PHILOSOPHY OF EPIDEMIOLOGY

Media Briefing

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Background

- Epidemiology is the science that studies the way diseases are distributed and caused in human populations
  - Every time you hear that something is good or bad for you, an epidemiological study is behind it…
  - …or if not, it should be!
- E.g. epidemiologists might look at people who are prescribed statins, and see whether they really do suffer fewer heart attacks than comparable people who are not prescribed statins

- *Philosophy* of epidemiology is the study of philosophical questions that arise in connection with the science of epidemiology

Philosophy of epidemiology – why?

- Epidemiology is a very important science, yet relatively young and unknown
  - Even among well-educated, "scientifically literate" people
- It has developed exponentially since the middle of the twentieth century
- Yet it has never been subjected to systematic philosophical study
  - (unlike physics, biology, chemistry, economics, mathcs…)
- This sort of inquiry can
  - Increase the understanding of non-epidemiologists who need to rely on epidemiology
  - Increase epidemiologists' own understanding of the conceptual underpinnings of their discipline – why they do what they do

Two key themes

1. Hunting for causes of disease is not the same as explaining and predicting disease

2. Obtaining and publishing the "best evidence" for a claim is not enough – epidemiologists must also seek to assess whether the claim is *stable*, i.e. whether it will stand the test of time

- (…among other topics: epidemiology and the law; risk relativism; the nature of disease; the causal interpretation of statistical measures)

The hunt for causes

- Epidemiologists are like detectives
- Their "criminals" are causes of disease
- Great epidemiological discoveries include:
  - That drinking water contaminated with excrement causes cholera
  - That smoking causes lung cancer
  - That a sedentary lifestyle causes heart disease
  - That a sexually transmitted virus, HIV, causes AIDS

- BUT not all cases are so clear
  - Do very large soft drink containers cause obesity?
  - Does breast feeding improve the long-term health of the child?
  - Does paracetamol (Panado) cause childhood asthma?

Explanation

- Sometimes the problem is that a "cause" of an event might not be a very good explanation for it
  - Traffic caused me to arrive late…
  - But so did the presence of oxygen for me to breathe, my alarm clock ringing this morning, the happy union of my parents, etc, … back to the Big Bang
  - Had any of these not have occurred, I would not have arrived late (or indeed at all)

- I argue that epidemiologists *sometimes* forget this
- *Sometimes* (not always!) they focus too much on whether risk factors are causes…
  - and not enough on whether the causes are explanatory
- E.g. large soft drink containers *do* cause obesity…
- but many feel that the *explanation* of obesity must mention psychological, social, even moral factors too

Prediction

- The other error we naturally make when we hear that X causes Y is that X is a good *predictor* of Y
  - E.g. an American paediatrician argued that paracetamol use causes asthma, and hence recommended restricting its use – give something else instead, such as ibuprofen or aspirin
  - Sounds fine, right?...
- But what else can cause asthma?
  - Other painkillers, especially non-steroidal anti-inflammatories such as ibuprofen
- Thus *even if the paracetamol causes asthma*, the recommendation might not reduce asthma prevalence
- I call this *The Causal Fallacy*
  - Another example: low tar cigarettes don't reduce cancer incidence

Prediction

- Remarkably little has been said about what makes a good prediction, either in epidemiology or in philosophy

- I argue that:
  - Technical methods are not enough
  - It is always necessary to consider *ways you might be wrong*
    - (e.g. what if ibuprofen causes asthma?)
  - Then you need to *explain why you are probably not wrong* in these ways

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Best evidence?

- There has been a huge emphasis on getting *good evidence* for medical treatments, and in general claims about what is good and bad for you, in the last 20-ish years
- This is a good thing, by and large

- BUT despite these efforts, claims about what is good/bad for you remain remarkably confusing
  - Hormone Replacement Therapy and heart disease?
  - Caffeine intake during pregnancy on birth weight?
  - Early alcohol use and later alcohol abuse?
  - All have been subject to reversals…

Stability

- I argue that epidemiologists should think more explicitly about how *stable* a result or finding is likely to prove

- That is, whether, according to our best current scientific knowledge, the finding is likely to be overturned soon
  - In ongoing work, I am seeking to develop a practical measure of probable stability that researchers could apply to their own results

- This is linked to my idea about prediction – it's all about thinking how you might be *wrong*, rather than looking for more evidence that you are right

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Summary

- Epidemiology is a very important science that is often not well understood even among educated people
- This is because it has developed fast in recent decades
- Philosophy of epidemiology is a new field that can help non-epidemiologists who need to rely on epidemiology to understand it better
- Philosophy of epidemiology can also throw light on the conceptual underpinnings of epidemiology, and sometimes, challenge current scientific practice
- I've indicated a couple of places where I think current practice should have a different emphasis: more on explanation and prediction (rather than causation), and more on identifying stability (rather than best evidence)