

Healthcare Economics

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Lecture 1: Resource allocation I : allocative efficiency

Mon 05 Feb 12:31

1 Health care markets and access to health care

1.1 Overview

Health Care markets

- health as an economic good
- there are efficiency and equity concerns on both sides of the arguments for and against public and private provision of health care
- but why inequalities in health exist is important

access to health care

- looking at the importance of access to health care
- measuring inequalities in access to health care
- policy on how we can reduce inequalities in this aspect

access to health care is particularly important to resource allocation

1.2 health care as an economic good

healthcare : perfect competition

- healthcare is an economic good, it is scarce relative to wants
- in competitive markets, market forces match supply with demand
 - shortages drive prices up
 - surpluses drive prices down
- providers produce health care in an efficient way, maximising profit
- purchasers are willing and able to pay equilibrium
- access in a free market is based on *the ability to pay rather than need*

Market Failure

- the first fundamental theorem of welfare economics
 - perfect competition generates a socially efficient (pareto optimal) allocation of resources
 - that is, social marginal benefit = social marginal cost
- in a perfectly competitive market the allocation of resources may be privately efficient but not necessarily socially efficient
- when the private marginal benefit \neq social marginal benefit OR private marginal cost \neq social marginal cost then we cannot be **pareto optimal** and market failure exists

externalities

- individuals consume unto the point where the individual's marginal utility of consumption (PMB) equals the individuals marginal cost of consumption
- any external effect of consumption or production (MEB, MEC) is typically not accounted for when individuals or firms maximise their utility/profit
- EG, smoking vaccinations altruism
- from a welfare perspective, the competitive market is not pareto optimal since with
 - positive externalities : goods are underconsumed
 - * $SMB = PMB + MEB > PMB$ $MEB > 0$
 - * $SMC = PMC + MEC < PMC$ $MEC < 0$
 - negative externalities : goods are overconsumed
 - * $SMB = PMB + MEB < PMB$ ($MEB < 0$)
 - * $SMC = PMC + MEC > PMC$ ($MEC > 0$)

public goods

- public goods are good jointly consumed by everyone
 - non rival : consumption by one does not prevent consumption of same good by another individual
 - non-excludable : cannot exclude other from consuming same good (free rider problem)
- healthcare can be rival (hospital beds) and excludable (ability to pay)
- some types of health care are public goods (vaccinations, altruism)

consumer sovereignty

- individuals may not demand health care rationally (over or under - valuing healthcare)
- this could be due to :
 - imperfect information - not knowing what treatment is needed/necessary
 - the ability to communicate needs - how can we signal our preferences (if unconscious)
 - exploitation when health shocks arise (irrationally choosing healthcare with highest cost and lowest risk - does having say headache make a painkiller worth more?)
 - excessive discounting (age dependent) : long term effects of activities?

imperfect information

three main causes of imperfect information

- lack of opportunity for sampling : no prior experience to value quality since most health care is "one off event"
- unclear cause-effect relationship :
 - quality is rarely learnt
 - it is difficult to distinguish the cause and effect of treatment impacts, is it the effect of drugs or the natural healing process
- asymmetric information : education is costly, giving suppliers a degree of power, this may incentivise supplier induced demand

2 for and against public and private provision of healthcare

public or private provision?

- the existence of market failure in health care does not necessarily mean public provision is warranted :
 - insurance markets can work to account for unpredictable nature of health
 - nominated guardians and insurers can offset such concerns about under or over - estimating value of health and health care
 - limited public intervention could work alongside health insurance :

- * information campaigns, quality guidelines, regulation
- * taxes and subsidies

public provision problems :

- removes competitive market forces which can potentially open up inefficiencies in the provision of healthcare, possibly government failure
- moral hazards - can be insured regardless of health investment
- free riding - no 'price' to health care, over utilisation may occur
- financing - equitable - use it or lose it?

private provision problems

- free rider problem - compulsory insurance can resolve this
- adverse selection and asymmetric information - the wrong people buy insurance
- moral hazard - individuals may alter their probability of ill-health
- uninsured populations are certainly those most in need of health care, no provision

there is currently an A&E crisis in England, is this indicative of government failure, would this be resolved in the private sector?

Health policy trilemma

We can think of health policy as being three pronged

1. health - health of the population
2. Wealth 0 spending on other goods
3. Equity - fairness

Moving towards either poses an opportunity cost, reducing the ability to meet the other. Though it must be noted that different countries may have different preferences.

2.1 Access to healthcare

access to health care depends on:

- Availability (geographic, queuing, opening times)
- Acceptability (patient's willingness to accept treatment and provider's willingness to provide treatment)
- Awareness (knowledge of service availability and effects of treatment)
- Affordability (cost of using services : time off work transport etc)

Access is much more than that, (Mcintyre paper), some is availability (number of appointments), opening times, appointment times - what you can access, But it also *depends on awareness*, for instance weekend appointments, would that constitute good access to GP appointments, 7 days a week.

gender, sex, age, ethnicity, sexual orientation can all influence threshold to access GPs. This is also the case for the flip side. GPs may not offer services based upon these.

Affordability - prescription costs, NHS dental costs, **opportunity cost** - what could you have been doing instead of visiting dentist/hospital. Possibly not prepared to since value extra hour in bed etc, affordability in that sense.

Equitable access to healthcare is not just about access :

Good access : empowerment of the patient to seek and obtain care when needed

Extended access policy - **access 7 days a week**

Prolific work in this area, motivation being :

Take pressure off of A&E services

Issues

- moral hazard - people already accessing them may overuse them upon further opportunity to use services
- 7 day access doesn't necessarily improve access for the population, no improvement in access in terms of opportunity cost
- cultural changes take time (such as sunday shop opening hours), maybe culturally it is strange to access GP on Sundays
- *Awareness* - reflecting poor access

Finding that it does take pressure off of A&E services, specifically for younger people it has improved access. However, uptake of this was very low, 40% of appointments weren't taken up. Due to practices not advertising this.

Issues around service itself such as not being the 'local' centre etc.

Given the NHS and public sector interventions are mainly around improving access

How can we define access inequality?

- Horizontal Equity - Equal treatment of equals - individuals with equal need for health care have equal access. Essentially, that access depends on need. The GP has final say in this.
- Vertical Equity - Unequal treatment of unequal needs - different access for individuals with different needs

Vertical different health different access. People who are different have different access

Horizontal - same need same health. Everyone cancer free has same access. Everyone in cancer group has same access. People who are identical in that sense

Example. Horizontal equity - people with MA in economic get the same wage
- vertical equity - people with different degrees get different wages

Access inequities - empirics

How to define unequal in health?

- one way to measure inequalities in access is to assess use: here we can regress use on **health**, age, gender, income, social class, supply
- Need to record protected characteristics and need (health)
- this allows us to make positive statements about equity
- supply can also bias the protected characteristics

Example (OVB). population of 1000 where split population under and above 50
50+ have 3 emergency department visits, those under have 1
regression

$$use_{it} = \beta_0 + \beta_1(age_{50} + u) + e_{it} \quad (1)$$

to get estimated use of people under 50

$$\hat{\beta}_0 + \hat{\beta}_1(age_{50} + u) = 1.0 + 2.0(age_{50} + u) = 1.0 + 2.0 \cdot 0 = 1 \quad (2)$$

predicted use of those aged 50+

$$\hat{\beta}_0 + \hat{\beta}_1(age_{50} + u) = 1.0 + 2.0(age_{50} + u) = 1.0 + 2.0 \cdot 1 = 3 \quad (3)$$

this regression basically gives us the averages

$\hat{\beta}_1$ tells us by how much more (or less) the population aged 50+ use

but need for healthcare likely depends on more than age, and specifically characteristics correlated with age, the variable before is likely biased, hence OVB, not picking up the true effect, picking up other things.

$\beta_2 < 0$ then ...

If $\hat{\beta}_1$ is significant, looking at equation 2 there will be horizontal inequity in need, their use and treatment is different subject to which sides of 50 they are on. Thus horizontal inequity in need. In 3 ...

Protected characteristics allow us to identify horizontal inequality, health measure vertical inequity

Example. under the NHS constitute, there should be equal use of services for those with equal need (capacity to benefit)

Erwin and Whittaker (2016) aimed to analyse whether access to primary care (GP services) was equitable across sexual orientation (regressing GP visits on : sexual orientation, job status, religious belief, ethnicity (protected, age, health ()) and GP characteristics ())

findings suggest in NW, there may be inequality in access for lesbian women, bisexual using more (OR > 1)

adjusted model does not include age - since this can be a big issue here (we don't want to pick up other things when advising policy - we can have unintended effects)

Adjusted regression takes into account supply measures, need, so on.

For the adjusted, we still find less use for lesbian women, but maybe we are concerned there is access issues for bisexual women

gay men use GP services 20% more. From which side is this?

Looking at inequalities, it is so important to make sure regression is specified correctly

under the NHS constitution, where we want equal want for equal need, not depending on sexual orientation, it should be equitable.

barriers to access - differences due to acceptability? Concerns on sex of GP? Availability is still there but there is something in the patients mind creating a barrier, but this is the

Health System's problem to make right

if we believe heterosexual women should use GPs more (say pregnancy), this may be a reason why heterosexual women are using more than bisexual

Vertical Equity :

- recall normative judgements are needed on whether unequal use is justified for unequal need for health care
- a standard test is that those in rose health have higher use

Summary

Market for health care

- health care is an economic good - scarce relative to our wants
- left to a competitive market, the market for health care would not be **pareto optimal** - market failure likely
- the existence of market failure does not necessarily prove the need for public provision
- public provision or intervention usually driven by equity concerns

Lecture 2: Allocation of healthcare resources (budgets)

Wed 07 Feb 14:53

2.2 Health Care Budgets

- publicly funded health care systems require some form of resource allocation funding principles to enable the payer to distribute budgets across a population
- health care provision is usually by geographically specified boundaries (primary care trusts, local authorities (public health), clinical commissioning groups (NHS Budget)
- These geographically specified population groups are likely to differ in terms of the need for health-care (recall NHS aims of equal access for equal need)

capitation

- capitation - population size
- populations can be identical, though they can vary Population of 4 will always get the same share, though a much older population is likely to need a greater need for healthcare, furthermore looking at gender, ethnicity etc. this may influence the make-up of our budget required

- rarely done, when we don't have good data to find above characteristics

Differences in health care likely due to

- population size, age and gender distribution, health and socio economic deprivation

Weighted Capitation

Say elderly have twice the need as young, we can take this into account by multiplying need factor by population size

$$weight = 2 : 1 \quad (\text{A young, B elderly})$$

$$\text{Weighted population} = 1000 * 1$$

$$\text{weighted population} = 500 * 2$$

2.3 Utilisation Measures

Use as a proxy for need - how much use a population has of healthcare, last year say, compared to another population

though there are issues with use, we may underestimate need due to under access

- access is a product of demand and supply (nearby to a hospital - induced demand?)
- Access depends on list of access - why is the use a problem (**fundamental problem in this course**)
- say if dentists earn more money, the more they treat, is use reflecting need? Or rather over treatment?

we have measures of use, this may reflect differences in supply (more hospitals / appointments due to differences in supply), we don't want to allocate resources based upon this (we want to adjust/predict supply), we want to predict use.

Use might be related to protected characteristics

We predict **use**, however use is made up of supply, inequality and need. We want to isolate several valid estimations of need into our predicted value of use.

$$utilisation_{it} = \beta_x Need_{it} + \delta_x Supply_{it} + e_{it} \quad (4)$$

$\hat{\beta}_x$ enables us to determine the predicted need in a population (population weights) $\hat{\delta}_X$ is not used to estimate need

We need to come up with some kind of measure that aggregates all factors of use (appointments etc.), we put this into cost. We need to measure supply and run OLS based on these measures. 1 injection + 1 A&E visit, translating this to cost is logical.

Recap

Deciding how to distribute budget accordingly : capitation - most obvious way of doing it, looking at geography.

However, this is quite inequitable. 2 populations of same n, if differ in age there will likely be different healthcare needs than a younger population (sex, ethnicity differ also). Say Manchester to Salford, an are more deprived may require more resources, even if population sizes are same.

Weighted Capitation - say weighted population has twice the needs of unweighted (could be younger). Just take into account population B is elderly and has greater need, we redistribute the need.

Problem lies in how we calculate utilisation. There is no measure for how healthier Salford or Liverpool or London is to Manchester

In these cases we make use of previous healthcare use, we hope those that have a greater use of healthcare are likely to have a larger need for healthcare. However there are different domains of access, measures of use may capture issues of supply variation, inequalities in access.

If more dentists in an area, there will naturally be more use here as opposed to dentist deserts, thus basing utilisation off of this is not warranted. We need to 'strip' supply from this measure. *Use as the sum of a range of different things* - create a 'needs-based' use to predicted need. That isn't reflecting supply.

$$Utilisation_{it} = \beta_x Need_{it} + \delta_x Supply_{it} + e_{it}$$

Need to be proxied using deprivation, diagnosis data, proportion of population own benefits - using variables correlated with the need for healthcare.

Question : Cancer - if more checkups say in Japan than America, how can we obtain need for cancer checkups? since cancer rates higher in japan - presumably due to more check-ups and mortality from cancer higher in the US, how would we whittle down to the 'utilisation' of cancer check-ups?

Needs Index - 2 populations, 500 and 750 = 1250. Under capitation pop 1 = 40 percent, 2 = 60 percent of budget, if we think unemployment is a needs variable

under weighted capitation, estimate $y = b_0 + \beta_1 UB + e$ predict need $\hat{y} = \hat{\beta}_0 + \hat{\beta}_1 UB = \hat{y} = 216 + 20(UB)$

Using some measures of need to predict needs-based use and make it into our budget-share they are almost equal (in our example) **Limitations**

- if used alone, utilisation may sustain inequalities in access to healthcare and health
- unmet need becomes a key concern
 1. utilisation is only observed for services being used
 2. under-utilisation from populations with need is not controlled for
 - (a) specific unmet need - for particular groups (minority ethnic groups, liability status)
 - (b) general unmet need - for the whole population
- inappropriately met need (over-utilisation) may also occur

From a technical side, the lower the unit of analysis, the better. Historically in England, they are stuck in regions but now we have progressed to the individual level (as opposed to governmental region - hence ecological fallacy).

Alternative Measures of need

- alternative measure of need may be
 - Demographic characteristics of the population
 - * age and gender explain need
 - Epidemiological characteristics of the population
 - * Higher mortality rates explain higher need
 - * Requires data on everybody in the population
- Both are imperfect measures, need is a function of more than age, gender and a specific health measure

NHS - Weighted Capitation

- England
 - Total health care budget £180.2 In
 - * budget is split between sectors (mental health services, GP, hospital etc. - each have their own formulas - mental health to dental services - may have different use and thus stratified need
 - * That is, within each sector different indices and models are estimated to better identify need and split budgets be area
 - NHS England responsible for determining resource allocation formulae, *equity is the ultimate goal*

Example. Ramp Project Research aimed at updating the resource allocation formula for mental health budgets in England (since new data avail, was previously only using amount of time spent in hospital - there could be areas with good mental health services and thus fewer inpatient services receiving less than those with the opposite) 2008/09 - 2% of adult population using mental health services ran regression of costing, the β from regression are used to inform costing while δ 's are not used in order to not sustain access in inequalities to services

Model	WA1	WA2
Proportion providing informal care	-11.86309 (-7.71)	-11.78299 (-7.66)
Contains MH provider	2.74108 (4.38)	2.73913 (4.37)
Distance to CMHT base	-0.07264 (-3.32)	-0.07384 (-3.36)
IB/SDA with mental health diagnosis	36.18262 (18.71)	36.02567 (18.67)
SMR (where a mental illness excluding dementia is indicated)	0.07360 (6.48)	0.07355 (6.47)
Proportion Black Caribbean	3.59290 (3.69)	
Proportion Black		2.15511 (3.87)
Constant term	0.89021 (6.40)	0.83010 (5.64)
N	32482	32482
Adjusted R2	16.83%	16.86%
RESET	0.096	0.184

Figures in parentheses are t-ratios. Models also contain PCT mean values of each of the included variables to control for correlation between PCT effects and the included variables.

Figure 1: Ramp Results

Clinical reason for inclusion of ethnicity, analysis largely focuses on adjusted r-squared. Done for both younger and older populations. Estimates from regression then feed into exposition book, rather than interpreting results. They would each have their own needs index talking about need, how we can identify, and how we can redistribute based upon this, Impact : (arguably more inline with need for healthcare) :

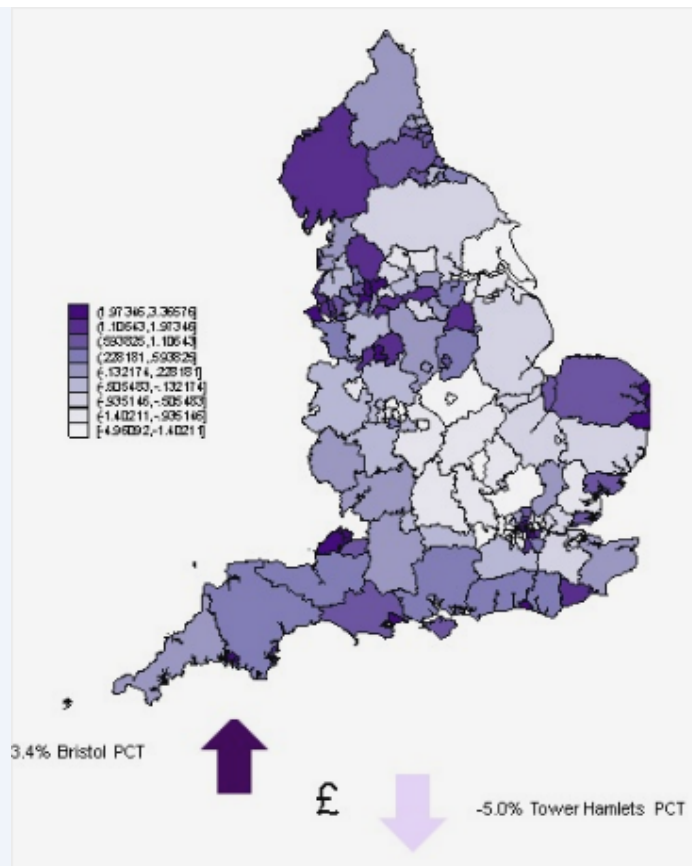


Figure 2: Spatial Effects of RAMP

Clearly, some PCTs have received larger increases in their budget due to others

Weighted Capitation : Equity

- weighted capitation may be seen as horizontally equitable - attempting to ensure equal need has equal weight
- Weighted capitation may also be seen as vertically equitable - different needs have different weights, relative differences driven by the Odell rather than policymaker, still normative - what activity should be modelled
- is weighted capitation efficient?
- What if the aim of the payer is equal health outcomes?

PPF approach to resource allocation

WE are largely conceived with allocative efficiency, looking at this over a year

- When discussing efficiency and equity it is helpful to apply a PPF approach. We can recall a PPF plots the output (gain in health) from differing inputs (budget allocations)
- **Allocative efficiency** - producing maximum

PPF of a population group

Assumption 1 :

PPF

1. No historic spend feedback (in play when we commence)
2. zero expenditure can have positive outcomes
3. Decreasing returns to expenditure (marginal gain decreasing after point)
4. One input, one output
5. Individual behaviours, environment, other external factors are exogenous to the PPF
6. Time period is 1 year

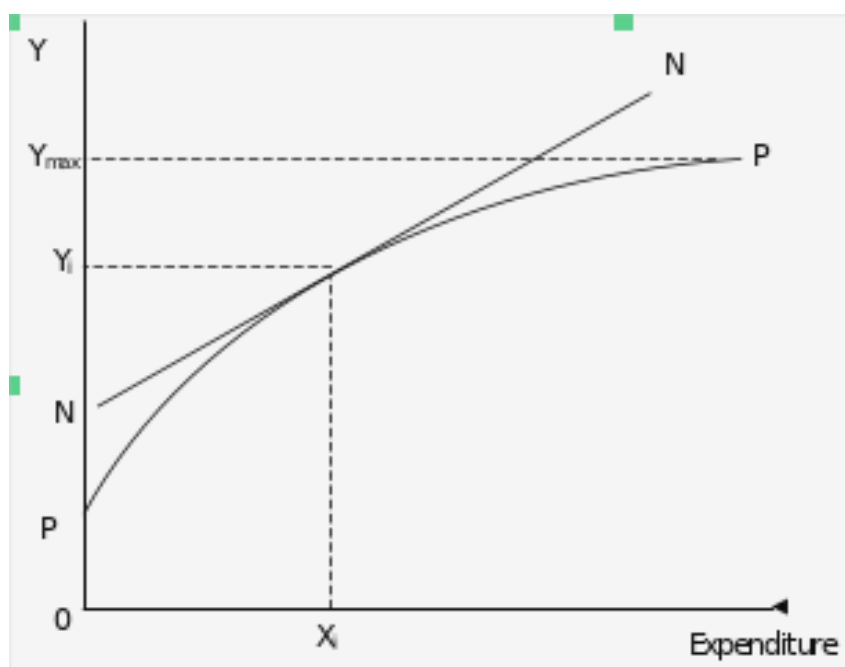


Figure 3: PPF

- need varies at different levels of budget allocation
- ideally give budget such that everyone is at maximum
- however healthcare is scarce resource, we are not likely to be at this point for every population
- as a decision maker - what is the most efficient point at which we can provide?
- one way is to look at marginal benefit of additional expenditure, might be prepared to say : extra days health for £1 : looking at the PPF we can figure out at which point this cutoff point meets

In reality we will likely have many different PPFs for each population. We as health economists can try to estimate the PPFs for 2 different populations. 2 populations with different needs will likely have 2 different PPFs.

Efficient Solution

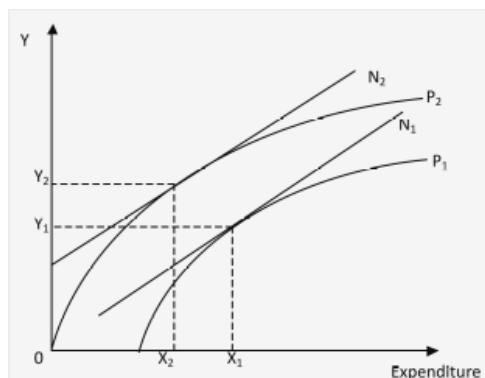


Figure 4

This is where we want to be - the efficient solution, but may we have issues :

- depends how accurate we can identify differences in need. Say we used regression, if there is problems with this we have under or overestimated need in p_1 , p_2 . Further, what says this is equitable, that pop 1 has more healthcare allocation than pop 2?