Weather

Weather, climate, and public health

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Seasonal changes and the impact on public health

> ''Whoever would study medicine aright must learn of the following subjects. First he must consider the effect of each of the seasons of the year and the differences between them. Secondly he must study the warm and the cold winds, both those which are common to every country and those peculiar to a particular locality....''
> Hippocrates, ''*Airs, Waters, Places*'', 400 bc[1]

> ''As important as the overall tendency toward global warming may be to human health, the effects of the extreme and anomalous weather that accompany it be even more profound''
> Paul R Epstein, 2002[2]

Many texts concerning epidemiology and public health, especially those on health matters related to environmental factors, start by quoting words written by Hippocrates more than 2000 years ago. As we see in the quotation above, this wise Greek doctor considered seasonal changes as fundamental factors in the explanation of health phenomena occurrence. Twenty four centuries later this matter still creates great interest not only among researchers and health professionals, but also among decision makers and the general population. One of the main reasons for this is the growing worry concerning the potential impact on health of an increase of ambient temperature because of the process of ''global warming''.

The relation between environmental temperature and health has been known for a very long time. Various diseases and disorders such as heat stroke and hypothermia are directly linked with temperature extremes. Furthermore, the results of a number of investigations suggest that the relation between mortality and ambient temperature appears graphically as a ''U'' or ''V'' shape, with mortality rates lower on days in which the average temperatures range between 15° to 25°C, rising progressively as the ambient temperature becomes hotter or colder. Investigations carried out in a large number of cities have shown that the temperature level corresponding to the minimum mortality level varies from place to place and country to country according to the usual climate of each zone and probably reflect adaptations of the population to the usual range of temperatures. The greater part of mortality linked to heat occurs during the first days after temperature increase, while the effect of cold has been described as being prolonged for several weeks.[3 4]

A fairly well studied phenomenon has been the seasonal variation in mortality. In fact, the periodic changes in weather conditions are a fundamental factor in determining the seasonal behaviour of some forms of illness. Cardiovascular and respiratory causes of death are those most strongly linked to changes in temperature; and elderly people and those with impaired health or suffering from poor social conditions are the most susceptible to the impact of weather changes. Typically, rates of mortality increase each winter, referred to as ''excess winter mortality''. Initially this phenomenon was related to influenza outbreaks but has become a major issue in Great Britain where estimates show that around 40 000 extra winter deaths occur every year.[5] The results of these studies suggest that exposure to both heat and cold have an important and direct effect on daily mortality that, in the case of cold, can only partially be explained by influenza incidence.

Among the causes speculated to explain the impact of cold are socioeconomic, mainly housing conditions. However, results have been contradictory up to now. In this issue of the journal, Healy presents an interesting paper examining variations in winter excesses on mortality and some potential related factors in 14 European countries.[6] One of the major findings, as was described in the Eurowinter study[7] is that countries with mild climates (as southern ones) show higher levels of excess winter deaths. Following the results from the authors, socioeconomic conditions and housing standards could play an important part in explaining these differences.

Previous articles do not find any association with deprivation indices[6 8 9] although this could be attributable to methodological problems such as the ecological design that many of these studies have, or the low sensitivity of the indices used to discriminate social conditions or housing standards. On the other hand, there is greater evidence that some housing conditions, especially the presence of central heating and insulating systems may play an important part as far as protection is concerned. A recent report has showed a substantially greater winter excess mortality in people living in colder homes in England.[10] This evidence has increased the development of different programmes to improve heating systems in homes having heating deficiencies in the United Kingdom.[11] Together with housing standards, other authors have highlighted the importance of clothes and the type of activity that people perform outdoors.[7 12]

On the other hand, so called ''heat waves'' have been linked with increases in mortality, most notably due to cardiovascular and respiratory causes. The effects of a heat wave are more notorious at the start of summer, when vulnerable people have not had enough time to acclimatise themselves to the high temperatures,[13] and could be explained, in a substantial part, as a harvesting effect, that is to say: a temporal displacement in the occurrence of death among frail people.[3] Home air conditioning has been described as an important factor alleviating the impact of high temperatures.[14]

As well as temperature, the possible interaction with mortality of other meteorological phenomena such as humidity or wind has also been mentioned. These factors are usually treated as individual variables within the model, but also variables or indices that combine the most important element—temperature—with other meteorological variables are used (for example, dew point, ''apparent temperature'' index). Furthermore, a more holistic approach (the so called: synoptic approach) considering city specific climatic categories has been proposed.[15]

Because most of the studies examining the impact of weather on health are time series analyses, some methodological problems must be considered. Besides their ecological nature, one problem in these studies could arise from the fact of differential population being at risk in different months. That is, it is possible that fewer residents are in the city during the summer months.

This bias may be differential if the rate between the summer population and the winter population changes in the groups being compared (wards, cities, countries; ages, social classes). On the other hand, concern has been raised on the possibility that weather and air pollution are confounders. This criticism is crucial for the ''weaker'' predictor, air pollution. In this sense, a number of studies have proved the independent effect of air pollutants on health using different approaches for weather adjustment.[16 17]

Several public health actions have been proposed to prevent negative health effects of temperature such as educational programmes to produce behavioural changes in the population (clothing, to limit time spent outdoors, adequate drink/food), social measures (home insulation, adequate domestic heating/air conditioning), and sanitary measures (advice to prepare emergency services, hospitals, and general practitioners for an increase in demand for services).

In large metropolitan areas in the United States, health watch warning systems, based on a synoptic approach and on forecast meteorological variables to predict and to alert city's residents of dangerous weather conditions during summer are applied,[18] but have not been experimented with until now in European cities. These systems integrated with intervention activities (increasing emergency medical services, alerting groups of volunteers, guidelines for policy makers, and for specific subgroups of the population to avoid heat related illnesses) could be effective in reducing heat related mortality, and further studies to demonstrate the health benefits of these systems are needed.

The definition of public health programmes to prevent heat and cold related mortality needs further research to clarify: (1) the population at risk (elderly people, persons with cardiovascular and respiratory diseases, low social class groups, characteristics of the area of residence); (2) the lag time of the effect (few days, within one week, more than one week); (3) the effect on cardiovascular and respiratory morbidity (for example, analysing hospital admissions data); (4) the role of respiratory infections; (5) the significance of other meteorological variables (humidity, atmospheric pressure, wind, precipitation).

In conclusion, future epidemiological research that focuses on these specific questions will provide a more accurate measure of the full health impact and will assist in improving public health measures and mitigation actions to prevent heat and cold related health effects.

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Iraq

Iraqi reconstruction: for an empowerment process

V Ridde

Humanitarian assistance in Iraq after the conflict

Between my missions in Iraq in 1994/95 and the latest in May 2003, the health of the Iraqi population has dramatically deteriorated[1] and what little remained of the healthcare system no longer exists. Total chaos reigns, healthcare centres have been looted,[2] and patients are not receiving treatment. Twenty million dollars per month would be needed to revive the system.[3] But for it to operate effectively, it is necessary to first reconstruct it. The purpose of this paper is to stimulate a debate on the possible effects of the current process of humanitarian assistance in Iraq, in which non-governmental organisations (NGOs) are involved, because it is necessary to meet the needs of the Iraqi people in an appropriate way.[4]

For some time now, humanitarian actors have been alarmed at the confusion that results from military implementation of humanitarian projects. When American forces bombarded Afghanistan in 2001, with grenades accompanied by daily food rations and medicines, NGOs drew attention to this possible confusion.[5] On the other hand,