countries who prefer these jobs to working in their own countries. Another option would be to use increasingly the services of nurses and health workers for primary health care.

In summary, South Africa's medical workforce is inadequate and unevenly distributed. It is in a state of flux, with doctors emigrating from and immigrating to South Africa. The immediate shortage will inevitably be made up by foreign medical graduates. These

problems are not unique to South Africa, and the way South Africa goes about solving them will be of interest to health planners in other areas of the world.

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Letter from Chengdu

China takes to the roads

Ian Roberts

China is undergoing rapid motorisation—motor vehicle registrations are growing at a rate of 10%-20% a year. Road trauma is already a major public health problem, and road deaths, officially estimated to be around 50 000 a year, will almost certainly rise with increasing motorisation. China, with its millions of bicycles, currently has one of the most environmentally friendly transportation systems on the planet. However, as the trend towards car travel continues, the problems of congestion and environmental pollution so evident in the West will also become critical public health issues in China.

The gargantuan Chinese state was set moving in a new ideological direction by Deng Xiaoping at the Third Plenum of the Eleventh Party Congress in 1978. The economic reforms instituted to encourage private enterprise and promote sustained economic growth were a great success. Since the early 1980s, the Chinese economy has continued to gather momentum. Between 1980 and 1991, the gross national product per capita increased at a rate of 7.8% a year. Industry, fuelled by an exports boom, provided the thrust for economic growth. The immense internal market also contributed, with consumer products such as refrigerators, washing machines, and televisions becoming more widely available to the Chinese public.

The past decade has also witnessed a dramatic increase in motorisation (fig 1). Although by Western standards the levels of car ownership remain low, there can be no mistaking the trends. And the increase is likely to continue. A recent World Bank report on transport development in the Guangdong province of southern China, a province that contains three of China's four special economic zones, warned that shortages of transport threaten to stifle the region's

FIG 2—Cycle lanes are separated from vehicles

burgeoning economy.² The report called for increased investment in road transport, observing that the fastest growing segments of the economy, light manufacturing and agricultural produce, require flexible, door to door services to be competitive. What the report did not consider were the health implications that these changes might have for both China and the planet. Overdependence on road transport, with the problems of traffic accidents, congestion, pollution, and social inequality, is now a critical issue in the West. Will history repeat itself in China? Last November I travelled to Chengdu in southwestern China to learn more about some of these issues at first hand.

China's Sichuan province is slightly larger than France and has a population of 110 million. The capital city, Chengdu, lies at the heart of the province, midway between the high Tibetan plateau to the west and fertile alluvial plains to the east. Like other rapidly developing Chinese cities, Chengdu is a city under construction. The concrete skeletons of new office blocks and luxury hotels dominate the horizon. A road map of Chengdu looks like a dartboard. Inner and outer ring roads are linked by some 20 radial routes. These, in turn, are interconnected by a labyrinth of narrow alleys. At the bullseye is a colossal statue of Mao, his right arm raised, palm pressed outwards, signalling like King Canute to the waves of traffic on Renmin Nan Lu, the city's main thoroughfare.

Mass transit in Chengdu is by bicycle. During rush hour, the wide, separated cycle lanes flanking the major routes are rivers of (unhelmeted) bobbing heads (fig 2). At city intersections, retired Chinese

FIG 1—Motor vehicles in use in China, 1965-89.¹

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"volunteers," garbed in orange uniforms, blow whistles and wave flags to marshall the flow of cycle traffic. The importance of the bicycle as a mode of transport is underscored by the abundant cycle facilities. There is ample and inexpensive cycle parking (fig 3), and there are as many roadside cycle repair shops as there are petrol stations in Western cities. But where cycle and vehicular traffic mix there is chaos. At the intersection of Binjiang Lu and Renmin Nan Lu, a woman cycling in front of me is knocked off her bicycle by an opened taxi door. Uninjured, she scowls at the alighting passenger while rubbing mud off her clothes. In the busiest parts of the central urban area congestion probably keeps travel speeds down, but on the outskirts of the city the vehicles are more likely to be heavy trucks; they travel faster, and conflicts are likely to be more serious.

Reporting road deaths

Road trauma in China is a major public health problem. Already the number of road deaths, officially estimated to be around 50 000 a year, exceeds the number of deaths (16 000) from infectious diseases.³ In Sichuan, data on road traffic fatalities are compiled by the department of epidemiologic research at the provincial Health and Anti-Epidemic Centre of Sichuan. As Professor Wang, director of epidemiological research, points out, monitoring mortality in a population spread over 570 000 square kilometres is no small task. Complete enumeration is impractical, so data are obtained from a network of disease surveillance areas. All deaths in geographically defined surveillance populations are reported to the local health and anti-epidemic centre with a system of "death cards," which include information on the deceased and the cause of death. The surveillance data on traffic injuries reveal some important aspects of the Chinese road trauma epidemic. One notable feature is that rural death rates (12.7/100 000) are nearly 50% higher than urban death rates (9.0/100 000). This is important, given that almost two thirds—800 million—of China's population is rural. Limited access to emergency medical care in rural areas is likely to be one of the reasons for the higher rate. Chinese trauma surgeons are well aware of the importance of the "golden hour," that window of intervention opportunity, after which mortality rises steeply.

The most important aspect of the Chinese road trauma epidemic is that it is just beginning. Chinese road death rates are already close to those in the United States but there are only five vehicles per 1000

population in China compared with 770 vehicles per 1000 in the United States.¹⁴ But it won't stay low for long. The *China Daily* reports on a recent car fair in Beijing: "An exhibition showcasing thoroughbreds of the world's auto giants last week in Beijing added colour to Chinese families' car owning dreams [and] annual demand for cars in China, where less than 100 000 cars are owned by private individuals, is predicted to be one to five million units around the year 2000." Although most Chinese families will still be dreaming long after the year 2000, increasing motorisation will almost certainly be accompanied by a rise in road death rates.

Child accidents

The voice of my host is barely audible over the thrum of the engine as we hurtle along the new dual carriageway between Chengdu and De-Yang City. "De-Yang City is a new city, it used to be just a village," he informs me. Before I can reply, we brake suddenly as two children, probably no older than 6 or 7, dart across our path. I look back, relieved to see that they made it safely across. An hour or so later, at the health and anti-epidemic centre of De-Yang City, we exchange information on paediatric injury. We soon realise that our respective countries have many problems in common. Traffic injury and drowning, both leading causes of childhood accidental death in Britain, are also important causes of injury and death in China. In De-Yang City, drowning is the leading cause of childhood accidental death, accounting for 53% of deaths. Traffic accidents account for 12% of deaths, a much smaller proportion than in Britain, where they account for 50%. However, the Chinese rates (18.7/100 000) are more than five times those in Britain (3.4/100 000).

Later the same day, on the wards of the People's Hospital of Guan-Han City, we see the human face of the road trauma epidemic. In one room is a 5 year old boy, his leg and foot crushed by a bus; in the next, a 4 year old recovering from a liver laceration, having been hit by a truck while riding pillion on his father's bicycle.

An edict from the Chinese Ministry of Public Health urges public health workers to "grasp infectious disease in the right hand and chronic disease in the left hand." Judging by the dramatic fall in infectious diseases, the right hand is clearly the strongest. Since the inception of the expanded programme of immunisation, death rates from diphtheria, pertussis, and tetanus have plummeted. Controlling chronic disease may prove to be more difficult. As for the injury epidemic, the situation seems to be similar to that in the West, with the role of health professionals more or less limited to counting the dead and treating the injured. The World Health Organisation seems to be aware of the magnitude of the problem. Since 1987 it has collaborated with the government of China to develop a "national programme for the prevention and control of traffic accidents." None the less, an effective programme of countermeasures remains some way off.

Motorisation, development, and health

In China, every other Saturday is a regular workday. I was lucky. My last weekend in Chengdu was a "long weekend," and dining alone at the Furong Restaurant I enjoyed the opportunity to reflect on my visit to Chengdu. From the table behind me there was raucous laughter—an English businessman was showing a group of Chinese how to pour beer without it frothing. Subsequently, shards of English conversation pierced the background Chinese hubbub—"How do you get your gearboxes to your retailers? . . . I hear you have a

FIG 3—Cycle parking on Renmin Nan Lu

heavy truck problem . . . I've got a contact in Mercedes you know." There it was again, just like in the World Bank report, the link between motorisation and development. Cause or consequence, the motorisation of China will have important implications for the health of its people. Some effects will be beneficial, such as improved access to medical care, employment, and recreational opportunities. Others, notably traffic accidents and environmental pollution, will be detrimental. Adverse effects will be global as well as local. Worldwide, passenger cars account for 13% of the carbon dioxide—the most important greenhouse gas—emitted from fossil fuels. If China's 1.3 billion population attains a degree of personal motorised mobility approaching that in the United States, the contribution to global warming would be immense.

China, with its millions of bicycles, currently has one of the most equitable and environmentally friendly transport systems on the planet. However, European and North American car markets are reaching saturation point. Western car manufacturers are

looking to the east. Little wonder China is one of Mr Clinton's "most favoured nations." Sadly, the answer to my question, "Will history repeat itself in China?" is almost certainly: yes, it will.

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Publication: an ethical imperative

John Pearn

Publication of medical research is both a monitor of the researcher's ethics and an audit of the local or regional ethics committee that approved it. Selectivity of publication or of the intention to publish lessens this audit. Opinions differ about what is ethically allowable in clinical and benchtop medical research. Ethical permission and ethical monitoring of medical research are subject to a hierarchy of pyramidal controls, starting in hospital and ending with the local, institutional, or regional ethics committee. Currently, such committees function with widely varying degrees of efficiency and quality of output, and with differing viewpoints on many ethical issues. Without an a priori insistence by institutional ethics committees that there be an intention to publish all medical research involving human subjects, ethics committees cannot routinely be subject to the scrutiny or audit which they themselves demand of researchers.

Divergent views on many ethical aspects of medical research are held not only by individuals¹⁻¹¹ but by institutional ethics committees¹² and by the broader informed public as well.¹³⁻¹⁷ Some ethics committees are startled by what others allow, and some committees, by contrast, are seen as overly conservative. Only a fraction of this divergence of collective viewpoints of ethics committees is ever printed. One celebrated exception was widespread comment about the recent study of HIV in children in Zaire—a study approved by the French national ethics committee but not by the United States National Institutes of Health.^{14,15}

Local or regional ethics committees and institutional ethics committees undoubtedly function "at present with variable performance."¹¹ Such ethics committees act as watchdogs of patients' rights, but who watches over ethics committees? The best way in which institutional ethics committees can open their deliberations to scrutiny is through publication of the research that they allow. Rarely do they demand, as a condition of ethical approval, that any research project be submitted for publication. Both the Royal Children's Hospital (Brisbane) ethics committee and the Australian Defence Force medical ethics committee have adopted this requirement for all projects involving human or animal subjects. My own experience, follow-

ing discussion in many ethics forums, is that this *modus operandi* is exceptional. This paper explores some themes and experience apposite to this topical and important subject.

The chain of ethical supervision

The basic principle that underlies the ethical supervision of medical research is that of higher order sanction. The three primary technical evils of misconduct in medical research—piracy, plagiarism, and fraud¹⁸—are minimised by such a hierarchy of supervision. The fourth evil, that of unethical research, is partly mitigated by a traditional in house supervisory sequence of hierarchical control; but without the demand that research will be published, these modulatory overtones remain "in house," with all the historical evidence of the dangers of such a system.

The funding of most, but not all,¹⁴ medical research is provided by public or private institutions, or by commercial companies which demand initial approval by the institutional ethics committee. Most committees do not monitor research, an omission that is not unique to medicine. One major national institution of engineers "for 70 years has never once investigated a case where an engineer failed to put the public interest first."¹⁶ To ensure that societal values are upheld, even developed and clarified, the safety and quality of institutional ethics committees' judgments need to be subject to the audit that the committees demand of their client researchers.

Institutional ethics committees and quality of decisions

Though the theme of medical ethics has a history of more than 2000 years, most local and regional ethics committees and institutional ethics committees have been instituted in the past decade and operate in the context of an evolving discipline. All who have served on such committees know that there can be widespread differences of opinion not only between individuals but between committees when specific research projects are being appraised. Sometimes a particular research project crosses boundaries of several institutions and sometimes one institution's ethics committee will

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