DATA TAKEN FROM THE HUMAN MORTALITY DATABASE



Life expectancy at 45 for 2010-2014 Survey - men: **34.07** (33.18-34.97), CDC: **34.14**  
women: **40.99** (39.92-42.06), CDC: **37.88**

Collaborative For Innovation in Data & Measurement in Aging (CIDMA) Institute Workshop

# Definitions of Healthy and Unhealthy Status

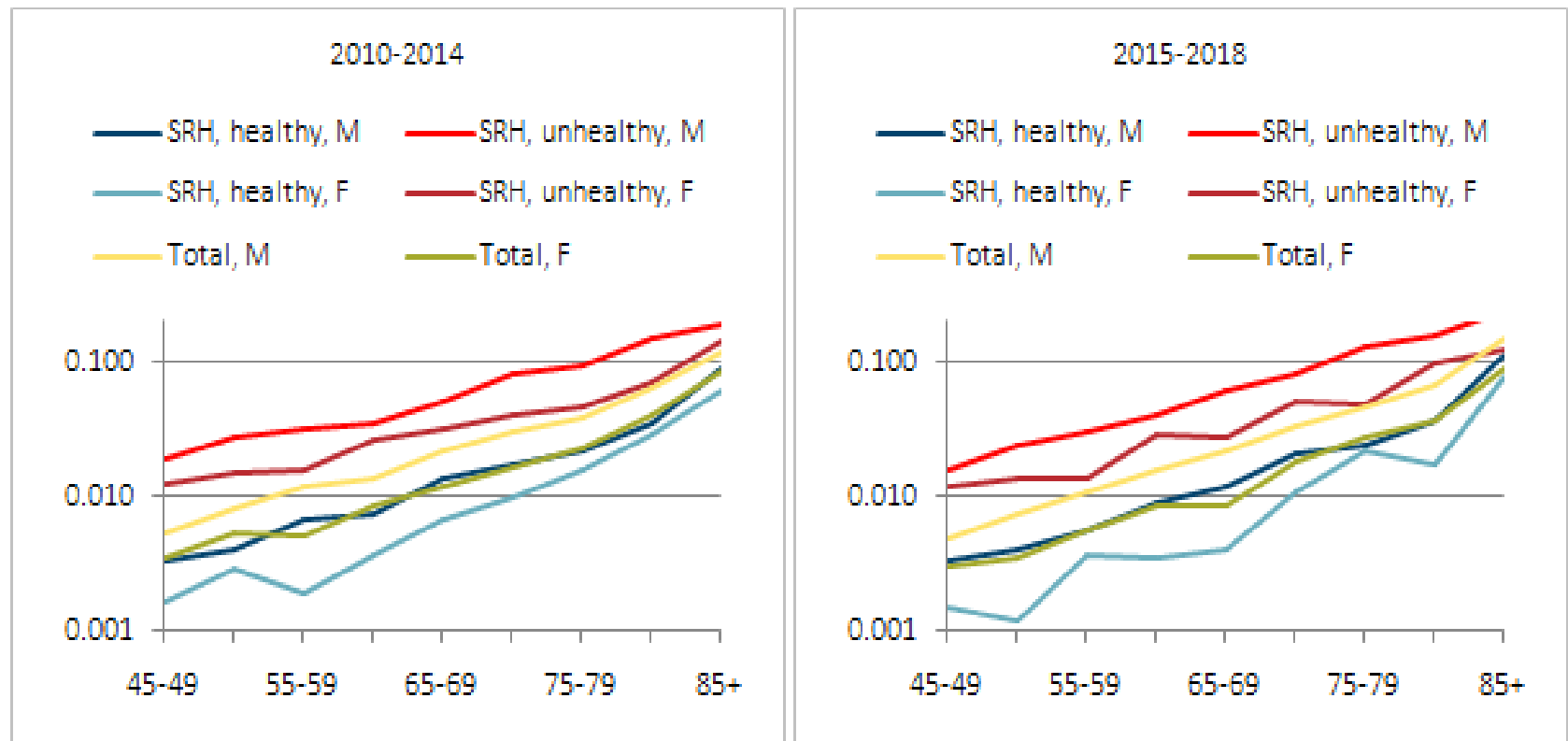
## Broad definitions of unhealthy status:

- Poor or fair self-rated health (SRH)
- Frailty Index (FI) values equal to or higher than 0.2 ( $FI \geq 0.2$ ); FI was based on 64 health conditions in NHIS



## Age trajectories of mortality for healthy and unhealthy respondents compared to all respondents

- AGE-SPECIFIC MORTALITY (LOG SCALE) OF HEALTHY AND UNHEALTHY U.S. MEN AND WOMEN IN 2010-2014 AND 2015-2018 ACCORDING TO THEIR SELF-RATED HEALTH BASED ON THE NHIS SAMPLE ADULT FILE FOR THE U.S. MEN AND WOMEN.¶



Poor or Fair Self-Rated Health is defined as unhealthy

# Rockwood's Frailty Index

Counts number of deficits (health problems) for each respondent

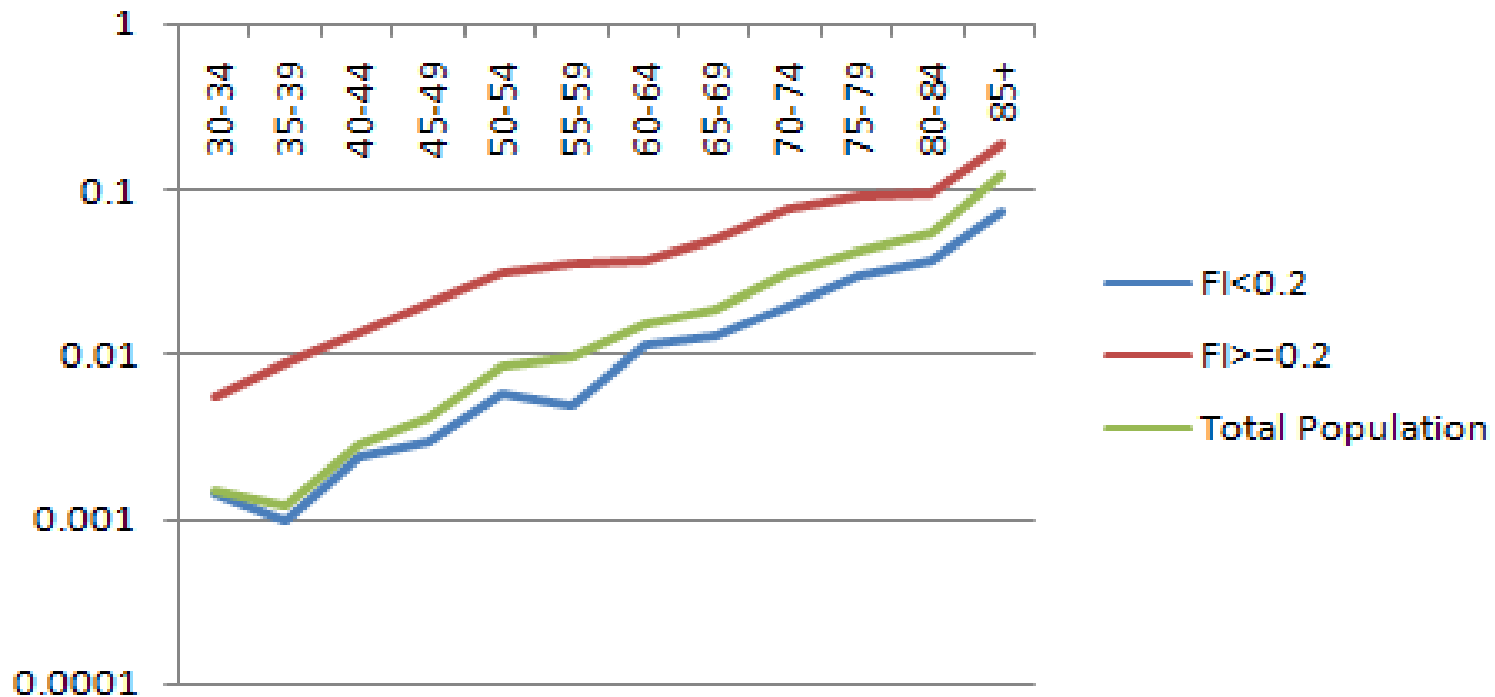
Calculates Frailty Index score by dividing the sum of the variables' recoded values (the sum of the deficits) by the number of variables measured for that person (or total possible number of deficits).

Major domains of health deficits used to construct Frailty Index:  
Presence of chronic diseases. Disability (limitations of activity including IADL/ADL). Sensory problems. Mental problems.  
Smoking

Total number of deficits in the NHIS: 64

## Age trajectories of mortality for healthy and unhealthy respondents compared to the total population

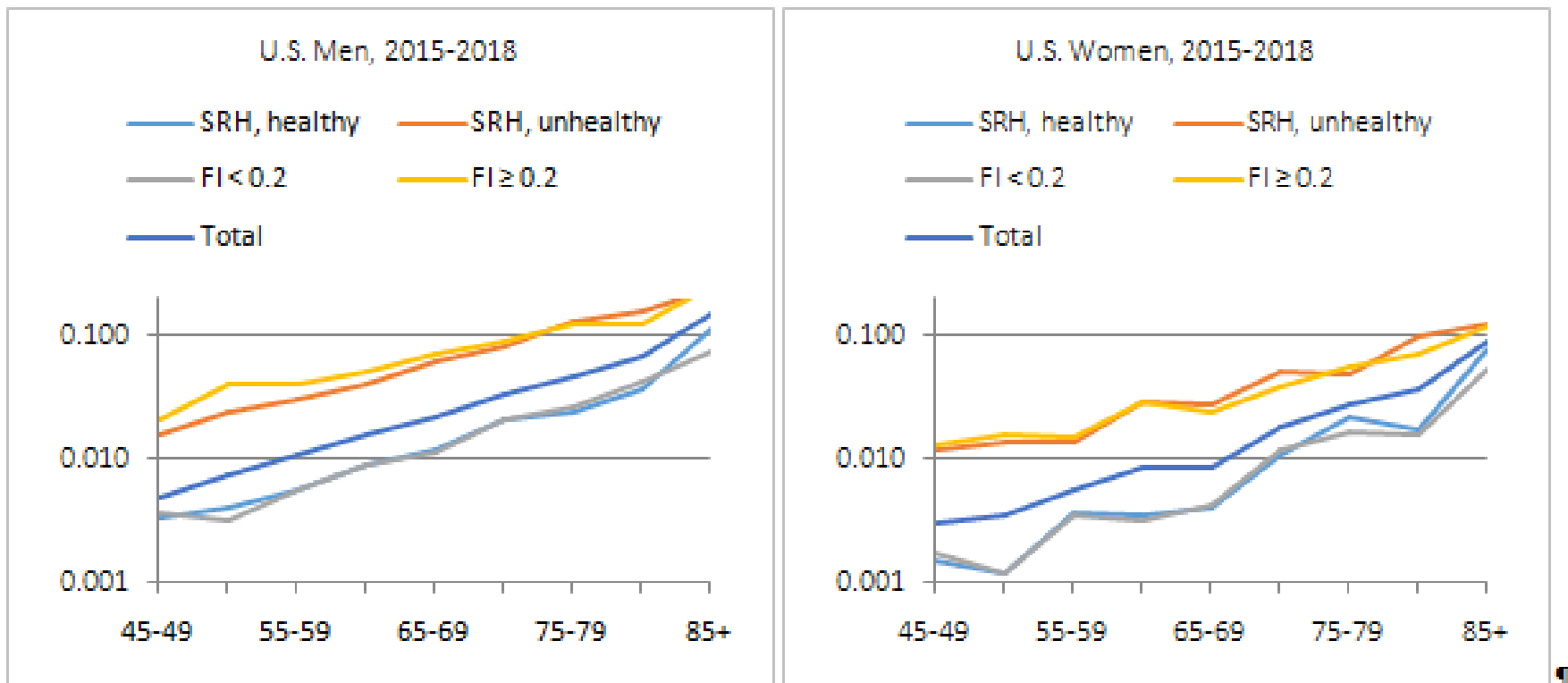
### Mortality of U.S. Men, 2015-2018



Definition of healthy and unhealthy used Frailty Index threshold equal to 0.2

## Unexpected result: Mortality of healthy and unhealthy respondents by two different definitions is similar

- AGE-SPECIFIC MORTALITY (IN LOG-SCALE) FOR MEN AND WOMEN IN 2015-2018 ACCORDING TO DIFFERENT DEFINITIONS OF HEALTH: (1) SELF-RATED HEALTH AND (2) FRAILTY INDEX (FI) WITH CUT-OFF EQUAL TO 0.2.



Mortality by two definitions is similar although SRH requires only one question while FI is based on 64 questions

# Life expectancy at age 45

## Men

Group	2010-2014		2015-2018	
	LE45	SE	LE45	SE
Total	35.25	0.26	34.42	0.24
FI<0.2	41.54	1.11	41.20	1.26
FI>=0.2	22.98	0.98	21.82	1.36
SRH, healthy	40.55	0.82	39.11	0.47
SRH, unhealthy	24.62	0.80	23.65	0.88

Life expectancy at age 45 in 2010-2014 is 34.23 years according to official data (CDC)

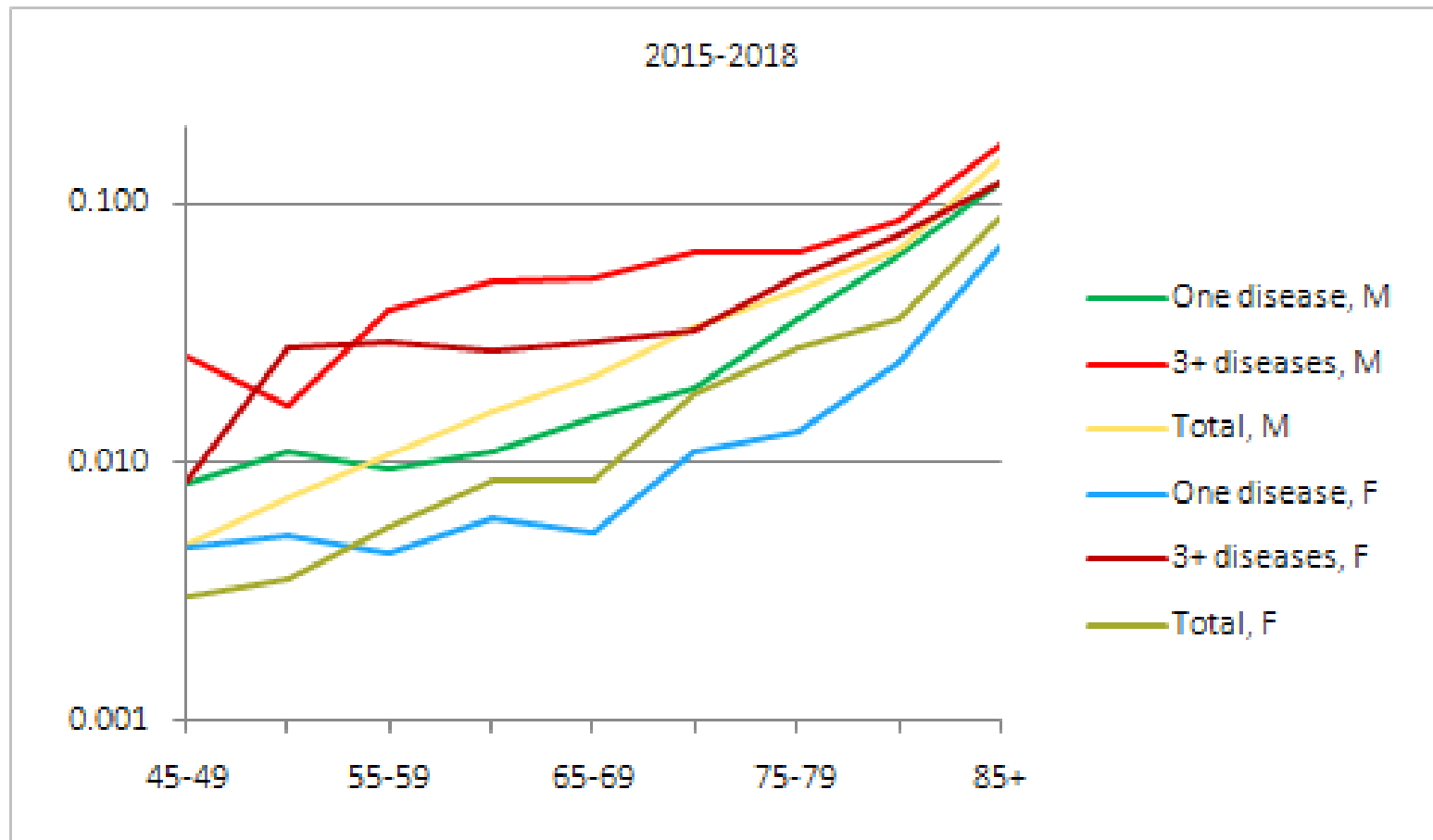
# Life expectancy at age 45

## Women

Group	2010-2014		2015-2018	
	LE45	SE	LE45	SE
Total	41.19	0.31	41.43	0.39
FI<0.2	50.81	1.69	50.42	2.95
FI>=0.2	30.79	0.89	29.68	1.23
SRH, healthy	46.55	0.90	46.16	0.80
SRH, unhealthy	30.69	0.81	29.86	1.05

Life expectancy at age 45 in 2010-2014 is 37.85 years according to official data (CDC)

# Mortality of respondents with multimorbidity



Mortality as a function of age, log scale

## **Key Takeaways**

- ❑ Persons with three or more chronic diseases had a significant increase in mortality versus individuals with one or two chronic diseases.**
- ❑ The self-rated health definition proved to be just as good of a measure for being unhealthy as the more sophisticated Frailty Index definition, which is based on 64 health conditions.**



# Specific definitions of unhealthy status:

- 1) mental conditions**
- 2) disability or activity limitation**
- 3) presence of chronic disease**  
**(based on a list of nine**  
**diseases)**

# Mental Conditions

Mental conditions were defined as a positive answer to at least one of the questions:

- (1) Person is limited by difficulty remembering;
- (2) Intellectual disability, e.g. mental retardation causes difficulty with activity;
- (3) Senility causes difficulty with activity (ICD-9 code for senility is 797 – senility without mention of psychosis);
- (4) Depression/anxiety/emotional problem causes difficulty with activity;
- (5) Other mental problem/ADD/bipolar/schizophrenia causes difficulty with activity.

✓ Memory problems (questions 1 and 3) were also studied separately. In NHIS questionnaire all mentioned mental problems were associated with difficulty of activity.

✓ Other mental conditions – questions 2,4,5

## Key Takeaway: Mental Conditions the Worst Group According to LE45

Group Male	2010-2014 LE45	95% Confidence Interval	2015-2018 LE45	95% Confidence Interval
No memory impairments	36.37	35.24-37.50	35.34	34.29-36.39
<b>Memory impairments</b>	<b>19.31</b>	16.76-21.85	<b>20.85</b>	17.78-23.91
No disability	45.55	41.92-49.18	43.20	36.15-41.39
Disability	23.55	22.11-24.99	22.86	21.18-24.54
No chronic diseases	42.90	39.00-46.80	39.76	37.28-42.24
Chronic diseases	31.25	30.15-32.36	30.64	29.45-31.83

Group Female	2010-2014 LE45	95% Confidence Interval	2015-2018 LE45	95% Confidence Interval
No memory impairments	44.59	42.97-46.22	44.11	42.51-45.70
<b>Memory impairments</b>	<b>24.82</b>	22.09-27.55	<b>25.49</b>	22.02-28.97
No disability	59.81	52.64-66.98	56.19	50.42-61.96
Disability	30.83	29.27-32.39	30.66	28.88-32.44
No chronic diseases	48.43	44.79-52.08	44.76	42.00-47.51
Chronic diseases	38.37	37.13-39.61	38.85	37.41-40.29

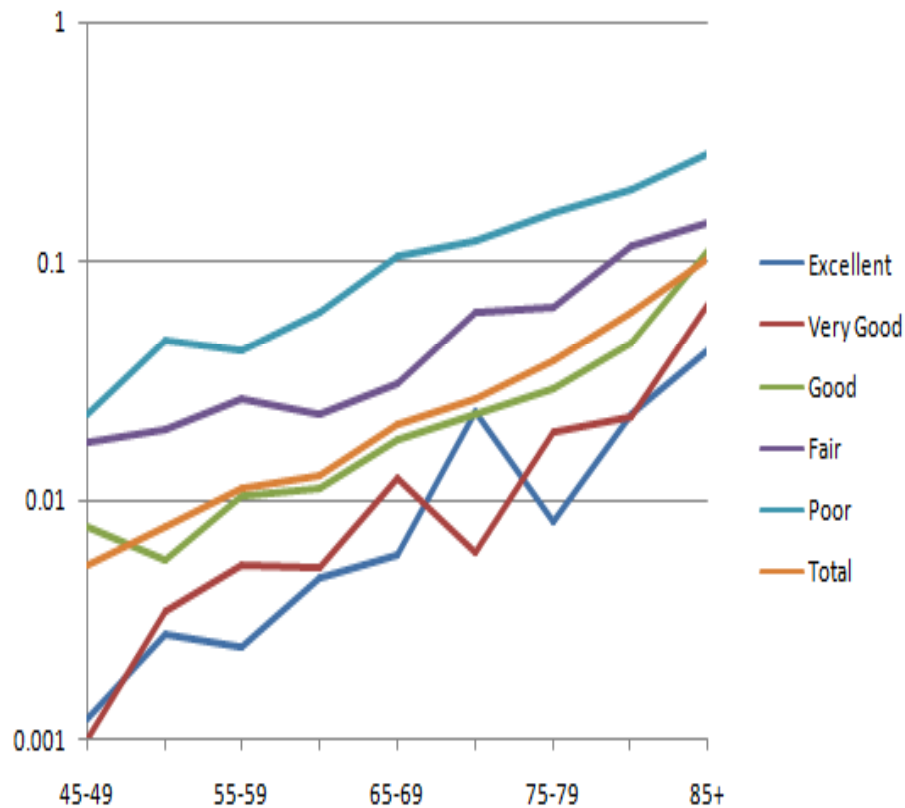
## **Key Takeaways**

- ❑ In comparing the unhealthy and healthy groups, regardless of definition employed, mortality was much higher for the unhealthy group.**
- ❑ The mental conditions subgroup had the lowest life expectancy at age 45 (LE45) compared to the disability and the chronic disease subgroups.**

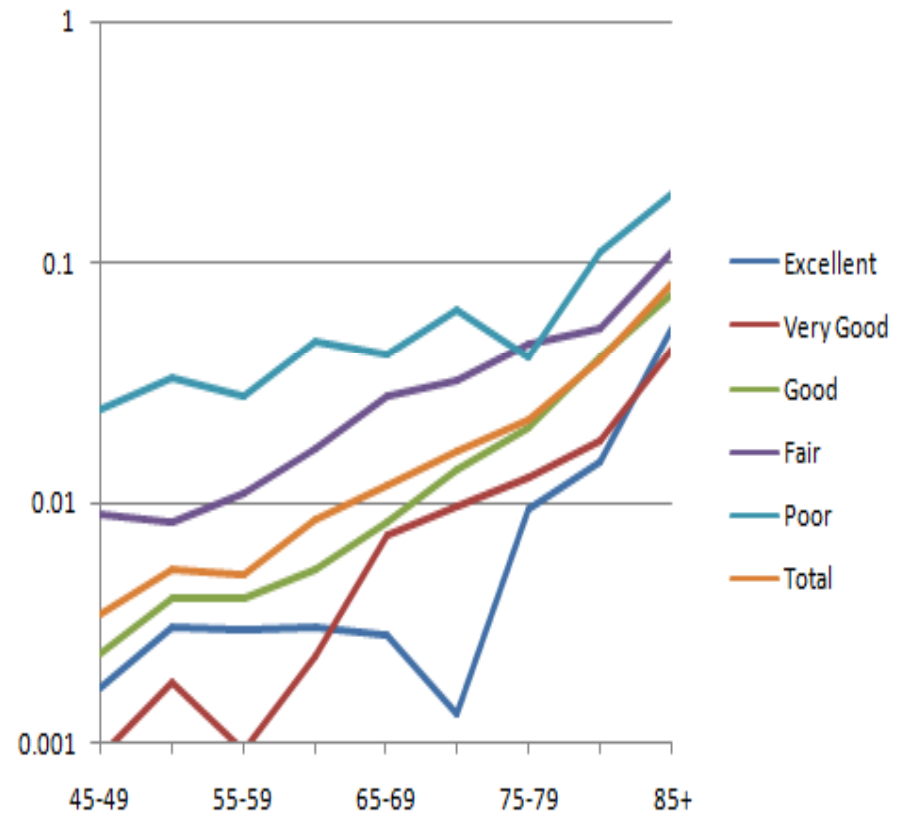
# **This Life Table Method Allows us to Answer Many Health-Related Questions**

# How Good is Reported Good Health Mortality by SRH Category

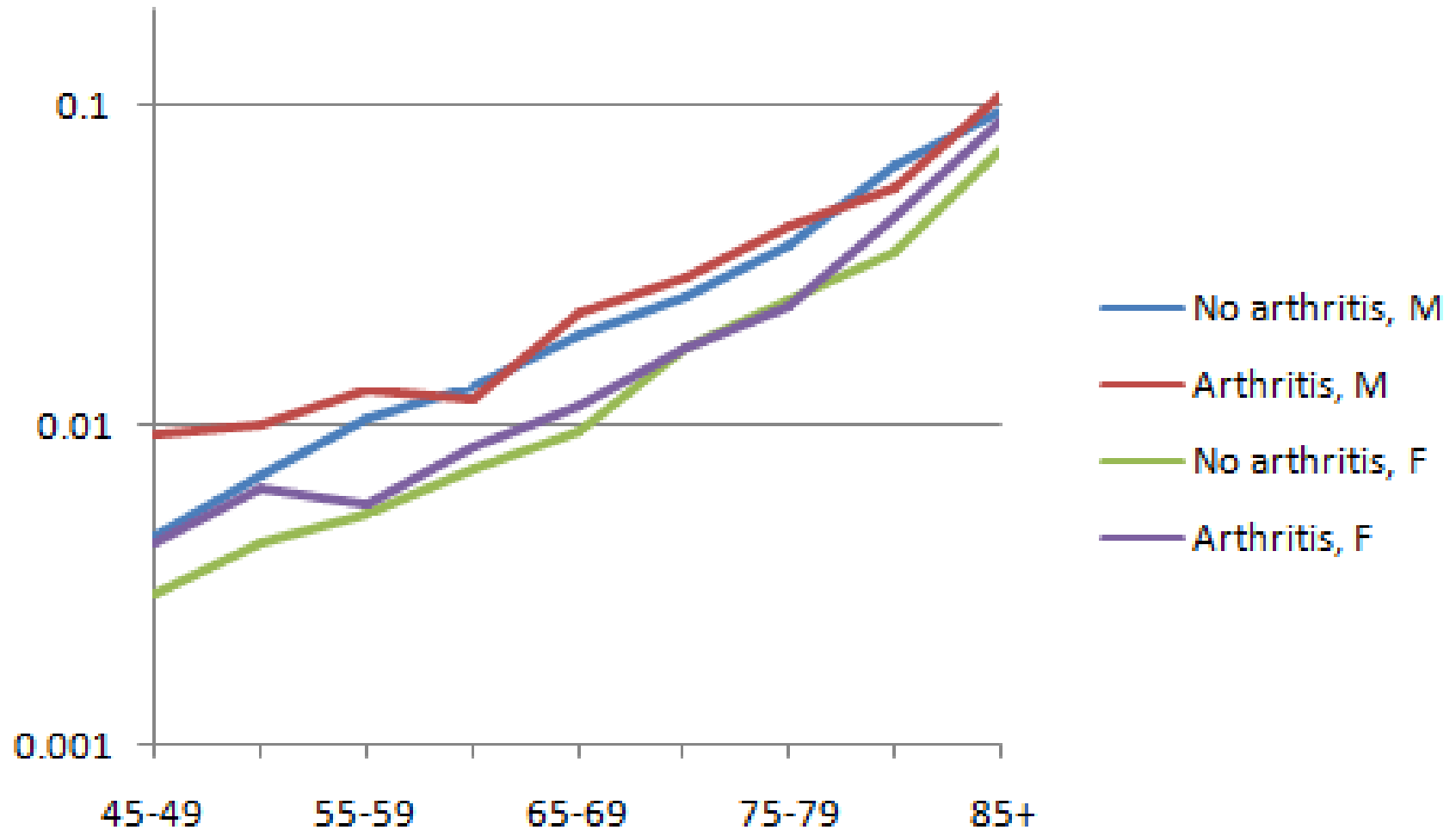
## Men, 2010-2014



## Women, 2010-2014



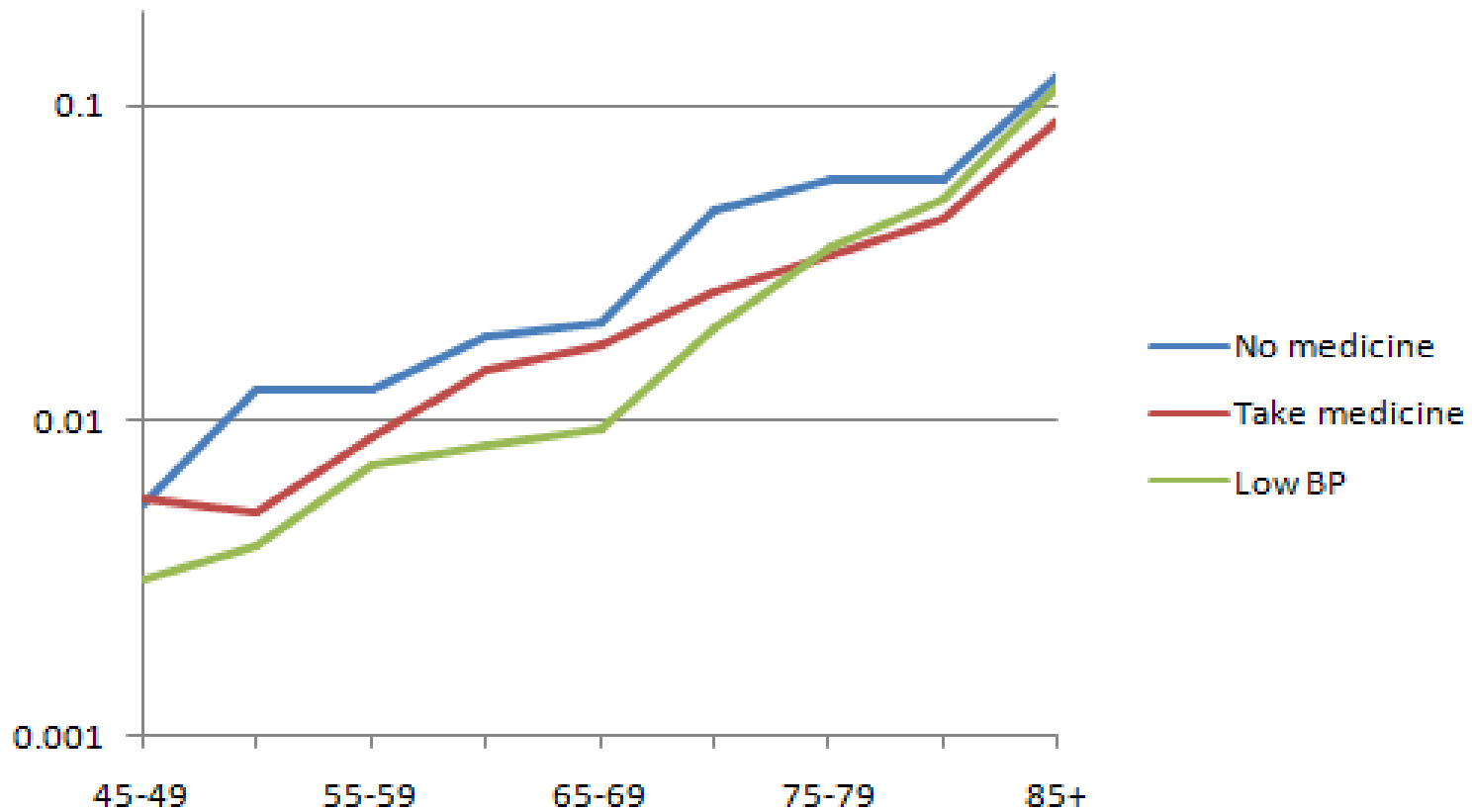
# Mild disease: Arthritis



Mortality as a function of age, log scale.

# Hypertension

Mortality by High and Low Blood Pressure, 2015-2018



Taking high blood pressure medicine helps to decrease mortality



Thank you for your attention!

Any questions and comments?

