



HEALTH

***Projections of Health Status and Utilization
for Older Americans***

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RAND

Acknowledgements

RAND

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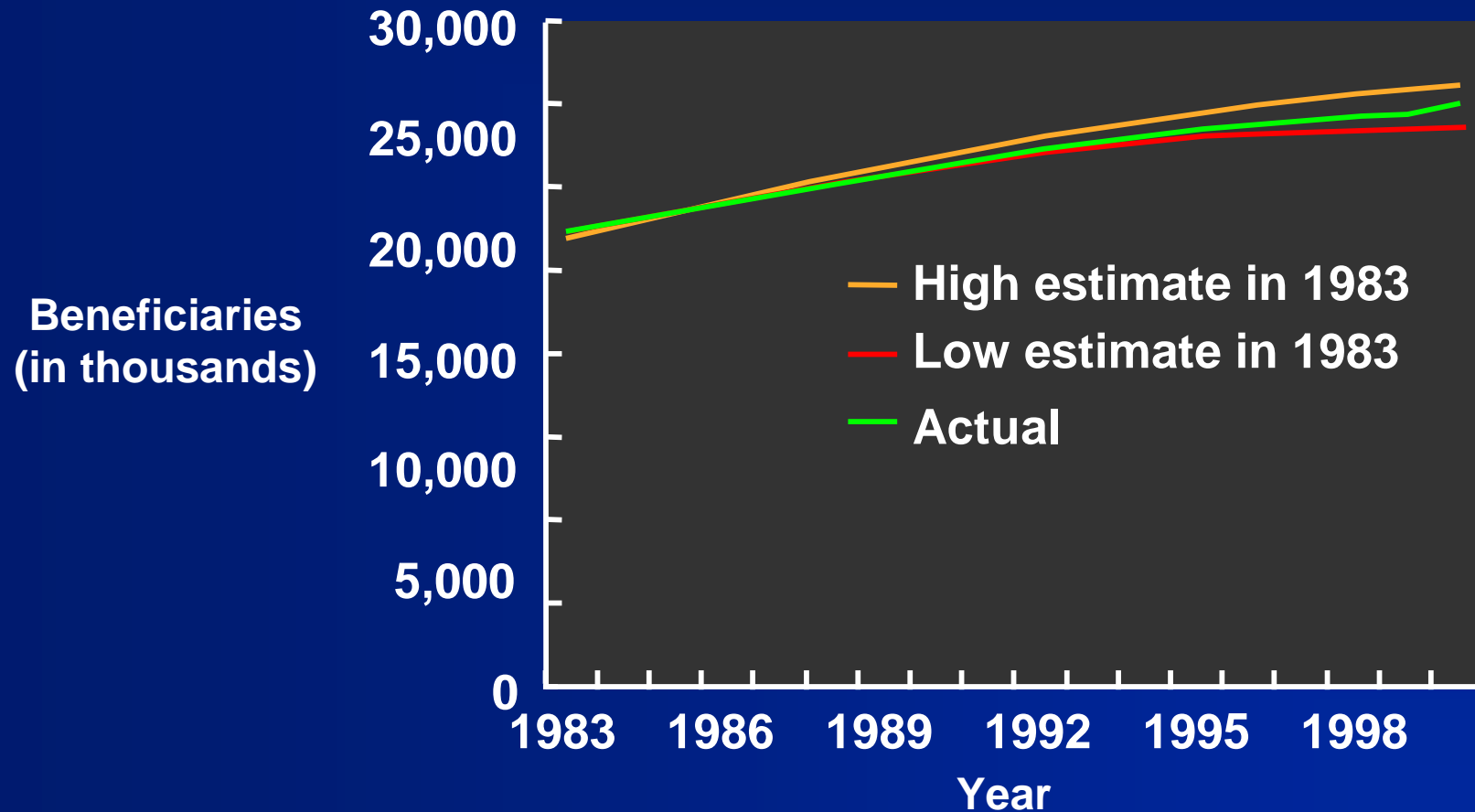
Roadmap of the Talk

- **Motivation and scope of the Future Elderly Model (FEM)**
- **Model structure, data sources and assumptions**
- **Projections of chronic disease prevalence and utilization under different scenarios**
- **Conclusions**

Motivation

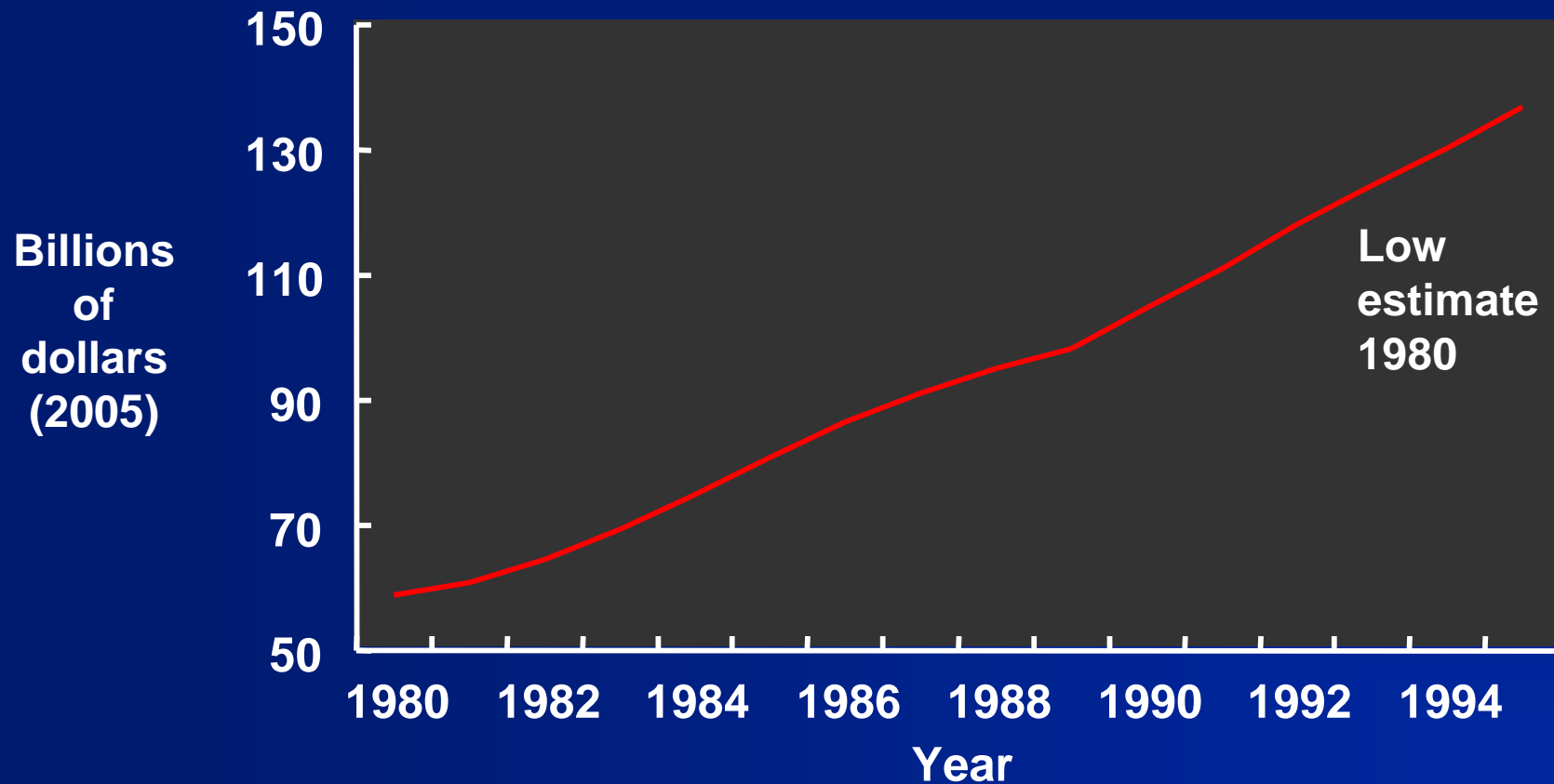
- We would like to predict how the future looks like:
 - How many Medicare beneficiaries?
 - How will their health look like?
 - What resources will they need?
 - ...
- How can we change the future if we do not like how it looks?

Government Does a Great Job Forecasting the Number of Medicare Beneficiaries



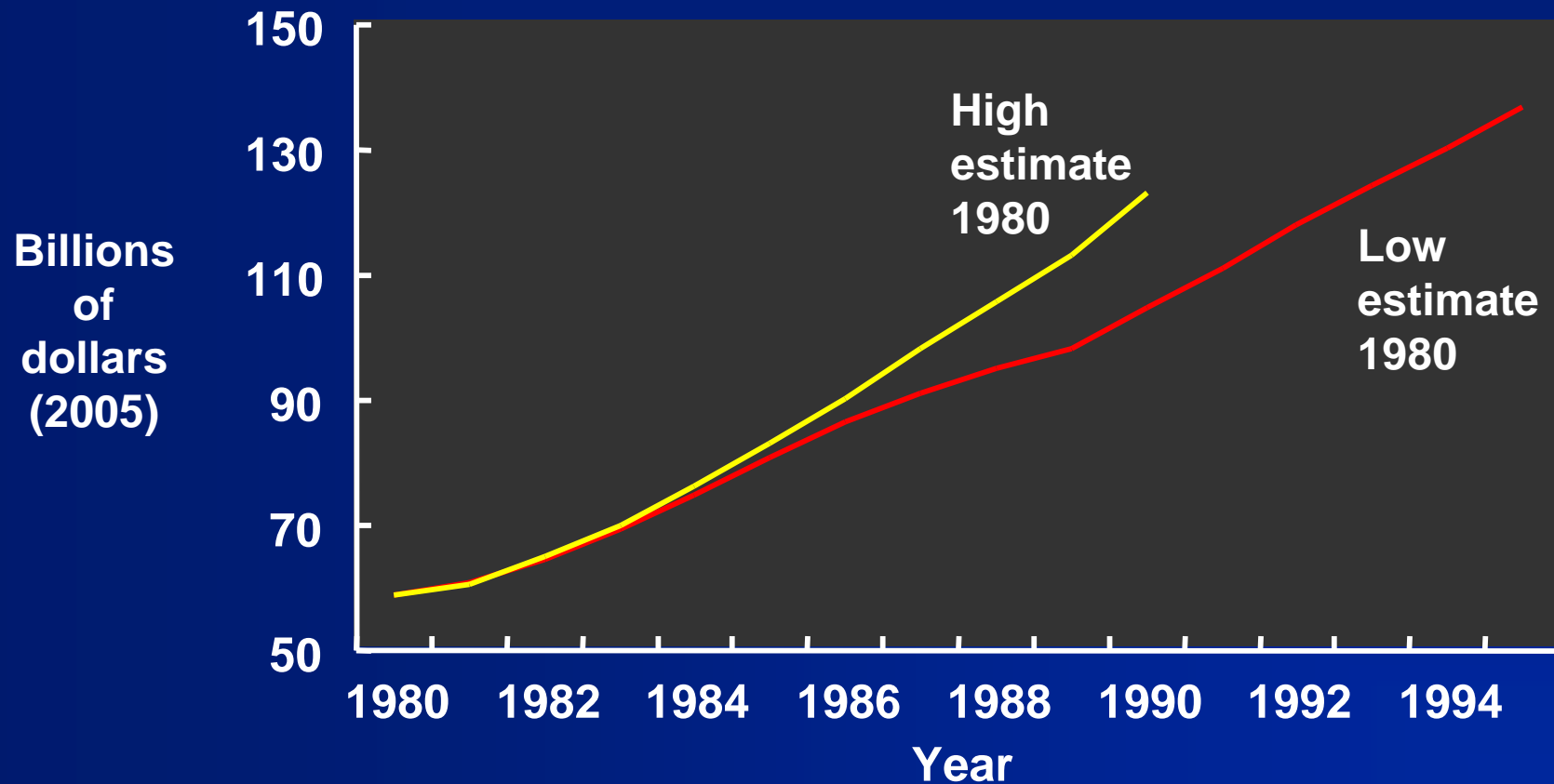
Medicare Spending is Harder to Predict

Medicare Part A spending (hospital insurance)



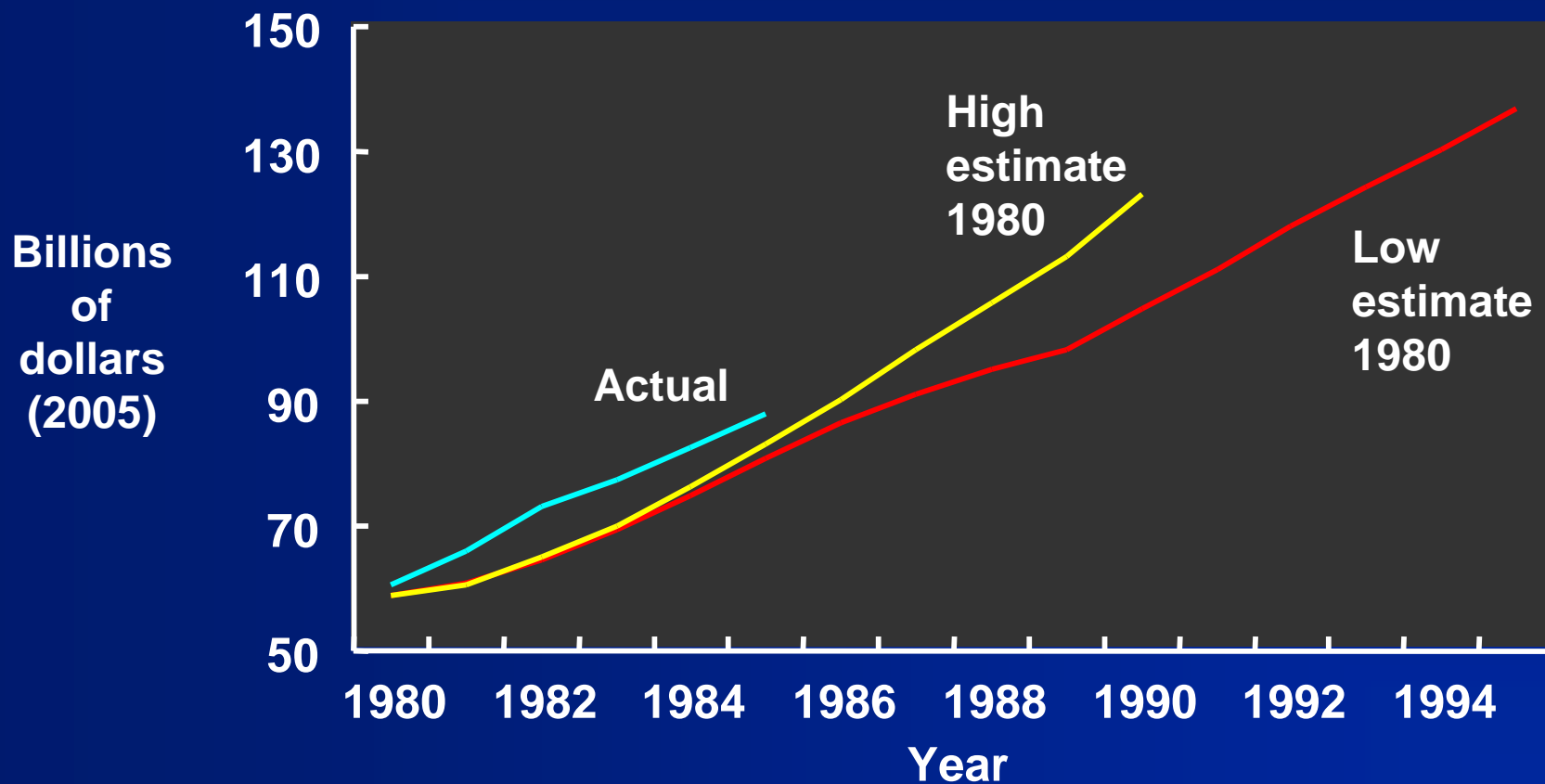
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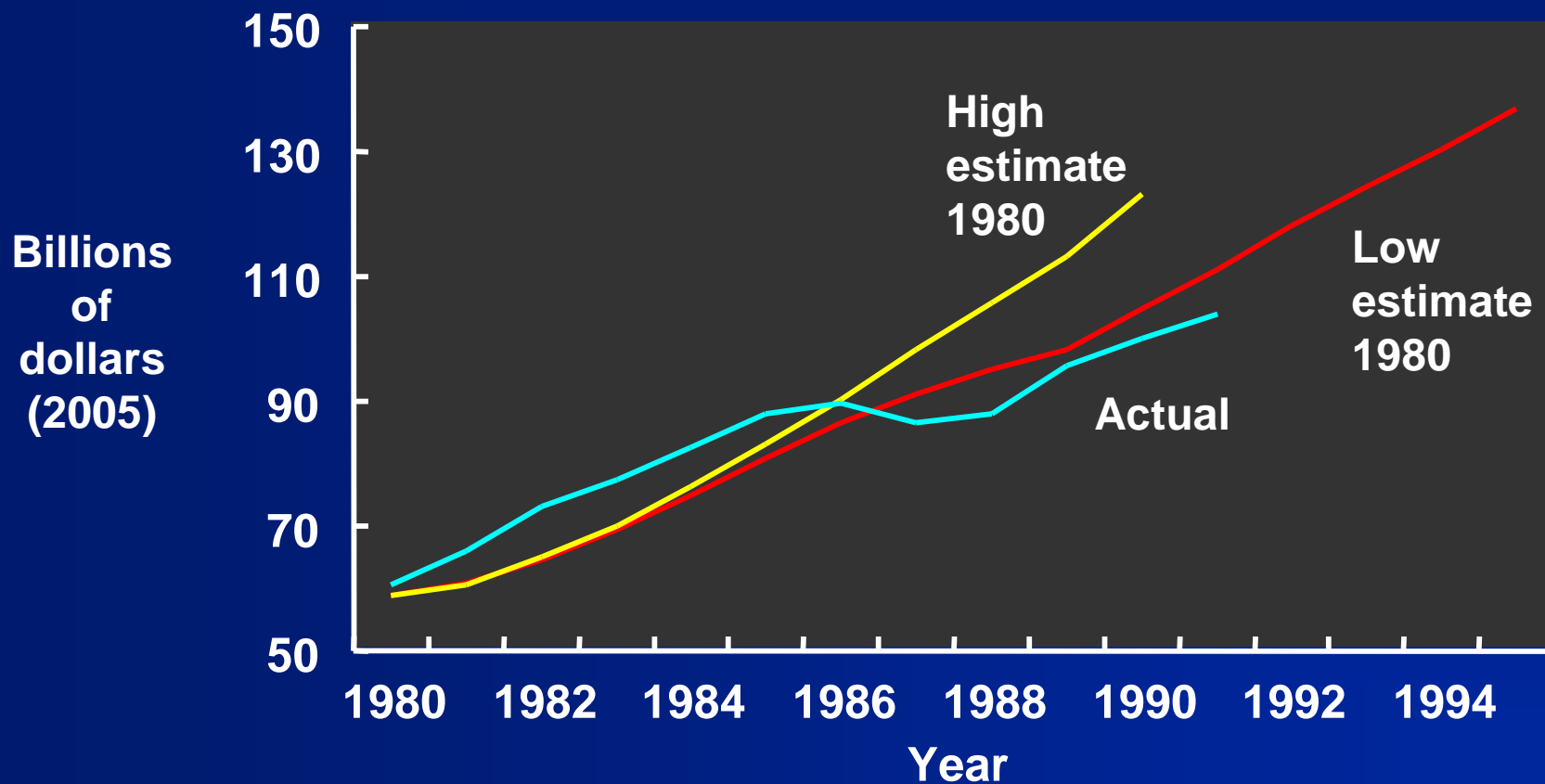
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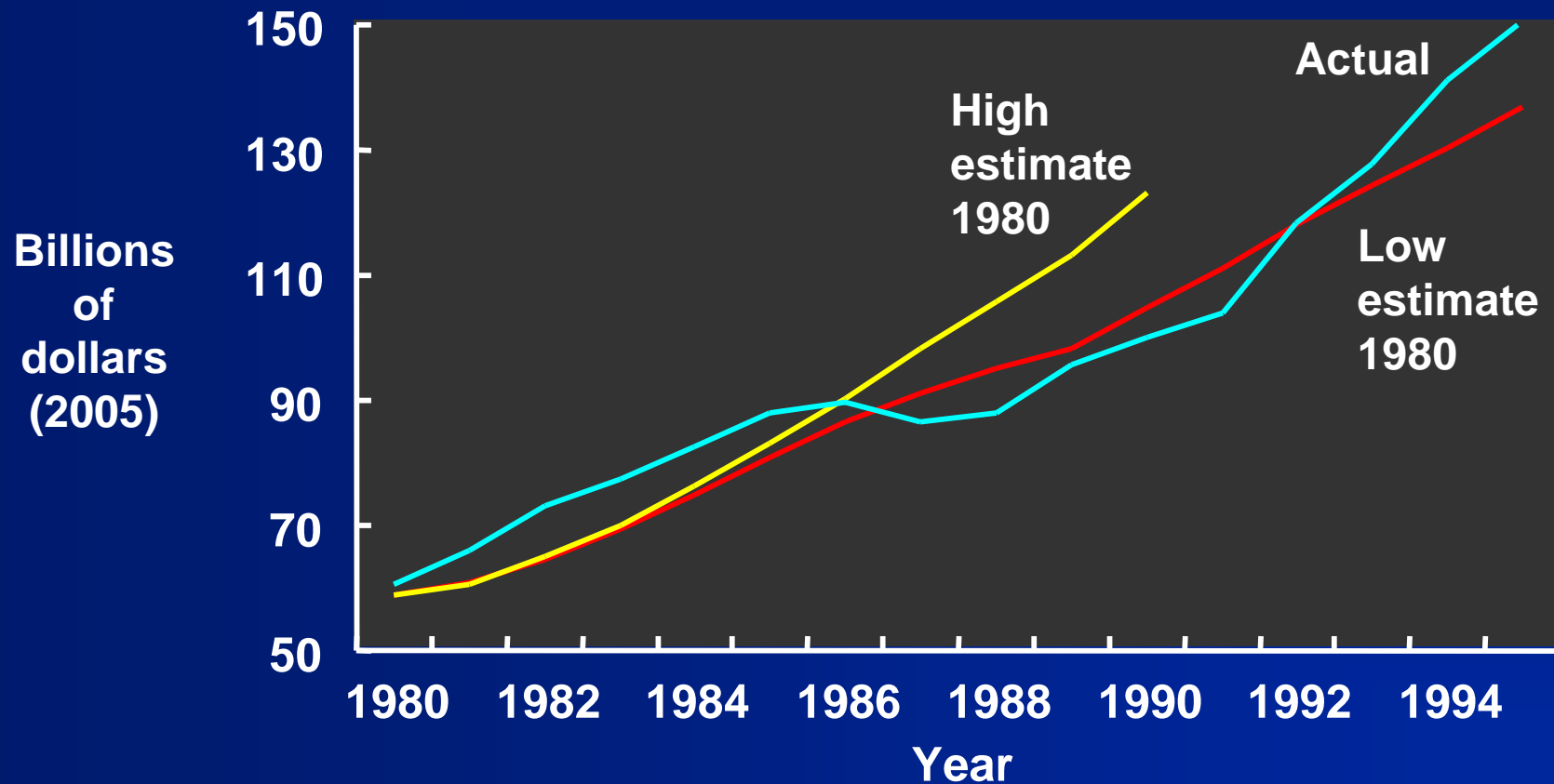
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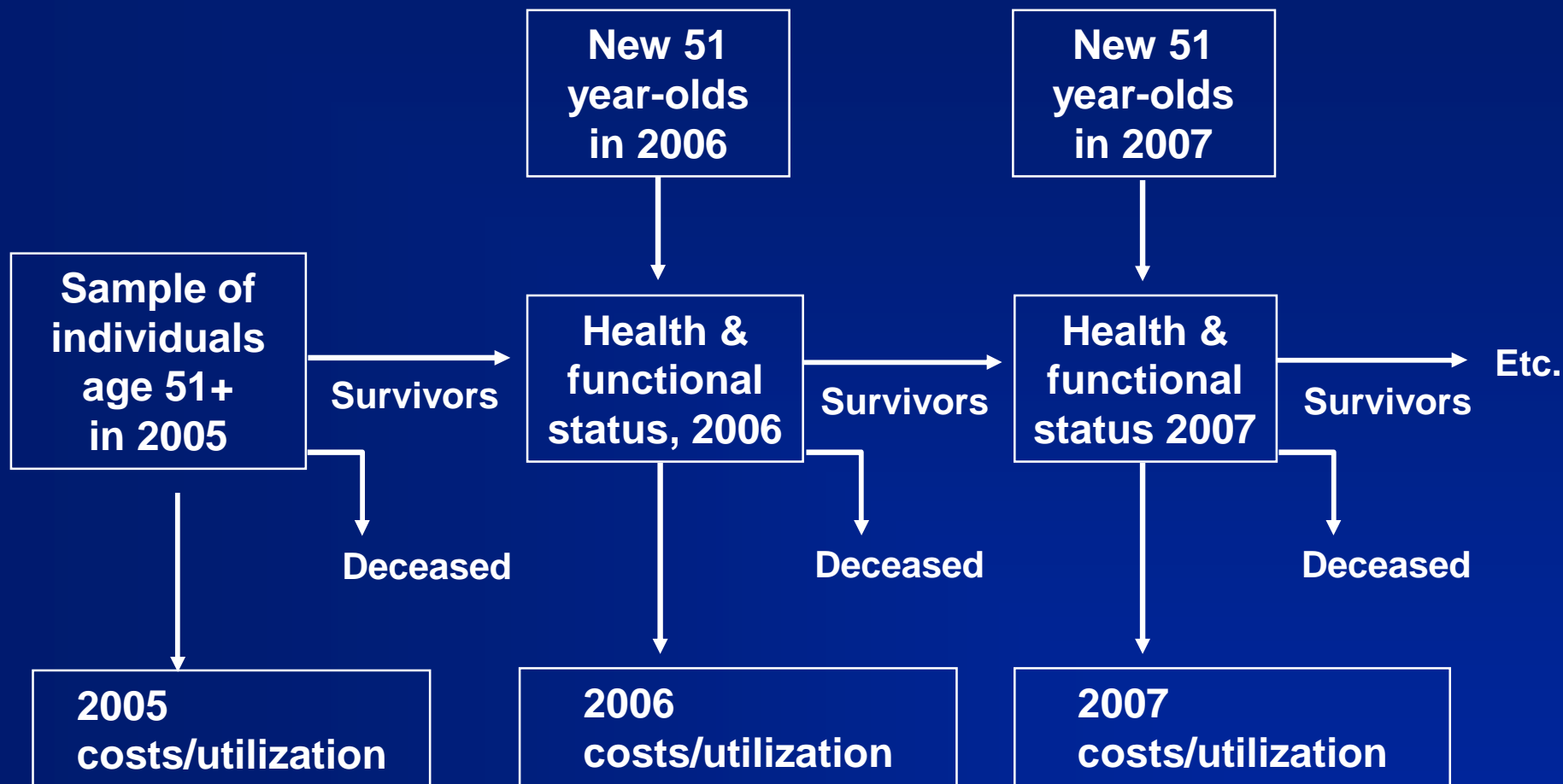
Medicare Part A spending (hospital insurance)



The Future Elderly Model (FEM)

- A demographic and economic model of the near elderly (50+) originally developed by D. Goldman
- The model allows one to simulate changes in:
 - Individual behavior, disease incidence, disease treatment
- The model predicts, for the next 50 years:
 - Health, utilization, retirement status, medical expenditures, Social Security taxes and benefits
- The model accounts for competing mortality and morbidity risks

The FEM Tracks Individuals Over Time



Elements of the Model

Health-Related Outcomes

Conditions

- Heart disease
- Diabetes
- Lung disease
- Cancer
- Hypertension
- Stroke

Functional status

- ADLs and IADLs
- Nursing home
- Death

Risk Factors

- BMI
- Smoking (now/ever)

Utilization

- Physician office visits
- Hospital admissions/days

Economic Outcomes

Labor Market

- Employment
- Earnings

Social Security

- Benefit receipt
- SS benefit amount
- Widowhood

Spending

- Total medical spending
- Out-of-pocket spending

Other Demographic Factors

- Non-time varying
- Age, gender, race, education, marital status

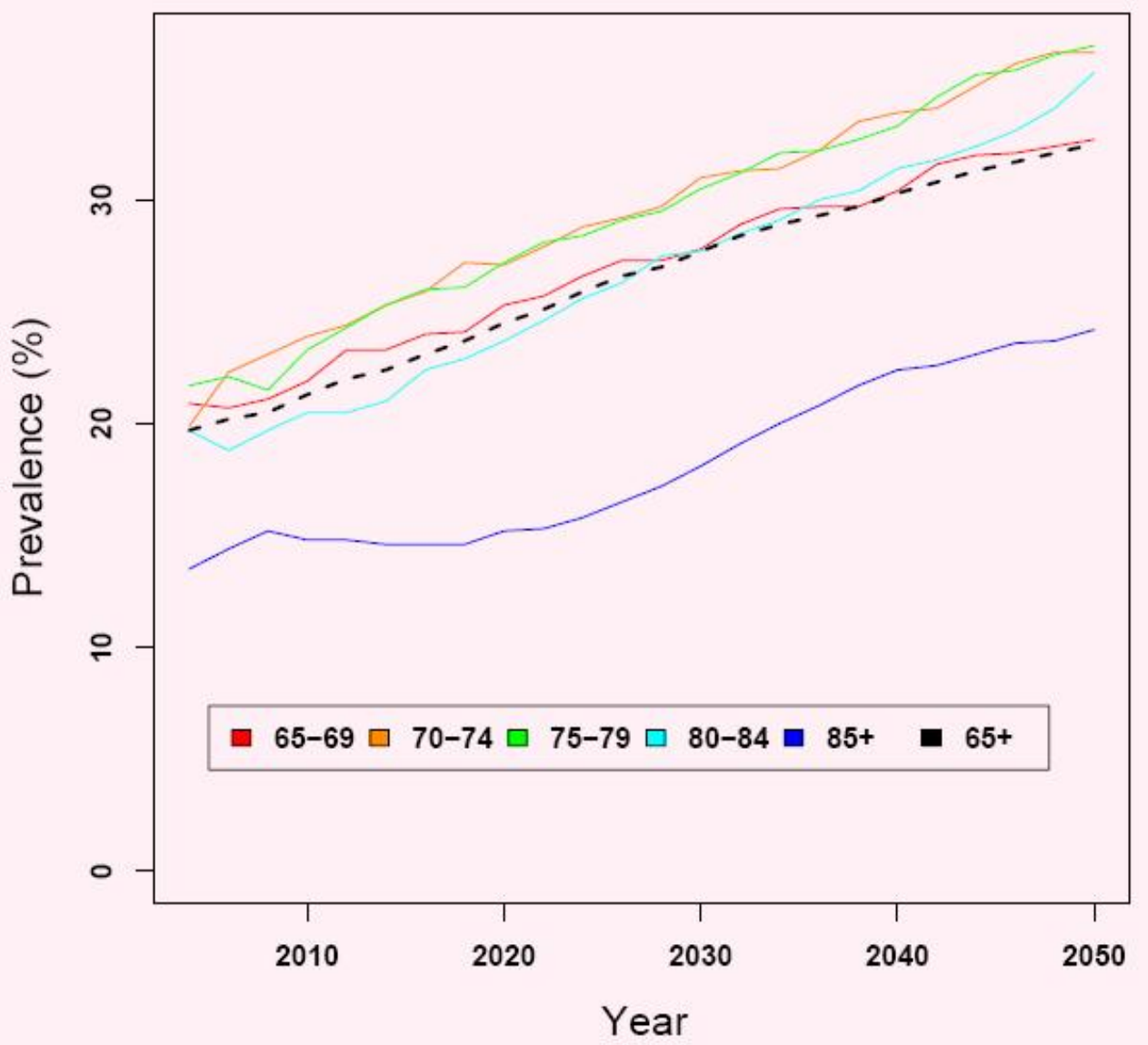
Data Sources and Assumptions

- **Populated using the Health and Retirement Survey and the Medicare Beneficiary Survey (longitudinal studies)**
- **It requires assumptions about size, composition and health status of the incoming cohort (51 years old) for the next 50 years**
- **As a default it assumes that model parameters (regression coefficients) remain constant over time**
- **It *does* assume a mortality improvement over time**

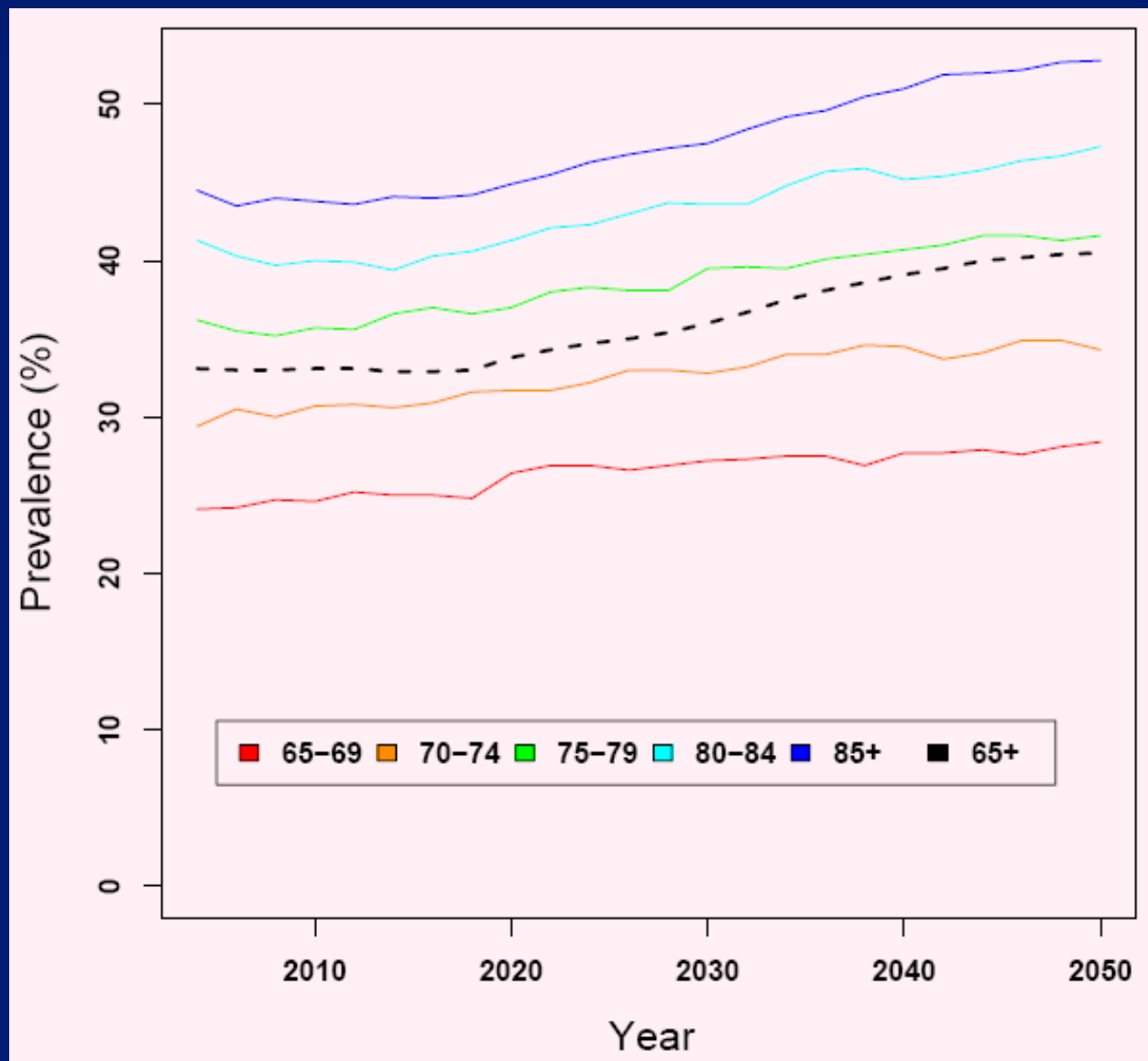
Assumptions for Baseline Scenario

- **Composition and size of incoming cohort (51+) comes from Census projections**
- **We increase the prevalence of obesity in the incoming cohort (51 years old):**
 - **2004-2028: a percentage increase in obesity prevalence of 2% every year**
 - **2028-2050: a percentage increase in obesity prevalence of 0.5% every year**
- **When we adjust obesity we also adjust health status accordingly**
- **Technological change is reflected in mortality rates decreasing of 1.2% every year.**

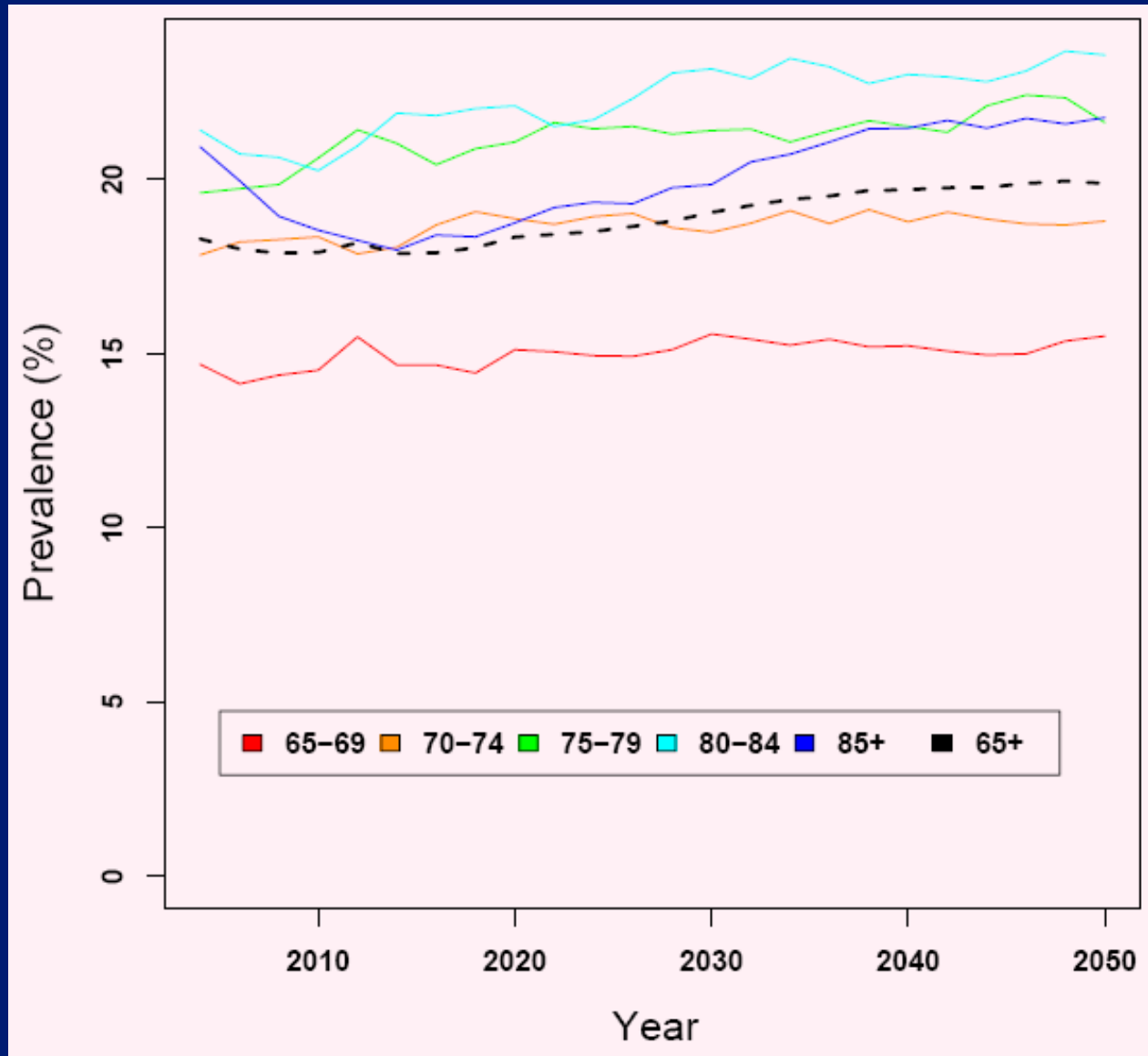
Diabetes Prevalence



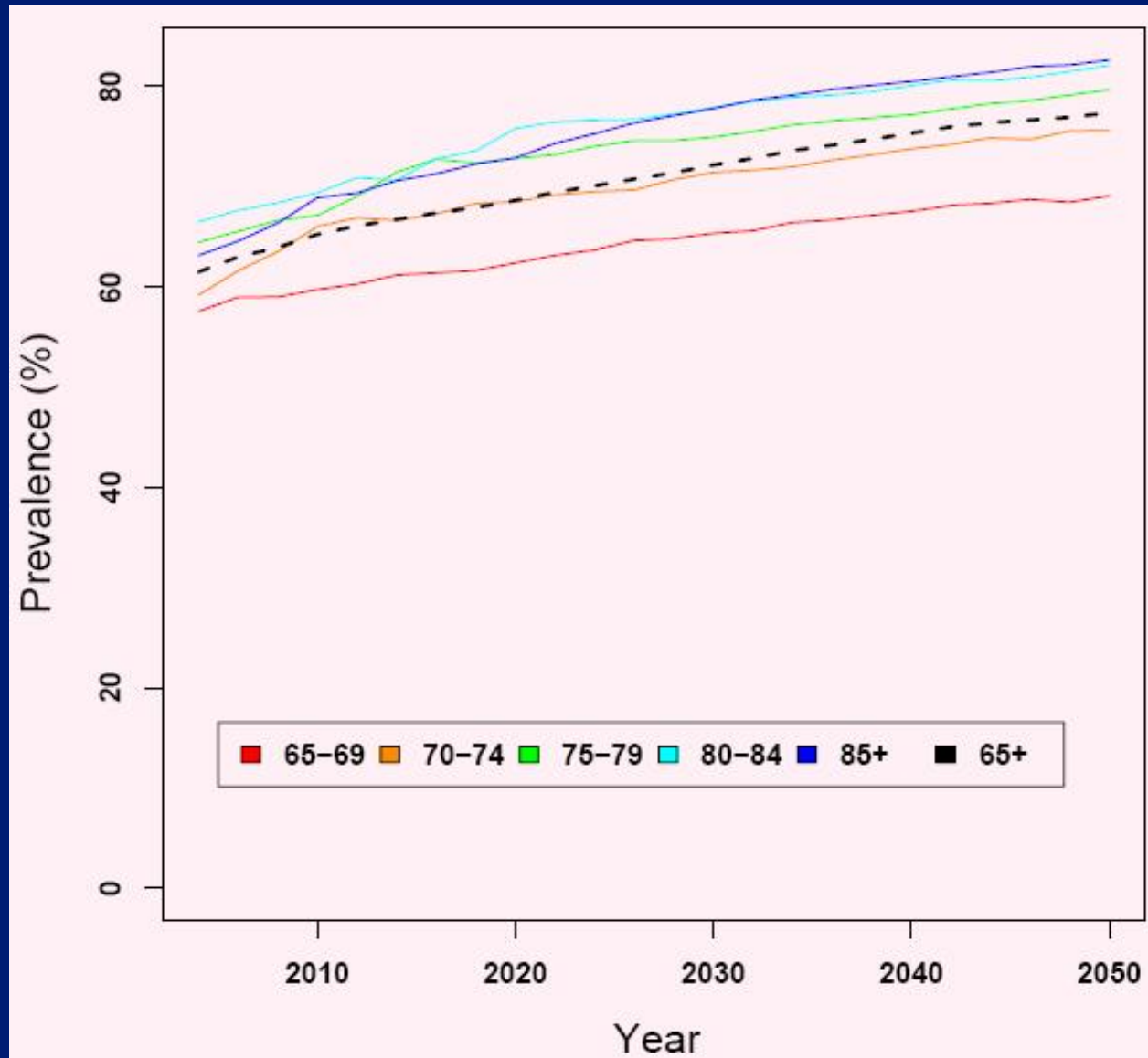
Heart Disease Prevalence



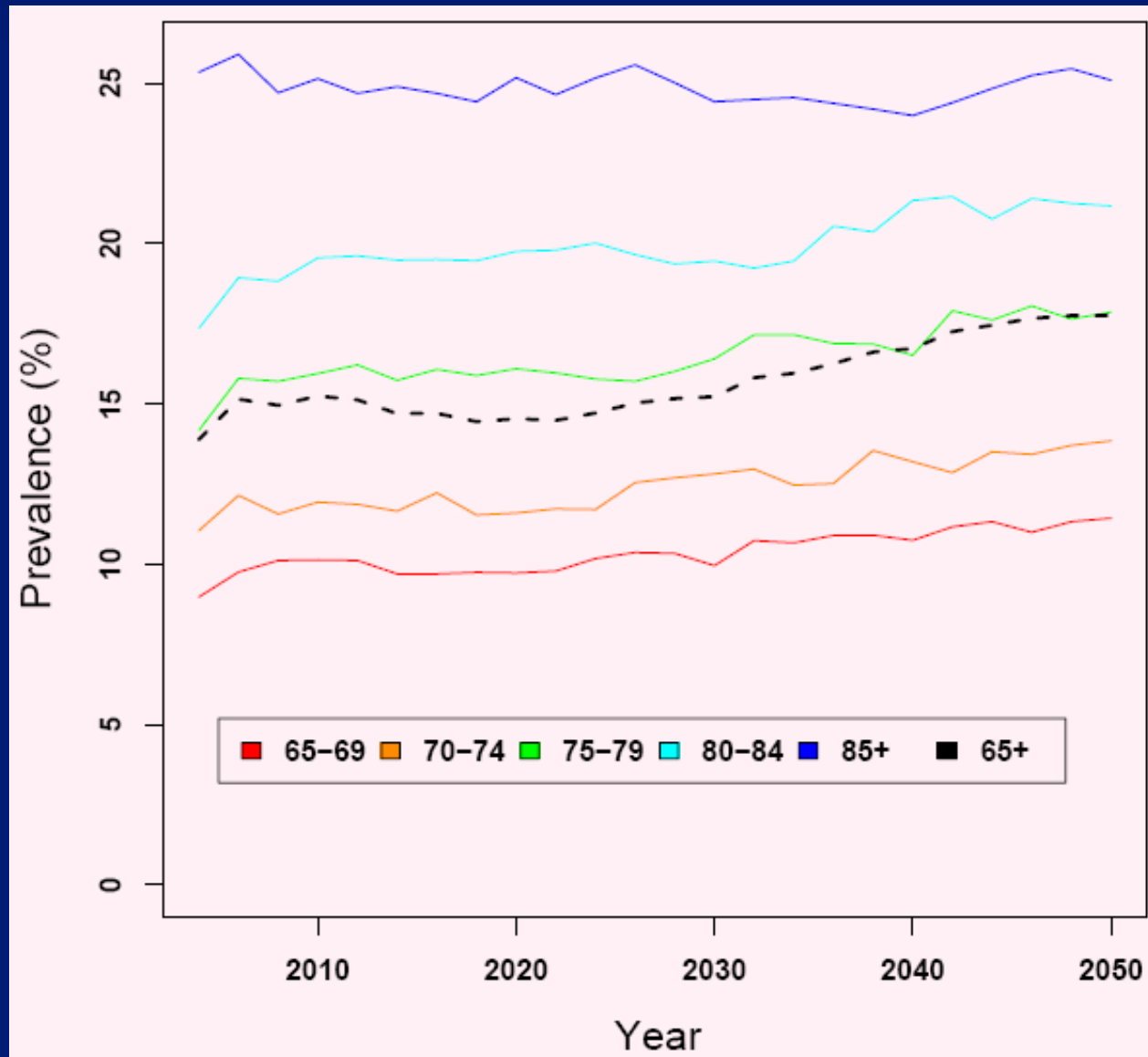
Cancer Prevalence



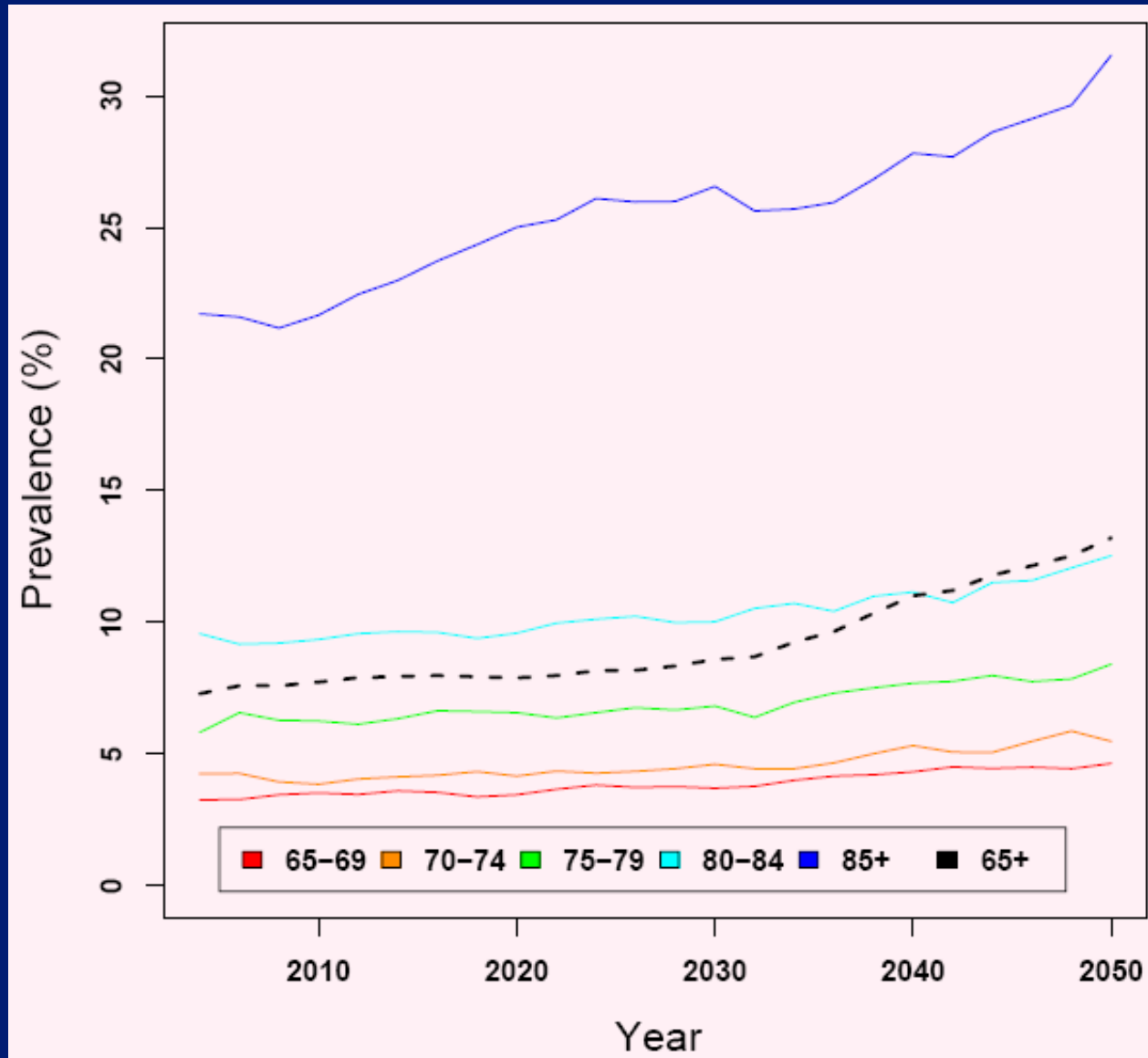
Hypertension Prevalence



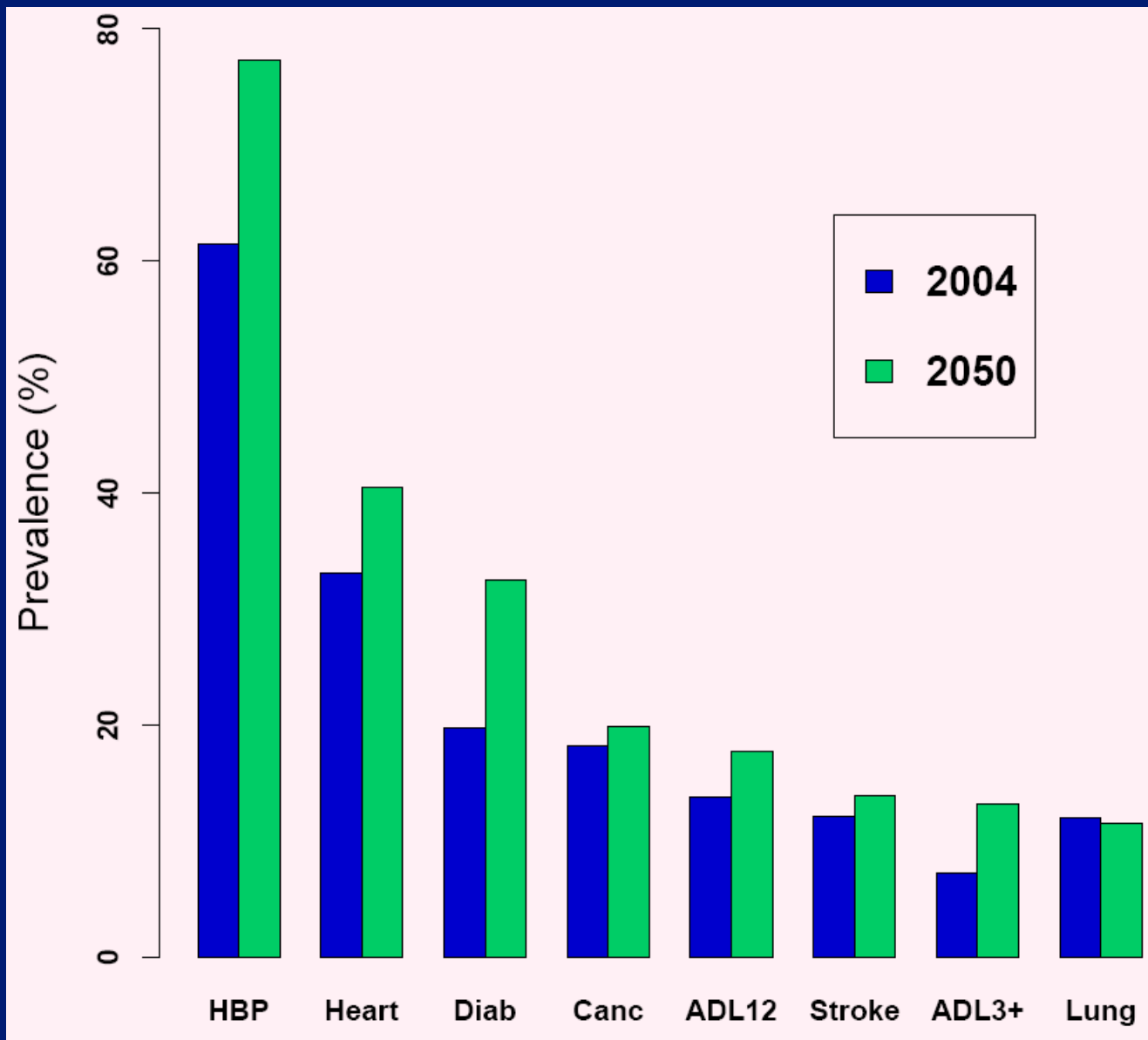
ADL (1-2) Prevalence



ADL (3+) Prevalence

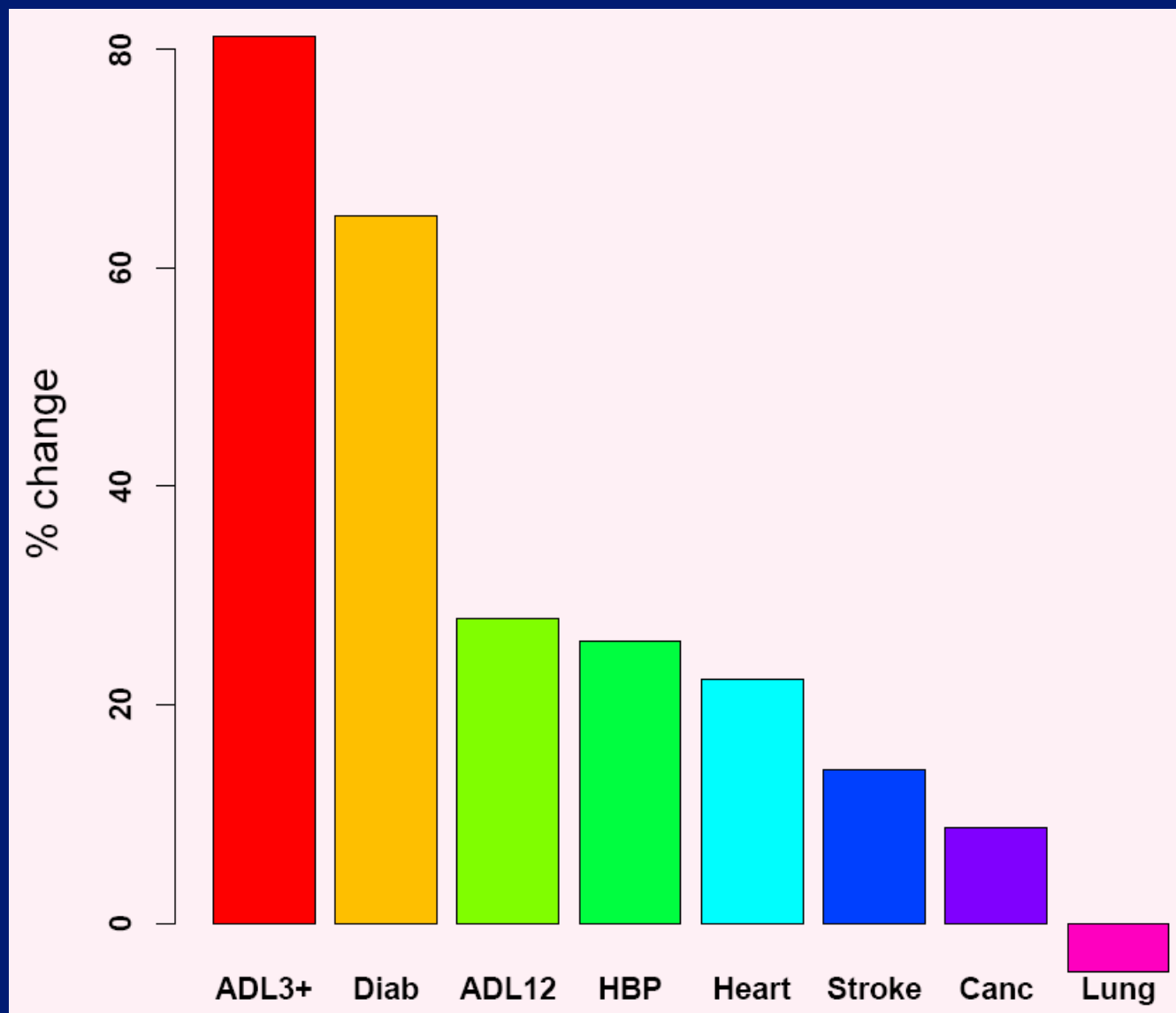


Health Projections Baseline Scenario, 65+



Health Projections: % change 2004-2050

Baseline Scenario, 65+

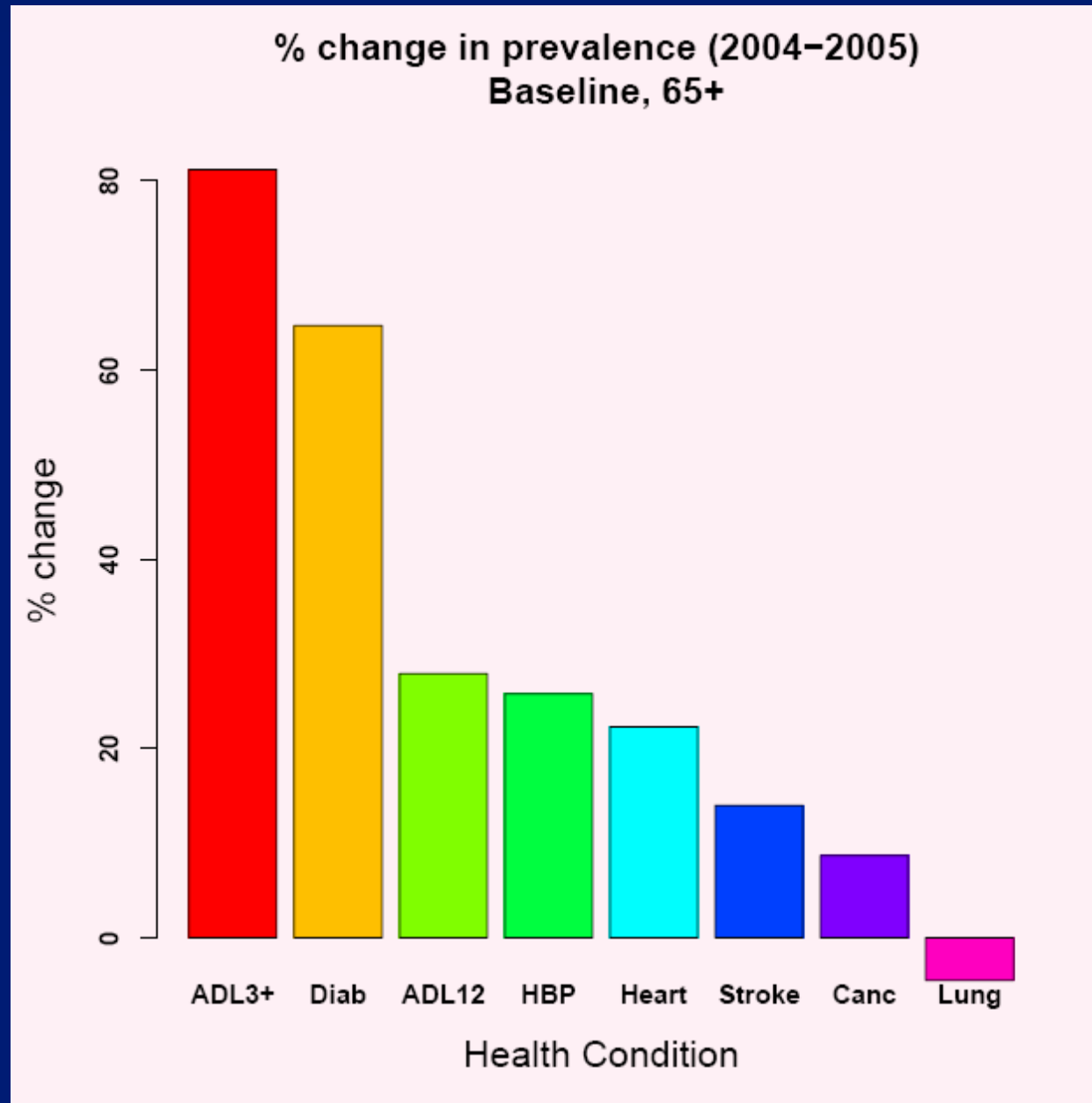


What affects the Projections?

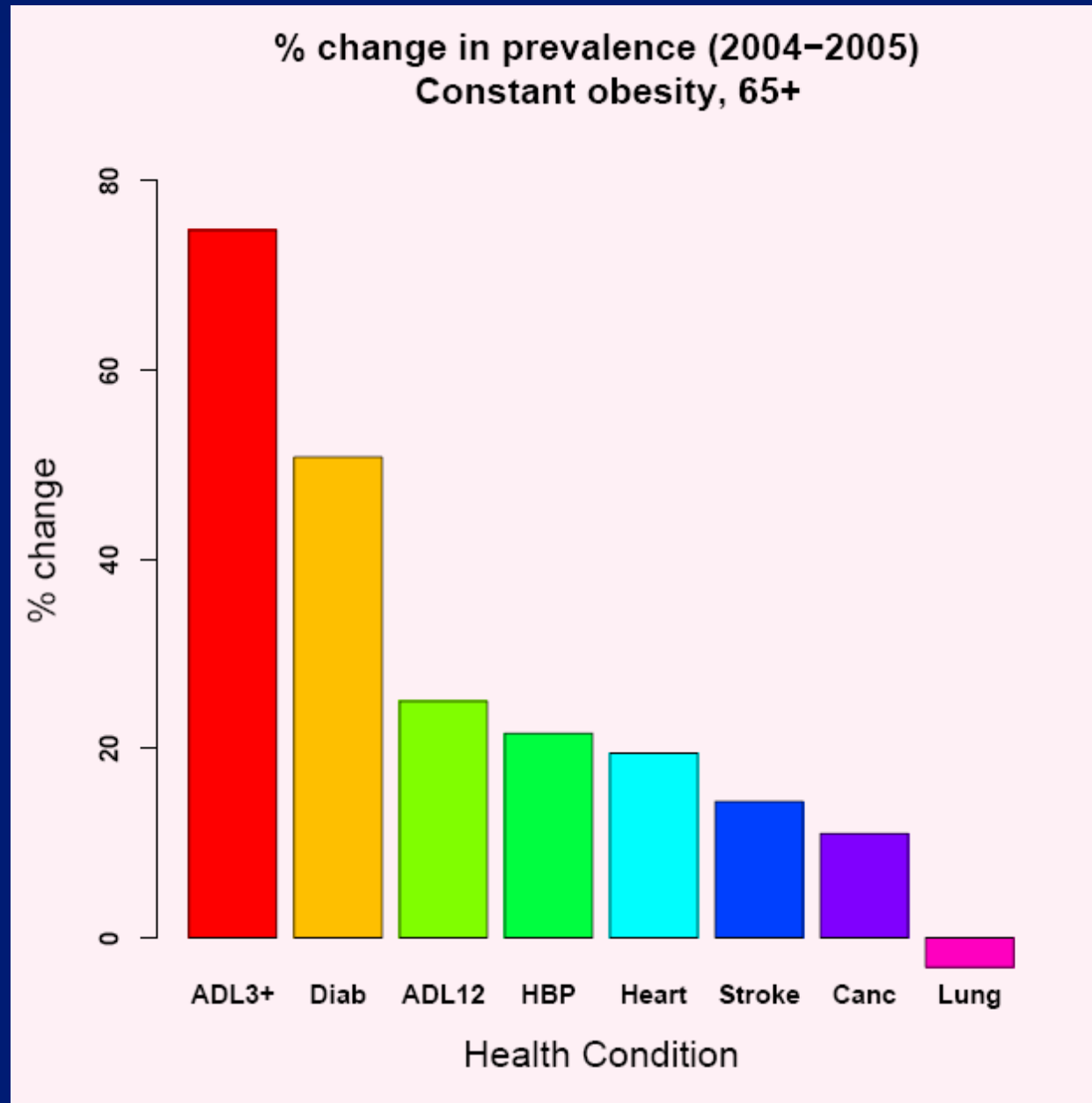
Alternative Scenarios

- **Constant Obesity Scenario:** obesity in the incoming cohort remains at 2004 level.
- **Obesity Reduction Scenario:**
 - move half of the obese into overweight;
 - move half of overweight into normal weight.
- **Quit Smoking Scenario:** in 2004 everybody quits smoking. Health effects of smoking history are *not* erased. Used in conjunction with Constant Obesity Scenario.
- **Smoking Eradication Scenario:** make everybody look like they never smoked. Used in conjunction with Constant Obesity Scenario.

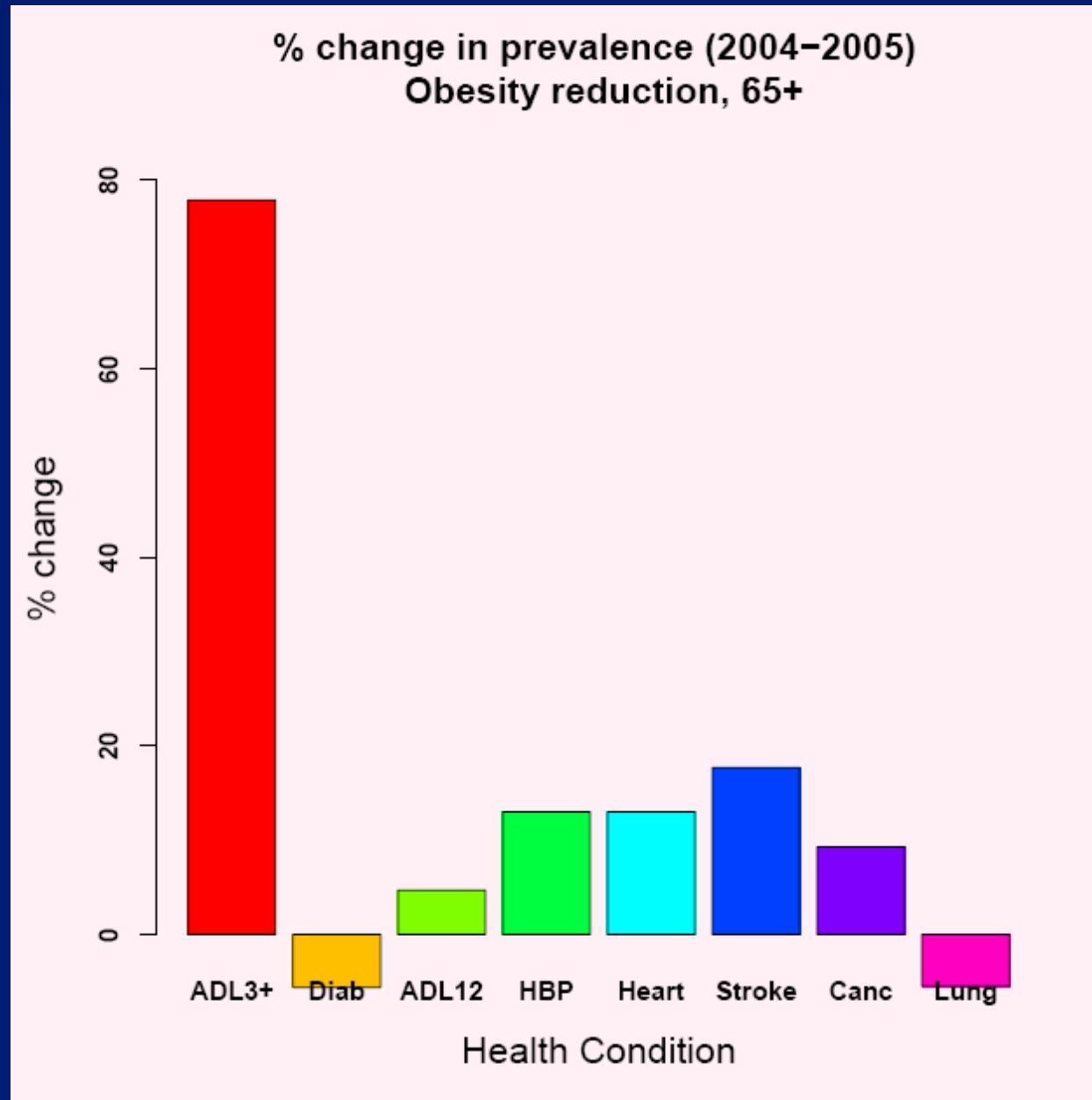
Health Projections



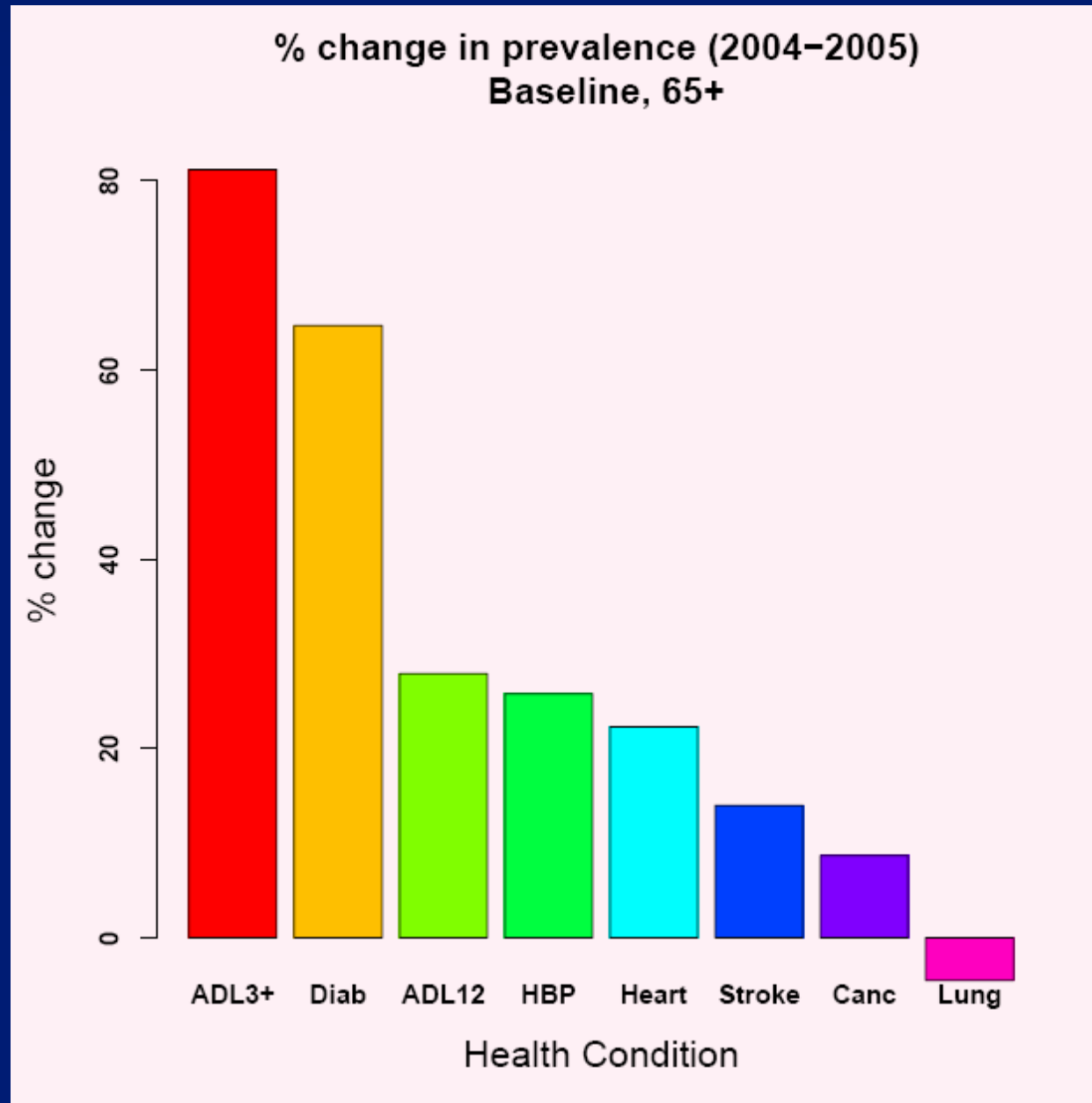
Health Projections



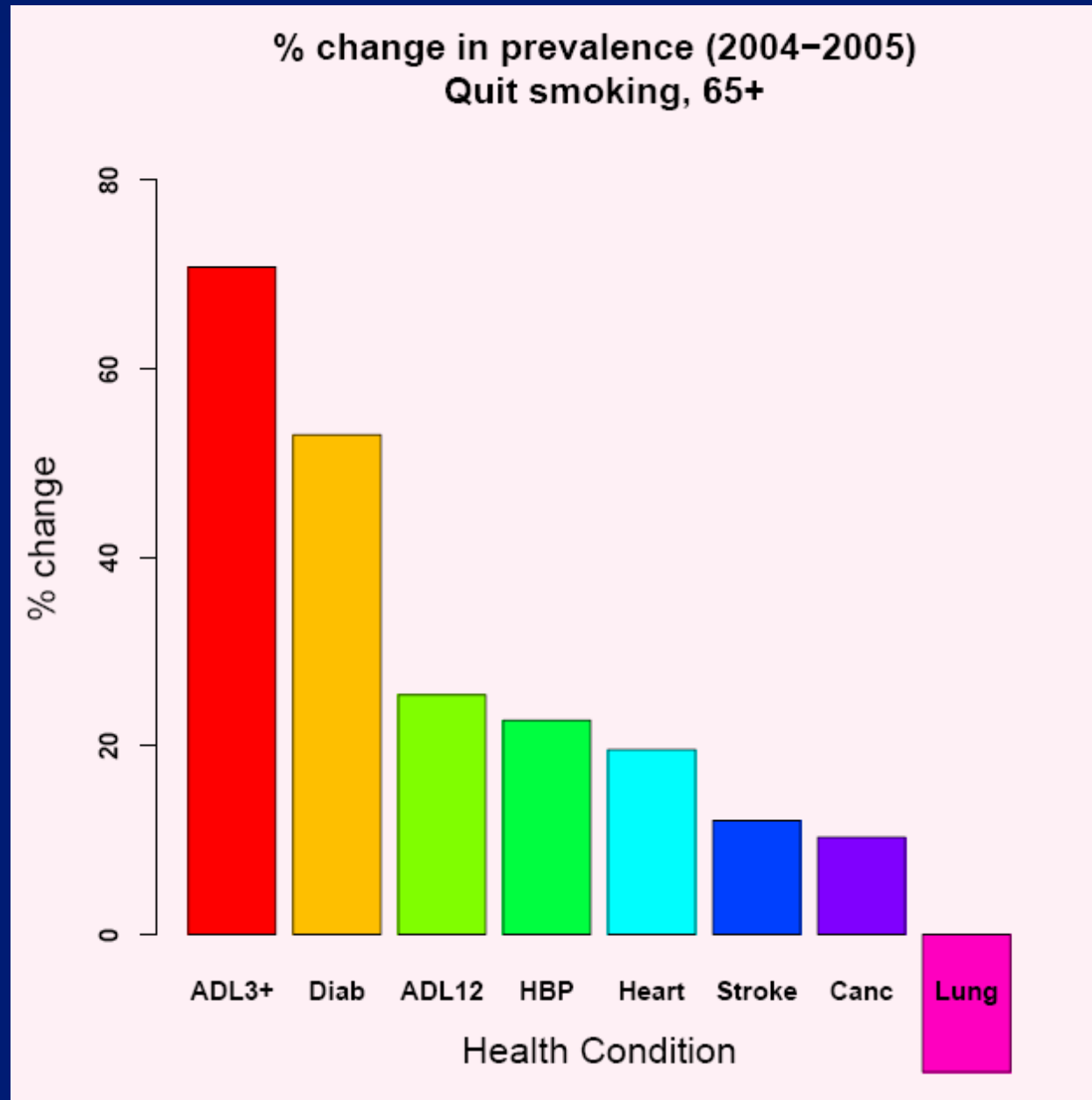
Health Projections



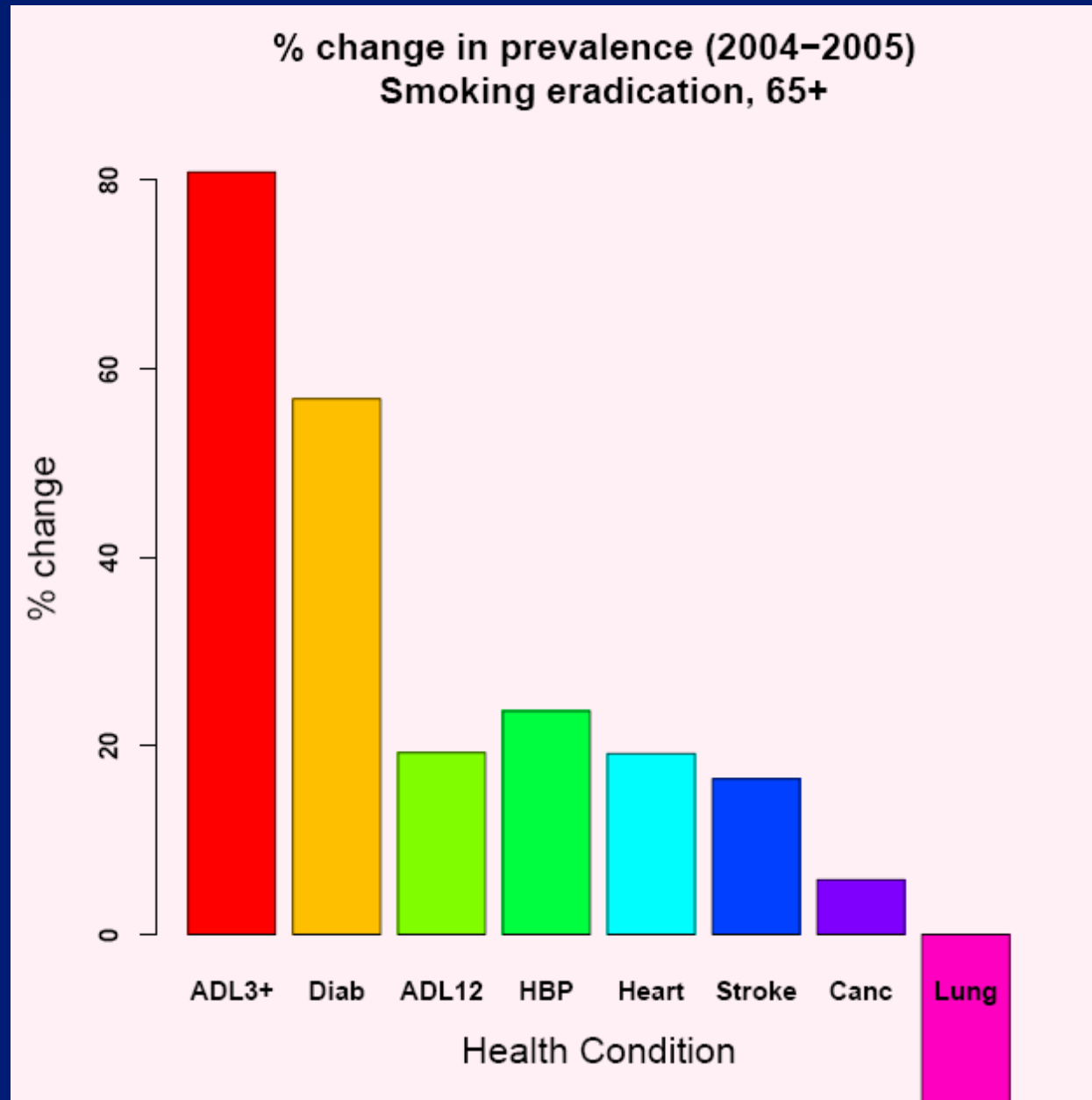
Health Projections



Health Projections



Health Projections



From Health to Utilization

- For each age group we know the relationship between health status/age/socio-economic variables and utilization
- Health projections → Utilization projections
- Total utilization = Population X Per Capita Utilization
- Change in total utilization can be decomposed:
 - A component reflecting exclusively changes in demographic composition (“demographic effect”)
 - A component reflecting change in per capita utilization, due to changes in health (“health effect”)

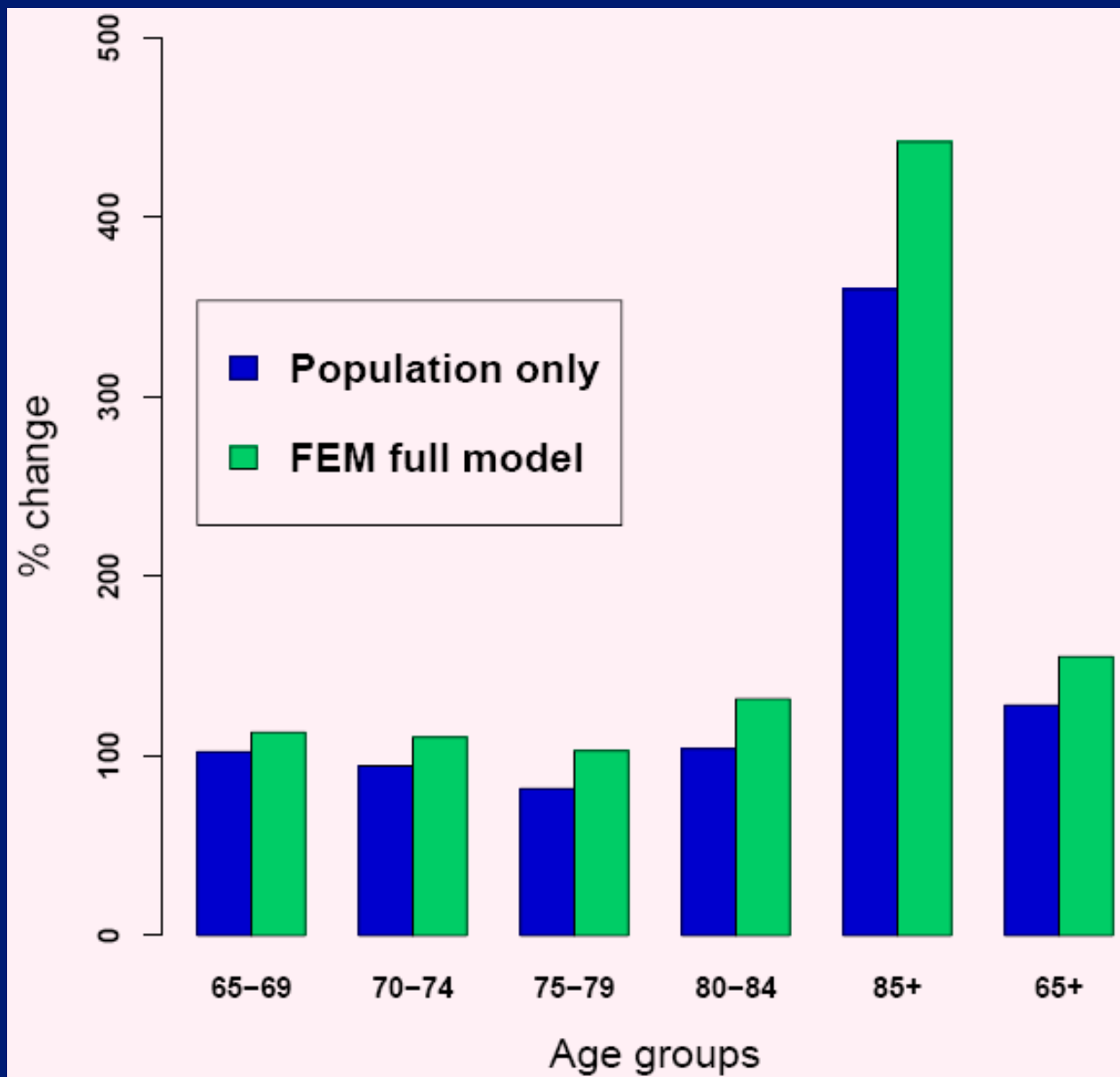
Services Utilization: % increase attributable to selected risk factors

Selected risk factor	Doctor office visit	Hospital days
Cancer	1.4^{***}	1.2^{***}
Diabetes	1.2^{***}	1.4^{***}
Heart disease	1.4^{***}	1.6^{***}
Stroke	1.0^{***}	1.2^{***}
ADL 3 or more	1.4^{***}	3.6^{***}
Black	0.7^{***}	1.2^{***}
...

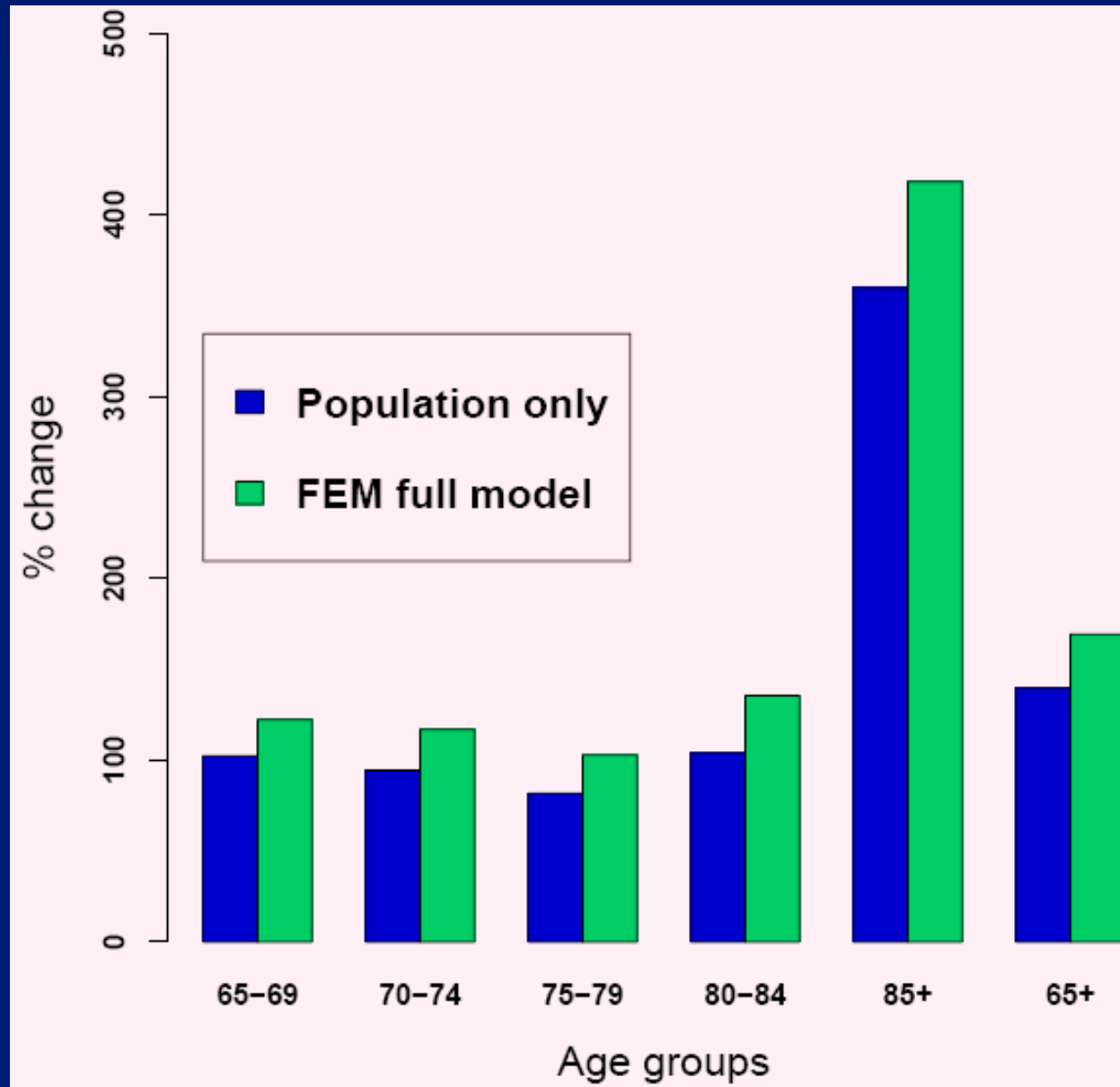
*** p<0.001

Note: Poisson regression models adjusts for age, gender, race, hispanic origin, education, marital status, hypertension, lung disease and disability. Data come from the Medicare Beneficiary Survey.

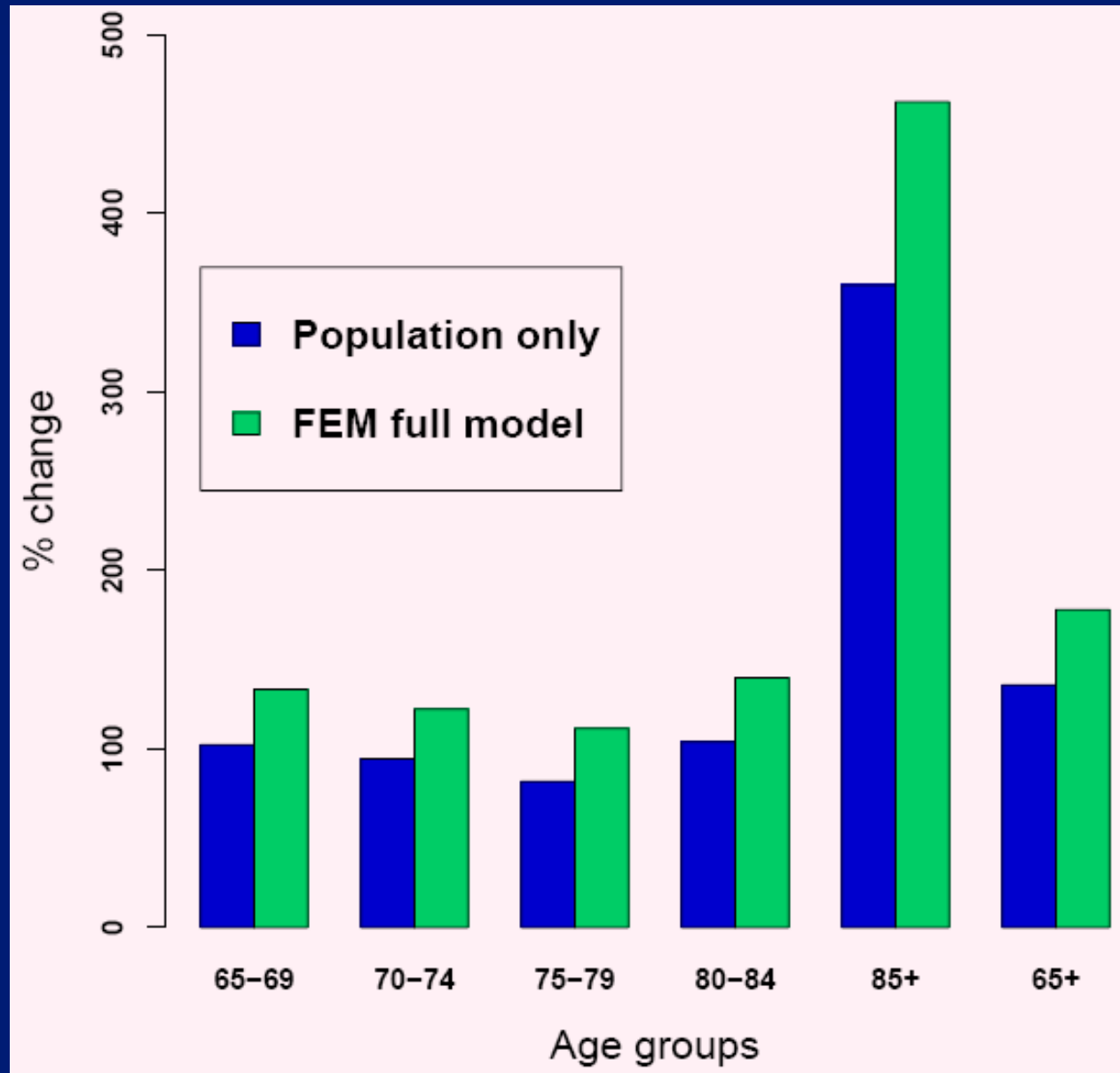
% Change in Doctor Office Visits (2004-2050)



% Change in Hospital Days (2004-2050)



% Change in Medical Expenditures (2004-2050)



Utilization Projections and Decomposition

Baseline Scenario

	% Change (2004-2050)	Demographic Effect (%)	Health Effect (%)
Total expenditures	180%	75%	25%
Office visits	155%	85%	15%
Hospital days	170%	80%	20%
Hospital stays	165%	85%	15%

Utilization Projections and Decomposition

Constant Obesity Scenario

	% Change (2004-2050)	Demographic Effect (%)	Health Effect (%)
Total expenditures	175%	80%	20%
Office visits	155%	85%	15%
Hospital days	165%	85%	15%
Hospital stays	165%	85%	15%

Utilization Projections and Decomposition

Obesity Reduction Scenario

	% Change (2004-2050)	Demographic Effect (%)	Health Effect (%)
Total expenditures	170%	90%	10%
Office visits	155%	95%	5%
Hospital days	155%	100%	0%
Hospital stays	155%	100%	0%

Utilization Projections and Decomposition

Quit Smoking Scenario

	% Change (2004-2050)	Demographic Effect (%)	Health Effect (%)
Total expenditures	180%	80%	20%
Office visits	160%	85%	15%
Hospital days	170%	90%	10%
Hospital stays	170%	90%	10%

Utilization Projections and Decomposition

Smoking Eradication Scenario

	% Change (2004-2050)	Demographic Effect (%)	Health Effect (%)
Total expenditures	195%	80%	20%
Office visits	175%	85%	15%
Hospital days	185%	90%	15%
Hospital stays	185%	90%	10%

Utilization Projections

- Demographic changes alone explain 75%-85% of the increase in utilization
- Medical expenditures are more sensitive than other utilization measures to changes in population health
- Utilization is projected to increase about 3 times more in the age group 85+ than in the other age groups
- Interventions on obesity save resources, reducing the overall increase in utilization
- Interventions on smoking improve health, but increase utilization

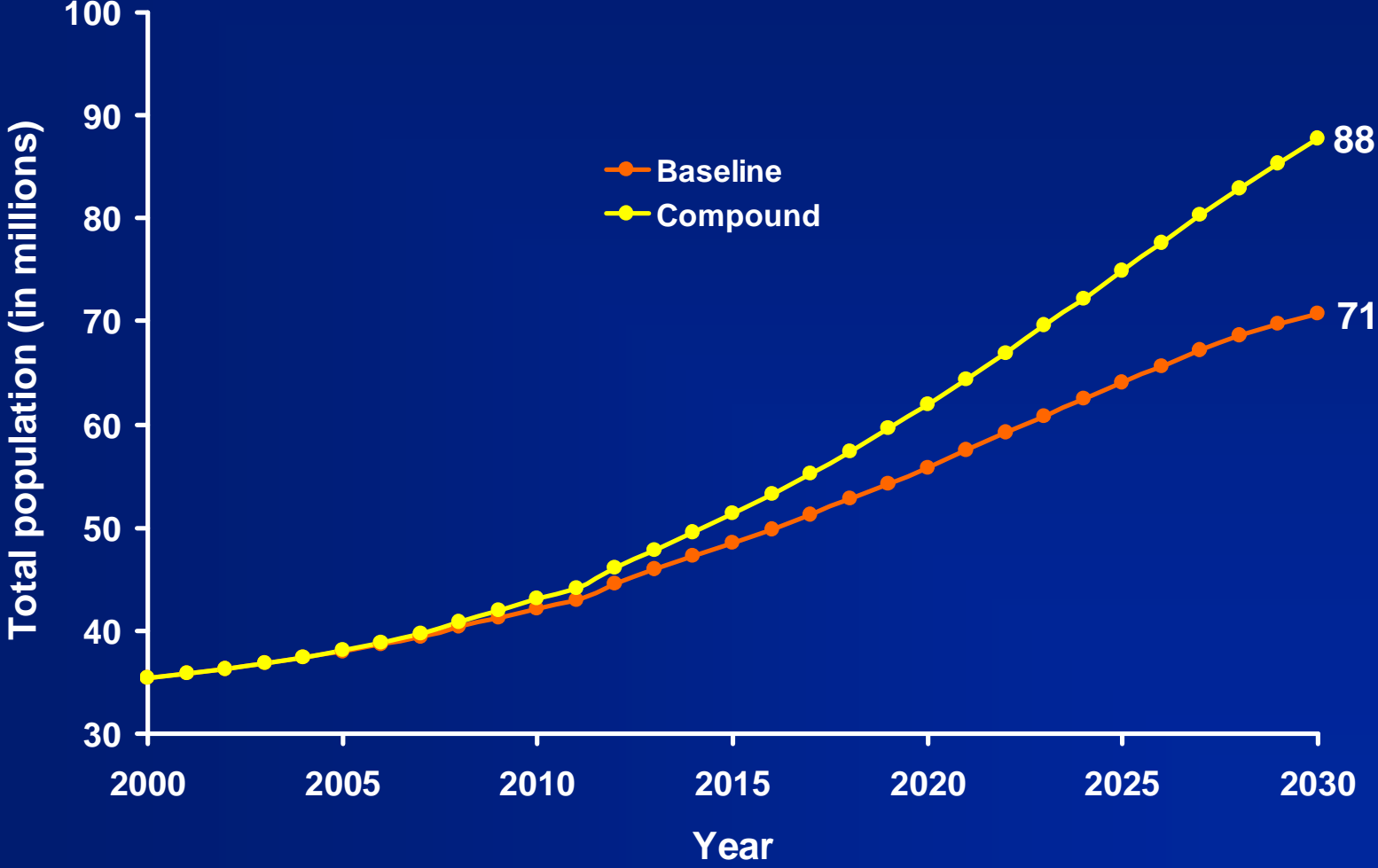
What About Technology?

- We have focused on the demographics
- But medical technology is also important:
 - Just one technology could increase elderly health care spending by 14% to 70% annually
 - But it could also generate substantial social value
- Burning social issue will be who gets access to these leading edge technologies

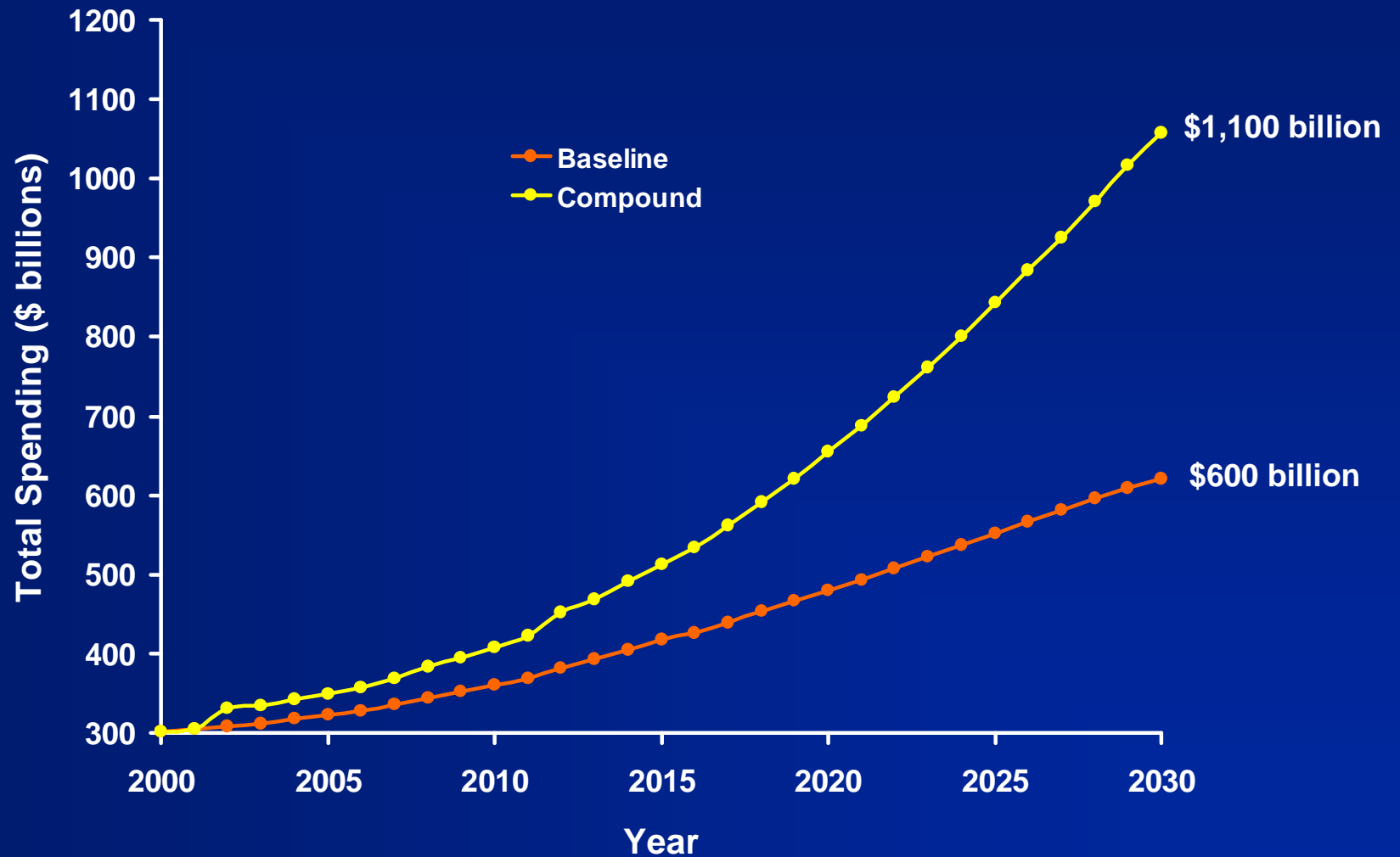
Example: Compound to Extend Lifespan

- **Overwhelming biomedical evidence that reducing caloric intake of animals by 30% increases life expectancy by 25%**
 - **Chemical compounds can mimic this behavior in rodents**
- **Such a pill could emerge for humans**
 - **Taken by everyone at a cost similar to nutritional supplements (\$1/day)**
 - **Hazard of death decreases by 63% (equivalent to extending life by 15 years)**

Aged Population Would Grow by 17 Million by 2030



Health Care Spending Would Be 70% Higher in 2030



Technology Will Put Substantial Pressure on Medical Spending by the Elderly

Technology	Increase in medical spending* (%)	Cost per additional life-year
Anti-aging compound (healthy)	13.8	9,000
Cancer vaccines	0.4	18,000
Treatment of acute stroke	0.4	22,000
Anti-aging compound (unhealthy)	70.4	30,000
Telomerase inhibitors (cancer)	0.5	62,000
Implantable cardio-defibrillators	3.7	103,000
Antiangiogenesis (cancer)	8.0	500,000
Left ventricular assist devices	2.3	500,000
Pacemaker for atrial fibrillation	2.3	1,400,000

*Increase in 2030 health care spending relative to status quo without the technology.

No Magic Bullets

- **Large increases in utilization due to the changing demographic composition and health status of the elderly are likely to stay with us**
- **Utilization and expenditures are likely to increase at a rate faster than population growth**
- **Technology will most likely only add to these woes**
- **Preventive interventions may have large social value and be cost effective, but do not necessarily reduce demand for services**

TALK ENDS HERE

Example 1:

Intraventricular Defibrillators

Used to treat patients with life-threatening arrhythmias: shocks heart to restore natural rhythm.

Target: 50% of patients with heart failure
50% of patients post heart attack
20% of patients with cardiomyopathy } ~3.5 million in 2004

Likelihood: 30% in 10 yrs
30-40% in 20 yrs

Impact: No effect on hospitalizations
Life expectancy increases 6-10 months

Cost: \$35,000 - \$40,000 per case

We Evaluated the Technologies Most Likely to Enter Clinical Practice

Technology	Increase in medical spending* (%)	Cost per additional life-year
Implantable cardio-defibrillators	3.7	103,000

*Increase in 2030 health care spending relative to status quo without the technology.