**Book Review: Alex Broadbent (2013): *Philosophy of Epidemiology*, Palgrave MacMILLAN**

A philosophical inquiry into a practical and happening discipline like epidemiology is a novel initiative as it has tremendous implications on the day to day life of people and the public health policies of nations. Boradbent engages with some of the core challenges in epidemiology and hence is an important read for not only students of public health and medical science but also for policy makers and practitioners of public health though in some chapters the philosophical engagement might appear difficult in a single reading. Another unique characteristic of the book is the simultaneous engagement with the core issues in epidemiology from an epidemiologists' point of view as well as from the philosopher's stance thereby raising one of the complex problems in epidemiology, namely causal inference, convincingly.

The core theme is about the problem of causation and risk analysis in epidemiology. The implication is that the knowledge production in epidemiology, a field of study that “hunt for causes”, has direct implication for public health practice. The book opens with a broader definition of epidemiology that emphasises the methodology used “as the study of the distribution and determinants of disease and other health states in human populations by means of group comparisons for the purpose of improving population health”(p.1). ‘Determinants’ imply causes and by group comparisons implies the method of risk analysis inherent in epidemiological approach. It is this method of drawing causal inference by merely doing group comparisons is critiqued and is termed as the causal interpretation problem (CIP) in epidemiology. This is convincingly argued by devoting an entire chapter to examine causal inference arrived from a probabilistic and counterfactual approach thereby raising the need for an explanation of the process as a necessary condition to ‘validate’ any form of possible causal inference. In other words, causal inference based on mere difference in the outcome of two groups without an explanation of the underlying process is not only inadequate but could be misguiding. Thus in epidemiology it is the measure of causal strength, mostly implied in a mono-causal explanation that owe its methodology of measuring difference in exposure between groups.

By demonstrating CIP in epidemiology, Broadbent moves on to examine how those aspects of translation, and prediction operates in the field of epidemiology and demonstrate its limitation in real life situations. Translation of results in epidemiology is used extensively to not only 'validate' the applied nature of the field but also to 'legitimize' the causal claims incorrectly attributed based on the difference in the exposure between two groups. One of the limitations in the book is that the problems of translation from individual to population characteristics and vice versa has not been offered a solution except the author points to it as a reason why epidemiological evidence fail to convince the legal system. For Broadbent, the myth of translation emerge initially as a 'metaphor' but later as a way out of the frustration to offer a convincing explanation to population health. In his words “The translation metaphor arises from frustration. Findings and results in epidemiology, as well as in the biomedical sciences more generally, do not have the hoped-for impact on population health (p.58).”

It is in this context he argues the possibility of using the criteria of Stability for evaluating the knowledge claims in epidemiology. Stability is not to be interpreted as stagnation, at least in the context of knowledge claims. Nor it should be interpreted as that maintains the status quo, in which case paradigm shifts deemed impossible. Instead “Stability is that knowledge which is not soon contradicted by good scientific evidence; and given best current scientific knowledge it would

probably not be soon contradicted by good scientific evidence, if good research were to be done on the topic”(p.63). This is a strong statement in the current context when a range of studies in health and medicine are contradicted with such a short period of time so that there is very little ‘stable’ knowledge in the field of medicine and epidemiology. Further, author poses whether stability of knowledge can be ensured by having good quality evidence or by explaining convincingly the mechanisms behind the knowledge. Neither of it is a necessary or a sufficient condition but the latter is a step closer to ensure stability.

Extending from the characteristics of stability is the predictive capacity of knowledge which is considered crucial considering the applied nature entrusted in the science of epidemiology. The book draws on prediction having close linkage with stability and causal inference but warns the popular tendency to equate causal inference as also prediction claims and calls it as causal fallacy. The example author gives explain this well “Inferring that 50% of lifetime risk of lung cancer in the population is attributable to smoking cigarettes is not the same as prediction that if cigarette smoking ceases, the total lifetime risk of lung cancer in the population will drop by 50%.” In other words the characteristic of stability of knowledge, where it is argued that the knowledge arrived at is the inference possible to the best of explanation in the current context, is both a characteristic of right knowledge and also the characteristic of good predictive activity. Though the author doesn't claim a complete philosophical solution to the problem in epidemiology but warns the misconstrued use of risk analysis in epidemiology as if it is causal and attributes power to predictive claims. This is demonstrated by examining the risk analysis in epidemiology by devoting an entire chapter titled 'puzzles of attributability'. Here two forms of fallacies are demonstrated, wherein the term 'attributable' as used in epidemiology in risk analysis is a misnomer as it only indicates excess fraction and doesn't have any power to explain whether one can attribute the exposure to the outcome. This the author calls as exclusive cause fallacy, wherein the power of the single factor is overestimated than actual and is attributed a power for explaining the outcome merely based on having excess in one group as compared to the other. Yet another fallacy is linked with the predictive power of risk analysis, which is termed as counterfactual fallacy, which is while removing even the most probable cause of an outcome in a group will not result in a drop in the risk of the outcome in the same proportion as posed by the risk as it is possible that the ‘probable’ cause can get replaced by another and is not vanished entirely.

By cautioning the tendency of using excess fraction in risk analysis as a causal inference and therefore having predictive claim is like misconstruing 'attributable to' as 'explained by' for all excess fractions calculated in epidemiology. This further overlooks the complexity and diversity inherent in populations by overemphasizing the exposure component and the potential outcome. Further the idea of Relative Risk (RR) and its application in epidemiology is strongly critiqued by questioning its very premise itself as it is only the difference in risk between two populations and there is no way it can help understand strength of association or even contribute in any way in making causal inferences. According to the author “The preferential expression of causal strength using RR is not justified by the possibility of estimating RR from case-control studies, the possibility of eliminating confounders using RR, or any special transferability of RR between populations.” (pp.143).

Thus the book conclude by opening a ‘Pandora’s box’ in the current practice of epidemiology by finally pointing to its limits to address multifactorial causation, wherein the risk factor epidemiology dominates. Based on the earlier critiques to Risk Relativism and Attributability, the author reiterates

the need for explanation of mechanisms and an urge to attain stability in knowledge as ways to become reflexive about the methods in epidemiology, a proposal also emerging from the proponents of critical epidemiology. Thus the author conclude by reiterating the central theme of the book that focus on the limits of epidemiological method by cautioning on the tendency to overindulge in causal ‘explanations’ based on a methodology that is neither grounded in philosophy nor with a valid theoretical basis. This if taken in true spirit can become the beginning for a paradigm shift in the field of epidemiology and therefore public health practice.

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