DCP3 Cancer: tax tobacco, count the dead and realistic goals by 2030/2050

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St. Michael's

Inspired Care.
Inspiring Science.

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Conclusions

- **Cessation by age 40 (and preferably earlier) avoids 90% of the excess risk of continued smoking**

- **Tripling of excise tax worldwide would reduce smoking by 1/3, avoid over 200 million premature deaths, and raise $100 B more in revenue**

- **Monitoring is needed: smoking and death status plus cause of death surveys**

- **Set realistic goals- halving 2050 cancer death risks from 2010 risks IS achievable**
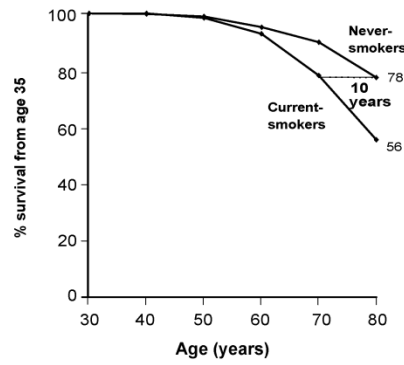
Cancer deaths before age 70 years worldwide, 2011

Cancer type	Male	Female	Both
Lung	537	222	759
Other tobacco	446	195	641
Liver	343	125	468
Stomach	247	126	373
Breast	-	344	344
Colorectal	175	132	307
Cervix		225	225
Prostate	68	0	68
Other cancers	686	617	1,303
TOTAL	2,504	1,987	4,490
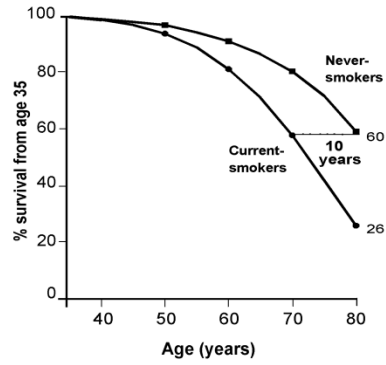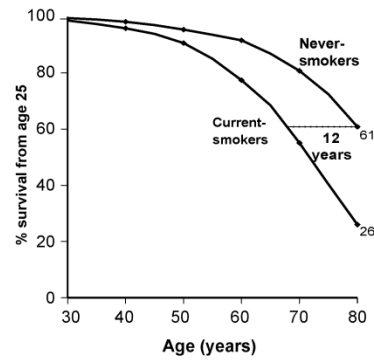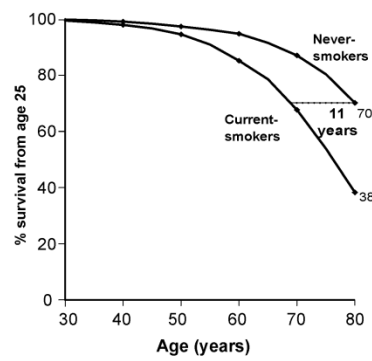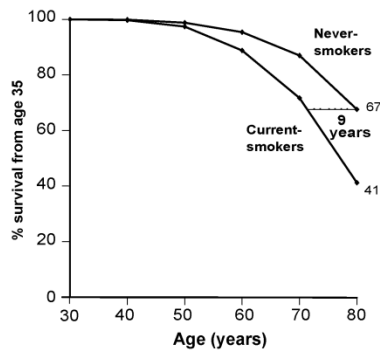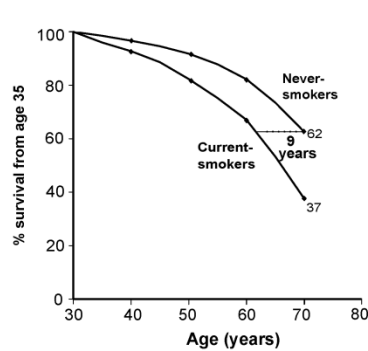
Years gained by quitting smoking by age

55-64   4

45-54   6

35-44   9

25-34   10
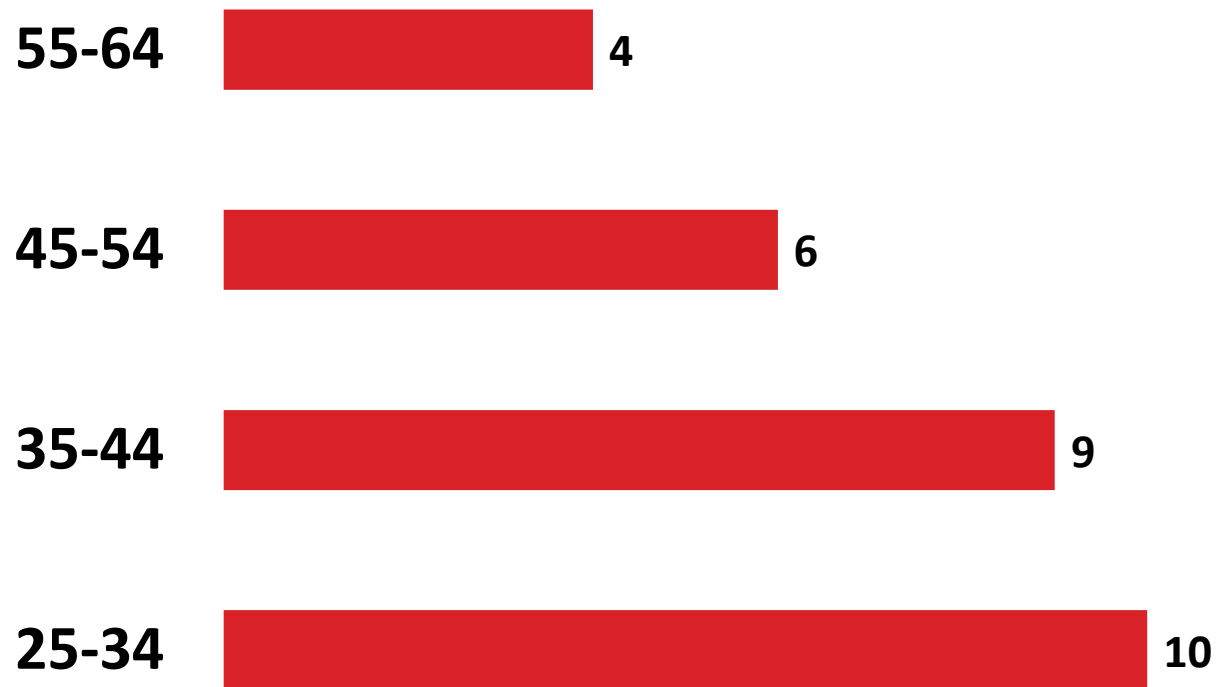
Reductions in risk by age stopped, UK Women (Million Women's Study)

All-cause mortality

Relative Risk (95% CI)

- current smokers
- 1.01
- 1.05
- 1.20
- 1.56
- never smokers

Ex-smokers, by age at stopping

Cancer of the lung

Relative Risk (95% CI)

- current smokers
- 1.6
- 1.8
- 3.3
- 5.9
- never smokers

Ex-smokers, by age at stopping
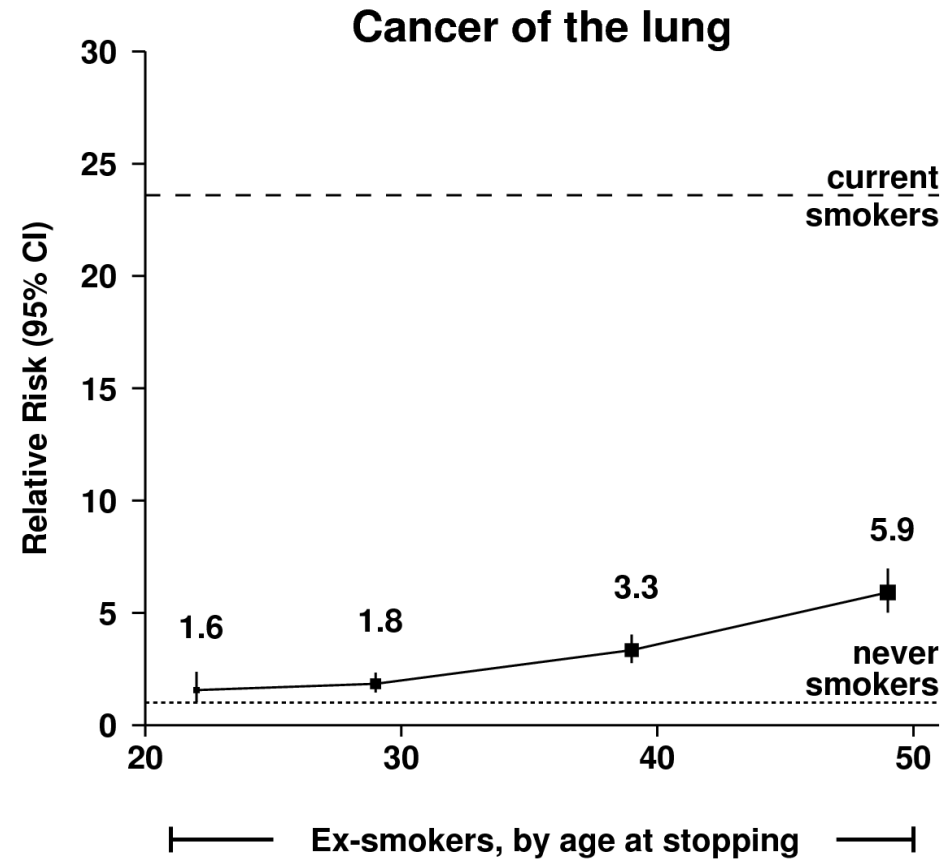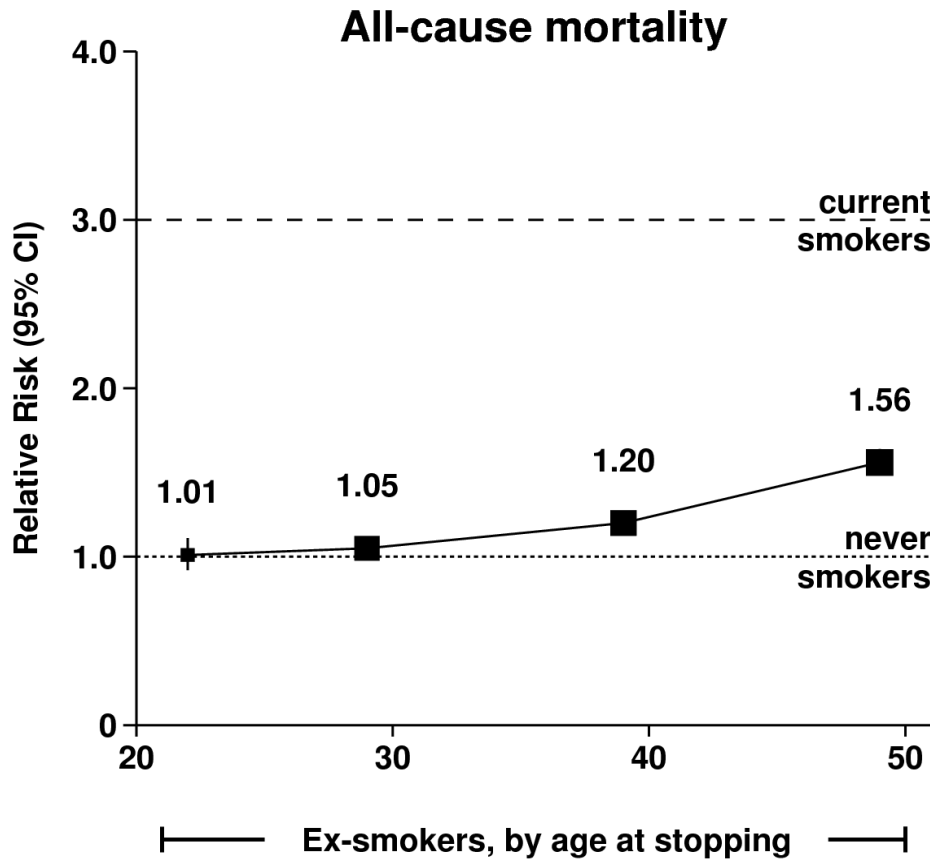
Current mortality risks for male smokers vs never smokers

UK/US/Japan

India-cig

Bangladesh-cig/bidi

South Africa-Coloureds

Agincourt-Black

South Africa-White

South Africa-Black

0   1   2   3

RELATIVE RISKS

= **NOT CAUSED BY SMOKING**
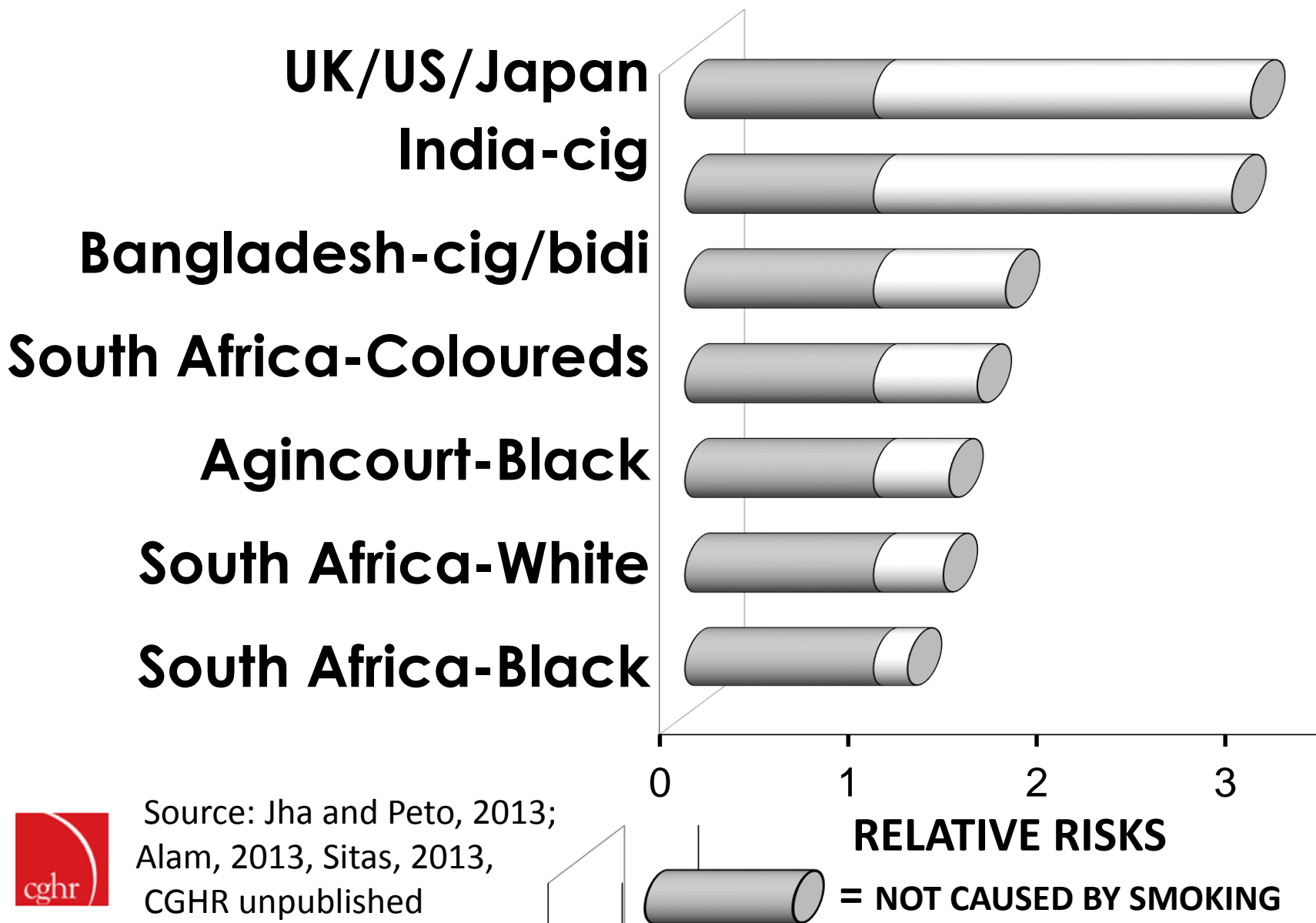
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Annual Chinese cigarette production, 1952-2011
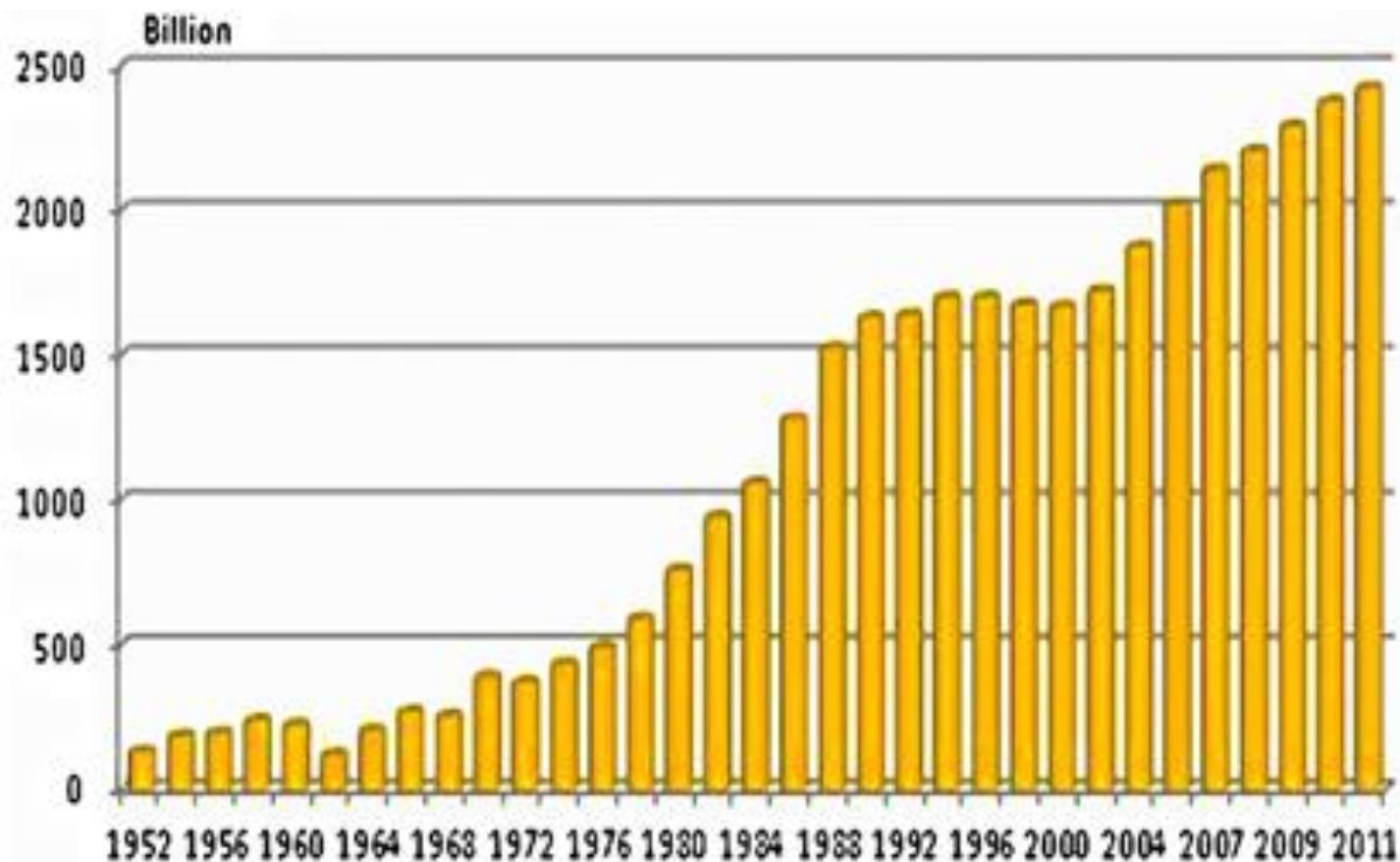
Yang G Tob Control 2014;23:167-172

INDIA: Years of life lost
among 30 year old smokers*
(MDS results)

Men who smoke bidis	**6** years
Women who smoke bidis	**8** years
Men who smoke cigarettes	**10** years

* At current risks of death versus non-smokers, adjusted for age, alcohol use and education
(note that currently, few females smoke cigarettes)

Cigarettes displacing bidis: men aged 15-69 yrs from 1999 to 2009/10
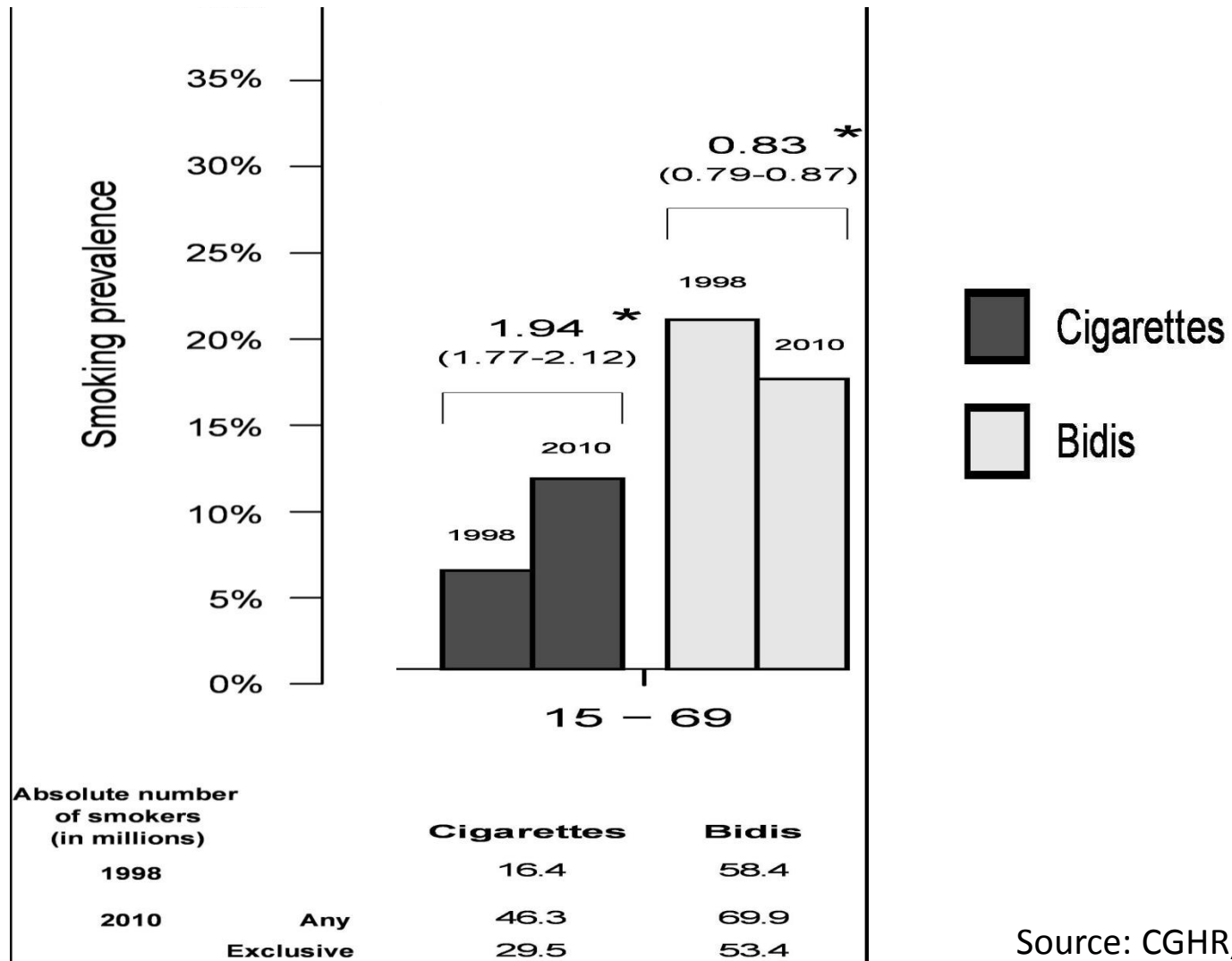
Source: CGHR, in press

Low Specific Excise taxes in LMICs
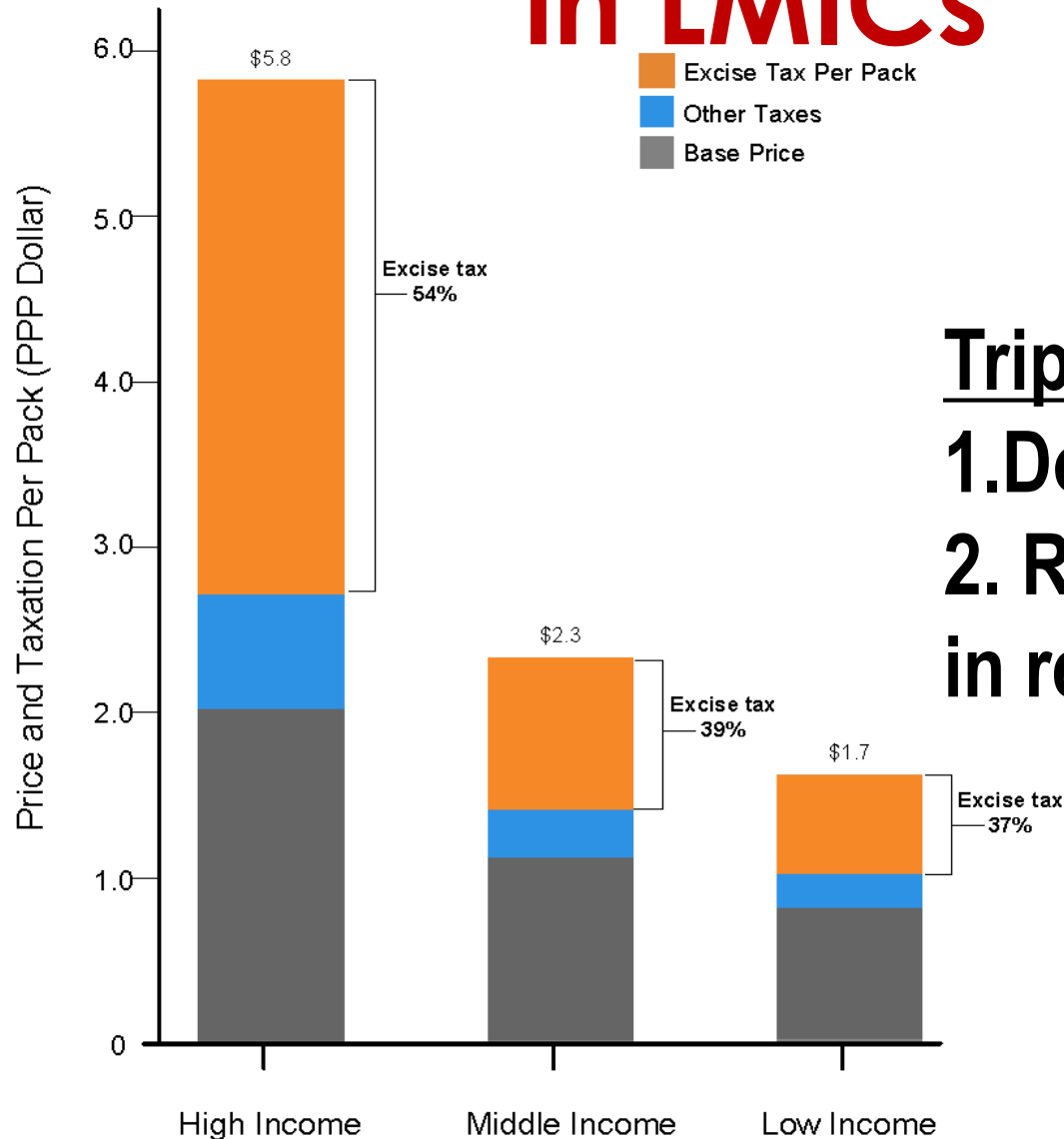
Tripling excise would:
1.Double street price
2. Raise $100 B more in revenue

Source: Jha and Peto, NEJM 2014,

Cigarette prices tripled, smoking halved, revenue doubled: FRANCE and SOUTH AFRICA

France

South Africa

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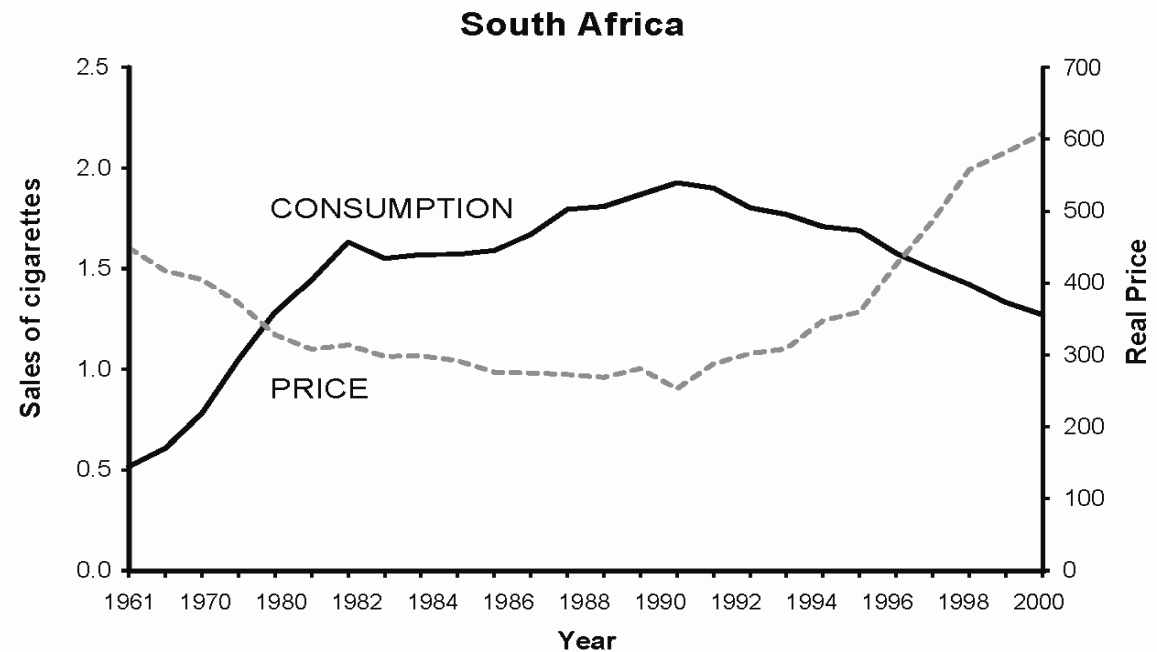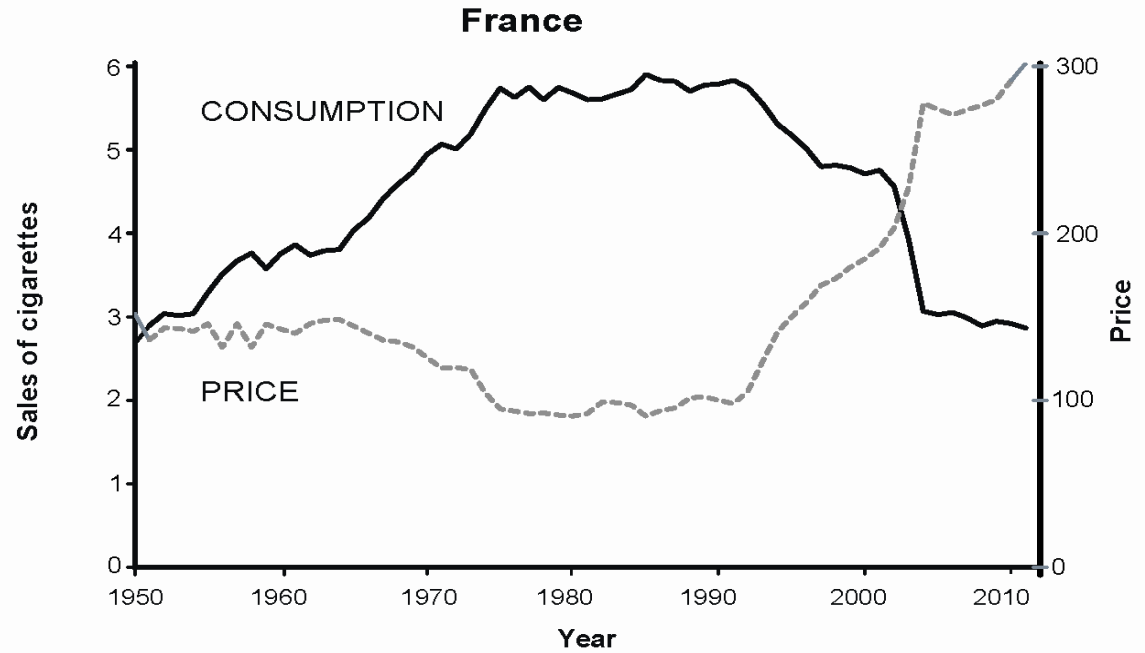
UK & France, lung cancer mortality trends (35-44) to 1997, but not beyond

UNITED KINGDOM
Lung cancer mortality at ages 35−44
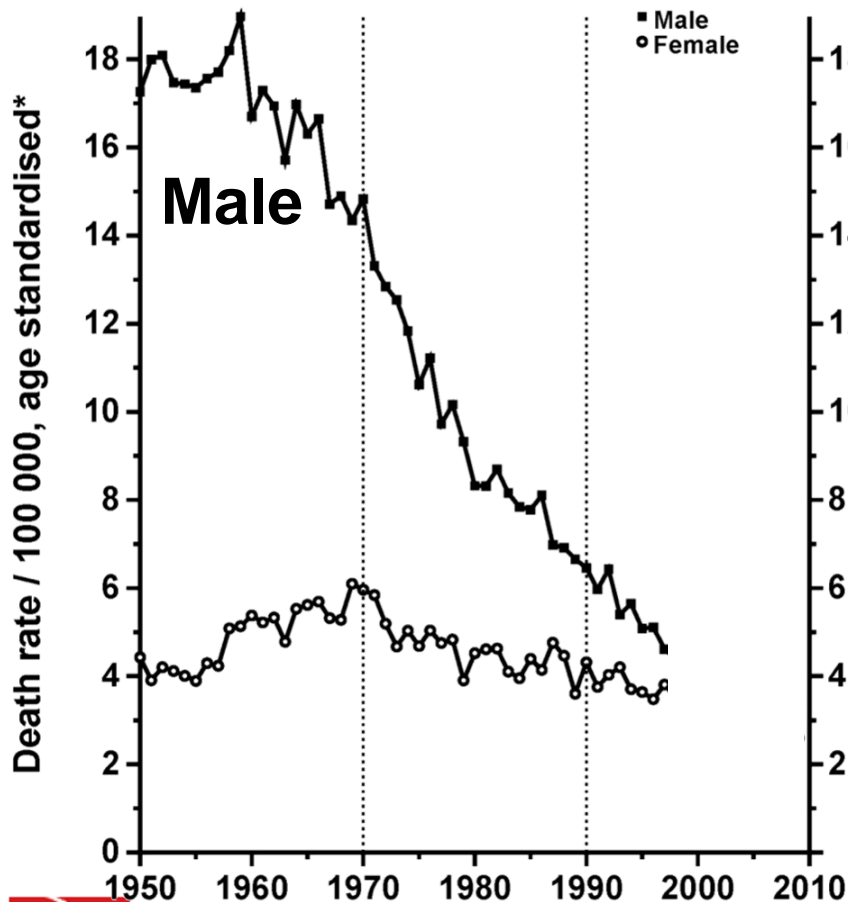
Male

Death rate / 100 000, age standardised*

■ Male
○ Female

*Mean of annual rates in the two component 5−year age groups

Source: WHO mortality & UN population estimates

FRANCE
Lung cancer mortality at ages 35−44
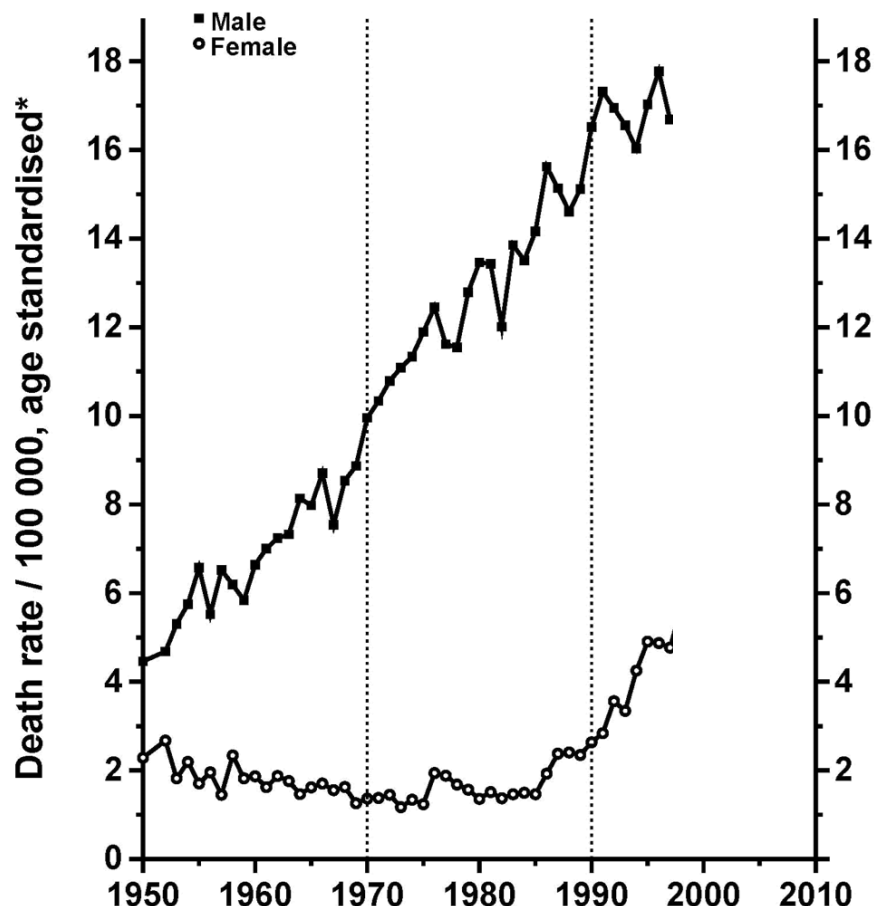
Death rate / 100 000, age standardised*

■ Male
○ Female

*Mean of annual rates in the two component 5−year age groups

Source: WHO mortality & UN population estimates

UK & France, lung cancer mortality trends (35-44) after 1997

UNITED KINGDOM 1950−2009: Males & Females
Lung cancer mortality at ages 35−44

FRANCE 1950−2007: Males & Females
Lung cancer mortality at ages 35−44
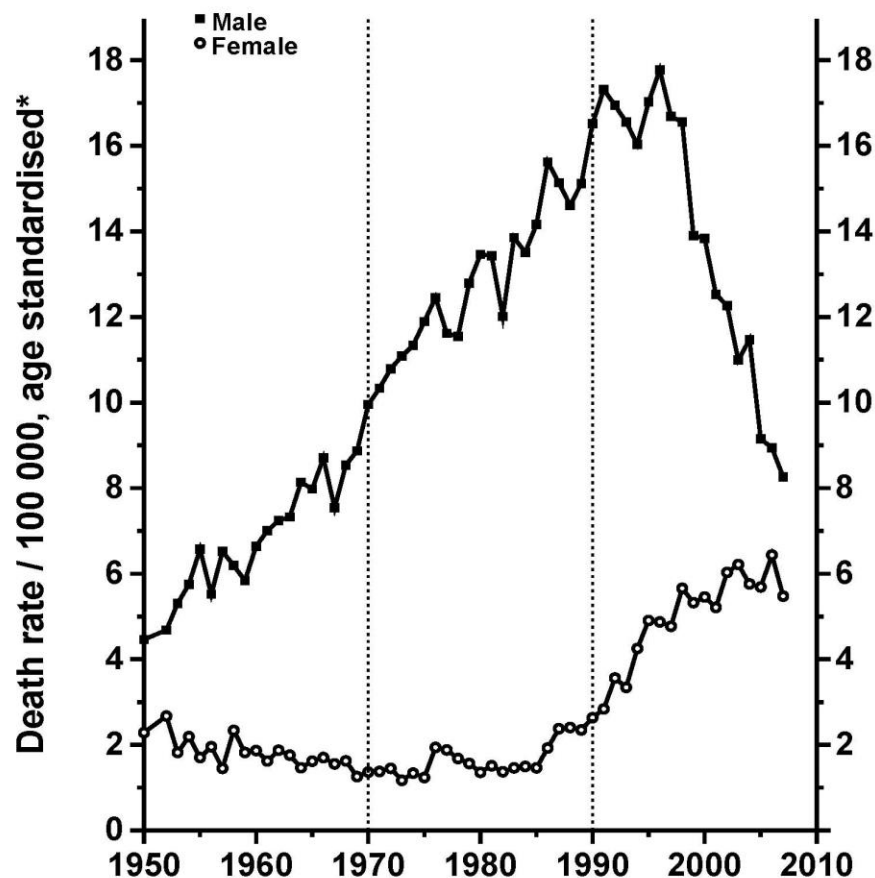
*Mean of annual rates in the two component 5−year age groups

Source: WHO mortality & UN population estimates

Source: Peto, 2012

Mexico: 7 peso (25%) tax rise, 2010

GOAL: 10 peso hike

- **Good epidemiologic analyses**
  - **Mexico: ~11 M smokers so 4-6 M will die from smoking unless they quit**
  - **Price elasticities and poverty analyses**
  - **Immediate follow up numbers to show increasing revenue, decreasing consumption, no major smuggling**
- **International seminar with MoF:**
  - **Political visibility**
    - **Senator Saro**
    - **Organized NGO protests on steps of MoF**
    - **Slogan: 10 pesos for 1 million lives saved**
- **Linked to financing development:**
  - **"soft earmarking"- more money focused on poverty reduction**

MILLION DEATH STUDY IN INDIA

1. Visit 1 M homes ("true snapshot" of India) with a recent death & ask standard questions and get a narrative
2. Use non-medical surveyors (electronic entry + GPS)
3. Web-based double coding by 500 doctors (guidelines + adjudication and other strict quality control)
4. Study all diseases, work with census dept, keep costs <$1 per home

Cancer death rates by education, men and women aged 30-69, India
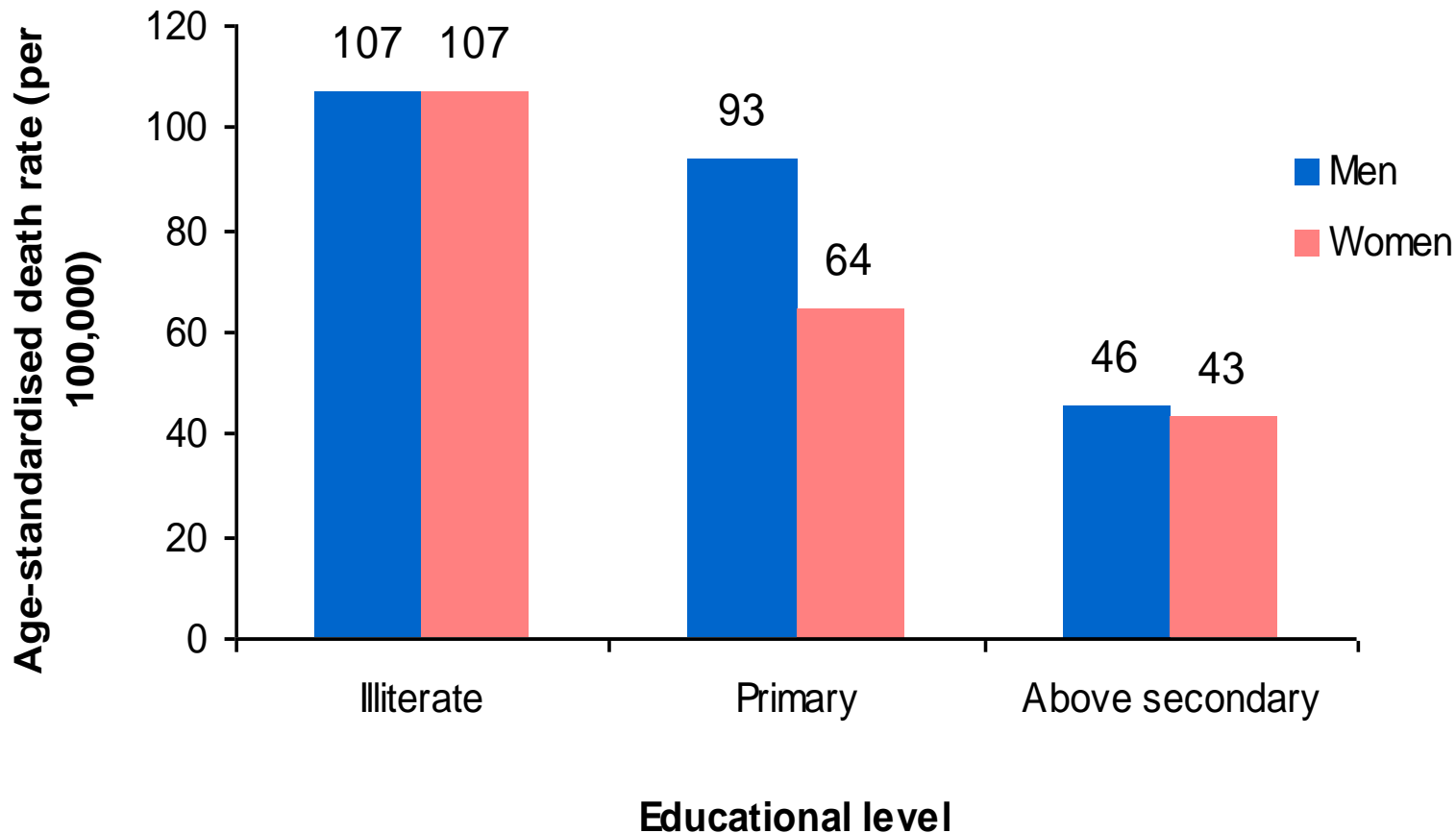
Source: Dikshit et al, Lancet 2012

Cervical cancer rates
by state, women 30-69 years

Age-standardized mortality rates per 100,000

	2.3	3.5	16
	Jammu & Kashmir	Assam	India

Cancer (non tobacco/non infection):
BOTH GENDERS aged 30-69 years

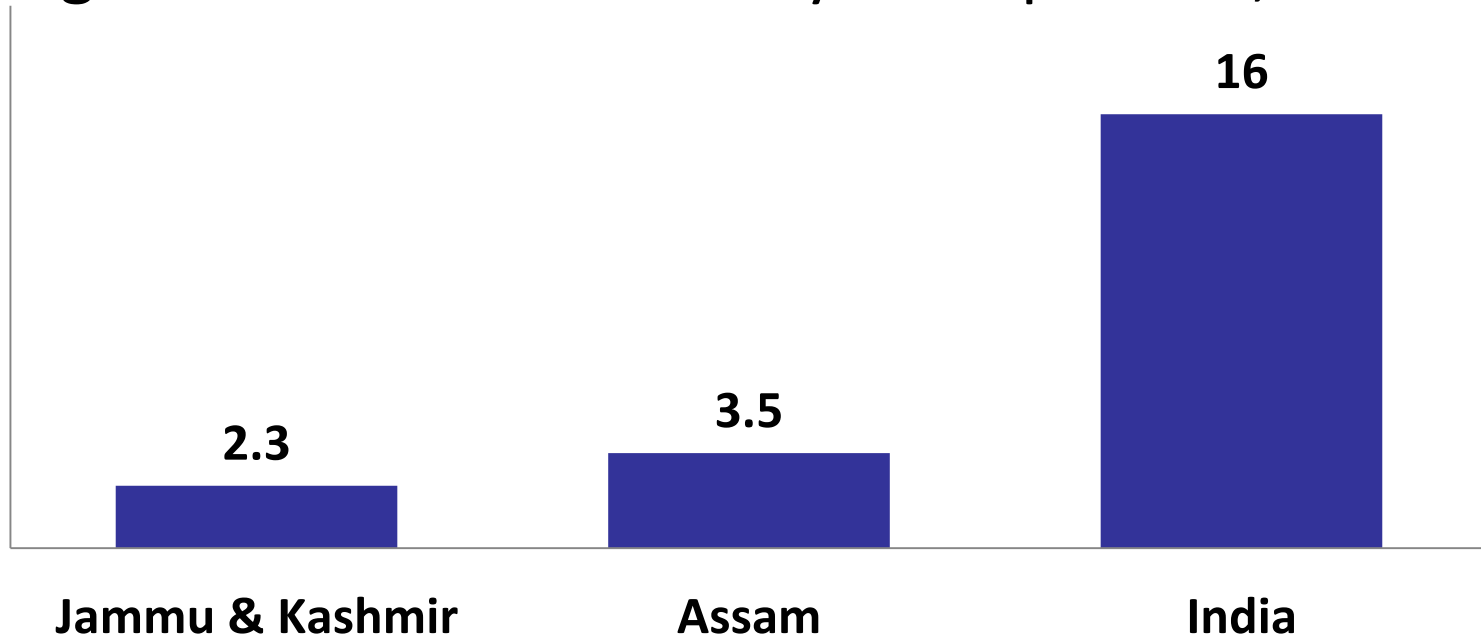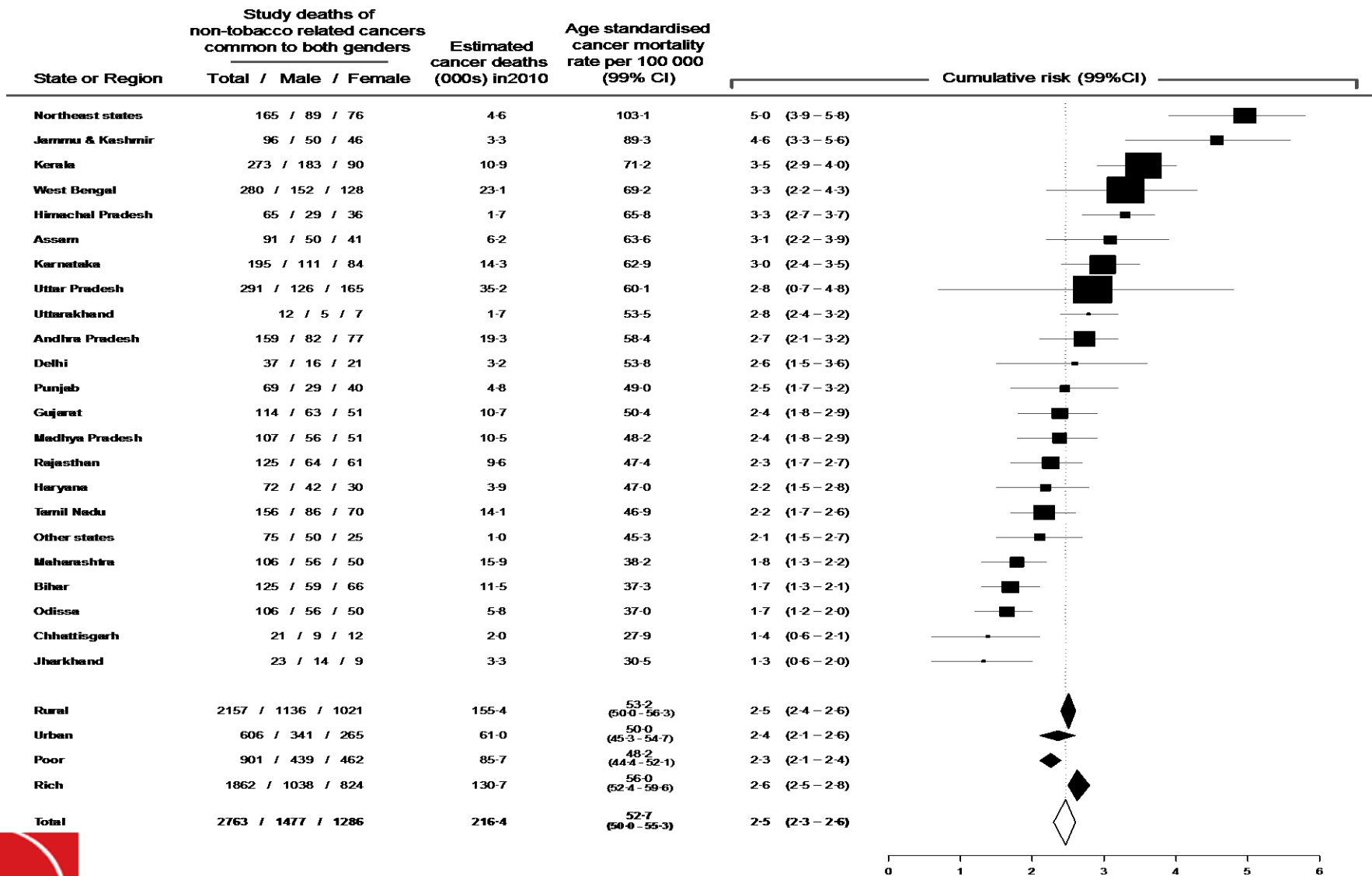| State or Region	Study deaths of non-tobacco related cancers common to both genders Total / Male / Female	Estimated cancer deaths (000s) in 2010	Age standardised cancer mortality rate per 100 000 (99% CI)	Cumulative risk (99%CI)	
Northeast states	165 / 89 / 76	4·6	103·1	5·0	(3·9 – 5·8)
Jammu & Kashmir	96 / 50 / 46	3·3	89·3	4·6	(3·3 – 5·6)
Kerala	273 / 183 / 90	10·9	71·2	3·5	(2·9 – 4·0)
West Bengal	280 / 152 / 128	23·1	69·2	3·3	(2·2 – 4·3)
Himachal Pradesh	65 / 29 / 36	1·7	65·8	3·3	(2·7 – 3·7)
Assam	91 / 50 / 41	6·2	63·6	3·1	(2·2 – 3·9)
Karnataka	195 / 111 / 84	14·3	62·9	3·0	(2·4 – 3·5)
Uttar Pradesh	291 / 126 / 165	35·2	60·1	2·8	(0·7 – 4·8)
Uttarakhand	12 / 5 / 7	1·7	53·5	2·8	(2·4 – 3·2)
Andhra Pradesh	159 / 82 / 77	19·3	58·4	2·7	(2·1 – 3·2)
Delhi	37 / 16 / 21	3·2	53·8	2·6	(1·5 – 3·6)
Punjab	69 / 29 / 40	4·8	49·0	2·5	(1·7 – 3·2)
Gujarat	114 / 63 / 51	10·7	50·4	2·4	(1·8 – 2·9)
Madhya Pradesh	107 / 56 / 51	10·5	48·2	2·4	(1·8 – 2·9)
Rajasthan	125 / 64 / 61	9·6	47·4	2·3	(1·7 – 2·7)
Haryana	72 / 42 / 30	3·9	47·0	2·2	(1·5 – 2·8)
Tamil Nadu	156 / 86 / 70	14·1	46·9	2·2	(1·7 – 2·6)
Other states	75 / 50 / 25	1·0	45·3	2·1	(1·5 – 2·7)
Maharashtra	106 / 56 / 50	15·9	38·2	1·8	(1·3 – 2·2)
Bihar	125 / 59 / 66	11·5	37·3	1·7	(1·3 – 2·1)
Odissa	106 / 56 / 50	5·8	37·0	1·7	(1·2 – 2·0)
Chhattisgarh	21 / 9 / 12	2·0	27·9	1·4	(0·6 – 2·1)
Jharkhand	23 / 14 / 9	3·3	30·5	1·3	(0·6 – 2·0)
Rural	2157 / 1136 / 1021	155·4	53·2 (50·0 – 56·3)	2·5	(2·4 – 2·6)
Urban	606 / 341 / 265	61·0	50·0 (45·3 – 54·7)	2·4	(2·1 – 2·6)
Poor	901 / 439 / 462	85·7	48·2 (44·4 – 52·1)	2·3	(2·1 – 2·4)
Rich	1862 / 1038 / 824	130·7	56·0 (52·4 – 59·6)	2·6	(2·5 – 2·8)
Total	2763 / 1477 / 1286	216·4	52·7 (50·0 – 55·3)	2·5	(2·3 – 2·6)

Source: Dikshit et al, Lancet 2012

Tobacco deaths (% of total), MEN, Canada, 1986-2006, by income

Poorest: 1986 41%, 1991 40%, 1996 36%, 2001 34%, 2006 31%

Richest: 1986 28%, 1991 27%, 1996 25%, 2001 21%, 2006 20%

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Limitations of indirect estimates (GBD 2010, GHE 2012)

GBD estimates for 25 million deaths use only 29,000 nationally representative deaths, or 850 estimated deaths for 1 actual death

Quality of the LMIC cause of death statistics reported to WHO: High and Medium | National Verbal Autopsy | Low
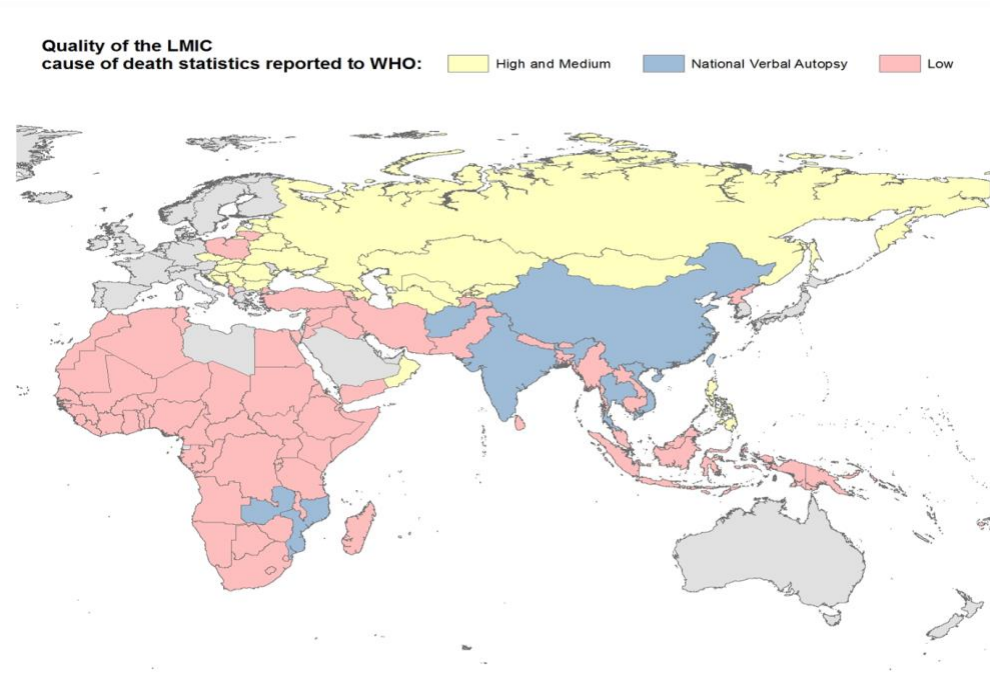
-India's TB program- 800,000 deaths in 1996, then 400,000 the year after
- South African child mortality rates RISING 3% a year since 2000, but UN and South African government data show DECLINING 3% a year

Jha, BMC Med 2014

UK male and cancer mortality trends at ages 35-69, 1950-2010 and LMIC trends age 30-69, 2000-2011
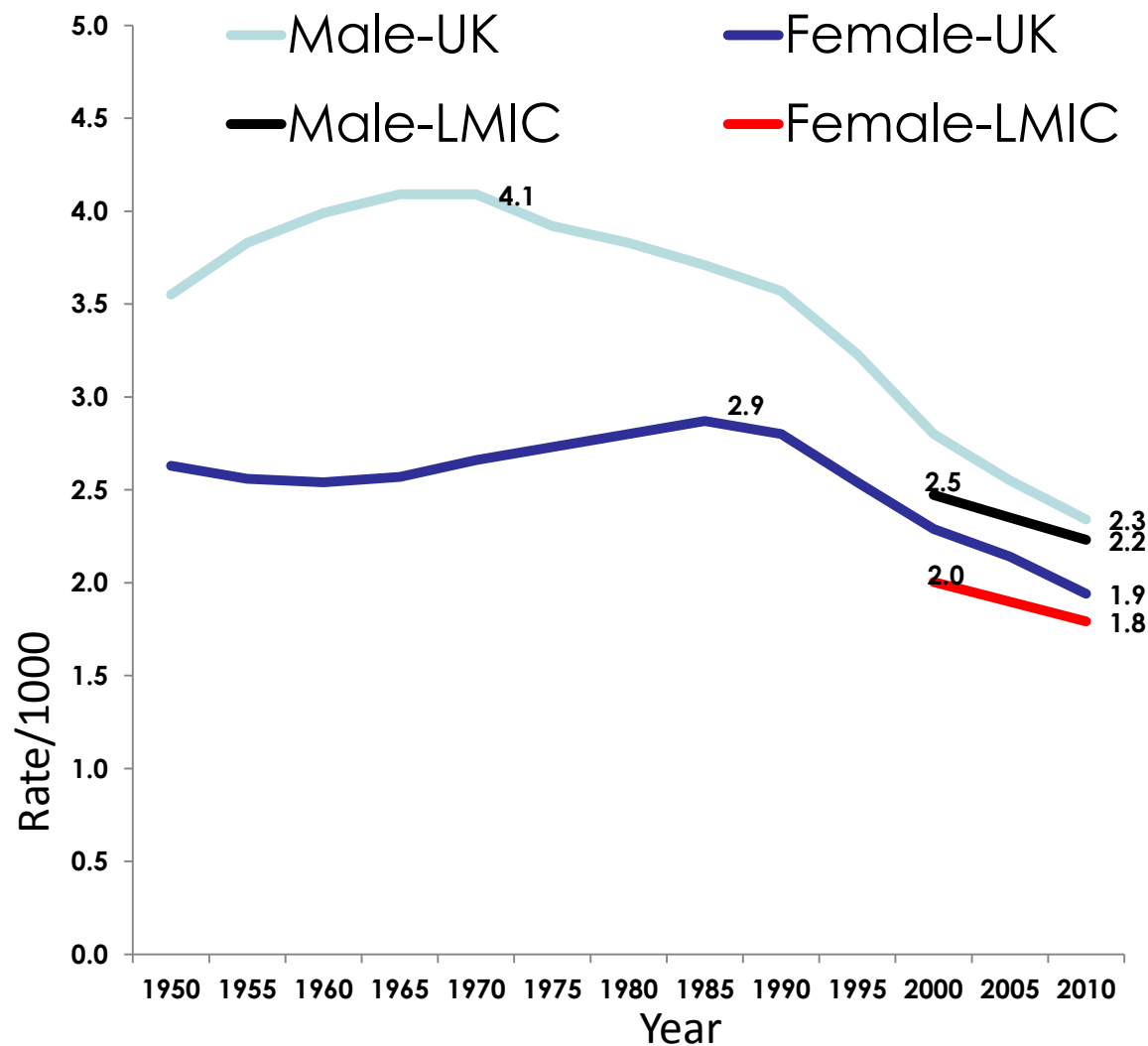
UK male cancer mortality trends at ages 35-69, 1950-2007: selected sites
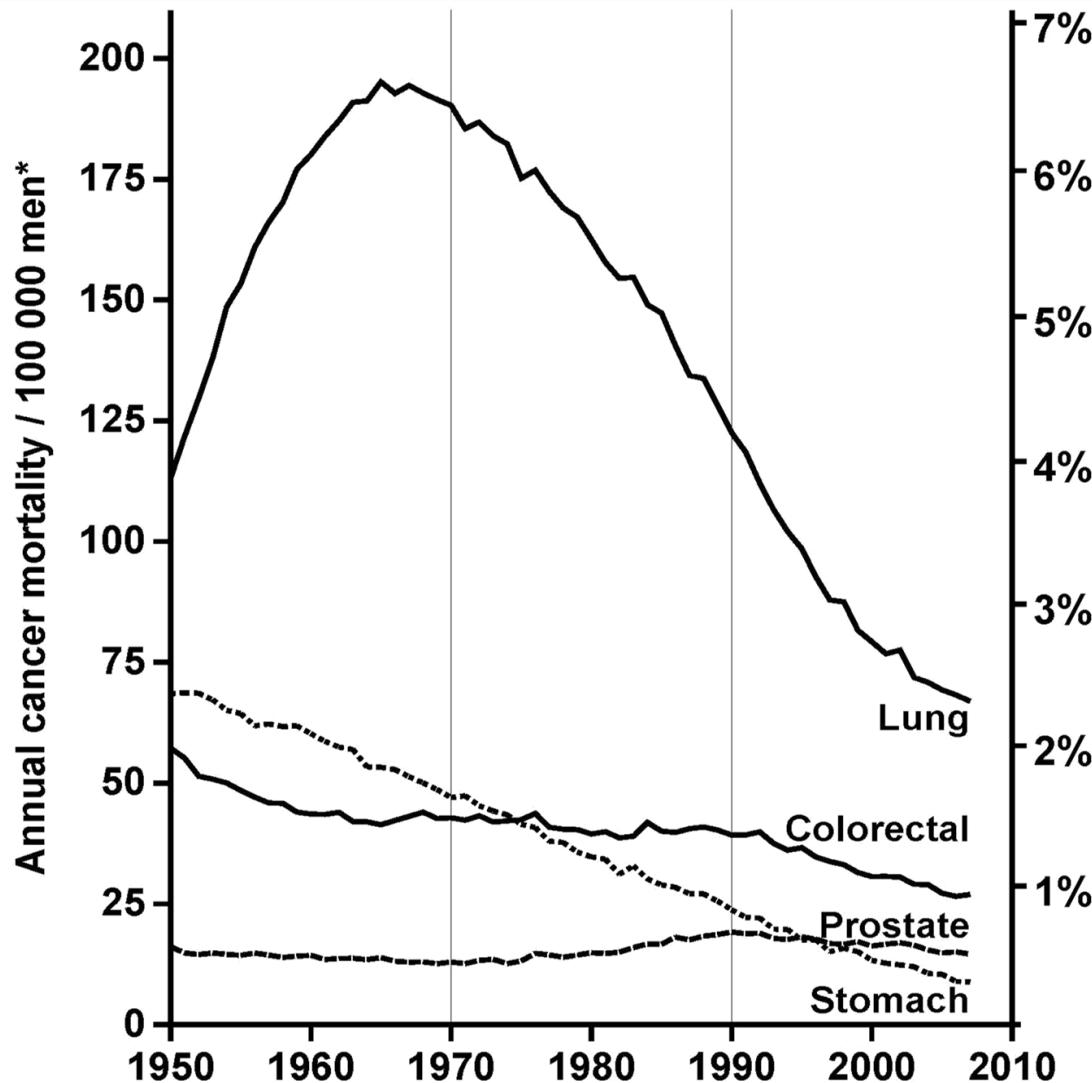
Main causes of trends in recent decades

35-year risk (%)

Lung: cigarettes
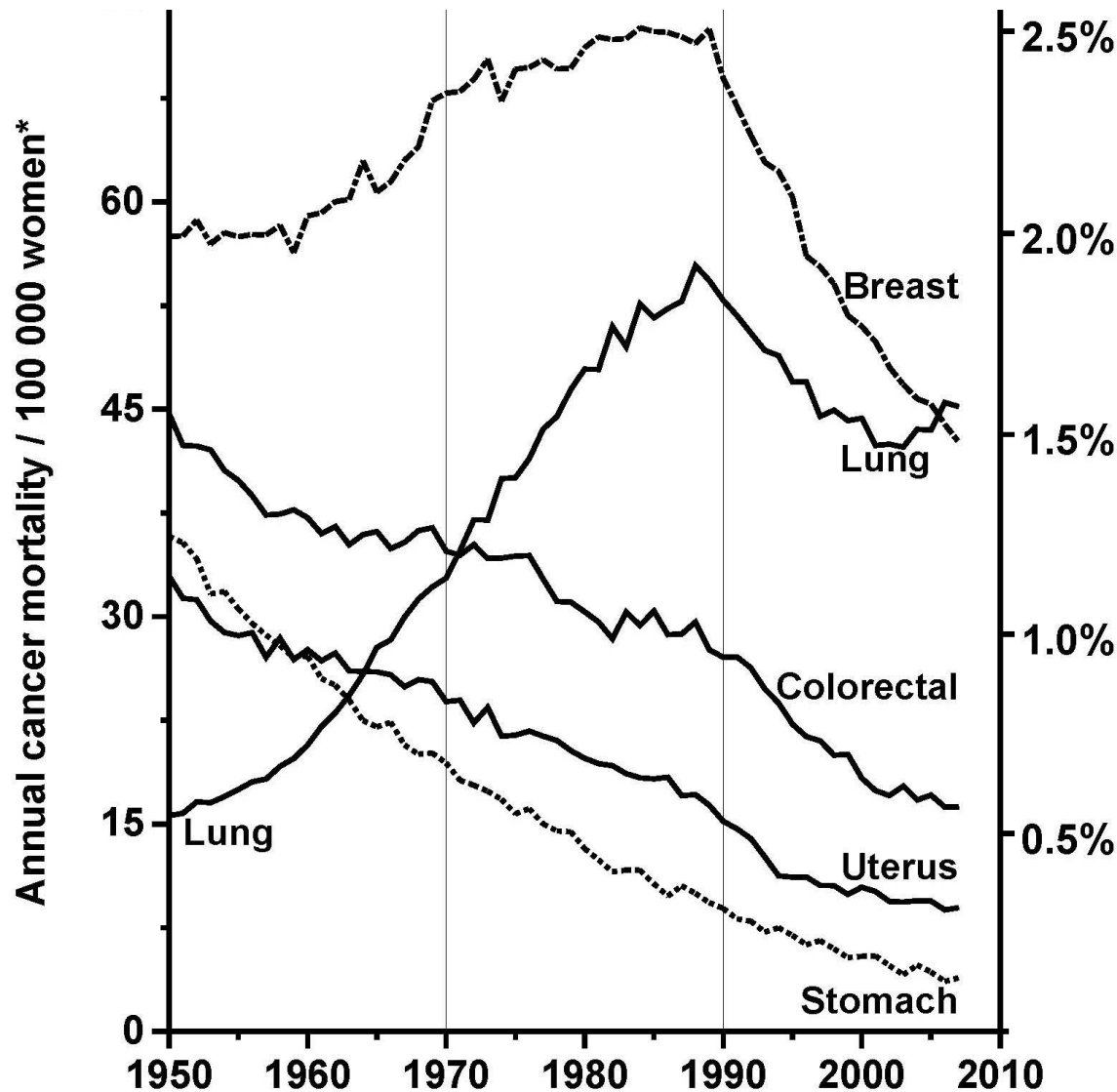
Colorectal: treatment

Stomach: Unknown

*Mean of annual rates in the seven component 5–year age groups

Source: WHO mortality & UN population estimates

Source: Peto, 2012

UK female cancer mortality trends at ages 35-69, 1950-2007: selected sites

Main causes of trends in recent decades

35-year risk (%)

Breast: treatment
Lung: cigarettes

Colorectal: treatment
Uterus: screening
Stomach: Unknown

Source: Peto, 2012

Cancer deaths before age 70 years worldwide, 2011

Cancer type	Male	Female	Both	
Lung	537	222	759 *	
Other tobacco	446	195	641 *	***Tobacco (31%)**
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TOTAL	**2,504**	**1,987**	**4,490**	

Probability of cancer death <70 years, 2000 and 2011, World

Type of cancer	Male			Female		
	2000	2011	% change	2000	2011	% change
All cancer	**9.0**	**8.0**	**-12%**	**6.8**	**6.0**	**-11%**
Tobacco-attributable	3.4	3.0	-12%	1.3	1.1	-10%
Infection-attributable	2.3	1.9	-16%	1.7	1.5	-16%
Other cancers	3.6	3.3	-9%	3.9	3.6	-9%

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Can the risk of cancer death <70 years be reduced by 30% by 2030 and by 50% by 2050?

- Not likely by 2030 but more certainly by 2050

- 2010 risk: 8% male, 6% female

- 10% decline in risk from 2000-2010

- Implies to reach 2030 goal (8%*.**7=5.6%** male, and 6%*.**7=4.2%** female), reduction in 2020-2030 would need to be about 22% during 2020-2030.

  - Even if tobacco risks halved (possible), this would still be short

- 2050 goal (4% male, 3% female) are more achievable, and consistent with rates of decline in UK/other settings (tobacco, plus expansion of treatments for common cancers)

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Marginal costs for maximal child survival are falling
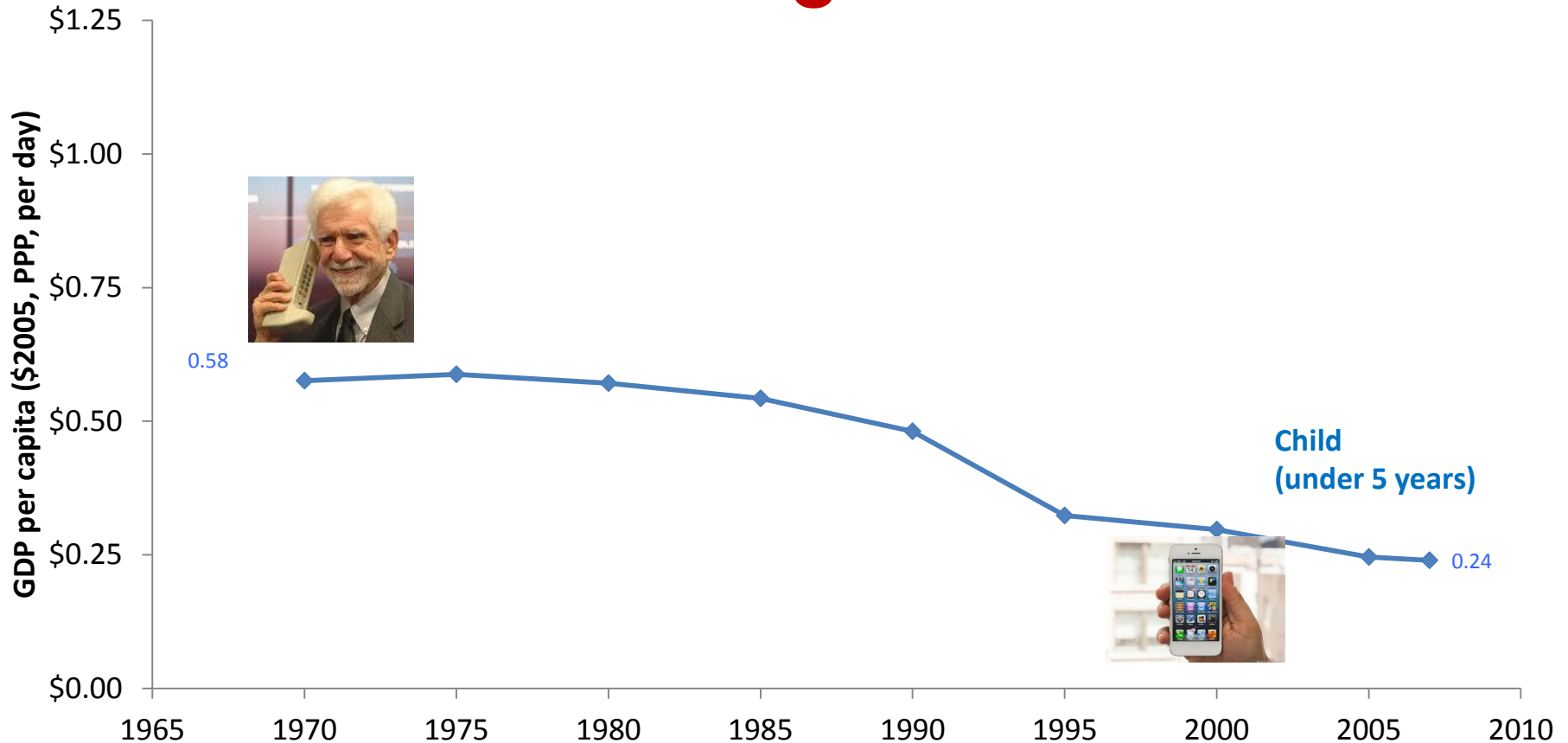
Y-axis: **GDP per capita ($2005, PPP, per day)**

$1.25
$1.00
$0.75
$0.50
$0.25
$0.00

0.58

Child (under 5 years)

0.24

X-axis: 1965 1970 1975 1980 1985 1990 1995 2000 2005 2010

"Critical" incomes is real $ needed to achieve ½ of maximal survival (in that year) from 1970 to 2007

Source: Hum et al, eLife 2012

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Marginal costs for maximal adult survival are rising
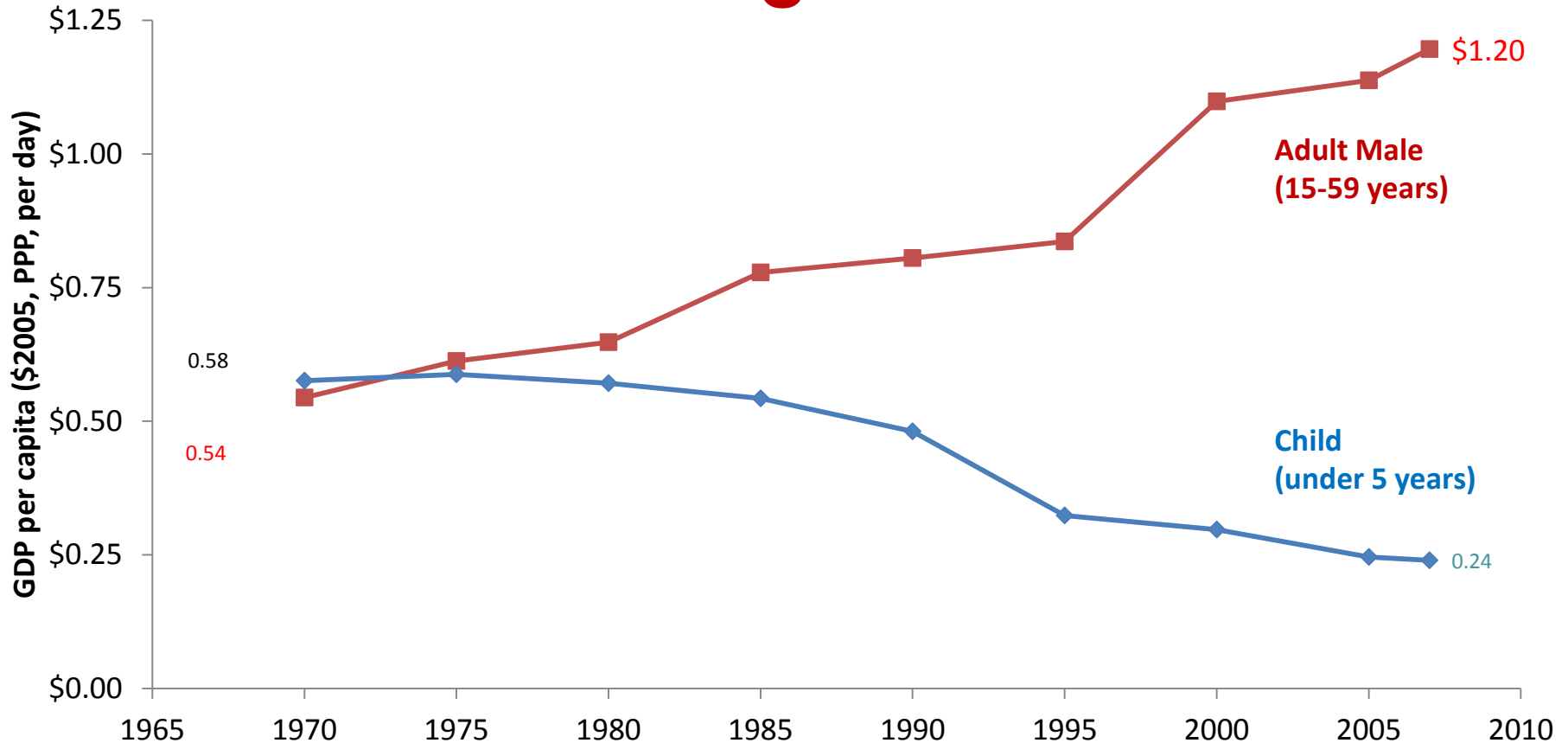
"Critical" incomes is real $ needed to achieve ½ of maximal survival (in that year) from 1970 to 2007; note higher adult costs due in part to HIV and tobacco

Conclusions

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- **Tripling of excise tax worldwide would reduce smoking by 1/3, avoid over 200 million premature deaths, and raise $100 B more in revenue**

- **Monitoring is needed: smoking and death status plus cause of death surveys**

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Canada Sharply Reduced Taxes in 1993

Source: World Bank, 2003
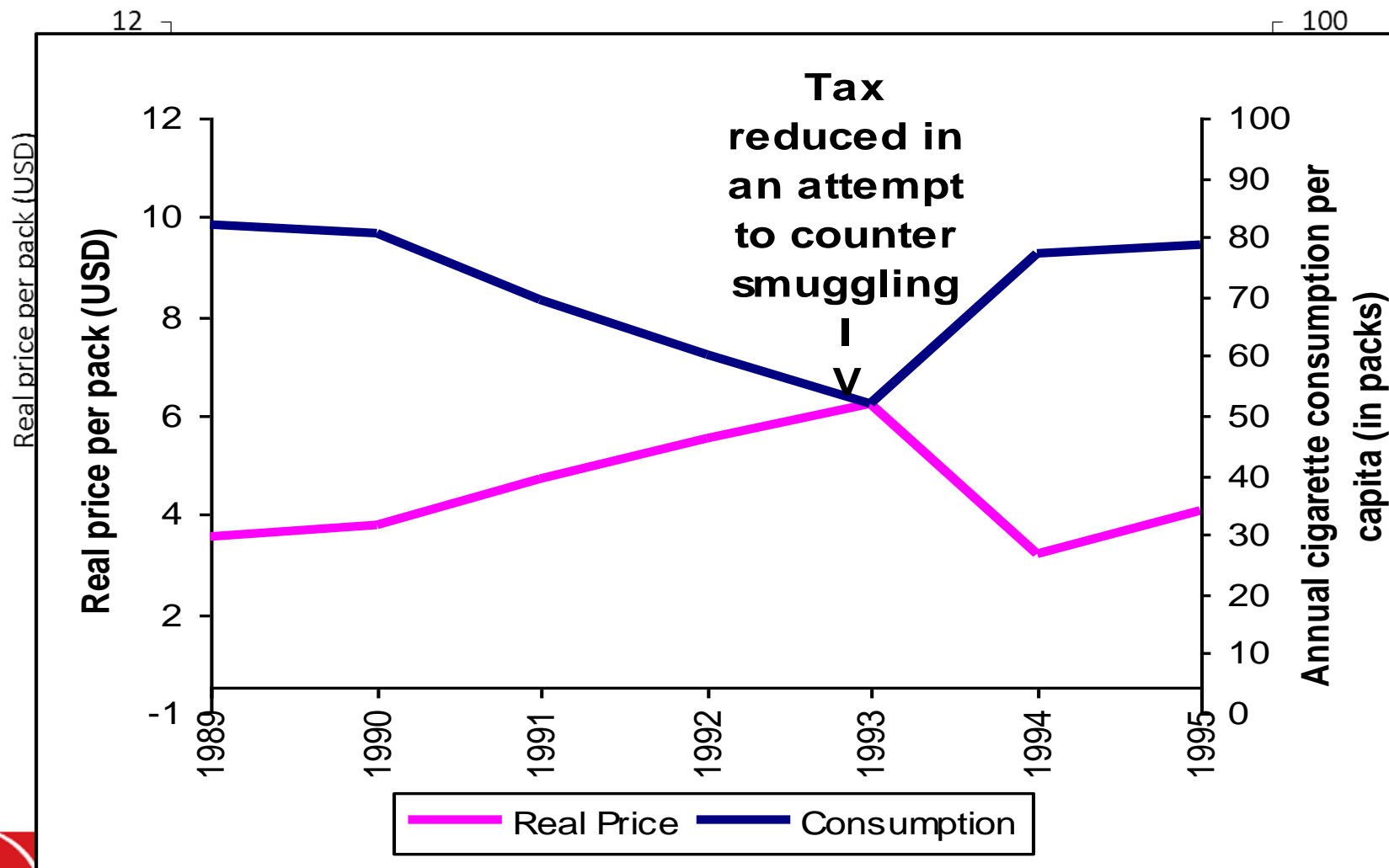
Developing countries
New algorithms for cervix screening