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Research and Policy

# Raising the Bar for Monitoring Child Health Inequalities by Socioeconomic Status: Lessons from 5 Years in Scotland

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- Scottish context
- Health inequalities
- Early Years Policy response in Scotland
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# Scotland

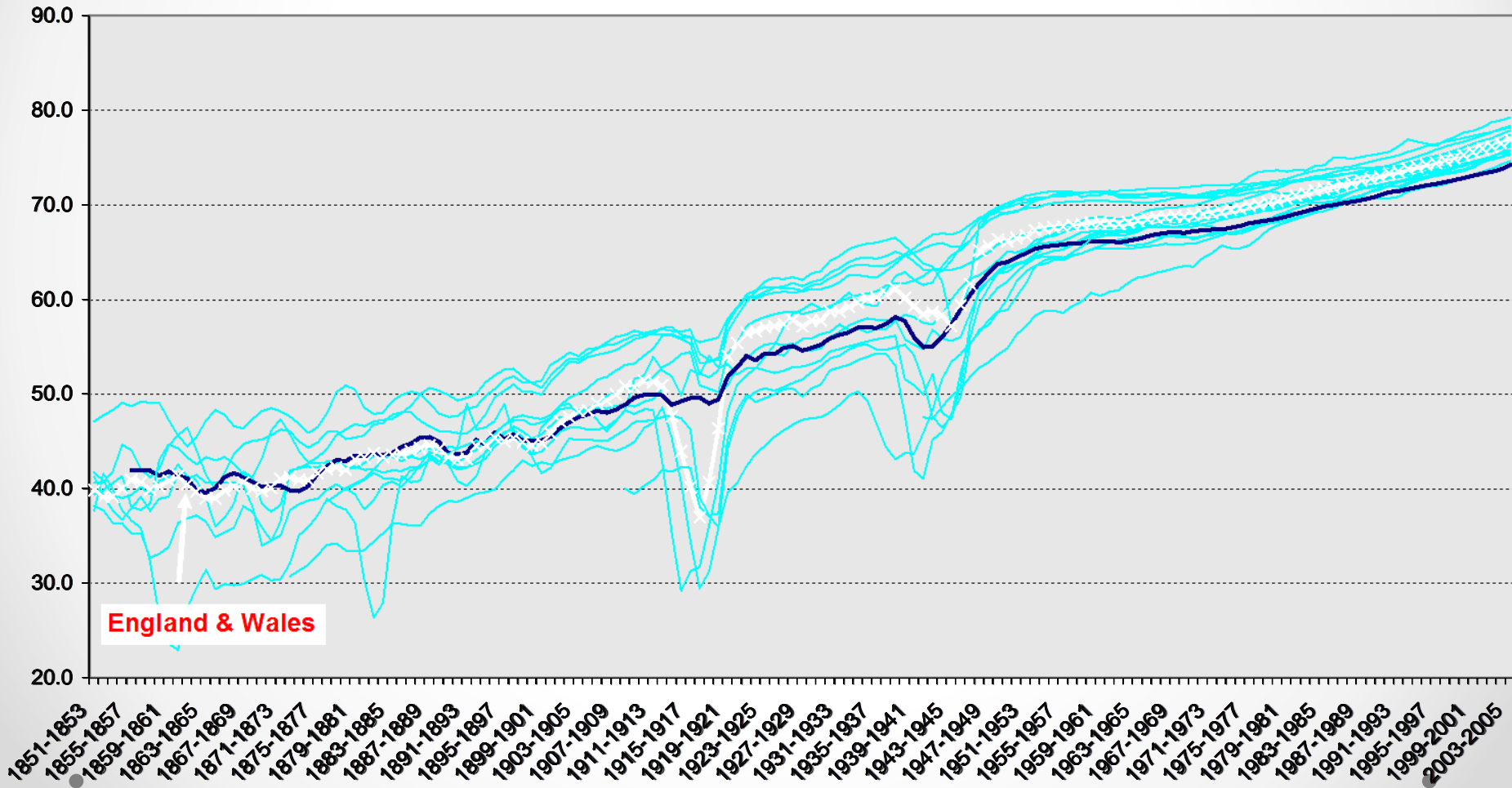
- Population 5.2 million
- Part of UK (Britain) but devolved powers e.g. health and education
- Dubbed 'sick man of Europe' due to highest mortality rates in Western Europe (figure next slide)
- Last 30 years, rise in inequalities in mortality and morbidity



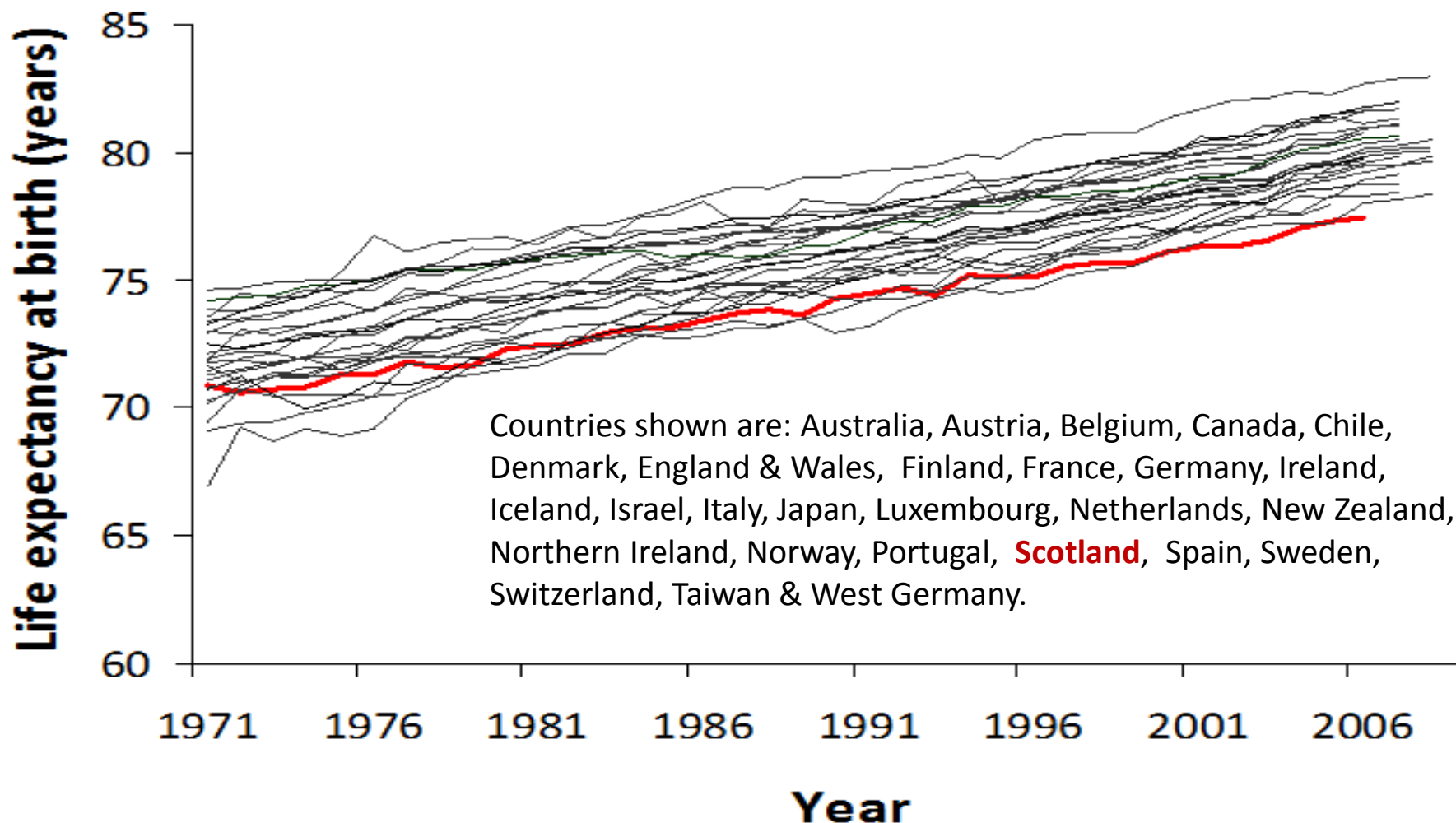
McCartney G, Walsh D, Whyte B, Collins C. Has Scotland always been the 'sick man' of Europe? An observational study from 1855 to 2006. Eur J Public Health 2011

# Life expectancy trends 1851-2005

Male life expectancy: Scotland & other Western European Countries, 1851-2005  
Source: Human Mortality Database



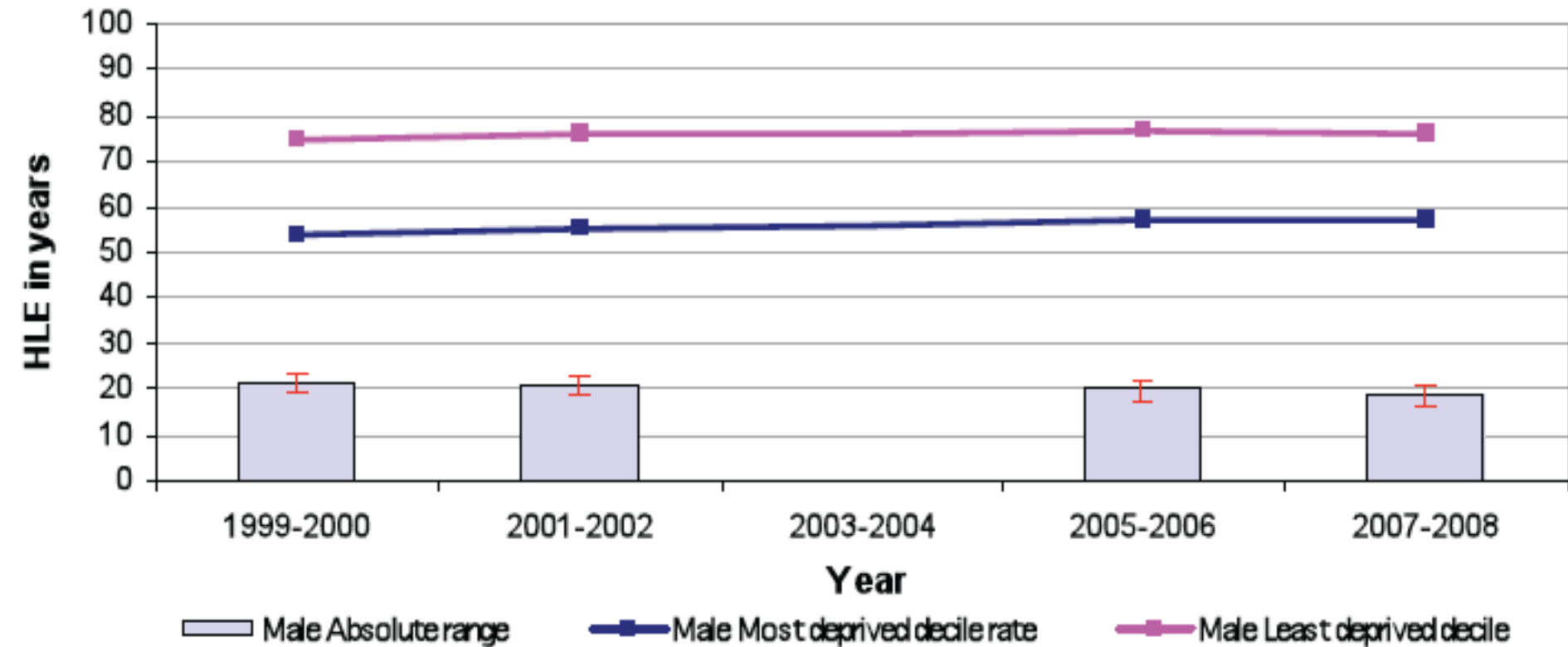
# Life expectancy: Scotland vs. other western countries 1971-2006



Source: McCartney G, Walsh D, Whyte B, Collins C. European Journal of Public Health, 2011. [Data extracted from the Human Mortality Database for each country]

# Absolute Range: Healthy Life Expectancy (Males)

**Absolute range: Healthy Life Expectancy - Males - Scotland 1999/2000-2007/2008 [Data not available for 2003/2004]**



Source: Scottish Government Health Analytical Services (2010) Long-term monitoring of health inequalities

by SCPHRP)

SES  
"x" =

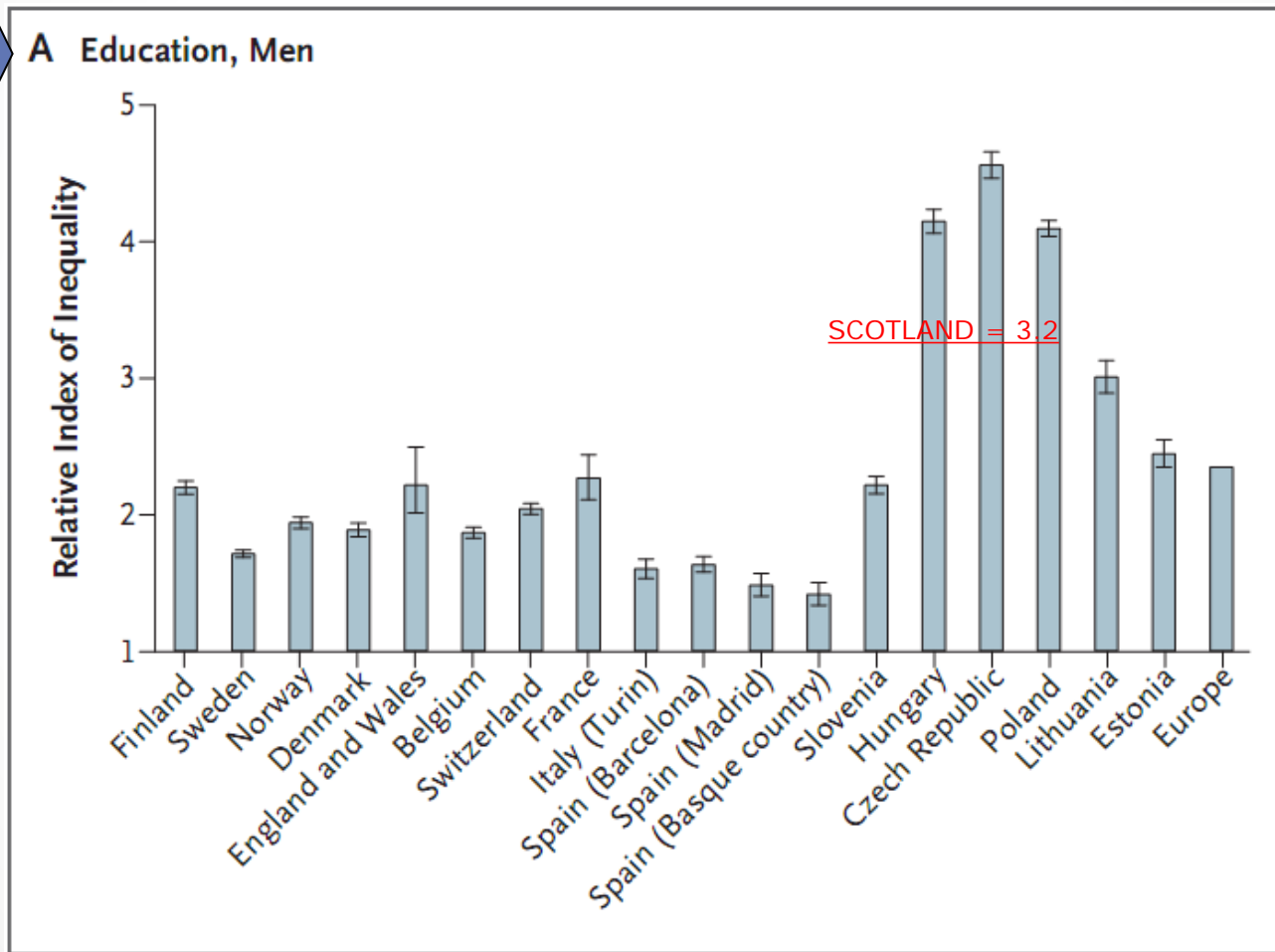
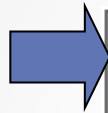


Figure 1 The Scottish education relative index of inequality (red line) for all-cause mortality in men 1991 to 1999 plotted against results for Europe (from Mackenbach *et al.* 2008)

# Health inequalities in Scotland throughout life-course

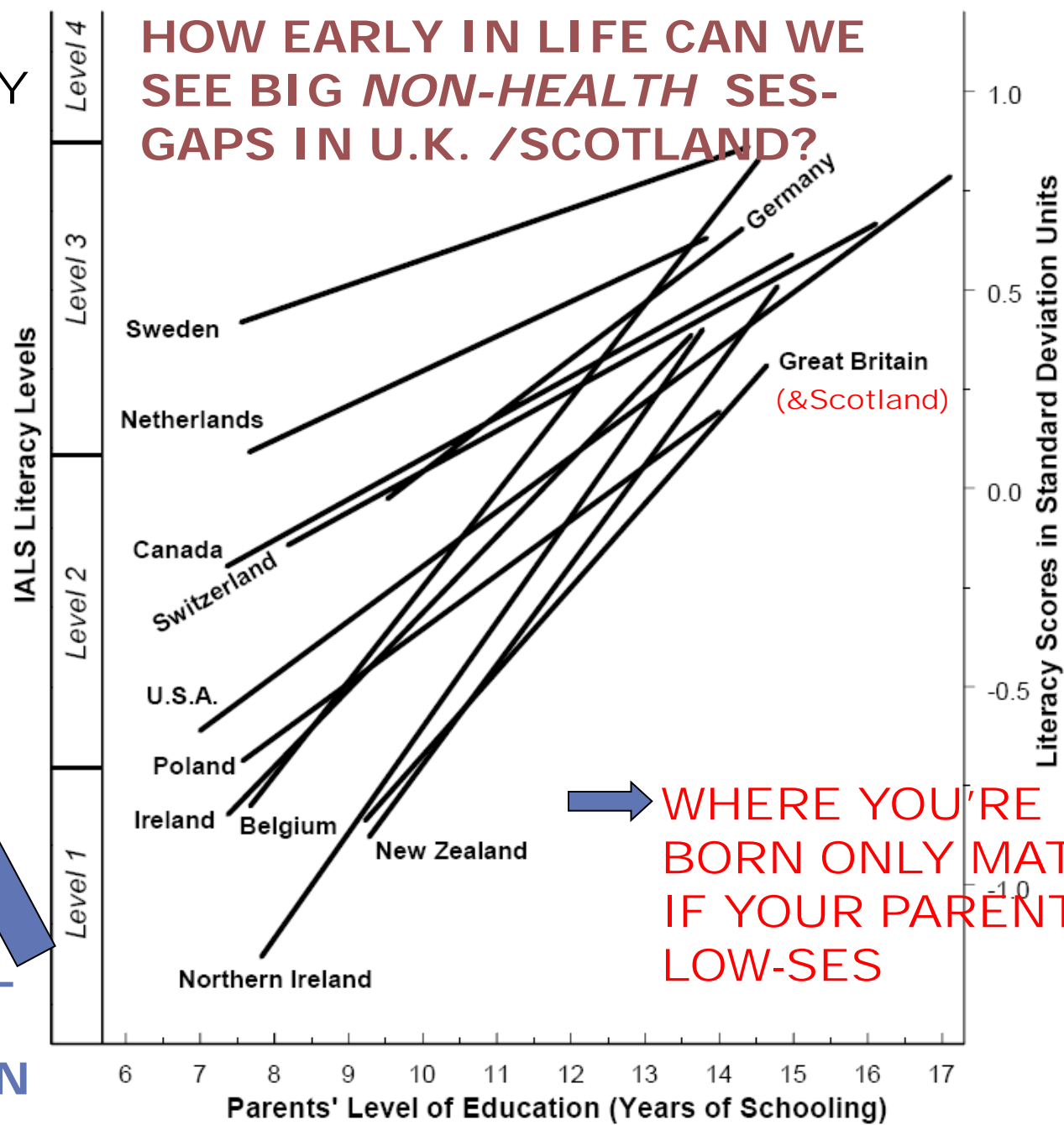
Outcome		Most deprived	Least deprived
Smoking during pregnancy <sup>1</sup>		38%	13%
Stillbirth		5.9/1000 live births	3.8/1000 live births
46 m	Language development concerns <sup>2</sup>	26%	12%
	Behaviour to other children	24%	10%
	Total difficulties (on SDQ)	20%	7%
Dental caries age 5 years <sup>3</sup> (odds)		4.6	1
Teenage pregnancy <sup>4</sup>		3 x higher	
Death in 15-44 year olds <sup>5</sup>		5 x higher	
45-74 year olds	Death due to CHD	3.8 x more likely	
	Death due to cancer	2.3 x more likely	
	Alcohol deaths	12.3 x more likely	
Under-75 year old deaths		3.6 x more likely	

Sources : 1. Gray R, Bonellie SR, Chalmers J, Greer I, Jarvis S, Kurinczuk JJ, et al. 2009. 2. Scottish Government. Growing Up in Scotland: Health inequalities in the early years. 2010. 3. Levin KA, Davies CA, Topping GV, Assaf AV, Pitts NB. 2009. 4. Scottish Government 2003. 5. Scottish Government Health Analytical Services Division 2008.



STD'D  
LITERACY  
TEST  
SCORES

# HOW EARLY IN LIFE CAN WE SEE BIG *NON-HEALTH* SES- GAPS IN U.K. /SCOTLAND?



TYPICAL  
"FAN"  
PATTERN

WHERE YOU'RE  
BORN ONLY MATTERS  
IF YOUR PARENTS ARE  
LOW-SES

Literacy Scores for Youth Aged 16-25 years (Statistics Canada & the OECD, 1995). Source: Sloat E, Willms JD. The International Adult Literacy Survey.

# Scotland: Media reports (December 2009)

## “Fifth of Scots have poor literacy”

- The BBC:
- <http://news.bbc.co.uk/1/hi/scotland/8393805.stm>

## “Literacy report shows Russell there really is a crisis in education”

- The Scotsman:
- <http://news.scotsman.com/opinion/Literacy-report--shows-Russell.5883656.jp>

## “Zero-tolerance approach to poor literacy needed, experts say”

- The Herald:
- <http://www.heraldscotland.com/news/education/zero-tolerance-approach-to-poor-literacy-needed-experts-say-1.989347>

# Determinants of School Outcomes in

## Scotland – Why Schools Not to Blame

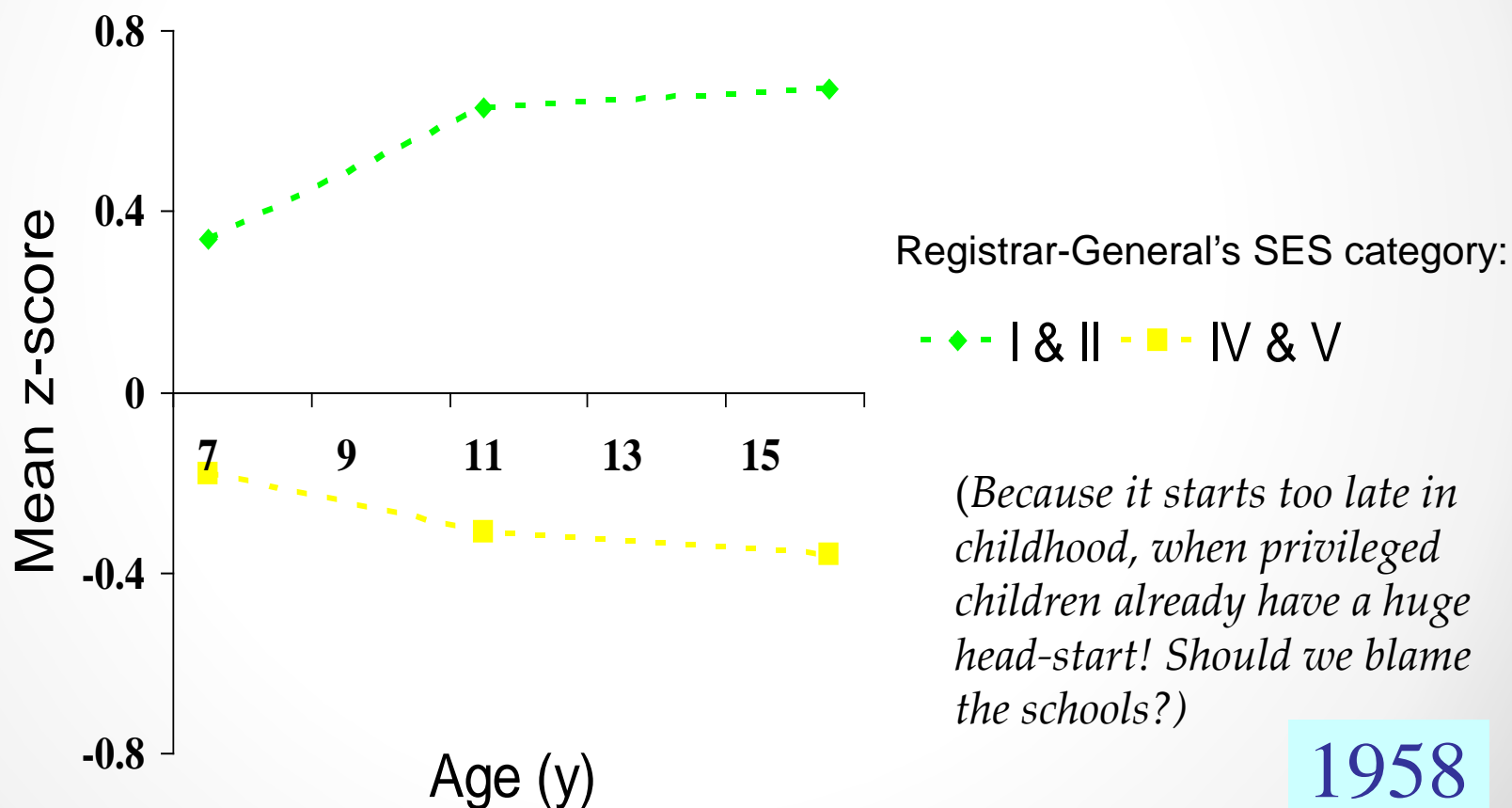
- “While individuals may defy this trend, no school in a deprived area is able to record a similar level of success to that achieved by almost all schools in the most affluent areas.”<sup>1</sup>
- “...but the gaps between them (schools) are far less important than differences between students. In Scotland, **who you are** is far more important than **what school you attend.**”<sup>2</sup>

1. Literacy Commission. A Vision for Scotland: The Report and Final Recommendations of the Literacy Commission. Scottish Labour, December 2009. <http://www.scottishlabour.org.uk/literacy>
2. OECD. Quality and Equity of Schooling in Scotland. Paris: OECD, 2007.

# Cognitive Development\* (7-16y) & Social Origins in the

## 1958 British Birth Cohort – How Ordinary Schooling

### Makes The Gradient Worse



# Key child policy in Scotland

## Overarching policy:

- *Getting it right for every child*

## Health policy:

- *"Hall4"*
- *Early Years Framework (published December 2008)*
- *Equally Well*
- *Achieving our Potential*
- *Better Health, Better Care*

## Education policy:

- *Curriculum for Excellence*
-

# Elements of Early Years Framework

- Renewed focus on the 0-3 year age group
- Increased need for developing parenting skills within antenatal and postnatal care
- More *consistent access* to intensive family support
- Integrated, flexible child care services
- Improved play opportunities
- Providing child-centred, *outcome-focussed* services



# Challenges to policy implementation

1. Economic recession
2. Decentralised model of government
3. Setting targets to assess impact
4. Intervention selection based on evidence
5. Consideration of alternative measures of success



# Challenge 1: Recession = National cuts = Local spending cuts

- “ ...most dramatic reduction in public spending imposed by any UK government on Scotland. Comprehensive Spending Review confirmed Scottish budget to be cut by £1.3 billion this year, compared to next year.”<sup>1</sup>
- “Education and social work are among the hardest hit departments in a proposed £54m cuts package at Glasgow City Council”<sup>2</sup>

1. Scotland's spending plans and draft budget 2011-2012.  
[www.scotland.gov.uk/Resource/Doc/331661/0107923.pdf](http://www.scotland.gov.uk/Resource/Doc/331661/0107923.pdf)

2. STV 6 February 2013



# Challenge 2: Decentralised model of government

Perceived “advantages” –

‘democratic’, freedom of choice, tailored responses for localised problems, not dictating to people

**Truth** – very homogenous (2% non-white), small (5.2 mill) population (~average US state) yet divided into 32 local authorities



## 2. Decentralised model of government

### Benefits to central SG:

- Local authorities (LA) take full responsibility for actions
- LA's make difficult spending decisions
- Limits centralised data collection services

### True disadvantages to early years services & outcome measures:

- Diverse range of early years' approaches/programs /interventions == increased potential for geographic inequalities
- LA's poorly equipped to accurately collect, analyse and interpret data
- Few universal measures of child health/development – many different measures

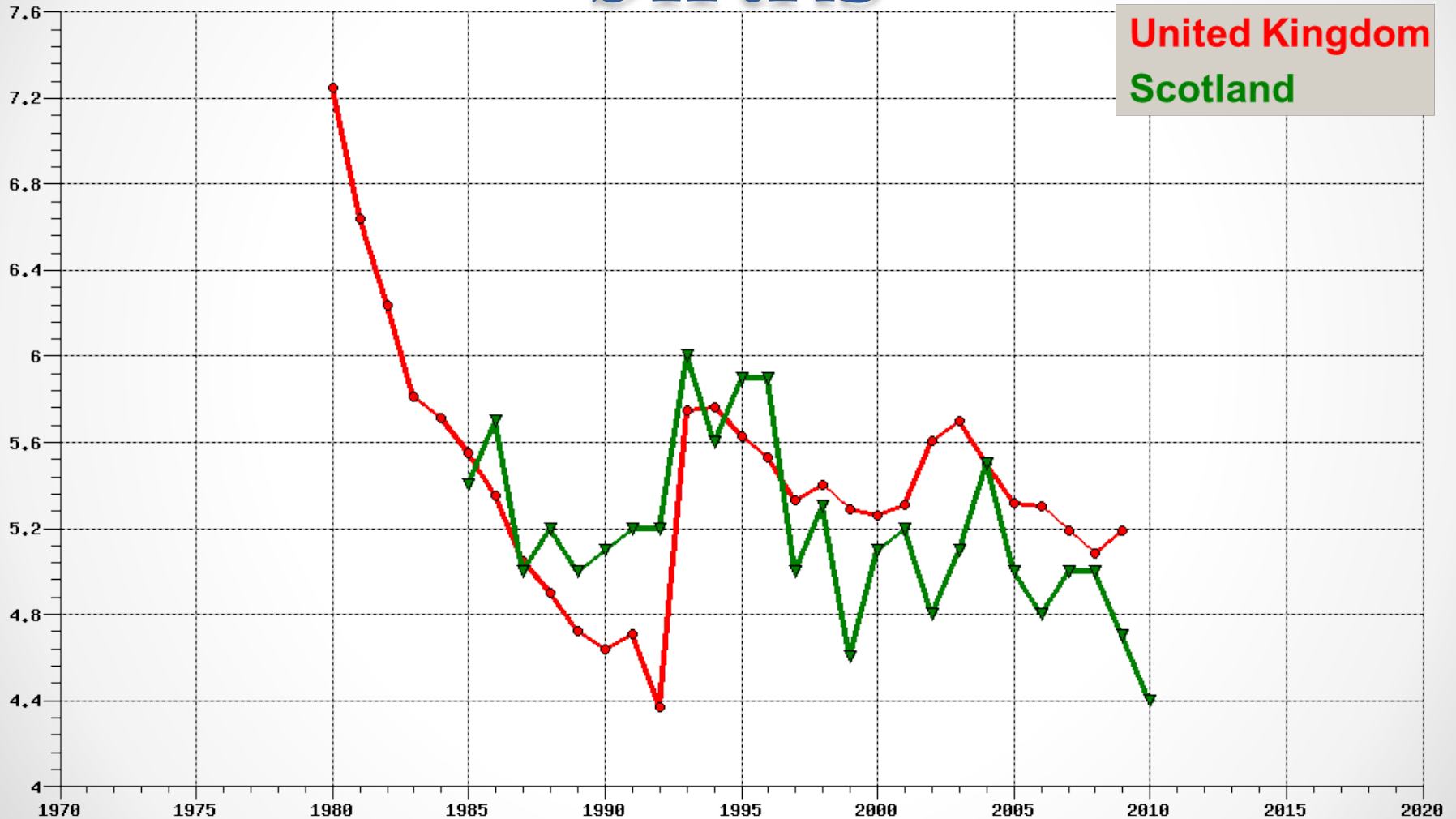
# Challenge 3: Setting targets to assess impact

Examples of proposed targets:

- Reduce proportion stillbirths by 15% by end-2015
- Reduce proportion neonatal deaths by 15% by end-2015
- Reduce proportion post-neonatal deaths by 15% by end-2015

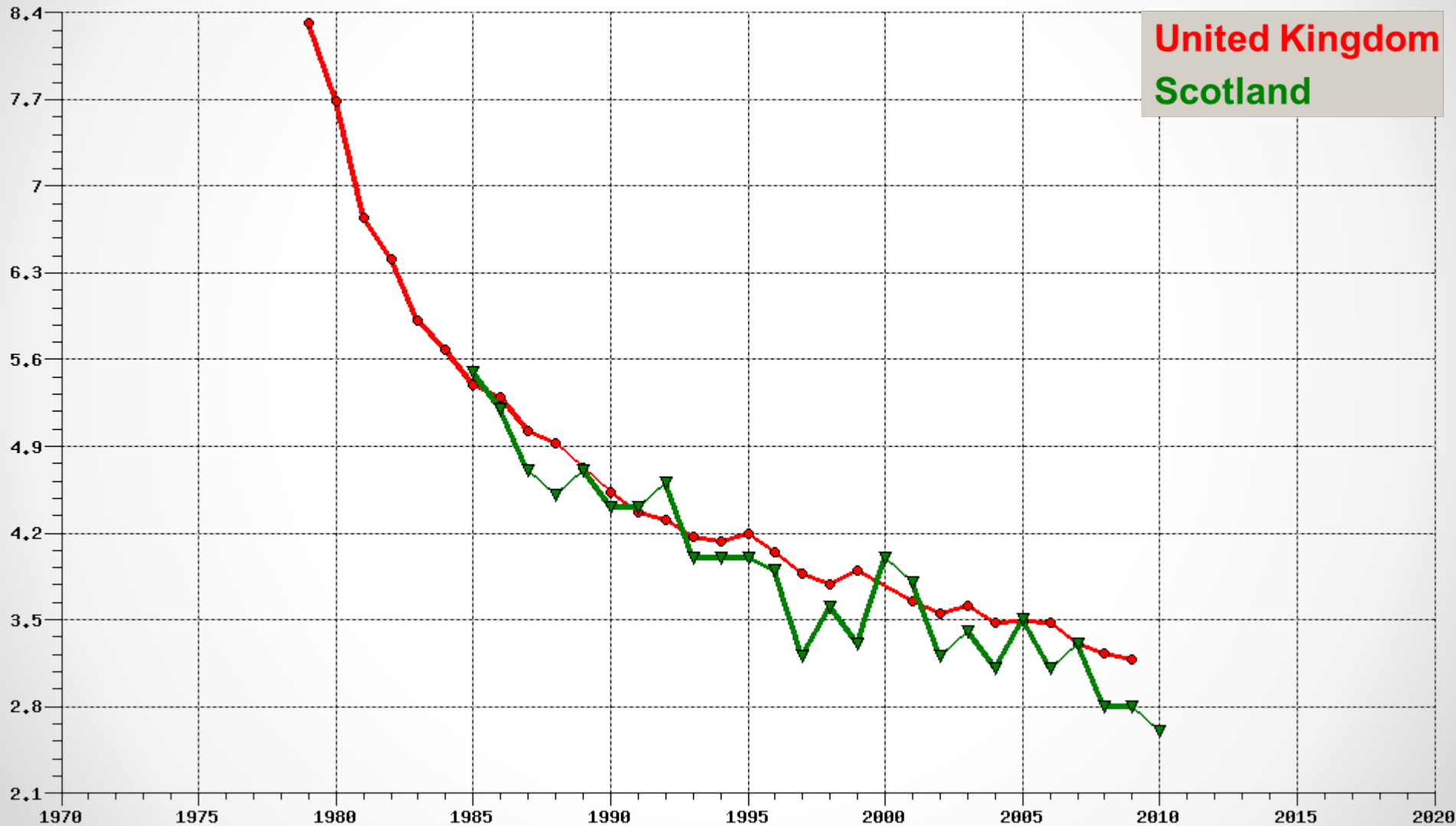
Standard perinatal epidemiological indicators already low, substantially lower than rest of UK

# Fetal deaths per 1000 births



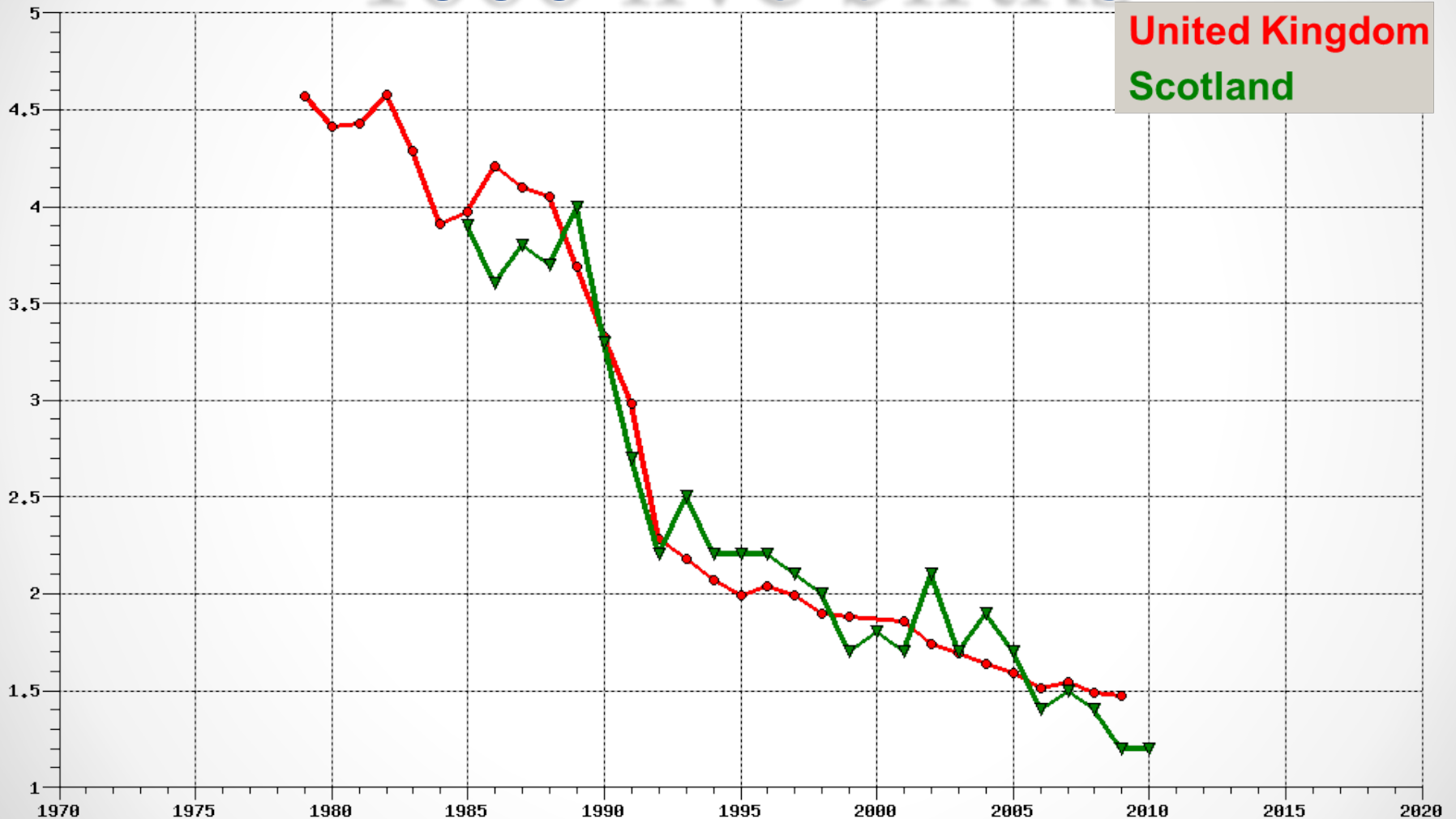
Source: WHO/Europe and ScotPHO, Scotland and European HfA Database 2012 •

# Neonatal death per 1000 live births



Source: WHO/Europe and ScotPHO, Scotland and European HfA Database 2012 •

# Post-neonatal deaths per 1000 live births



Source: WHO/Europe and ScotPHO, Scotland and European HfA Database 2012 •

# 3. Setting targets to assess impact

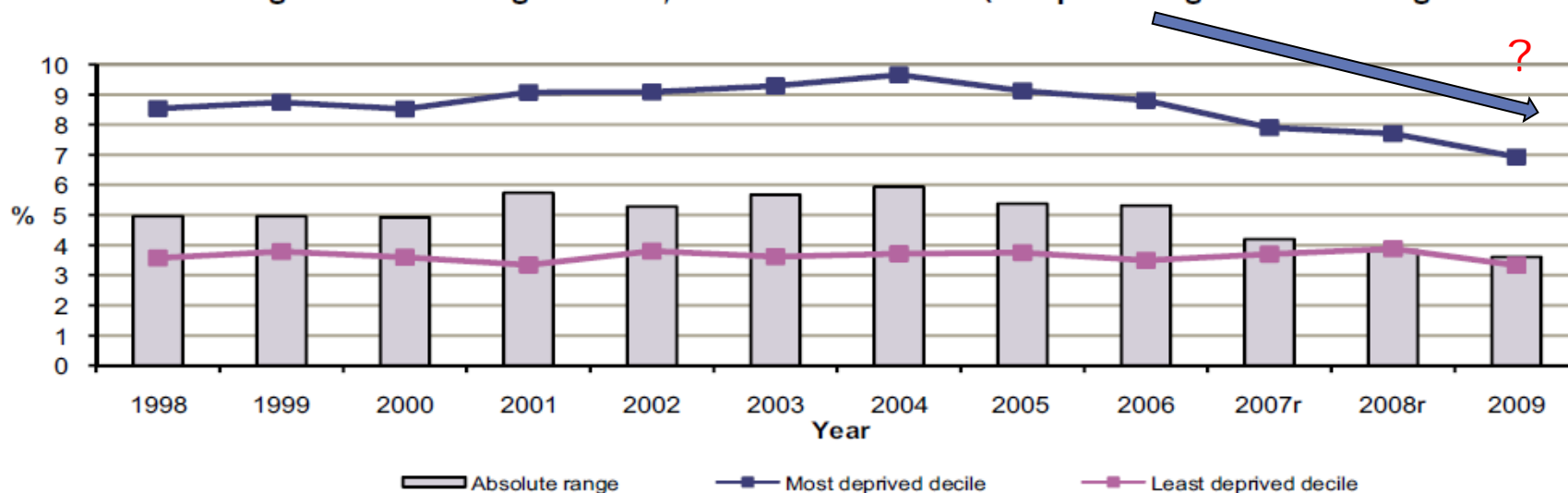
- Reduce proportion singleton low birth weight babies by 15% by 2017
- Reduce proportion singleton preterm babies by 15% by end-2017

Perinatal epidemiologists increasingly moving towards the exclusive reporting of Preterm Birth and Small-for-Gestational-Age. Knowing the gestational age and the weight of Preterms now more important. Recent trends in obstetric practice at 34-36 weeks mean PTBs have increased while lowering infant morbidity/mortality. Many of these babies born in the late preterm period who contributed to the secular increases in PTB -- but not of subsequent complications (disability, mortality) -- usually weigh more than 2500 g, and therefore ok. However, those having born *both* PT *and* LBW are at highest risk of subsequent adverse outcomes (about 60% of PTBs).

# What about early-life disparities? – the curious case of LBW

(=prevalence at birth:<2500 g.)

Figure 6: Absolute range: Low birthweight babies, Scotland 1998-2009 (as a percentage of all live singleton births)



Q: How to explain the complete plateau-ing of high-SES LBW rates? A: LBW= (SGA +true Pre-Term) Births, and these are moving in opposite directions int'lly, so LBW now very stable.

Source: Annual Report of the CMO, Scotland. The Scottish Government & NHS Scotland, Edinburgh. 2011.



# Weakness of LBW as a Perinatal Health Indicator

- There are two opposing secular trends in birth-weight in developed countries, at differing BW ranges, for differing reasons, LEADING TO VERY STABLE LBW RATES OVERALL:

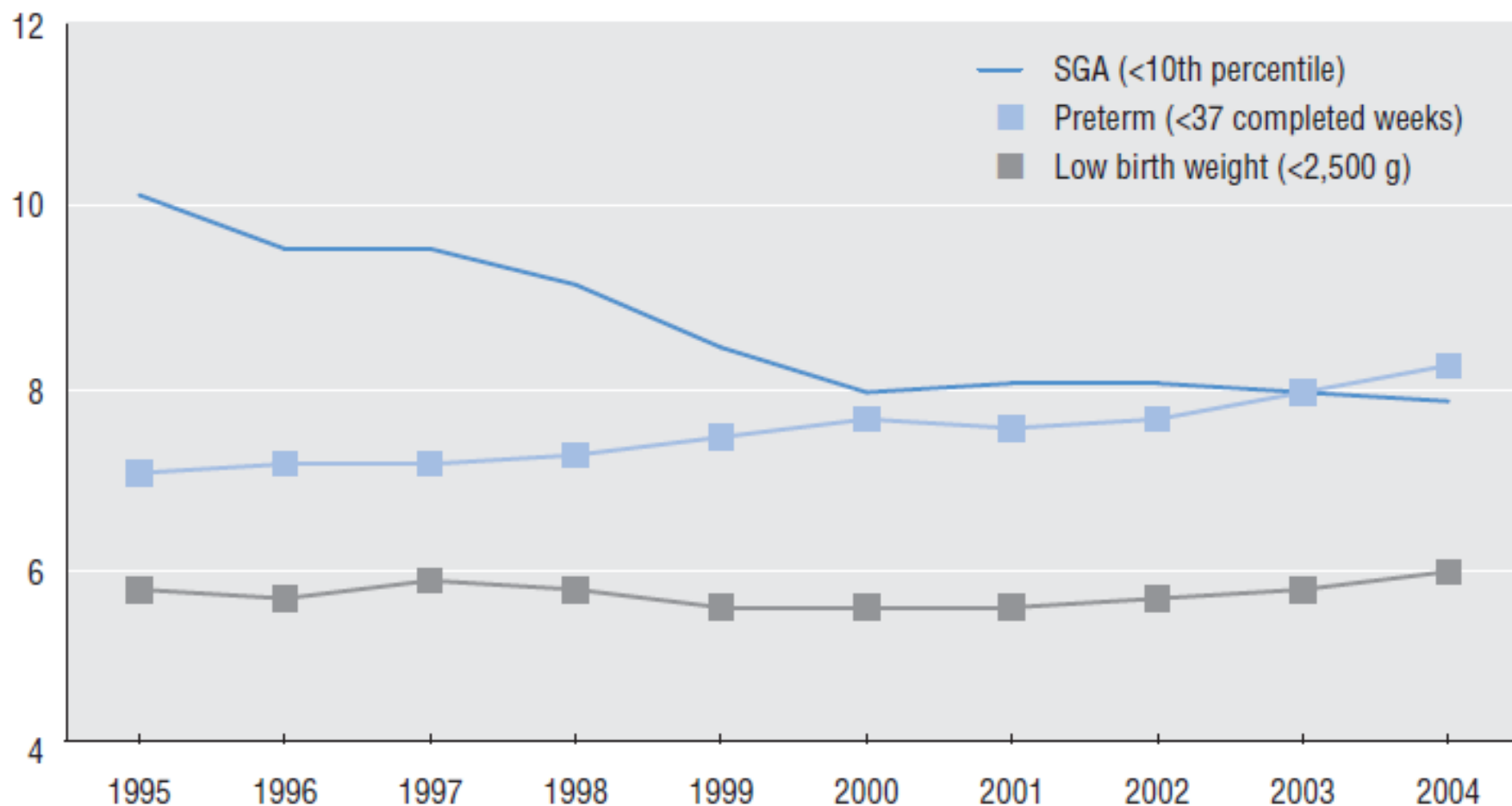
a) increased LBW induction/caesareans, resulting from modern OB management of foetal risk, in ever-older mothers (at higher SES levels) or continuing patterns of high-risk, such as low age and smoking (in lower SES mothers) leading to higher LBW rates, *at 32-34 weeks*;

b) long-term secular trends towards heavier *full-term* babies, likely due to changing maternal anthropometry/nutritional status (Kramer MS et al. Why are babies getting bigger? Temporal trends in foetal growth and its determinants. J Pediatr 2002;141:538-9.)

*All these phenomena vary by SES -- so "crude" LBW rates/trends by SES are almost un-interpretable*

# Rates of small-for-gestational-age (SGA) live birth, preterm birth and low birth weight\* Canada (excluding Ontario), \*\* 1995–2004

Frequency (%)



Source: Statistics Canada. Canadian Vital Statistics System, 1995–2004.

\* Live births with unknown gestational age or birth weight, gestational age <22 weeks or >43 weeks, and multiple births were excluded for SGA rate calculations.

\*\* Data for Ontario were excluded because of data quality concerns.

# BUT, IN 2006 IN SCOTLAND, "SMOKEFREE" LEGISLATION UNEXPECTEDLY HAD A BIG IMPACT ON BOTH CAUSES OF LBW!

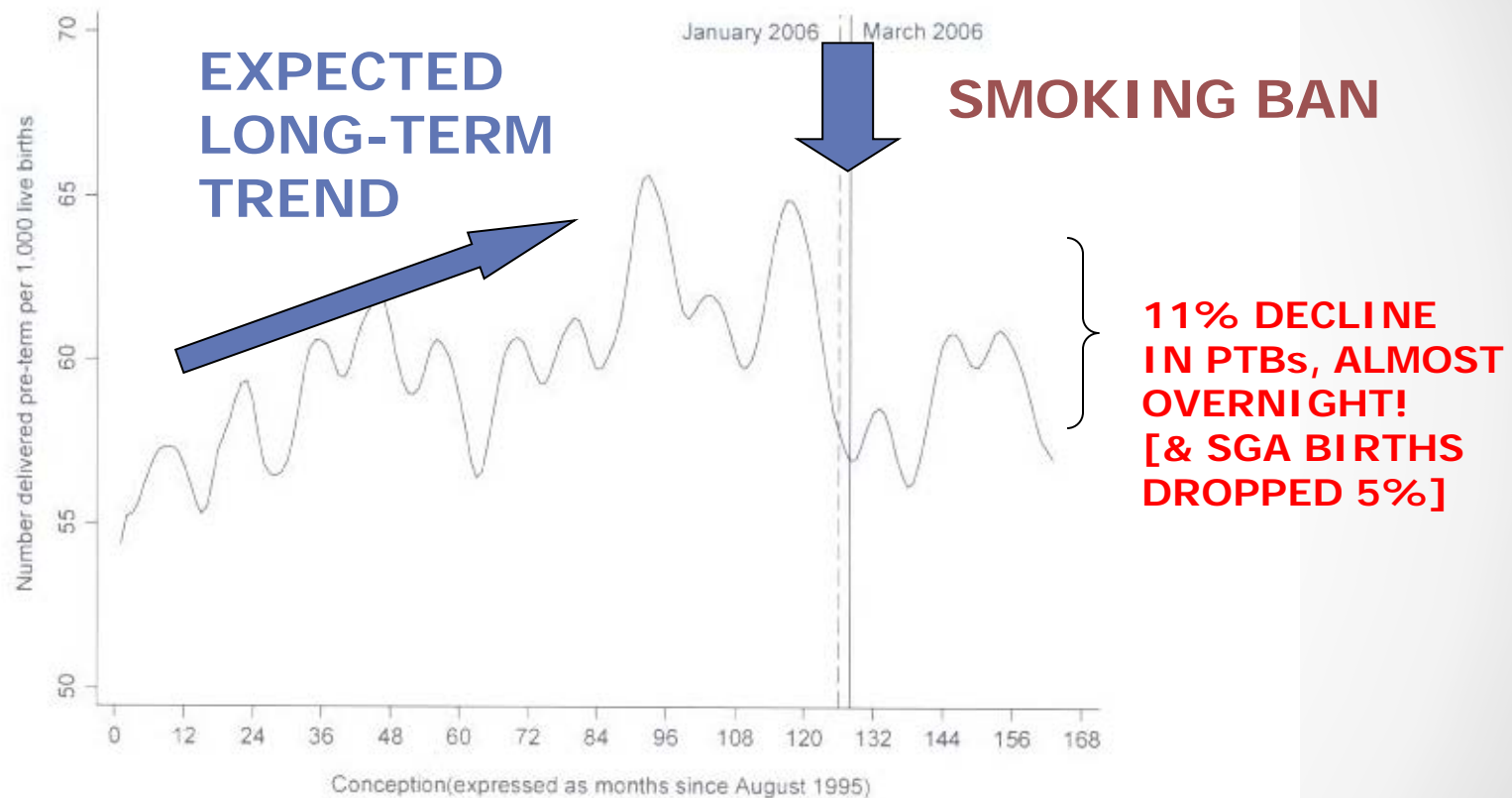


Figure 1. Time trend in the number of infants delivered preterm per 1,000 live births. Time trend smoothed using the Stata loess smoother with bandwidth = 0.1.  
doi:10.1371/journal.pmed.1001175.g001



# Challenge 4: Intervention selection based on evidence

- Selection of programs with very strong evidence but without considering *impact on health inequalities* e.g. Nurse-Family Partnership robust evaluation but only serves primigravidas/under-20's of all SES groups (thus  $\geq 20$  yr-old or non-primip pregnant women with difficult circumstances not targeted)
- New resource-intensive programs (such as NFP) may *undermine useful existing programs* (such as the universal health visitor system in UK) simply by drawing on same limited resource base

## 4. Intervention selection based on evidence

- Difficult for policy-makers to *assess levels of evidence* e.g. Roots of Empathy very popular in Scotland and plans for full roll-out, however, assessment of the evidence shows, in trials with control groups, very small effect-sizes at maximum (3 years) follow-up. Thus evidence of effectiveness could probably be described as “suggestive but not compelling.” Thus robust evaluation key.

*Sources:* Schonert-Reichl, K.A., Smith, V., Zaidman-Zait, A and Hertzman, C. (2012). School Mental Health, 4, 1-21 ; Santos R. G., Chartier M. J., Whalen, J. C., Chateau D., & Boyd L. (2011). Healthcare Quarterly, 14, 80-91.

# SCPHRP knowledge translation

- Reviews international and national early years' interventions
- Assesses evidence of what works
- Considers local Scottish context
- Recommends particular evidence-based programmes and universal proportionalism approach
- Recognition that **early years' outcome measures across Scotland were lacking**



# Challenge 5: Alternative measures of success

- With a few exceptions such as child dental health and weight at school entry, the routine population-level measures currently collected in Scotland are mostly concerned with either birth, hospitalization or later life end-stage events
- Data weighted to later life - chronic diseases, cancer incidence, hospitalization, most mortality - unlikely to allow policy-makers and professionals to reflect on recent health or social interventions
- Thus some\* called for more “upstream” outcome measures taken earlier in the life-course, which could potentially be changed within half a decade.

\*Frank J, Haw S. Best practice guidelines for monitoring socioeconomic inequalities in health status: lessons from Scotland. *Milbank Q.* a) 2011 Dec;89(4):658-93 & b) 2013 Mar;91(1):192-200.  
Hertzman C, Williams R. Making early childhood count. *CMAJ.* 2009 Jan 6;180(1):68-71. •

# 5. Alternative measures of success

- Overwhelming number of early childhood measures from which to choose
- Difficult for policy-makers to distinguish between:
  - ❖ screening/diagnostic tools;
  - ❖ individual-level measures of academic progress in school;
  - ❖ population-level measures which can inform community interventions
- Costly licensed individual child measures appear attractive to schools in the short-term e.g. PIPS (Performance Indicators in Primary Schools)



# Early development instrument pilot in Scotland 2011/2012



**EARLY DEVELOPMENT INSTRUMENT**

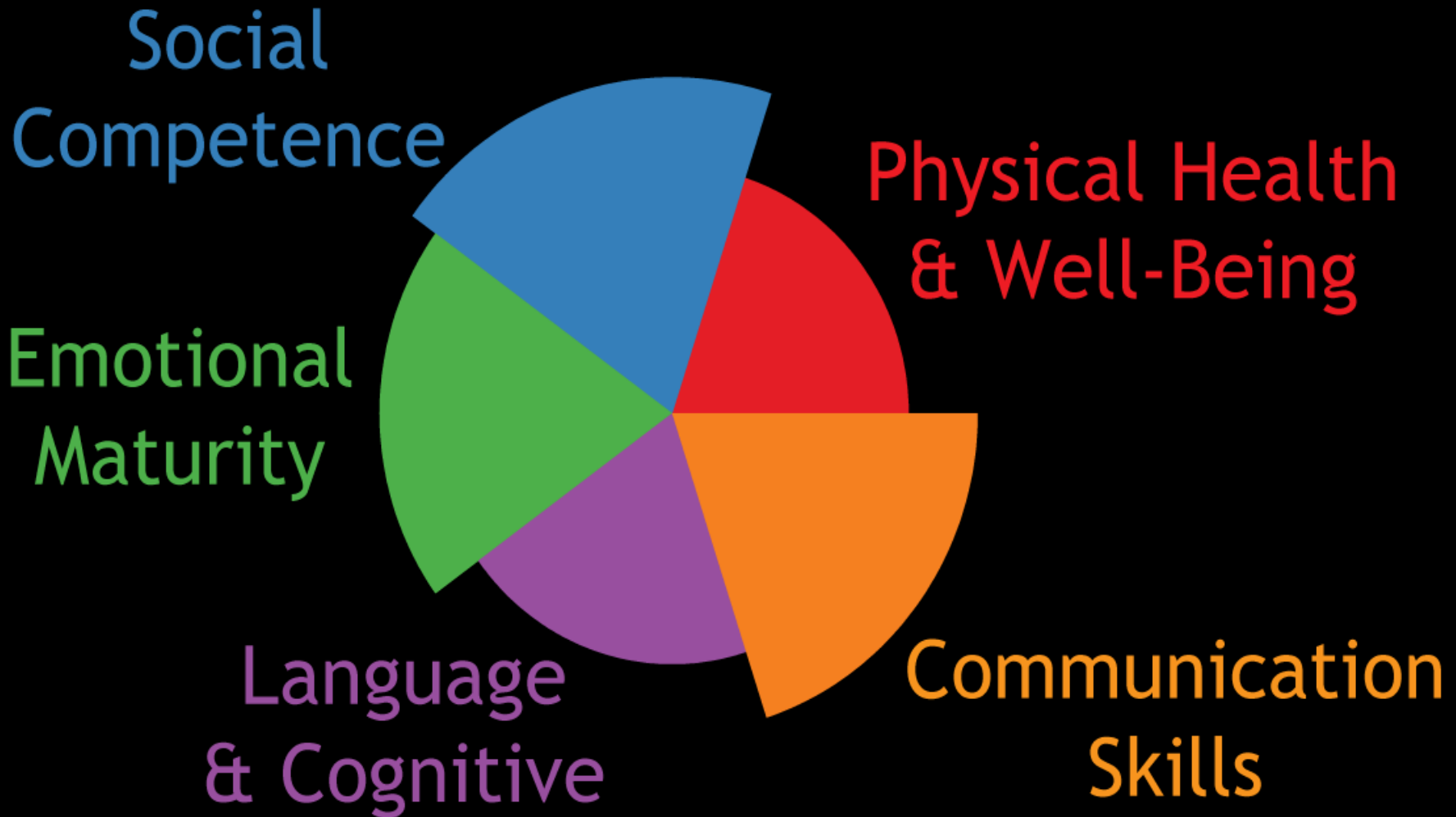
a population-based measure for communities

# What is the EDI?



- The EDI is teacher-completed 104-item checklist (taking 20 min) that assesses children's development when they *enter* school
- Measures the outcomes of children's *pre-school* (0-5 years) experiences as they influence their school readiness
- The EDI is designed to be interpreted at the group level
- The EDI does not provide diagnostic information on individual children

# What Does the EDI Measure?



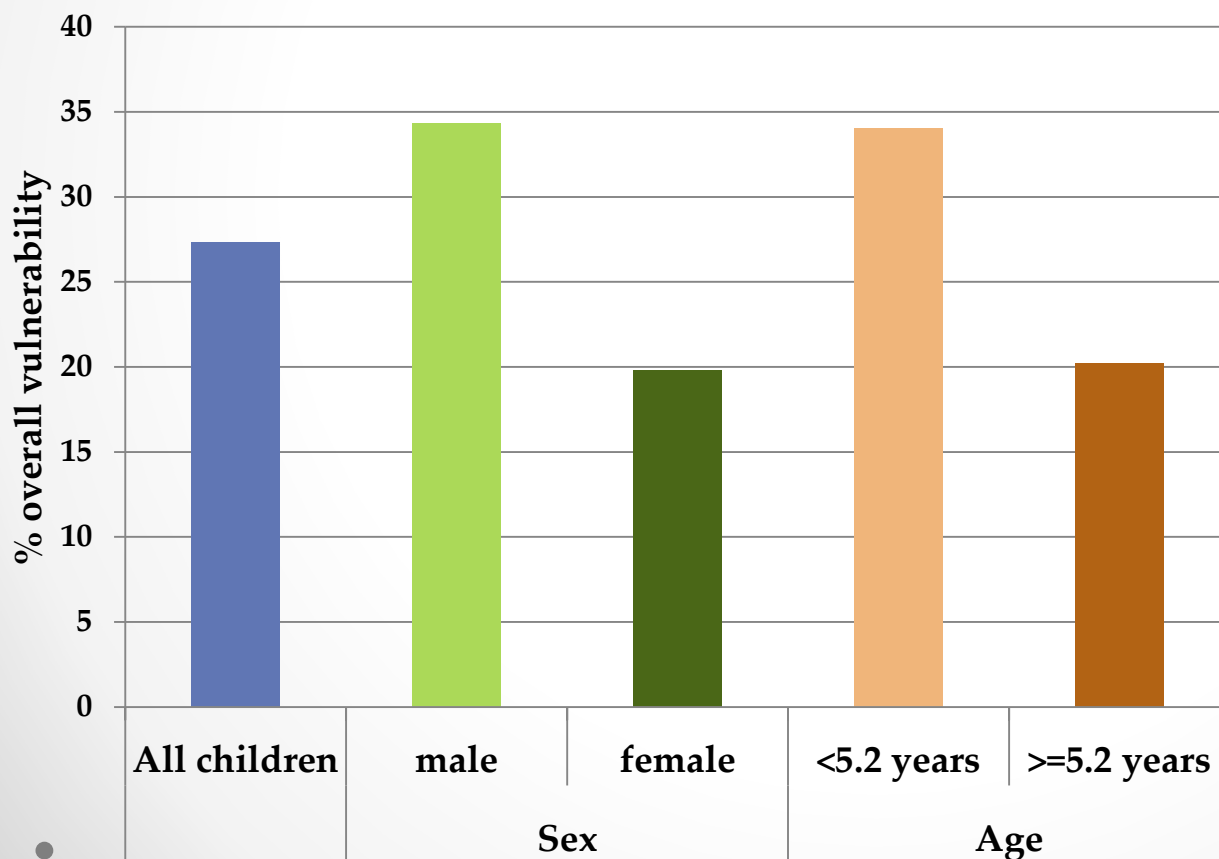
# EDI pilot in Scotland - main objectives

- Adapt Canadian EDI to Scottish context/school system and test discriminatory ability in Scotland
- Implement fully in one school district 2011/12
- Link mean scores in each developmental domain to socioeconomic status (using Scottish Index of Multiple Deprivation\*)
- Determine % 'vulnerable' children in each developmental domain, and overall
- Generate reports, present results to community stakeholders & to Scottish Government, using user-friendly charts & maps

\*SIMD ranks small areas (called datazones) from most deprived – ranked 1 – to least deprived – ranked 6,505. To assess deprivation in an area, it combines approximately 37 indicators across various measures, namely current income, employment, health, education, skills and training, housing, geographic access and crime. Datazones can be grouped into deciles (10 groups) or quintiles (5 groups).

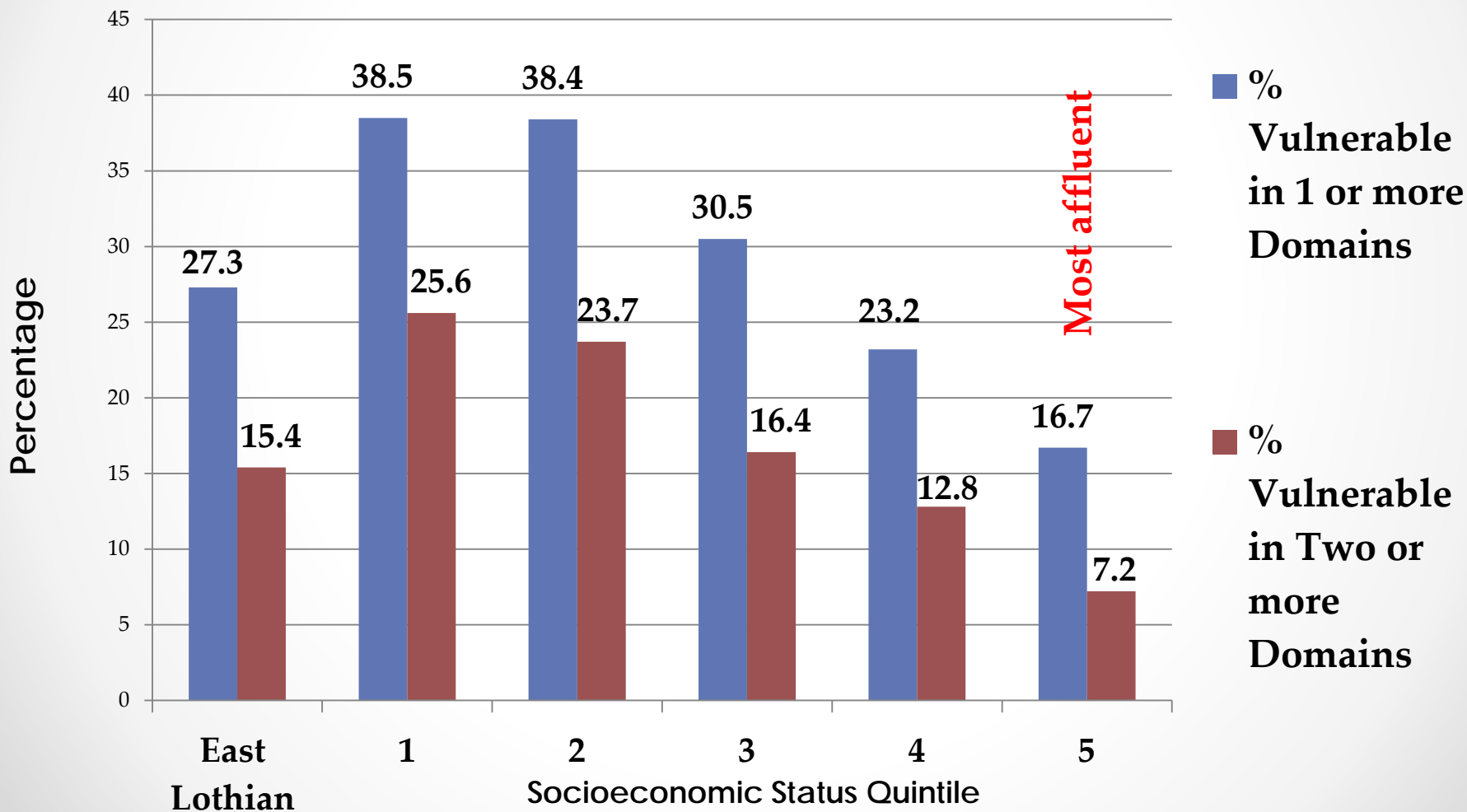
# Overall “developmental vulnerability” of school enterers (N=1200), Scotland, January 2012

- All children - 27.3% low on at least 1 domain  
- 15.4% low on at least 2 domains



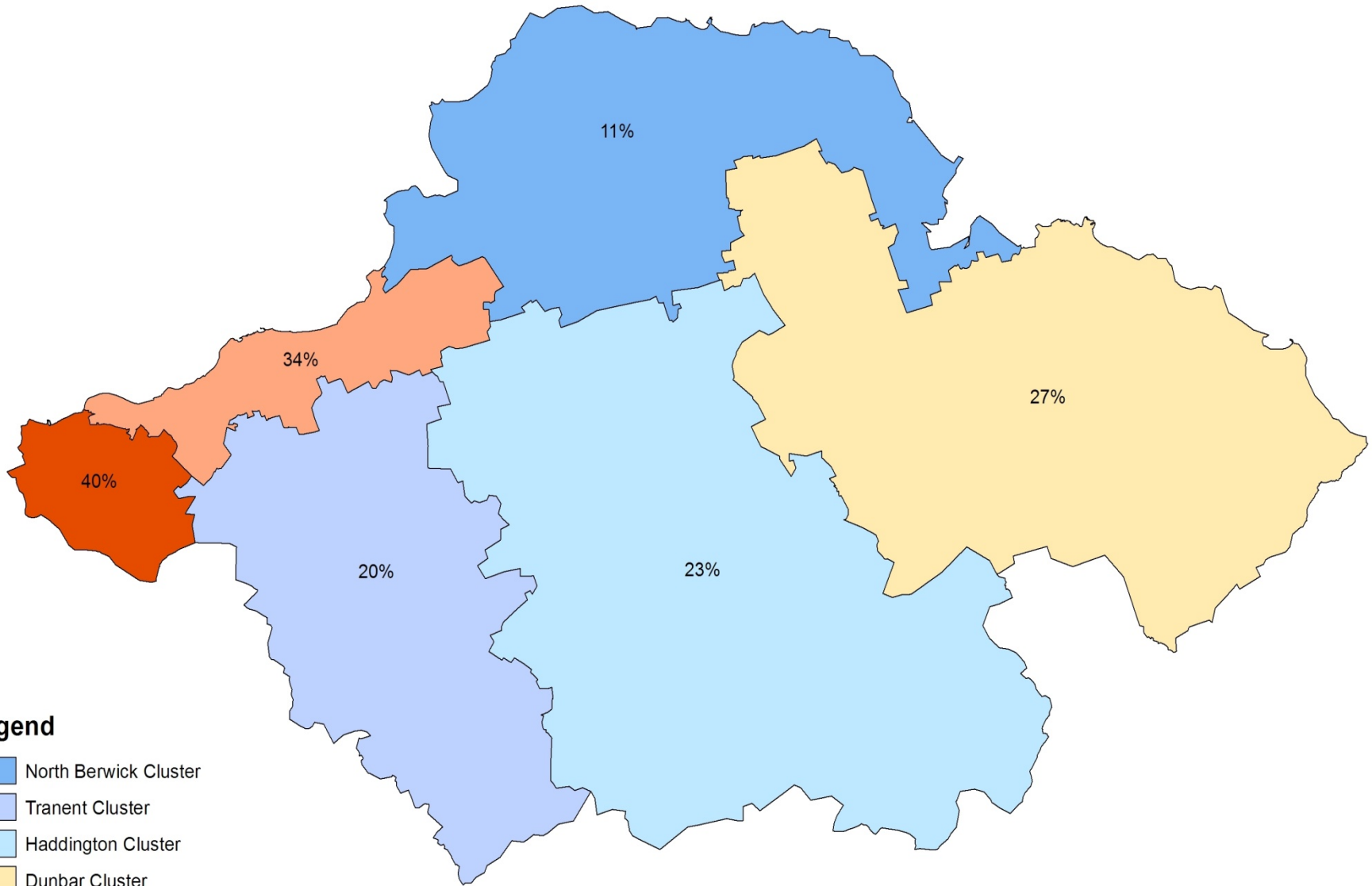
Measurement  
tool:  
*Early  
Development  
Instrument*

# 'Overall developmental vulnerability' (% children low on at least one/two domains of development) of Scottish school enterers by SES in Jan 2012



Note: Findings were limited by the small number of children in postcode quintile 1.

# Percentage of children who score low on one or more domains of development by cluster area



## Legend

- North Berwick Cluster
- Tranent Cluster
- Haddington Cluster
- Dunbar Cluster
- Prestonpans Cluster
- Musselburgh Cluster

# Main Conclusions of EDI pilot in Scotland

- EDI is acceptable, appropriate, cost-effective and feasible for use in Scotland
- All five domains of the EDI exhibited good internal consistency (Cronbach's  $\alpha$  higher than .76)
- Developmental differences between socioeconomic and geographic groups *can* be detected with EDI in Scotland



Local community groups in pilot area are now utilising EDI findings for decision-making around early years' services, resources and programmes



Support from the start East Lothian

# What the global scientific community thinks is good about the EDI

- Comprehensive/global assessment of child development
- Population-level measure for reflecting on early years (0-5) services/programs
- NOT for screening / diagnosing / categorising / labelling of individual children
- If rolled out, provide rich dataset of centralised information for country comparison

# What makes the EDI less acceptable to policy-makers

- Not for **individual-level use** -- thus difficult to 'sell' to teachers and the education sector
- If rolled out, **which level of government pays** for teacher-time buyout for collecting and analysing EDI information?
- Scotland: **model/culture of devolved** decision-making and budgets (now cut) so central government don't want to dictate how to measure child outcomes
- Australia: federal authorities realized early on that the states would not pay for the EDI, and teachers not welcome it, thus they paid for the buyout, and centralized the data analysis and most of its use

# Conclusion

- Barriers to these processes occur when there is:
  - a reluctance to accept scientific and technical support and guidance
  - Inflexible cultures and contexts
  - Difficult economic circumstances
- Successfully implementing childhood prevention policies means wisely choosing how to:
  - intervene
  - set targets
  - measure success

# Useful websites & references

- Scottish Collaboration for Public Health Research and Policy:

[www.scphrp.ac.uk](http://www.scphrp.ac.uk)

- Geddes, R., Haw, S., and Frank, J. (2010). Interventions for promoting early childhood development for health. An environmental scan with special reference to Scotland. A report for the Early Life Working Group of the Scottish Collaboration for Public Health Research and Policy. Available from: <https://www.scphrp.ac.uk/node/103>

- Offord Centre for Child Studies

<http://www.offordcentre.com/index.html>

- Australian Early Development Index - click on AEDI

[http://www.rch.org.au/ccch/index.cfm?doc\\_id=10556](http://www.rch.org.au/ccch/index.cfm?doc_id=10556)

- British Columbia ECD mapping portal

<http://www.ecdportal.help.ubc.ca/archive/faq.htm>

- Frank J, Haw S. Best practice guidelines for monitoring socioeconomic inequalities in health status: lessons from Scotland. *The Milbank Quarterly*. 2011 Dec;89(4):658-693.
- Frank J, Haw S. Persistent social inequalities in health: insensitive outcomes, inadequate policies, or both? *The Milbank Quarterly*. 2013 Mar;91(1):192-200.
- Hertzman C, Williams R. Making early childhood count. *CMAJ*. 2009 Jan 6;180(1):68-71.
- Lloyd JEV, Hertzman C. From Kindergarten readiness to fourth-grade assessment: Longitudinal analysis with linked population data. *Social Science & Medicine*. 2009;68(1):111-23.
- Hertzman C. Tackling inequality: get them while they're young. *BMJ* 2010; 340:346-8.





*Thank you*