



2019 台灣胸腔暨重症加護醫學會

2019 Taiwan Society of Pulmonary and Critical Care Medicine

The relationship between **AIR POLLUTION** and **LUNG CANCER** in **NON-SMOKERS** in Taiwan

J Thorac Oncol. 2019 May;14(5):784-792.

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National Taiwan Cancer Registry for 40 years

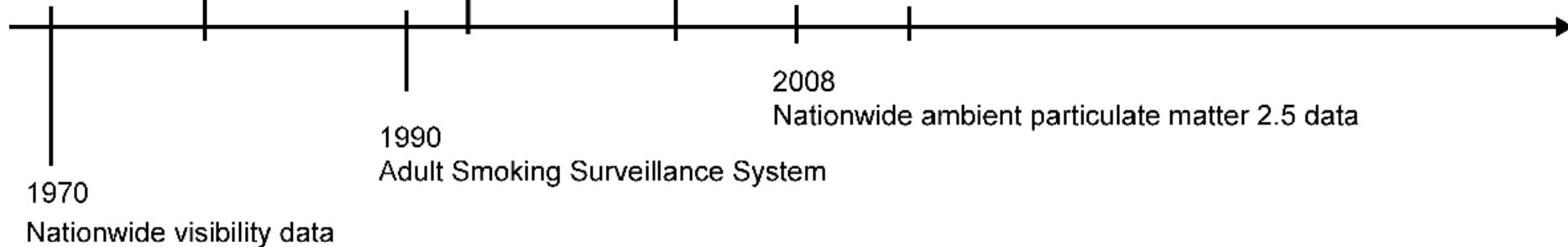
National health insurance for 20 years

Initiation of Taiwan Cancer Registry (TCR)
1979

National health insurance was instituted
1995 (Included cohort period, 1995-2015)

Cancer Control Act, Cancer staging registration in TCR
2004 (Cohort subset I, 2004-2015)

Smoking history and EGFR mutation status in TCR
2011 (Cohort subset II, 2011-2015)



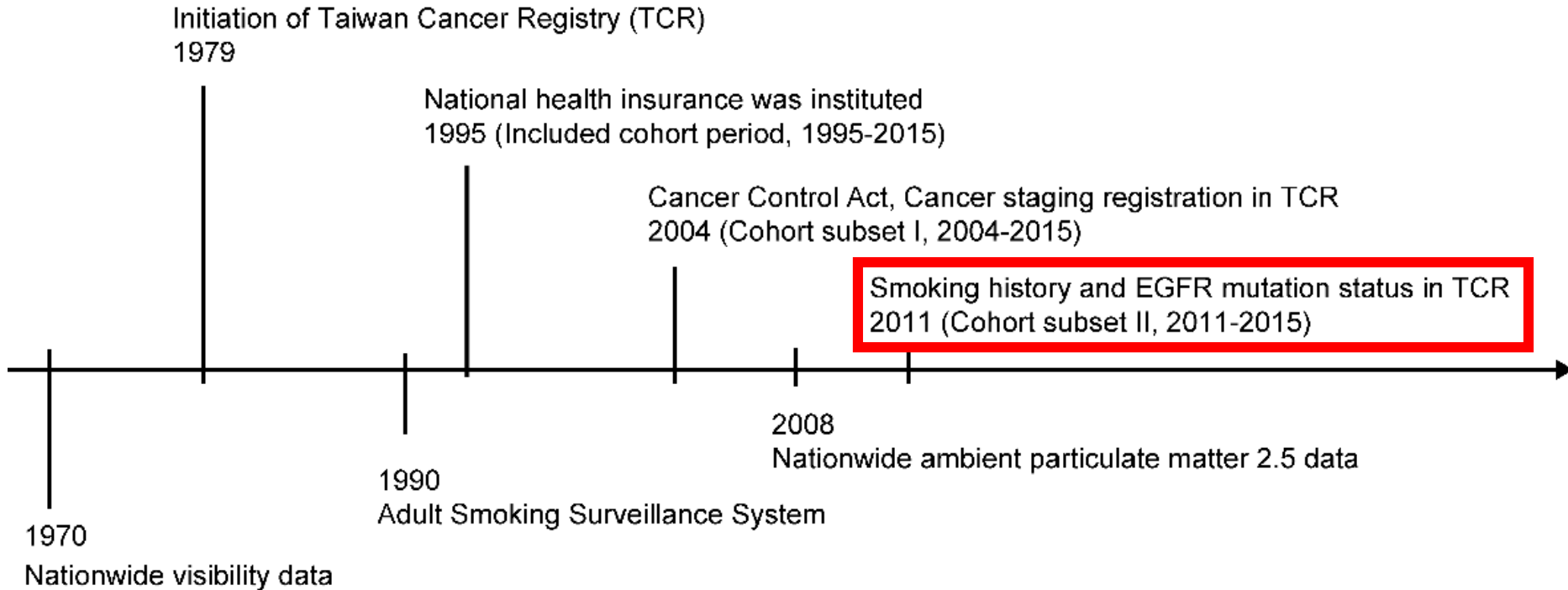
National Visibility data for 50 years

Adult smoking surveillance for 30 years

Nationwide PM 2.5 data for 10 years

National Taiwan Cancer Registry for 40 years

National health insurance for 20 years

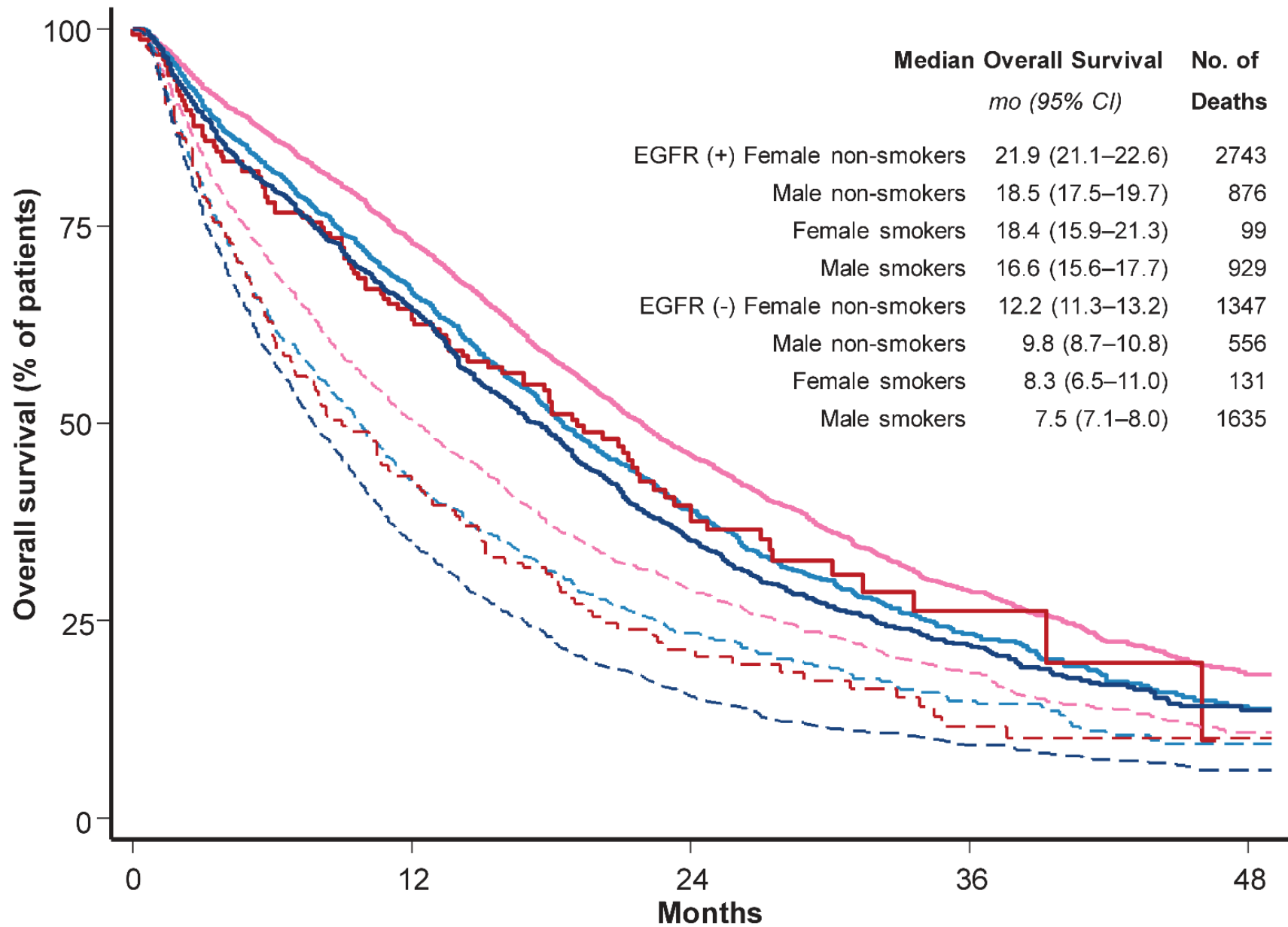


National Visibility data for 50 years

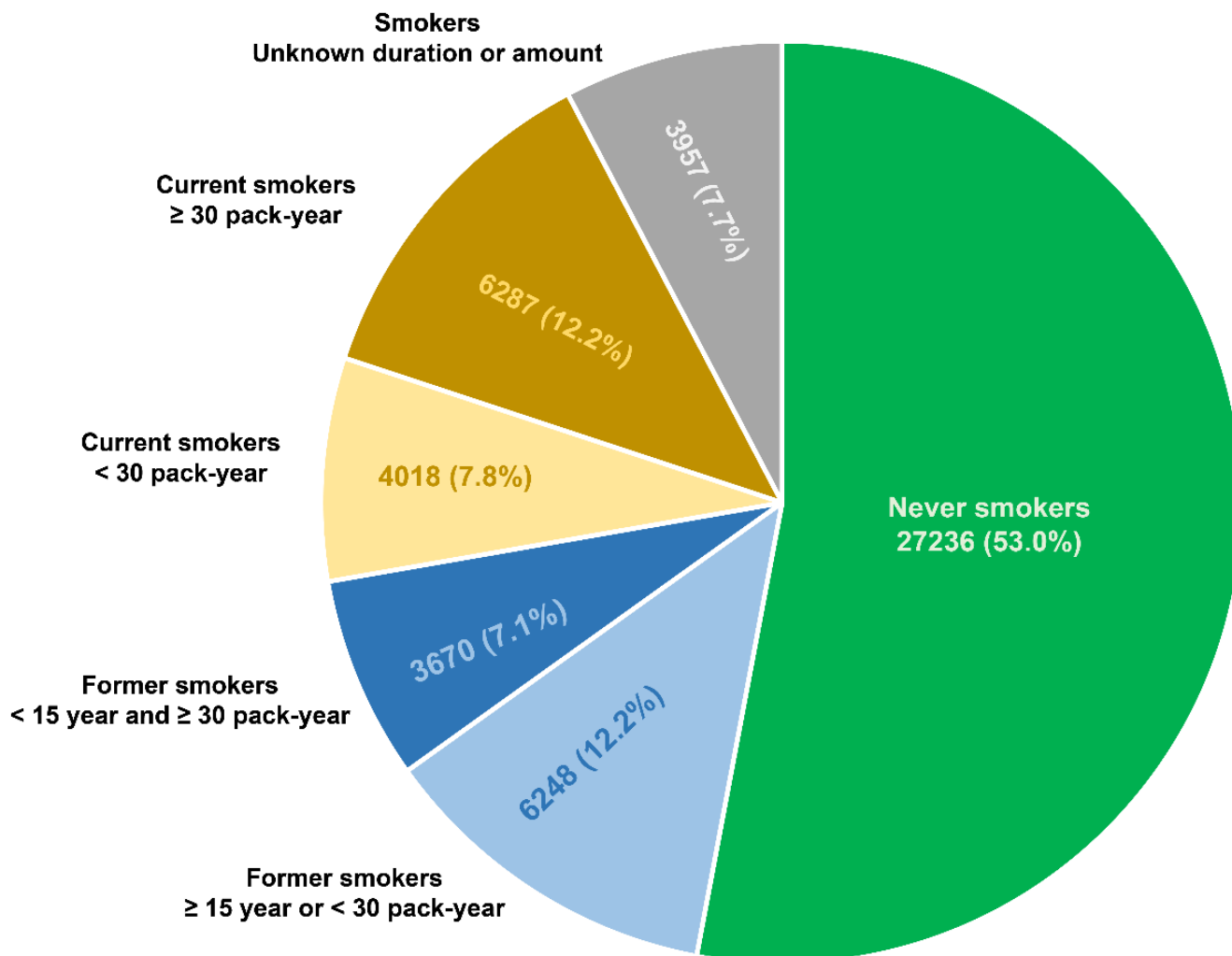
Adult smoking surveillance for 30 years

Nationwide PM 2.5 data for 10 years

EGFR (+) Female non-smokers Male non-smokers Female smokers Male smokers
 EGFR (-) Female non-smokers Male non-smokers Female smokers Male smokers



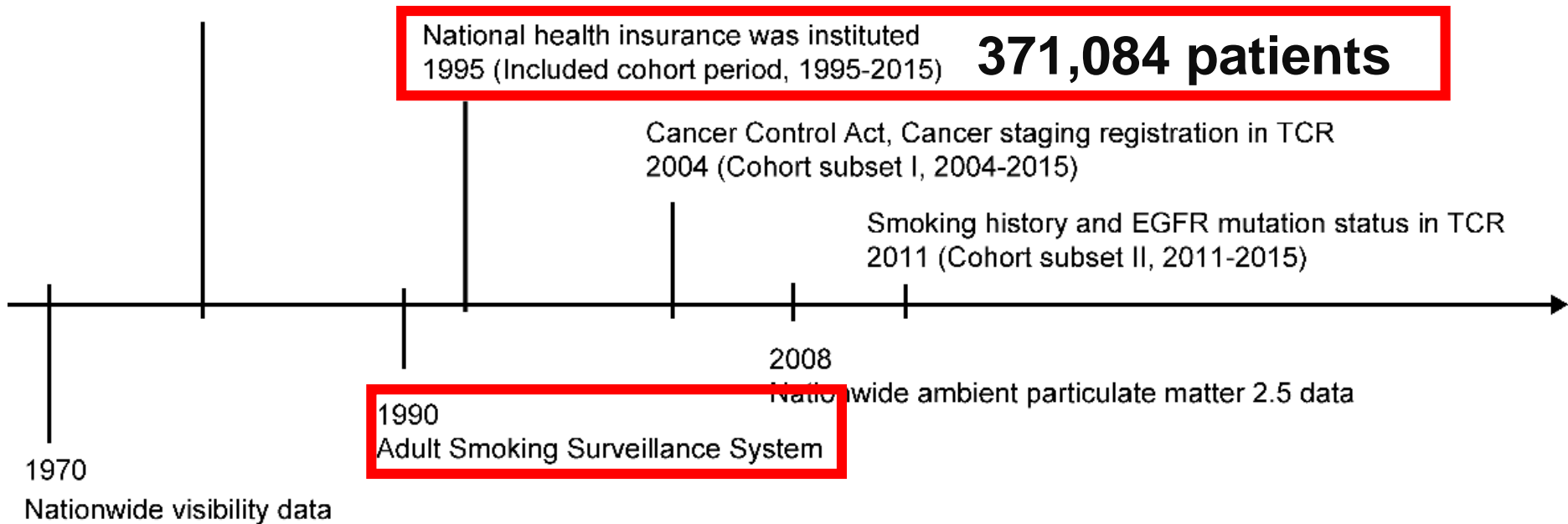
53% lung cancer were lifelong never smokers <20% was eligible for low-dose CT cancer screening



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National health insurance for 20 years

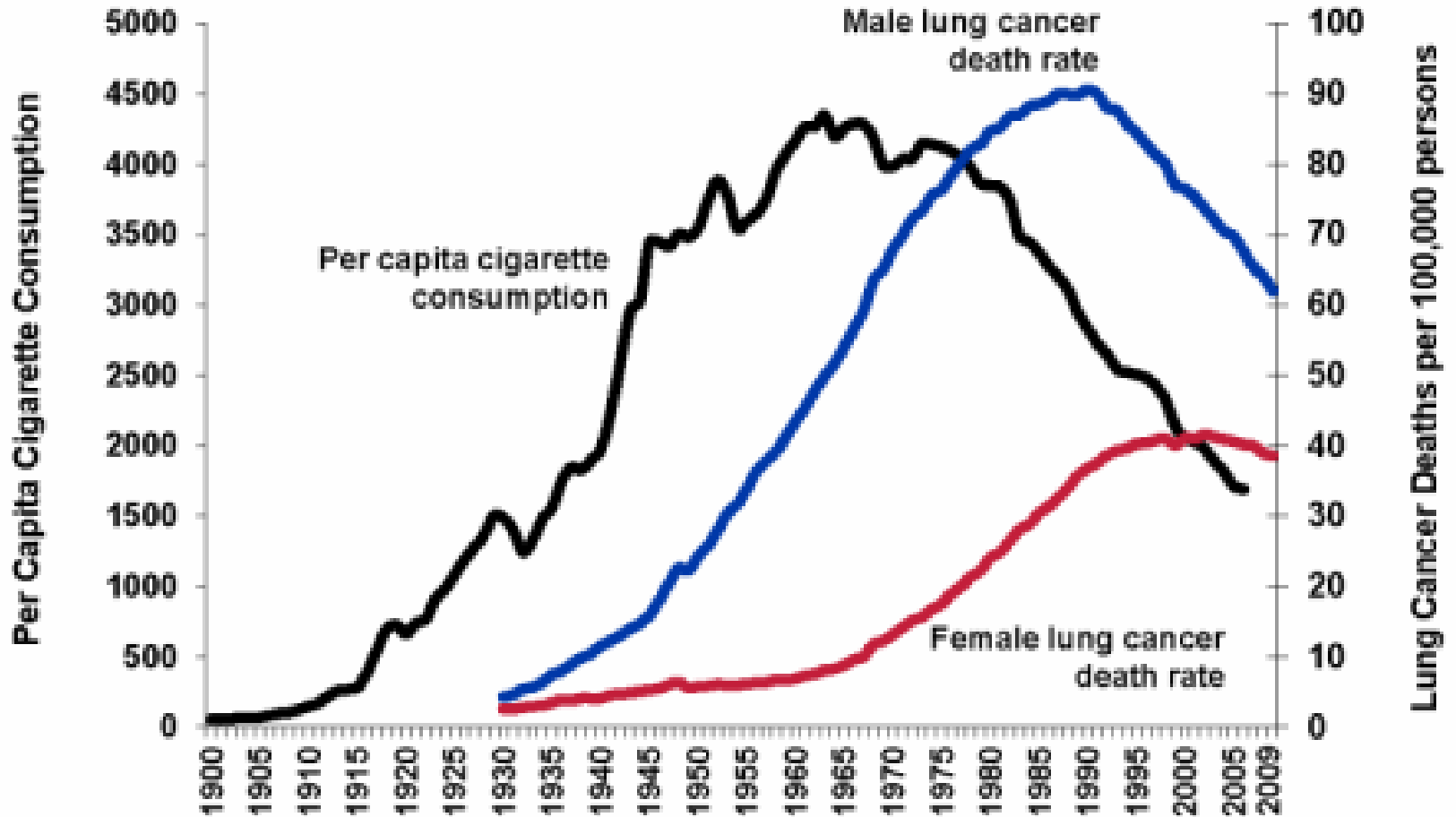
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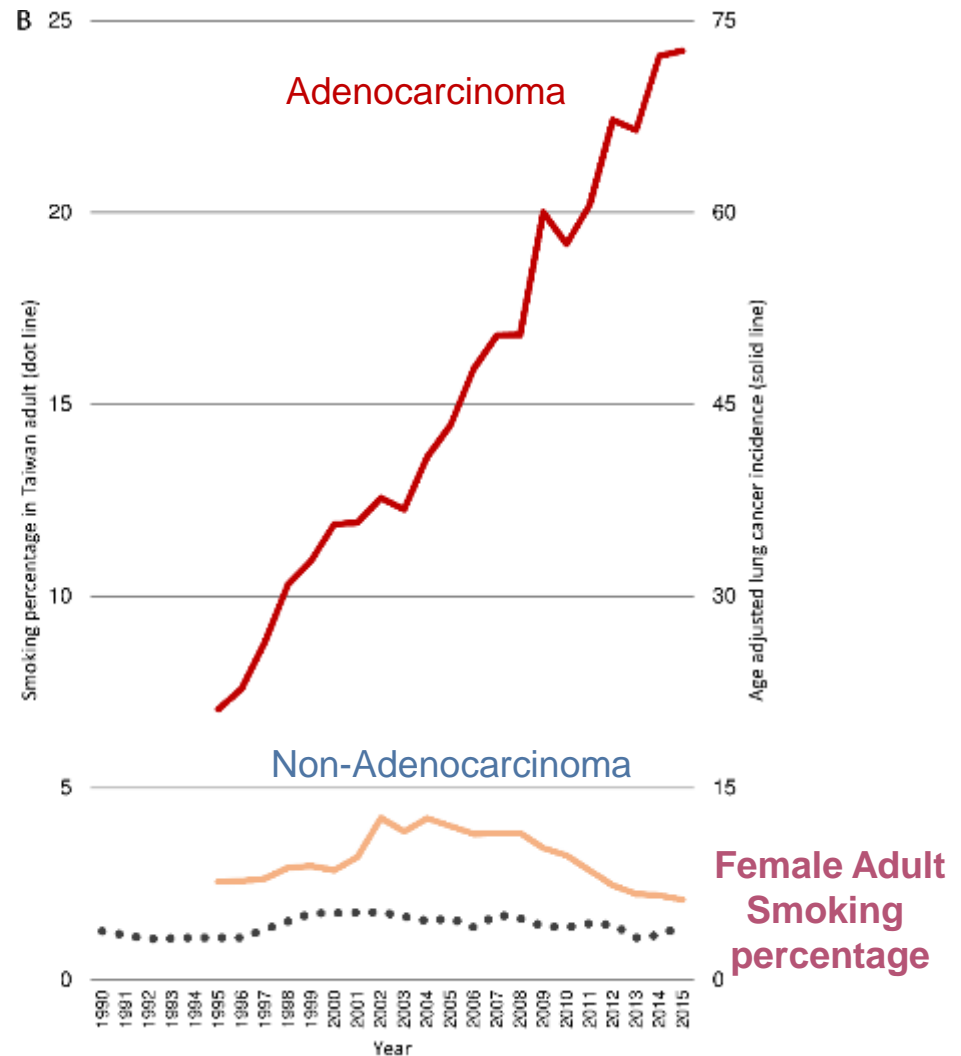
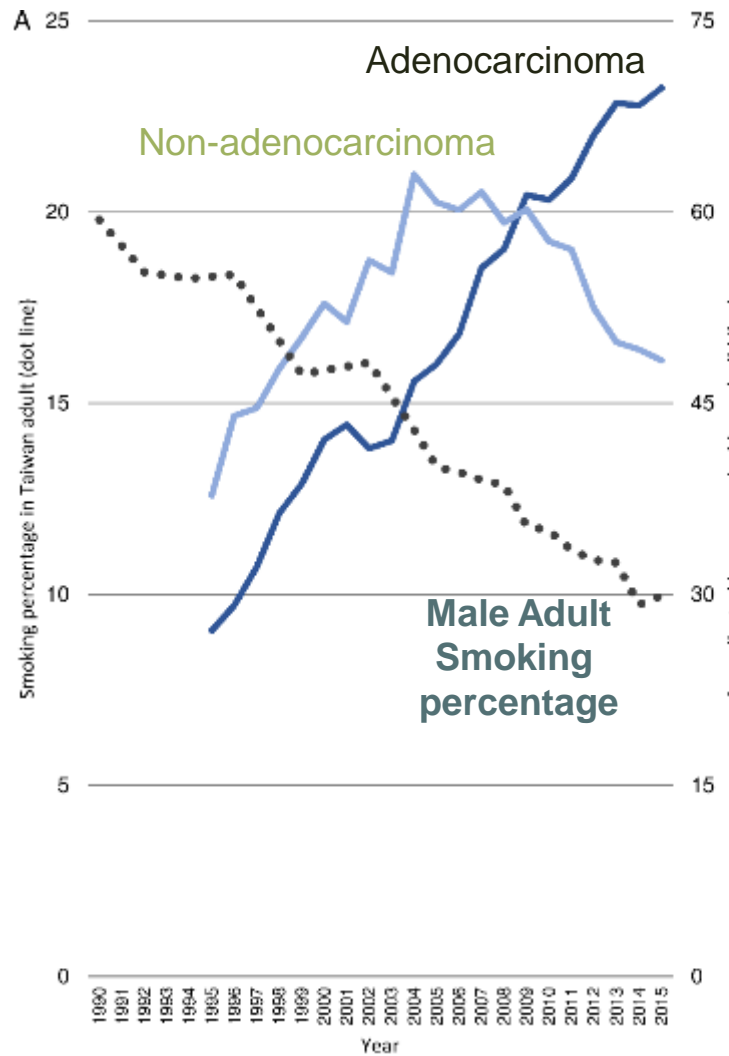
Adult smoking surveillance for 30 years

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*Age-adjusted to 2000 US standard population.

Non-adenocarcinoma followed the trend for smoking percentage Adenocarcinoma was increasing for past few decades



Population attributable fraction

| | | South Korea | | Portugal/UK | |
|---------------|-------------|--------------------|-------------|--------------------|-------------|
| | PAF | Prevalence | PAF | Prevalence | PAF |
| Male | 80.5 | 83% smokers | 53.3 | 58% smokers | 89.9 |
| Female | 58.4 | 4% smokers | 5.2 | - | 80 |

Low Population Attributable Fraction for Smoking

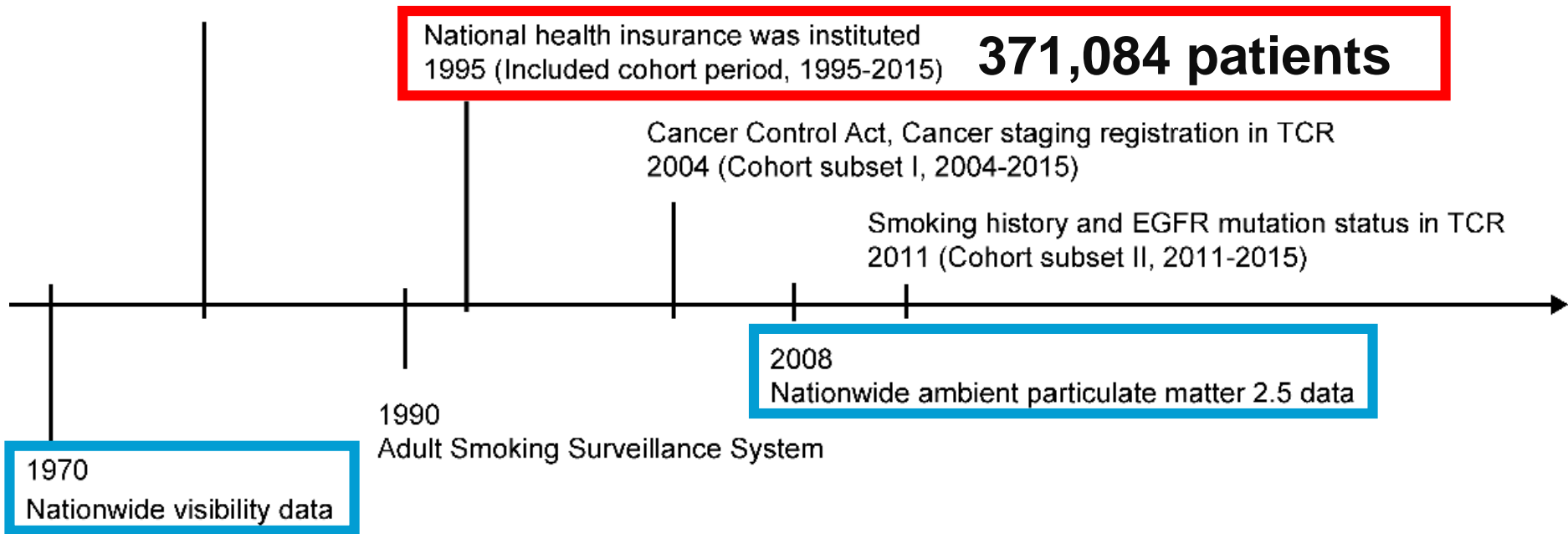
| Sex | Histological type | EAIR (SE) | | SRR | Population attributable fraction (%) |
|--------|-------------------------|--------------|---------------|------------------|--------------------------------------|
| | | Ever smokers | Never smokers | | |
| Male | Adenocarcinoma | 37.6 (0.4) | 22.8 (0.3) | 1.7 (1.6–1.7) | 26.8 |
| | Squamous-cell carcinoma | 22.2 (0.3) | 4.1 (0.1) | 5.4 (5.1–5.8) | 71.4 |
| | Small-cell carcinoma | 11.1 (0.2) | 1.6 (0.1) | 6.9 (6.2–7.6) | 76.7 |
| Female | Adenocarcinoma | 66.9 (1.7) | 31.0 (0.3) | 2.2 (2.0–2.3) | 3.8 |
| | Squamous-cell carcinoma | 14.8 (0.8) | 1.4 (0.1) | 10.9 (8.2–14.4) | 25.3 |
| | Small-cell carcinoma | 15.5 (0.8) | 0.4 (0.1) | 43.1 (28.9–64.2) | 59.1 |

EAIR, estimated age-adjusted incidence rate
 SRR, standardized rate ratios

National Taiwan Cancer Registry for 40 years

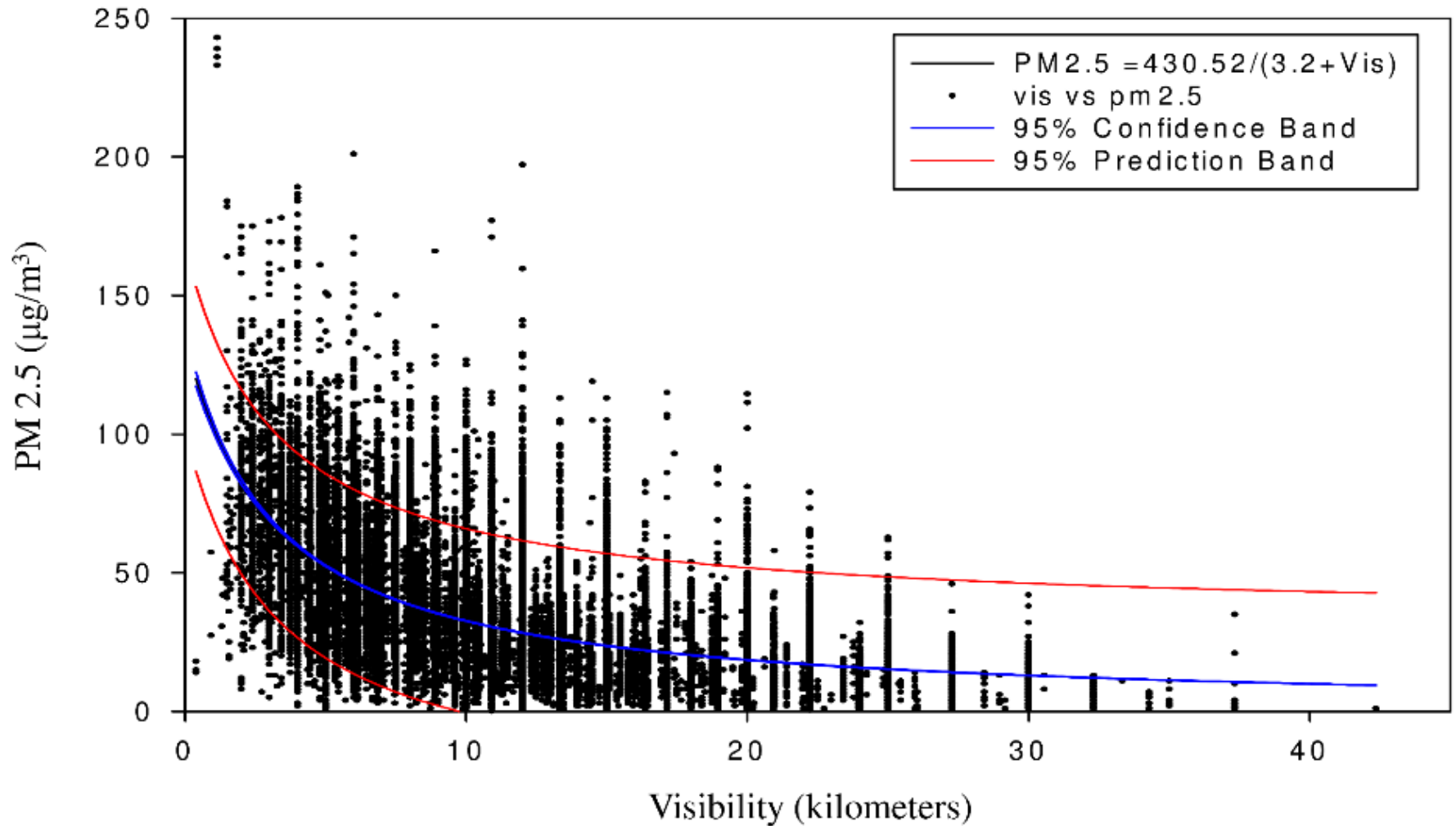
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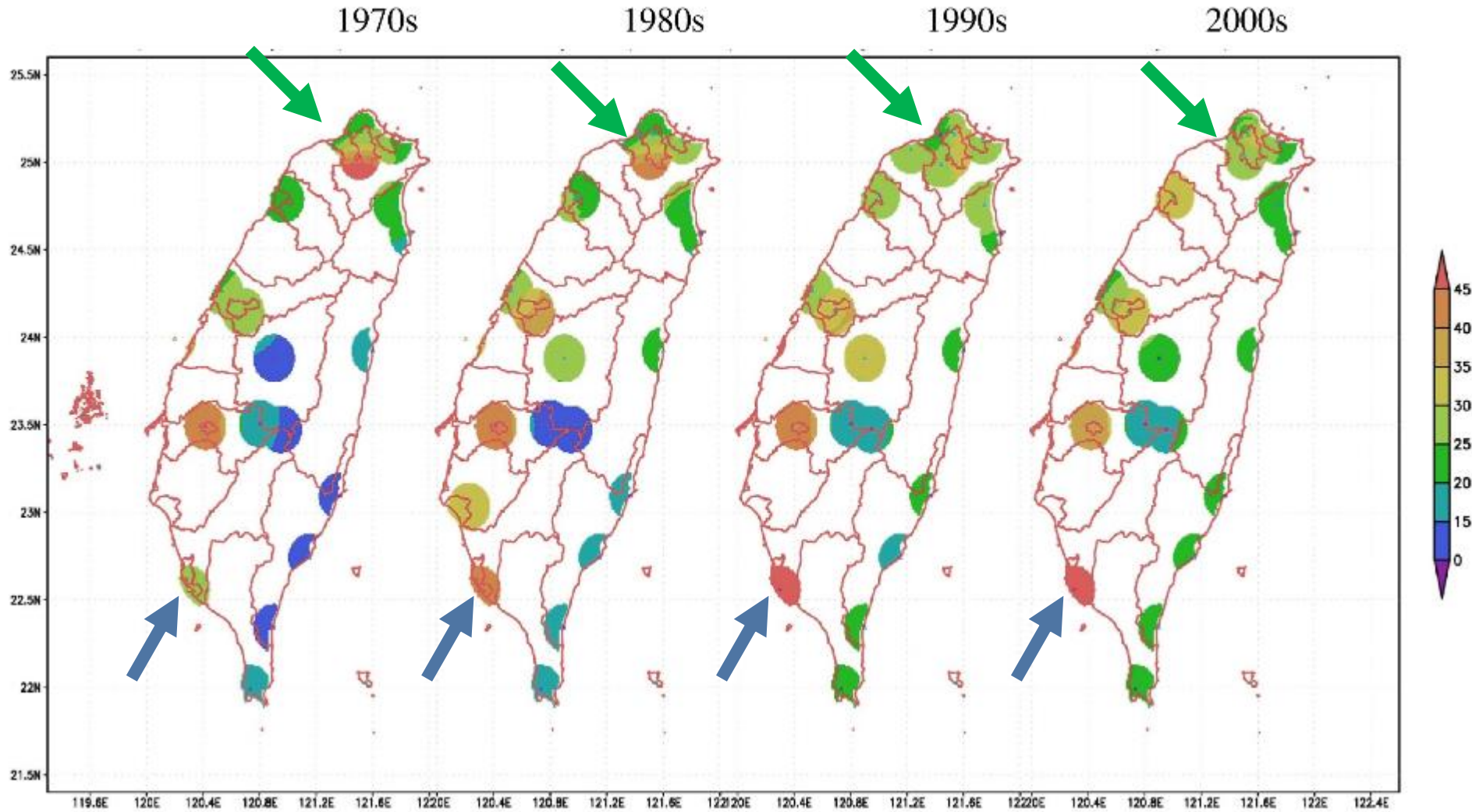


National Visibility data for 50 years
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Visibility trend over the past 50 years



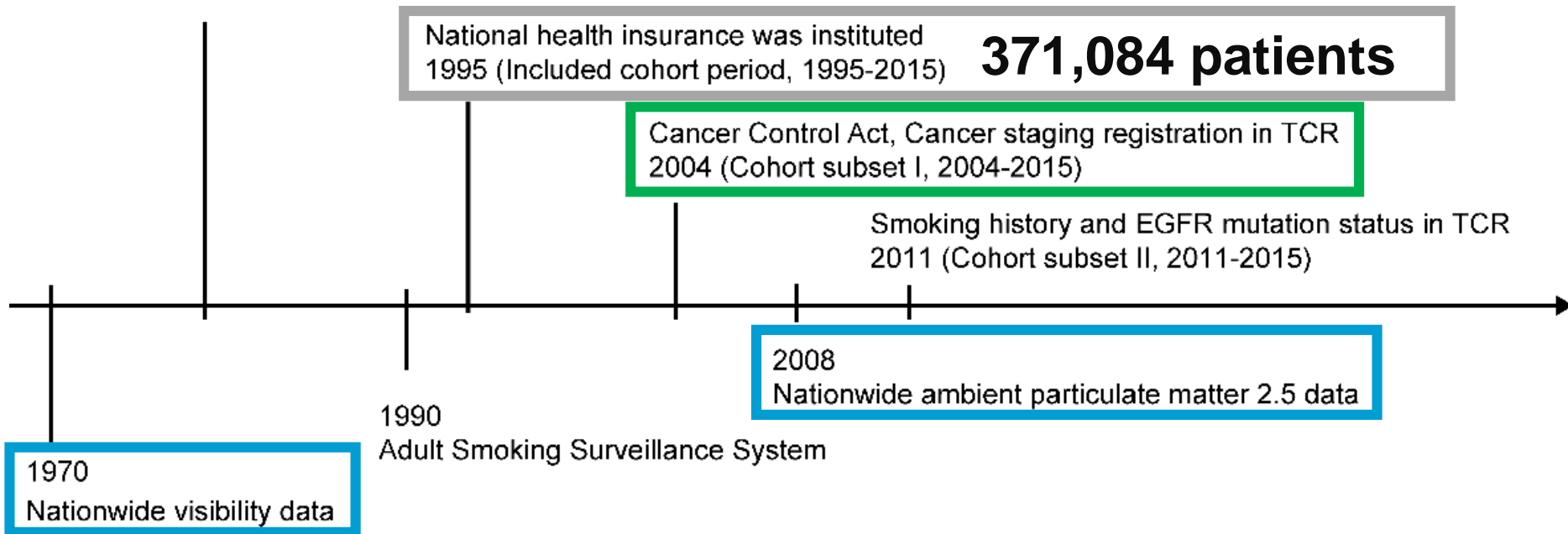
Visibility trend over the past 50 years



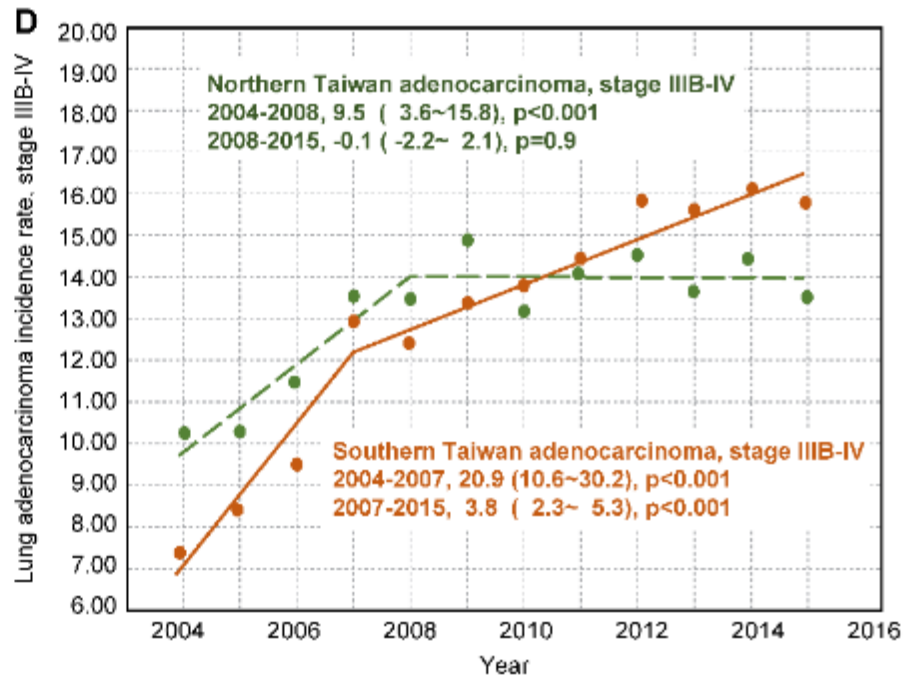
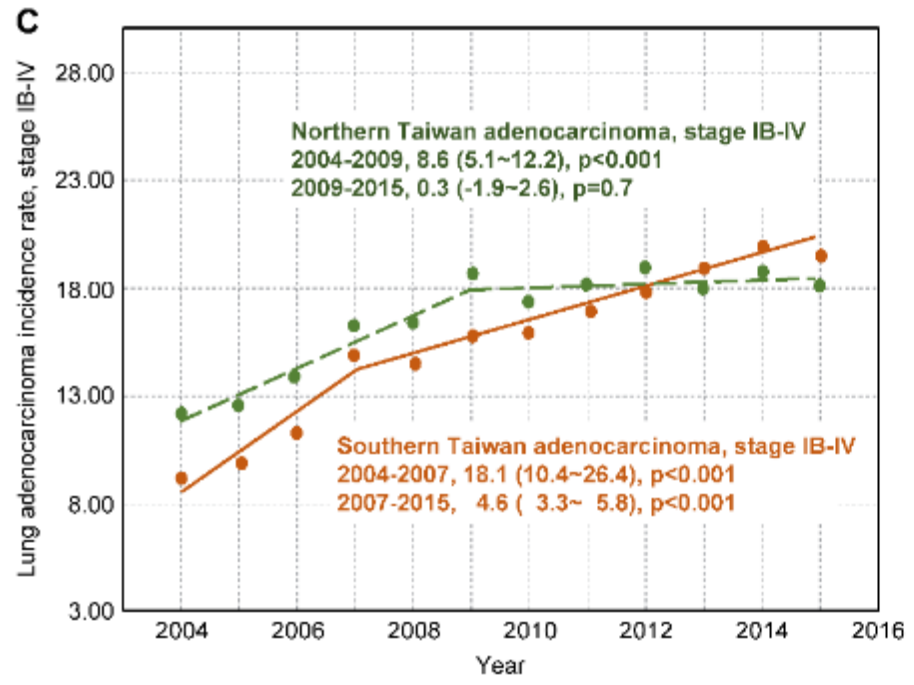
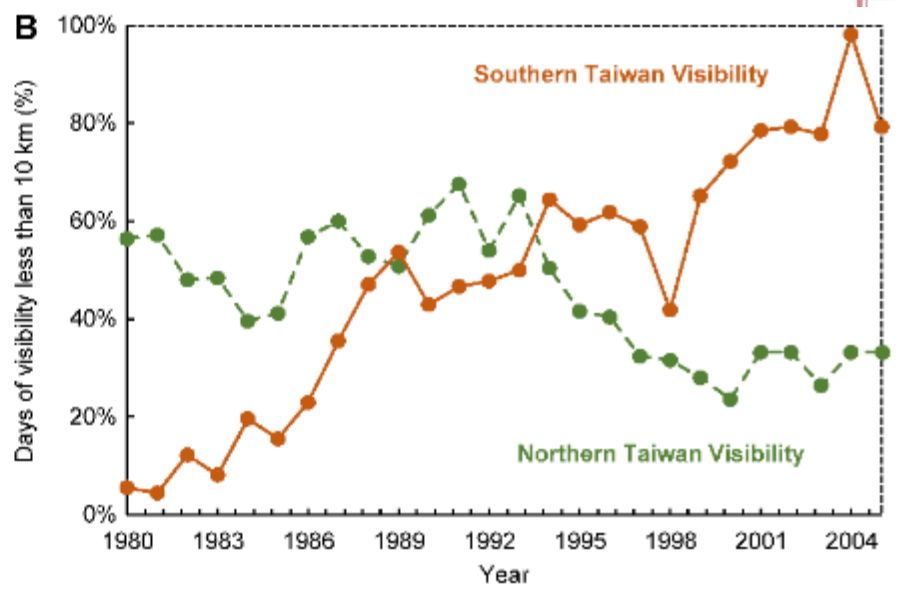
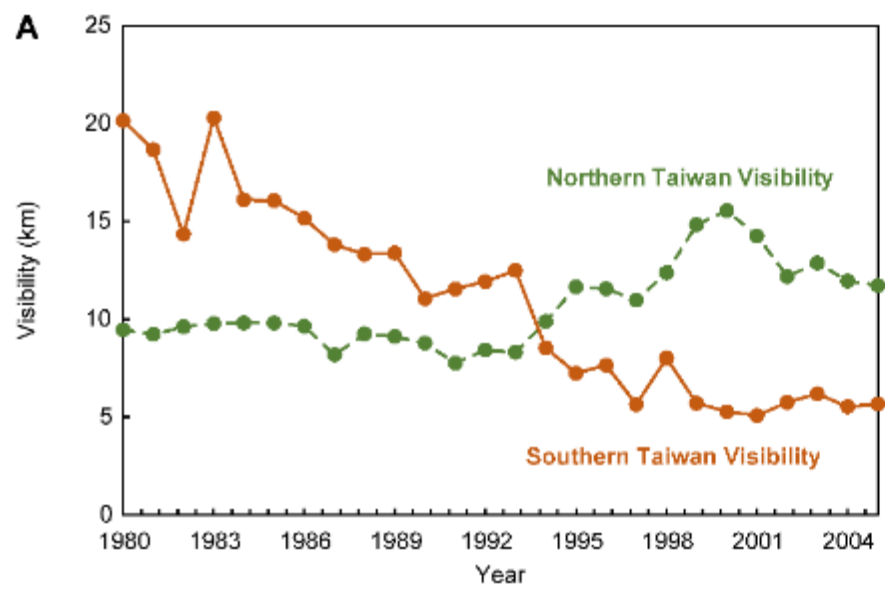
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| Sex/Smoking status | EGFR mutation | Location | No. of cases | 1-year survival | 2-year survival | 5-year survival | LR test | Hazard ratio |
|---------------------------------|---------------|------------------------|--------------|-----------------|-----------------|-----------------|-------------------|-------------------------|
| Female/ Never smoked | Positive | Northern Taiwan | 2411 | 74.0 | 47.7 | 15.4 | 0.371 | 0.96 (0.88–1.05) |
| | | Southern Taiwan | 1215 | 74.1 | 46.8 | 13.9 | | |
| | Negative | Northern Taiwan | 865 | 55.5 | 34.6 | 12.6 | 0 <.001 | 0.79 (0.70–0.90) |
| | | Southern Taiwan | 463 | 47.1 | 26.7 | 4.5 | | |
| Female/Ever smokers | Positive | Northern Taiwan | 183 | 65.6 | 41.1 | 19.1 | 0.662 | 0.92 (0.64–1.35) |
| | | Southern Taiwan | 53 | 73.6 | 31.7 | 15.4 | | |
| | Negative | Northern Taiwan | 154 | 41.6 | 18.5 | 5.6 | 0.862 | 0.96 (0.66–1.47) |
| | | Southern Taiwan | 33 | 36.4 | 20.0 | NA* | | |
| Male/Never smoked | Positive | Northern Taiwan | 710 | 68.6 | 39.9 | 10.7 | 0.997 | 1.00 (0.86–1.16) |
| | | Southern Taiwan | 357 | 68.6 | 40.9 | 9.5 | | |
| | Negative | Northern Taiwan | 356 | 45.2 | 23.1 | 7.4 | 0.591 | 1.06 (0.87–1.29) |
| | | Southern Taiwan | 173 | 46.8 | 28.1 | 4.3 | | |
| Male/Ever smokers | Positive | Northern Taiwan | 997 | 66.1 | 36.0 | 8.0 | 0.063 | 0.89 (0.78–1.01) |
| | | Southern Taiwan | 463 | 61.1 | 30.7 | 8.7 | | |
| | Negative | Northern Taiwan | 1350 | 36.4 | 16.8 | 5.3 | 0.193 | 0.94 (0.85–1.04) |
| | | Southern Taiwan | 607 | 36.2 | 13.9 | 4.6 | | |



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Take home message

3 points support one concept

Propose the possible causal risk factor

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