

Estimating Health-Adjusted Life Expectancy by Medical Care Utilization and Expenditure Data in Taiwan: A Log Transformation Study

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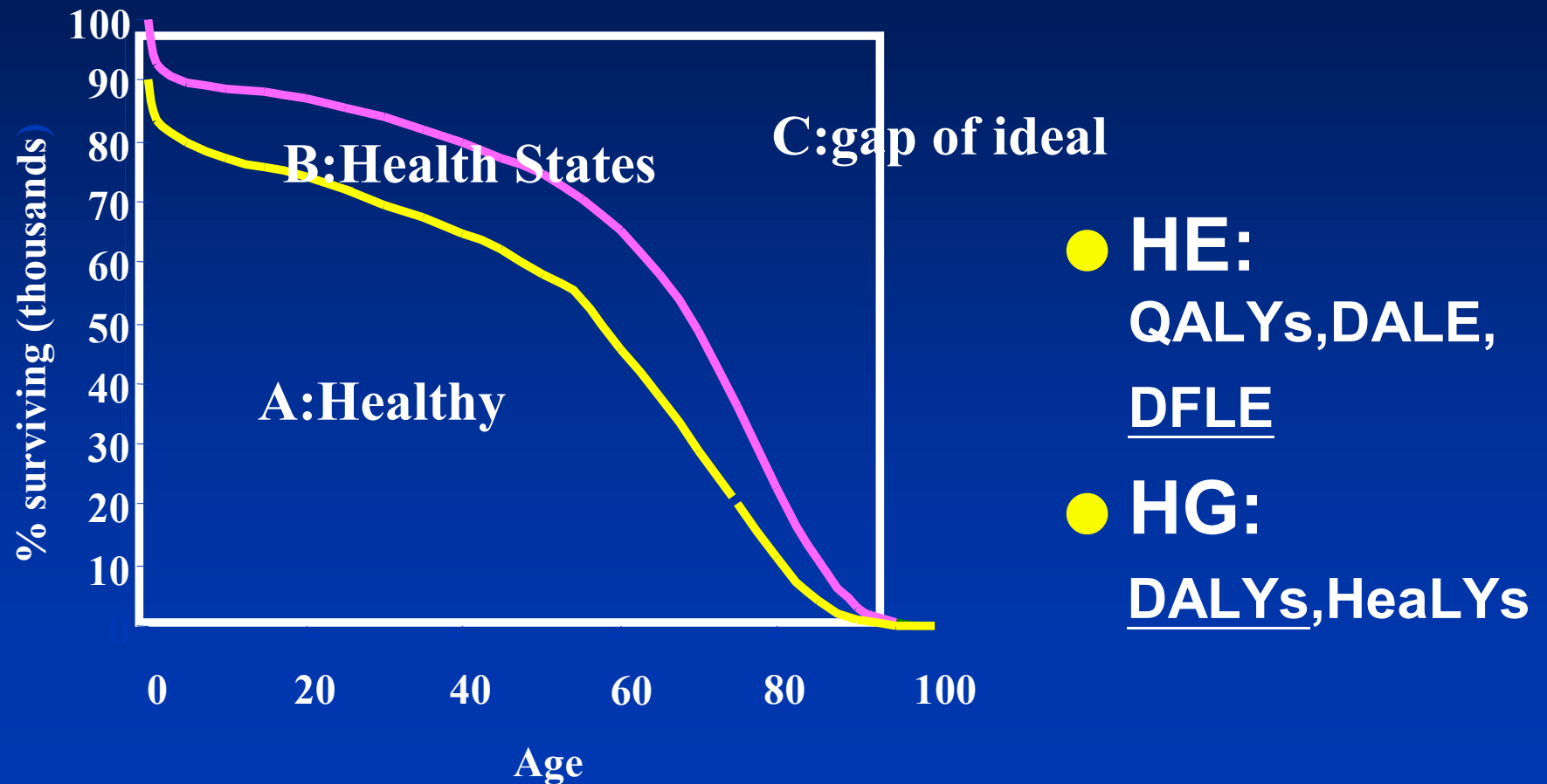
outline

- Background
- Objectives
- Materials & Methods
- Results
- Conclusions

SMPH

$$\text{Health Expectancy(HE)} = A + f(B)$$

$$\text{Health Gap(HG)} = C + g(B)$$



Background : Calculate HALE

There are two components in calculating Health Adjusted Life Expectancy(HALE):

1. A sequence of age-specific mortality rates: (Mortality Registration Data in Taiwan(死亡率))
2. A sequence of age-specific average health status(Disability Prevalence survey, sampling,,...find.)失能率

Backgrounds: Health Status

To measure average health status (**Disability Prevalence**) requires two kinds of information:

1. **Multi-attribute of Health States:**
Health States (Disability) Dimension :
i.e. pain, mobility, 失能狀態
2. **Categorical Level of Severity:** 失能嚴重度
From full health to no health (Death) Adjusted

Could we use Proxy indicator?

Backgrounds: Research Question

This Research Question:

Can we use National Health Insurance Medical Care Utilization and Medical Care Expenditure as a **proxy** for calculating HALE?

1. Medical Care Utilization (MCU) as a proxy for Health Status 醫療利用估失能狀態

2. Medical Care Expenditure (MCE) as a proxy for Severity Level 醫療費用估失能嚴重度



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Objectives

1. To calculate HALE Trends in Taiwan :
2. To assess **Disease Prevalence** using NHI's medical care utilization(MCU) and medical care expenditure(MCE) as a proxy for **Health Status and Severity Level**, 醫療利用及醫療費用,估總失能狀態



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Materials :

We computed LE and HALE using the three data.

All three data sets were created by gender and age: with each age as a separate age group

study data year 2010 and 2009

Materials and Limitations

Data are derived from following 3 sources:

1. Demographic data
2. Mortality Registration database
3. National Health Insurance Claim database

All data are derived from administrative database

All data covered whole population

All data are not from survey or sampling

All data are from physician's diagnoses.

All data not based upon self-rated health reports

Materials :

We computed HALE using the prevalence-based Sullivan's method.

All three data sets were created by gender and age: with each age as a separate age group

study data year 2010 and 2009

Methods: Sullivan's method

[1] age	[2] midpop	[3] death no	[6] no surviving to age x	[7] person years lived at	[9] life expectanc y	disability No	A	[10] proportion with disability	[11] Person years lived without disability in	[12] Total years lived without disability	[13] Health Adjusted Life	[14] prop of life spent disability
X	Px	Dx	lx	Lx	ex			px	[11]=(1- [10])*7	[12]=[11+[11]Age-1]	[13]=[12]/[6]	%
0	185083.5	778	100,000	99619	78.89	740	324	0.4%	77183	7215448	73.11	7.33%
5	223191	43	99,460	99450	74.31	2,232	356	1.0%	92384	6790400	68.54	7.77%
10	275062	38	99,366	99359	69.38	2,751	242	1.0%	96576	6317069	63.66	8.25%
15	323966.5	75	99,286	99274	64.44	3,240	254	1.0%	97196	5831470	58.76	8.82%
20	323940	163	99,097	99072	59.55	9,198	383	2.8%	96259	5347970	53.97	9.38%
25	368895.5	229	98,839	98808	54.70	12,142	592	3.3%	95556	4868850	49.26	9.95%
30	408330	321	98,492	98453	49.89	16,105	949	3.9%	94570	4392125	44.59	10.61%
35	354900	482	97,992	97925	45.13	14,476	1,283	4.1%	93931	3920284	40.01	11.35%
40	375490.5	734	97,231	97136	40.46	16,871	1,893	4.5%	92772	3453000	35.51	12.22%
45	386769	1098	96,080	95944	35.91	20,956	2,795	5.4%	90745	2992883	31.15	13.26%
50	363762	1496	94,518	94324	31.46	23,228	3,441	6.4%	88301	2544078	26.92	14.45%
55	316818	1753	92,364	92109	27.13	25,150	4,174	7.9%	84798	2109538	22.84	15.83%
60	224358	2013	89,368	88969	22.96	23,297	4,205	10.4%	79731	1694992	18.97	17.38%
65	156048	1935	85,092	84568	18.98	19,507	3,734	12.5%	73997	1307646	15.37	19.02%
70	136928	2736	79,012	78231	15.23	21,568	4,384	15.8%	65908	952588	12.06	20.86%
75	105843.5	3436	69,848	68733	11.89	20,430	4,140	19.3%	55466	642513	9.20	22.62%
80	83998.5	4672	56,983	55441	8.98	18,644	3,849	22.2%	43135	387979	6.81	24.17%
85	41853.5	4014	40,557	38701	6.58	10,476	2,157	25.0%	29014	200150	4.94	24.98%
90	14649	2172	22,973	21388	4.72	3,766	720	25.7%	15889	81641	3.55	24.70%
95	3797	879	9,469	8486	3.14	823	167	21.7%	6647	22535	2.38	24.11%
100	1937	355	3,002	1501	0.50	1,211	48	62.5%	563	563	0.19	62.50%

Materials :

Using Sullivan method: we need disability Prevalence.

How to measure disability severity : use per capita medical care expenditure as base to adjust disability **severity**

利用Log 均人醫費校正失能

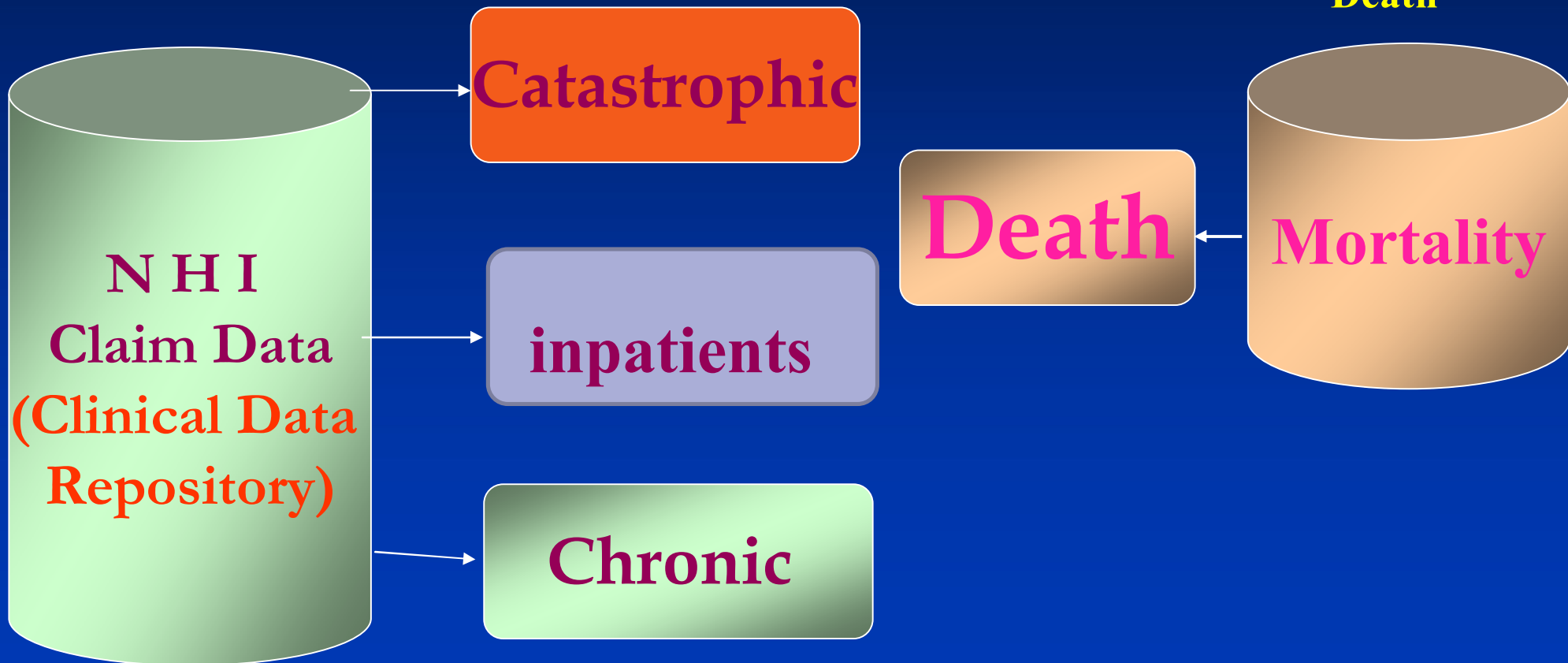
Database MCU

Prevalence

Health Status

Incidence

Death



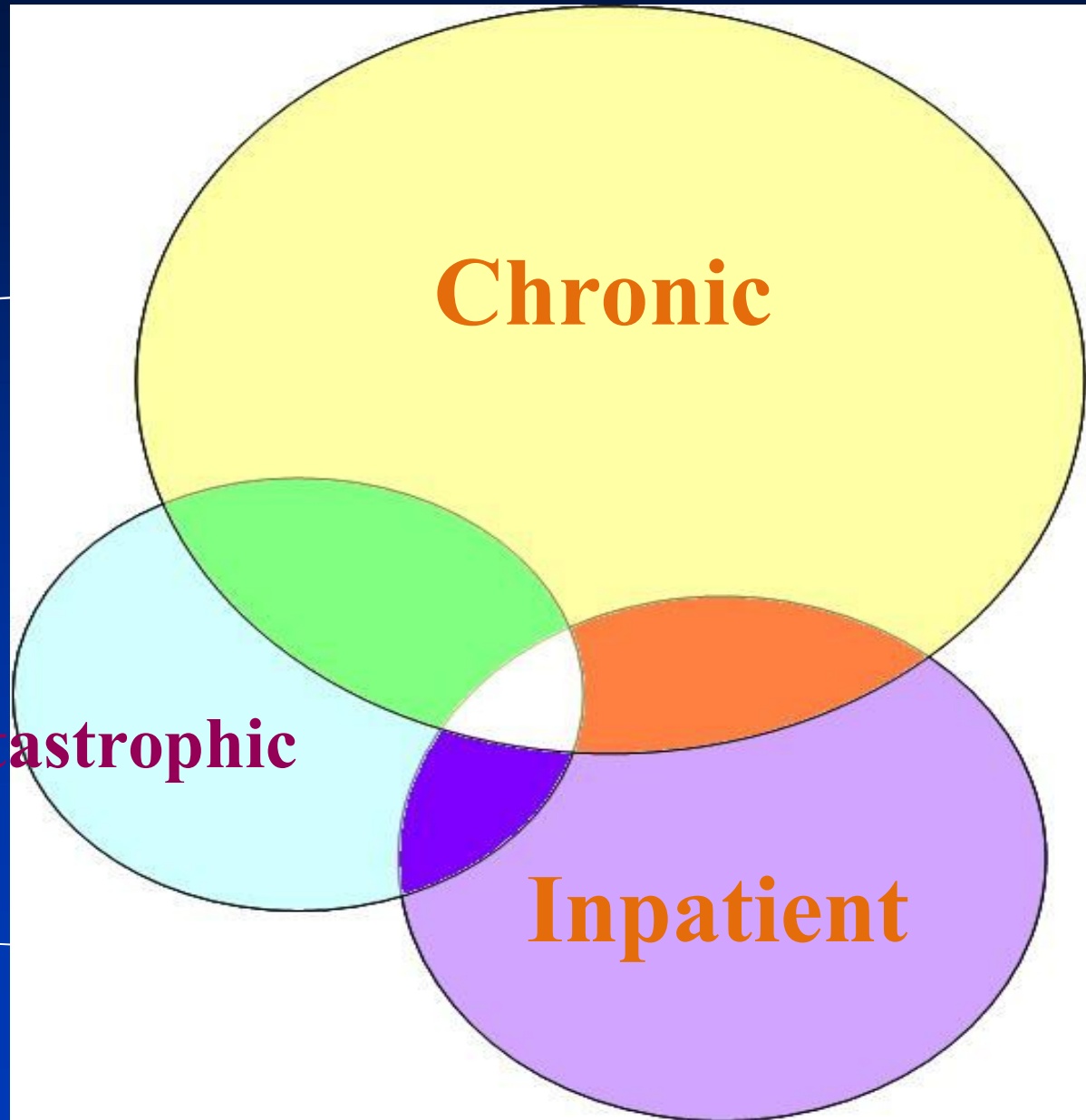
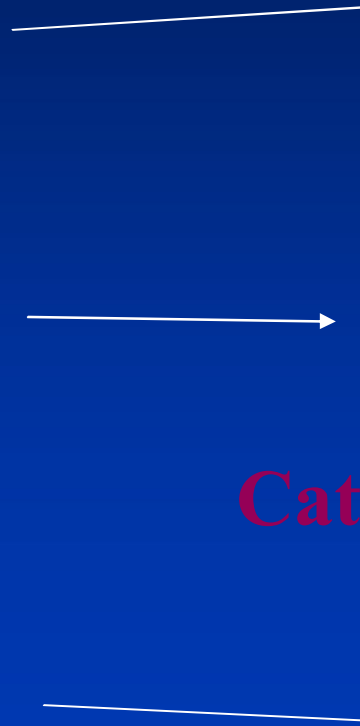
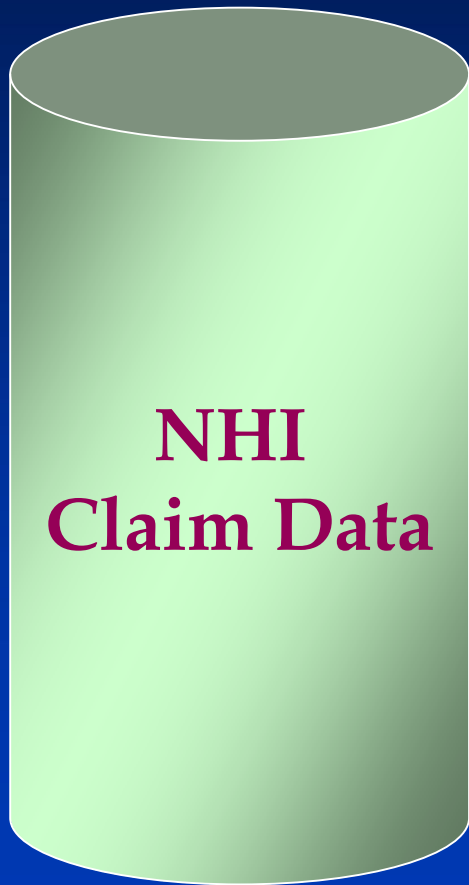
Methods :Health Status - MCU Proxy

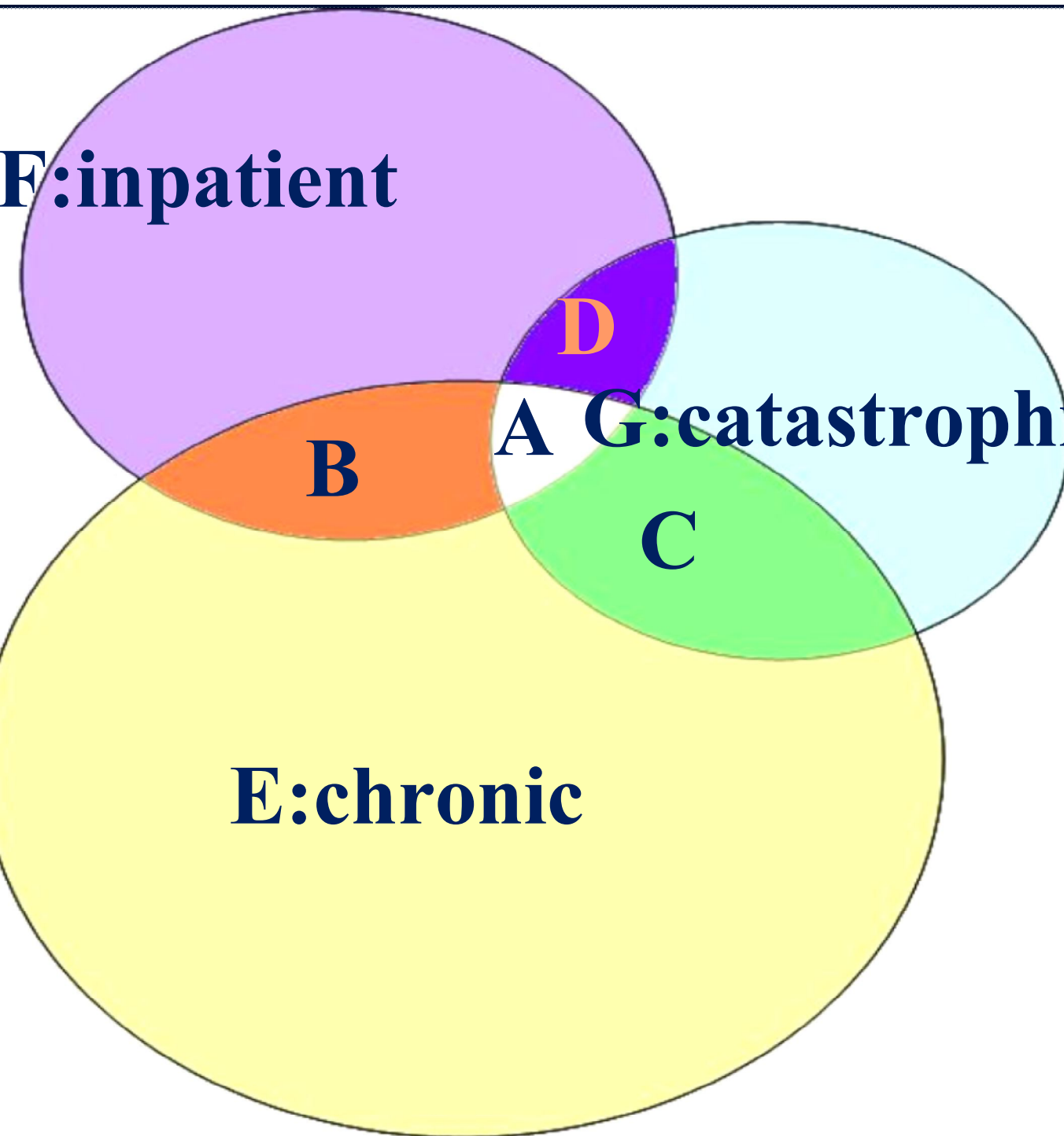
1. "catastrophic-inpatient -chronic",
2. "catastrophic-chronic"
3. "inpatient-chronic"
4. "catastrophic-inpatient"
5. Inpatients :
6. Catastrophic
7. Chronic Disease
8. Exclude Chronic Disease only.

Database MCE

Severity Level

Prevalence





**A. Catastrophic-
Inpatient-
Chronic**

B. Inpatient-Chronic

**C. Catastrophic-
Chronic**

**D. Catastrophic-
Inpatient**

F. Inpatients

G. Catastrophic

E. Chronic Disease

Methods :Severity Level Proxy-MCE

1. Calculate Medical Care Utilization (No of Patients) of these 7 kinds areas as Health Status in each age .7狀態估失能
2. Per Capita Medical Care Expenditure is a proxy for Severity Level in each age.
均人醫療費用為嚴重度

Method : Log Transformation

Before adjust disability weight : We make a log transformation of per capita MCE as disability severity.

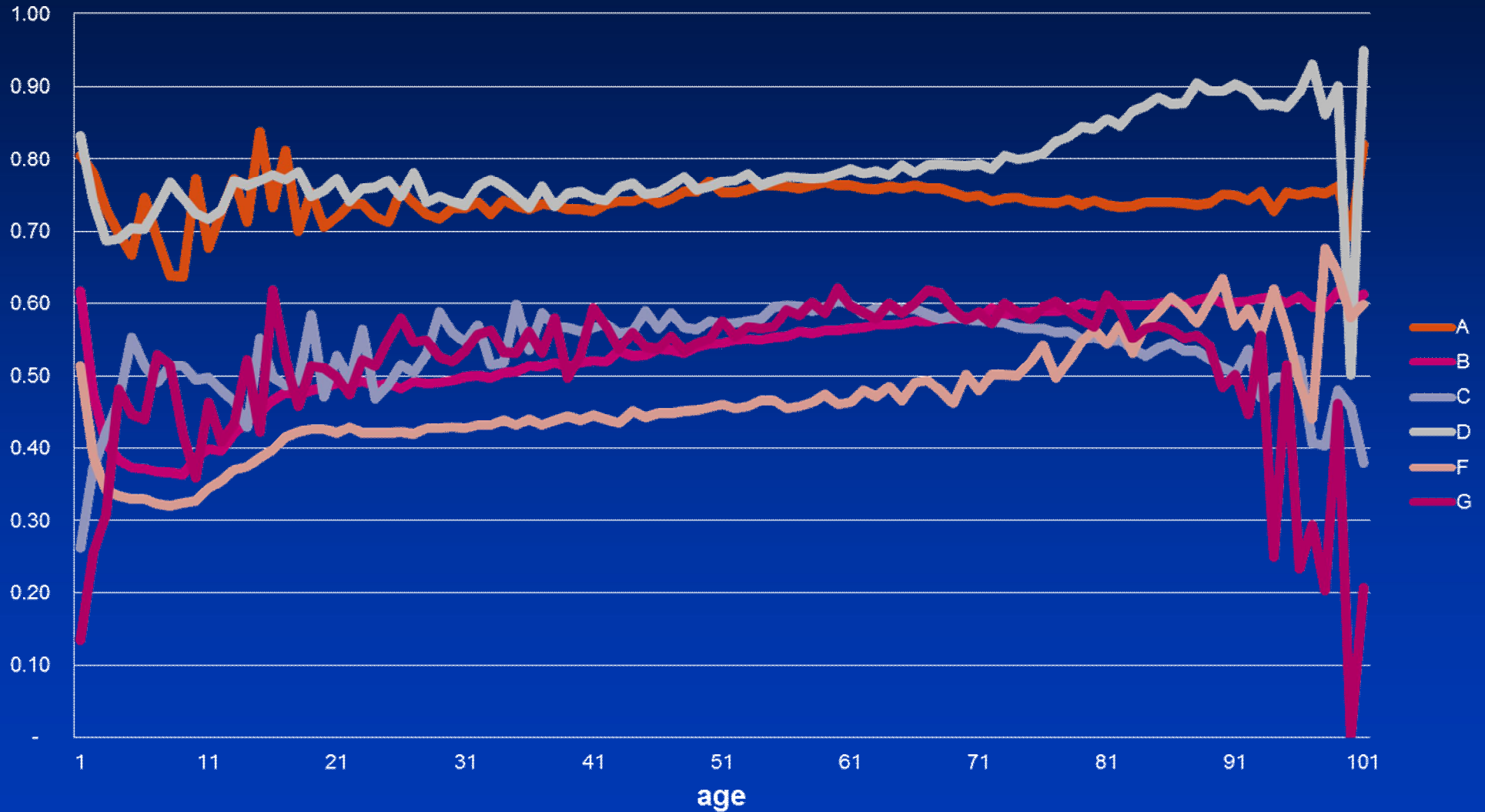
均人醫療費用轉 Log.

**Disability
prevalence was
adjusted by
MCU & MCE**

RESULT

**Disability
Prevalence
by log Trans-
formation**

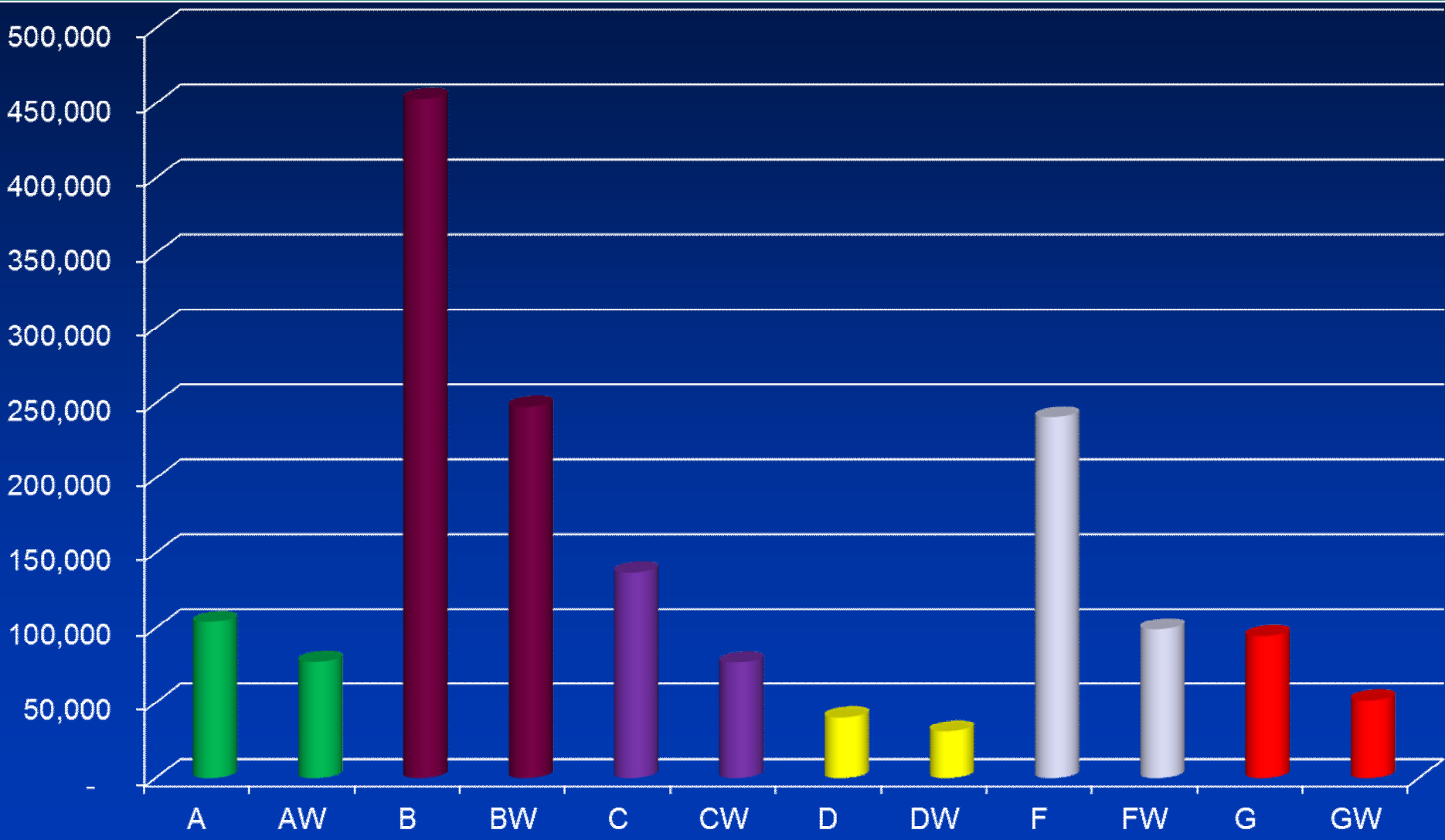
Results : Disability Weight (log,male)



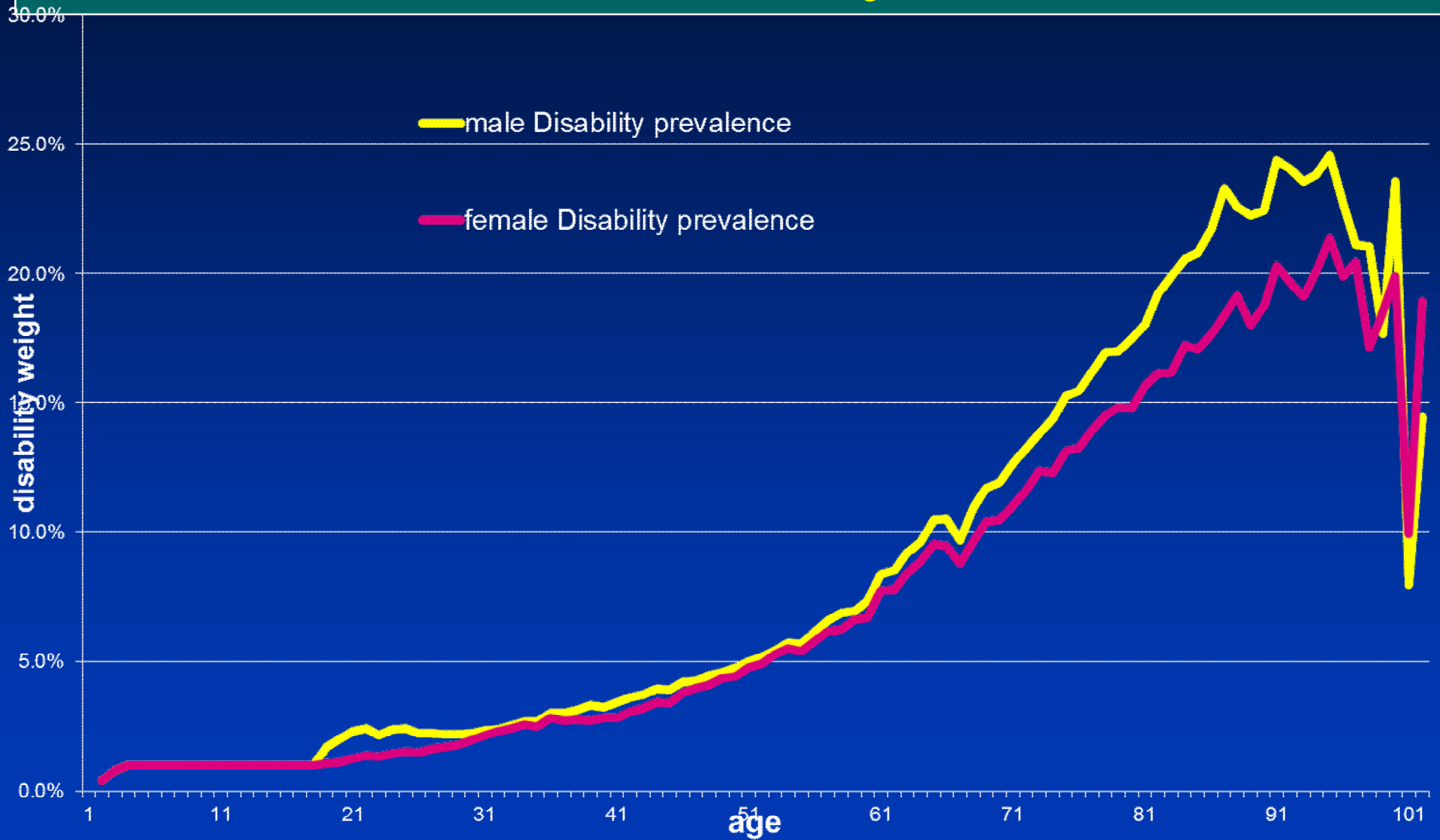
Results : Disability Weight(log,female)



Results : Disability Adjusted. Total No



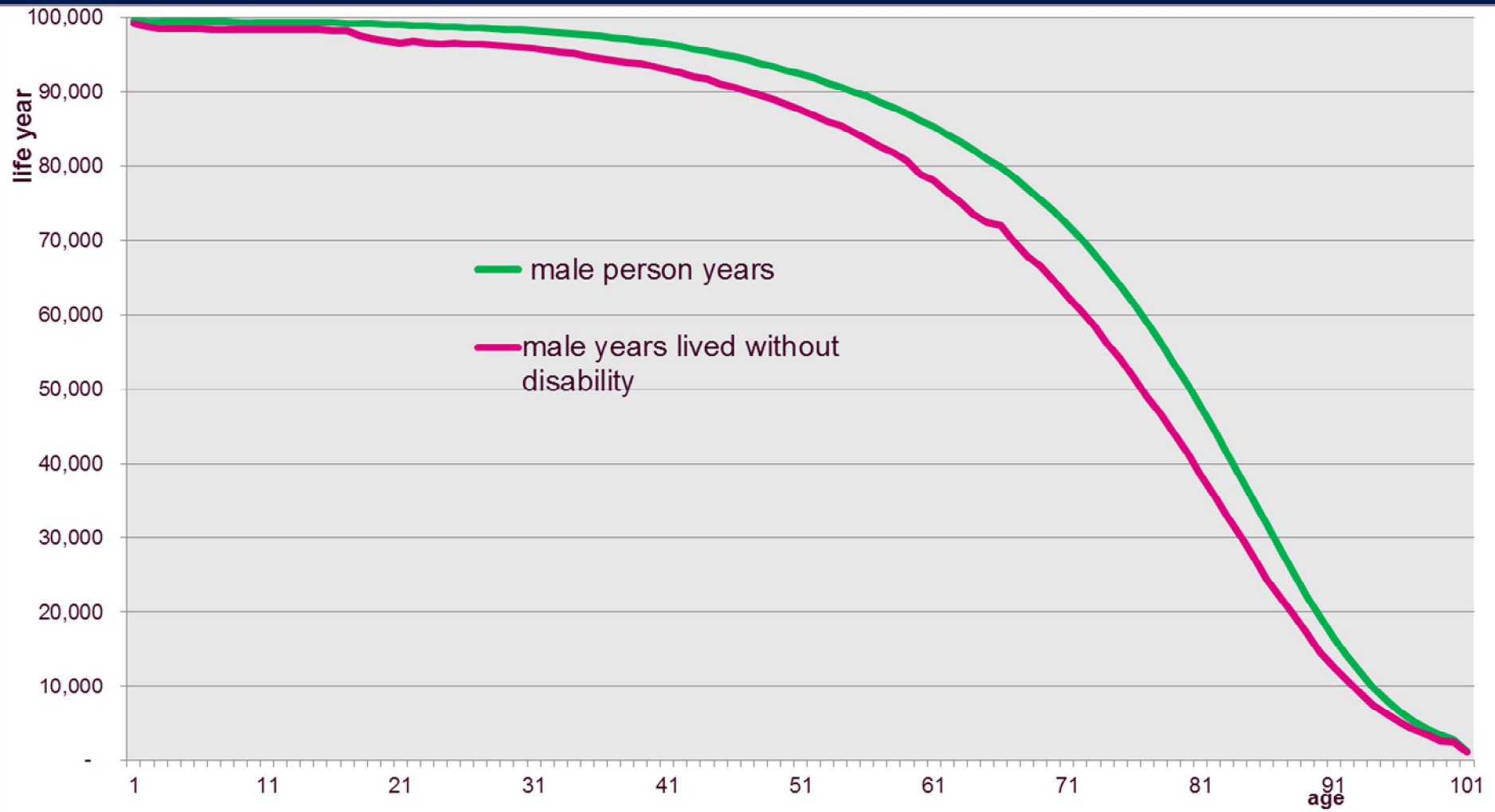
Results : Disability Prevalence



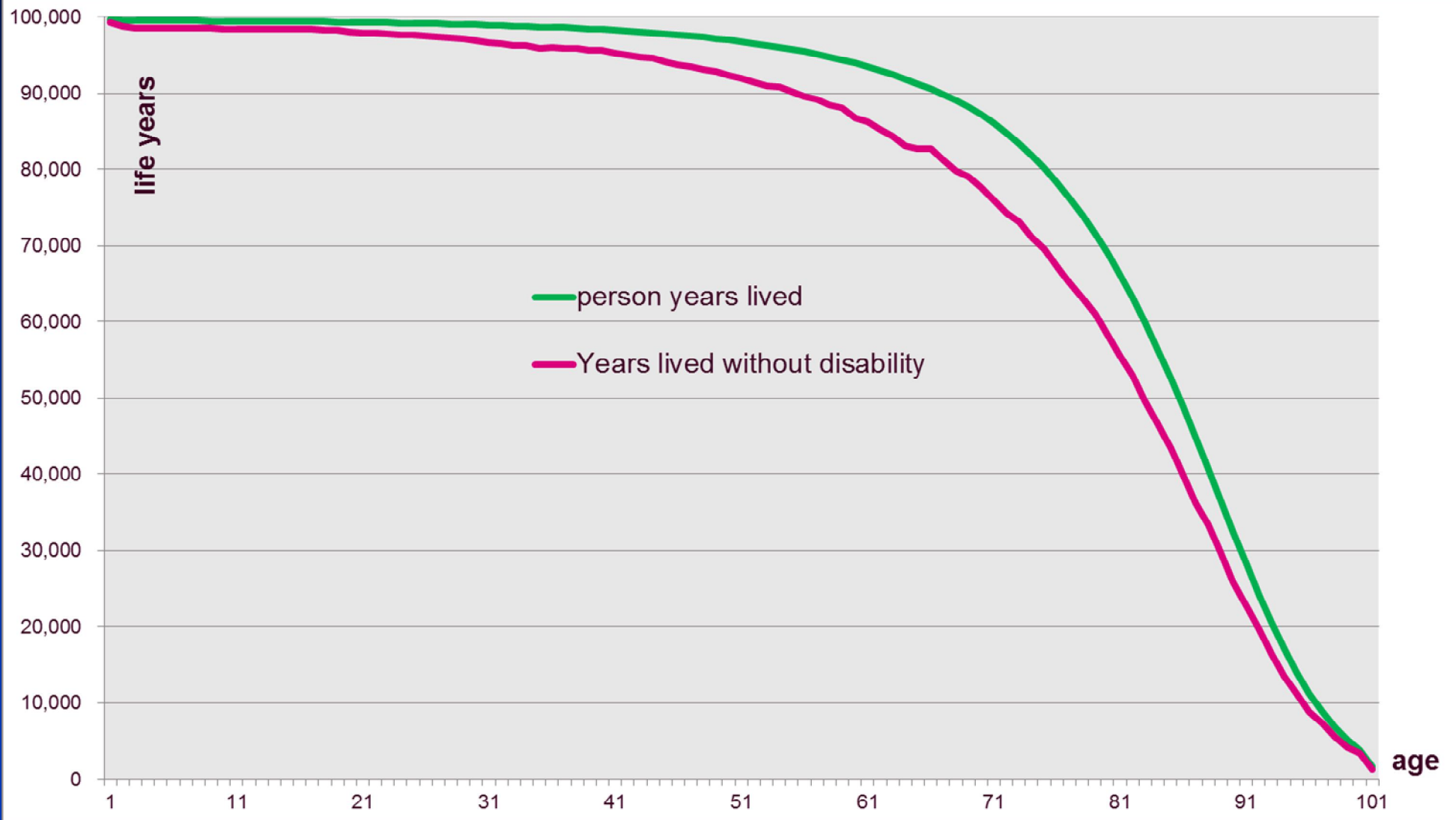
Results : Life Expectancy & HALE

2010 (2009 no log)	Life Expectancy	HALE	Disability free %
Age 0 Male	76.3(76.1)	71.9(70.7)	5.8%(7.1%)
Age 0 Female	82.4(82.0)	77.7(75.7)	5.6%(7.7%)
Age 60 Male	21.5(21.3)	18.3(17.6)	14.7%(17.7%)
Age 60 Female	25.0(24.7)	21.6(20.5)	13.2%(17.3%)

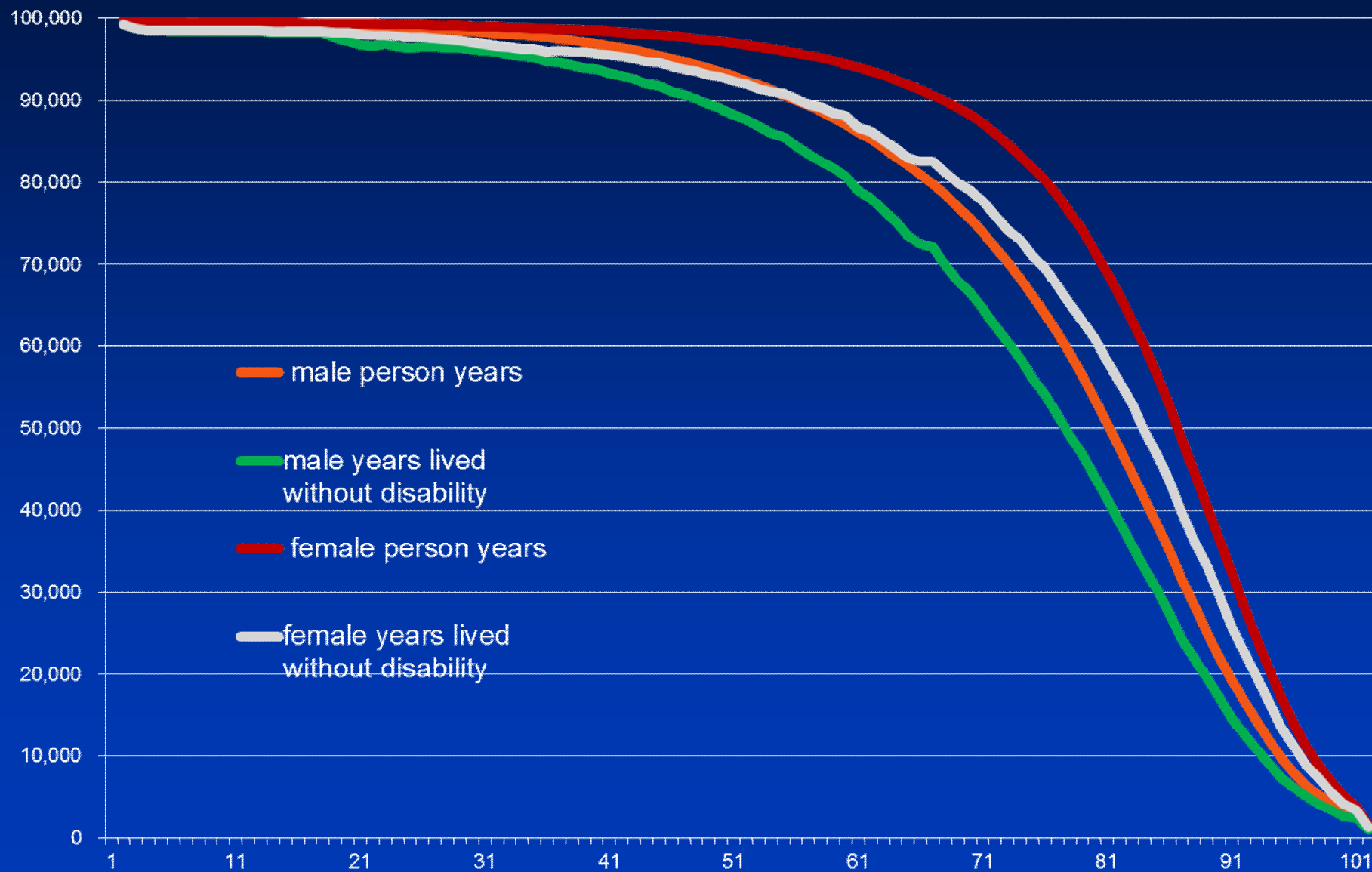
Results : HALE vs. LE(male)



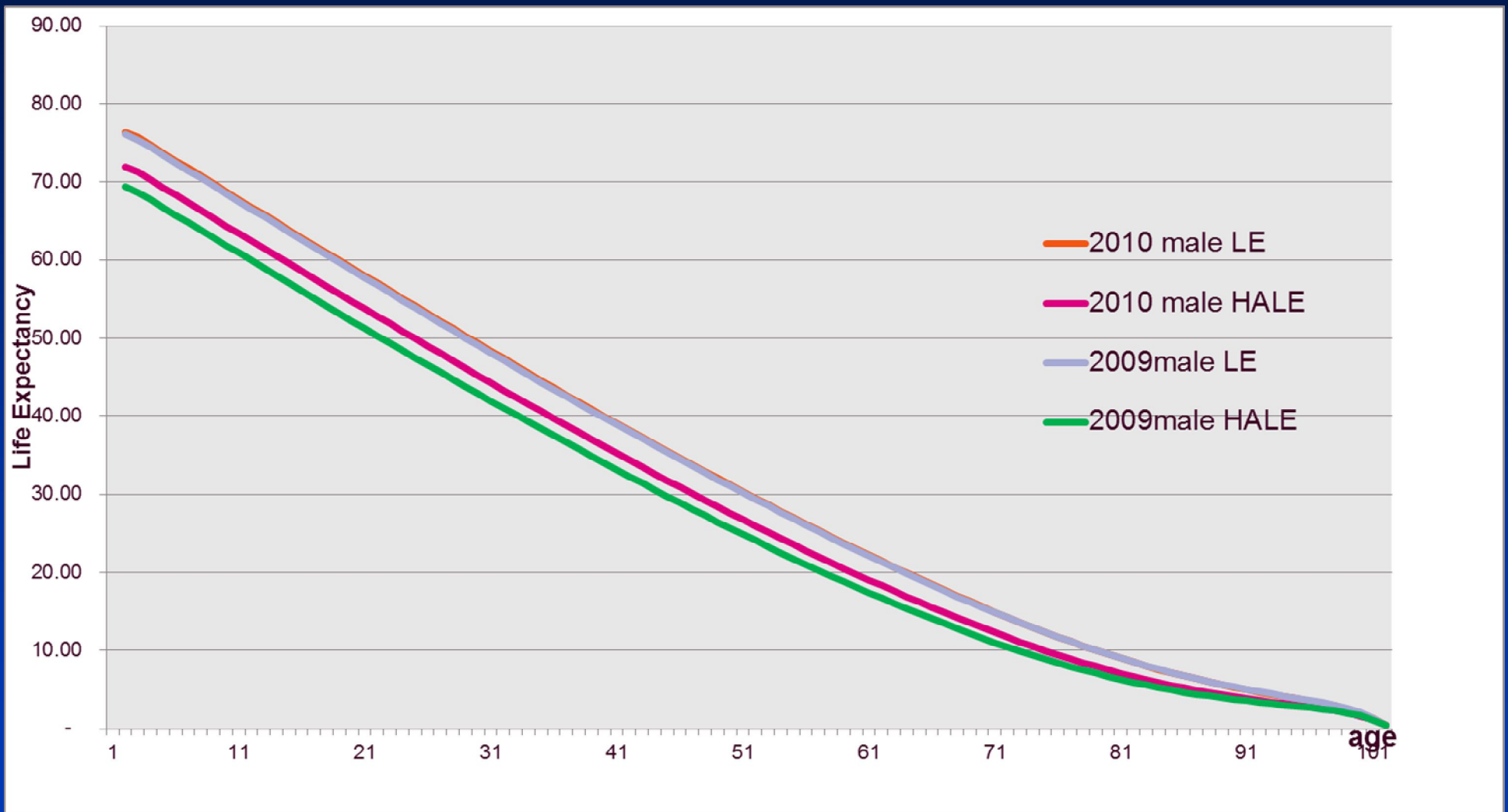
Results : HALE vs. LE(Female)



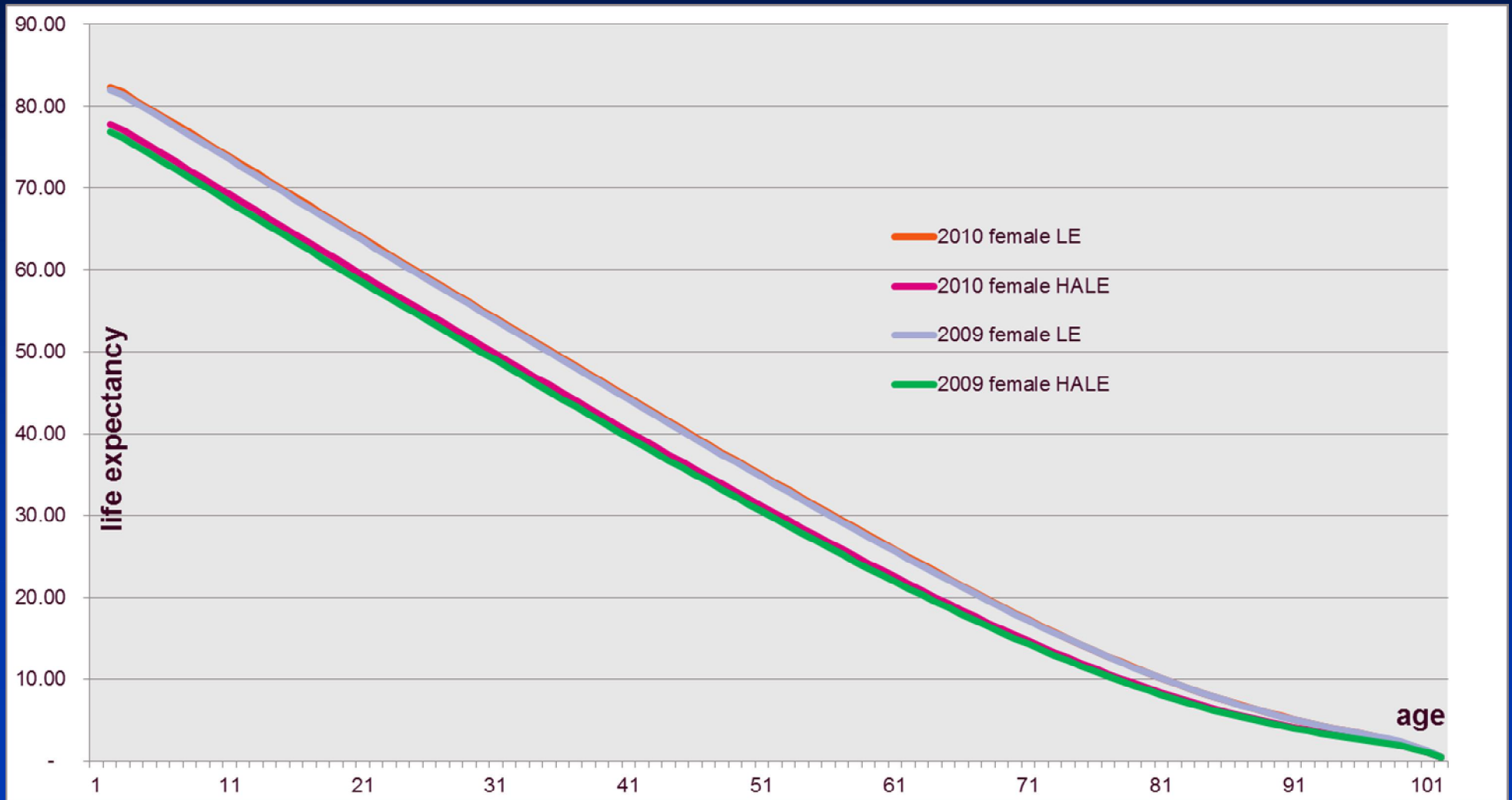
Results : Total life Years, without and with disability



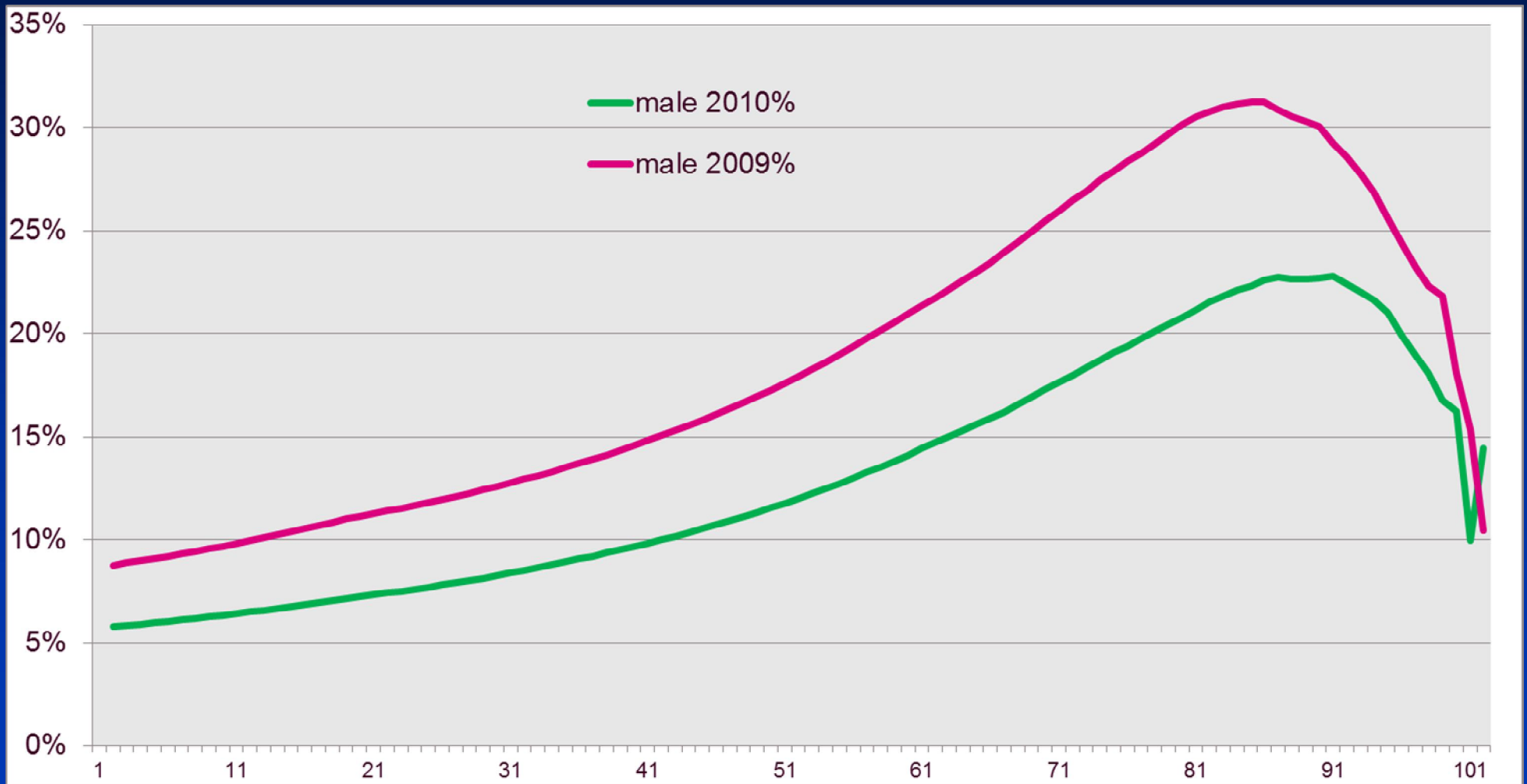
Results : LE vs HALE (MALE 2010 2009)



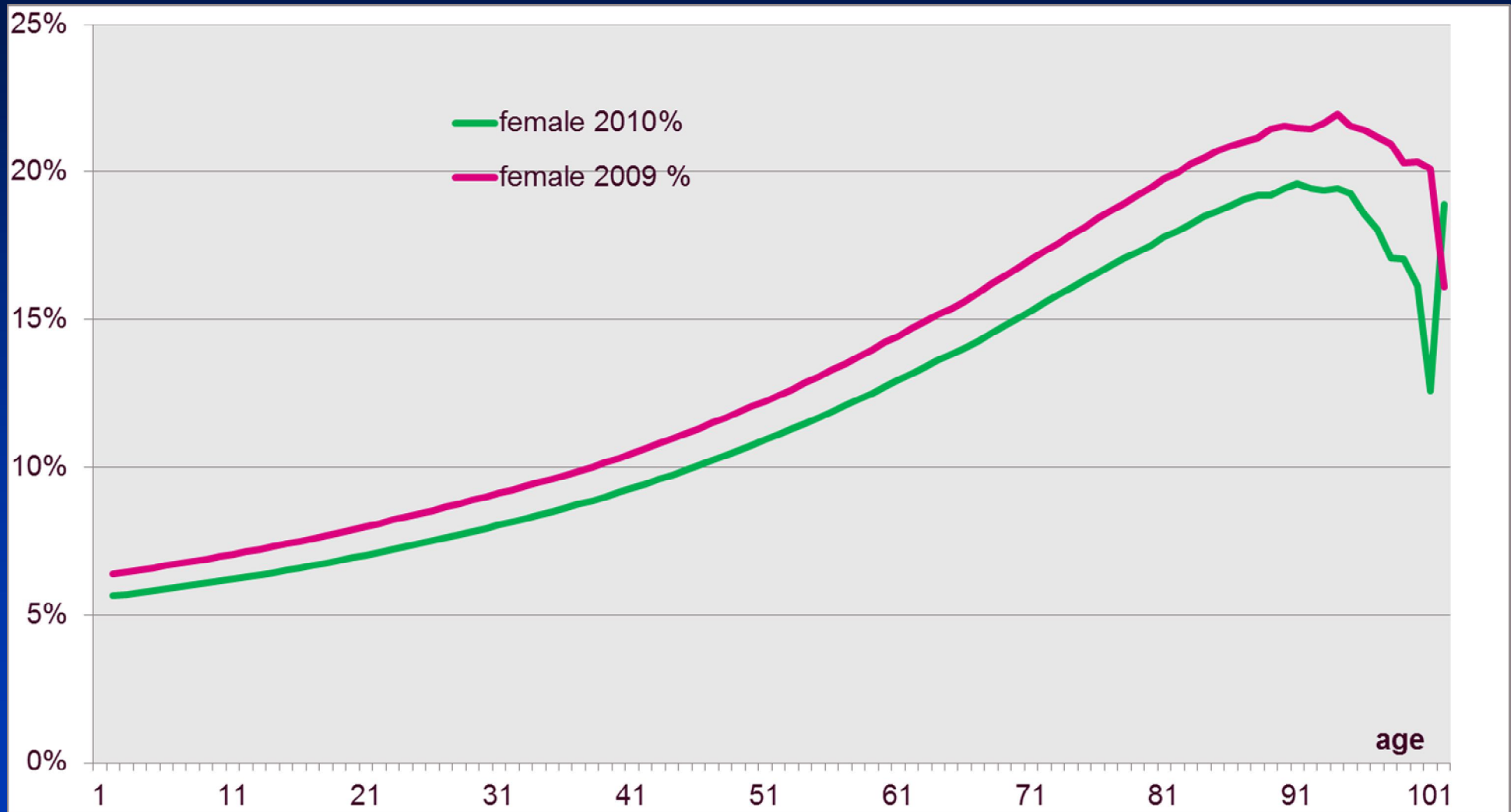
Results : LE vs HALE (female 2010 2009)



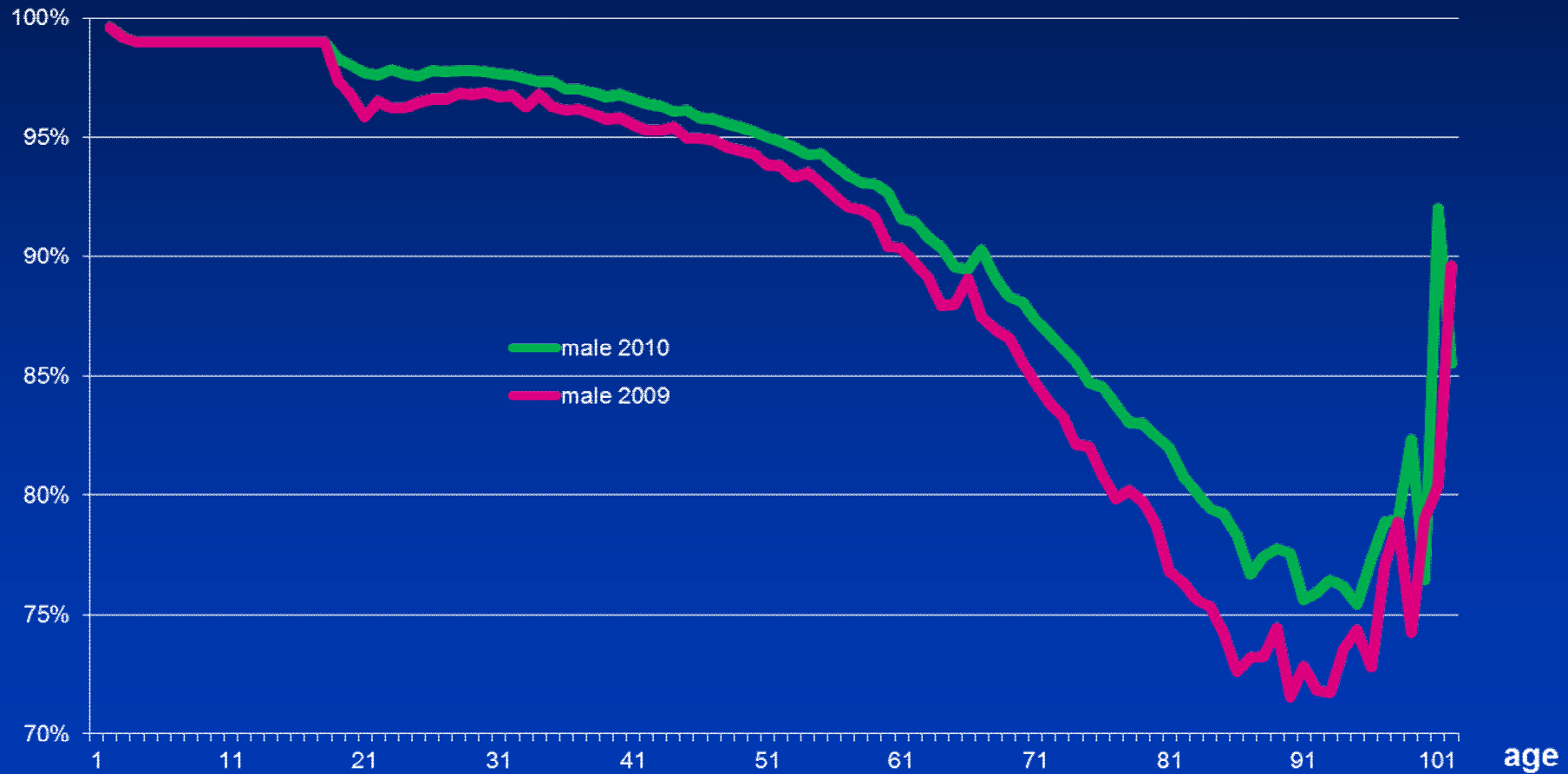
Results : LE with disability %(male)



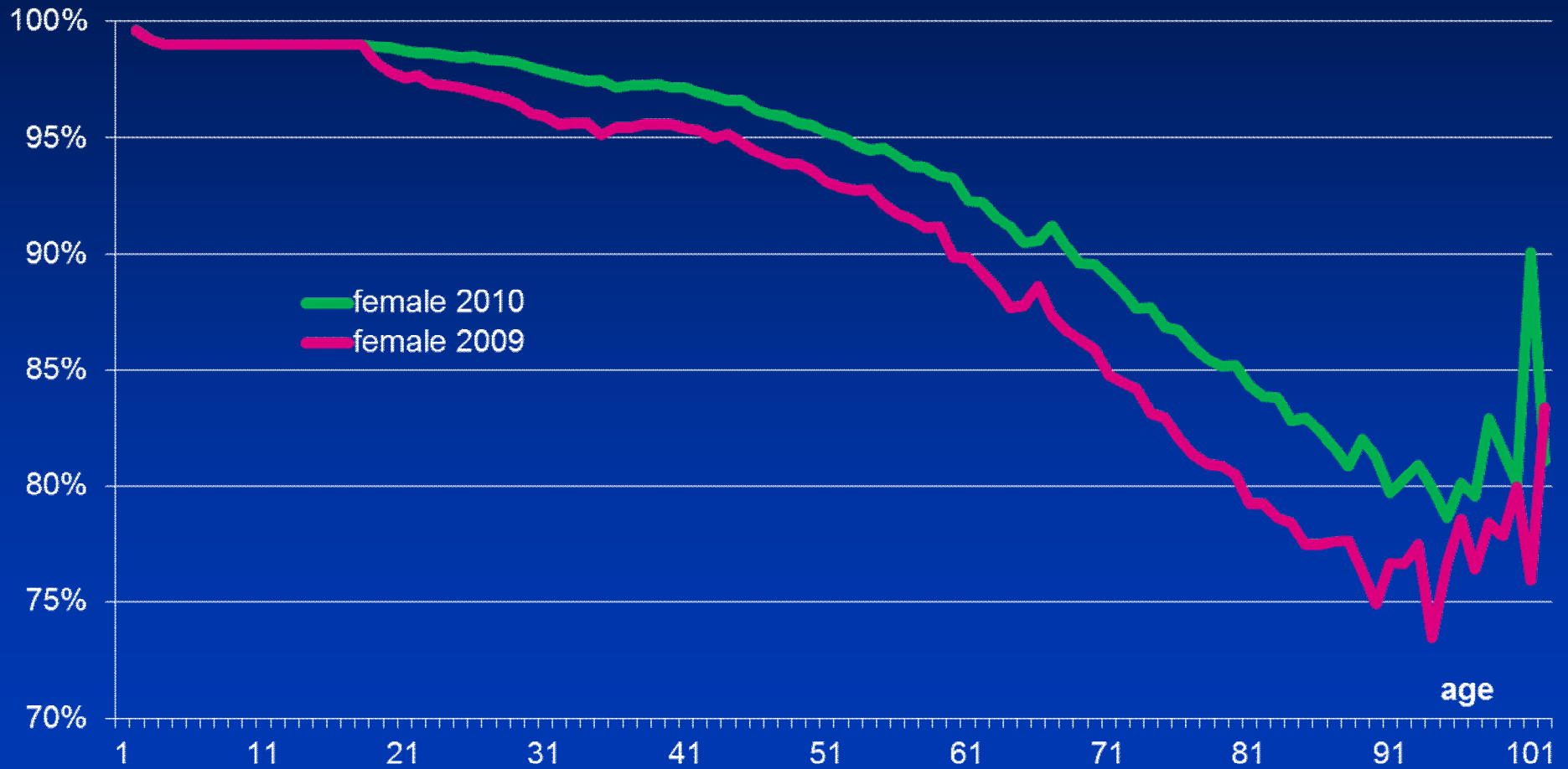
Results : LE with disability % (female)



Results : disability free % (MALE 2010 2009)



Results : disability free% (Female 2010 2009)





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Conclusions

The MCU and per capita MCE is a good proxy for health status and severity level.

More “MCU and MCE as a proxy” research is needed.

Thanks ! ! Thanks ! !
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