A national achievement?: Changes in inequalities in risk factors for cardiovascular disease in Australia

Work in Progress

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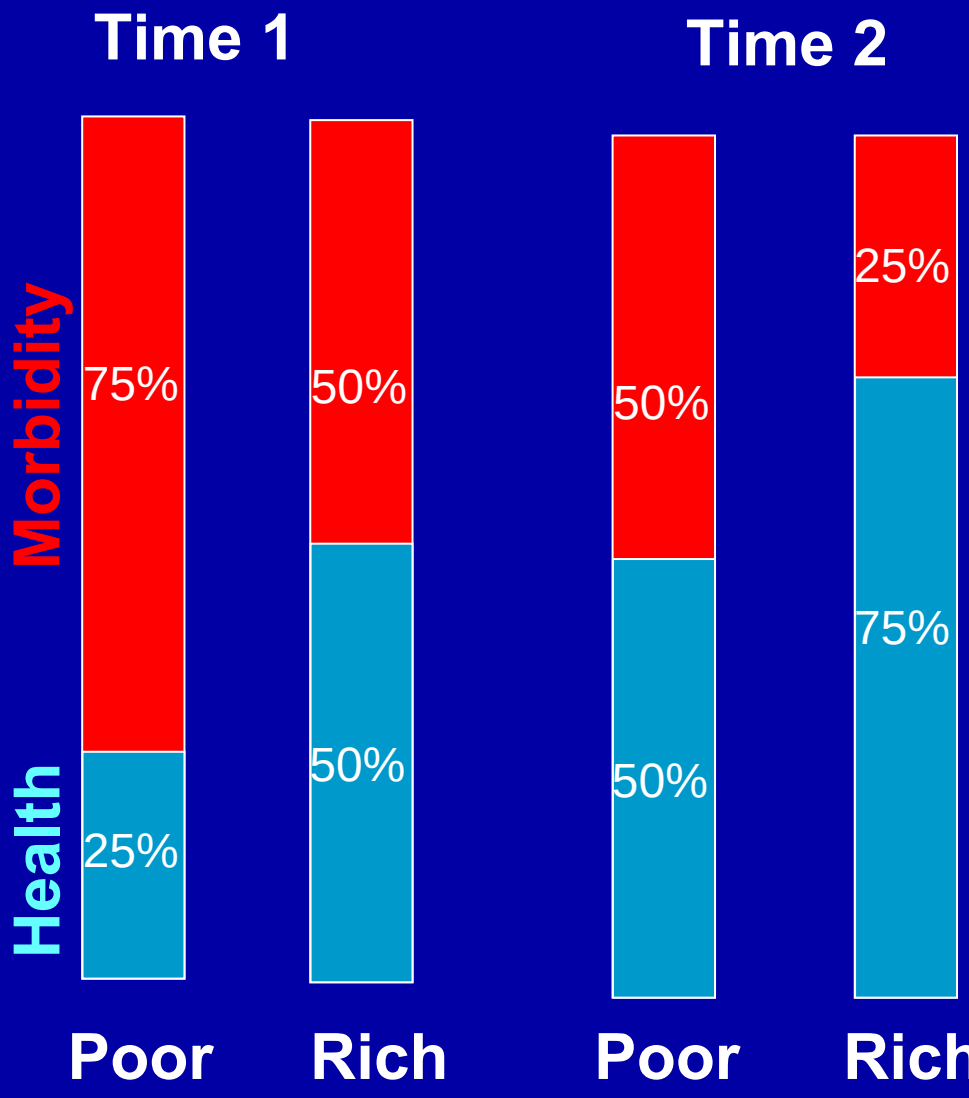
Structure of the seminar

- Background on inequality measures & Achievement index;
- Main focus on how to represent changes in inequalities and mean health;
- Some examples from self-reported cardiovascular risk factors from Australian National Health Surveys.

Inequality comparisons



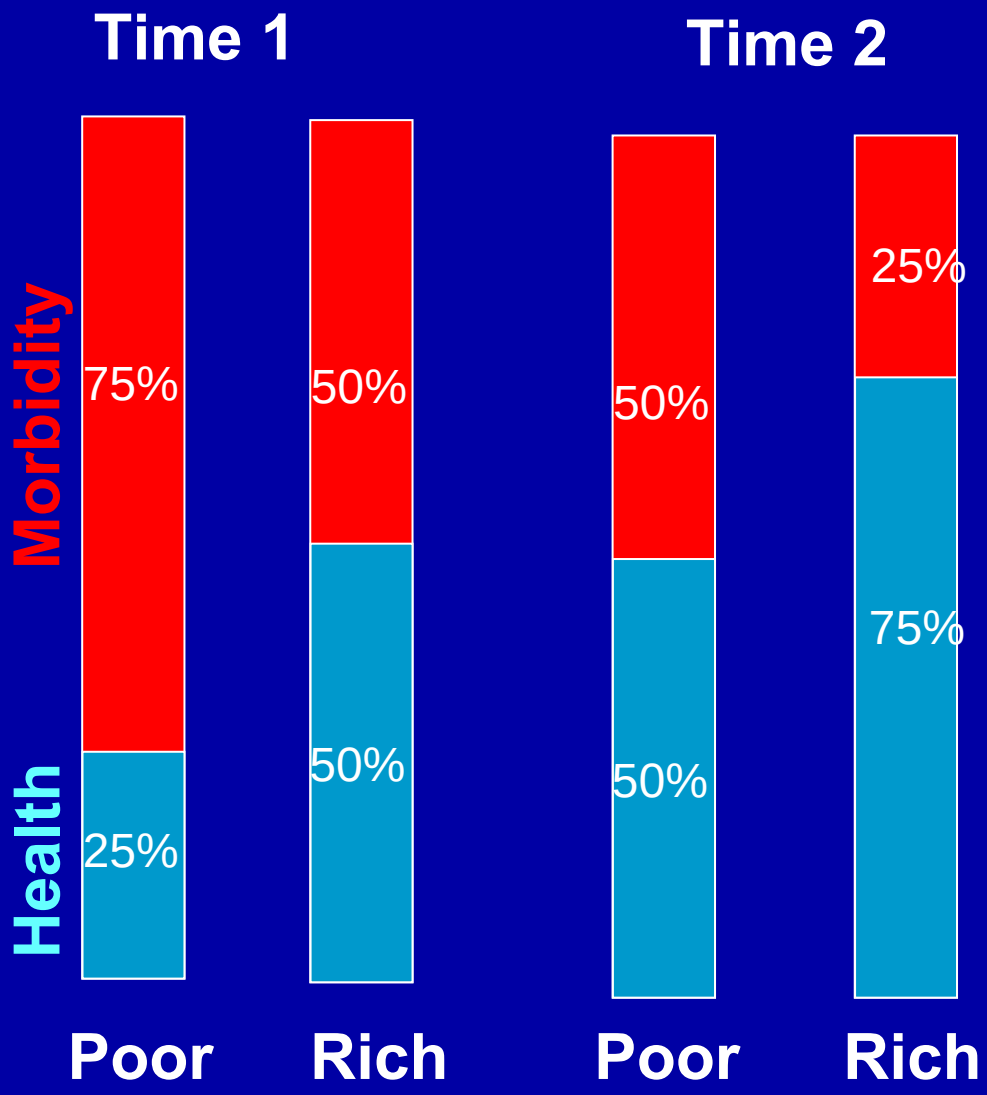
Have inequalities:

Decreased?

Remained the same?

Increased?

Case for decreasing inequalities



Relative inequalities in "health"

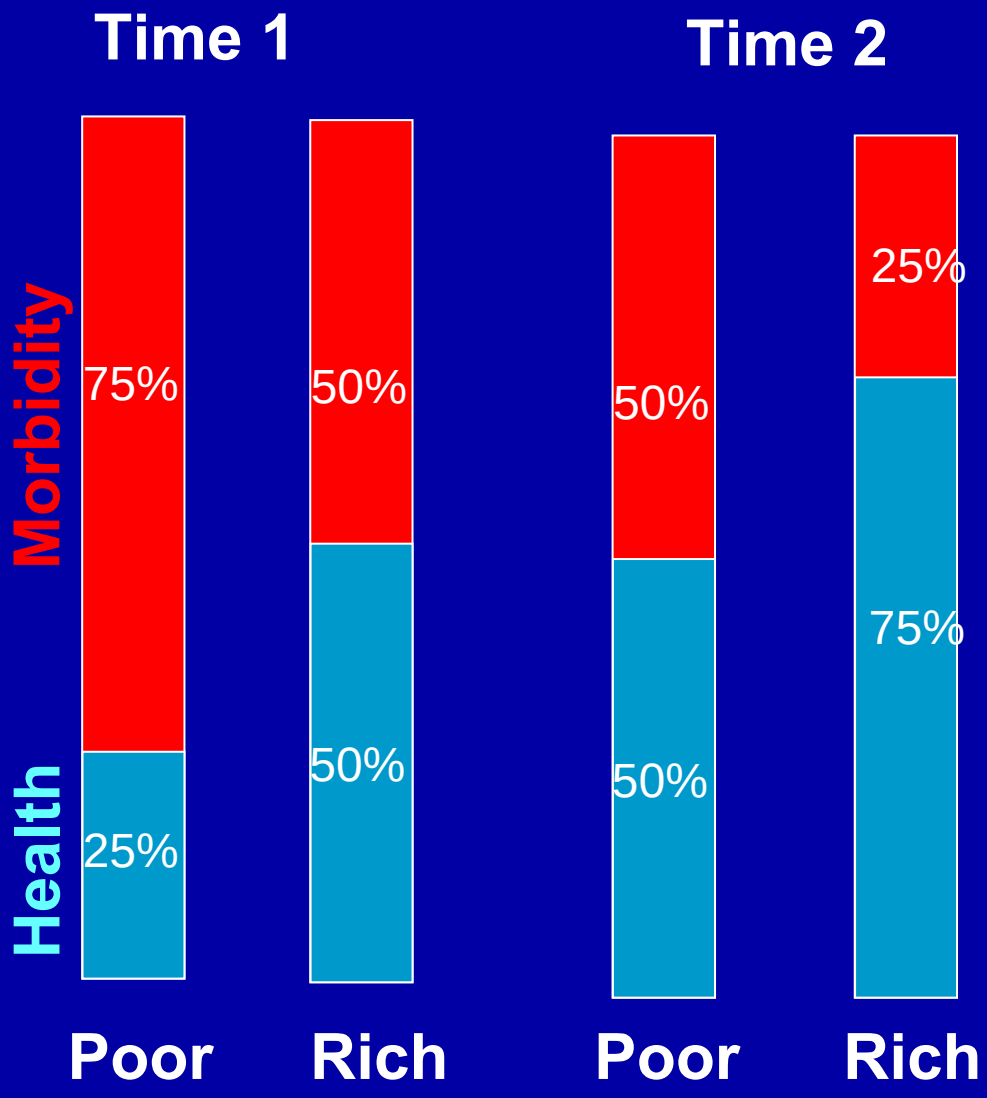
Ratio= Health of Rich / Health of Poor

Time 1 50%/25%=2

Time 2 75%/50%=1.5

Inequalities have decreased

Case for no change in inequalities



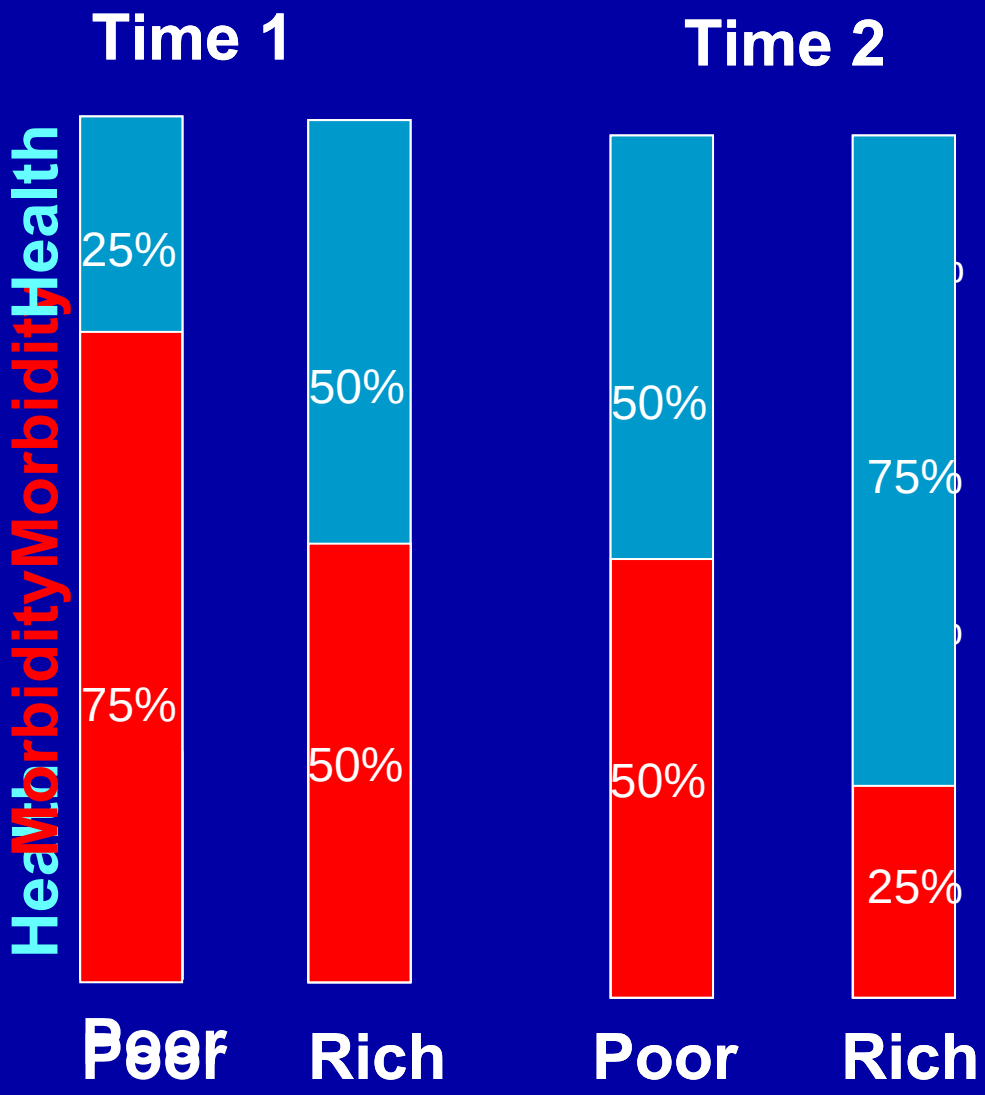
Absolute inequalities in "health"

Time 1 50%-25%=25%

Time 2 75%-50%=25%

Inequalities have remained the same

Case for increasing inequalities



Relative inequalities in "morbidity"

$$\text{Ratio} = \frac{\text{Morbidity of Poor}}{\text{Morbidity of Rich}}$$

Time 1 75%/50%=1.5

Time 2 50%/25%=2

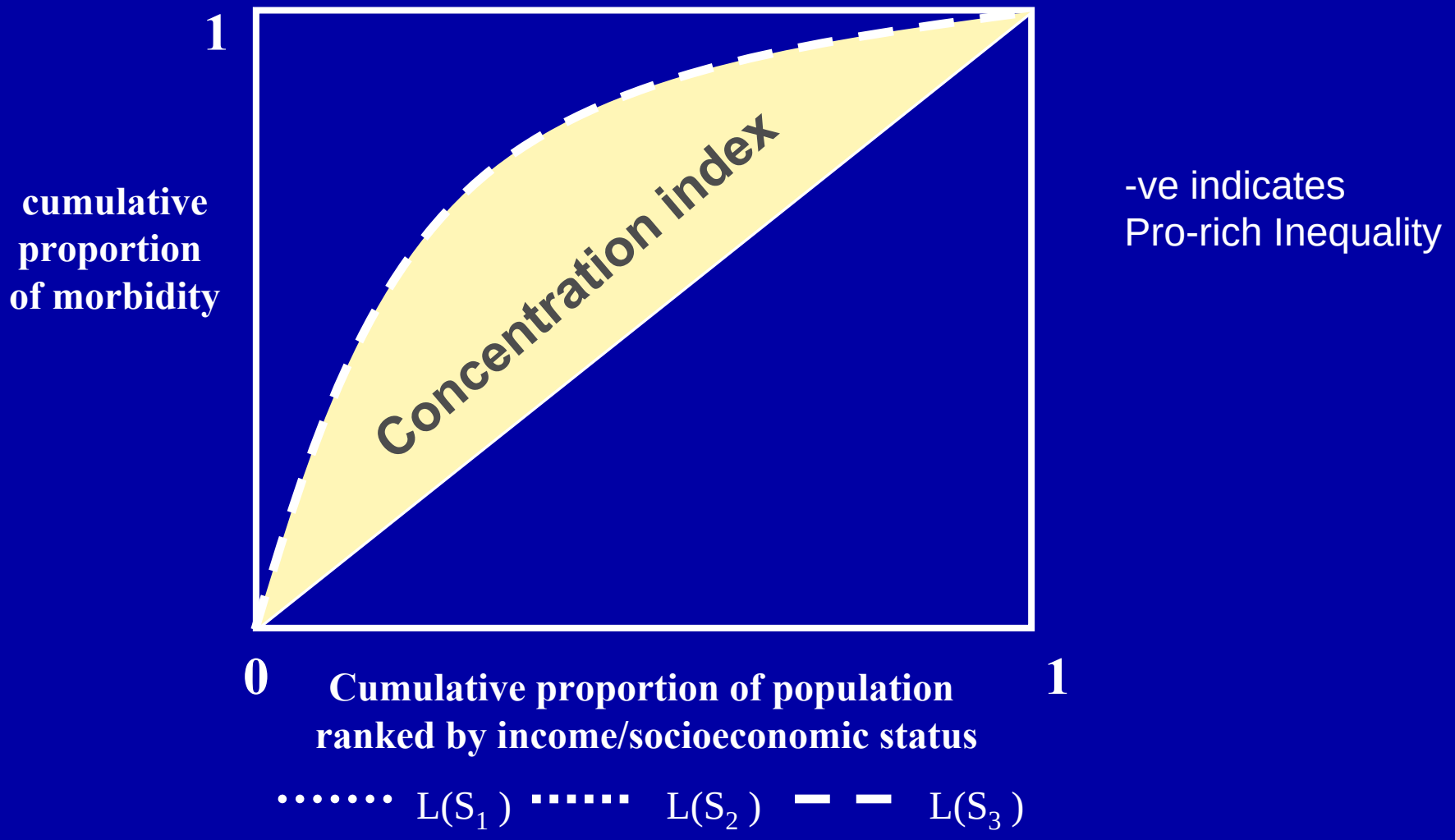
Inequalities have Increased!

Reads like a script from "Yes Minister"

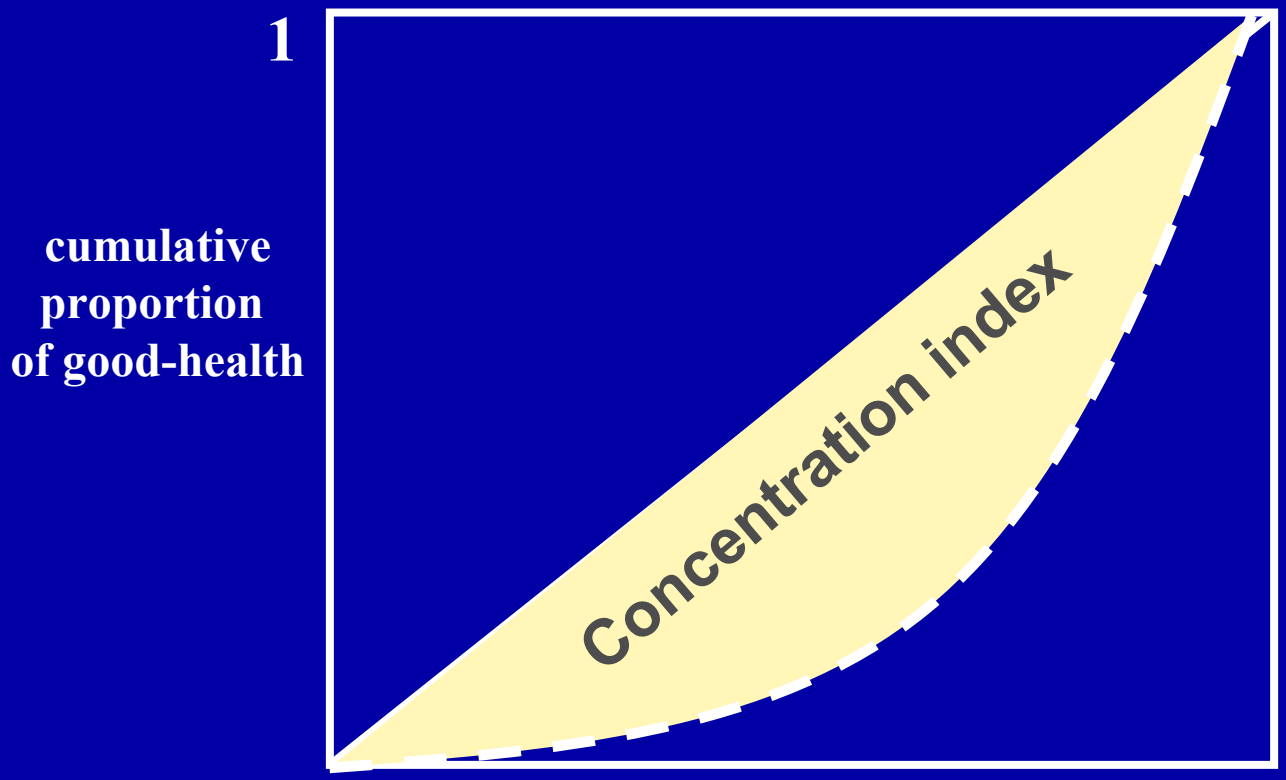
- Jim Hacker MP: "So Humphrey are health inequalities rising or declining?"

- Sir Humphrey: "Well Minister in terms of measures of morbidity, inequalities are increasing, but in terms of absolute inequalities they remain the same, and if instead we measure inequalities in terms of health they are actually declining."

Concentration curves

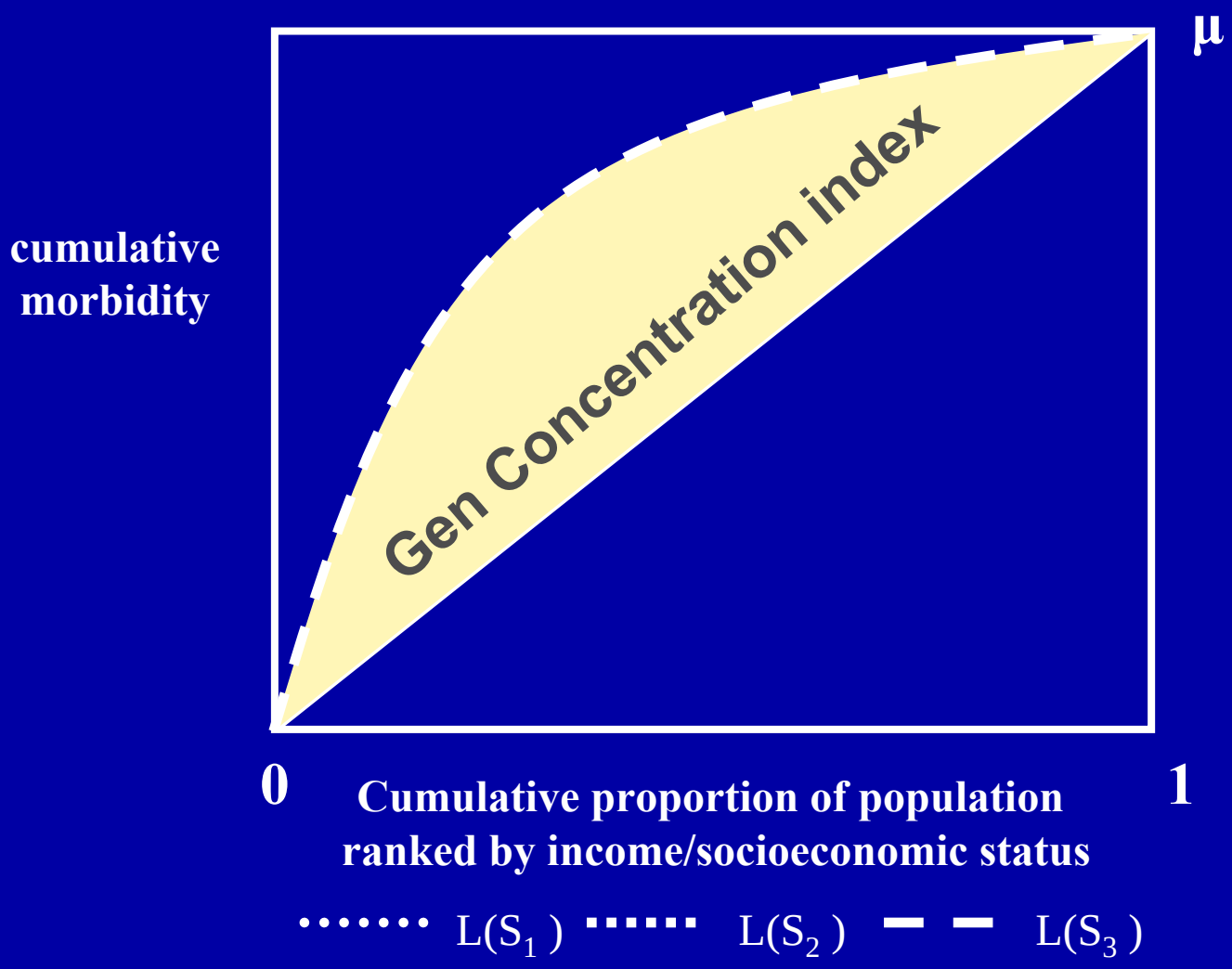


Concentration curves



+ve indicates
Pro-rich Inequality

Generalized concentration curves



Extended Concentration index

$$C = 1 - \frac{2}{n\mu}\sum_{i=1}^{n} y_i (1 - R_i)$$

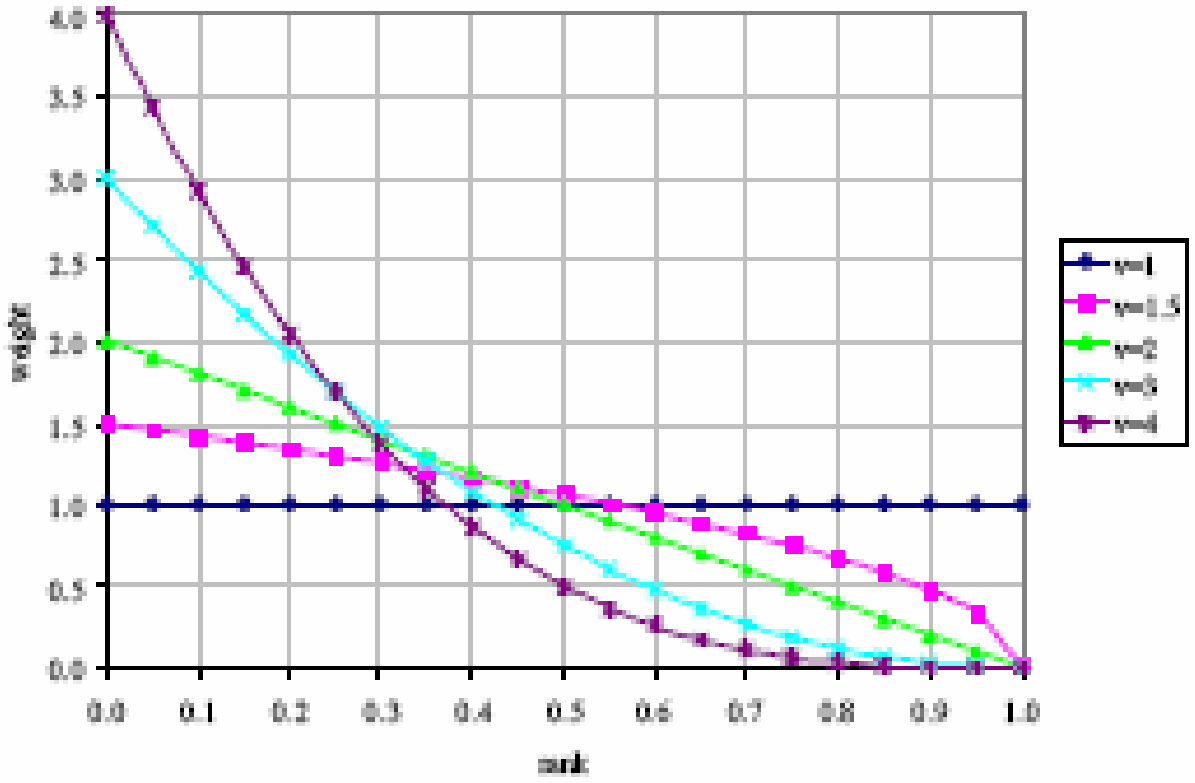
$$C(v) = 1 - v(v-1)\int_0^1 (1-p)^{v-2} L(p)\,dp, v > 1$$

$$C(v) = 1 - \frac{v}{n\mu}\sum_{i=1}^{n} y_i (1 - R_i)^{v-1}$$

Wagstaff (2002) Inequality aversion, health inequalities, health achievement, JHE.

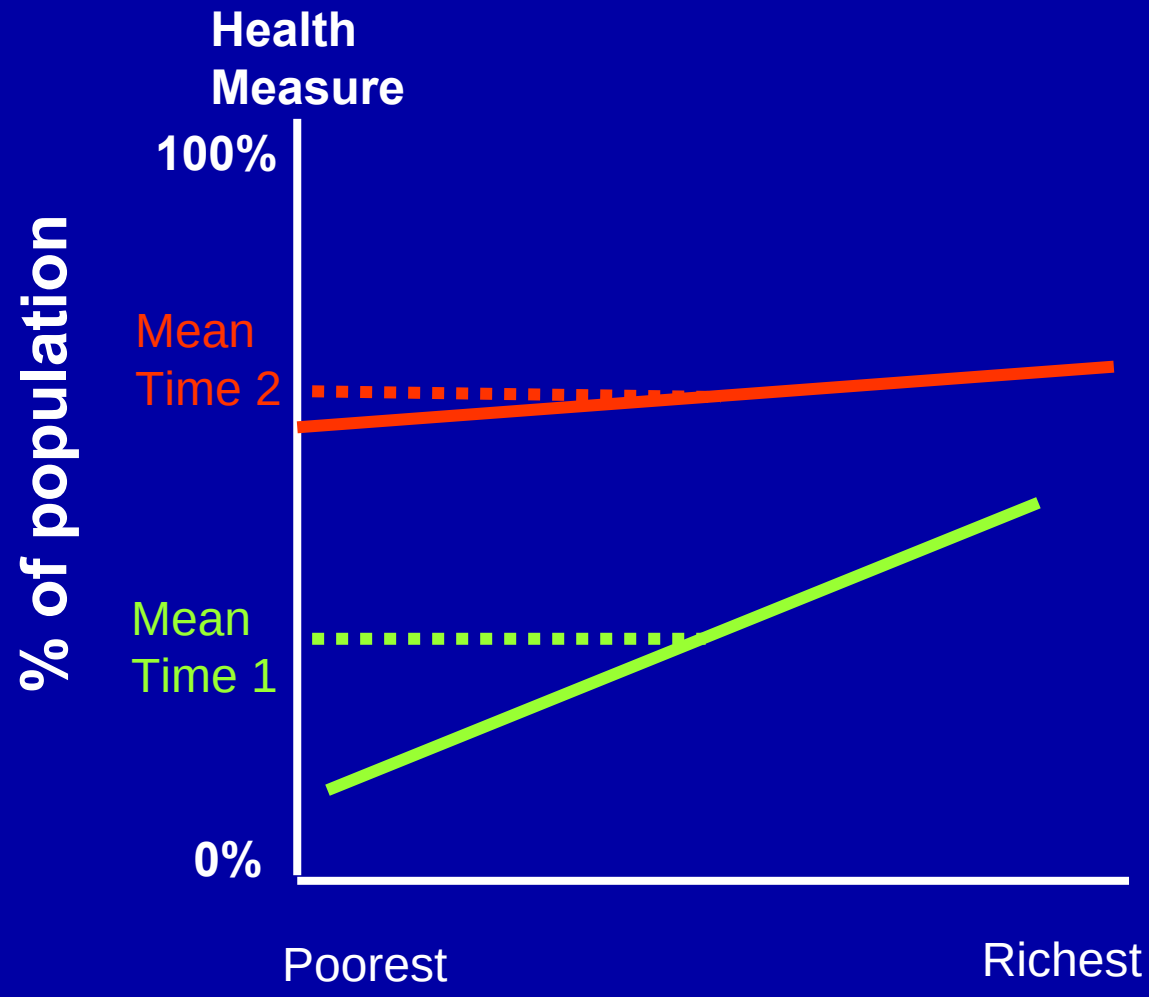
Inequality aversion

Fig 2: Weighting scheme for extended concentration index—eqn (5)



Wagstaff (2002)

How do we make meaningful comparisons across time?

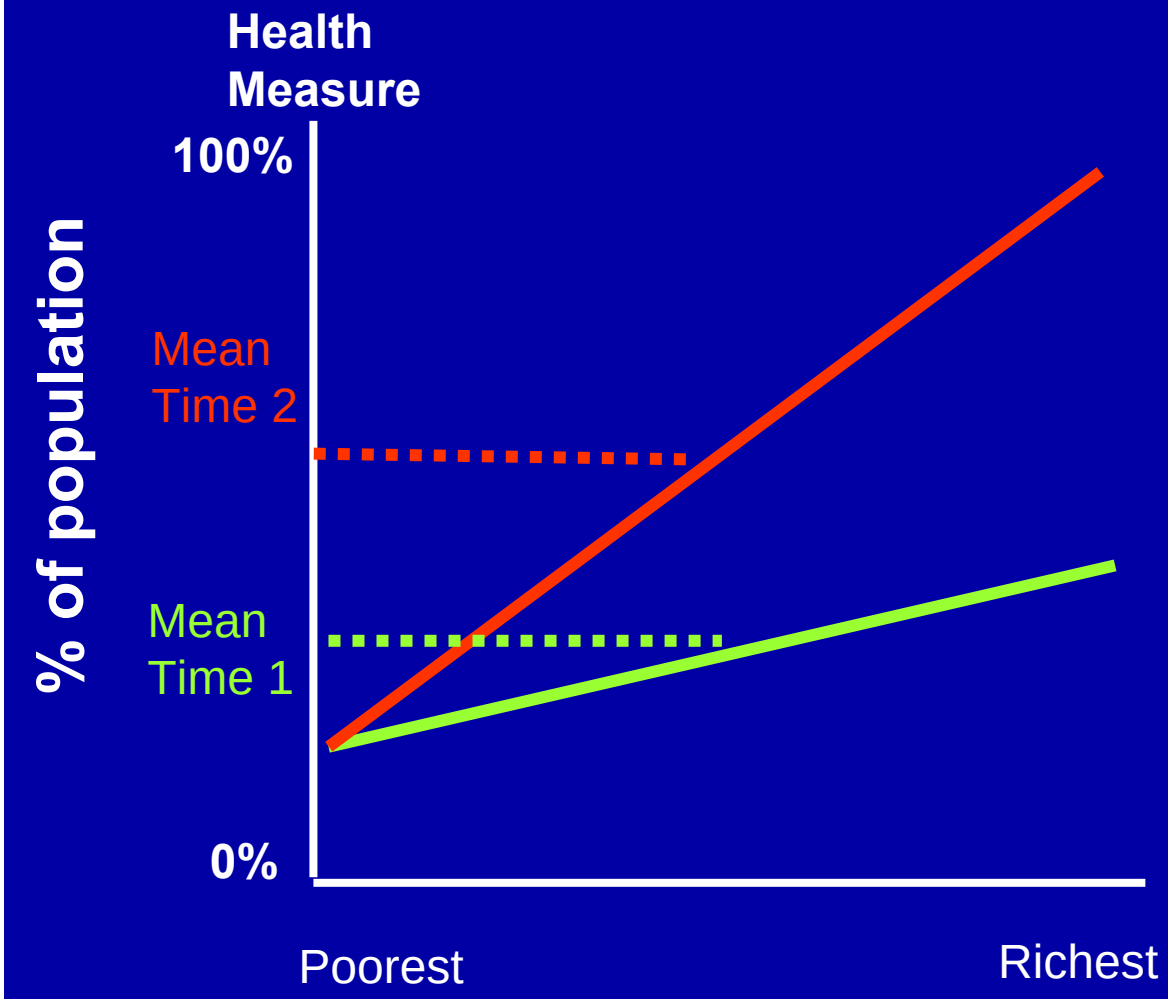


Average health has increased

Absolute and Relative inequalities have declined

Had to argue things are not improving

More difficult case



Average health has increased

Absolute inequalities ↑

Relative inequalities ↑

Hard to say if things are improving

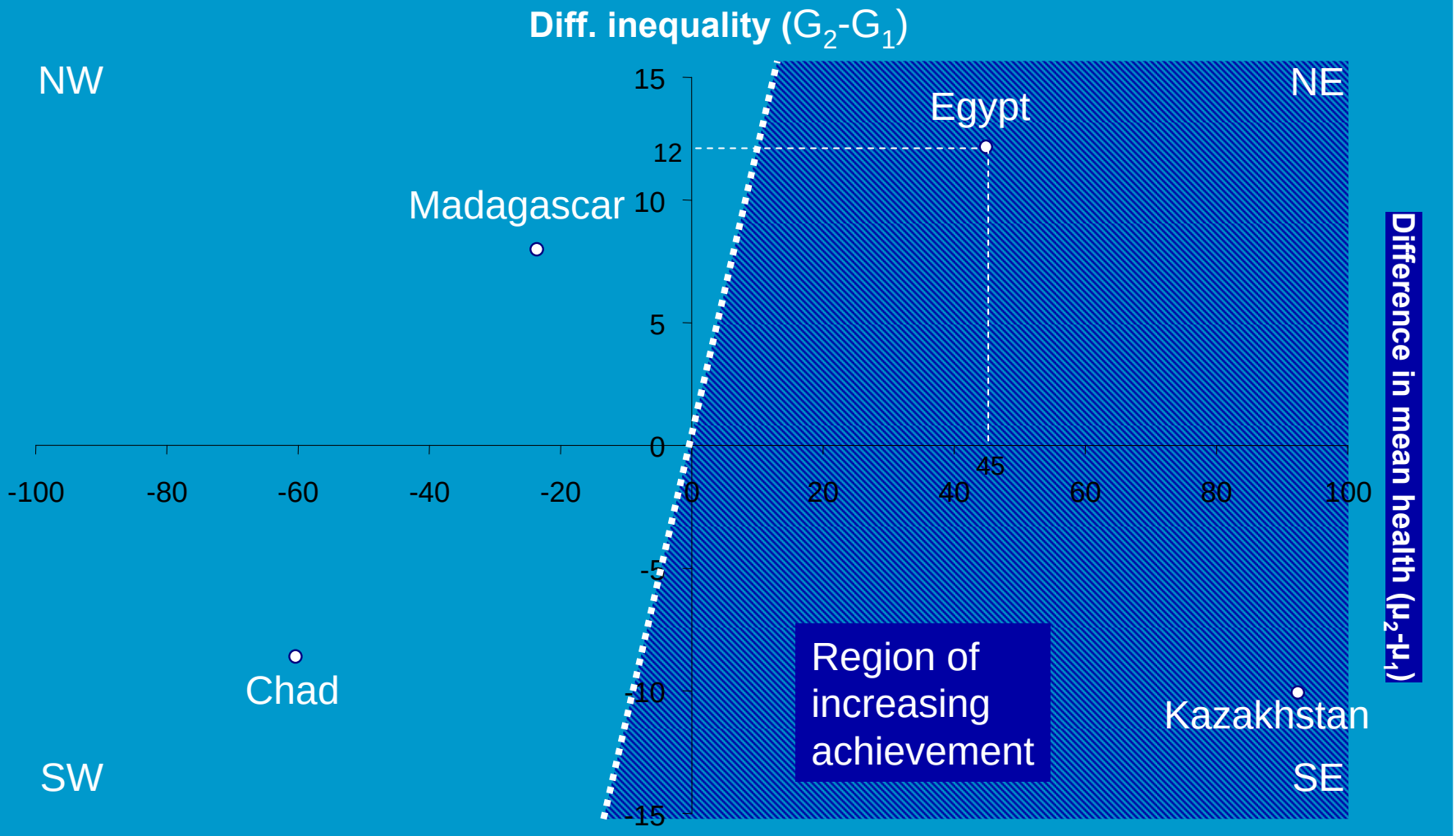
Achievement Index

$$I(v) = \mu(1 - C(\upsilon))$$

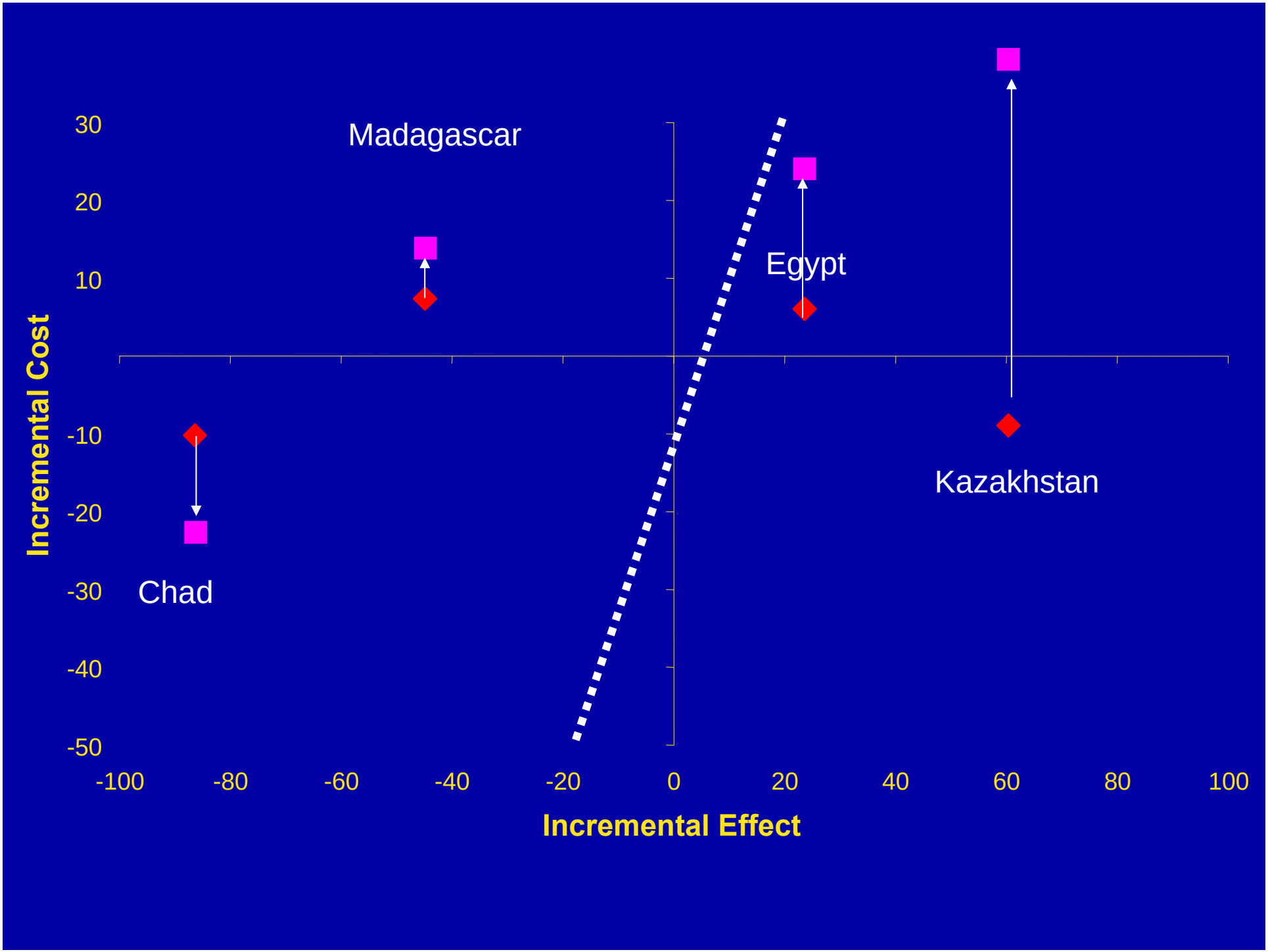
$$I_2(v) > I_2(\upsilon)$$

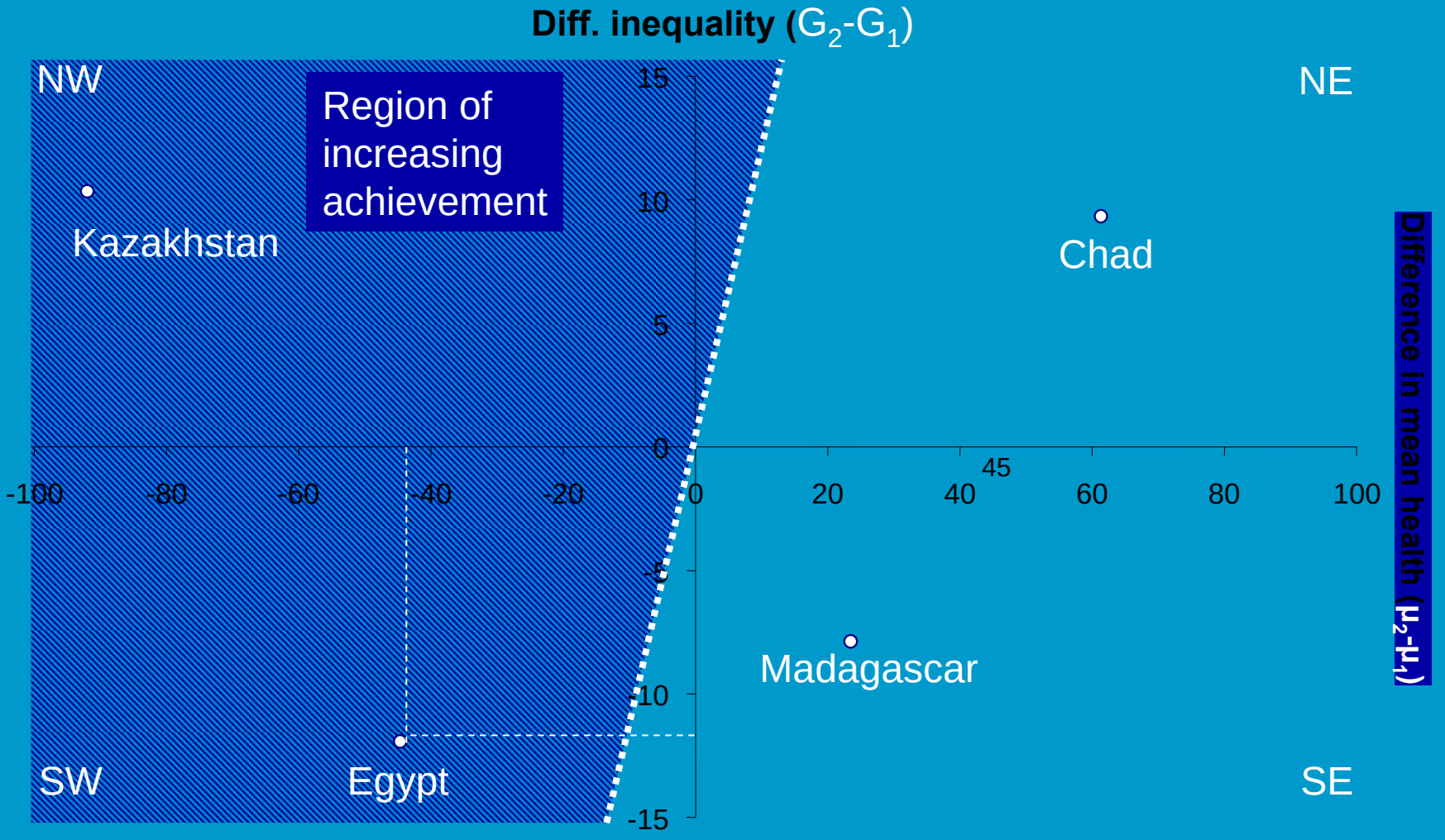
$$\mu_1 - \mu_1 C_1(\upsilon) > \mu_2 - \mu_2 C_2(\upsilon)$$

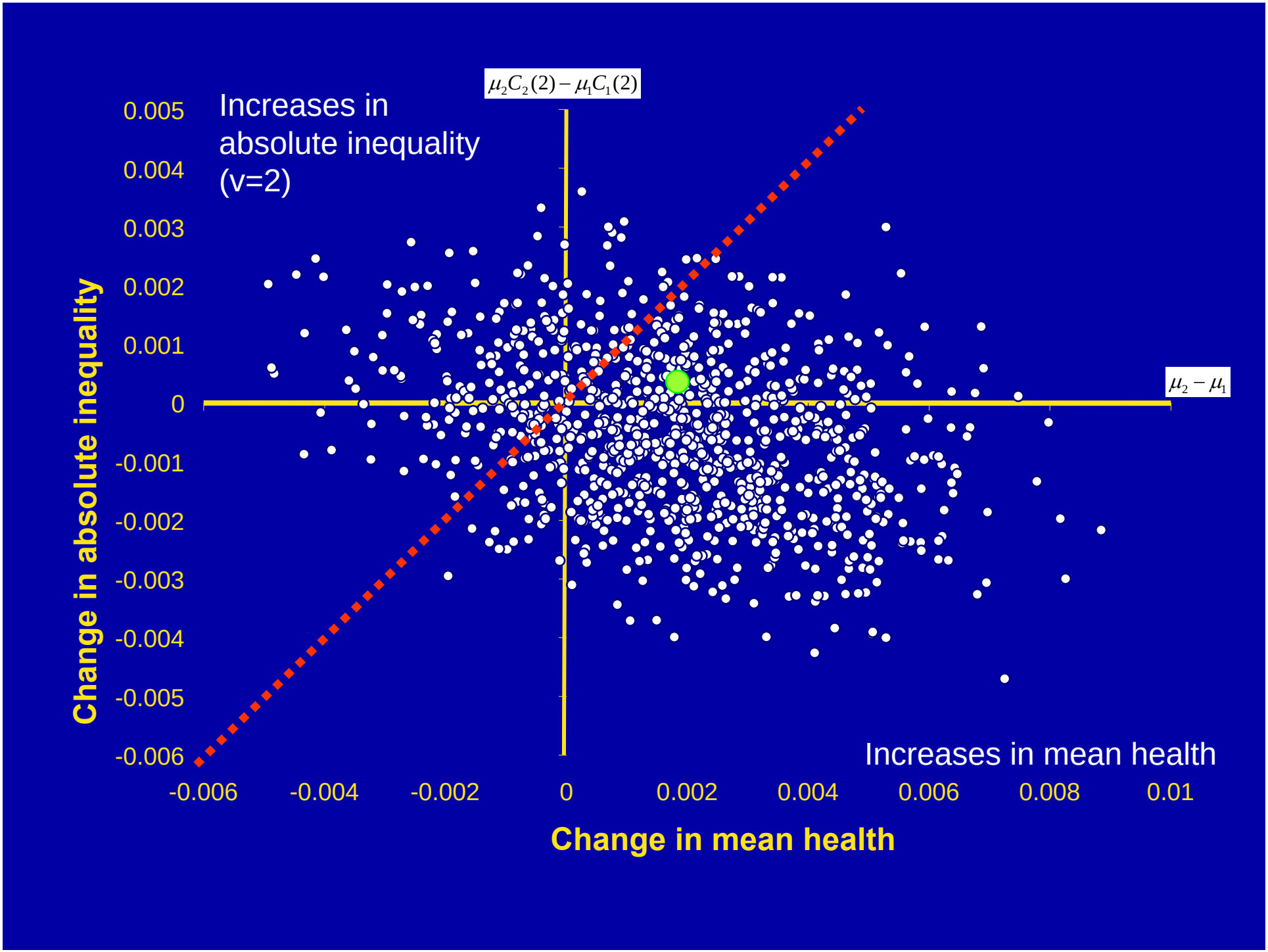
$$\mu_2 C_2(\upsilon) - \mu_1 C_1(\upsilon) > \mu_2 - \mu_1$$

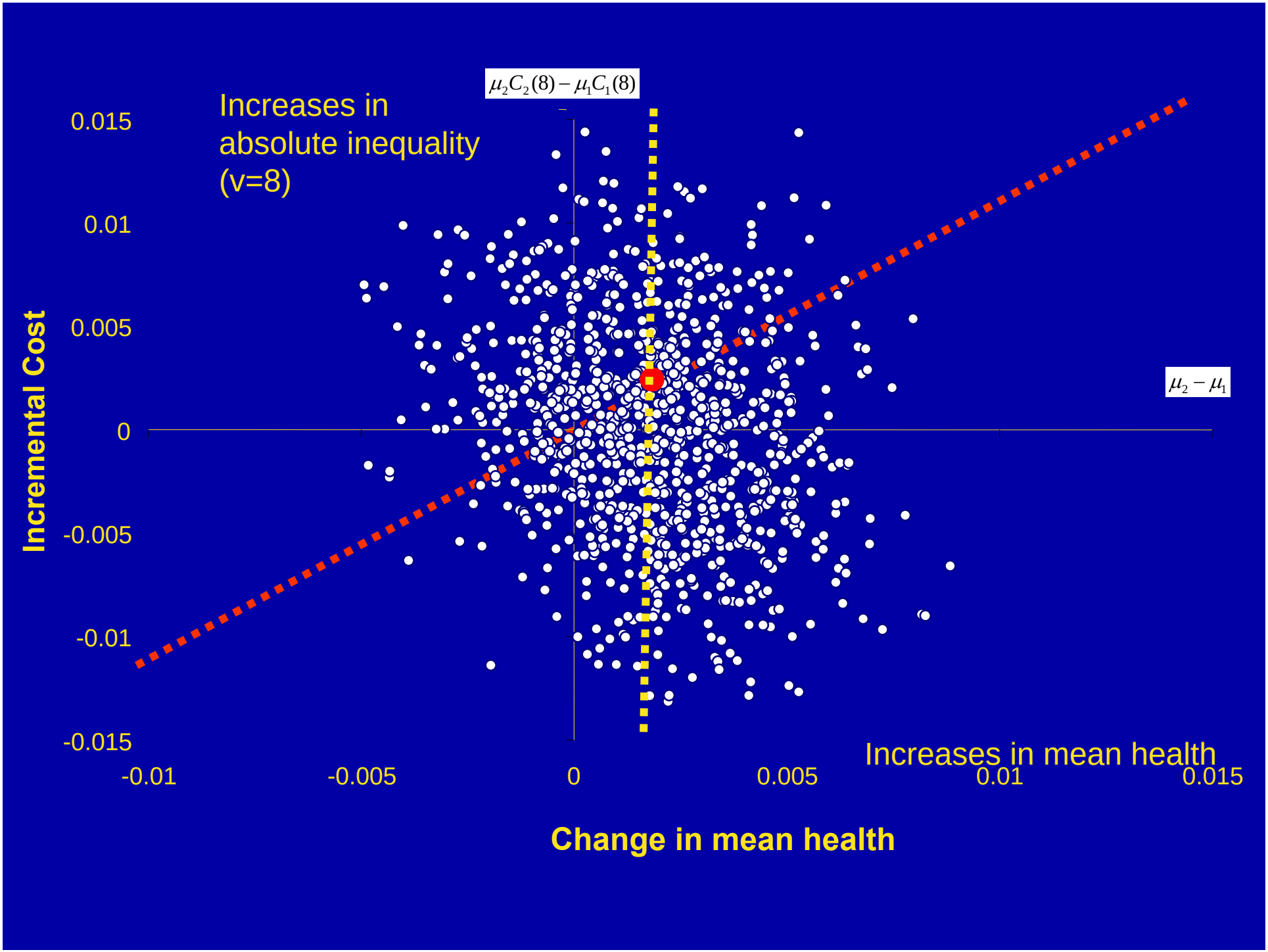


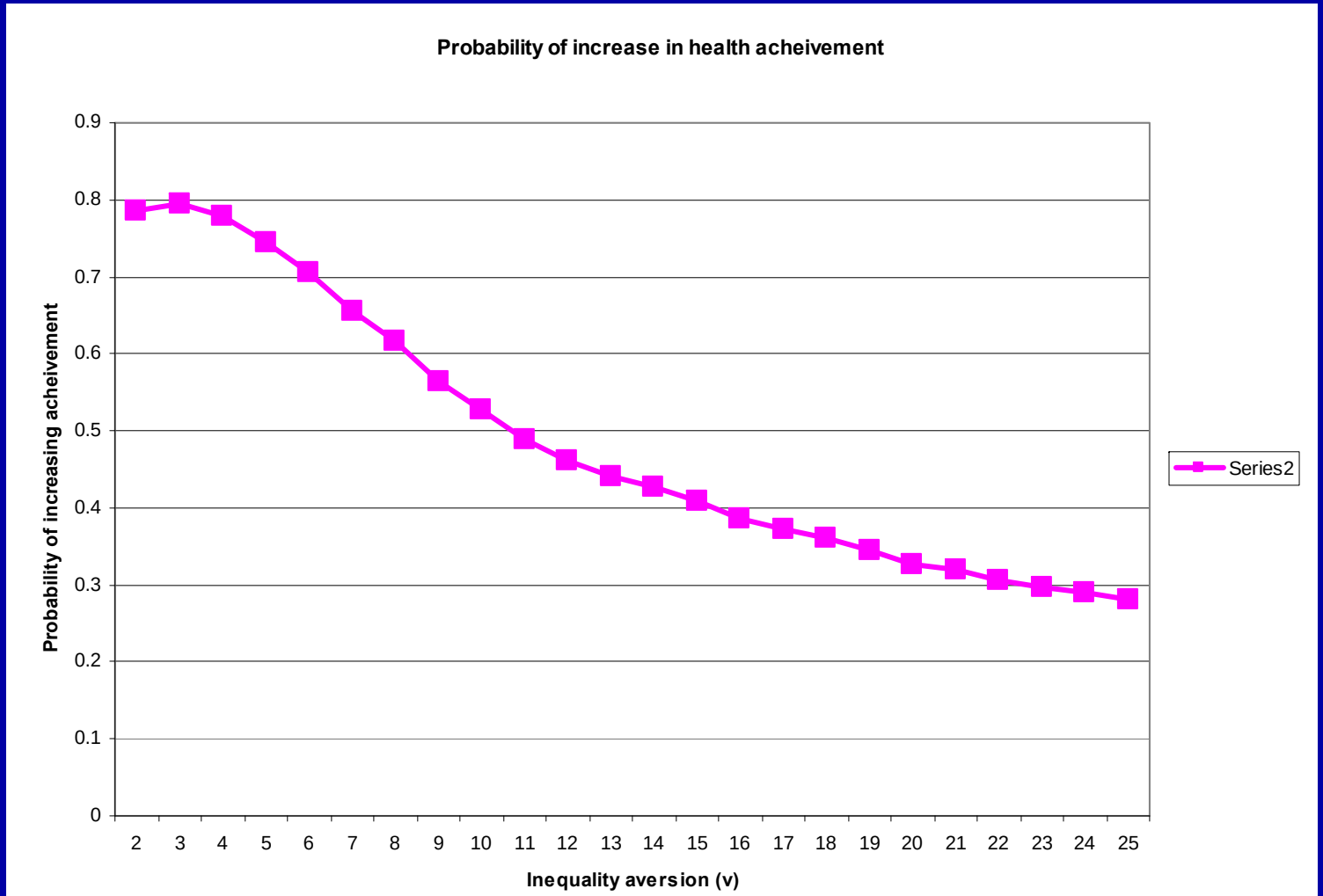
Incremental health achievement plane relative to Haiti


Madagascar
Egypt
Kazakhstan
Chad
Incremental Cost
Incremental Effect
30
20
10
-10
-20
-30
-40
-50
-100
-80
-60
-40
-20
0
20
40
60
80
100


Diff. inequality (G_2-G_1)
NW
NE
SW
SE
Region of increasing achievement
Kazakhstan
Chad
Madagascar
Egypt
Difference in mean health (μ_2-μ_1)
15
10
5
0
-5
-10
-15
-100
-80
-60
-40
-20
0
20
40
45
60
80
100


$\mu_2 C_2(2) - \mu_1 C_1(2)$
Increases in absolute inequality (v=2)
0.005
0.004
0.003
0.002
0.001
0
-0.001
-0.002
-0.003
-0.004
-0.005
-0.006
Change in absolute inequality
$\mu_2 - \mu_1$
-0.006
-0.004
-0.002
0
0.002
0.004
0.006
0.008
0.01
Increases in mean health
Change in mean health


$\mu_2 C_2(8) - \mu_1 C_1(8)$
Increases in absolute inequality (v=8)
0.015
0.01
0.005
0
-0.005
-0.01
-0.015
Incremental Cost
$\mu_2 - \mu_1$
-0.01
-0.005
0
0.005
0.01
0.015
Increases in mean health
Change in mean health


Probability of increase in health acheivement
Probability of increasing acheivement
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
Inequality aversion (v)
Series2

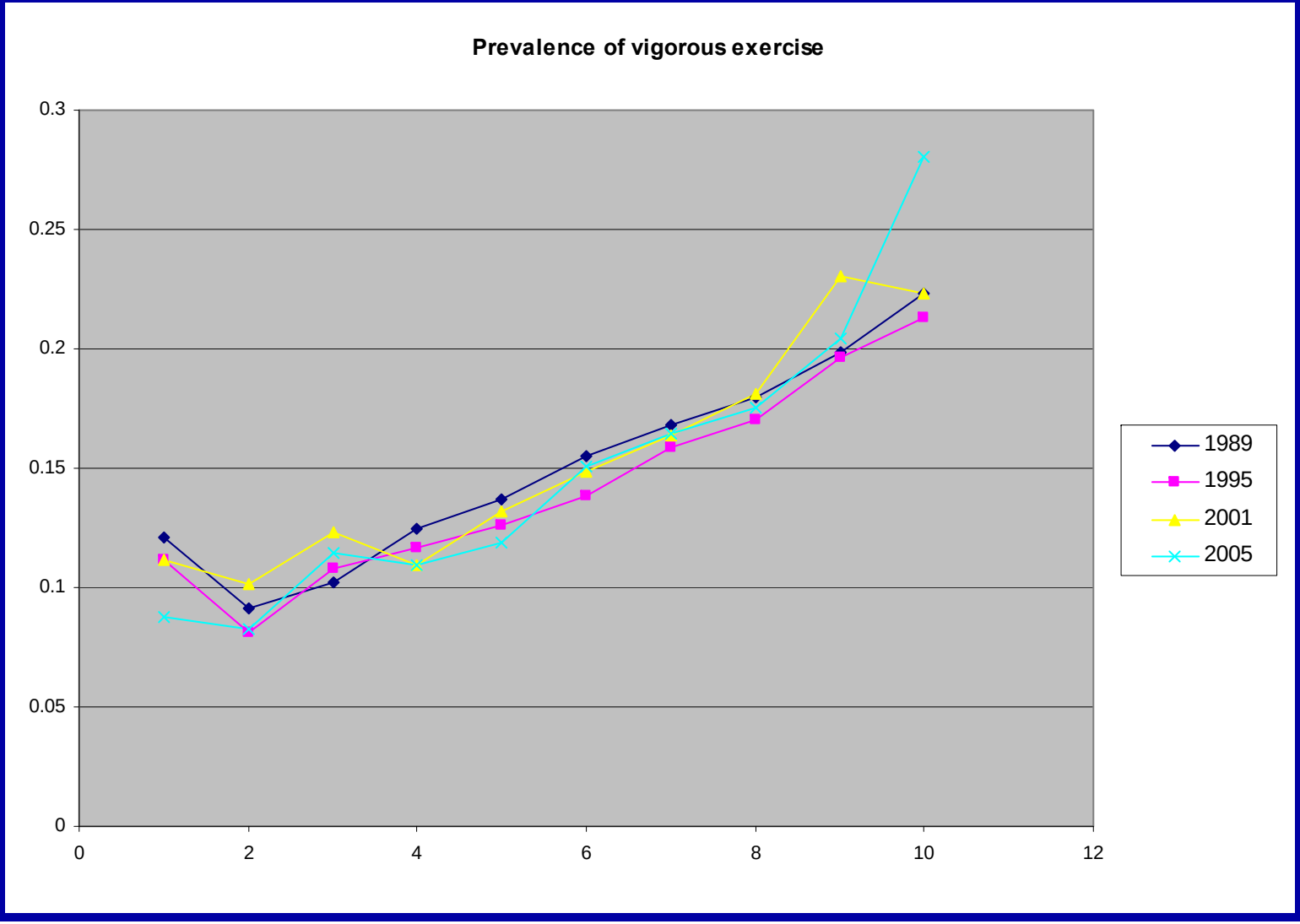
Cardiovascular risk in Australia

NHS survey population

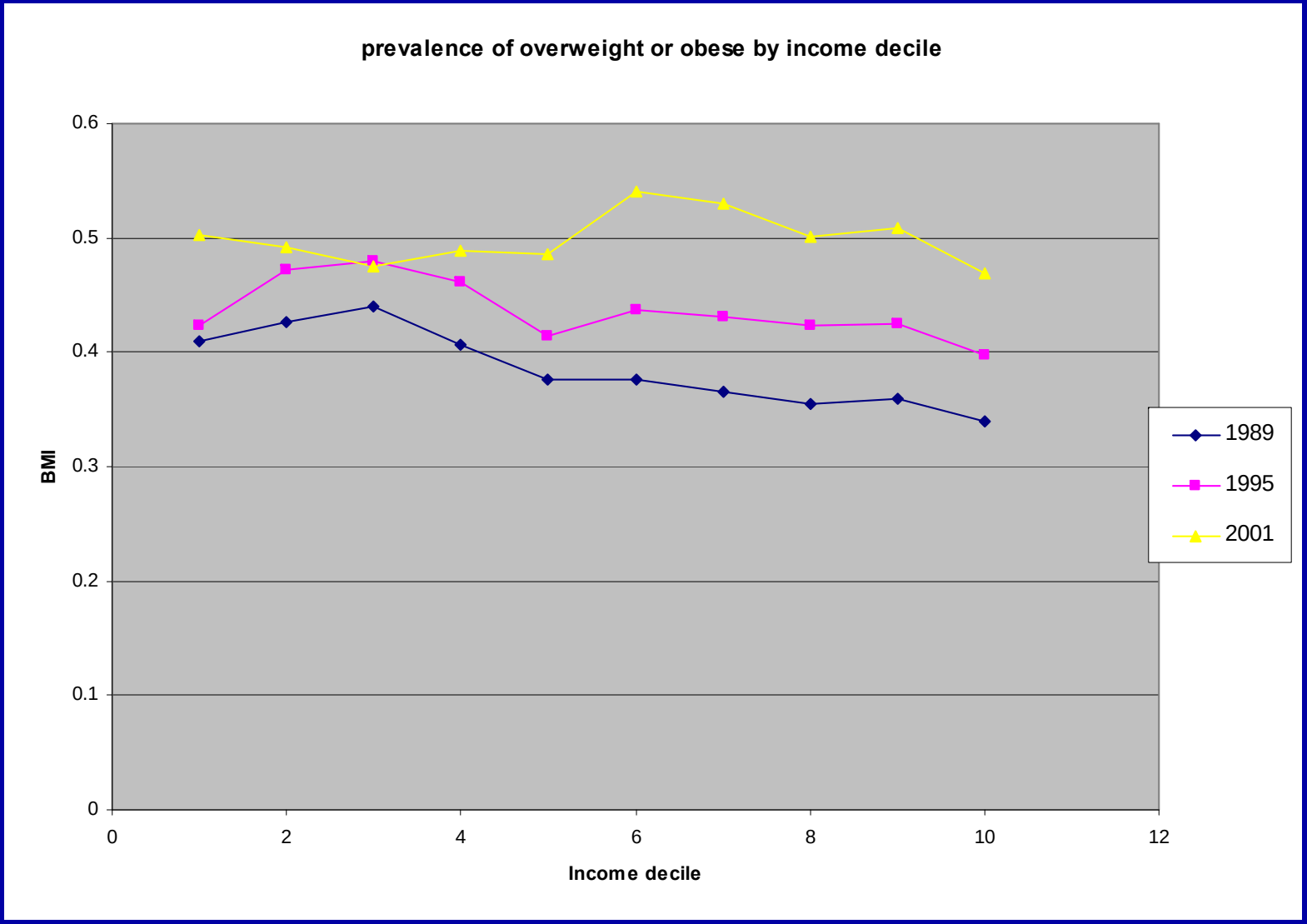
- Individuals participating in the last four ABS National Health Surveys, conducted in:
  - 1989-90, 1995, 2001, 2004-5.
  - N=54,241, 53,828, 26,862, 25,906
- Expanded surveys available on-line from 2001 via the remote access data laboratory (RADL)
- Urban and rural areas throughout all states and territories
- Non-institutionalized residential population;
- Collects self-reported information on health status, health behavior, health use (mainly over previous 2 weeks)
- Demographic and socio-economic factors, e.g. self-reported household income

Survey Year	**1989**	**1995**	**2001**	**2005**
N	34,078	15,713	13,167	15,004
% female	50.9	50.4	52.8	51.2
% over 50 years	33.9	32.7	40.2	39.9
Risk factors %				
High blood pressure	20.4 (20.5)	15.0 (14.5)	14.8 (12.9)	15.4 (13.8)
No exercise	35.9 (35.7)	33.1 (32.4)	29.6 (29.2)	(33.7)
Smoker	28.2 (29.1)	24.1 (25.0)	22.5 (24.5)	22.8 (25.6)
Diabetes	2.5 (2.3)	3.0 (3.0)	4.7 (4.2)	5.1 (4.6)
High cholesterol	10.9 (10.9)	7.3 (7.7)	9.4 (7.8)	10.2 (9.1)
Previous heart disease	5.0 (4.8)	4.2 (4.6)	2.8 (2.2)	2.1 (1.8)
Overweight or obese	39.0 (38.4)	44.9 (43.5)	52.2 (49.8)	55.0 (53.2)

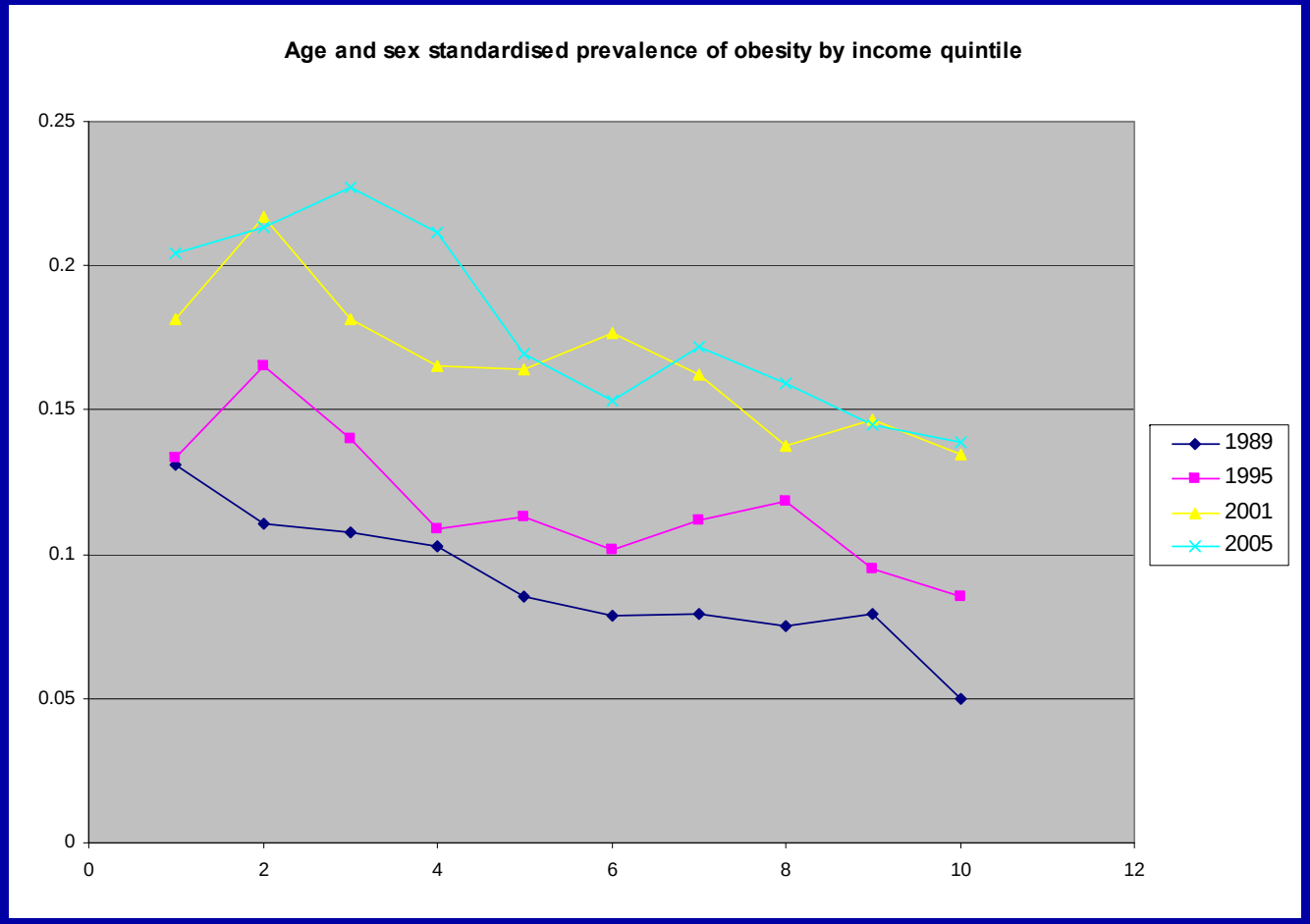
Vigorous Exercize



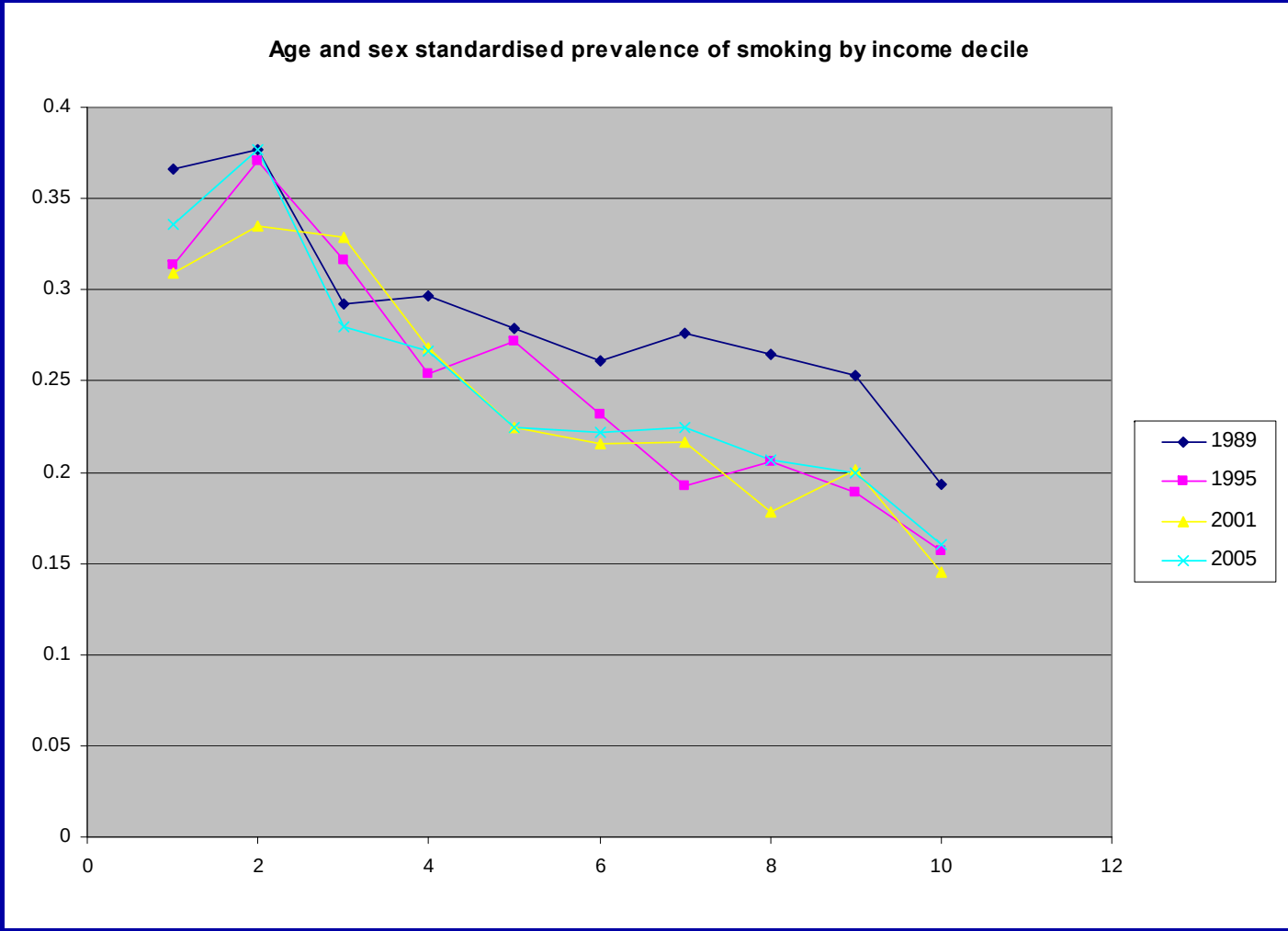
Overweight, or obese



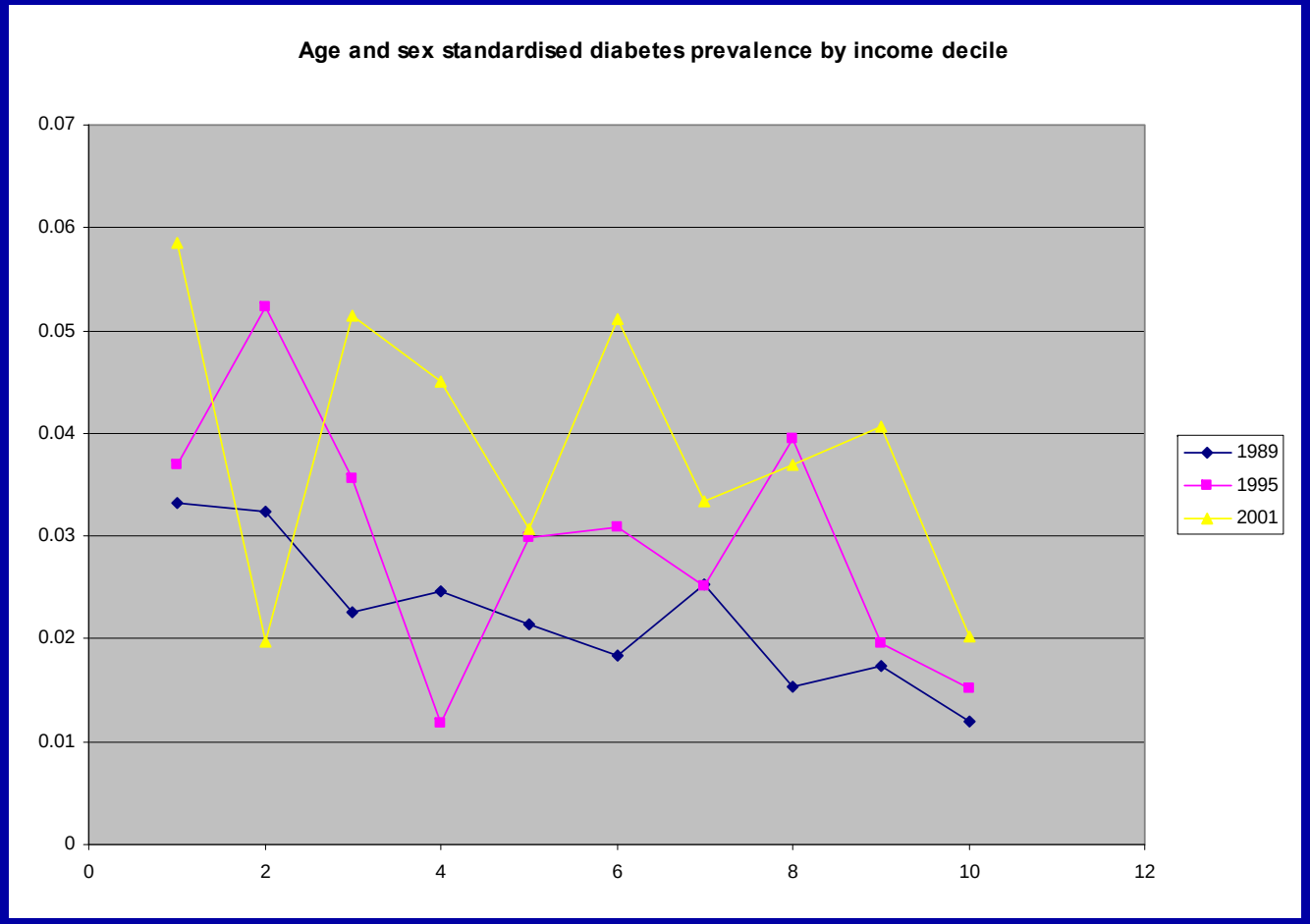
Obese


Age and sex standardised prevalence of obesity by income quintile
0.25
0.2
0.15
0.1
0.05
0
0
2
4
6
8
10
12
1989
1995
2001
2005

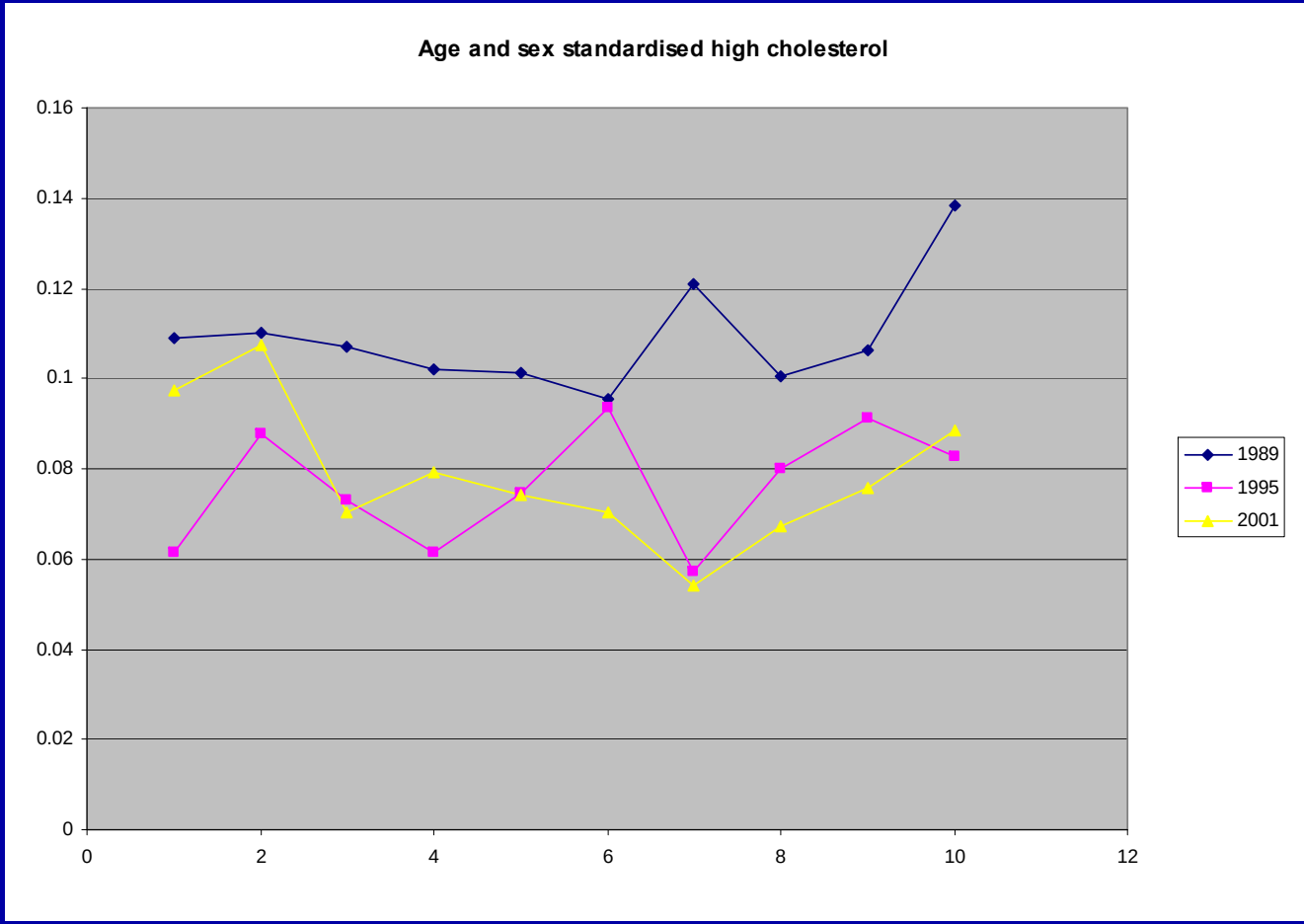
Smoking status



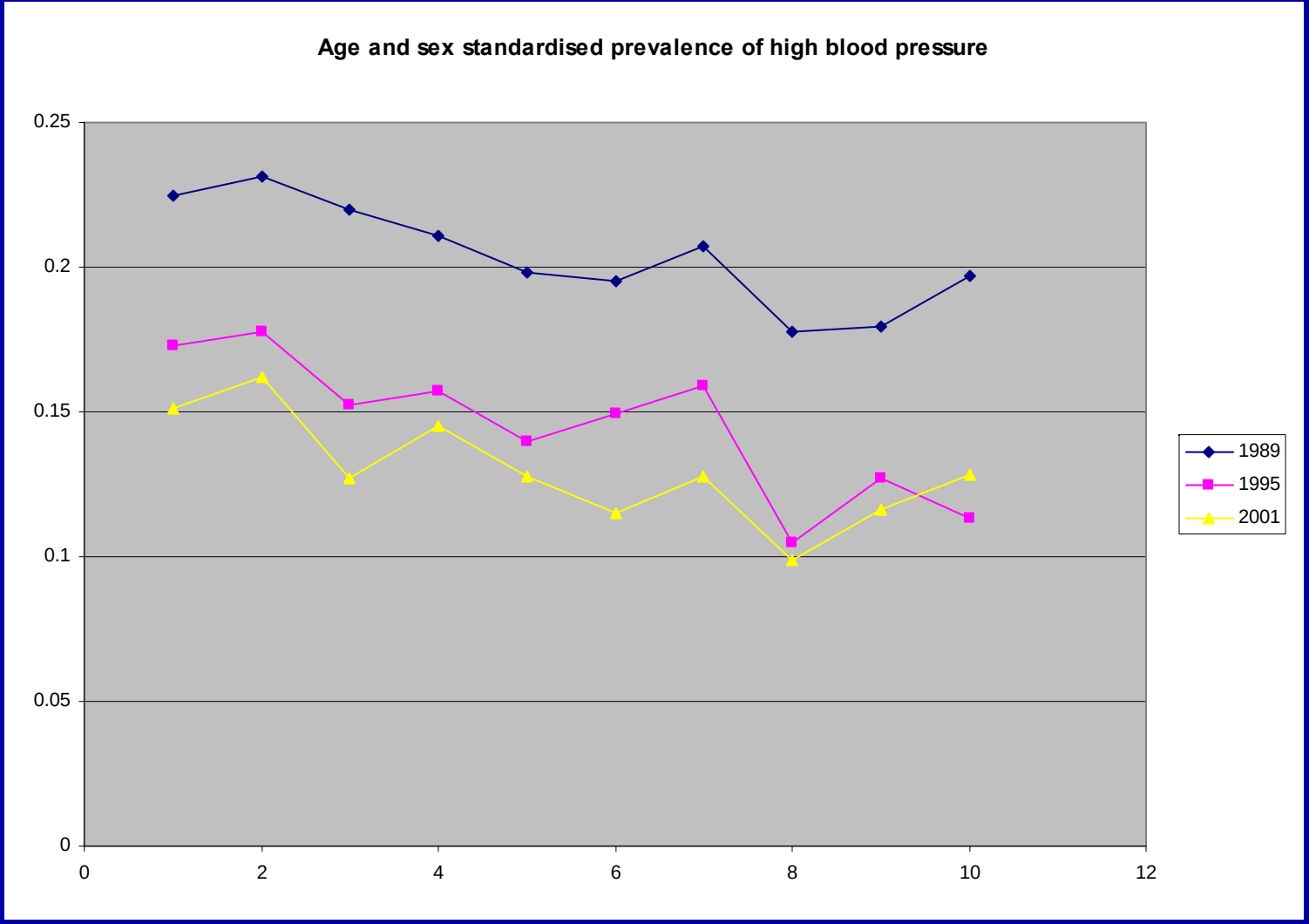
Diabetes (Type I & II)

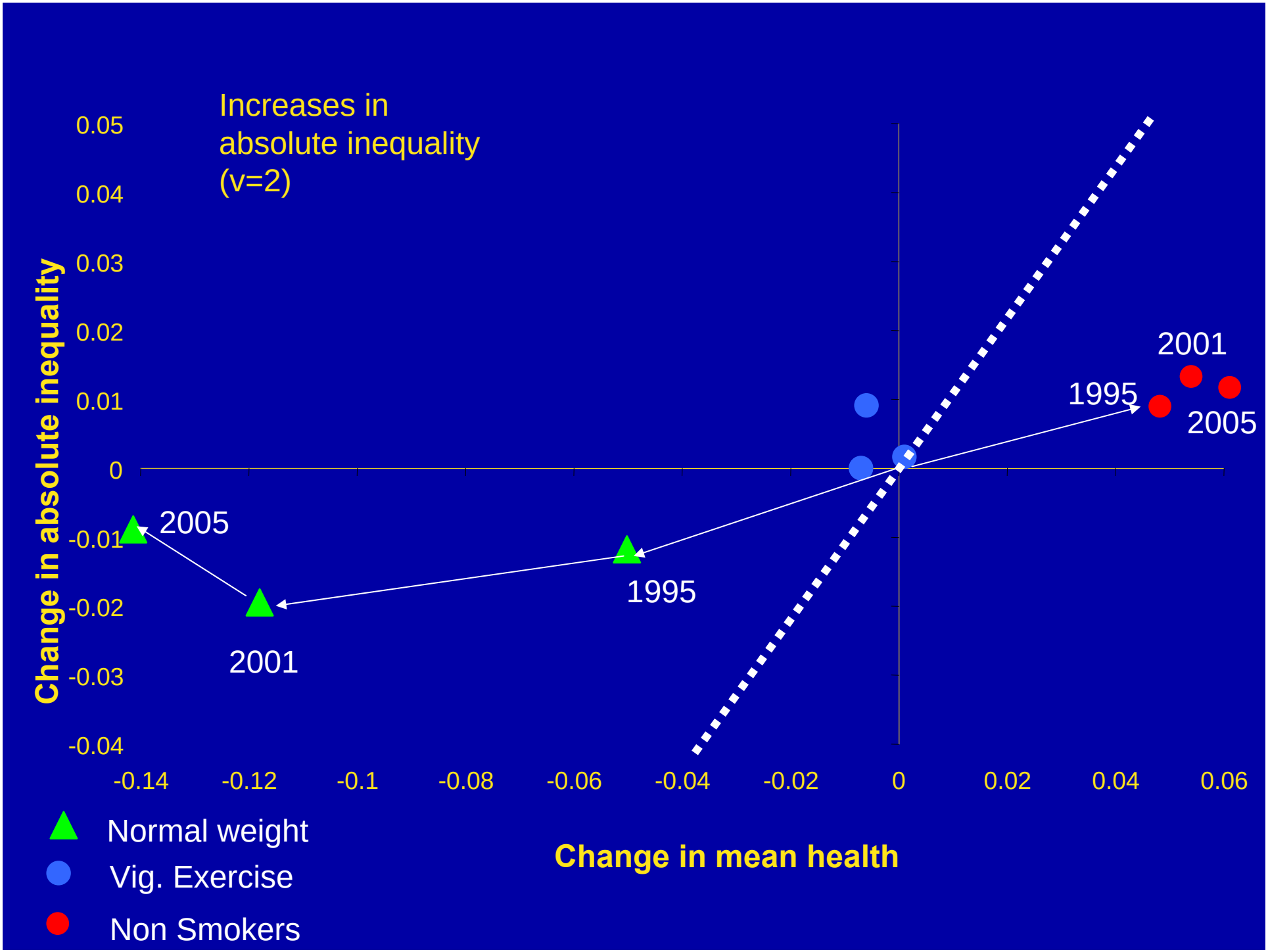


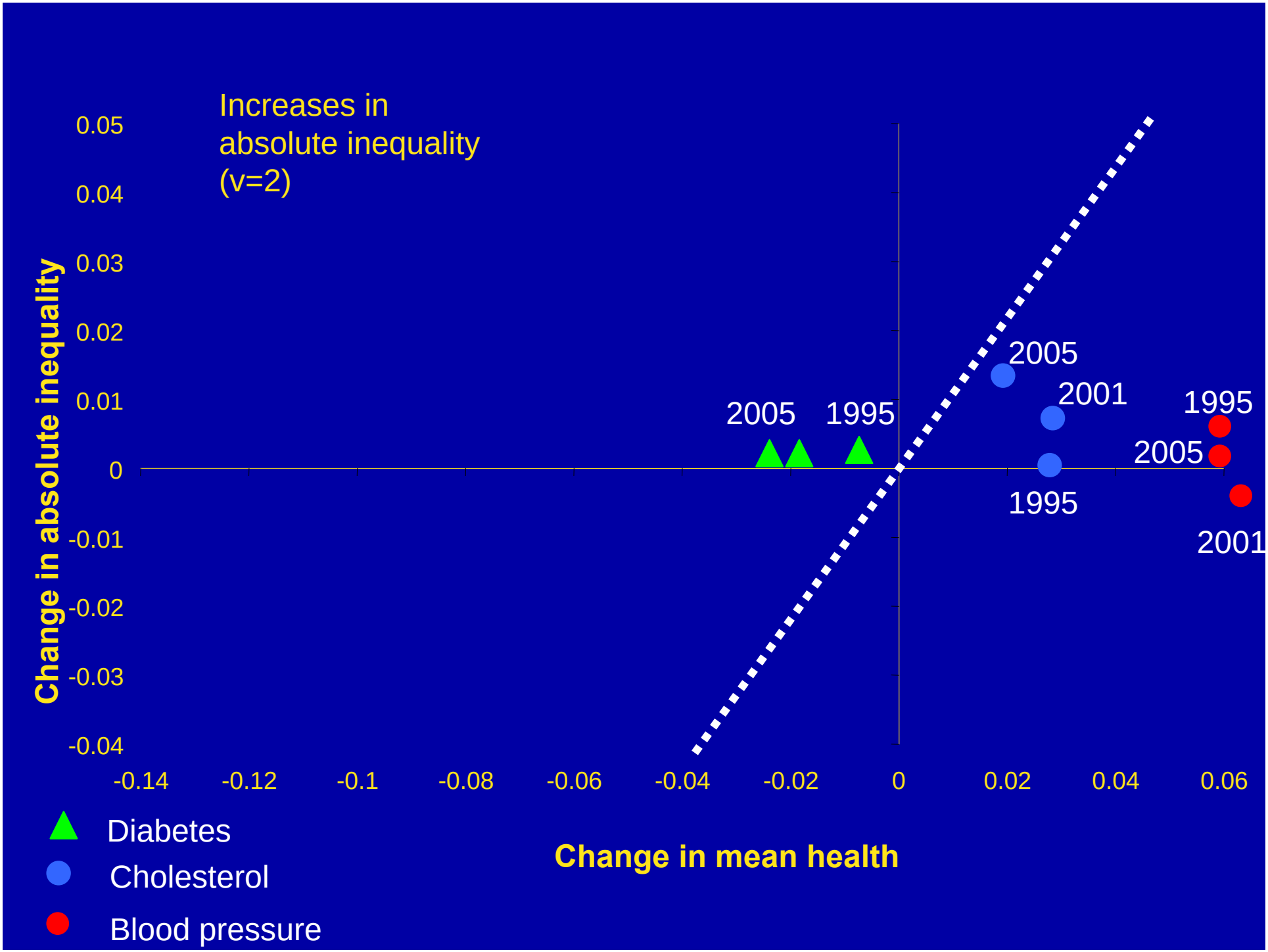
High cholesterol



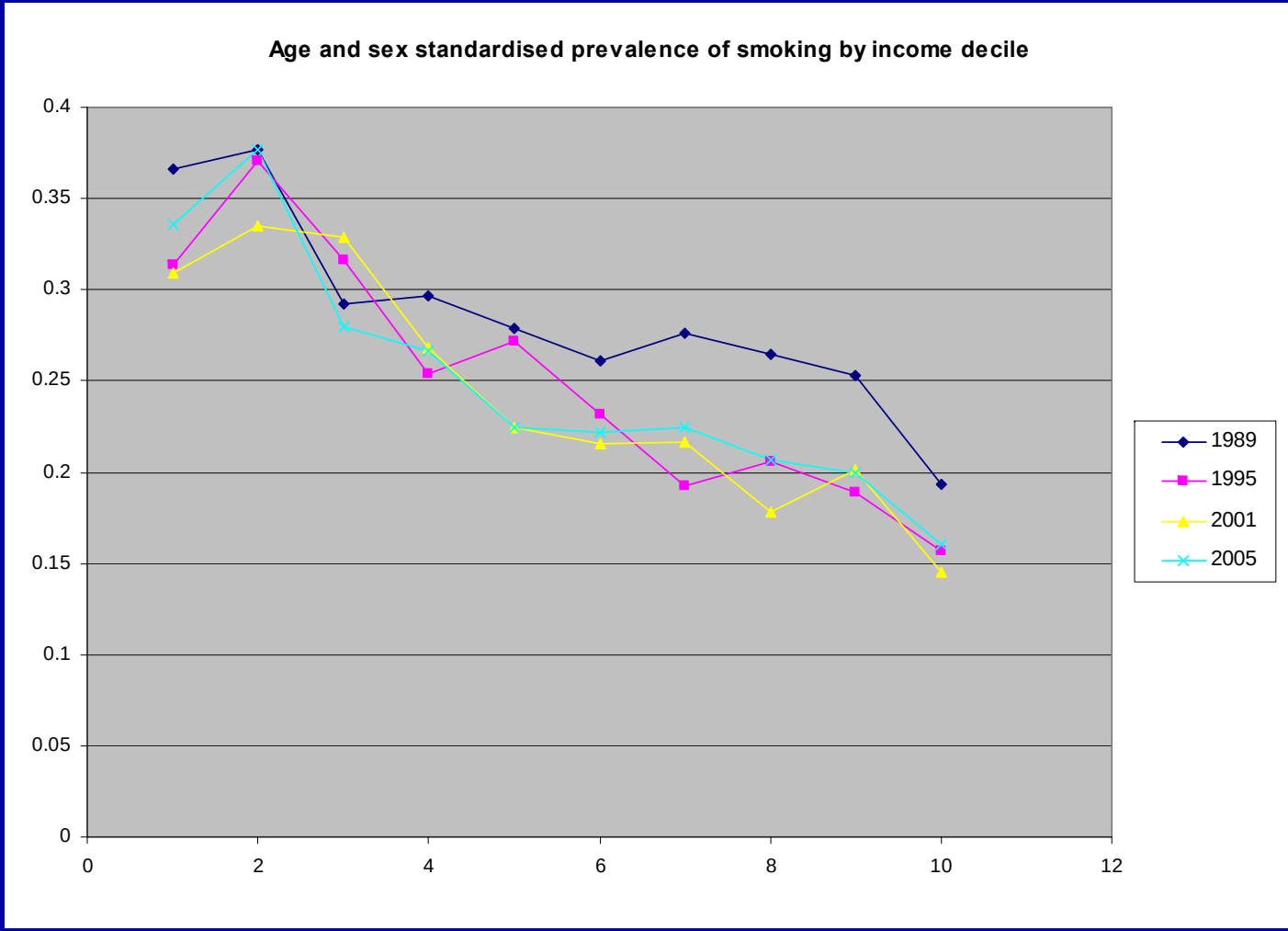
High blood pressure




Increases in
absolute inequality
(v=2)
Change in absolute inequality
0.05
0.04
0.03
0.02
0.01
0
-0.01
-0.02
-0.03
-0.04
-0.14
-0.12
-0.1
-0.08
-0.06
-0.04
-0.02
0
0.02
0.04
0.06
2005
2001
1995
2001
1995
2005
Change in mean health
Normal weight
Vig. Exercise
Non Smokers


Increases in
absolute inequality
(v=2)
Change in absolute inequality
0.05
0.04
0.03
0.02
0.01
0
-0.01
-0.02
-0.03
-0.04
-0.14
-0.12
-0.1
-0.08
-0.06
-0.04
-0.02
0
0.02
0.04
0.06
2005
1995
2005
2001
1995
2005
1995
2001
Change in mean health
Diabetes
Cholesterol
Blood pressure

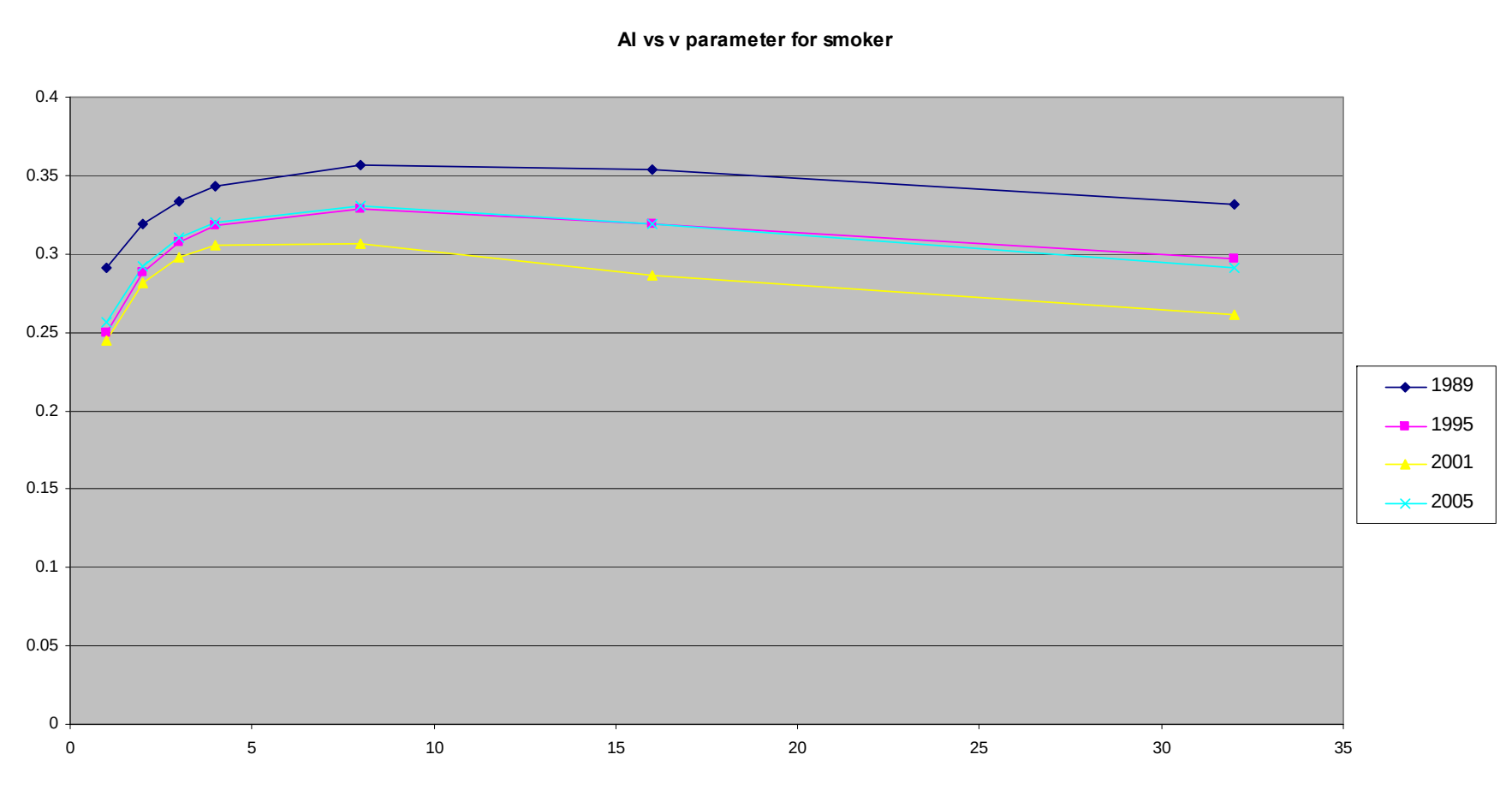
Smoking status



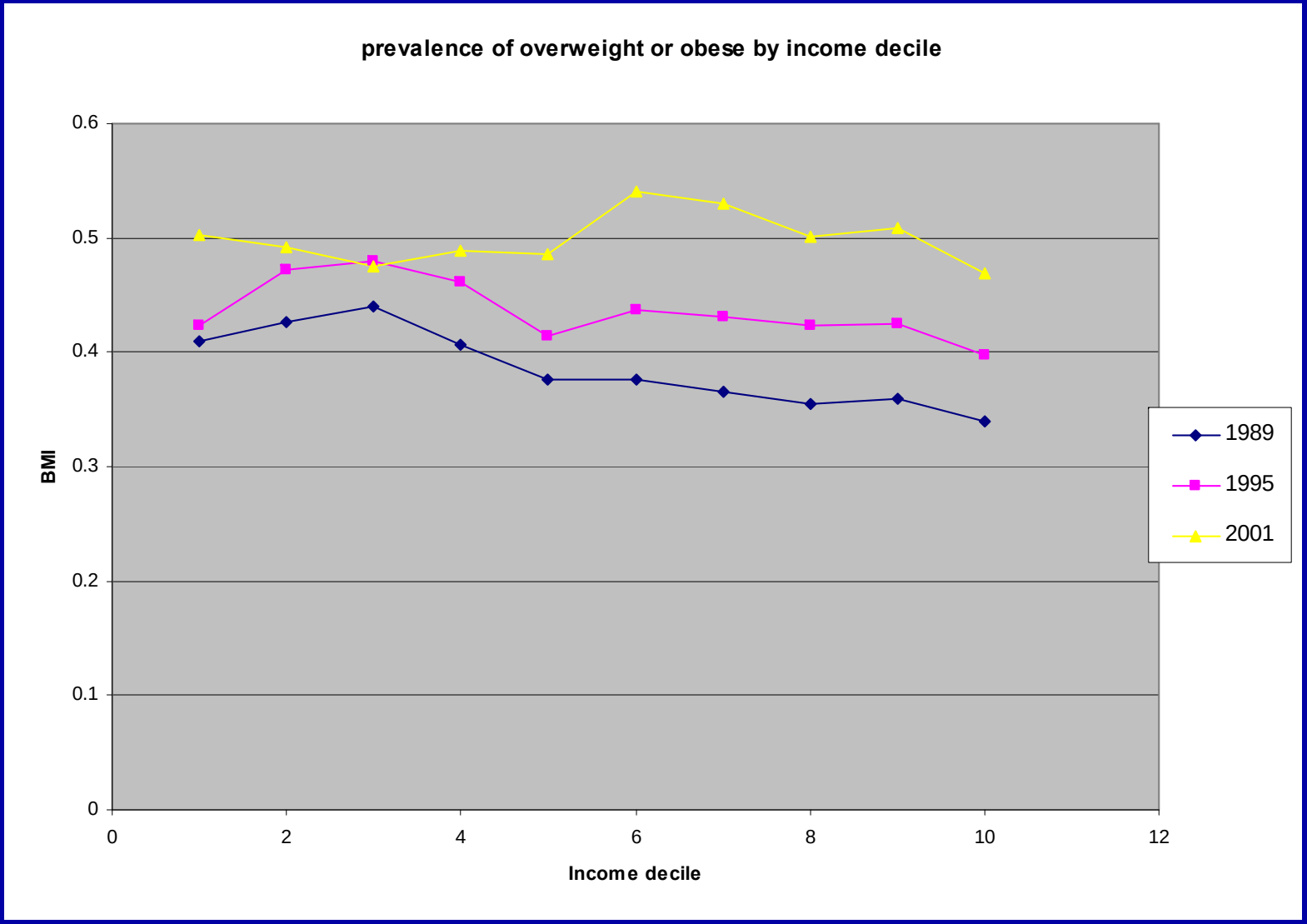
Measuring achievement: smoking

Survey year	Mean	CI_m	CI_h	μCI_m	μCI_H	AI_h	AI_m
1989	0.291	-0.098	0.04	-0.0285	0.0285	0.6805	0.3195
1995	0.25	-0.152	0.051	-0.038	0.038	0.712	0.288
2001	0.245	-0.148	0.048	-0.0363	0.0363	0.7187	0.2813
2005	0.256	-0.14	0.048	-0.0358	0.0358	0.7082	0.2918

Measuring achievement



Overweight, or obese



Overweight & obese

Survey year	Mean	CI_m	CI_h	μCI_m (v=2)	μCI_H (v=2)	AI_h (v=2)	AI_m(v=2)
1989	0.384	-0.046	0.029	-0.0177	0.0177	0.5984	0.4016
1995	0.435	-0.023	0.018	-0.01	0.01	0.555	0.445
2001	0.498	0.003	-0.003	0.0015	-0.0015	0.5035	0.4965
2005	0.532	-0.0157	0.018	-0.0084	0.0084	0.4596	0.4404