# The Role of the State in Public Health



Christopher Whitty Gresham College 2020

# The remarkable improvements in health have many causes, but State prevention has played a major role.



England/UK life expectancy since 1597. Our World in Data.

### Improvements in mortality over the last 150 years (UK data).



#### Infectious diseases, heart disease and stroke examples. (ONS)



### Prevention is better than cure.....

- Public health aims to extend healthy life by preventing or delaying death, disease, ill health, indignity and disability.
- Individual citizens, medical professionals and the State all have a responsibility and role.
- Much of public health does not require the State.
- The State has the capacity to prevent death or ill heath in many citizens.
- When should it?



The Queen (94) and Col. Sir Tom Moore (100)

# How you answer this depends on your discipline, nation and time in history.



From left Hippocrates, Avicenna, Harvey, Locke, Nightingale, Banda, Chan

### Political tradition is also important.



# There are several types of prevention in healthcare.

Conventionally divided into:

- Primary prevention. The diseasefree population to prevent disease starting.
- Secondary prevention. Early disease and high risk group to delay progression.
- Tertiary prevention. Patients with disease to prevent further disease or disability.



# State medicine and individual medical practitioners- prevention.

- Most people only go to a doctor when they or their family are unwell.
- Primary care physicians (GPs) and specialists have the central role in most secondary and tertiary prevention.
- Based on individual consent.
- Primary prevention for those not yet unwell often falls to the State.
- Along with health protection.



Oxford University

In democracies the role of the State must depend on the view of citizens, expressed through the elected government.

It is the job of health specialists to lay out the evidence and say what *can* be done by the State to improve health, and the risks either way.

Elected politicians, whether national or local say what *will* be done by the State.







#### Maurice/matthiusKabel/Wiki

# The ladder of possible State intervention.

- Make individual citizens subject to civil or criminal law.
- Ban.
- Tax heavily.
- Regulate.
- 'Nudge' tax or intervention.
- Mass voluntary programme (vaccination, screening).
- Engage with industry.
- Inform the public.
- Support science to test possibilities.



The tradition that the State should interfere as little as possible is a long and honourable one.

- On both the left and the right of politics.
- In the law.
- Newspaper commentators with varying degrees of consistency...
- Some things only the State can do.



Lord Sumption QC.

### The set point of public and Parliamentary opinion changes.

- It was controversial when it was first proposed the State should prevent children under 10 being sent up chimneys.
- It was accepted it caused serious lifelong health damage, but was thought by some in Parliament an imposition on trade.
- Campaigning began in 1760s but an effective Act was not passed until 1875.



Sweepsmart

# For most risks to health there are three possibilities at a point in time.

- The public overwhelmingly expects the State to act, and would be very critical if it did not.
- The public overwhelmingly expects the State not to interfere, and would be very critical if it did.
- The public is **split**, and political tradition about the role of the State comes into play.



Examples where the public *expects* the State to act. And usually has for generations.

Risk is shared across society: your risk is my risk.

- Epidemics.
- Infectious diseases more widely including vaccination, clean water, safe food.
- Pollution, especially air and water.

A major power imbalance may kill people.

- Industrial injury and occupational disease.
- Industries based on addiction like smoking.
- Dangerous industries like motor vehicles.

## Protecting the most vulnerable.

• Child and maternal health.



States intervened to reduce the impact of epidemics following contemporary beliefs as far back as we have records.

- Quarantine laws (14+ days if you have arrived from overseas) go back to the plague pandemics of the middle ages.
- The State often acted forcefully to detain the sick until they recovered or died to prevent onward transmission.
- Bans or regulation of what were perceived as high risk close contact professions.



John Snow's demonstration that contaminated water caused cholera C1854 was a turning point in basing this on scientific evidence.

- Seven massive pandemics, first started 1817, 7<sup>th</sup> started 1961 ongoing. 10s of millions killed.
- In 1854 London epidemic mortality rates up to 12% seen.
- Snow mapped cases onto certain water companies, and famously the Broad Street pump.
- Combatting cholera, typhoid and other epidemic diseases was considered the most important role of State medicine.





R. Wilson augmented John Snow's original map of 1854

# Support for measures to combat COVID-19 has been consistently high (so far).

- The lockdown measures in early 2020 were curbs by the State on individual freedoms, rightly decided by elected politicians.
- It had over 90% support in the UK (YouGov).
- Even in late 2020 the public is supportive of ongoing measures. All ages, social groups and politics.
- Overwhelmingly people intend to follow advice to protect others. They want other people to, or it seems in vain.

#### 93% of Britons support the government's new COVID-19 measures

Boris Johnson has announced that, due to the COVID-19 (coronavirus) outbreak, Britons are now only allowed to leave their house in order to: shop for basic necessities; exercise once a day; seek help for a medical need; provide medical care or help a vulnerable person; and travel to work in circumstances where it is absolutely necessary and cannot be done from home. Do you support or oppose these measures? %



In all epidemics, and many infectious diseases, if I increase my risk, I increase it for everyone around me.

- Most people want to reduce the risk to themselves, their family, and vulnerable members of society.
- They do not want others to increase the risk to the entire community as free-loaders (although this perception is often unfair or exaggerated).
- Only the State can ensure we all reduce the risk.
- The State has the authority and resources to act fast and limit the damage.
- Whether imposing lockdown, restricting travel, switching research priorities, expanding healthcare or underwriting a furlough scheme it is not obvious what the alternatives to the State are.



How much responsibility, if any, do you think that each of the following have for ensuring that people generally stay healthier? Ipsos MORI poll for Health Foundation, May 2020.

A great deal of responsibility 📕 A fair amount of responsibility















The State has also long been seen as responsible for protecting from contagious endemic diseases.

As examples:

- Leprosy one of the most extreme examples- sufferers excluded from society.
- The Hospital of St. Giles in the Fields founded by Queen Matilda and administered by the City of London until 1299.
- Syphilis led to substantial regulation of trades.
- Tuberculosis wards and fever hospitals.



The reduced threat from most contagious diseases has allowed a more muted State response.

- Proportionality is essential.
- Improvements in sanitation, housing, diet, vaccination and treatment have substantially reduced the threat from contagious diseases.
- The State now intervenes much less strongly for individuals.



Fever Van. LS Lowry 1935.

### Provision of voluntary mass vaccination programmes.

- People sometimes forget what it was like in a pre-vaccine world.
- Smallpox, polio, diphtheria, various forms of childhood meningitis among the multiple diseases State vaccination programmes have tackled.
- Reducing my neighbours risk reduces my risk.
- High coverage protects everyone.



Providing clean water, sewerage and regulating waste to reduce infection has been the responsibility of government for centuries.

- Providing clean water by the State for millennia. Pont-du-Gard, Nimes.
- The great sewerage projects of the nineteenth century were essential to the growth of London. Joseph Bazalgette (R).
- Two of the most effective public health interventions. Typhoid, cholera, diarrhoeal diseases.





The principle that the State should regulate food to keep it safe from infection longstanding, but can be controversial in practice.

- Medieval cities had regulations to prevent spoiled food being sold to citizens.
- Compulsory pasteurization of milk to protect children from TB and brucellosis an example; very controversial when brought in between 1920s and 1950s.
- Around 1600 children a year estimated to die from bovine TB at that point.
- A strong lobby against, made up of parts of the dairy industry and those philosophically opposed for several reasons.



# Salmonella in eggs in 1980s shows how tricky this can be.

- Salmonella in eggs was a major public health and economic issue. The (true) statement at the time 2 mm that "most of the egg production in this country [in 1988], sadly, is now affected with salmonella" led to a significant reduction in egg production, mass slaughter of chickens and a Ministerial resignation.
- In poultry vaccination contributed to UK poultry industry recovery (Lion Mark eggs) after the salmonella epidemic in 1980s.
- Superseded mass slaughter infected flocks.
- In UK 1.6 cases per 1,000 person years 1993 -96 to 0.2 cases 2008-9. Laboratory-confirmed cases dropped from >18,000 in 1993 to 459 in 2010.



Salmonella row

plunges poultry

into deep crisis

dustry plunges deeper

tatements by agriculture minis

untry's egg production is infected

slaughtering



Farmers Weekly 1988, PHE



#### BSE/nvCJD a major UK example. The government had to act. There was a major impact on industry.







E Krause 2016

USDA

# There is broad support for the role of the State in reducing air pollution across the political spectrum.







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CROSSWORDS AND GAMES: 2638 - TELEVISION & RADIO; 36-37 - LETTERS: 29-29 - WEATHER: 39 - ANNOUNCEMENTS: 34 - SUDO

Keeping polluting industries away from habitation a long State responsibility. For example King Edward I banned the use of sea-coal in London 1272.

The biggest spur to UK action on air pollution in recent times was the Great Smog of 1952.

- A combination of cold and atmospheric conditions.
- At least 4000 people died (maybe up to 12,000) and 100,000 made unwell over 3 days of severe smog.
- Led to the Clean Air Act of 1956.
- Substantial reductions in cardiovascular and lung disease.



Piccadilly Circus in a pea-souper 1952. *Unknown photographer*.

# Sulphur dioxide (SO<sub>2</sub>). UK 96% reduction since 1970, mainly reduced coal, and in towns fuel mix. NAEI 2018.





# The UK is doing fairly well in tackling emissions of many of the main air pollutants.

DEFRA Emissions of air pollutants in the UK, 1970 to 2016. ONS.



### Lead in petrol. An instructive if extreme example.

- Known to be toxic at high levels for 2 millennia.
- Tetraethyllead (TEL) developed by General Motors added to petrol from the 1920s.
- One of several potential engineering solutions to increased compression (ethyl alcohol another).
- Clear warnings of toxicity from the off.
- For 3 decades research dominated (monopolised) by the industry.



Thomas Midgely



Alice Hamilton

# Lead. Air pollution, affects children.

(UK data: National Atmospheric Emissions Inventory (NAEI) 2018)

- Biggest effect on brains of foetuses and children. Reduces IQ. Possible links to crime.
- Reasonable evidence from the 1960s.
- Restrictions begun in 1970s (US).
- Average American child's blood lead level 13.7 μg/dl 1976, in 2000 it was 2.0.
- Final UK ban on 4-star in 1998, although being phased down before.



Lead (kilotonne)

Tightening regulation spurs engineering innovation, and provides a level playing field.

### (This only works if manufacturers do not cheat).

	Effective date	Upper limit(mg/km)		
	New model	Gasoline	Diesel	
		NOx	NOx	PM
Euro 0	October 1991	1,000	1,600	Not regulated
Euro 1	July 1992	490	780	140
Euro 2	January 1996	250	730	100
Euro 3	January 2000	150	500	50
Euro 4	January 2005	80	250	25
Euro 5	September 2009	60	180	5
Euro 6	September 2014	60	80	5

Vehicle emissions control in Europe

Reference: European Automobile Manufacturers Association



Actions to reduce road accident deaths as an example of the complex role of the State in public health. Generally expected to act to regulate dangerous industries.

- Car design regulations (eg crumple zone, air bags).
- Road design, lighting, maintenance.
- Speed limits.
- Driving tests / licence.
- Drink driving laws.
- MOT test.
- Compulsory seat belts (1983).



Deaths in reported road accidents, UK 1979-2019. UK Gvt.

UK public believes government should reduce the risk of being killed solely due to work by legislation.

92 people were killed due to work related activities in 2019/20.



HSE

# There is generally support for State action against occupational causes of cancer.

- Occupational cancers have varied through history as industries rise and fall.
- One of the earliest recognised examples Potts' scrotal cancer in chimney-sweeps.
- Around 4% of UK cancers currently attributable to occupation (HSE).
- Maybe only 1% now avoidable in practicable ways (Doll & Peto).



Wellers chimney sweeps

# The occupational exposures that cause most cancer (UK).

- Asbestos: 4000 pa.
- Silica 800.
- Diesel exhaust 650.
- Mineral oils 550.
- Paint 350.
- TCCD 230
- Radon 180.



Stanley Spencer. Shipbuilders on the Clyde (detail, 1946). IWM

Observed and projected mesothelioma incidence, UK. Asbestos bans in 1985 and 1999. Rose rapidly, now peaked, projected to fall by over 50% by 2035. (CRUK)



Where a wealthy industry causes harm and depends on addiction for its operating model, or harms others.

- The archetypal one is the cigarette industry.
- Lung cancer the commonest cause of cancer deaths in the UK. Most diagnosed today will be dead within a year.
- The great majority because a wealthy industry has pushed highly addictive products they know will kill their customers onto them at an early age.
- Smoking also causes heart disease, stroke, lung diseases, other cancers.
- Other people's smoke can kill.



Vincent Van Gogh

Lung cancers are the most important in terms of mortality. Around a fifth of all cancer deaths in the UK are lung cancer. Smoking accounts for the great majority of them, and much current heart disease and stroke.



#### Women: 16,338 in UK, 2017

# Targeting children and teenagers was overt, then covert.

- "School days are here. And that means BIG TOBACCO BUSINESS for somebody. Lets get it." R.J Reynolds 1927 internal memo.
- Big push to target teens from the 1970s. "The base of our business is the high school student". Lorillard memo 1978.
- Consistent pattern of claiming to deplore child and teenage smoking, whilst undermining measures to curb it.
- 74% of smokers think smoking should be banned in cars with children. (YouGov)



Joe Camel ad. Moved from 1% to 32.8% of underage market. Started 1988, stopped 1997.

70% of smokers want to quit. And try. *Never* blame individual smokers for lung cancer. They were up against one of the most powerful and wealthy industries in the world.



# The cigarette industry is in rude financial health.

- "We are on track for one of our best financial performances for many years." British American Tobacco 2019.
- Data from BAT 2018 Annual Report. 708bn cigarettes (+3.3%) 189m vaping units.
- The UK High Court accepts that the net economic costs of tobacco use to society estimated at about £13.7bn p.a. whilst the industry pay approximately £10bn in taxes p.a.
- The profit for BAT is 3x the combined investment in the MRC, NIHR, Wellcome in **all** medical research into **any** disease.

Group cigarette (and tobacco heating products – THP) volume	Revenue (£m)	Profit from operations (£m)
708bn	£24,492m	£9,313m
+3.3% (-3.5% representative)	+25.2%	+45.2%
201/: +3.296 (-2.6% organic*) 2016: +0.2% (-0.8% organic*)	2018 £24,492m +25% 2017 £19,564m +39% 2016 £14,130m +13%	2018 £9,313m +45% 2017 <u>£6,412m</u> +38% 2016 £4,555m +2%
Group market share of Key Markets	Definition: Revenue recognised, net of duty,	Definition: Profit for the year before the impact of net finance costs/income, share of post tax results
+40 bps	In 2018, revenue includes £17,257 million of revenue from the Strategic Portfolio, an increase of 49% on 2017 (on a reported and representative basis).	
2017: +40 bps 2016: +50 bps	Change In adjusted <sup>2</sup> revenue at constant rates <sup>1</sup> (%)	Change in adjusted <sup>2</sup> profit from operations at constant rates <sup>1</sup> (%)
Strategic Cigarette and THP volume	+33.4%	+37.8%
451bn	km Non-GWP	Non-GMP
+17.9% (+5.8% representative)	2018 +33% 2018 (rep <sup>4</sup> ) +4%	2018 +38% 2018 (rep?) +4%
2018 45 2017 38 2016 32	2017 (32%) 1bn 2017 (org?) 43% 2bn 2016 +6%	2017 (arg?) 439% 2017 (arg?) 44% 2016 44%
2017: +17.9% (+7.6% organic*) 2016: +7.5%	Definition: Change in revenue before the impact of adjusting items and the impact of fluctuations in foreign exchange rates.	Definition: Change in profit from operations before the impact of adjusting items and the impact of fluctuations in foreign exchange rates.
Oral (snus) (no. pouches)	Change In adjusted <sup>2</sup> revenue from the Strategic Portfolio at constant rates <sup>1</sup> (%)	
3.9bn +93% (+10.5% representative)	+56.1%	
2018	9bn 2018 +56%	
2016	Sbn Definition: Change in revenue from the strategic	
2017: +317% (+32% organic*) 2016: +9%	portfolio before the impact of adjusting items and the impact of fluctuations in foreign exchange rates.	
Vapour (units)	This measure was introduced in 2018, with no comparators provided.	
189m	Changes in 2019	
+100% (+35% representative)	In 2018, the Group Introduced a new measure	called 'adjusted revenue growth from the
2018 11	<ul> <li>Strategic Portfolio' as part of the continual asse delivery of the strategic vision. This measure re growth metric as a key performance indicator i</li> </ul>	ssment of the Group's short- and long-term placed the GDB and Key Strategic Brands volume in connection with the Group's compensation
2016	plans. This Strategic Portfolio reflects the focus	of the Group's Investment activity and Includes
2016: +832%	Camel (US), Newport (US) and Natural Americ	an Spirit (US) and our potentially reduced-

risk products portfolio, which comprises our THP, vapour, modern oral and traditional oral

### Provision of services. Mass voluntary screening.

 Cervical screening has led to a substantial reduction in cancer.

 Bowel cancer and breast cancer screening other successful programmes.



Over 40% reduction in cervical cancer since screening started. ONS Examples where the public *expects* the State to act. And usually has for generations.

Risk is shared across society: your risk is my risk.

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- Infectious diseases more widely including vaccination, clean water, safe food.
- Pollution, especially air and water.

A major power imbalance may kill people.

- Industrial injury and occupational disease.
- Addictive industries like smoking.
- Dangerous industries like motor vehicles.

### Protecting the most vulnerable.

Child and maternal health.



### Public health has had an extraordinary impact on disease. (ONS)



The role of the State in paying for and providing medical individual treatment including secondary prevention varies widely by tradition and politics.

- The UK tradition is strong support for the NHS: State provided free at the point of delivery.
- GPs do most secondary prevention.
- Nations have widely varying approaches to State responsibility for treatment.



Treatment costs covered by the State vary widely. This is a revealed (practical and political) preference.

- Treatment costs usually much higher than prevention.
- In general higher income countries have higher proportion from the State.
- But political/cultural tradition varies widely.
- GBD Lancet 2019



What should the State do about harmful health trends which depend on individual decisions?

- An example is rising obesity, which is a major threat to health.
- Often driven by heavy and persistent marketing by industry, or limited choices.
- Childhood obesity a particular problem.
- Strong link to deprivation.
- The State (the public) pays for the consequences.



Year 6 children obese by deprivation. NHS Digital 2019.

# The ladder of possible State intervention.

- Make individual citizens subject to civil or criminal law.
- Ban.
- Tax heavily.
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- Mass voluntary programme (vaccination, screening).
- Engage with industry.
- Inform the public.
- Support science to test possibilities.



# Soft drinks sugar levy. No tax below 5g sugar per 100ml. Total sales went up 14.9%, total sugar sales went down 35%. All socioeconomic groups. (PHE 2020)



# The central role of evidence for a State public health intervention.

Three things should be kept in balance:

- Difficulty of the intervention. Includes popular support/opposition, cost, time.
- Size of the health effect.
- Strength of the evidence.



Penrose triangle. Sir Roger Penrose, sometime Gresham Professor of Geometry. Wiki. For those sceptical of the State's right to intervene for wider public health:

Pro intervention:

#### Con:

- The vulnerable (children).
- Strong evidence.
- Big effect.
- Cost-effective.
- Healthy working age population.

- Removing existing rights.
- Removing pleasures.
- Exposes the citizen to the law.
- Barrier to trade.
- Expands government.
- Unintended consequences.

# The remarkable improvements in health have many causes, but State prevention has played a major role.



England/UK life expectancy since 1597. Our World in Data.





Sir John Simon, First CMO 1855.