

Mid and late-life socioeconomic status and late-life co-morbidity trajectories

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NIH: AG022095 “Early Life Conditions, Survival, and Health: A Pedigree-Based Population Study”

NIH: AG036938 “Modeling Disability Trajectories in Rapidly Aging Populations”

Research questions

- * **Does one's father's occupation link to own later life health?**
- * **Does the association remain after adjusting for one's own occupation?**
- * **Does it remain after adjusting for several other covariates?**
- * **What do these relationships say about socioeconomic status mobility and later life health?**

Background

- * **Researchers increasingly asking whether early life conditions impact on later life health (e.g., Bengtsson and Lindstrom 2000; Elo and Preston 1992; Galobardes et al. 2004; Hayward and Gorman 2004; Luo and Waite 2005).**
- * **Early life SES can relate to many mechanisms such as:**
 - nutrition**
 - home/neighborhood environment**
 - medical care**
 - stress**
 - educational opportunities**
 - in utero**
 - development of immunities**
 - mortality selection**
- * **Linking earlier and later life SES speak to issues of mobility on health.**

Data: Utah Population Database*



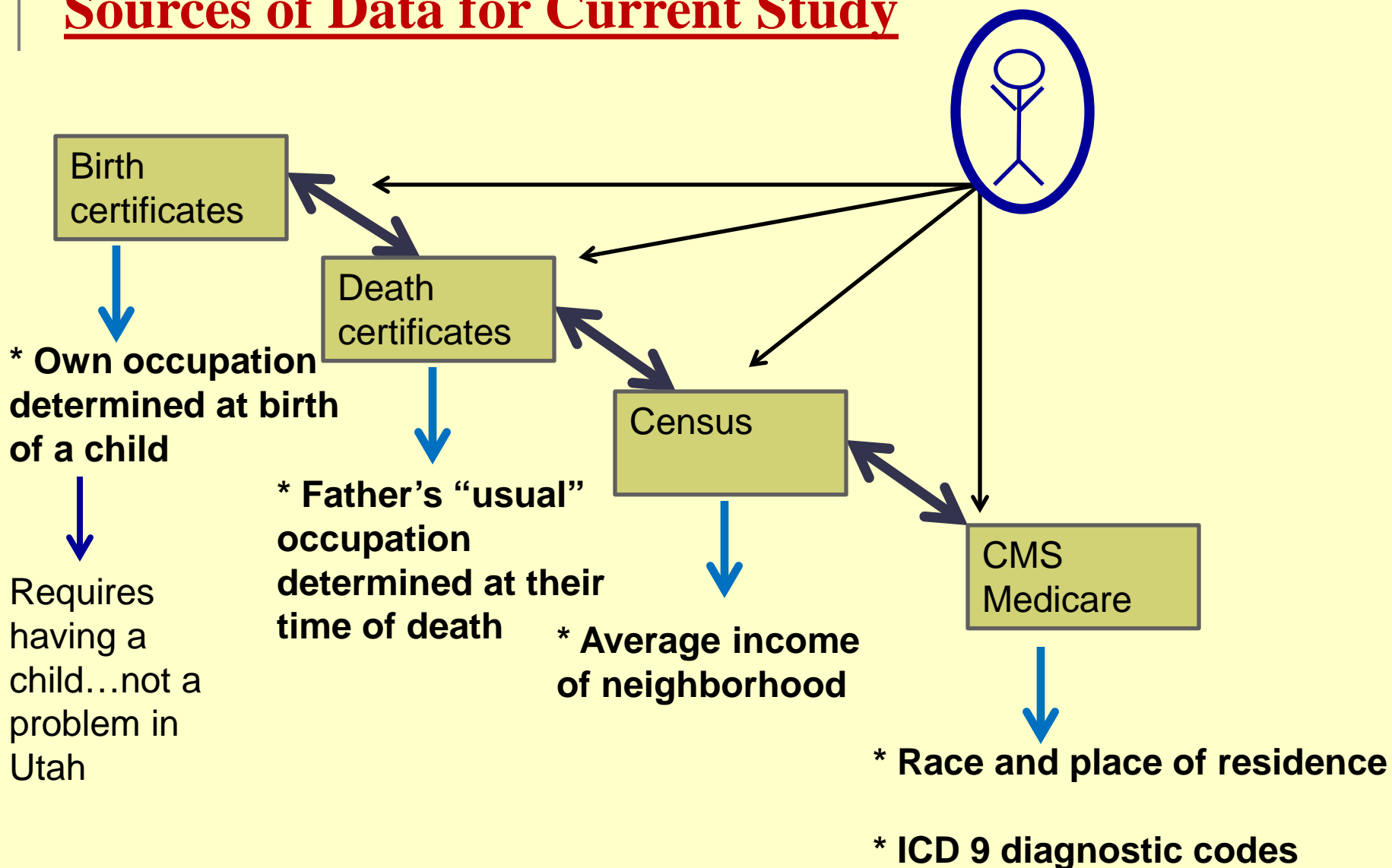
Links individual records from a variety of sources dating back to the early 19th century.

Nearly seven million individuals represented.

* <http://www.huntsmancancer.org/research/shared-resources/utah-population-database/overview>

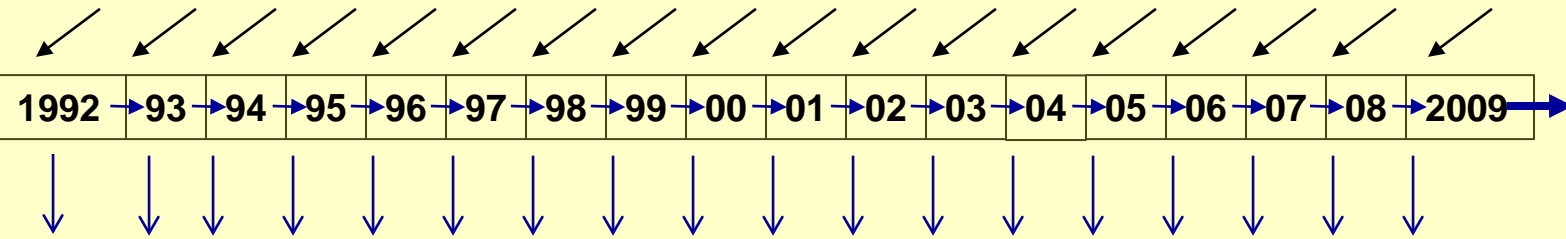
* use of data requires approval – is not downloadable.

Sources of Data for Current Study



Data: 50% sample

40,353 women and 33,392 men enter the data at age 66 at some point between 1992 and 2009.



They are followed until 2009 or death.

Recorded each year: having or not having 17 conditions or dying.

In total, there are 668,986 individual years of data collected for 73,745 women and men.

An average of about 9 years of observations per person.

Co-morbidity index

* **Conditions include:**

Myocardial infarction

Congestive heart failure

Peripheral vascular disease

Stroke

Dementia

Chronic lung disease

Connective tissue disease

Ulcer

Chronic liver disease

Kidney disease

Diabetes

Tumor

Leukemia

Lymphoma

Liver disease

Metastasis

AIDS

* **Used to create the Charlson co-morbidity index (Charlson 1987).**

Father's and own occupation

Nam-Powers Socioeconomic Scores - 1 to 99 (Nam and Powers 1982)

Grouped into six categories

1st Quintile

2nd Quintile

3rd Quintile

4th Quintile

Farmer (score of 40)

Missing

For own occupation, when married, recorded as highest couple.
If one is not working, occupation of person working is recorded.

Other variables

* Neighborhood SES:

Data from 2000 census based on zip codes recorded from CMS 1992.
Mean income of zip code coded as quartiles.

* Race:

Based on CMS.
White versus Other.

* Residence:

Based on CMS.
Rural / Urban Wasatch front / Urban non-Wasatch front.

Dependent variable: trajectory group

* A health trajectory is a pattern derived from a longitudinal series of scores on some health measure for a single person over time.

Dependent variable: trajectory group

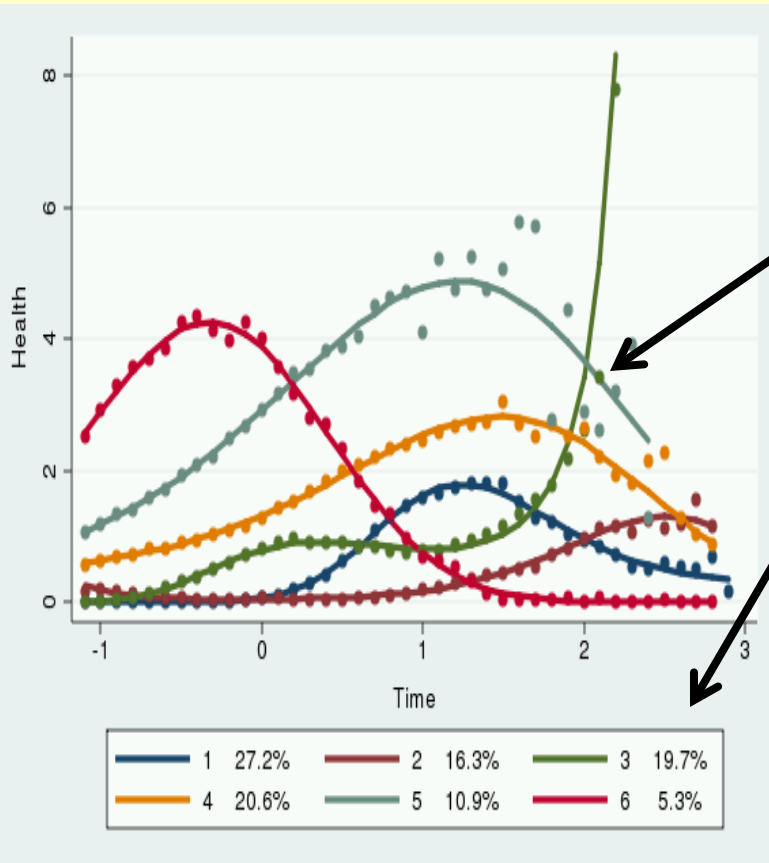
* A health trajectory is a pattern derived from a longitudinal series of scores on some health measure for a single person over time.

* Individual trajectories can be sorted into groups that follow statistically similar patterns over time (Nagin 2005).

* We can estimate percent of a population that follows each trajectory.

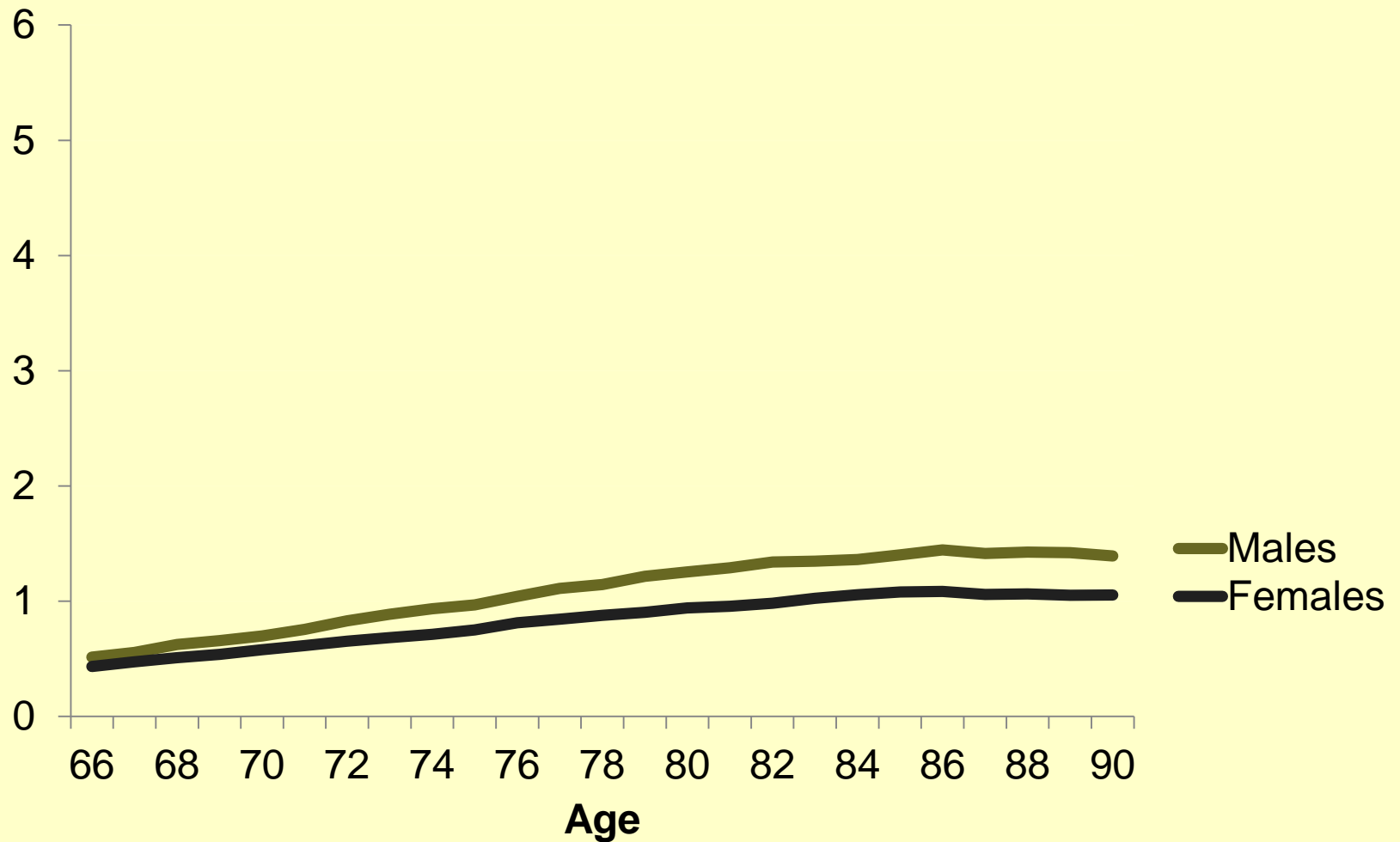
* Shape can take on any form.

* We can simultaneously estimate mortality trajectories.

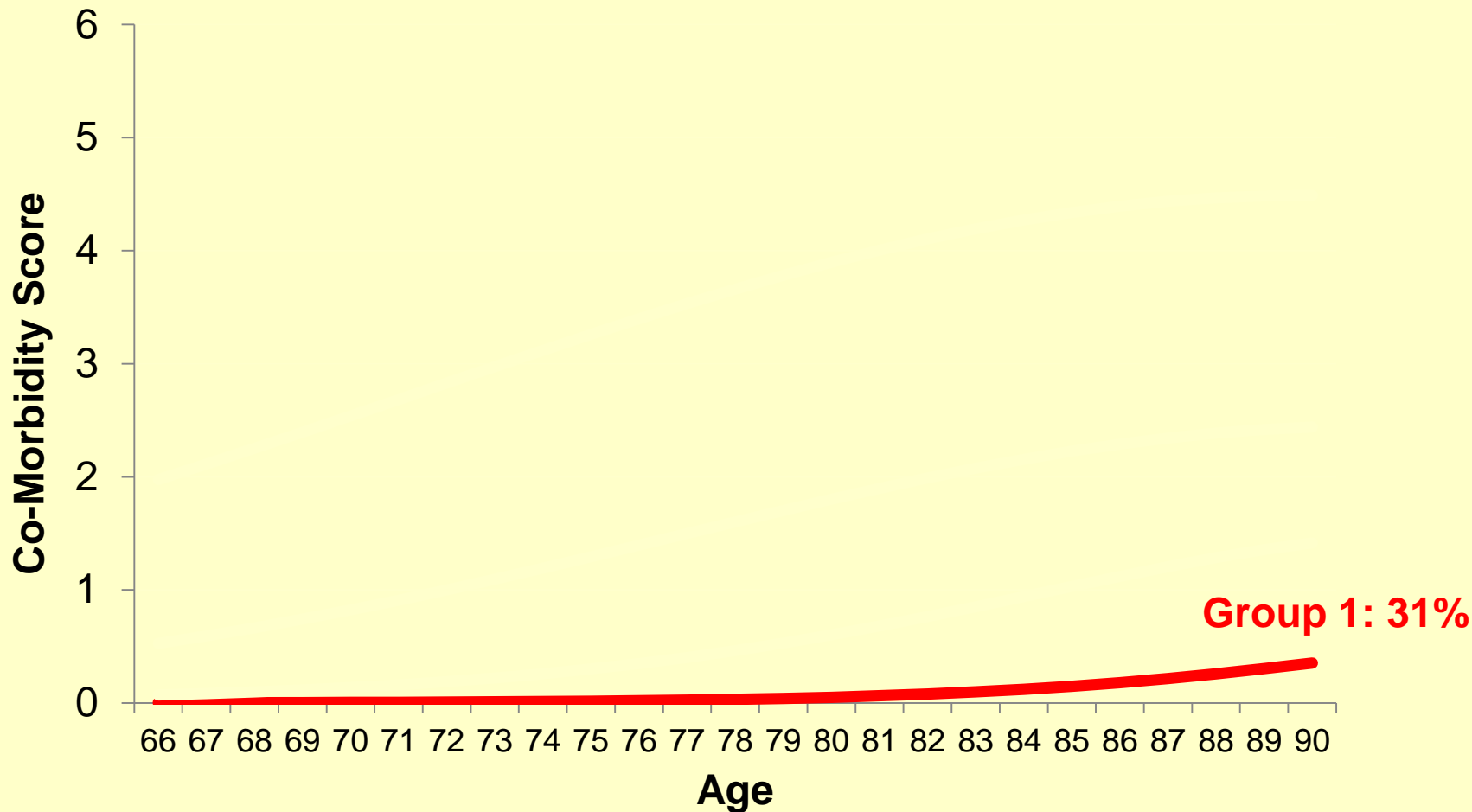


* Current study co-morbidity trajectory shapes determined using Zero-Ordered Poisson distribution.

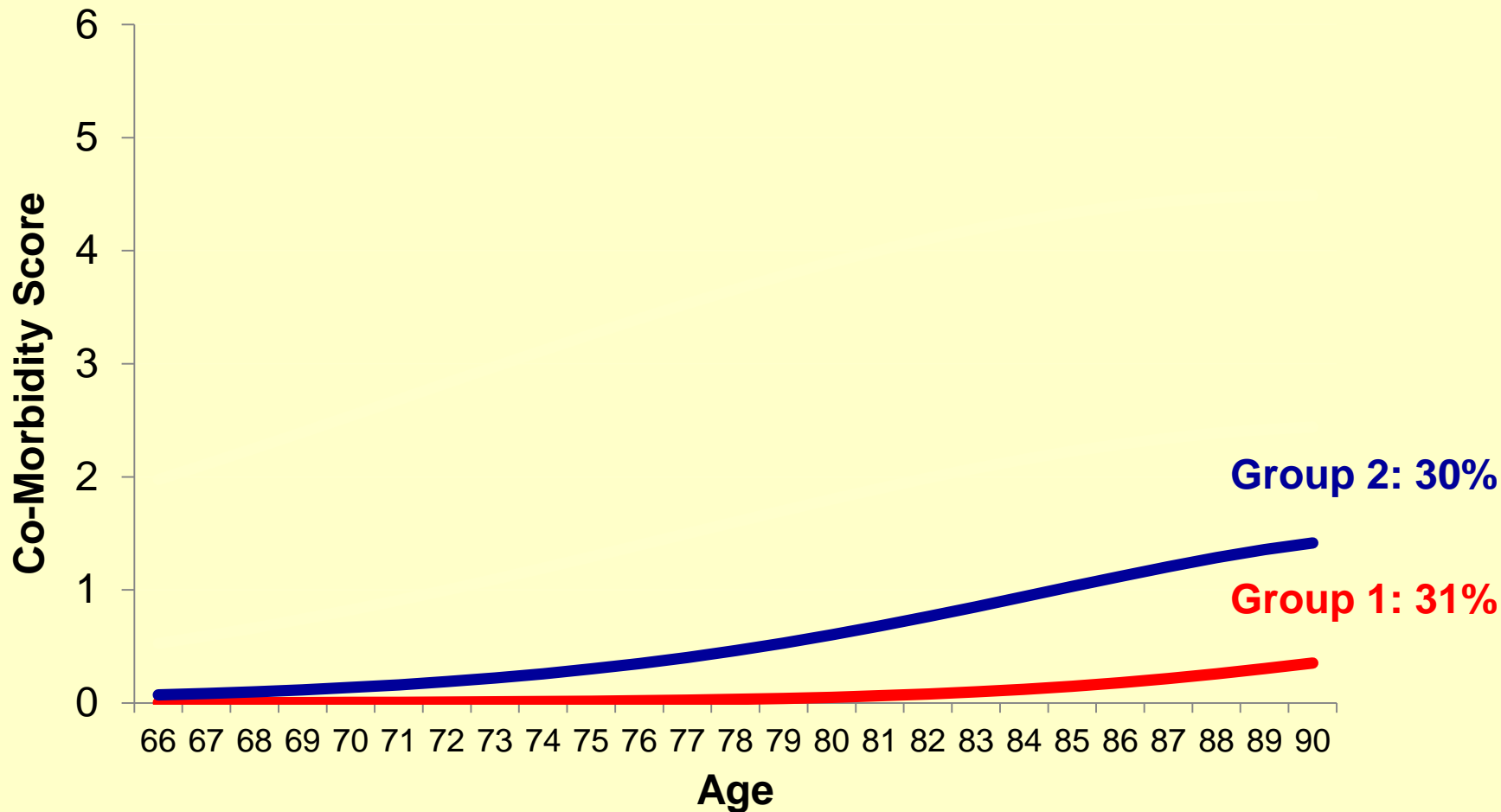
Average co-morbidity scores by sex and age



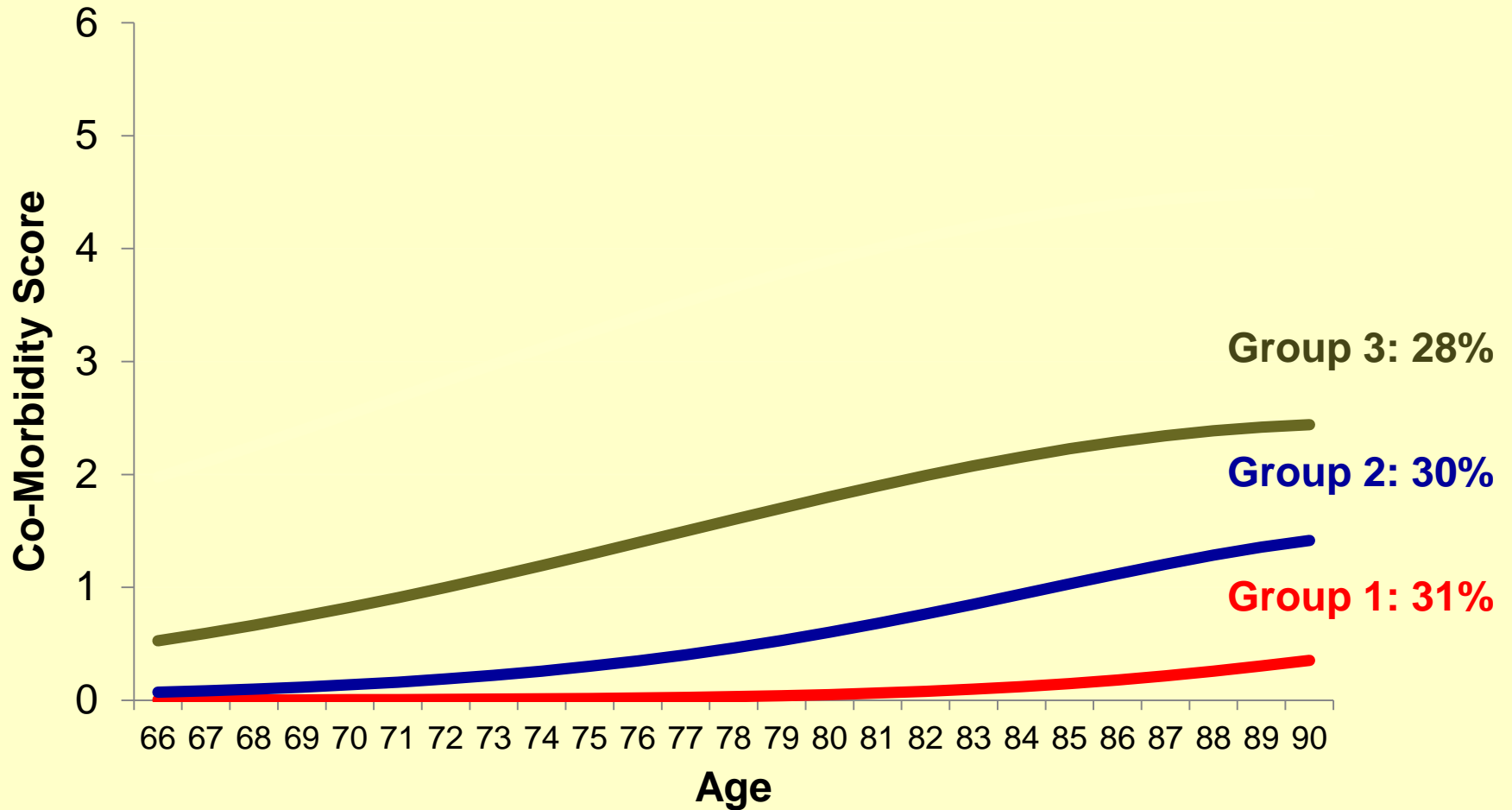
Estimated co-morbidity trajectories by group and age: FEMALES



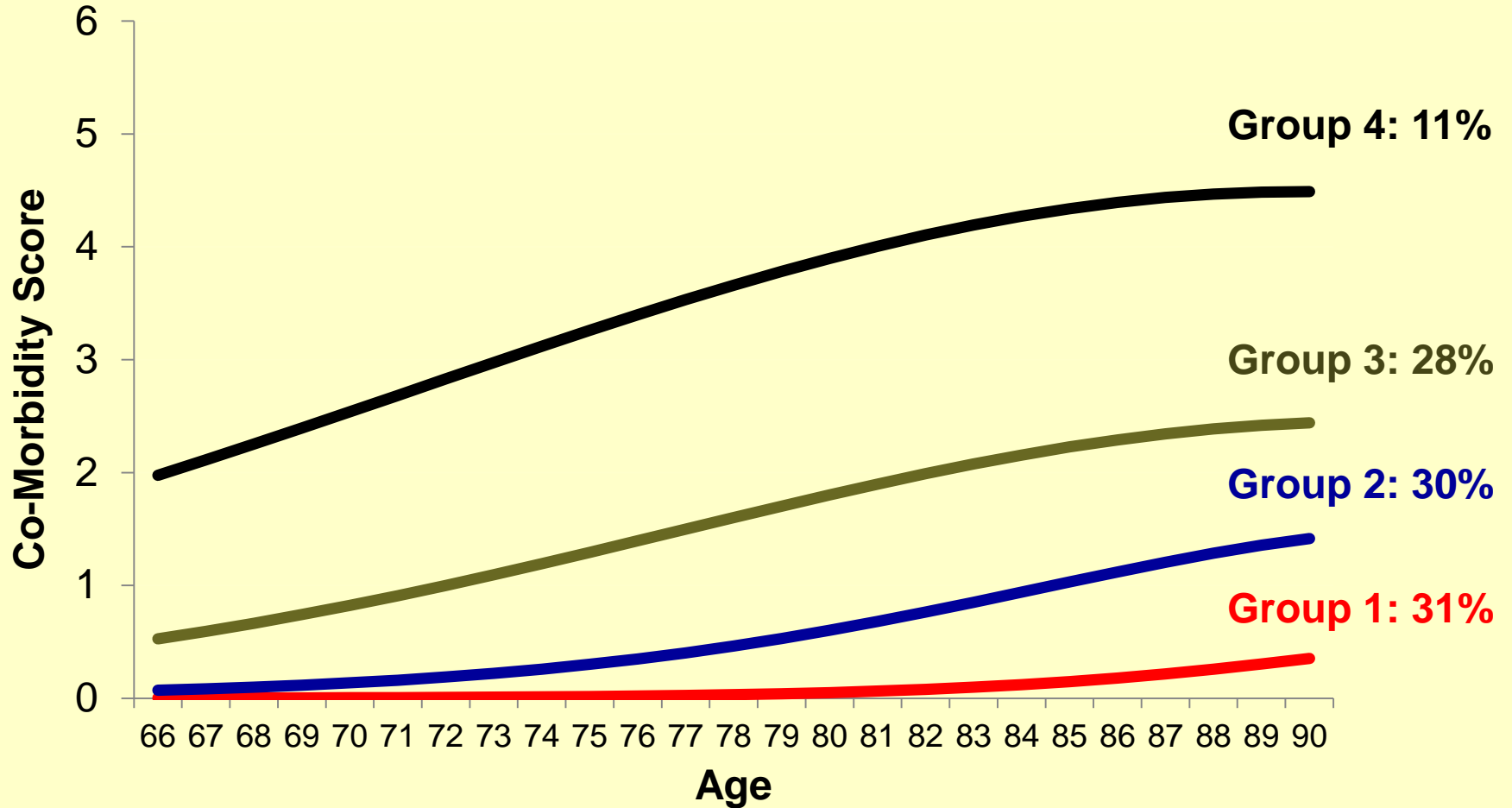
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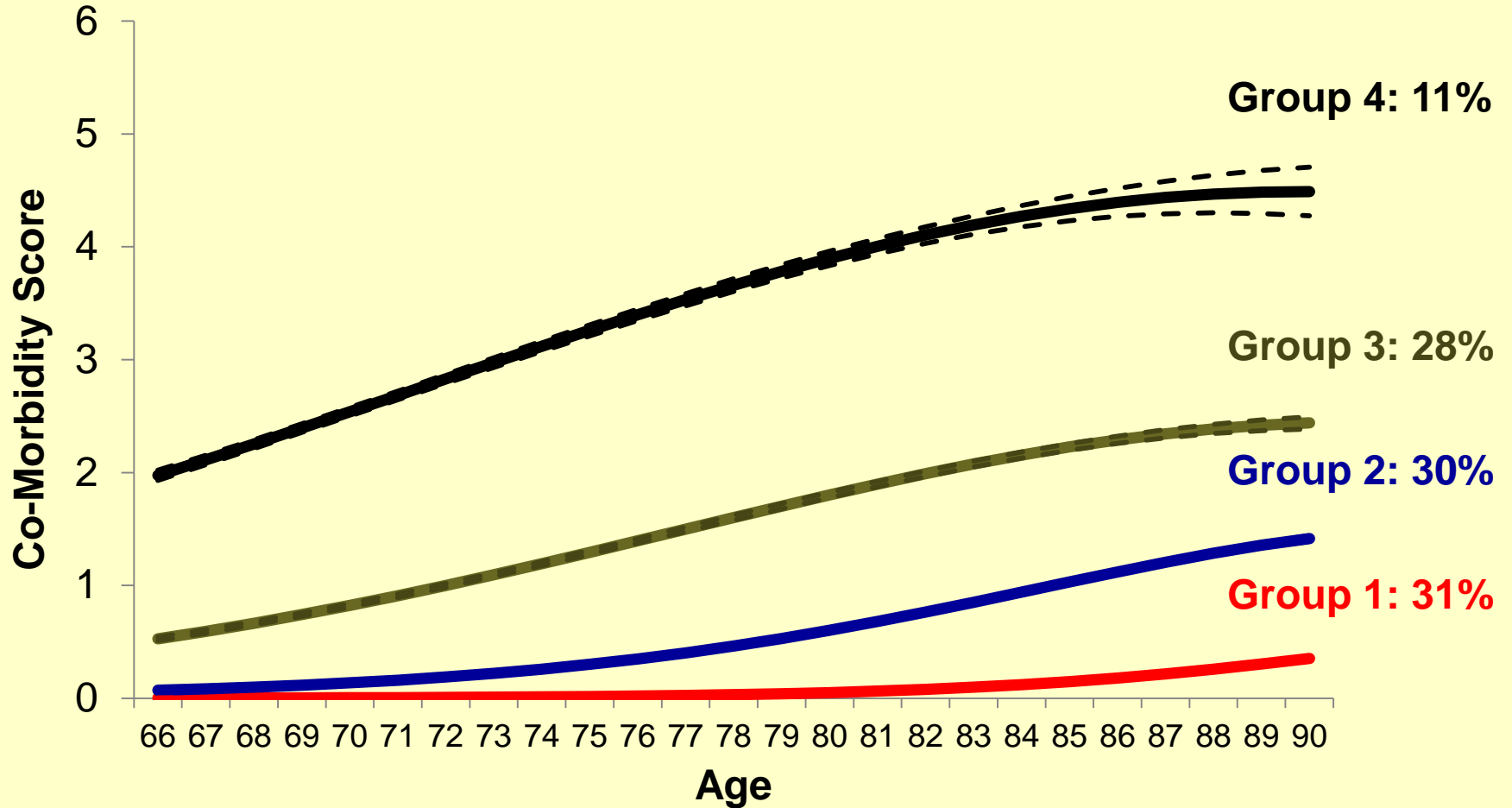
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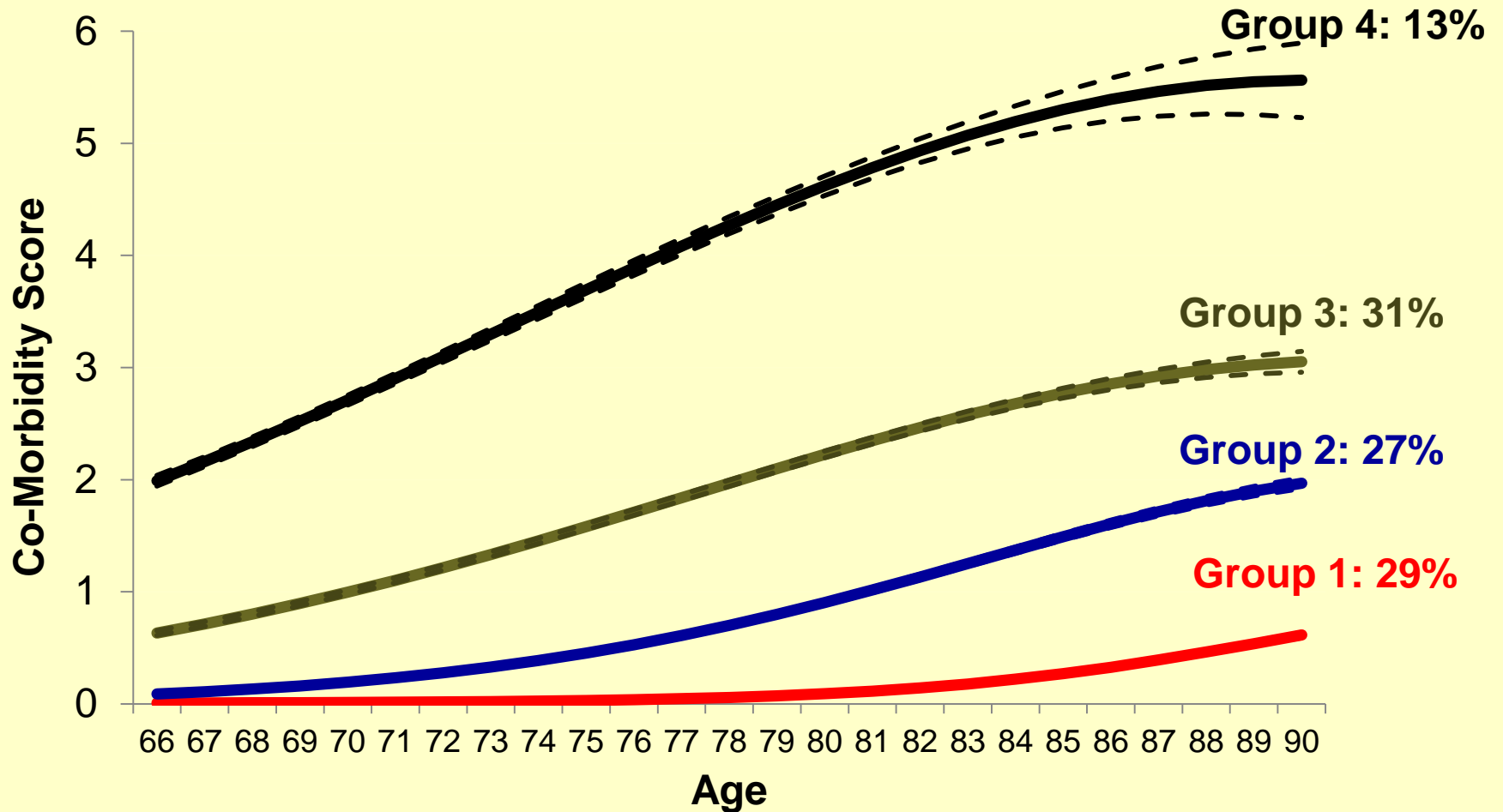
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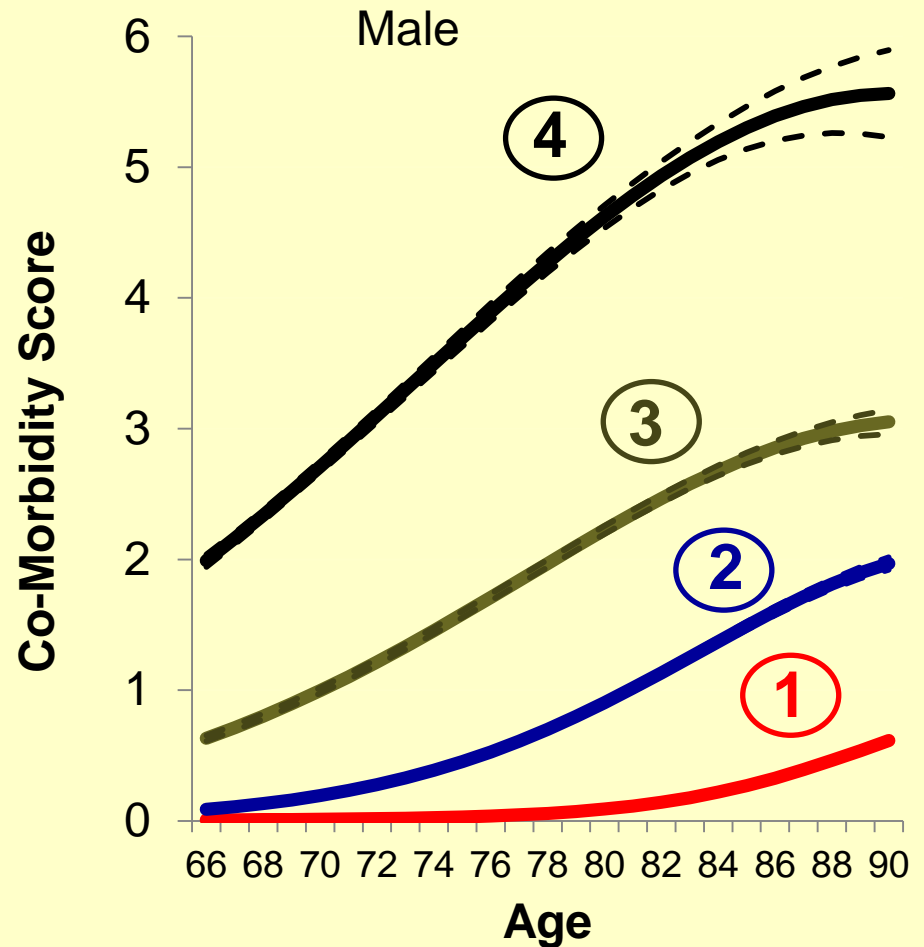
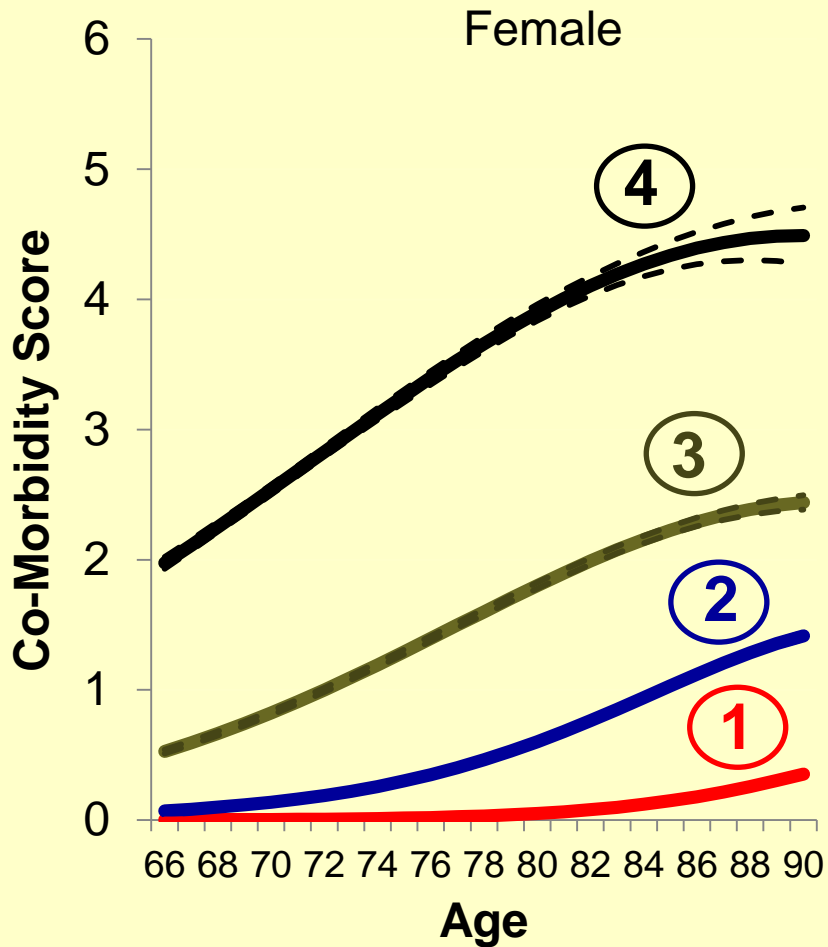
Estimated co-morbidity trajectories by group and age, with 95% CIs: FEMALES



Estimated co-morbidity trajectories by group and age, with 95% CIs: MALES



Comparing female and male trajectories



Multinomial regression predicting group membership

LN θ [Group 1 (BEST trajectory)] vs. $\frac{\text{Group 4 (WORST trajectory)}}{\text{Group 3}}$ = $\frac{\text{Group 4 (WORST trajectory)}}{\text{Group 2}}$

$\alpha + \beta$ (father's occupation) + β (own occupation) + β (neighborhood income) + β (race) + β (residency)

Multinomial regression selected odds ratios*

FEMALES

Occupation	Group 2 vs. Group 1	Group 3 vs. Group 1	Group 4 vs. Group 1
Father Q1	---	---	---
Q2	0.816**	n.s.	n.s.
Q3	0.834**	0.806**	n.s.
Q4	n.s.	0.805**	0.763**
farmer	1.149**	0.826**	0.767**
Own Q1	---	---	---
Q2	n.s.	n.s.	0.805**
Q3	0.898*	0.810**	0.743**
Q4	n.s.	0.753**	0.584**
farmer	1.310**	n.s.	0.769**

n.s. = not significant

** p < .05 * p < .10

Multinomial regression selected odds ratios*

MALES

Occupation	Group 2 vs. Group 1	Group 3 vs. Group 1	Group 4 vs. Group 1
Father Q1	---	---	---
Q2	n.s.	n.s.	n.s.
Q3	0.838**	n.s.	n.s.
Q4	0.766**	0.734**	0.870*
farmer	1.149*	n.s.	0.826**
Own Q1	---	---	---
Q2	1.194**	n.s.	n.s.
Q3	1.116*	0.810*	0.869**
Q4	n.s.	0.754*	0.672**
farmer	1.223**	n.s.	0.745**

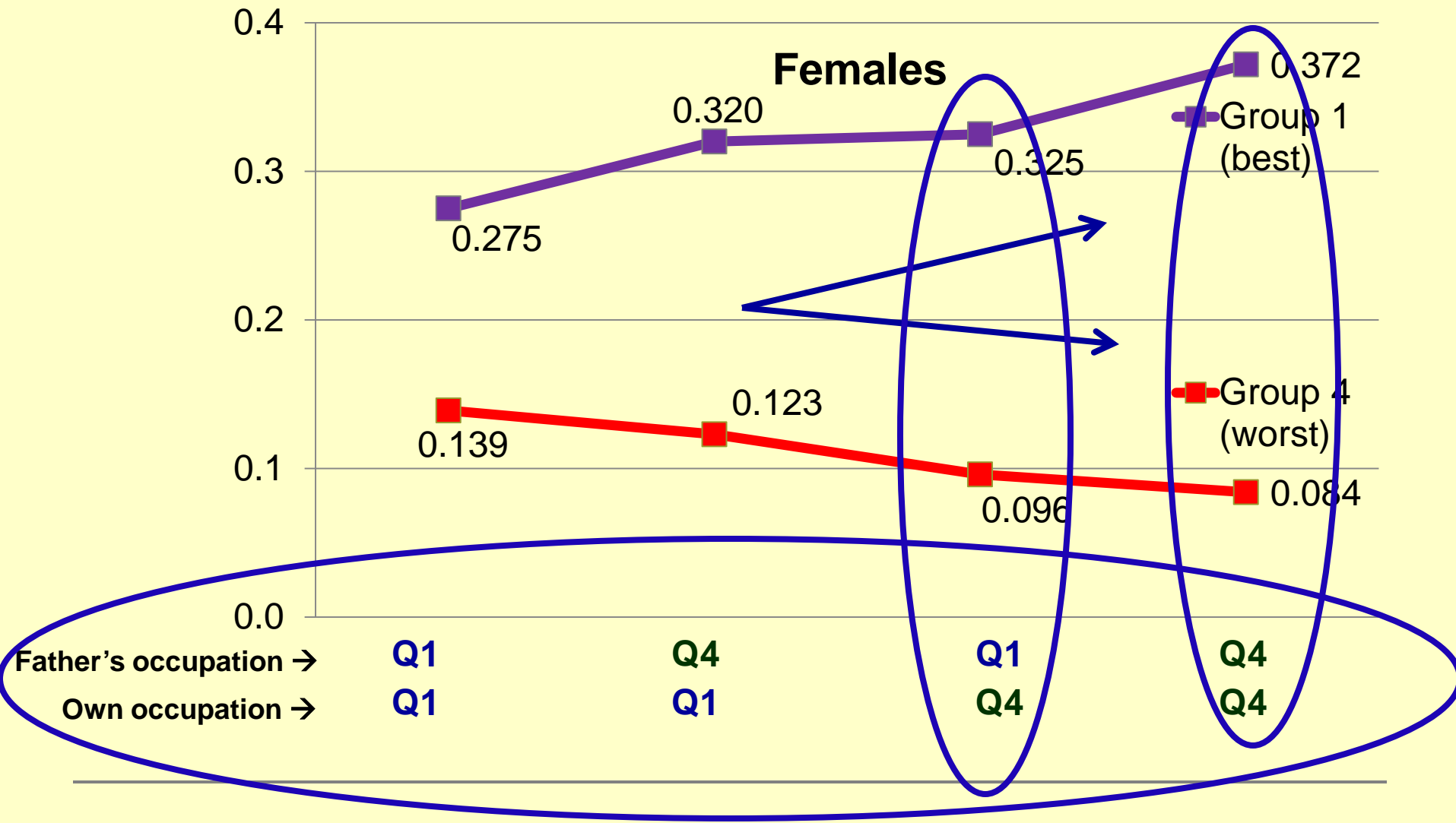
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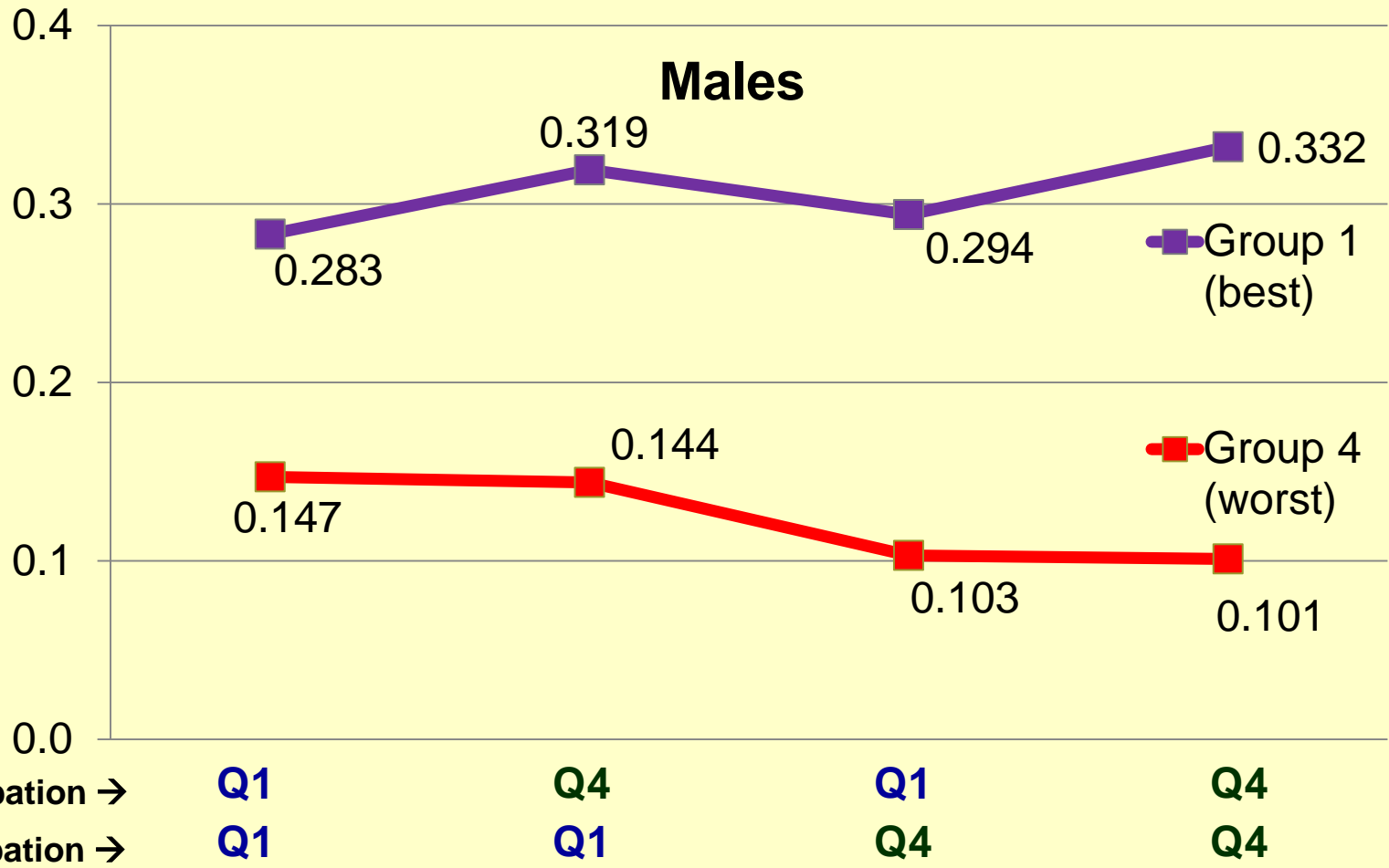
How much mobility in occupation is there? Distribution of males' older adult occupation status by father's occupation status

		Males					
		Father					
		<u>Q1</u>	<u>Q2</u>	<u>Q3</u>	<u>Q4</u>	<u>Farmer</u>	<u>Missing</u>
Older Adult	Q1	21.0	19.3	13.9	10.5	15.4	14.2
	Q2	22.4	24.6	21.7	13.3	19.1	16.5
	Q3	18.5	18.1	22.0	20.5	14.5	15.7
	Q4	13.6	14.6	18.2	27.8	11.6	14.7
	Farmer	2.1	1.9	1.2	2.2	19.3	3.9
	Missing	22.4	21.5	23.0	25.6	20.1	35.2
	Total	100.0	100.0	100.0	100.0	100.0	100.0

Estimated probability of being in the most and least favorable groups by father's and own occupation



Estimated probability of being in the most and least favorable groups by father's and own occupation



Conclusion

- Both own and father's occupation are predictors of late-life comorbidity trajectories.
- True of both men and women, but model more robust for women.
- Though you can improve your chances of having better morbidity trajectories by having higher SES, you can never escape the past (i.e., 'the long arm of childhood' (Hayward and Gorman 2004)).
- More research on:
 - mechanisms
 - farmers
 - males vs. females;
- How do trajectories translate into life and active life expectancies?

Thank-you

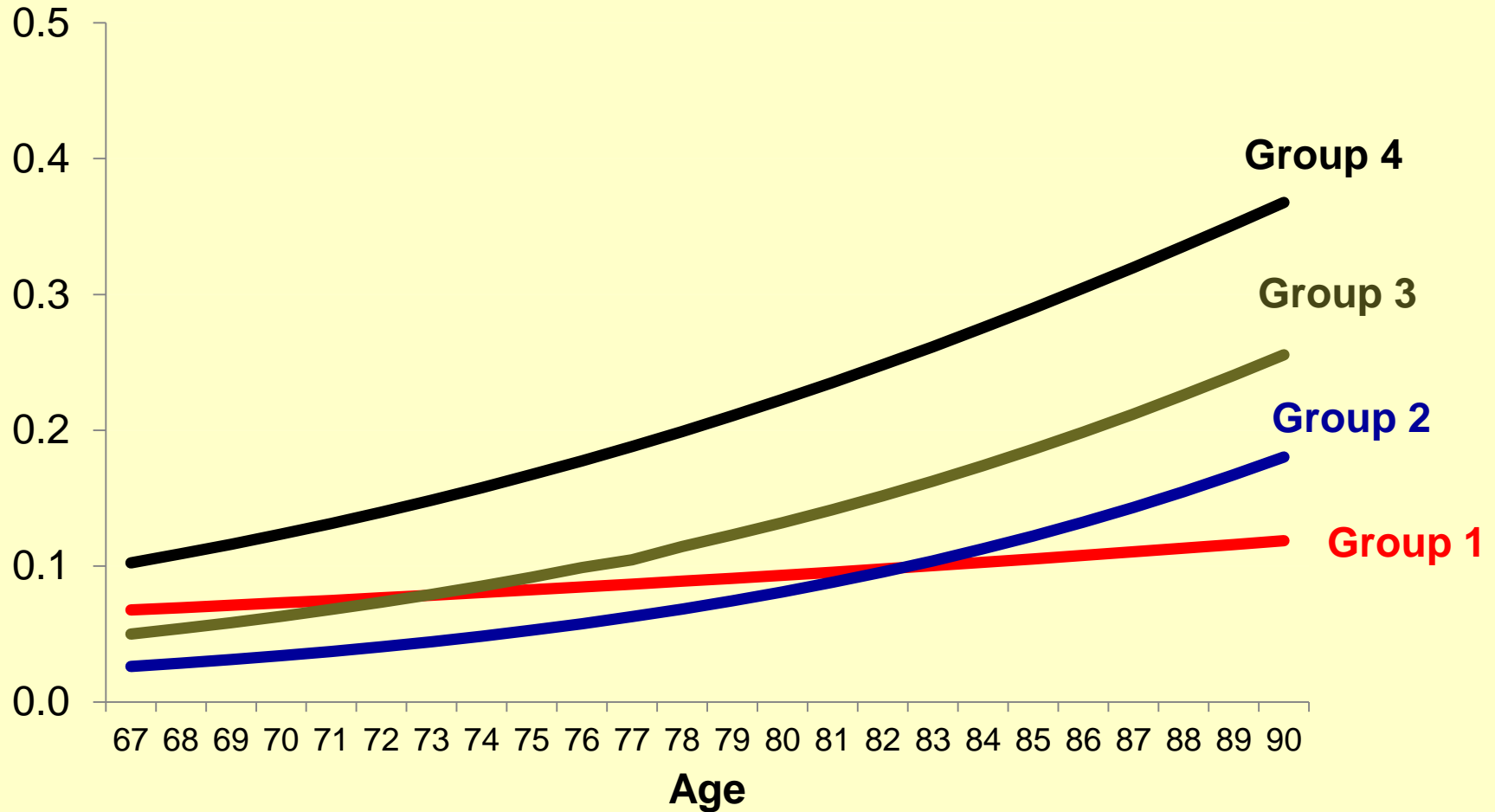
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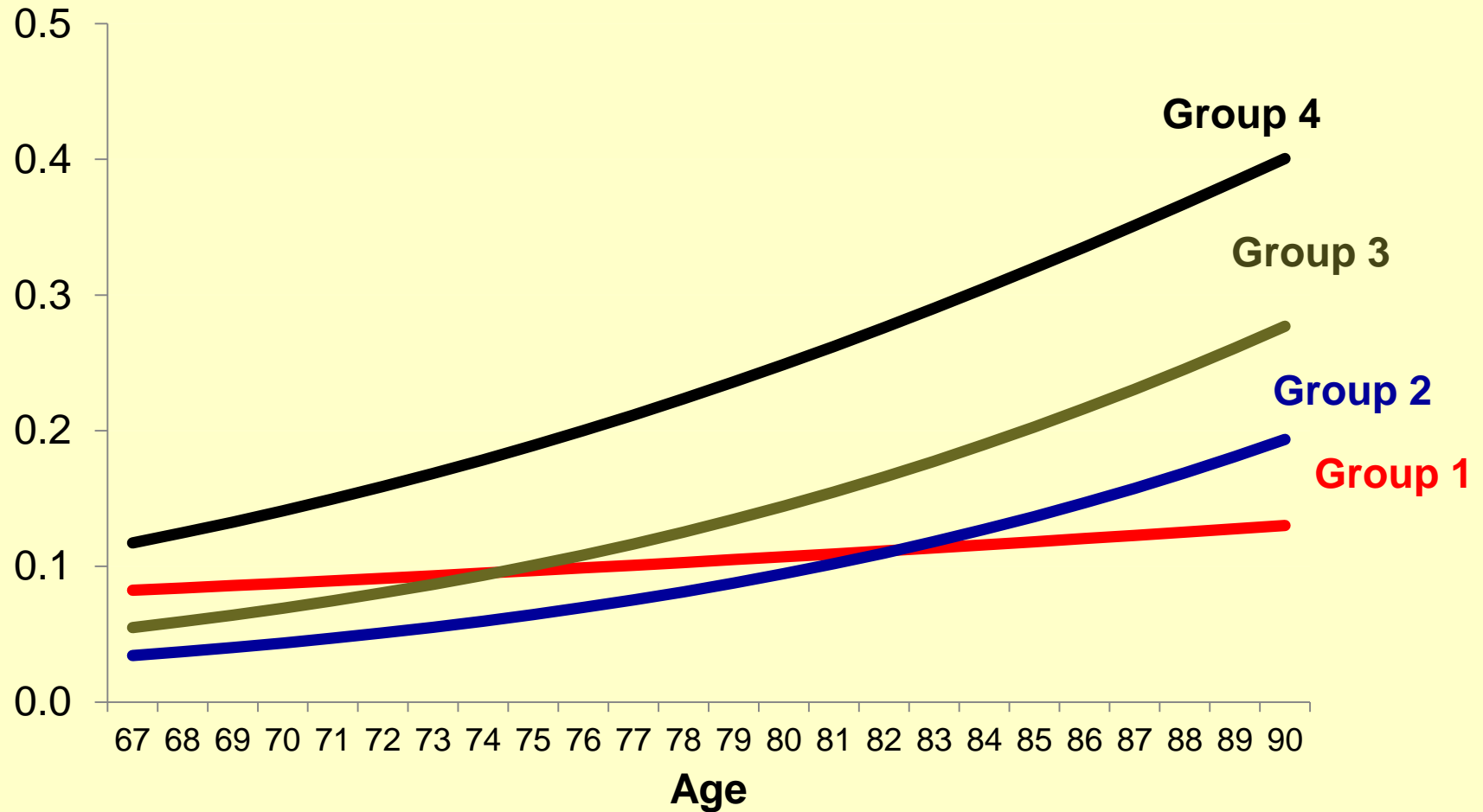
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Estimated mortality probabilities by group and age: FEMALES



Estimated Mortality Probabilities by Group and Age: MALES



Females

1 Constant	0.				
2 Constant	0.48223	0.14455	3.336		
PaNpSESQ2	-0.00478	0.06825	-0.07	0.9442	0.995
PaNpSESQ3	-0.20332	0.06836	-2.974	0.0029	0.816
PaNpSESQ4	-0.18199	0.06492	-2.803	0.0051	0.834
paFarmer	0.13895	0.05673	2.449	0.0143	1.149
misses	-0.03922	0.05881	-0.667	0.5048	0.962
ZipQ2	-0.13607	0.04807	-2.831	0.0046	0.873
ZipQ3	-0.11727	0.0494	-2.374	0.0176	0.889
ZipQ4	-0.2419	0.05297	-4.567	0	0.785
white	-0.45762	0.12653	-3.617	0.0003	0.633
waurb	0.05154	0.05193	0.992	0.321	1.053
nonwaurb	-0.16762	0.05991	-2.798	0.0051	0.846
BCQ2	0.07604	0.05762	1.32	0.187	1.079
BCQ3	-0.10768	0.05923	-1.818	0.069	0.898
BCQ4	-0.05273	0.05995	-0.88	0.3791	0.949
FarmerNpSES_	0.26998	0.07169	3.766	0.0002	1.310
MissNpSES_Bc	0.01742	0.05298	0.329	0.7423	1.018
3 Constant	0.46569	0.1409	3.305		
PaNpSESQ2	-0.02232	0.0601	-0.371	0.7103	0.978
PaNpSESQ3	-0.21532	0.06017	-3.578	0.0003	0.806
PaNpSESQ4	-0.2169	0.05753	-3.77	0.0002	0.805
paFarmer	-0.19174	0.05145	-3.727	0.0002	0.826
misses	-0.11275	0.05238	-2.152	0.0314	0.893
ZipQ2	-0.11467	0.0442	-2.594	0.0095	0.892
ZipQ3	-0.06952	0.04513	-1.541	0.1234	0.933
ZipQ4	-0.2013	0.04829	-4.168	0	0.818
white	-0.13695	0.1265	-1.083	0.279	0.872
waurb	-0.04455	0.0472	-0.944	0.3453	0.956
nonwaurb	-0.20061	0.05503	-3.645	0.0003	0.818
BCQ2	-0.03758	0.05087	-0.739	0.46	0.963
BCQ3	-0.2108	0.05202	-4.053	0.0001	0.810
BCQ4	-0.28322	0.05351	-5.293	0	0.753
FarmerNpSES_	-0.08736	0.06745	-1.295	0.1953	0.916
MissNpSES_Bc	-0.25298	0.04764	-5.31	0	0.776
4 Constant	0.09269	0.16028	0.578	0.5631	
PaNpSESQ2	0.08529	0.07723	1.104	0.2694	1.089
PaNpSESQ3	-0.12505	0.07847	-1.594	0.111	0.882
PaNpSESQ4	-0.27009	0.07751	-3.485	0.0005	0.763
paFarmer	-0.26468	0.06853	-3.862	0.0001	0.767
misses	-0.00441	0.06793	-0.065	0.9482	0.996
ZipQ2	-0.23717	0.05839	-4.062	0	0.789
ZipQ3	-0.06513	0.05772	-1.128	0.2591	0.937
ZipQ4	-0.40064	0.06374	-6.286	0	0.670
white	-0.64902	0.13785	-4.708	0	0.523
waurb	0.08698	0.06223	1.398	0.1622	1.091
nonwaurb	-0.2178	0.07501	-2.904	0.0037	0.804
BCQ2	-0.21653	0.06575	-3.293	0.001	0.805
BCQ3	-0.29754	0.06679	-4.455	0	0.743
BCQ4	-0.53752	0.07225	-7.44	0	0.584
FarmerNpSES_	-0.26278	0.09056	-2.902	0.0037	0.769
MissNpSES_Bc	-0.26861	0.0597	-4.499	0	0.764

Males

1 Constant	0.				
2 Constant	-0.02301	0.15897	-0.145	0.8849	0.977
PaNpSESQ2	-0.07599	0.07853	-0.968	0.3332	0.927
PaNpSESQ3	-0.17625	0.07745	-2.276	0.0229	0.838
PaNpSESQ4	-0.26638	0.07501	-3.551	0.0004	0.766
paFarmer	0.06701	0.06593	1.016	0.3095	1.069
misses	0.117	0.06757	1.731	0.0834	1.124
ZipQ2	-0.18699	0.05581	-3.351	0.0008	0.829
ZipQ3	-0.19067	0.05839	-3.265	0.0011	0.826
ZipQ4	-0.25213	0.06246	-4.037	0.0001	0.777
white	0.01476	0.13864	0.106	0.9152	1.015
waurb	0.08513	0.05935	1.434	0.1514	1.089
nonwaurb	-0.04514	0.06796	-0.664	0.5066	0.956
BCQ2	0.17716	0.06511	2.721	0.0065	1.194
BCQ3	0.10985	0.06377	1.722	0.085	1.116
BCQ4	0.0936	0.06539	1.431	0.1523	1.098
FarmerNpSES_	0.20108	0.08413	2.39	0.0168	1.223
MissNpSES_Bc	-0.32469	0.06232	-5.21	0	
3 Constant	0.12589	0.14138	0.89	0.3732	1.134
PaNpSESQ2	0.04026	0.06691	0.602	0.5474	1.041
PaNpSESQ3	-0.08437	0.0663	-1.273	0.2032	0.919
PaNpSESQ4	-0.11383	0.06359	-1.79	0.0734	0.892
paFarmer	0.0241	0.05758	0.419	0.6755	1.024
misses	0.11531	0.05897	1.956	0.0505	1.122
ZipQ2	-0.08735	0.04845	-1.803	0.0714	0.916
ZipQ3	-0.09587	0.05052	-1.898	0.0578	0.909
ZipQ4	-0.21639	0.05428	-3.987	0.0001	0.805
white	0.0216	0.12455	0.173	0.8623	1.022
waurb	0.08481	0.05142	1.649	0.0991	1.089
nonwaurb	0.01682	0.05872	0.286	0.7746	1.017
BCQ2	0.05652	0.0561	1.008	0.3137	1.058
BCQ3	-0.03539	0.0547	-0.647	0.5177	0.965
BCQ4	-0.04409	0.05596	-0.788	0.4308	0.957
FarmerNpSES_	-0.05719	0.07591	-0.753	0.4512	0.944
MissNpSES_Bc	-0.30081	0.05207	-5.777	0	
4 Constant	-0.09795	0.1549	-0.632	0.5272	0.907
PaNpSESQ2	0.0635	0.08347	0.761	0.4468	1.066
PaNpSESQ3	0.0329	0.08184	0.402	0.6876	1.033
PaNpSESQ4	-0.13912	0.0814	-1.709	0.0874	0.870
paFarmer	-0.19087	0.07429	-2.569	0.0102	0.826
misses	0.08242	0.07396	1.114	0.2651	1.086
ZipQ2	-0.00416	0.06151	-0.068	0.9461	0.996
ZipQ3	-0.04763	0.0643	-0.741	0.4588	0.953
ZipQ4	-0.34396	0.07078	-4.859	0	0.709
white	-0.56013	0.12991	-4.312	0	0.571
waurb	0.13935	0.06576	2.119	0.0341	1.150
nonwaurb	-0.05113	0.07767	-0.658	0.5103	0.950
BCQ2	0.02299	0.06978	0.329	0.7418	1.023
BCQ3	-0.14045	0.06912	-2.032	0.0422	0.869
BCQ4	-0.39776	0.07491	-5.31	0	0.672
FarmerNpSES_	-0.29475	0.10451	-2.82	0.0048	0.745
MissNpSES_Bc	-0.22305	0.064	-3.485	0.0005	0.800

		Father					
Own	Q1	Q2	Q3	Q4	Farmer	Missing	Total
Q1	1,994 20.33	1,864 19.28	1,526 16.36	1,443 12.80	3,618 16.40	2,531 13.63	12,976 16.08
Q2	1,901 19.38	2,151 22.25	1,716 18.39	1,597 14.17	3,813 17.28	2,845 15.33	14,023 17.38
Q3	1,640 16.72	1,590 16.44	1,709 18.32	2,091 18.55	2,998 13.59	2,564 13.81	12,592 15.60
Q4	1,105 11.26	1,183 12.23	1,569 16.82	2,668 23.67	2,446 11.09	2,550 13.74	11,521 14.28
Farmer	589 6.00	488 5.05	407 4.36	476 4.22	3,154 14.30	1,023 5.51	6,137 7.60
Missing	2,581 26.31	2,393 24.75	2,402 25.75	2,996 26.58	6,034 27.35	7,050 37.98	23,456 29.06
Total	9,810 100.00	9,669 100.00	9,329 100.00	11,271 100.00	22,063 100.00	18,563 100.00	80,705 100.00

Father and own occupation for women