

## EDITORIAL

# Epidemiology: a science for justice in health<sup>†</sup>

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The relationships between social environment and health, a time honoured topic of epidemiological research, have been the object of renewed interest particularly in the last 10–15 years. The scientific importance of socially relevant variables, namely those characterizing either a person as an agent in society (e.g. roles, such as sexual or professional, education, income) or a social institution (e.g. type of family, a health delivery service), emerges in several ways. First they are omnipresent as potential, and often actual, confounding factors to be measured and controlled when investigating the associations of other exposures with health outcomes. For instance the association, possibly causal, between levels of blood vitamin C and reduced mortality from several causes has been recently challenged on the grounds of uncontrolled confounding by socioeconomic factors.<sup>1–3</sup> In general these factors tend to be underrated, namely left unmeasured or inadequately measured, not least because of the received (non)wisdom that for variables of interest only as potential confounders crude and cheap procedures of measurement may be all that is needed. Second whatever effect they may have on health outcomes may be partly direct at the level of each individual and partly contextual at the level of the aggregate to which he/she belongs, an aspect not captured by common methods of single-level statistical analyses and which may pose delicate issues of modelling in multi-level analyses.<sup>4</sup> Third socioeconomic conditions accompany each individual from birth and can exercise short- and long-term effects: ideally they would need to be measured at different points of the whole life course.<sup>5</sup>

## Justice in health as a professional concern for epidemiologists

Health related social variables, however, are not only scientifically relevant. The patterns of their associations with a variety of health indicators (of mortality, morbidity and service use) also reflect, and are perceived to reflect, the 'justice in health' that actually exists—or does not—within a society and in the world at large. This perception is revealed by the very language used to deal with health related social variables. One commonly speaks of, say, 'socioeconomic inequalities' in coronary heart disease, although one never hears of 'blood cholesterol inequalities' in coronary heart disease, though both instances equally

refer to differences in disease risk between classes of a variable, in one instance socioeconomic status and in the other blood cholesterol. This '*ad hoc*' language signals and stresses a special challenge to the research epidemiologist, which he or she can confront in two ways, corresponding to two different conceptions of how the epidemiological investigation of social inequalities in health relates to public health.

The first conception regards this research as one of the multiple specialized and subspecialized areas of epidemiology, whose results are left at the door of colleagues in public health practice and of decision makers, letting them use, or not, the findings as they see fit. It regards epidemiological research and public health practice not only as distinct activities, which they are, but also as essentially independent, which they are not. This purist view of epidemiology, however, overlooks the elementary fact that the term 'population', the trademark of epidemiology, denotes two different things. On one side the population is the tool of the epidemiologist's trade: we typically use populations as tools to investigate disease etiology (and today thanks to the increasing availability of biomarkers, this extends to pathogenesis) as other researchers use cell systems or rats. On the other side there are the populations with their burden of disease waiting to be reduced, and this may happen only to the extent that epidemiological research results are translated into effective interventions. Are we going to use populations as expedient tools for science and do nothing, or just pay lip service (as often happens), about populations as targets for interventions simply because it is not our job as researchers? A positive answer, common as it is '*de facto*' if not in intentions in a number of academic circles, suffers from three major flaws. First it deviates from Kant's ethical principle to regard any human also as an end and never only as a means.<sup>6</sup> When using populations only for science while abstaining from any active direct or indirect involvement in the public health processes to benefit them, we simply consider people only as means (unless Kant's principle is very questionably interpreted as satisfied by the use without harm of consenting people).

Second a positive answer perpetuates the stereotype that because the distinctive trait of science as a collective enterprise is objectivity, namely inter-subjective validity of results obtained under explicitly specified conditions, it follows that individual scientists respond only to the moral imperative of scientific truth, unhampered by other moral or political considerations. This stereotype may be naïve but it is certainly not innocent. It increases the risk that researchers, including epidemiologists, abstain from dirtying their hands in policy and political decision processes while in fact influencing them from

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a position of alleged neutrality in which scientific judgement is indistinguishably mixed with undeclared moral and political values and preferences: and these carry particular weight when social issues are at stake.

Third, a positive answer conflicts with the claim, often made when requesting support for epidemiological research, that health benefits for the whole society flow more immediately from direct epidemiological investigations in humans than from the less directly applicable results of other biomedical research. It is true that knowing through epidemiology that tobacco smoke causes lung cancer, leads directly to prevention by avoidance, even without any knowledge of pathogenesis: but actual preventive actions must be taken of which there is no guarantee if as epidemiologists we leave exclusively and discretionarily to others the decision of when and to whom in society they are to be applied.

In sum a purist view of epidemiology may make for comfortable rhetoric, but it stands on frail logic and debatable ethics. A sounder conceptual frame is needed to relate public health to epidemiology and to the investigation of social inequalities and health.

## Justice in health as a guide to research and action

At the very heart of public health, as ‘the science and the art of preventing disease, prolonging life, and promoting health through organized efforts of society’<sup>7</sup> lay the mission of improving *all* people’s health: what is then the justification of costly organized public health and health service administrative structures if it is not for raising the level of health while at one and the same time minimizing social inequalities in health? We hardly need such institutions for the privileged sections of society which, as historian Eric Hobsbawm<sup>8</sup> points out, can well take care of themselves in health no less than in other matters. In this perspective the epidemiological diagnosis of social inequalities in health becomes an integral part of the *raison d’être* of public health and, correspondingly, the epidemiological investigation of social inequalities in health should become, around a necessary specialized nucleus of methodological and substantive development, a common component and dimension within all lines of epidemiological research, with results proactively brought into the public health arena. This conception carries several implications.

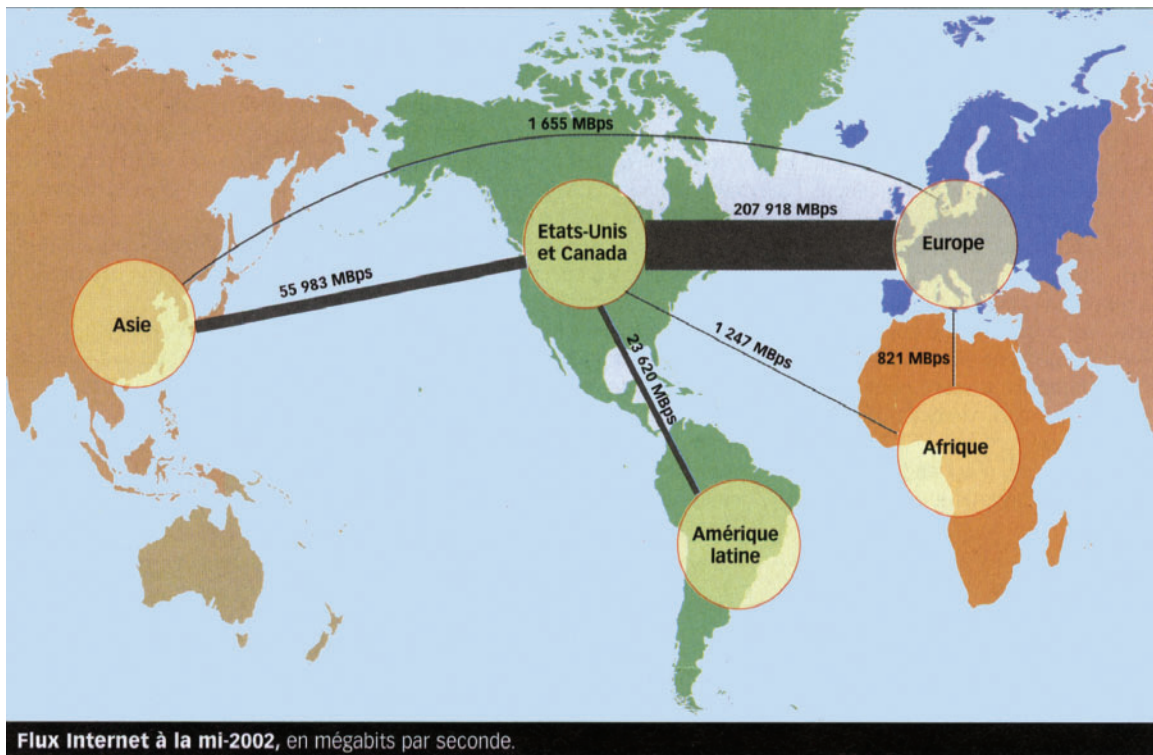
From the research viewpoint it fully acknowledges the fertility of every epidemiological line of research but by adding to each the social inequalities dimension it provides them with a focal point of convergence well geared to the public health needs of our time. I believe such focus of convergence to be indispensable as the very success of the epidemiological approach in all areas of biomedical and health research has tended to make epidemiology a kind of all-purpose ‘post-modern’ tool,<sup>9</sup> subordinate in its research priorities to the logic of whatever particular area it happens to be inserted in. If epidemiologists have been remarkably successful in fulfilling the tasks coming under the three ‘E’s’ characterizing the discipline i.e. ‘Etiology, Evaluation, Education’, a fourth ‘E’ as ‘Equality’ in health (or in actual practice equity in health) remains a task for the future.

To drive research from the descriptive aspects of social health inequalities into their multiple causation and their embodiment<sup>10</sup> into physiological processes makes it indispensable to develop collaborations with both the biological and the social sciences, and, within the latter, with economics, the most developed of social sciences on quantitative aspects. In this respect, however, it is for the epidemiologist to play the role of the hard nosed empiricist and to ask for ‘evidence-based’ results of economics research rather than be satisfied with conclusions, on which often public health decisions are taken, from ecological correlations or brilliantly sophisticated models grounded on unchecked and—to quote a well-known Harvard economist—‘rather rudimentary assumptions’,<sup>11</sup> of which economics is definitely more plentiful than epidemiology.

Last but not least, advocacy both for research programmes on social inequalities in health and for public health policies to reduce them becomes not only a legitimate but a necessary exercise for the epidemiologist, subject to the basic condition—already stressed some 30 years ago<sup>12</sup>—that in order to keep separate the scientific judgments from the value judgements inherent in any advocacy the latter are openly declared (a point Myrdal<sup>13</sup> had cogently argued within the social sciences).

## Justice in health within globalized capitalism

Health changes are today taking place within the new environment of a capitalist socioeconomic system extending worldwide, i.e. ‘global’. Globalization as connectedness and exchanges between human populations all over the globe has always existed. Even its acceleration is not a new phenomenon as it goes back at least to the beginnings of early capitalism, with the steam engine and, later, the telegraph as enabling tools. Today’s basic novelty is the extraordinary acceleration of the informational flows. Unlike trade that has less than doubled (as a proportion of the world GDP) in respect to a century ago, flows of information, in bits exchanged per unit time via formal channels, have increased by several orders of magnitude in the last decades. The density of transistors per chip, the hardware base of all information processing and transmission, have spectacularly increased by at least six orders of magnitude in 30 years. Internet users have been multiplied 20 times, from 30 to 600 million, just in the period 1996–2002<sup>14</sup> and other indicators, e.g. telephone calls or mobile phone density, follow similar steep trends. As shown in Figure 1 these massive flows of information are highly concentrated between some areas of the world,<sup>15</sup> creating new ‘divides’ that join to reinforce or attenuate the older, secular ones. A crucial enabling effect of growing informational flows is the shift of advanced economies from the material to the financial side, virtual financial exchanges increasing at much faster rate than commercial exchanges of goods and services; in 2002 the former had reached a worldwide volume 30 times greater than the latter.<sup>16</sup> Financial exchanges offer plenty of new opportunities for high profits, often of pure speculative nature, and come to condition and dominate the generally less profitable productive activities, enlarging socioeconomic inequalities that penalize people and countries excluded or peripheral in respect of the financial circuits.



**Figure 1** Internet flow at mid-2002, megabits per second.

Within this global environment changing inequalities are observed between countries and within countries, both in material circumstances and health statuses. The secular trends of GDP per capita<sup>17</sup> shows a ratio between the richest world region (Western Europe in 1820 and its Western ‘Offshoots’ later on) and the poorest one (Africa) increasing from 3 in 1820 to 9 in 1913 and 15 in 1950; the ratio decreased to 13 in 1973 but then rose sharply during the development of the neo-liberal global economy to reach 19 in 1998. For Africa this economic aggravation appears to be paralleled by the secular evolution of expectation of life at birth between 1900 and circa 2000 as shown in Figure 2.<sup>17</sup> The figure also indicates that at the other end of the spectrum Western Europe had a consistent improvement in life expectancy during the century, notwithstanding two devastating wars on its territory. It may be tempting to relate this observation with the coexistence within Western European countries of advanced economies and relatively developed social protection systems.

Within countries inequalities exhibit more complex patterns. Data for 20 developing countries in Asia/Near East/North Africa, Latin America and Sub-Saharan Africa show on average a more than double mortality for children (under 5 years) of mothers with no education compared with children of mothers with secondary or higher education. The excess mortality is, however, generally higher for countries with lower levels of mortality and higher GDP per capita. Similar results were reported for the comparison of children of fathers occupied in agriculture compared with fathers employed in professional, technical or clerical jobs.<sup>18</sup> It is not clear whether there is any general trend towards widening or narrowing of these differences. For developed countries, however, data concerning

	1900	1950	2000
Western Europe	46	67	78
USA	+1	+1	-1
Japan	-2	-6	+3
Russia	-14	-2	-11
Latin America	-11	-16	-9
Asia (Except Japan)	-22	-27	-12
Africa	-22	-29	-26

**Figure 2** Expectation of life at birth (M & F) as difference in respect to expectation in Western Europe.

six Western European countries consistently show a decreasing level of adult mortality (ages 30–74) between 1981–85 and 1991–95 accompanied by an increasing mortality ratios when comparing subjects with high vs low educational level: for instance the ratio in England & Wales changed from 1.36 to 1.52.<sup>19</sup> In the same direction goes the recently observed increase in the differential of life expectancy between the least-deprived and most-deprived group in the US.<sup>20</sup> In 1980–82 the life expectancy at birth was 2.8 longer in the least-deprived than in the most-deprived (75.8 vs 73.0), but in 1998–2000 the gap had increased to 4.5 (79.2 vs 74.7). These growing differences have been paralleled in most Western countries by increasing income inequalities, particularly marked in the US where the ratio of household income at the 90th percentile to household income

at the 10th percentile increased from 8.85 in 1969 to 10.63 in 2001.

Taken together these inequalities, which adversely affect large sections of contemporary societies, have also the perverse effect of inculcating by their very presence (as Marx clearly saw<sup>21</sup>), the generic and false idea that all inequalities between humans are 'natural' hence not amenable to correction. Most of these inequalities are in fact man-made and historically determined rather than natural and rooted in biology: but even if they were natural it would be ludicrous to regard them as 'a priori' impossible to correct, in the same way as it would be absurd to consider it impossible to make an object heavier than air to fly because of the natural law of gravity. Still the ideology of inequalities as essentially irreducible, and indeed stimulating and beneficial to society 'as a whole', lies at the heart of unbridled capitalism, old and new. To contribute to empirically proving the opposite concept—that social inequalities in health can be reduced—thereby increasing every citizen's health and liberty, is a major task ahead for epidemiologists, in collaboration with researchers from other relevant disciplines. It entails tracing and analysing the specific links connecting health to standards of living and health care and to their controlling economic and, above all and increasingly, financial forces. In this scientific work two twin objectives equally unattainable in full, but equally worth pursuing, confront epidemiologists as researchers institutionally engaged in public health: truth and justice. In Rawls<sup>22</sup> terse words: 'Justice is the first virtue of social institutions, as truth is of systems of thought'.

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