20th century trends in life expectancy in Scotland and 16 other Western European countries

Males
Trends in life expectancy - males
All cause death rates, M 0-64, 2001

- Europe
- Other European countries
- Local council area within Scotland

Death rate per 100,000 population
All cause death rates, M 0-64, 2001

Glasgow City
Inverclyde
West Dunbartonshire
Dundee City
Renfrewshire
Eilean Siar
North Ayrshire
North Lanarkshire

30%
Life Expectancy (LE) and Healthy Life Expectancy (HLE) at Birth, 1980-2006

- LE Women
- HLE Women
- LE Men
- HLE Men

Year:

LE / HLE (in years):
60.0 65.0 70.0 75.0 80.0 85.0
Absolute differences in Life Expectancy
By local authority - least and most deprived quintiles

Males

Females
IHD mortality 1999, 2006

England: 205.5, 136.6
Scotland: 263.3, 168.1
Wales: 233.1, 151.4
Northern Ireland: 248.1, 155.4
Trends in CHD mortality

per 100,000

overall actual
overall target
women actual
women target
men actual
men target

CHD inequalities

Absolute difference in directly standardised mortality rate from CHD between the most deprived quintile of Local Authorities and the least deprived quintile

<table>
<thead>
<tr>
<th>Country</th>
<th>CHD Mortality Males</th>
<th>CHD Mortality Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>England</td>
<td>51.3</td>
<td>25.0</td>
</tr>
<tr>
<td>Scotland</td>
<td>61.2</td>
<td>29.8</td>
</tr>
<tr>
<td>Wales</td>
<td>39.9</td>
<td>12.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Region</th>
<th>2004</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>England</td>
<td>59.2</td>
<td>52.8</td>
</tr>
<tr>
<td>Scotland</td>
<td>77.8</td>
<td>66.8</td>
</tr>
<tr>
<td>Wales</td>
<td>58.8</td>
<td>57.7</td>
</tr>
<tr>
<td>Northern Ireland</td>
<td>62.8</td>
<td>56.4</td>
</tr>
</tbody>
</table>
Stroke inequalities

Absolute difference in the directly standardised mortality rate from stroke between the least deprived quintile of local authorities and the most deprived quintile.
Cancer inequalities

Absolute difference in directly standardised mortality rate per 100,000 population from all cancers between most deprived quintile of Local Authorities and least deprived quintile

No. deaths per 100,000 population

England: 36.0
Scotland: 20.8
Wales: 24.6
Northern Ireland: 39.6

Source: WHO

*World standard population
Lung cancer survival

<table>
<thead>
<tr>
<th>Country</th>
<th>Relative Survival (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>16.3</td>
</tr>
<tr>
<td>Switzerland</td>
<td>15.3</td>
</tr>
<tr>
<td>Austria</td>
<td>14.1</td>
</tr>
<tr>
<td>Sweden</td>
<td>13.9</td>
</tr>
<tr>
<td>Italy</td>
<td>13.4</td>
</tr>
<tr>
<td>Netherlands</td>
<td>12.9</td>
</tr>
<tr>
<td>Norway</td>
<td>11.2</td>
</tr>
<tr>
<td>Northern Ireland</td>
<td>10.7</td>
</tr>
<tr>
<td>Wales</td>
<td>10.4</td>
</tr>
<tr>
<td>England</td>
<td>8.4</td>
</tr>
<tr>
<td>Scotland</td>
<td>8.2</td>
</tr>
</tbody>
</table>
Prevalence of smoking of manufactured cigarettes in Great Britain. Data from Tobacco Advisory Council (1948-70) and General Household Survey (1972-2001)
Age-standardised incidence rates of lung cancer by sex, Scotland, 1960-2003
Lung cancer incidence

Average number of cases per year (bars)

ASR per 100,000 population (lines)

- Males, observed cases
- Females, observed cases
- Males, model estimates
- Females, model estimates
Median waits for cataract surgery

- **England**: 65 days in 2005-06, 56 days in 2006-07
- **Scotland**: 35 days in 2005-06, 35 days in 2006-07
- **Wales**: 67 days in 2005-06, 67 days in 2006-07
- **Northern Ireland**: 41 days in 2005-06, 27 days in 2006-07
Expenditure per capita

- Scotland
- Wales
- Northern Ireland
- England
<table>
<thead>
<tr>
<th></th>
<th>IHD</th>
<th>115</th>
<th>64</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death rate per 100,000 men 0-64</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IHD</td>
<td>166</td>
<td></td>
<td></td>
<td>-32</td>
</tr>
<tr>
<td>All Cancers</td>
<td>118</td>
<td>107</td>
<td>92</td>
<td>-10</td>
</tr>
<tr>
<td>Lung Cancer</td>
<td>49</td>
<td>37</td>
<td>26</td>
<td>-25</td>
</tr>
<tr>
<td>Chronic Respiratory</td>
<td>17</td>
<td>11</td>
<td>9</td>
<td>-38</td>
</tr>
<tr>
<td>Liver Disease</td>
<td>9</td>
<td>9</td>
<td>23</td>
<td>6</td>
</tr>
<tr>
<td>Suicide</td>
<td>18</td>
<td>21</td>
<td>26</td>
<td>15</td>
</tr>
<tr>
<td>Drugs</td>
<td>0</td>
<td>1</td>
<td>10</td>
<td>239</td>
</tr>
<tr>
<td>Alcohol</td>
<td>5</td>
<td>4</td>
<td>9</td>
<td>-4</td>
</tr>
<tr>
<td>Assault</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>55</td>
</tr>
<tr>
<td>All Causes</td>
<td>495</td>
<td>388</td>
<td>339</td>
<td>-22</td>
</tr>
</tbody>
</table>
Relative inequalities in mortality by cause
Men, Scotland 2000-02

Slope index of inequality divided by mean rate

Age

0-5 10-15 20-25 30-35 40-45 50-55 60-65 70-75 80-85+

0.0 0.5 1.0 1.5 2.0

Ischaemic Heart Disease
Cerebrovascular disease
Chronic lower respiratory diseases
Disorders due to use of alcohol
Disorders due to use of drugs
Accidents
Suicide
All other causes
All neoplasms
Chronic liver disease
Chronic Liver Disease mortality rates per 100,000 population 1950-2006
Chronic Liver Disease Mortality by Deprivation, Scotland (Men)
Obesity Trends in Scottish Adults

**Obesity prevalence in men in Scotland 1995-2003**

![Graph showing obesity prevalence in men from 1995 to 2003.](image)

**Obesity prevalence in women in Scotland 1995-2003**

![Graph showing obesity prevalence in women from 1995 to 2003.](image)

Source: Scottish Health Survey
Exercise participation
Social circumstances and health
DIGGING CART FOR HIGH FORAGING DEMAND
CSF CRF CONCENTRATIONS IN DIFFERENTIALLY-REARED JUVENILE PRIMATES:

CRF IS A “FEAR” NEUROPEPTIDE

Group Effect: P < .0001
Evening Cortisol Levels Increase with Months of Orphanage Rearing *

*linear trendline
The Human Brain Under Stress: key brain regions

Prefrontal cortex
- Executive function, working memory
- Atrophy

Hippocampus
- Contextual, episodic, spatial memory
- Atrophy

Amygdala
- Emotion, fear, anxiety
- Hypertrophy, later atrophy
Hippocampus: Dendritic atrophy after stress

Rat hippocampal neuron before (A) and after (B) 3-week repeated stress

McEwen, 1999
Chronic Confrontation with Dominant Causes Remodeling of Hippocampus

Neurogenesis suppressed

CA3 dendrites remodeled
pSoBid: Stroop test

![Graph showing colour-word score by age group and condition (MD and LD) with a p-value of <0.001.](image)

- **Age (years):** 35-44, 45-54, 55-64
- **Colour-word score:** Ranges from 0 to 120
- **Conditions:**
  - MD
  - LD

The graph illustrates a significant difference in colour-word scores between the MD and LD conditions across different age groups, with a p-value of <0.001.
pSoBid: Verbal Learning

![Bar chart showing word recall by age group and condition.](chart.png)

- Age groups: 35-44, 45-54, 55-64
- Conditions: MD (light blue), LD (dark blue)

Significance: *p* < 0.001
The Trails Test: a test of “executive function”

Trails “A”

Trails “B”
pSoBid: Trails B

Age (years)

Seconds

35-44  45-54  55-64

MD  LD

p<0.001
pSoBid: Choice reaction time

![Bar chart showing reaction time over age groups](chart.png)

- Age (years): 35-44, 45-54, 55-64
- Reaction time measured in milliseconds

**Significance:**
- p<0.001
pSoBid: psychological state

All p<0.001

GHQ = General Health Questionnaire; SoC = Sense of Coherence; RSE = Rosenberg Self-Esteem Scale; BHS = Beck Hopelessness Scale; GSE = Generalised Self-Efficacy Scale
PERCEIVED CONTROL IN NATIONAL SAMPLES AND ALL CAUSE MORTALITY

CONTROL (AGE-SEX ADJUSTED)

Pikhart, Bobak et al 2000
Determinants of early brain development

- At birth, development shifts from genetic to environmental influences.
- There are 100 billion neurons but they are not part of functional networks.
- First few years are spent forming permanent neural networks - ‘Neurons that fire together wire together’.
- **Social interaction determines brain development**
Attachment theory

• Ainsworth
  – Deep emotional connection that infant develops with primary caregiver
  – Reflects an “internal working model” expressing the infant’s expectations of parental behaviour in meaningful situations
  – Basis for development of later relationships

• Increasingly recognised as determinant of later emotional, cognitive and social outcomes
Attachment theory

“Infants develop the attachment behaviours that optimally enhance their survival in their own characteristic environments.”

Crittenden, 2000
“Serve and return”

“The ‘instruction’ to attend to the primary caregiver is genetic, the outcome depends on what happens”

Balbernie, 2001
Exposure to predator odor elevates glucocorticoid levels and inhibits adult neurogenesis in rats

Similar effect with other aversive stressors and in other species
Does social housing affect the response to a positive stressor?
The Stroop Test
a test of ‘response inhibition’

<table>
<thead>
<tr>
<th>Shapes</th>
<th>Words</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>green</td>
</tr>
<tr>
<td></td>
<td>blue</td>
</tr>
<tr>
<td></td>
<td>red</td>
</tr>
<tr>
<td></td>
<td>yellow</td>
</tr>
<tr>
<td></td>
<td>blue</td>
</tr>
<tr>
<td></td>
<td>red</td>
</tr>
<tr>
<td></td>
<td>green</td>
</tr>
<tr>
<td></td>
<td>yellow</td>
</tr>
<tr>
<td></td>
<td>red</td>
</tr>
</tbody>
</table>

Say the colour names of the shapes  
Say the word names  
Say the names of the colours that the words are printed in
The Dunedin cohort

- 1000 children recruited in late 1972/3
- At age 3, “at risk” children identified on the basis of chaotic circumstances, emotional behaviour, negativity and poor attentiveness
- As adults, those “at risk” were more likely to:
  - be unemployed
  - have criminal convictions (especially for violence)
  - been pregnant as a teenager
  - have a substance abuse problem
  - exhibit signs of insulin resistance and metabolic syndrome
Opportunity to escape poverty, decent housing, social networks, self esteem and sense of control

Consistent parenting, safe, nurturing early years, supportive education

Health related behaviours
www.infoscotland.com/childprotection

He can’t tell anyone his mum’s too drunk to look after him.
But you can.

If you are concerned about any child’s welfare, call the Child Protection Line: 0800 022 3222.
Scotland’s health is improving rapidly but it is not improving fast enough for the poorest sections of our society. Health inequalities... remain our major challenge.
Equally Well recommendations

- Support for families and young people
- Mental health and wellbeing
- Poverty and employment
- Physical environments
- Alcohol, drugs, violence
- Healthcare system
Equally Well-test sites

- **Glasgow City** - integrating health into current and future city planning
- **Govanhill, Glasgow** - community regeneration and development
- **Whitecrook, West Dunbartonshire** - targeting the high prevalence of smoking in the area
- **Lanarkshire** - sustained employment and barriers to finding employment
- **East Lothian** - health inequalities in early years in Prestonpans, Musselburgh East and Tranent
- **Blairgowrie** - looking at delivering health inequality sensitive services in a rural setting for people with multiple and complex needs
- **Fife** - anti-social behaviour in relation to alcohol and underage drinking
- **Dundee** - methods of improving wellbeing
Tackling wicked problems

- Authoritative or collaborative strategies?
- Narrow or broad approach?
- Firm trajectory or innovative “hunches?”
- Organisational focus or cross organisation?
- Tight governance or “project review?”
- Regulation or persuasion?
Management of complex systems

- Order generating rules
- The importance of instability
- Emergence of solutions
- Conditioning emergence
- “Deep structures and archetypes”
- Paradox and contradiction
It all matters!

- Smoking, abuse of alcohol and drugs, obesity and lack of exercise damage health and need to be tackled.
- Poverty, unemployment, poor educational attainment all damage self esteem and sense of control.
- Consistent, supportive and nurturing early life provide the basis for successful social and physical development into adulthood.
“The success of an economy and of a society cannot be separated from the lives that the members of the society are able to lead… we not only value living well and satisfactorily, but also appreciate having control over our lives.”

Amartya Sen, Development as Freedom (1999)
## The intervention ladder

<table>
<thead>
<tr>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eliminate choice</td>
</tr>
<tr>
<td>Restrict choice</td>
</tr>
<tr>
<td>Guide choice by disincentives</td>
</tr>
<tr>
<td>Guide choice by incentives</td>
</tr>
<tr>
<td>Guide choice by changing the default policy</td>
</tr>
<tr>
<td>Enable choice</td>
</tr>
<tr>
<td>Provide information</td>
</tr>
<tr>
<td>Do nothing</td>
</tr>
</tbody>
</table>
Wicked problems

Horst Rittel and Melvin Webber
Wicked Problems
Rittel and Webber 1973

- There is no definitive formulation of a wicked problem.
- Wicked problems have no stopping rule.
- Solutions to wicked problems are not true-or-false, but better or worse.
- There is no ultimate test of a solution to a wicked problem.
- Every solution to a wicked problem is a "one-shot operation"; every attempt counts significantly.
- Wicked problems do not have an enumerable set of potential solutions, nor is there a well-described set of permissible operations that may be used in the plan.
Wicked Problems
Rittel and Webber 1973

- Every wicked problem is essentially unique.
- Every wicked problem can be considered to be a symptom of another problem.
- The existence of a discrepancy representing a wicked problem can be explained in numerous ways. The choice of explanation determines the nature of the problem's resolution.
- The planner has no right to be wrong (planners are liable for the consequences of the actions they generate).
Examples of wicked problems

• Reverse climate change
• Prevent terrorism
• Fix bank
• Give America a functioning health care system
• Sort out Glasgow’s hospitals
• Improve cancer care
• Implement a SIGN guideline
Tackling wicked problems

• Authoritative or collaborative strategies?
• Narrow or broad approach?
• Firm trajectory or innovative “hunches?”
• Organisational focus or cross organisation?
• Tight governance or “project review?”
• Regulation or persuasion?
Creates broad awareness that exercise is indeed medicine.

Makes "level of physical activity" a standard vital sign question for each patient.

Helps physicians and other healthcare providers to become consistently effective in counselling and referring patients as to their physical activity needs.

Leads to policy changes in public and private sectors that support physical activity counselling and referrals in clinical settings.

Produces an expectation among the public and patients that their healthcare providers should and will ask about and prescribe exercise.

** Appropriately encourages physicians and other healthcare providers to be physically active themselves.**