

II – 1. INTRODUCTION

The term ‘*epidemiological research*’ tends to be used, at present, in reference to any research that addresses the rate of occurrence of a phenomenon of ‘health’ in a human population. There is little or no concern to distinguish between *clinical* research (ultimately on rate-based probabilities, in reference to individuals) and genuinely epidemiological research (on rates per se, concerning populations). No-one seems to ask, for example, whether research in ‘pharmaco-epidemiology’ actually is epidemiological or, instead, clinical. And the term also is applied to inquiries that are not research at all. At issue may be mere fact-finding (about rates), especially fact-finding that is part of epidemiological practice (of community medicine); and the phenomena being addressed may be ones of healthcare rather than of health.

The I.E.A. dictionary [4] does not define *epidemiology* as community medicine. Instead, the definition it gives is this: “The study of the occurrence and distribution of health-related states or events in specified populations, including the study of the determinants influencing such states [*sic*], and the application of this knowledge to control the health problems.” Explications of the terms in this follow, starting with this: “Study includes surveillance, observation, hypothesis-testing, analytic research, and experiments.” The closing explication is that “control of health problems” as the aim of epidemiology means “to promote, protect, and restore [*sic*] health.” *Epidemiological research* that dictionary defines as: “Occurrence research – i.e., research among people into the frequency of occurrence of phenomena of public health, clinical, social, or biological relevance, with measures of frequency and causal assessments related to the determinants of such phenomena.” Much could be said, critically, about these definitions.

Epidemiological research may actually defy definition that is generally agreeable – objective in this meaning. But it definitely is possible to define *quintessentially* ‘*applied*’ epidemiological research. This is research to advance the *knowledge-base* of community medicine (cf. Preface) – of epidemiology, that is (cf. [sect. I – 1. 2](#)). Advancement of the knowledge-base of community medicine is so important that it generally trumps the rest of the research in this genre, whatever might be someone’s definition of the entirety of epidemiological research. As a consequence, epidemiological research is here addressed in terms of that quintessentially ‘*applied*’ segment of it, this alone.

Some clarification of this concept and term may be in order. All of truly medical research – so-called ‘basic’ medical research included – is ‘applied’ in the meaning that it is conducted in the interest of advancing the practice of medicine [16]. Medical research that is not quintessentially ‘applied’ holds some promise – quite remote, perhaps – of bringing an innovation – a new tool (a ‘biomarker’ of some risk, say) or perhaps a newly-established concept (e.g., anti-oxidants as cancer preventives) – for potential deployment, or consideration, in practice. The practitioner need not know about the results of, or even the knowledge derived from, this research, at least not before the new tool or concept arrives. If and when it does arrive, it can enter into the objects of some of the quintessentially ‘applied’ research, to develop the knowledge-base of its deployment in scientific practice of medicine.

I continue to keep that adjective ‘applied’ in quotes, to indicate that it is jargon of science that I regard as less than apposite (cf. [sect. I – 2. 2](#)). I use the word because it is so deeply and widely ingrained in science, mathematics and statistics included, and because no obviously better alternative has been adduced. It means that the research is not ‘pure’ – science for the sake of science – but, instead, intended to produce knowledge for some application outside science itself. This suggests that alternatives to consider are ‘instrumental’ and ‘pragmatic’ (cf. [sect. I – 2. 2](#)).

In ‘epidemiological’ research, now that it has so dramatically expanded in volume and also in scope, sight has largely been lost of the earlier focus on the advancement of the knowledge-base of community medicine. The component concerns in this community-oriented research could be seen to be the advancements of the knowledge-base for the three types of gnosis – diagnosis, etiognosis, and prognosis – in the epidemiological meanings of these [17].

Community diagnosis, concerning a particular illness, is about its current rate of occurrence in the cared-for population (rate of incidence if at issue is an event, rate of prevalence if at issue is a state; cf. Preface and [sect. 1. 2](#)); it is about the illness-specific *morbidity*, current, in the cared-for population (cf. ‘Morbidity’ in [sect. I – 1. 2](#)). Specifically, community diagnosis is *knowing* about the current morbidity from a particular illness in the cared-for community/population, knowing about the *level* of this morbidity (cf. [sect. I – 1. 2](#)).

Community etiognosis is about the etiogenesis of the current level of morbidity from a particular illness in the cared-for population. It is *knowing* about the extent to which this morbidity is due to a particular etiogenetic factor (its presence in lieu of its alternative). It is knowing about this etiogenetic fraction/proportion (cf. [sect. I – 1. 2](#)).

Community prognosis is about the future course of the morbidity from a particular illness in the cared-for population. It is *knowing* about the future levels of this morbidity in the cared-for population (cf. [sect. I – 1. 2](#)).

Research to advance the knowledge-base of community *diagnosis* addresses morbidity (rate of incidence or prevalence) from a particular illness as a function of, mainly, demographic determinants of that level. This concerns non-communicable illnesses only, their endemic levels of morbidity. One alternative to basing community diagnosis on general knowledge about morbidity as a (descriptive) function of its determinants would in principle be a prevalence survey on the cared-for

population. This would be a consideration for a relatively chronic illness only. In such a survey (which is not research; cf. [sect. II – 2](#)), clinical-diagnostic probability of the presence of the illness would be set for each person-moment in the sample, and the sample prevalence of the illness would be derived as the mean of these probabilities. The incidence counterparts of prevalence surveys are more realistic to consider. They require canvassing the care facilities for the illness at issue, except insofar as cases of the illness are subject to registration. The event at issue here is coming to rule-in diagnosis of the illness at issue, first rule-in diagnosis to be specific.

Research for community *etiognosis* about a particular illness addresses a causal rate-ratio of its occurrence, contrasting the presence of the etiologic/etiogenetic antecedent with that of its alternative; it addresses this parameter conditionally on extraneous determinants of the rate's magnitude, and as a function of its (demographic) modifiers. In practice, such an RR for a particular stratum (demographic) needs to be coupled with particularistic information about the frequency of the antecedent among those with the illness to derive the stratum-specific etiologic-etic fractions, and the overall EF can then be derived as the average of these EFs, weighted according to the distribution of the cases across the strata (cf. [sect. I – 1. 2](#)).

Community *prognosis*, regarding future levels of morbidity from a particular illness in the cared-for population, is not as much subject to having a knowledge-base from research as is clinical prognosis. To wit, the declines in the morbidity rates for degenerative cardiovascular diseases over the last two or three decades were not predicted, nor were they predictable. And while an imminent pandemic infection of H1N1 infection ('swine flu') was recently predicted, it didn't really come about.

Even though community prognosis about future morbidity from a particular illness generally is, and will be, unattainable in the practice of epidemiology, the epidemiologist's main concern nevertheless is to help bring about *reduction* in that morbidity, if at all possible; for epidemiology is, in the main, community-level preventive medicine in this meaning (cf. [sect. I – 1. 2](#)). To this end the epidemiologist may recommend, to makers of health policy, the adoption of a *regulation* to remove an etiogenetic factor from the people's environments, or mandating individuals' submission to a preventive intervention (vaccination, most notably); and/or (s)he may recommend making available a community-level *service* for people to reduce the risks for an illness or to achieve its early detection through screening. (Pursuit of early diagnosis is not preventive medicine, contrary to a common notion among epidemiologists; cf. [sect. I – 1. 2](#).)

The epidemiologist's main line of action in the reduction of morbidity from a particular illness is, however, community-level health *education*, whether done personally or delegated – with supervision – to a health educator. Even though directed to the cared-for population at large, the aim in this is to help *individuals* in the population to take informed decisions about their own behaviors and environments (elective) relevant to their own risks for coming down with the illness (or any of the set of illnesses the risks for which would be affected). A notable consequence of this is that the knowledge-base of epidemiological preventive medicine, as it pertains to the health-education in this, is quite the same as that of clinical preventive medicine.

Of particular note in this is that insofar as risk assessment or some other care by a clinician – screening for an illness or prescription for the use of a prophylactic medication, say – may be required, the epidemiologist needs to know this and, in the health-education, encourage seeking of clinical care on particular, specified indications.

This, then, is the big picture of quintessentially ‘applied’ (instrumental) epidemiological research, as it here has emerged up to this point: In comparison with its clinical counterparts, the objects of community-diagnostic studies (on morbidity) are distinctly more limited in the diagnostic indicators that need to be considered; similarly, the objects of community-etiological studies are more limited in the inclusion and particulars of the causal histories as well as of the potential modifiers of the causal rate-ratio that are relevant to consider; and community-prognostic research is much less important, if possible at all; but, for etiologic/etiogenetic research on behavioral and environmental factors the objects of study are quite the same as they are for clinical preventive medicine.

Rather than illness-preventing interventions (artificial, such as vaccinations), preventive medicine is principally promotion of avoidance of behaviors and environments that are naturally occurring and causing illness. Experimental study of this naturally occurring causation generally is quite impractical. Therefore, the scientific knowledge-base of preventive medicine, epidemiological as well as clinical, generally is derived from *non-experimental etiogenetic/etiogenetic* research.

On the other hand, though, when at issue is not change in behavior or environment but adoption of the use of a potentially preventive artifact – use of a vaccine or a chemopreventive, say – experimentation analogous to therapeutic clinical trials – the use of a *prevention trial* – is feasible. (Preventive and other clinical interventions are artificial changes in constitution; cf. ‘Intervention’ in [sect. I – 1.2.](#))

In all of this I use the terms ‘prevention’ and ‘preventive’ – and address the concepts to which I take them to refer – in the framework of traditional – and still appropriate – medical terms and concepts (set forth in [sect. I – 1. 2.](#)). Epidemiologists, however, have a propensity to think that only their practice – and none of that of clinicians – is preventive medicine. This leads to a tendency to enlarge the concept of prevention in healthcare. Thus, the I.E.A. dictionary says that “The concept of *prevention* is best defined in the context of *levels* of prevention, traditionally [*sic*] called, primary, secondary, and tertiary prevention. Other levels (primordial prevention, quaternary prevention) are also used.” It proceeds to define all five of these. (Cf. ‘Prevention’ in [sect. II – 2.](#))

‘Clinical epidemiology’ is not epidemiology [16]. The I.E.A. dictionary defines it as “The application of epidemiological knowledge, reasoning, and methods to study clinical issues and to improve clinical care.” Health services research it defines as “The integration of knowledge from clinical, epidemiological, sociological, economic, management, and other sciences in the study of the organization, functioning, and performance of health services,” while a tenable conception of this ‘research’ is that it actually is mere fact-finding about the occurrence (particularistic) of phenomena of healthcare – for evaluation of it, and this in terms of processes rather than outcomes [40].