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Relation of rainfall pattern and epidemic leptospirosis in the Indian state of Kerala

Leptospirosis epidemics in tropical countries are often related to heavy rainfall and flooding.[1–4] The Indian state of Kerala has witnessed post-monsoon epidemics of leptospirosis in recent years. We investigated the relation between the pattern of daily rainfall and the incidence of disease in Calicut, North Kerala by plotting the number of confirmed cases having onset of illness on each day with the daily rainfall recorded for the district by the state meteorology department between July and October, 2002 (fig 1). The day of onset was calculated by subtracting the duration of fever from the day of admission. Disease confirmation was by positive microscopic agglutination test (titres above 1/100; 282 of the 340 suspected cases). IgM enzyme linked immunosorbent assay was also positive in 255 of the 282 cases.

The three peaks of disease onset were in August, September, and October. Each of these was preceded by heavy rainfall peaking about 7–10 days previously. Rainfall peaks were followed by rain cessation resulting in troughs in the graph. The baseline of the troughs preceded the disease onset peak by five to six days. The patients did not have direct occupational exposure to animals. Some 62.9% of the patients had either fissures or wounds on the feet.

Thus, periods of heavy rain followed by days of little or no rain seemed to be the setting for leptospirosis epidemics in this part of the world. Most cases seemed to occur by cutaneous exposure of the legs while walking in stagnant water or moist soil. This implied that leptospira multiplied in the walking paths where water remained undrained for a period of two to three days after the rains was responsible for most cases. Most people in the state wore rubber chappals during the rainy season, which offered little protection against possible infection.

Climatic and environmental factors were probably responsible for epidemic leptospirosis seen in Kerala in the recent years. The pattern of rainfall has changed in the western ghats region of India—which includes Kerala—in the past century, with more rainless days during the monsoon months.[5] There had also been rapid urbanisation and construction activities in the past two decades, resulting in blockage of natural drainage of rainwater and consequent water logging near human habitats.

If our hypothesis is correct, future epidemics of leptospirosis can be anticipated by studying daily rainfall patterns. The thrust of community action can then be oriented towards improved water drainage and if necessary by disinfection or salination of water logged walking paths and wearing of effective protective footwear.

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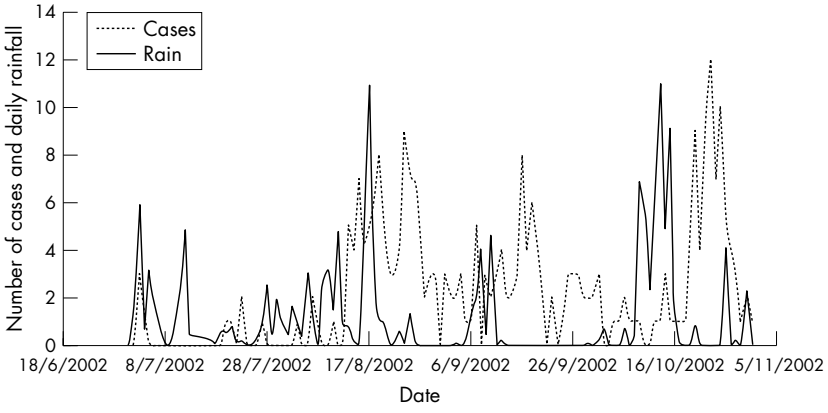

Figure 1 Daily rainfall and leptospirosis incidence (disease onset) for the months July–October 2002.

Qualia years (QY)—not years—should be the unit of measurement of QALYs, DALYs, life expectancy, and life

The complementary concepts QALYs and DALYs combine years of life and quality of life in a single measure.[1–3] In Arnesen and Nord's words: ''QALYs are years of healthy life lived; DALYs are years of healthy life lost. Both approaches multiply the number of years (x axis) by the quality of those years (y axis). QALYs use ''utility weights'' of health states; DALYs use ''disability weights'' to reflect the burden of the same states. If the utility of deafness is 0.67, the disability weight of deafness is 1–0.67 = 0.33. Disregarding age weighting and discounting, and assuming lifetime expectancy of 80 years, a deaf man living 50 years represents $0.67 \times 50 = 33.5$ QALYs gained and $0.33 \times 50 + 1.0 \times (80–50) = 46.5$ DALYs lost''.[2] Note that QALYs+DALYs = 33.5+46.5 = 80.0 = lifetime expectancy (complementariness).

More accurately, we had to put QALYs = $(0.67) \times (50y) = 33.5y$ and DALYs = $(0.33) \times (50y) + (1.0) \times (80y–30y) = 46.5y$. This means that the unit of measurement of QALYs and DALYs is years (y). As y is the unit for lifetime, using the same unit for the product (lifetime)×(lifequality) is confusing.

Saying that quality is rated on a scale from 0 to 1, we have implicitly transformed the real but unknown scale of quality into a standard scale, where 0 denotes no quality at all and 1 the 100% of quality expected (lifequality expectancy). Therefore QALYs and DALYs, combining actual years and dimensionless quality, are, in fact, semi-standardised measures. In a previous article we proposed the fully standardised measures SQALYs/SDALYs.[4] This article, unstandardising lifequality as well, proposes the fully unstandardised measures UQALYs/UDALYs.

Let q be the unit of measurement of quality—qualio in singular, qualia in plural. Continuing the example above, let us assign lifequality expectancy 160q to dimensionless 1, and lifequality 107q to 0.67—in the same manner as dimensionless 1 was previously[4] assigned to lifetime expectancy and 0.625 to 50y. Thus, fully unstandardised QALYs = UQALYs = $(107q) \times (50y) = 5350qy$, and fully unstandardised DALYs = UDALYs = $(160q–107q) \times (50y) + (160q) \times (80y–50y) = 7450qy$. That is, from the total expected life to be lived = $(160q) \times (80y) = 12800qy$ = life expectancy, 5350qy were actually lived and

7450qy were lost: 42% and 58% respectively, the same as in fully standardised measures.[4]

These transformed to fully unstandardised measures do not measure life in years as if it was only lifetime, but, as it is the product (lifetime)×(lifequality), in qualia-years (qy); therefore UQALYs/UDALYs are not misleading. The idea is analogous to py (pack years) in smoking measuring.

Concluding, current semi-standardised QALYs/DALYs should be replaced by either fully unstandardised or fully standardised ones—the latter, in addition, are more understandable and comparable.[4]

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BOOK REVIEWS

Archie Cochrane: Back to the front

Edited by F X Bosch, R Molas. Barcelona: published privately, 2003.

In 1978 one of the authors of this book (the Catalan epidemiologist Xavier Bosch) and Archie Cochrane (probably one of the most influential personalities in the field of the health care) carried out a journey to the places that the latter knew during the Spanish civil war, as a member of the International Brigades that went to help the Spanish legitimate republican government.

This journey constitutes the starting point of this singular book, carefully edited and illustrated (including some of the legendary photographs of R Capa on the Spanish civil war). To a large extent, the book consists of a series of brief comments (not always laudatory) on the biography of A Cochrane, carried out by epidemiologists as Richard Doll, Peter Elwood, and Lester Breslow, among others. An important part of the text is formed by fragments of well known historians and writers as Gabriel Jackson, Hugh Thomas, and George Orwell, which help to understand the socio-political frame of the Spanish civil war and the second world war, during which he was imprisoned in a Nazi concentration camp (where he could carry out a nutritional clinical trial!). Especially interesting are the comments that connect these first professional experiences with the theoretical thesis that Archie Cochrane would defend later on. We mention, for example the following lines of his autobiography about his clinical practice in the concentration camps, in which it is not difficult to recognise the desire of an evidence based clinical practice:

> I remember at that time reading one of those pamphlets considered suitable for POW medical officers about clinical freedom and democracy. I found it impossible to understand. I had considerable freedom of clinical choice of therapy; my trouble was that I did not know which to use and when. I would gladly have sacrificed my freedom for a little knowledge.

The book is conceived as homage to A Cochrane, and does not intend to be either his complete biography, or a critical introduction to his thinking. The book, however, will be read with pleasure by the people that have been felt influenced by the ideas of A Cochrane. On the other hand, young epidemiologists will find in this book, impregnated with social commitment and with ethical values, a superb complement for their career education.

Jaime Latour-Pérez

Global AIDS: myths and facts

Edited by Alexander Irwin, Joyce Millen, Dorothy Fallows. MA: Cambridge, 2003, $19.00, pp 296. ISBN 0-89608-673-9

The authors of *Global AIDS: myths and facts* subtitle their work, *Tools for fighting the AIDS pandemic*. Indeed, they argue that ''informed, determined activism can make a difference'' and urge their readers to ''get involved in the ongoing effort'' to end the AIDS pandemic (page 184). Given this raison d'etre it comes as no surprise that much of their text is devoted to providing practical information that readers can use to educate themselves on a comprehensive array of AIDS issues ranging from vaccine development to drug pricing to organisational corruption as an impediment to expanding HIV prevention and treatment programmes.

At the heart of this volume is a sincere effort to debunk myths and misconceptions that interfere with efforts to systematically and comprehensively tackle the global AIDS epidemic. Readers who are knowledgeable about HIV/AIDS may have difficulty acclimating to the use of ''myths'' as the unifying construct of the text, as at times, they are, of necessity, overstated (for example, ''A vaccine will soon be available to prevent HIV infection'', ''AIDS is primarily an African problem,'' etc). Also, one wishes that the editing might have been more careful—a few of the US statistics cited in chapter one are incorrect. For example, it is not accurate that ''in 2001 for every AIDS case diagnosed among gay and bisexual men in the U.S. two were diagnosed among heterosexual men or women'' (page 14).

In summary, this book provides an accessible overview of the important policy issues facing communities in their struggle to take collective action against AIDS. Readers are provided with informational resources and offered practical recommendations that can help them confront what is undoubtedly the single most important global health crisis of our lifetime. Its message of continued effort in the face of adversity is particularly welcome.

Ronald O Valdiserri

Epidemiologic methods. Studying the occurrence of illness

Edited by Thomas D Koepsell, Noel S Weiss. Oxford: Oxford University Press, 2003, £39.95, pp 513. ISBN 0-19-515078-3

Several books introducing epidemiology are available. They usually follow the traditional layout: from initial definitions to the description and control of biases and measurement errors and it becomes challenging to offer something ''different''.

Epidemiological Methods, by Koepsell and Weiss succeeds in presenting epidemiology in a different way. They nicely capture the readers' interest right from the beginning by taking them through a ''guided tour'' to explore the ''epidemic'' of retrolental fibroplasia, and its epidemiological investigation that begun in the mid-1940s. The authors present frequency measures, treatments, and results from early studies in descriptive tables and figures, some of which seem contradictory and puzzling. They end up shedding light on the correct interpretation of several years of investigation and controversy. The names of these study designs (cohort, case control, clinical trials, etc) and the reasons why results sometimes seemed contradictory are briefly enumerated and at this point the reader's appetite for more epidemiology increases! One perceives why epidemiology is such a relevant tool.

The classic epidemiological concepts are further on introduced and explained in a very didactic way with real but simple examples that are ''beginner friendly'' and pertaining mostly to studies that students, novel to this field, will certainly find interesting (AIDS, detection of drinking problems, smoking, etc). Each chapter uses real study examples and 75 figures and 89 tables to boost understanding of difficult issues. At the end of chapters, students can work on exercises that have correct answers and comments. A key asset of this book is that it originates from the teaching experience and materials of the authors. Furthermore, despite being an introductory text, the authors give the reader a flavor of more advanced issues such as residual confounding or interaction. In summary, a nice example of how epidemiology can help students ''derive an almost esthetic pleasure from epidemiology''.

Jokin de Irala

CORRECTION

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An editorial error occurred in this paper by Professor Wiggins and others (2004;**58**:779–87). The keys to the symbols in figures 2, 3, and 4 were omitted. In figure 2 diamonds represent employed, squares unemployed, and triangles inactive. In figure 3 diamonds represent previous GHQ 0, crosses previous GHQ 3, and bars previous GHQ 6. In figure 4 diamonds represent previous GHQ 0, crosses previous GHQ 3, and bars previous GHQ 6.