have increased sharply in recent years, particularly since compulsory restrictions on the size of families were introduced in some parts of the country in the late 1970s. There are also some new, ominous signs in China, such as a substantial increase in the reported ratio of male to female births—quite out of line with the rest of the world. It could quite possibly indicate “hiding” of newborn female children (to avoid the rigours of compulsory restriction on the size of the family), but it could, no less plausibly, reflect a higher female infant mortality—whether or not induced (with new births and new deaths both going unreported).

What causes the relative neglect of females, and how can it be changed? Possible influences include traditional cultures and values. But some economic links have also emerged, and some connections between economic status and social standing have been identified. For example, the ability to earn an outside income through paid employment seems to enhance the social standing of a woman (which is the case in sub-Saharan Africa). This makes her contribution to the prosperity of the family more visible. Also, being less dependent on others, she has more voice. The higher status of women also affects ideas on the female child’s “due.” Secondly, education, especially female literacy, may make a substantial difference. Thirdly, women’s economic rights (for example, land ownership and inheritance) may be important.^{10 11} Public policy can influence all of these.

The Indian state of Kerala provides an illuminating exception to the prevailing experience. It has the most developed school education system in India, which dates from the early nineteenth century, with strongly supportive state policies in the “native kingdoms” of Travancore and Cochin.⁵ Adult

literacy rate is now over 90%. Property inheritance passes through the female line for an influential part of the community (the Nairs). Many women participate in “gainful” economic activities. Kerala also has an extensive health care system, which has been built up through public policy. Even though Kerala is one of the poorer Indian states, life expectancy at birth there now exceeds 73 years for women and 67 years for men.

The female: male ratio of the Kerala population is now around 1.04—similar to that in Europe and America (and most unlike that in the rest of India, Bangladesh, Pakistan, China, west Asia, and north Africa). It seems that the “missing women” may be rescuable, after all, by public policy.

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- 1 Sen AK. *Resources, values and development*. Oxford: Blackwell, 1984:346-85.
- 2 Kynch J. How many women are enough? Sex ratios and the right to life. In: Gauhar A, ed. *Third world affairs 1985*. London: Third World Foundation, 1985:156-72.
- 3 Harriss B, Watson E. The sex ratio in south Asia. In: Momson JH, Townsend J, eds. *Geography of gender in the Third World*. London: Butler and Tanner, 1987:85-115.
- 4 Sen AK. Women’s survival as a development problem. *Bulletin of the American Academy of Arts and Sciences* 1989;43:14-29.
- 5 Dreze J, Sen AK. *Hunger and public action*. Oxford: Clarendon Press, 1989:50-9, 221-5.
- 6 Coale AJ. Excess female mortality and the balance of the sexes in the population: an estimate of the number of “missing females.” *Population and Development Review* 1991;17:517-23.
- 7 Waldron I. The role of genetic and biological factors in sex differences in mortality. In: Lopez AD, Ruzicka LT, eds. *Sex differences in mortality*. Canberra: Department of Demography, Australian National University, 1983.
- 8 Chen L, Huq E, D’Souza S. Sex bias in the family allocation of food and health care in rural Bangladesh. *Population and Development Review* 1981;7:55-70.
- 9 Sen AK. *Commodities and capabilities*. Amsterdam: North-Holland, 1985:81-104.
- 10 Boserup E. *Women’s role in economic development*. London: Allen and Unwin, 1970:15-154.
- 11 Sen AK. Gender and cooperative conflict. In: Tinker I, ed. *Persistent inequalities*. New York: Oxford University Press, 1990:123-49.

On your bikes

Doctors should be setting an example

Urban cyclists are a heroic and selfless breed: they would rather brave congestion and smog than add to them. Seen by motorists as pests, they have been in decline since the 1950s. But this week, with the publication of the BMA’s report on cycling, they and their environment have found a new and important champion.¹

The health benefits of cycling are well documented. Regular physical exercise delays postmenopausal osteoporosis and lowers cardiac morbidity and mortality—perhaps by reducing body fat and blood pressure and increasing the ratio of high density to low density lipoproteins. It may also improve mental health and all cause mortality.¹ As a form of aerobic exercise cycling is ideal; it makes use of the large limb muscles without putting strain on the joints. The energy requirements of cycling 6.5 km each way to work at a speed of about 20 km/h are equivalent to those of 10 minutes’ wrestling, over half an hour’s squash, 50 minutes’ tennis singles, an hour’s skating, a brisk 4 km walk, or 24 holes of golf.² Studies have shown that civil servants who cycled regularly experienced half the expected number of coronary events,³ and lifelong cyclists over the age of 75 had a 10-fold reduction in the incidence of ischaemic heart disease.⁴

But being cardiovascularly and mentally fit is of little use if you are knocked off your bicycle by the next car turning left. For cycling to be truly beneficial to cyclists instead of just to their fellow urbanites it also has to be safe. This cycling is patently not, and the danger has increased over the past 40 years. Between 1952 and 1987 deaths per billion kilometres

travelled by cycle in Britain almost doubled.⁵ Added to the risk of injury is the fear of injury, with the result that, according to the London Cycling Campaign, one million people who would like to cycle in the capital have been deterred. Traffic fumes, noise, and congestion are also to blame.

Cycling is now taking on all the signs of an unsafe activity. The carefree, hair free child in the butter commercial has become a fully armoured vehicle sporting helmet, reflective clothing, and face mask. These are valid forms of protection and are endorsed by the BMA, with the caveat that the main thing in their favour may be that they draw attention to the problems of road safety and air pollution. But they have no effect on the cause of the problems. They hamper the cyclist while leaving the motorist, the source of the danger and the dirt, unrestrained.

Almost everyone can cycle—99% of men and 87% of women in a 1989 Mintel survey¹—but progressively fewer do. Annual sales of bicycles in Britain are equivalent to car sales, but while 94% of cars are used every day only one in four bicycles is used in a typical week.¹ In the 1950s 10% of all travel by mechanical means was by bicycle, mostly for commuting to work. Now the figure is 1%, mostly for leisure.⁶

And as more people take to their cars to avoid the increasingly hostile urban environment a vicious cycle develops. More cars mean more fumes and accidents, which deters more people from cycling, which means more cars. Town planners fuel the upward spiral, building motorways

that spawn out of town shopping and recreational facilities. Local shops and schools cannot compete and are forced to close. People without cars must either put up with shrinking local provision or invest in a car. Once bought, a car tends to be used for other journeys.

This trend is not universal. In Dutch towns and cities up to half of all trips are made by bicycle and the proportion is growing.⁷ The Dutch government's strong support for cycling, rather than the Netherlands' flat terrain, is responsible. Between 1975 and 1985 it spent £230m building cycle routes, parking areas, and facilities at railway stations.

The BMA's recommendations are far from new; they have been made by cycling bodies, environmentalists, and enlightened planners for years. They include more cycling lanes, an integrated system of cycling paths, priority for cyclists and pedestrians over motorists, traffic restraint, and better access for cycles on trains. As the report says, it is mysterious how policy makers in Britain have managed

repeatedly to overlook the benefits of encouraging more cycling.

Cycling has become a public health issue and one on which doctors can set an example—as they did on cigarette smoking. Like the professor of public health in Newcastle,⁸ those of us who can should abandon our cars. It could inspire a new slogan: "Think first; most doctors go by bike."

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- 1 BMA. *Cycling towards health and safety*. Oxford, New York: Oxford University Press, 1992.
- 2 Williams R. De sanitate urbanorum. *BMJ* 1979;iii:1617-22.
- 3 Morris JN, Clayton DG, Everitt MG, Semmence AM, Burgess EH. Exercise in leisure time: coronary attack and death rates. *Br Heart J* 1990;63:325-43.
- 4 Robertson HK. Heart disease in life long cyclists. *BMJ* 1977;iii:1635-6.
- 5 Public Health Alliance. *Health on the move: policies for health promoting transport. The policy statement of the Transport and Health Study Group*. Birmingham: Public Health Alliance, 1991.
- 6 Banister C. Existing travel patterns: the potential for cycling. In: *Cycling and the healthy city*. London: Friends of the Earth, 1990:20-8.
- 7 Lowe M. Cycling into the future. In: Browne LR, ed. *State of the world 1990. A Worldwatch Institute report on progress towards a sustainable society*. New York: W W Norton, 1990.
- 8 Bhopal R. One car down. *BMJ* 1992;304:451-2.

Photodynamic therapy for cancer

Still awaiting rigorous evaluation

That certain dyes, activated by light, have biological effects has been known for a century.¹ In 1903 three patients with skin cancer became the first to be treated by photodynamic therapy, with topical eosin and a combination of sunlight and artificial light being used.² The recent surge in clinical and research interest stems from the work of Dougherty in the '70s, which showed that the treatment can selectively necrose tumours.³

The treatment entails injecting patients with a photosensitiser, which is partially retained in tumours over a period of 48-72 hours by a complex pharmacokinetic process. The most commonly used agents are haematoporphyrin derivative and its more purified form, photofrin. Two days later the drug within the tumour is activated by laser light (usually tuned at 630 nm, red colour) to release singlet oxygen, a cytotoxic species that destroys the tumour by acting directly on tumour cells and indirectly through changes in tumour vasculature.^{4,5}

As photodynamic therapy depends on light which has a limited penetration in living tissues the depth of necrosis does not exceed 5-10 mm. It therefore follows that for treatment to be curative it should be applied to small and thin lesions. Despite this, most research has concentrated on treating advanced tumours, and only recently have attempts been made to treat early lesions. In a recent Japanese multicentre study photodynamic therapy produced complete remission in all 78 patients with tumours of the stomach, lung, and bladder of less than 1 cm diameter.⁶ Other studies have reported similar results for various early tumours but have been criticised for their small numbers and lack of randomisation.

In some cases, early tumours metastasise readily to regional lymph nodes, in which case surgery remains the best treatment because of its ability to deal with lymphatic drainage.⁷ Nevertheless, photodynamic therapy may have a role in the curative treatment of small tumours in selected patients, particularly those with in situ lesions. Furthermore, its use may have even greater potential in treating residual microscopic deposits left behind after what seems to have been curative surgery.⁸ In these cases photodynamic therapy is delivered intraoperatively to the tumour bed after excision of the primary tumour. Whether this adjuvant use has any effect on local recurrence after ostensibly curative surgery for

colorectal cancer is currently the subject of a phase III study.⁹

Although photodynamic therapy is most suitable for small lesions due to its lack of penetration, it also seems to palliate advanced and recurrent tumours effectively by reducing their bulk.¹⁰ Interestingly, this occurs even in lesions that have failed to respond to conventional modalities. Among its advantages, photodynamic therapy can be used to treat lesions accessible to light through the endoscopic, laparoscopic, and percutaneous (ultrasonically guided) routes, making it less invasive than some other forms of treatment. In addition, its action is relatively selective because of the higher retention of photosensitiser in tumours than in normal tissue and accurate targeting of the activating light. Healing of destroyed tissue occurs by regeneration, resulting in good cosmetic and functional results. The treatment is non-toxic, causes minimal morbidity, and hence is good for palliation in patients with terminal conditions such as inoperable malignant dysphagia.¹¹

Its main drawback is skin photosensitivity, which lasts for up to eight weeks. During this period patients are advised to stay out of sunlight to avoid developing sunburn. Furthermore, some damage, usually minimal, may occur to the surrounding normal tissues. Another drawback is that laser sources are cumbersome; difficult to operate, requiring specialist training; and expensive to run. To surmount some of these disadvantages research is being directed at finding better light sources and photosensitisers.¹²

More than 15 years have elapsed since photodynamic therapy in its present form was first used clinically and over 10 000 patients have been treated. Because reports of its use have rarely risen above the level of anecdote it must still be considered as a research tool. This may change with several prospective controlled trials recently begun in the United States and Europe to compare photodynamic therapy with other established modalities in the treatment of solid tumours. Among these are studies comparing photodynamic therapy with neodymium YAG (yttrium aluminium garnet) laser treatment in oesophageal and lung cancer, and endoscopic resection of papillary bladder cancer with and without photodynamic therapy. These studies should help to clarify