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China

Long-Term Issues and Options in the Health Transition

(In Two Volumes) Volume I: The Main Report

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FISCAL YEAR

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ABBREVIATIONS

AES	-	Anti-Epidemic Station
AIDS	-	Acquired Immune Deficiency Syndrome
CAPM	-	Chinese Academy of Preventive Medicine
CHD	-	Coronary Heart Disease
COPD	-	Chronic Obstructive Pulmonary Disease
CT	-	Computer Tomography
DSP	-	Disease Surveillance Point
EPI	-	Expanded Program of Immunization
GDP	-	Gross Domestic Product
GIS	-	Government (civil service) Insurance System
HBV	-	Hepatitis B Virus
IDDM	-	Insulin Dependent Diabetes Mellitus
IMR	-	Infant Mortality Rate
LIS	-	Labor Insurance System
LOS	-	Length of Stay
MAC	-	Maximum Allowable Concentration
MCH	-	Maternal and Child Health
MMHg	-	Millimeters of Mercury
MOF	-	Ministry of Finance
MOPH	-	Ministry of Public Health
NAEM	-	National Association of Emergency Medicine
NEPA	-	National Environmental Protection Agency
NCD	-	Non-Communicable Disease
NIDDM	-	Non-Insulin Depended Diabeter Mellitus
NMTAC	-	National Medical Technology Assessment Council
OECD	-	Organization for Economic Cooperation and Development
PHCC	-	Patriotic Health Campaign Committee
PLA	-	People's Liberation Army
RDA	-	REcommended Daily Allowance
QALY	-	Quality Adjusted Life Year
SEdC	-	State Education Commission
SPC	-	State Planning Commission
SPAC	-	State Pharmaceutical Administration of China
STCMA	-	State Traditional Chinese Medicine Association
TB	-	Tuberculosis
TCM	-	Traditional Chinese Medicine
UNICEF	-	United Nations International Children's Emergency Fund
WHO	-	World Health Organization
YPLL	-	Years of Potential Life Lost

Preface

1. This report is about China's health status now and over the next 40 years. It covers a complex set of demographic, epidemiological, behavioral and economic factors which affect the provision of health care as China moves toward the 21st century. The forces involved will shape future social debate and public response to health needs. These forces will also determine the amount, characteristics and distribution of illnesses in China. Our understanding of these forces, their short and long-term implications and policies to direct or moderate them remains imperfect. But the broad directions of the health transition are now emerging clearly enough to require attention by Government. Many aspects of the health transition and these issues discussed in the report will also be relevant for other developing countries.

2. Today in most parts of China, and in much of the developing world, about 96% of all babies will live to be age 1. Of these infants more than 95% will survive to be 5 and more than 90% of these children will enter adulthood and live to at least middle age. The premature death of those children who are not among the fortunate majority continue, rightly, to be the subject of national and international interventions. The premature death and often substantial morbidity and disability of the majority of adults are often ignored, assumed to be inevitable, or the consequence of "fate". Many "public" health programs concentrate on the needs of the first five years (<10%) of an average life today. Health needs for the remaining 90% of life for most people are left primarily to market forces, personal wealth and good fortune. Even public expenditures for illness care in adulthood are mainly for treatment or palliation of illnesses which occur prematurely. These patterns of expenditure, coupled with the forces inherent in the health transition contain the nucleus of forces which threaten to cause consumers, providers and financiers of health services to respond in ways which may only polarize and exacerbate access to health care at all ages. Without better understanding of the forces at work, "we risk an unacceptable paradox: instead of being an instrument for equity, health services may serve to increase social inequity" resulting in a deterioration of health for many at the benefit of a few.^{1/}

3. The health transition is already well advanced in most parts of China. In these areas, many of the most important health priorities that now remain involve the control of chronic diseases in middle and old age. This report is intended to help China deal with the effects of the health transition and developing an affordable health care strategy for the coming decades.

^{1/} Frenk, J; Bobadilla J.L.; Sepulveda J.; Lopez Cervantes M.,. Health transition in middle-income countries: New challenges for health care. Health Policy Planning, 1989, 4/1 (29-39).

4. The report reflects the work and thinking of many Chinese scientists and health care leaders who have been involved in developing the content of the report and commenting on the Bank's preliminary understanding of problems and issues. Their wisdom and contributions are gratefully acknowledged. The next step toward a national and regional consensus on health strategy and details of approach, necessarily must be taken by them.

5. The international community has also contributed to the report. The Centers for Disease Control in the United States has been particularly helpful. Scientists and leading health authorities from Australia, the United Kingdom, Canada, and the United States, have generously contributed their advice and experience. Although it is not possible to acknowledge them all individually, their encouragement and willing contribution is deeply appreciated.

6. The main Bank mission was led by J. Richard Bumgarner, who is the primary author of the report. Zafer Ecevit structured the early work on this study, led the first mission and provided continuing guidance in development of the report. H. Dennis Tolley, Ph. D., Brigham Young University (U.S.), has constructed the computerized projection model on which future epidemiological scenarios are based. Prof. J.E. Blanpain, M.D., Leuven University Medical School (Belgium), contributed to the core draft for the hospital management chapter; David Banta, M.D., health policy consultant (The Netherlands), provided the assessment of medical technology in China and the vignettes on cost effectiveness of leading technologies. Thomas Hall, M.D. University of San Francisco (U.S.), tackled the complex topic of China's health manpower and its future development needs. Howard Barnum of the World Bank contributed to cancer epidemiology, and the report's conceptual approach. Robert Kane, M.D., University of Minnesota, Nicholas Prescott, and Dennis Mahar of the World Bank participated in early missions to China during which the report's concept, approach and data needs were defined. Chiraporn Chotikabukkana, World Bank, helped with charts and tables presented in this report. Stephanie Gerard trimmed the lengthy first draft into a readable report. Guia Bunoan, Susan Brown, Maria Dimatulac, Socorro Manila and Linda Mih assisted in its processing. The report is in two volumes, a Main Report and a detailed Annex Volume, each with nine chapters.

7. The Ministry of Public Health leadership and staff contributed actively and thoughtfully at all stages. Their support, insights and encouragement made this report possible.

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CHINA

LONG-TERM ISSUES AND OPTIONS IN THE HEALTH TRANSITION

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Executive Summary

China: Issues and Options in the Health Transition

1. The future health of China's people will depend largely on public policies to improve health in an economically efficient, equitable manner. As a result of inexorable demographic and epidemiological changes a health transition is occurring in China (Box 1.1). The chronic, non-communicable diseases have become the main cause of premature adult morbidity and mortality. The response of the health care system and of broader public policies to the demands originating in the health transition will determine the amount, characteristics and distribution of future illnesses. Health care spending will inevitably grow, but the rate of its growth, and, more important, the distribution of benefits, will be determined by Government policies. Budgetary, planning, fiscal, public health, environmental, regulatory, educational and manpower policies can influence the course of the transition, improve efficiency of health services and help to maintain social equity. This report reviews the main interacting demographic, epidemiological, behavioral and economic factors which affect health status and the provision of health care in China. It concludes that the magnitude of the health transition, the important policy options and the areas requiring further study are now emerging clearly enough to allow informed decisions by the Government.

2. *Past Progress.* Family planning, childhood immunization, accessible primary health care (particularly for mothers and children), improved nutrition, infectious disease control and better education, sanitation and housing have contributed to remarkable gains in health and life expectancy in China. The achievements have been far beyond what could be expected for China's stage of economic development and are termed the First Health Care Revolution (1.1-10)^{1/}. It was firmly founded on a broad, publicly financed and conducted disease prevention strategy, coupled with accessible primary health care. Such successes in the control of infectious disease mortality far exceeded what has been achieved in many other developing countries.

3. Morbidity and mortality from infectious diseases continue to decline on average in most areas of China. However, in some locales and among certain age groups, and especially among people in remote and poor regions, levels of communicable disease are much higher than the national averages. Reliable data about infectious disease trends in these areas do not exist. But even data based on provincial averages show that there are substantial parts of China where declines in the prevalence of some diseases have slowed and even reversed. Underlying these developments, and sharpening their impact among the poor have been uneven economic growth, a relative reduction of public funding for health and privatization of most health services. Even where deterioration of health status may not have occurred, between 10 and 20% of the population still suffers unacceptably high levels of acute respiratory disease, tuberculosis, pneumonia, dysentery, parasitic diseases and micronutrient deficiencies. Although circumstances surrounding the health sector have changed in 1980s, the chief public health priority for this part of the population is to complete the First Health Care Revolution. This will require the expansion and continuation of the disease prevention strategies that have already proved effective in most of China. Gains in the more backward areas will be more difficult to achieve. They will require improved epidemiological

^{1/} References to more detailed discussion in the main text are indicated by chapter and paragraph numbers, i.e. chapter 1, paras. number 1-10).

planning, resumption of public financing for primary health care, increased and better health manpower, health education programs, and effective deployment of health care workers and resources. In addition, for most of China, health strategy for the future will have to recognize that some of the current inequities in disease burden have been caused in part by shifts in health and economic policy since 1979.

4. However, in all parts of China, including the poorest areas, infectious diseases have decreased to a point where the chief causes of premature death and disability that remain are the various chronic diseases (1.11-22 and Table 1.1). China's disease reporting systems are improving rapidly and leave no doubt about overall trends (Box 1.2). The infant mortality rate by the beginning of the 1980s was thought to have fallen to about 34/1000 live births (official data). It is now recognized to have probably stagnated at about 40/1000 during the 1980s, though this still is moderately low among developing countries. Chances of death in childhood (1 to 4 years) and youth (5 to 14 years) have been consistently and dramatically falling since the mid-1970s. The annual probability of death from infectious disease for adult men and women in China (ages 15 to 60) is just over 1%. Rural men have almost twice the chance of urban men of dying of infectious disease (1.1% versus 0.7%). Rural women are four times as likely to die of infectious disease (1.4% versus 0.34% urban). Almost all this difference is due only to tuberculosis for men and to tuberculosis (three-fourths) and maternal risks (one-fourth) for women. Both problems can be effectively addressed with well-designed, publicly-funded health services but have languished during the 1980s partly as a consequence of economic policy shifts.

5. In contrast, the annual probability of adult death from chronic disease, injury and suicide is almost 15 times greater for men, and 10 times greater for women (when compared with infectious disease). Urban/rural differences are much narrower for chance of death from the chronic diseases. Rural adult males are 8% more likely to die from chronic disease or injury compared to urban men; rural women have probabilities 11% higher than urban women. For both sexes, in both rural and urban areas, the risk of death from chronic disease is many times that of communicable disease. The main causes of death are cancers, heart disease, stroke, chronic lung disease, liver disease and injury and suicide. These same causes account for the majority of premature, serious disability. For 80% to 90% of the population the most important disease control priorities that remain for the 1990s and beyond involve the chronic non-communicable diseases of middle age, injuries and suicide. Success in the First Health Care Revolution presents China with very different public health challenges for the future.

6. The Health Transition Forces. The Chinese health care system is not well-prepared for the transition from acute to chronic disease control, or for coping with the problems created by the structural changes in the economy. However, many of the forces driving this health transition are inexorable.

- There are demographic changes as the many children of today grow older to form a larger middle-aged population at risk from the chronic diseases which emerge mainly in middle and old age (Table 4.1).
- There is changing probability of developing chronic diseases as a result of trends in risk factor exposures (e.g., cigarette smoking). The present masking effect of the long incubation period for chronic diseases will soon begin to disappear. In particular, the future large effects of current smoking patterns will materialize (3.4-

14). Other lifestyle, dietary, environmental and occupational risk factor exposures are changing, with some increasing and others decreasing in duration, magnitude or frequency (3.15-36).

- There is consequent changing morbidity and mortality from disabling and medically complex chronic diseases (Chapter 2). Demands for treatment and care for the middle aged and elderly will be strong. Economic losses from the effects of premature disease and death and investment requirements for hospitals, medical technologies and health manpower will be large (Chapters 6-8).

7. At present, some prevention programs and health agencies lack clear objectives (5.6) and sustained, public financial support. Many "public" health programs now concentrate almost all their efforts on the needs of only the first 10% of the average life span. Health needs for the remaining 90% of life for most people are largely subject to market forces (9.23-27). Even public expenditures for illness care in adult life are often mainly for treatment or palliative care of chronic illnesses which, although they may have been preventable, may not respond to medical treatment (9.33-36 and Chapter 2). Expenditure patterns and the trends inherent in the health transition threaten to cause consumers, providers and financiers of health services to respond in ways that are largely ineffective, and may actually reduce access to effective health care at all ages (Boxes 9.2 and 9.3). Health institutions and their staff today are oriented (by training, equipment, tradition and especially the present financial system) toward providing mainly treatment services (6.1-22), and this is not in general the best strategy for control of chronic disease (Chapter 2 and 5.1-3). The Central and Provincial Planning Commissions continue to place priority on increasing investment in hospitals (6.35-38). Total health care spending patterns are less supportive of the stated national policy goals of "prevention first" and "health for all." Indeed, in recent years, health care financing has been provided in ways that, in part, are working against development of a preventive strategy (9.19; 9.35-36) and are contributing to higher health care costs (9.43-57). For example, financial authorities, concerned about present serious resource constraints, try to limit recurrent budget funding and press health institutions to mobilize more of their resources from fees, with adverse general implications for health spending (9.28-30; 9.62-66).

8. *Health Financing.* The most important event for China's health sector in the 1980s was the decision by government, in implementation of its economic reforms, to make cost recovery the foundation of health care financing (9.11-18). This process began with the ending of the commune system, which had previously served as the source of much health care financing. The change accelerated with financial system reforms and decentralization policies that resulted in relative declines in public resource flows to the health sector to pay for adequate salaries and other recurrent costs (9.23-27).

9. The macro-economic environment for the health system radically changed and became relatively inhospitable to public health goals. It stressed competition and financial self-sufficiency at the institutional level and directed public resources away from the health sector in favor of the productive sectors. To cope with these changes, the Ministry of Public Health (MOPH) and provincial and local bureaus of health initiated policy changes within the health sector. Many of these changes were intended to improve efficiency and service. They also sought to mobilize essential resources for the sector in order to retain health manpower and keep health institutions open. By and large these attempts have succeeded, but with some unintended, adverse effects.

- There has been a redirection of effort away from basic prevention programs with mainly public benefits toward revenue earning preventive activities with limited (mainly private) benefits (9.18-20).
- Resource mobilization and efficiency were encouraged by reforms requiring most health institutions to earn revenues sufficient to cover operational costs and some capital costs. This resulted in "provider encouraged" consumption of those health services on which a profit could be earned, irrespective of whether they were of much real benefit (7.12-13 and Boxes 9.2 and 9.3).
- More health services were provided to the population who are insured because most insurance plans do not have co-payment or deductible charges to discourage excessive consumption of services (9.13-15 and Chart 9.3).
- Health service provision was influenced by prices. Some prices are well above costs and provide an incentive for hospitals and physicians to prescribe use of these services and items; other prices are well below cost and cause losses that discourage their use (9.41-55).
- There is a lack of effective referral and triage systems. This has meant that insured and fee paying patients seek care mainly from higher level facilities, these hospitals thus have high usage rates and make additional claims for expansion, using the public investment budget (9.33 and Chapter 6).

10. The macro-environment and the health sector's responses to it have resulted in the following current trends in the health sector financing (Chapter 9):

- Real health spending (from all sources - budgets, fees and insurance) per capita has been rising faster than total economic growth (11% compared to 8.7%, 1980-88).
- An increasing share of health spending is for hospitals and treatment costs, rather than prevention and health protection programs.
- Budgetary spending for health is increasing in absolute terms but is declining as a share of total health spending (from 30% to 19%, 1980-88).
- Budgetary spending for operating costs of disease prevention programs and primary health care services is increasingly inadequate.
- Patient fees are increasing both absolutely and as a share of total health expenditures (from 14% to 36%, 1980-88). They may be unevenly distributed across the population, thereby raising questions of equity and access to health care for the most needy.
- Insurance payments are increasing in absolute terms but their relative shares of total health spending may have declined (from 53% to 41%, 1980-88) and cover only a smaller share of the population than previously.

The total effects of these changes and trends have left China poorly positioned to deal with foreseeable health status developments and accompanying financial pressures.

11. *Prospects for Future Illness Trends and Options.* The main chronic diseases causing premature death and disability are stroke, various heart diseases, chronic obstructive lung disease, various cancers, and diabetes; injuries and suicides are additional important causes of premature death and illness. There is good evidence from China and other parts of the world that a large fraction of premature illness and death from these causes is preventable (Chapter 2).

12. Chronic disease is the result of exposures to risk factors (Chapter 3). These can play many roles in different settings, can modify each other, and can operate simultaneously in several disease processes. Risk factors for the chronic diseases are often multifactorial, synergistic, and socially complex. Moreover, chronic diseases move in slow motion. The pathological processes take years to develop. The constellation of risks that produce the pathology is imbedded in community habits that change slowly. Effects of some chronic disease risk factors are relatively irreversible. This implies need for quick and concerted action not only to safeguard the young but to arrest further risk increases for adults. The main risk factors for premature development of chronic disease in the future are tobacco smoking (3.4), hypertension (3.16), (saturated, animal) fat in the diet (3.22), environmental and occupational factors (3.27), and chronic bacterial and viral infections (3.32).

13. It is possible to estimate the approximate future trends for the main chronic diseases that will be caused by these determinants (Chapter 4). As today's youth mature, the middle aged population will grow very rapidly in the next few decades (+240% for ages 40-69, 1990 to 2030) while the numbers of children and young adults will probably remain about the same (Table 4.1). Total numbers of deaths will rise sharply (from 5 million to about 17 million annually), but about one-third of the total will be premature, among the middle aged. This will cause average life expectancy to decline (by about 4 years by 2030) and the numbers of ill and disabled in the population will rise sharply (Table 4.2). Health care costs for treatment of the middle aged and for long, repetitive periods of disability can be expected to increase rapidly (4.24-33).

14. These trends are not inevitable. With a health strategy aimed at prevention of chronic diseases the trends can be moderated (Chapter 4, section B) with approximately the following consequences.

- Population growth among the middle aged and elderly will be slightly higher, but will not feedback into fertility. Total numbers of deaths annually will be somewhat lower (about 13 million by 2030), and fewer of these will be among the middle aged.
- Average life expectancy will continue to increase slowly, as it has in more developed countries, and the size of the disabled and ill population compared to the productive population will be smaller.
- Health care costs will still rise, but less rapidly, for treatment of premature illness. Considerable investment in critical care units, hospitals and high technologies for treatment of middle aged illness can be avoided. Economic losses due to premature death and disability can be limited. Total spending on health will still rise. But, it will be more a function of policies relating to access, location and intensity of

medical care to prolong life in old age, rather than for premature illness in middle age.

- The greatest amount of premature mortality and morbidity can be prevented by concentration on the diseases of lung cancer, chronic obstructive lung disease, coronary heart disease, stroke and injuries. Prevention efforts for all other chronic diseases combined will yield much smaller total effects, though these may be important for certain groups and locales. Prevention of liver cancer, the complications of diabetes and perhaps the recurrence of stroke, will not affect mortality significantly but could substantially reduce disability and medical costs.

15. The choice in strategy is not between prevention or treatment of chronic disease, but in achievement of an affordable balance of treatment on top of a sustained preventive strategy. This balance will have to be achieved within the resources available and that means that total health spending will be the most important element for Government to consider as it revises national health strategy.

16. Basis for Strategy. Total health spending (and its growth rate) are functions of four broad variables:

- a) changes in demand induced by the demographic factors, i.e., population growth and an aging population structure;
- b) changes in demand induced by epidemiologic factors, i.e., higher (and lower) age-specific rates of different diseases;
- c) changes in utilization due to higher (and lower) consumer demand or provider induced consumption of health services (because of better - or worse - access, insurance coverage, rising incomes, desire for more profit, etc.); and,
- d) changes in unit costs (increases or decreases) because of new technology or practices in health services, or because of proven ineffectiveness of some established practices.

17. In managing the health transition very little can be done during the next half century about the first variable because the people who will reach middle age are already alive. The second variable of epidemiological change can best be controlled through strategy elements which emphasize prevention, to reduce and control exposure to tobacco, hepatitis B virus (HBV), hypertension, and other risk factors. Rough estimates show that by the year 2030 the absolute number of deaths among middle-aged Chinese will have grown at 4% annually "without", compared with 2.7% growth annually "with", adoption of a preventive strategy (growth is due chiefly to the increasing numbers at risk); 1.3% per year difference in growth rate from 1990 to 2030 would mean that by 2030, 40% of all premature deaths would be avoided. Projections show that with a good preventive strategy the rate of growth of real, per capita, health spending due to the demographic and epidemiological variables could be cut by 30 to 50% (from over 2% per annum per capita in real terms to about 1-1.2% per annum, per capita).

18. Preventive programs take time to become effective (4.23) and most benefits are in the future, while morbidity requires care in the present. Health strategy will still have to be concerned with providing illness care because earlier preventive programs did not exist and because some

share of disease cannot be prevented. Thus, strategy must also be concerned with health care institutions, technology and manpower, and include consideration of effectiveness and with achieving efficiency in the use of effective treatments (i.e., controlling costs, and constraining demand).

19. The third and fourth variables determining total health spending (utilization and unit costs) can be influenced by government policy efforts to improve effectiveness and efficiency of hospitals, technologies and manpower. Policies aimed at controlling utilization and unit costs might limit the rate of growth from these variables to about half of what might otherwise occur (increasing at the rate of 1.5% per annum, per capita rather than 3%).

20. With the right health strategy China's total health expenditures might only rise from today's 3.2% of GDP to perhaps 6-7% by 2010 and 10-12% by 2030 (4.34-37). With less successful effort to control the health transition and to improve effectiveness and efficiency, total health spending will soon rise to levels which cause either a collapse of the health system, or the emergence of destabilizing inequities and social problems.

21. Development of Health Strategy. This findings of this report suggest that health strategy will have to include the following objectives:

- 1) preservation of gains over infectious diseases, plus treatment and prevention of remaining infectious diseases in areas which have experienced some deterioration in recent years or with still high rates of maternal, infant and childhood mortality;
- 2) treatment of those chronic diseases for which medical procedures are effective;
- 3) sustained, long-term and publicly-financed, national programs of prevention of premature disability and death from the chronic diseases and from injuries and suicides; and,
- 4) development of pluralistic (public and private) financing systems for humane care of the chronically ill and elderly.

22. The report also suggests that health strategy in China must address five key policy areas, with sensible adaptation to take account of regional differences, as the essential elements to future success or failure. These key policy areas are:

- improved management of the health transition itself;
- adoption of health financing systems and policies appropriate to the health transition;
- more effective development and management of health institutions;
- better assessment and regulation of health technologies; and,
- improvement in the quality and numbers of health manpower.

The first two of these are concerned mainly with overall direction and impact of the health system. The last three are concerned mainly with efficiency and effectiveness.

Policy Recommendations in the Five Key Areas

A. For the Health Transition.

23. To keep the health transition from producing a health care crisis, China needs to concentrate on a primary prevention strategy aimed at the reduction of the key risk factors and the development of cost-effective secondary prevention programs and, where effective treatments exist, efficient delivery of those treatments that are most important. To do this will require China to reform, adapt and strengthen the Ministry of Public Health and health institutions at all levels for greater efficiency (5.2-6). The Government will need to develop consensus on, articulate and disseminate a strategic framework for chronic disease prevention and management (5.7-26). At minimum this strategy will have to include the following elements.

- The Ministry of Public Health needs to reach an *internal consensus* about the health transition, the remaining infectious disease problems and the evolving chronic disease problem, the importance of a risk factor approach and, on this basis, formulate a preliminary strategy for government (5.27; 3.1-3).
- National awareness (official and public) of the *nature of chronic disease* needs to be raised (5.28-29). Medical authorities will need to inform political and financial leaders of the reasons for China to adopt a preventive approach or it is doubtful that adequate, sustained budgetary resources will be provided for prevention programs.
- A key topic to be considered by Government is whether the magnitude of health risks, rapidly escalating costs, and considerations of efficiency mandate *reorganization* of the major agencies whose activities determine demand and supply of health services. Specifically, the lack of effective coordination between the health sector and the pharmaceutical and medical equipment production companies under the control of the State Pharmaceutical Administration risks continued inappropriate subsidies and sub-optimal products and drugs to meet real health needs (Box 9.3, Chapters 7 and 9). The duplicate functions and competitive forces inherent in a separate system of Traditional Chinese Medicine hospitals in every county, and of enterprise hospitals, also deserves reconsideration. The present situation only impedes efforts to control costs, develop population-based health services and improve efficiency and efficacy (Chapters 6, 7 and 9). To deal appropriately with these other agencies may require establishment of a strong supra-ministerial policy body. It will be essential for this body to have a health promotion and disease prevention orientation.
- The most *important risk factors* need to be targeted for long-term, national control efforts (5.30-31). By far the most important of all these efforts will involve control of cigarette smoking. This should be the focus of a national, multi-sectoral program including health education, regulatory and fiscal measures to reduce smoking prevalence among all age groups (Box 5.1). Hepatitis B virus vaccination and dietary change will be important, supplementary measures. Injury prevention will be

important in the short and medium term. Reduction of indoor air pollutants, occupational risk exposures, heavy metal and toxic contaminants in the air and of water resources are important steps with probable long term health benefits. Public funding is appropriate for research to determine probable risk and to recommend effective risk reduction strategies.

- The Ministry of Public Health, the Ministry of Finance, and the State Planning Commission need to develop and use health, financial and planning policies which take account of *disease-specific strategy* considerations (5.32):
 - i. of the leading cancers only lung cancer (and other smoking-related cancers) and liver cancer can now be addressed effectively with primary prevention programs; secondary prevention and treatment programs for most of the other cancers should be approached cautiously in allocating public resources;
 - ii. primary prevention programs for coronary heart disease and underlying atherosclerotic disease are cost-effective and efficacious and such programs should become part of China's normal public health arsenal, with considerable public funding and no attempt to earn fees from these services;
 - iii. stroke and hypertensive heart disease will respond well to publicly funded primary and secondary prevention efforts to reduce hypertension;
 - iv. the optimal strategy for control of hypertension is problematic and deserves to be the subject of large, simple randomized trials to confirm the best approaches for China and to establish the most cost-effective methods. Inclusion of funding for these trials in the national budget should be a priority;
 - v. public primary prevention programs and multi-sectoral public and private investments of a wide variety can be effective in reducing morbidity, mortality and long-term disability from injury and suicide;
 - vi. chronic obstructive lung disease (COPD) can be substantially limited by smoking cessation, and perhaps by reduced exposure to other forms of indoor and outdoor smoke, improved childhood nutrition and access to primary care to reduce childhood respiratory infections, and improved housing and working conditions; these, however, all require further epidemiological research. Public financing of secondary prevention to minimize COPD disability is likely to be cost-effective if properly undertaken;
 - vii. the principles of cost-effectiveness and considerations of efficacy should also be applied to primary and secondary prevention programs that deal with other diseases (communicable and chronic) and their risk factors. Most important, obvious priorities would be vaccination (including HBV), resumption of public financing for control of pulmonary tuberculosis, schistosomiasis and selected other chronic infectious and endemic diseases.

24. Government policies will also have to involve multi-sectoral intervention programs and cooperation in the following key points. For successful development and coordination of cross-sectoral policy the supra-ministerial body referred to above^{2/} may also be crucial.

- Agricultural production and food pricing policies need to begin to take account of the health and economic benefits of key dietary factors, particularly that increased fresh fruit and vegetable consumption, and salt, animal fat, alcohol and tobacco avoidance are effective elements of a preventive strategy.
- Regulatory policies to control cigarette tar levels, food contents and processing methods, micronutrient supplements, animal fat avoidance, salt restriction and consumer product safety can be adjusted to have substantial health benefits.
- Employment policies can be modified to positively affect health risk behaviors, job safety and occupational hazards such as heavy exposure to smoke or dusts;
- The social and economic costs of disability can be reduced by eliminating barriers to productivity and mobility;
- The structure and ownership of the health care system itself can be an important determinant of the cost and use of and access to health services; wage policies for health providers and budgetary and fiscal policies which affect provision of health services can have positive effects on the health system which today are neglected or are even negative in impact.

25. The health institutions and their roles, a framework for infectious and chronic disease management, and disease-specific strategies for chronic disease control are three essential elements for China to consider in dealing with the health transition. Improvements in capacity and effectiveness of the illness-care system, and in the policies which influence resource allocation, are crucial elements but these require the cooperation and involvement of planning and finance and other authorities to help develop policies appropriate to the health transition.

B. For Health Financing.

26. For the immediate future, the main financial challenge is to return to adequate public (budgetary) funding for primary health services to the poor, prevention of infectious disease, and initiation of primary and secondary prevention programs for premature chronic disease. In addition, government will need to do the following.

- Revise prices for medical procedures and services to levels close to marginal cost; revise incentives that health institutions have for unnecessary provision of services not related to medical conditions (9.56-58;).

^{2/} Recommendation three, para. 23.

- Review and analyze the present system of drug pricing, distribution, mark-ups and profit retention, with the purpose of reducing incentives for polypharmacy and excessive drug prescription (9.51-57).
- Develop co-payments, deductibles, disease related group (DRG) systems and other forms of cost control, and create disincentives aimed at excessive consumption of medical care by insured patients (9.13-15).
- Review and study alternatives for development of national health insurance systems, including both public and private, market-related, decentralized approaches and centrally or provincially-funded and coordinated "universal health insurance systems" (9.69-71).
- Develop an integrated system of estimating annual health expenditures from all sources, by health purpose, category of expenditure, region, etc., for assessment and planning of health policy.
- Establish better controls on capital investment in the health sector to ensure responsiveness to health needs, to assess cost-effectiveness and to ensure attention to the lowest level health institutions and to prevention programs and institutions.

27. Progressively with time, the challenge will be to deal with the inevitable emergence of much more chronic illness in middle and old age, while maintaining control of infectious diseases and sustaining widespread programs of primary prevention against premature chronic disease. This will require sharp improvements in efficiency and effectiveness of health resources (Policy Recommendations C, D, and E below).

28. The key questions to be explored for the near and medium term future include:

- How to pay for primary prevention services? How to select which of these services to offer? How to ration access to them?
- How to pay for secondary prevention services that benefit the individual but also offer economic benefits (or loss avoidance) to the economy as a whole? How to evaluate which services should be offered and to whom?
- How to pay for treatment and care? Which conditions and medical procedures fall into categories that all people should be entitled to? Which conditions benefit only the individual so specifically and are so expensive or of so little efficacy that payment for them should be primarily the responsibility of the affected persons? How to provide risk sharing mechanisms for those who wish to protect themselves against such conditions?
- Which behaviors by people or industries create such significant future health burdens and economic losses that they need to be regulated or taxed in order to protect the public benefit for the future? Who should pay, and how, for health costs that result from high risk behavior and practices by individuals and industries?

- How to begin to pay for health maintenance care for the elderly? How to provide and pay for the chronically and terminally ill among the elderly? Which conditions can be effectively dealt with and how--and which cannot?

29. There are *no easy answers* to these questions. Many countries are struggling to develop answers that match their ethical, social and economic objectives. While China will have to debate, experiment with and evaluate its own approaches to these questions, the themes explored throughout this report are likely to provide useful reference points:

- Primary prevention for the major diseases that can be prevented is likely to be cheaper than any alternative.
- Primary prevention must be started early and sustained, or its benefits are lost, or are much slower to materialize.
- Secondary prevention efforts must be approached with caution to ensure their priority and cost effectiveness.
- All primary prevention programs, and many secondary prevention efforts, will be at risk of eventual collapse unless primarily and permanently funded from public sources, as recognized public goods.
- Many features of treatment, curative, rehabilitative and maintenance medical care will share some features of public and private goods and benefits. Some will be cost effective and efficacious and others will not. Institutions and procedures (and not reliance on market forces) will be necessary to keep these under constant review and to facilitate continuing public consensus on what should be provided and paid for, what should not, and from what sources.

30. In the longer term future the main issue, once premature chronic illness is largely controlled, will be how to finance health care (much of it for chronic illness) at the end of a long life, equitably and with efficiency. Financing for these needs will have to be considered in the broader context of old age insurance schemes, pension entitlement, and the other financial needs of the elderly. These topics are beyond the scope of this report.

C. For Health Institutions and Their Management.

31. The hospital system is overloaded and inefficient at the higher levels and is under-used and of poor quality at the lower levels. While the system is already large, it is deteriorating and will require substantial new investment and expansion to serve the predictably much higher demands for medical care which will emerge from the health transition (6.1-39). The following key recommendations are made (6.40-48).

- A stronger *primary prevention content*, particularly at the lower levels, should be added to the already strong primary health care orientation of hospitals, emphasis should be placed on improving quality and breadth of service at the lower levels to avoid unnecessary overload of higher level hospitals and to improve effectiveness and equity.

- ***Regional health planning*** authorities need to be established with strong powers of resource allocation and coordination (including capital and operating budgets, equipment, manpower and programs) to plan and direct region-wide health programs and investment (6.45-46). A comprehensive, integrated, health information system should be developed and used by these authorities. Current incentives for individual hospitals to earn revenues should be revised to emphasize region-wide hospital resource mobilization. Allocation of resources among hospitals should be accompanied by increased budgetary funding for public and preventive health goals and for reduction of waste and inefficiency (6.43).
- ***Hospitals planning and ownership*** needs to be consolidated to no more than three levels and effectively coordinated among all owners to meet health needs in a given service region. Ownership of separate hospitals by each level of government should be abolished in favor of a regional (population-based) hospital system. Development of some form of unified management system (or corporation) for all public hospitals in a region should be considered to allow rational specialization, cooperation and inter-hospital reallocation of resources (equipment and staff). Professional hospital managers should be developed to replace the current system of clinician managers. Specialized hospitals need to be reduced in number and gradually made into general hospitals; expansion to every county of the separate system of Traditional Chinese Medicine hospitals needs to be reconsidered (6.43).
- Widespread ***management and operating reforms*** to improve efficiency are needed but can be successful only with the policy changes (above) to revise hospital system planning and incentives for good financial management. Steps required then will also include (Chapter 6): an active program of health services research, professional health care managers, nearly complete reorientation of emergency services, reduction of average length of stay, establishment of a simple accreditation system, internal and external quality control and quality assurance procedures, increased emphasis on ambulatory care programs and alternatives to hospital stay for rehabilitation patients and the terminally ill, and initiation of performance-based criteria to ensure efficiency, appropriateness and quality of patient care.

D. For Medical Technologies.

32. Medical technologies (including drugs) in use today in China are purchased and used with little regard to their cost effectiveness (7.3-6). There is not even a basic system of medical technology assessment to guide future acquisitions and influence current uses. Some practices of using technologies are inappropriate. Many ineffective and dangerous technologies are still in use and should be discontinued (7.6-11). The current pricing structure for medical services is resulting in overuse of some technologies, and under use of others (7.12-13), so that health care spending is unnecessarily increasing while attention to disease prevention and equity of access to primary care may be declining. Yet appropriate acquisition, distribution and use of cost effective medical technologies can be an important element of health strategy to improve efficacy, efficiency and equity (Box 7.1). The following key recommendations are made.

- China should begin quickly to develop and regularly utilize a policy of medical technology assessment (7.14-16) and use it to streamline and improve applications of current technologies.
- Findings of technology assessment investigations should be widely disseminated to influence acquisition and use. Technologies which are clearly not cost-effective should be abandoned or not initiated (7.11 and Box 7.2).
- While China can easily and quickly take advantage of technology assessment work done elsewhere in the world, it needs to develop specific ways to assemble, synthesize and disseminate knowledge and appropriate policies about technologies. To do this, development of a national program for medical technology assessment and establishment of an organization to manage this program is recommended (7.20-25).
- The current pricing system for medical technologies and drugs should be substantially changed to reduce incentives for over or underuse (7.26).
- Revision of the pricing system will also require changing the means by which public and social elements of health care are financed (9.57-61). There will need to be a change from the present emphasis on fee-for-service and cost recovery to a system of public funding for basic health entitlements, public health goals and most preventive services, and a parallel, probably pluralistic (public and private), system of financing private health services (i.e., those which have mainly private, not public, benefits).

E. For Health Manpower.

33. Past health sector success was partly the result of innovative deployment and direction of manpower to overcome clearly identified problems (8.4). The health transition is rapidly changing the issues with which health workers have to deal. Many good educational and training innovations which offer hope for effective response to future problems are underway (8.10-12). These are impeded by a general shortage of operating budgets for educational innovation, a lack of skilled personnel and institutional mechanisms for evaluating educational and training innovations, and overly rigid institutional and professional boundaries (8.13-14). There are severe shortages of some health manpower specialties and manpower policy and planning is still unduly linked to hospital planning and bears little relation to broader health goals (8.15-16, 23-34). The recruitment and retention systems have many strengths, but also major weaknesses - the current health financing system, especially as it relates to wage policy (and its detrimental effects on health workers' attention to efficiency, medical efficacy, primary health care needs and prevention strategies), is probably most in need of reform (8.18-22).

34. In addition to the financial and price reforms suggested elsewhere, the following key steps are recommended:

- Manpower planning methods for hospital services, and hospital staffing norms and skills, are in need of urgent revision to deal better with the health transition. These methods need to be population based, closely coordinated with educational programming, pre-service and in-service, especially concerning the manpower skills implied in the other sections of this report (e.g., for epidemiology, planning, management and preventive services).

- Manpower policies need to be carefully formulated together to create a more efficient, equitable medical care system (with ambulatory emphasis, a focus on prevention, and skills and knowledge consistent with a regional health services approach and appropriate utilization of medical technologies). This will require policies which facilitate career development, reassignment and retention of personnel among all health institutions in a health region.
- Short and medium-term priorities should be on substantial *quality enhancement* through retraining and upgrading of existing manpower, except in the very scarce categories (nursing, dentistry, technicians, etc.) where quantitative expansion should also be stressed (8.15).
- Longer term goals should be on *quantity expansion* consistent with health policy goals (not just hospital ratios) with qualitative educational focus on key problems such as those suggested in other parts of this report.
- In the meantime, the curriculum at all secondary and higher level health sector schools and colleges should continue to be improved. This should include less emphasis on specialization, much more attention to a population-based approach, preventive strategies and the skills that are needed for these, and rapid introduction of modern health planning, finance and management concepts.
- Better coordination with the State Education Commission, and greater flexibility on its part to respond to innovative approaches such as well-managed correspondence courses and a graduate school of public health, would considerably improve the chances of manpower policies and skills evolving successfully.

CHAPTER 1 - OVERVIEW OF MORTALITY AND ILLNESS IN CHINA

A. Introduction

1. Childhood immunization programs, accessible primary health care, family planning, improved nutrition, control of many infectious and endemic diseases and better sanitation and housing have contributed to remarkable improvements in health and increased life expectancy in China today.

2. A 1984 Bank study, The Health Sector in China (No. 4664), examined the policies and programs that led to China's achievements during its first health care revolution, beginning in 1949. That report reviewed China's progress in health, in population control and in nutrition, as well as the relevant supporting policies, financing and resources. The report also discussed several influences on health from outside the health sector--greater access to clean water, sanitary waste disposal, and fertility reduction. However, the 1984 report found two distinct problem areas:

(i) Success had been uneven. China had succeeded in combatting communicable diseases and improving the health of its population far beyond what could be expected at its stage of economic development. Health conditions in the cities were very good indeed, and many rural areas lagged behind the cities by only a few years in life expectancy. But the health conditions of perhaps a quarter of the rural Chinese remained similar to those in other developing countries. These people lived in remote parts of China where economic and administrative infrastructure was lacking, education levels generally were low, and the economic resource endowment was generally poor. The 1984 report concluded that there would be no easy or inexpensive alternatives to achieving improved health conditions in these areas equivalent to the standards of the better developed regions. Continuation of the past, proven methods of health sector development deserved high priority and continued funding by the central government for these areas.

(ii) The emerging prevalence of chronic diseases was becoming a major concern. China's pattern of disease and death had become very much like that of the industrialized world, with heart disease, cancer, and stroke remaining as the major killers and disablers. As a rapidly increasing proportion of China's population survives past youth, with infectious diseases less and less common not only in early adult life but also in middle-age, chronic disease would kill or disable large numbers of the middle-aged, including some of the most productive and important segments of China's population. Increasing rates of some chronic diseases would counterbalance decreasing death rates from others, and would mean that a substantial proportion of the middle-aged population would become chronically ill and disabled or would die prematurely. Moreover, treatments for many chronic diseases, as carried out in the West, tend to be expensive and of limited efficacy, and have little overall health impact.

3. In light of these problems, China's health sector faced two priority challenges:

- To complete the first Chinese health care revolution by extending the methods that were already effective in most of China to areas where mortality from infectious diseases continued to be high; this would include the development of detailed plans for reducing mortality rates and morbidity due to specific infectious diseases in those areas. These plans would cover epidemiological considerations, financial analysis, and assessment of manpower needs, training, and deployment. The Ministry of Public Health, and programs supported by WHO, UNICEF, UNFPA, the World Bank and others have given increased attention and support to these factors and to programs of Maternal and Child Health and the Expanded Programme of Immunization.
- To instigate a second Chinese health care revolution, which would develop and implement approaches to the control of chronic disease, and would combine prevention, low-cost treatment, rehabilitation, and humane care. With many more people living longer, it will be particularly important to develop affordable ways of postponing the onset of morbidity, and of providing humane and dignified care of limited cost to those who are ill in middle and old age. Even partial success would be of immense value to China and to the rest of the international community.

4. In connection with the challenge of completing the first health care revolution, the 1984 report recognized that two highly undesirable consequences had resulted from the collapse of the rural cooperative health insurance programs. (This occurred after introduction of the so-called production responsibility system in the early 1980's, which meant that most of the rural population had to begin to pay on a fee-for-service basis for medical and preventive services.) First, some of the major gains in welfare that had been achieved by risk sharing would be lost without a health insurance scheme. Although the rural cooperative insurance system had many defects, it nonetheless provided important basic protection at commune level. Second, fee-for-service approaches to provision of health care would inevitably neglect public preventive measures, although these had played a vital role in China's past successes in combatting communicable diseases.

5. The second challenge, forging phase two in the Chinese health care revolution, was inherent in China's success in reducing the incidence of communicable disease. It initiated the "health transition" (Box 1.1) and contained the seeds of the emerging problems that will confront China over the next century: the preponderance of illness and death, and medical care needs, being the result of chronic, non-communicable diseases, while at the same time China will have to continue the struggle against infectious diseases.

6. China's experience over the next few decades may offer lessons in social and health policy for the rest of the world, developed and developing alike. This report analyzes the changing epidemiological patterns, explores the main issues and probable trends of the second health revolution, and examines the need to realign strategic planning in health infrastructure, technology, manpower, and finances. The objectives of the report are to sharpen understanding of the future disease burden and its main causes; to

help define the key issues in the health sector; and to evaluate options for China to consider in planning its future.

B. Demographic Trends.

7. In China before 1950, life expectancy from birth was low, and more than half the population could expect to die from infectious and other non-degenerative diseases before reaching middle-age. Indeed, even during middle age, infective and parasitic diseases resulted in more suffering and death than did chronic diseases. With the success of the first health care revolution, these conditions have changed. Overall mortality declined rapidly after 1949.

8. The demographic impact is clearly visible in the improvements in the approximate survival curves presented in Chart 1.1, which show a dramatic older and upward progression over the 30 year period for both males and females. For example, a Chinese male had about a 60% chance of living to age 50 at the death rates of 1957. The 1975 death rates meant that he had the same probability of living to about age 65, and by the 1986 rates to his early seventies about the same as a American male.

9. This decline in death rates will continue to result in structural demographic changes, and affect China's medical care needs and system, as part of the health transition. Chart 1.2 shows an estimation of dependency ratios to the year 2025:

- "Dependent" populations (those above or below the normal working age range of 15 to 65 years old) will remain a relatively stable portion of total population, with a modest long-term decline.
- The "old dependent" ratio (population above age 65 as a percentage of the working age population) will rise steadily from a modest 8% to 18%, about the same as the OECD nations today. Now that the probability of survival to old age is large, further decreases in mortality before old age will not be a very large determinant of the "old dependent" ratio. Nor, perhaps surprisingly, will the death rates in old age be a large determinant, for although preventive and therapeutic measures can decrease the proportion who die before old age, they have only a limited effect on life expectancy in old age.
- Equally important, the total "medically vulnerable" population (those below age 5 and over age 50, both groups that are prone to illness) will increase from 38% to 60% of the working age population. This will result largely from the age structure settling down and through the control of infectious diseases, which is already achieved in many areas.

10. These structural demographic changes mean that there will be future, inevitable increases in the overall prevalence of illness and the demand for health care. In addition, as will be explored in later chapters, (a) risk exposure, and thus probable disease incidence for some chronic diseases, is increasing; (b) the incidence of communicable and endemic diseases for most of

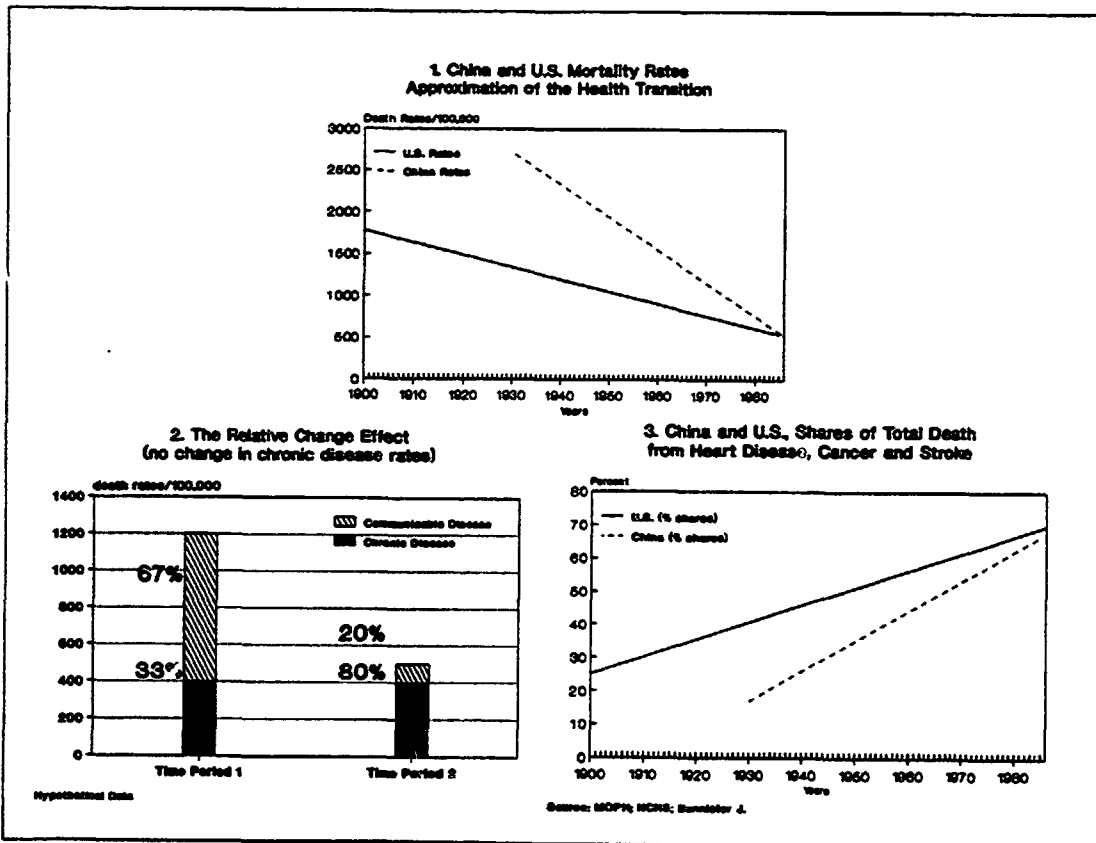
Box 1.1
The Health Transition

Clarification of the concept of the health transition is necessary to understand the perspective of this report and the alternatives open to governments in providing for the health of their citizens. "Health transition" in this report is used to mean the shift in disease predominance from mainly communicable and infective diseases to mainly chronic and non-communicable diseases. It is the result of three independent but related phenomena, here termed: the relative change effect, the demographic change effect, and the epidemiological change effect. Public and professional perceptions of and reactions to these phenomena are determining much of present health care spending, health research and public policy. A better understanding of these phenomena and their implications can improve the directions and content of public policy.

Chart 1 below shows the approximate declines in the total death rates for the U.S. and for China earlier this century. These trends reflect the impact of immunizations, better nutrition, improved sanitation, clean water, fertility control and many other factors.

The relative change effects of the health transition are simply those caused by declines in the rates of death and morbidity from infectious

and communicable diseases. These declines make mortality and morbidity from all other causes relatively more important, even if their real rates are not increasing. Chart 2 below shows this in a theoretical perspective and Chart 3 shows the relative changes experienced in both China and the United States. The much shorter time period during which the relative change effect has occurred in China places additional strains on already fragile health and medical institutions and their personnel. During the normal working life of most health planners and doctors in China the range of issues and demands which they must deal with has radically changed. It has proven difficult for them to educate civil leadership to the changes that are underway, and the new spending priorities and health strategies which these require. In a number of countries, including China, the relative effect has generated commentary and calls for action among the public and civil leaders because chronic diseases are "rising". This perception may prove factual but it cannot be alleged only from a "rising share". Other factors are at work and need to be accurately understood. By themselves, the relative shifts in disease prevalence and death causes are interesting but rather trivial events for the purposes of health planning and decisions to invest in new health systems.



The demographic change effects of the health transition are those induced by the aging of the population structure - more people living beyond young adulthood constitute a greater pool of persons at risk from the non-communicable, chronic diseases which emerge mainly in middle and old age or with long exposure to causal factors. Chart 4 shows an example of how changes in demographic structure in east and south Asia will increase dramatically (250%) the pool of people who could normally be expected to be more prone to chronic disease during the next 40 years. (The respective increase in China will be 240%.) The demographic effect contributes to visibility of the relative effect, but the latter would occur even if the population structure was not aging because of continued high fertility. When fertility reduction occurs (as in Chart 4) it accentuates both the demographic and relative change effects of the health transition but fertility reduction by itself is not a causal factor in the health transition. Even in societies with continued high fertility the demographic effect of the health transition will occur though the "relative" share of adults compared to infant and children would be less.

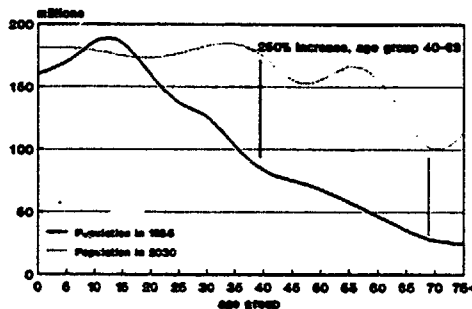
The epidemiological change effects of the health transition are those are caused by increases or decreases in the age-specific death or illness rates for the different diseases. These are mainly the consequence of increases or decreases in exposure to risk factors for the diseases. Chart 5 shows hypothetical data for three different categories of chronic disease - those whose age-specific rates are declining, are remaining about the same, and are increasing over time. The rates and total share of those diseases which are truly increasing, or likely to increase, will determine the overall course of the health transition. In making population projects, demographers have generally assumed that total average age-specific death rates, at least through middle-age, will continually fall. This assumption yields upward future estimates of life expectancy. Whether this assumption is viable or not depends entirely on whether the epidemiological change effects of the health transition are mainly decreasing. This has been the experience in the industrialized and

developing nations, on average, up to now. However, prospects for continuation of this trend have been little examined or the developing world in public health and medical literature. There are reasons, explored in later sections of this report, why the developing countries may begin to experience a health transition quite different from that of the industrialized countries with average increases in age-specific death and disease rates amongst the middle-aged and elderly. In the future it is certain that there will be more deaths and disease if more people live to ages where chronic diseases are more common and if the age-specific rates of some diseases increase. There will be strong political and social claims resulting from the first factor. It is essential that policy leaders understand their ability to influence the health transition through control of the second.

Case fatality rates will also affect epidemiological outcomes of disease and thus the nature of the health transition. If fewer people die of one cause of heart disease because of technological improvements in treatment, the numbers (and age-specific rates) of persons dying of other causes will eventually increase. Similarly, successful efforts at disease prevention will influence the epidemiological effect of the health transition by affecting both the ages and, probably, rates of death from other disease.

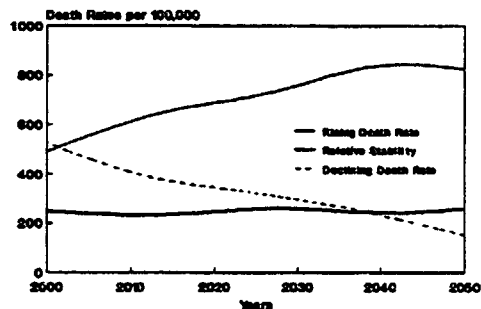
In summary, the health transition is a process which is already underway almost everywhere. It is not a fixed, stable event, but rather the interaction of a series of discrete events which do not by their nature tend toward equilibrium. Its course in the future will depend primarily on both the demographic and epidemiological effects, but the latter will become progressively more important as average life spans will only slowly lengthen beyond present elderly ages. Technological innovations which change case fatality rates will affect the nature of the transition. Policy changes which affect risk factor exposures will be the main determinant of future changes in age-specific disease rates and are thus the most important elements open to governments to influence the health transition.

4. Population, East and Southeast Asia distribution by 5 year age group



Source: World Bank Population Projection

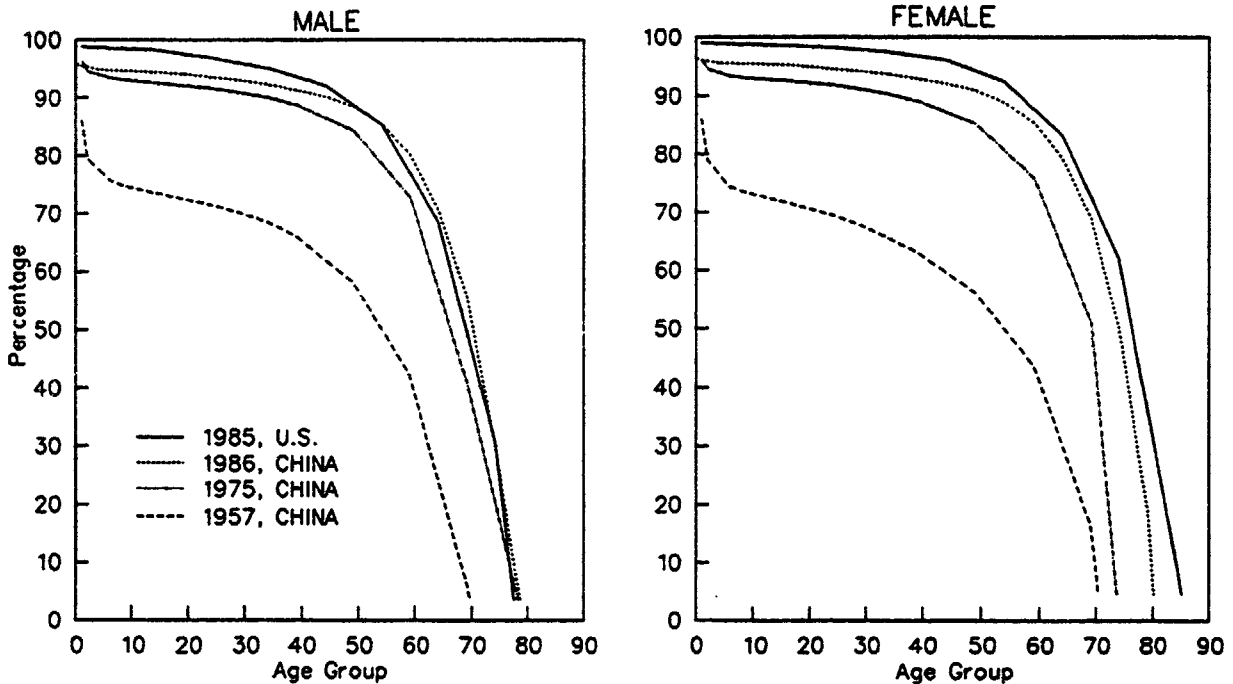
5. Epidemiological Change Effects depend on chronic disease mix and trends



Hypothetical data only

Chart 1.1

Survival Probability by Age
China: 1957, 1975, and 1986 and U.S. 1985



Sources: U.S. data from National Center of Health Statistics.
China 1986 data from Disease Surveillance Points System with adjustment of infant mortality from DSPs to correspond to national average of 40/1000.
1957 and 1975 data for China are from World Bank Health Sector Report, 1984
Probabilities would reach true "0" only at later ages for which data set are not complete enough for detailed plots.

the country is not likely to fall substantially, as the easy reductions have already been made; and (c) medical care costs, if not managed through wise policies, may rise faster than the general rate of growth and inflation.

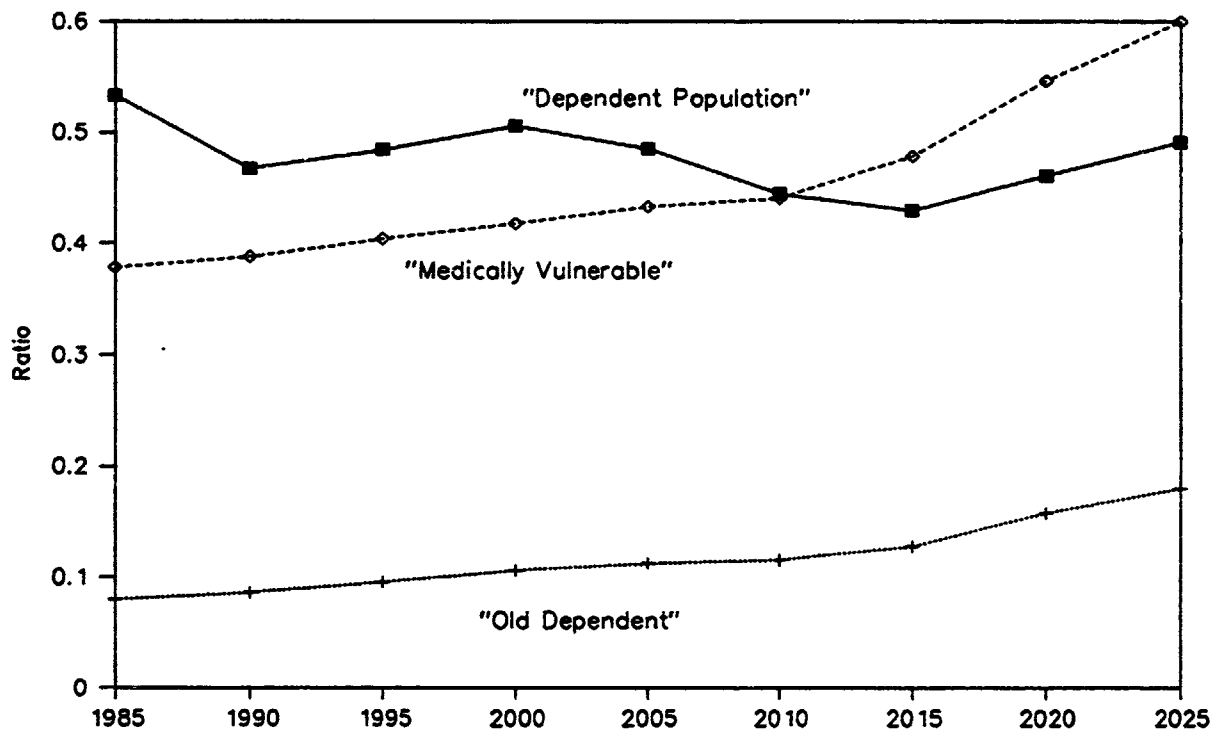
C. Mortality

11. Mortality today in China compares favorably to many other developing and developed countries. The infant mortality rate for most of China is low, about 40 per 1000 live births as a national average, though it may have been

places China among the better performing developing countries, the IMR is not uniformly low in all areas. Forty-one cities and urban areas have IMRs estimated to be less than 14/1000 and 84 counties may be less than 24/1000. UNICEF estimates provided to the MOPH include more than 500 counties with IMRs over 50/1000 live births, 263 counties over 75, and 89 counties (not including Tibet) over 100/1000. However, rates of death from all causes in childhood

Chart 1.2

China Dependency Ratios, 1985-2025



Source: World Population Projection 1987-88 Edition, The World Bank.

- Note:
1. "Dependent Population" (under age 15 and over 65 as % of those in working ages (15-64)).
 2. "Old Dependent" population (over age 65 as % of those in working ages)
 3. "Medical Vulnerable" population (under age 5 and over 50 as % of those in working ages).

comparative life table analyses, 1975 Cancer Survey, 1982 Census, and 1987 One Percent Sample Survey, Judith Bannister, U.S. Bureau of the Census, unpublished findings, personal communication, August 1989 and research by the Ministry of Public Health, published as "Zhongguo yinger siwangly fenxi" [An Analysis of Infant Mortality Rates in China], Zhongguo renkou kexue [Population Science of China], No. 3, June 1, 1989, pp. 35-46.

Table 1.1
Selected National Comparators

	<u>Probability of Death Between Ages (in %)</u>			
	<u>0 - 5</u>		<u>15 - 60</u>	
	Male	Female	Male	Female
Singapore	1.1	0.8	16.2	9.9
Canada	1.1	0.9	14.2	7.6
United States	1.4	1.1	17.5	9.3
Poland	2.1	1.6	24.8	10.3
Malaysia	3.3	2.4	20.4	14.5
China ^{*/}	4.4	3.3	16.6	14.9
Brazil	6.9	5.6	23.5	14.5
Kenya	12.1	10.5	32.4	18.2
India	13.8	11.8	24.6	27.0
Nigeria	18.3	16.3	36.1	30.3

^{*/} Unadjusted figures, based on 10% sample survey, not on Disease Surveillance Points.

Source: World Bank: Health of Adults in the Developing World.

12. Using 1987 unadjusted data comparable across a number of countries^{3/} the probability of dying for males in China between ages 15 and 60 is about 16%^{4/}. This places China in the middle ranks of 55 countries. For women the probability of death is lower - about 12%. However, there are only 11 countries where the probability of death for women in adulthood is higher. Using more detailed, cause and age-specific mortality data for 1987 and adjusting for rural/urban population distribution, show that Chinese males have about a 15% chance (and women, an 11% chance) of dying between ages 15-60.

13. Analysis by cause shows this probability of death to be distributed as shown in Table 1.2.

14. Disaggregating communicable diseases by rural versus urban areas indicates the clear differences and priorities which must still be addressed in completing the first health care revolution - tuberculosis and respiratory infections in the rural areas, and reproductive illnesses for women in all parts of China but with emphasis on rural areas.

^{3/} World Bank, Health of Adults in the Developing World, in press.

^{4/} The statistic is analogous to the infant mortality rate (the probability of dying between birth and age 1). For China the IMR is about 3% average.

Table 1.2
China: Distribution of Causes of Death

<u>1987 adjusted data (in percent)</u>	<u>(Probabilities of Death by Cause)</u>	
	Ages 15 - 60	
	Males	Females
Communicable Disease	1.05	1.24
Tuberculosis	.72	.72
Respiratory Infections	.08	.10
Helminths	.02	.01
Reproductive	.00	.23
Non-communicable Disease	10.28	7.71
Cancer	4.28	2.45
Cardiovascular	3.17	2.98
COPD (incl Pulmonary H.D.)	1.56	1.32
Other	1.27	.96
Injuries	3.71	2.12
Intentional	1.26	1.22
Unintentional	<u>2.65</u>	<u>.91</u>
Total	15.04	11.08

Source: World Bank: Health of Adults in the Developing World.

D. Morbidity and Health Priorities

15. Morbidity data for China are fragmented and difficult to interpret but generally show relatively consistent, steep declines in infectious and endemic diseases. The factors contributing to this are many - nutritional improvement with widespread economic growth, increased immunization and other prophylactic measures including strong community participation at earlier periods in health campaigns to control environmental and vector risks. There was also earlier widespread access to effective primary health care and persistent public health education about the main communicable disease risks. Some of these conditions no longer prevail but, for a number of reasons, deterioration in health status that could be expected is unlikely to be statistically clear. Improved nutritional status is strongly protective of health even in circumstances where other risks are rising; immunity to childhood diseases is now much more widely established; and prevalence of many communicable diseases is now so low that major outbreaks will necessarily be much less frequent. Primary health services are still readily available, at least for those who can pay, and lastly disease reporting is the weakest and slowest to emerge from the poorest and remote communities.

16. Table 1.4 shows numbers of patients and rates of change for key endemic diseases. It helps to reveal several aspects of current health status. Conditions such as fluorosis which must have long been prevalent, but not been a priority, are now better identified and can be targeted. Conditions which have long been identified as special problems (Keshan Disease, Kaschin Beck's

Table 1.3
China: Distribution of Communicable Diseases as Causes of Death

1987 adjusted data (in percent)	Probability of Death, Ages 15 - 60			
	Male		Female	
	Rural	Urban	Rural	Urban
Communicable	1.11	.67	1.39	.34
Tuberculosis	.79	.26	.81	.18
Respiratory Infections	.08	.05	.11	.05
Helminths	.01	.11	.00	.04
Reproductive			.27	.03

Source: World Bank: Health of Adults in the Developing World.

Disease) are gradually being brought under control or are diminishing for secular reasons. Iodine deficiencies are being gradually remedied with improved distribution of iodine oil and iodized salt to those most at risk but iodine deficiency disorders remain an important problem in a number of poor areas.

Table 1.4
China: Selected Endemic Diseases
Annual Rate of Change (%) in Morbidity
(1981-83 average compared to 1986-88 average)

Schistosomiasis	
Total Patients	-6.3
Acute Infection Patients	+8.3
Snail Habitat	+3.1
Iodine Deficiency Disorders	
Population in Endemic Area	+6.4
Patients	-7.1
Cretinism Patients	+0.3
Fluorosis Patients	
Dental Fluorosis	+56
Skeletal Fluorosis	+27
Kaschin Beck's Disease	-4.5
Keshan Disease	-10.4

Source: Ministry of Public Health, Endemic Disease Department.

Box 1.2
The Disease Surveillance Systems and Epidemiological Data in China

There are now multiple disease surveillance systems in China, one for communicable disease and one for chronic disease. The communicable disease reporting system is based in the Anti-Epidemic and Hygiene Stations of the MOPH. Key communicable diseases are required to be reported monthly, quarterly and annually through this system; some of the key 25 diseases require immediate reporting by phone. The Anti-Epidemic Stations at each level have special Epidemic Prevention and Vaccination Units, which are responsible for collecting, sorting data, and monitoring the prevalence of the disease.

Because the chronic diseases have emerged as an important problem for all of China in recent years, a reporting system has also been established for them. It is not yet as comprehensive or systematic as the system for communicable diseases. Routine surveillance data are based on a variety of information about hospital in-patients and out-patients. Hospitals and health care institutions are required to provide such data to the statistics divisions of local health bureaus. Data flows, consistency of reporting, and processing of information is not yet working well.

The Maternal and Child Health Departments and the Endemic Disease Control Departments and others, also maintain specialized disease reporting systems, but sometimes without age-specific information. Until now there has been little consolidation of these different systems and they are of limited usefulness for overall epidemiological analysis or for sectoral planning.

Reasonably good data giving age- and cause-specific mortality have begun to become available in recent years with the development and gradual extension of a mortality surveillance system called the disease surveillance points (DSPs). This system has been developed by the Anti-Epidemic Bureau of the Ministry of Public Health and the Chinese Academy of Preventive Medicine. DSP data from the early 1980s suffered from many reporting flaws and lack of age-, sex- and location-specific parameters in computer usable form. By the mid-1980s many of the reporting weaknesses had been overcome and the number of surveillance points had been increased. For 1986 there were 69 DSPs reporting, of which the data quality and coverage were reasonable for 58 (covering about 10 million people in 23 rural and 35 urban DSPs). The map in Annex Chapter 1 gives the location and names of the 69 DSPs. This data was used for much of Chapter 2 of this report. The MOPH/CAPM now have three consecutive years of data (1986, 87, 88) from an increasing number of DSPs. For 1989, following a Bank-sponsored visit to the Office of Smoking and Health of the U.S. Centers for Disease Control, post-mortem smoking behavior investigation was

added to the DSP system. With financial assistance from the Rural Health and Medical Education Project (Credit 1472-CHA) the DSP system is being extended to cover 100 points and these are being modified to be provide better quality, stratified, random samples of China's urban and rural population.

Problems will of course remain with the reliability and coverage of the data, as they do with any such system. Today's DSP data under-report infant mortality for a number of reasons. Although some DSPs are in poor rural areas, the current distribution exaggerates the health experience of economically advanced areas. It is likely therefore that the DSP data under-report mortality from infectious and endemic diseases and give slightly too much weight to the chronic diseases.

On balance, the problems with the DSP system are small in relation to the power of the analytical tool that it can provide for China in developing a health care strategy for the future. Further support should be given to this system by the central government to accelerate its establishment in poorer and more backward regions, to link it gradually with other health data systems and to evolve competent centers of statistical and epidemiologic analysis to utilize these data. This will be a foundation on which future health strategy and other parts of social welfare strategy can be developed.

Attention should also now be given to developing the DSP system in a way that the provinces can directly use and benefit from the data, and to supplement it with a regular system of sample surveys of specific disease prevalence and incidence. Cooperation with external technical agencies to develop these systems will yield important health and economic planning benefits in the future.

The MOPH also has a fairly comprehensive cause and age-specific mortality reporting system run by the provincial and local health departments and covering 100 million population, mainly in the urban areas and surrounding rural areas from the wealthier and coastal provinces. This data is now being supplied to WHO for use in the World Health Statistics series. It shows approximately the same epidemiological situation as described in Chapter 2 but is more heavily biased toward the disease profile of urban and higher income areas. The vital registration system in China is quite comprehensive and provides a useful cross check on both the MOPH 100 million system and on the DSP system. All these data sets are broadly consistent and leave no doubt about the general course and pace of the health transition.

17. The changes in schistosomiasis indicators are significant and may be the clearest health marker available of the deterioration in health status which

may be occurring as a result of the collapse of the public health safety net and a switch to a fee-for-service system of health care. Snail habitat is clearly increasing and detailed maps show the persistence and extent of the spread of heavy infestation since the early 1980s. The total numbers of patients being treated have consistently declined but the number of acute infections is on the increase. This raises two questions worth further study: 1) are economic barriers causing patients to postpone seeking treatment (or attempting self-medication) until the disease reaches a serious stage; 2) are a portion of those who are treated not completing their therapy because of economic reasons thus gradually raising the numbers of persons with acute infections. The spread of the snail vector is clearly related to the inadequacy of public funding for conduct of snail control programs now that community participation in such efforts has virtually ceased. Charging for treatment of schistosomiasis infections must certainly pose a financial burden to some.

18. However, there is very little evidence overall that health status is not continuing to improve, on average, in most of China. Communicable disease is (relatively) much less important today in China, on average, than at any time in the past. However, in some regions it remains more important than average figures would indicate and in all areas the remaining main communicable diseases - tuberculosis, respiratory infections, and reproductive illness - deserve to be targets of effective, publicly-funded programs to improve health status. For the remaining communicable diseases which probably cause significant morbidity, data are not sufficient to support a detailed discussion. However, it seems certain that primary health care programs aimed at control of diarrheal diseases and respiratory infections, especially in infancy and childhood should, at least in poor regions, once again have priority for public funding rather than be the subject of cost recovery efforts.

19. Lastly, sample surveys indicate clearly that the chronic, infectious diseases (tuberculosis, malaria, dengue and schistosomiasis) are only under control to a limited extent. Experience elsewhere shows that these diseases are quite likely to re-emerge if public health spending priorities do not maintain an appropriate focus of case finding and control. The data on schistosomiasis and the persistent, very high rates of TB indicate a process of deterioration, or at least stagnation, of health gains. As discussed later in this report this is largely the result of the health system being subjected to economic forces which do not recognize the essential "public" welfare and "public" benefit nature of much disease and prevention control. Creation of a macro-economic environment which essentially privatized most health services, including prevention and control programs has put many of China's previous health gains at risk.

E. Distribution of the Present Health Burden

20. Infectious and endemic diseases account for less than a quarter of all mortality today. Heart disease, chronic obstructive lung disease, stroke, cancer, and injuries and suicide are the leading causes of mortality, accounting for 72% of all deaths. These same chronic diseases already

account for the majority of hospital services and health care costs. Most of the severe and disabling morbidity that requires care and treatment is also related to chronic diseases and injury (see Annex Chapter 1 for a more detailed overview of mortality in China.)

21. Detailed analysis of current mortality data show that, in general, men are affected relatively more than women by the chronic diseases of middle age. Rural areas are affected relatively more than urban areas by certain chronic diseases that have risk factors rooted in poverty (e.g. hypertension related diseases) and low socio-economic status or that are caused by infections (e.g. liver cancer, which is linked to hepatitis B virus (HBV) infection), and by suicides and injuries. These urban-rural differentials can help to focus health programs and identify priorities. Urban areas are at present affected more by the chronic diseases that are primarily related to smoking and diet, although the main effects of tobacco use and of recent dietary changes will not fully appear even in the urban population for at least another two decades. However, it would be quite misleading to infer that the main future burden of the health transition would be in the cities. Incidence of some chronic disease is already higher in rural areas. The rapid spread of cigarette smoking and some other risk factors from urban to rural areas may worsen the future burden of chronic diseases by adding powerful new risk factors onto persistent, poverty-linked risk conditions (Table 1.5).

Table 1.5
China: Distribution of Chronic Diseases as Causes of Death

1987 adjusted data (in percent)	Probability of Death, Ages 15 - 60			
	Male		Female	
	Rural	Urban	Rural	Urban
Non-communicable Diseases	10.38	9.56	7.82	7.01
Cancers	4.19	4.76	2.37	2.95
Cardiovascular Disease	3.29	2.44	3.37	2.28
COPD + Pulmonary H.D.	1.65	.95	1.15	.44
Liver Disease	.8	.48	.34	.19
Injuries - intentional	1.35	.68	1.32	.57
unintentional	2.83	1.51	.97	.52

22. Nor is China's present chronic disease burden low, thus leaving time for complacency. Comparisons of U.S. and Chinese age-adjusted mortality rates (to remove differences due to age structure) show remarkably similar shares and rates of chronic disease burdens (Chart 1.3), indicating that China today already has a chronic disease mortality burden approximating that of a much wealthier, developed nation. While the specific disease composition (for heart diseases and cancers in particular) is different between the U.S. and China, the health transition process is already well underway.

F. Disease Surveillance and Broad Health Strategy

23. Mortality and morbidity vary widely from the average data discussed above. In some places communicable diseases, and infant and maternal health needs, remain much more important and burdensome than indicated by the

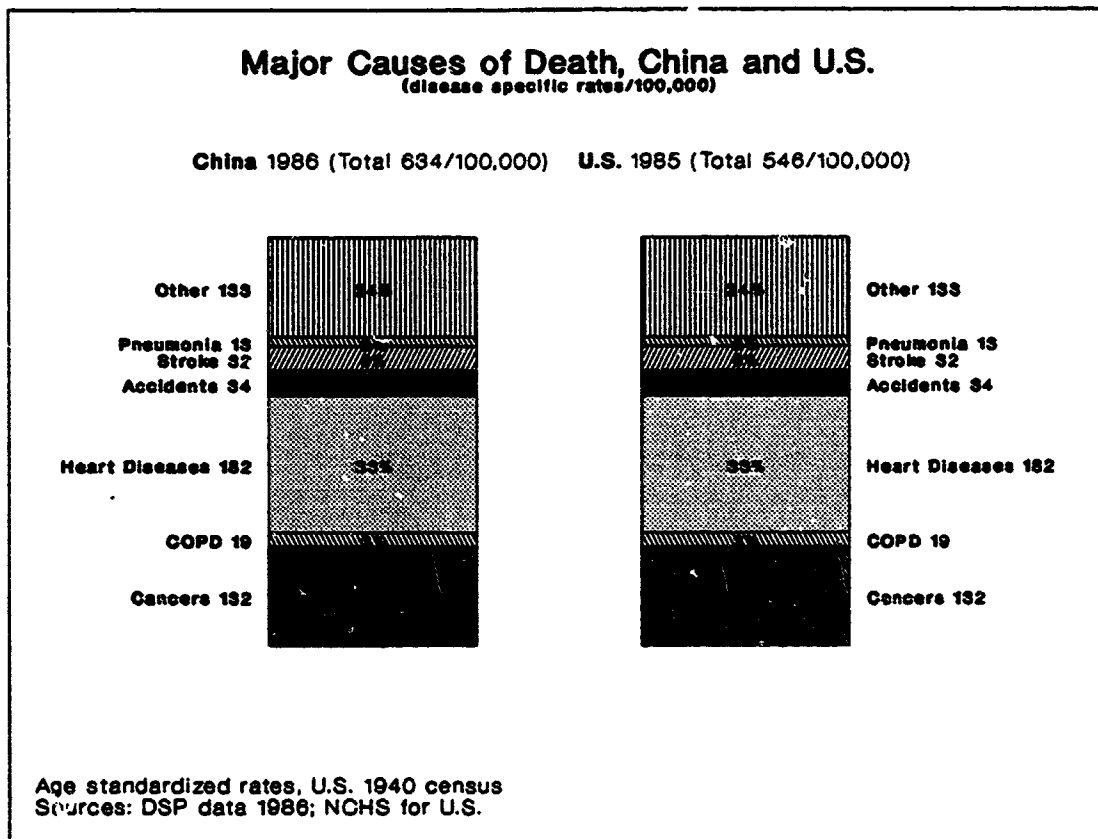
averages. In other locales, including most of urban areas and the seacoast provinces, the chronic diseases are more prevalent and the age-specific rates are already higher than the averages. The value of further developing and refining the disease surveillance system is obvious (see Box 1.2). Not only can geographic areas for particular types of health strategy be more clearly identified, but comparisons can be made using time series and location-specific data (within and outside China). Reliable epidemiologic data can help provide a sound basis for health needs assessment and for the development and targeting of health programs.

24. Many of the forces shaping China's future are inexorable:

- demographic shifts to a larger middle-aged and a more dependent, elderly population;
- changing probability of developing chronic diseases as a result of trends in lifestyle habits, and environmental risk factor exposure; and,
- consequent epidemiological shifts to increased morbidity and mortality from disabling and medically complex, chronic non-communicable diseases;

25. With considerable scope for regional variation, appropriate overall health strategy for China today calls for near-term focus on prevention and treatment of the remaining infectious diseases, and of some chronic diseases, and for a sustained, long-term strategy of prevention of preventive illness for most of the chronic diseases and for prevention of injuries and suicides. This would reduce mortality and morbidity from both communicable and chronic diseases, postpone the onset of chronic disease until as late in life as possible and would help to ensure that growth in health care costs is kept efficient, thereby protecting equity and social gains which have been difficult to achieve. However, heterogeneity can be further reduced with attention to the remaining pockets of infectious and endemic disease, some chronic disease burden can be eased with appropriate treatment and much of the premature mortality and morbidity from other chronic diseases can be prevented or delayed.

Chart 1.3



CHAPTER 2 - THE CHRONIC DISEASES

1. Control of the chronic degenerative and non-communicable diseases had not previously been a priority in China, partly because little was known of their causes and partly because they were overshadowed by endemic and infectious diseases. The main diseases discussed in this chapter are stroke, various heart diseases, chronic obstructive pulmonary disease (COPD), various cancers, and diabetes usually do not cause much death or disability until at least middle-age; injuries and suicide are considered as well. Together these are the major killers and disablers of China's people today. The changing age structure of the population and the increasing rates of some of these diseases will result in their much greater importance in the next several decades. (Annex Chapter 2 provides more detailed treatment of these and other chronic diseases.)

A. Circulatory Disease

2. Three circulatory diseases are discussed in this section: stroke, coronary heart disease, and hypertensive heart disease. Rheumatic heart disease and other chronic circulatory diseases are discussed in Annex Chapter

3. Stroke and Cardiovascular diseases are a leading cause of illness and death throughout the world and already account for 23% of all mortality in China. They have been increasing in importance over the last 20 years, partly due to the aging of the population and partly due to epidemiological changes caused by increased exposure to risk factors. The relative shares and mortality rates of the main diseases are shown in Chart 2.1 for urban and rural areas. The relative impact of the four leading circulatory diseases (and COPD), by age and sex, is shown in Chart 2.2.

Chart 2.1

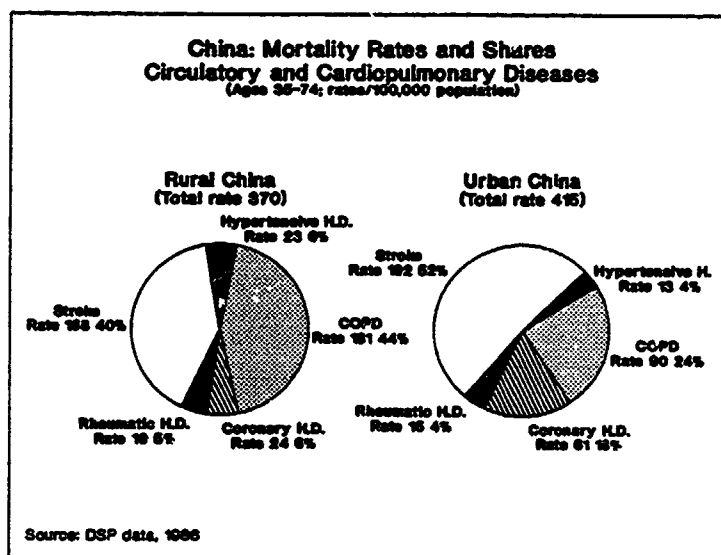
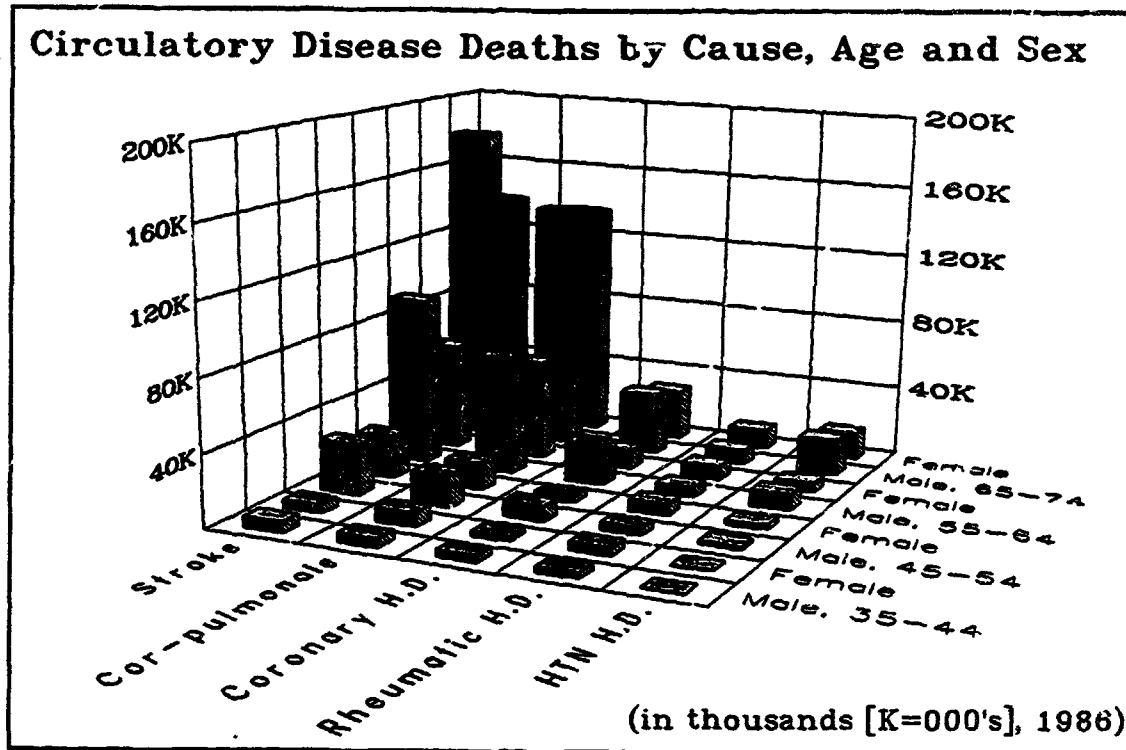


Chart 2.2



4. In the West over the last 50 years, some of these diseases have risen sharply as a cause of illness and death and then have declined in some cases sharply. With the right mix of policies, China may have the opportunity to avoid some of the increase in these diseases; it may also be able to bring about early declines where rates of illness and death are currently high. In China as elsewhere, the case for an aggressive preventive strategy is strong because of several facts about the circulatory diseases:

- large variations exist in the incidence of such diseases among different population groups;
- their frequency is strongly associated with socioeconomic factors and the distribution of modifiable risk characteristics; and
- dramatic changes are seen, both upward and downward, in reported deaths.

These facts imply that it is possible to influence the onset and frequency of occurrence of these diseases.

B. Epidemiology and Trends

5. Over the last few decades mortality for coronary heart disease, stroke and hypertensive heart disease in China has been increasing in relative importance. But precise statements about age-specific trends and their pace are difficult to make. The 1986 Disease Surveillance Points (DSP) data for circulatory diseases show averages indicative of the overall rates of coronary heart disease (CHD) and of stroke having increased from the levels reported some years earlier in small-scale studies. Urban areas have reached average levels of CHD mortality near the reported maximums from surveys in the mid-1970's. However, this does not provide solid evidence as to the real trends.

6. Several large-scale studies on cardiovascular disease in China have been underway since the early 1980s, with international collaboration, and can be expected to yield valuable epidemiologic information during the next five to 10 years. Although results are not directly comparable with community disease control projects in the West, the general experience and early trends corroborate early evidence in the West that large declines in circulatory disease mortality and morbidity are possible to achieve with good primary and secondary prevention programs.

7. Charts 2.3 through 2.5 convey the importance of these main circulatory diseases in terms of total mortality and death rates for various age groups and for urban and rural men and women. In general, although the total numbers of deaths are highest in the oldest age groups (65-74), the effect on society is most severe for the middle-aged. The death rates among this group are surprisingly high already and the absolute number of deaths will increase even further as the large numbers of people now under age 25 move into middle age.

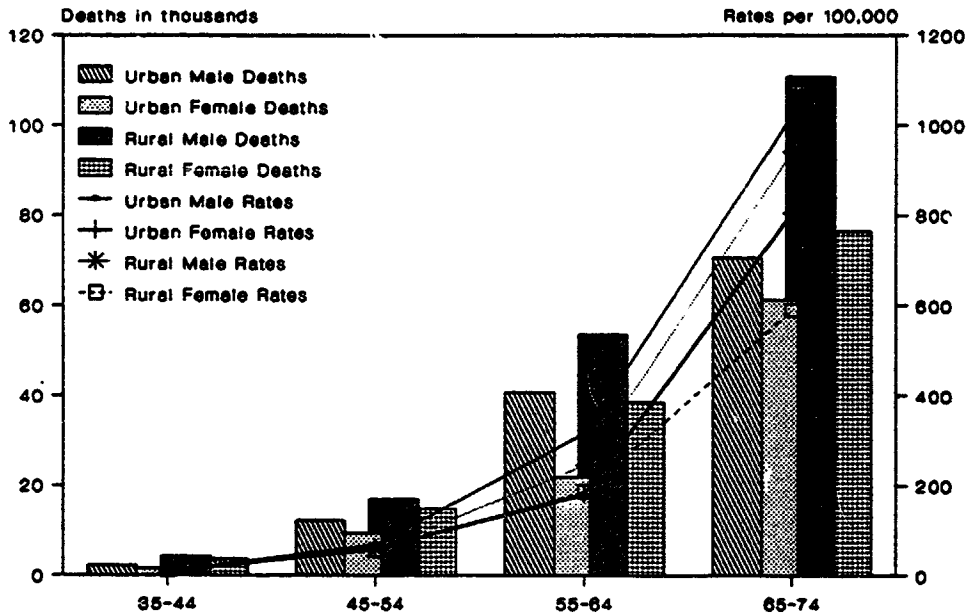
8. The disease differences between urban and rural populations, men and women, and different age groups can help China decide priorities for future investment in preventive programs, health facilities, and health financing. Development of better time series data and age-, sex-, location- and disease-specific epidemiological data will be particularly valuable as the foundation for future health planning and management (see Box 1.2).

9. Stroke is estimated to kill more than a million Chinese each year, many in the prime of their lives, (Chart 2.3) and may disable about two or three times that number. The middle-aged are badly affected by stroke, about 200,000 deaths annually for ages 35-64. As elsewhere, the elderly have very high rates of stroke and account for about 75% of all stroke deaths.

10. Risk factors. The most important known risk factor for stroke is hypertension (high blood pressure), which can itself be influenced by a number of external factors, including obesity, high salt intake and heavy use of alcohol. Stroke in middle age in Western countries is also caused by cigarette smoking. Prevention and control of these risk factors has a direct effect on the prevention of stroke, and other types of vascular disease as well.

Chart 2.3

China: Stroke Deaths and Rates by Age Group, Sex and Location, 1986



11. Long hospitalization periods for stroke victims in China do not reflect Western practice, and given the large numbers of stroke patients, such practices help to explain part of the strong pressures at every level for more hospital beds. Large-scale randomized evaluation of current Chinese practice would therefore be of particular interest to improving hospital efficiency. Besides higher overall hospital costs, the relative absence of community-based therapy for rehabilitation of stroke patients means slower overall recovery rates, longer absences from work, and large costs in human and financial terms.

12. More effective control of hypertension to reduce stroke should be a major public health focus for the next several decades in China. Research to define and adapt appropriate intervention methods should be the subject of simple, large-scale, randomized trials and health services research over the next few years. As China's population ages, the high rates of stroke will pose a major challenge for the health care system to adopt new practices and provide more community- and family-based rehabilitative care particularly for elderly patients. This may pose a difficult problem for several generations of single-child families. The West's success in sharply reducing stroke rates and improving strokes management over the last two decades provides good prospects for in China.

13. Coronary heart disease (CHD) accounts at present for only about 240,000 deaths annually in China (4% of all deaths), but the age-specific rates may be increasing. In Western countries it accounts for about 25% of all deaths and particularly affects males in the middle of life. The impact of CHD on Chinese males, and on urban males in particular (Chart 2.4), is already large. As exposure to the risk factors increases, and especially as this exposure diffuses to rural areas, the prospect of growing CHD mortality and morbidity rates implies heavier and expensive burdens on the health system.

14. Risk factors. The major known risk factors for CHD include smoking, a diet high in animal fats (which contributes to atherosclerosis), hypertension, and diabetes. Moreover, there is a known synergistic (multiplier) effect among all of these risk factors resulting in a much higher total risk of CHD for people with multiple risk factors. For example, for each 1% increase in blood cholesterol, the risk of CHD death increases by about 3%. Forthcoming research shows this relationship approximately to be true even for populations with low serum cholesterol levels such as in rural China. Middle-aged smokers more than double their age-specific, cholesterol-specific CHD risk. Hypertension also roughly doubles again the relative risk for those who are exposed to any other risk factor or combination of risk factors. The implications of this may be substantial in China, for although at present CHD death rates remain relatively low in comparison to stroke and other causes of death, many Chinese are now becoming exposed to multiple risk factors.

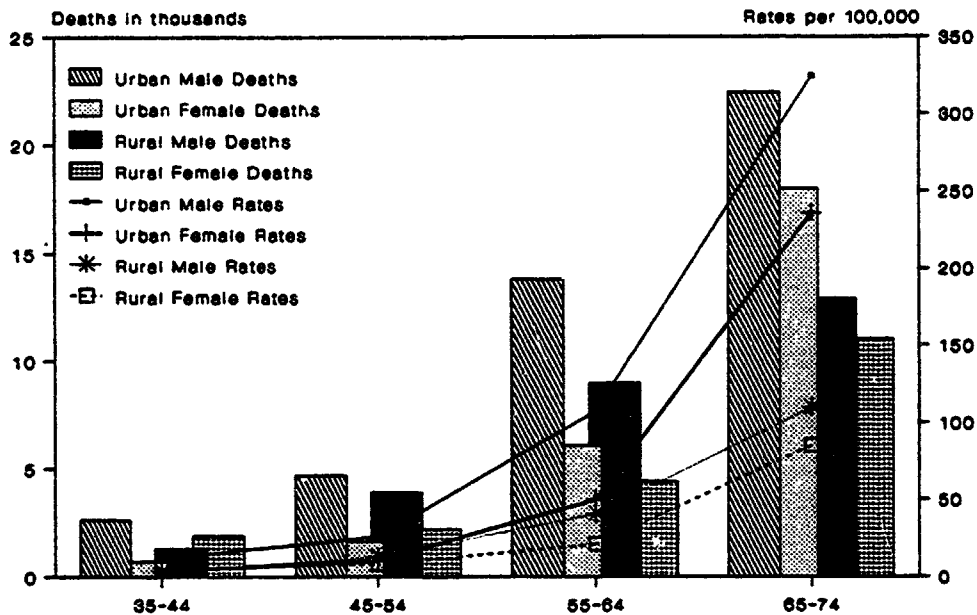
15. Incidence of CHD (including both fatal and non-fatal heart attacks) is about 2.5 times mortality in Chinese populations that have been studied. Morbidity from a growing CHD caseload over the next two decades should provide a strong impetus for China to find alternatives to the costly hospital-based intensive care of the West, to stress aggressive, widespread and well-funded prevention programs, and to move quickly to adopt more cost-efficient standards of care by reducing the current hospitalization time for CHD patients. Based on the experience of the West, China has the opportunity to emphasize a preventive approach to forestall a major portion of the otherwise predictably high burden of cardiovascular disease.

16. Hypertensive Heart Disease presents a health burden (Chart 2.5), with marked urban and rural differences. Although relatively less important as a cause of death and illness compared to stroke and CHD, much hypertensive heart diseases, especially in middle age, is avoidable or postponable. Control of hypertension has a direct reduces the risk of hypertensive heart disease and improves its effective case management. Prospects for hypertensive heart disease are therefore likely to be directly proportional to the success of programs to control hypertension.

17. These three main circulatory diseases are suitable for policy interventions to bring about long-term, population-wide reductions in risk exposure that would decrease the incidence of new disease. These interventions should include:

Chart 2.4

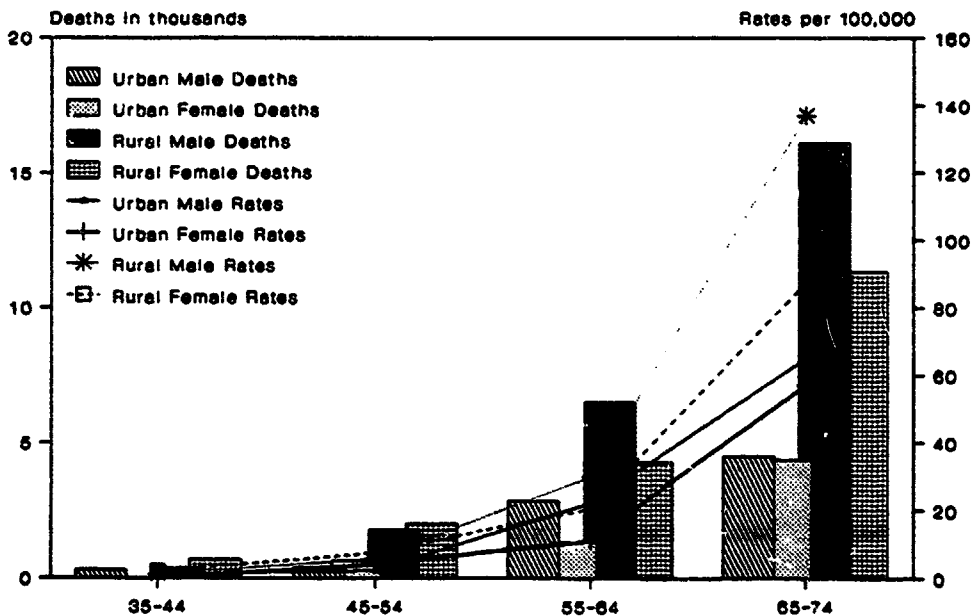
Coronary Heart Disease Deaths & Rates by Age Group, Sex and Location, 1986



Source: DSP data, 1986

Chart 2.5

Hypertensive Heart Dis. Deaths & Rates by Age Group, Sex and Location, 1986



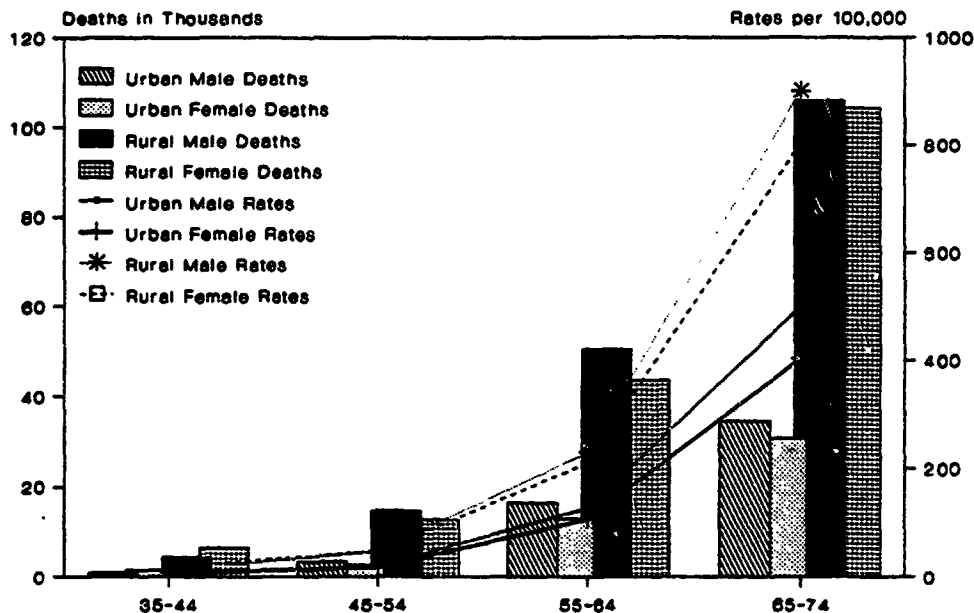
- Reduction and control of smoking
- Regulatory approaches to achieve population-wide reduction in risk exposure from diet (e.g. limiting and discouraging salt and animal fat in the diet).
- Targeted therapy programs to reduce and control hypertension in individuals found to be at high risk
- Community and school programs of education and health promotion
- Individual-based counselling on risks

C. Cardio-pulmonary Disease

18. Chronic obstructive pulmonary disease (COPD), kills about a million people annually and is a disabling disease for perhaps five to ten times more (see Chart 2.6 for death and mortality rates).

Chart 2.6

**China: COPD Deaths and Rates
by Age Group, Sex and Location, 1986**



Source: 1986 DSP data

19. COPD refers to several disease manifestations or stages of the same disease process and is known by various names: cor-pulmonale (heart disease with an underlying pulmonary deficiency, cardiopulmonary disease, right-sided heart disease, etc.), unspecific obstructive pulmonary disease, and bronchitis and emphysema are among the most common. COPD morbidity has a greater impact on most societies (including China) than COPD mortality, as death usually occurs only after an extended period of progressive disability and ill health and may in the end be unrelatively but primarily caused by stroke, cancer or other disease.

20. Risk Factors. Smoking is the most important proven risk factor for COPD--in many countries, both COPD prevalence and COPD death are limited mainly to smokers.

21. Smoking cannot, however, account for the high female death rates for the disease nor for the great variations in different geographic regions in China and other parts of the developing world. COPD is known to be linked, in ways not yet fully understood, to conditions of poverty, poor nutritional status, frequency of early childhood respiratory infections, and substandard living conditions including severe indoor air pollution exposure to heating or cooking smoke. Smog, industrial and other air pollutants, exposure to dust in mines, textile mills and factories are known to exacerbate the disease and can compound the severity and outcome of COPD and of other respiratory infections such as pneumonia and tuberculosis. In many countries considerable attention has been paid to these factors as a cause of COPD. Results of studies appear to support the notion that people with established COPD can be adversely affected by environmental pollution. However, few epidemiologic data support the conclusion that general environmental pollution is a major risk factor that causes COPD.

22. Future Epidemiology of COPD in China. China's mortality rates for COPD cannot yet reflect the recently increasing prevalence and duration of smoking (see Chapter 3, Risk Factors). Another 10 years of smoking experience may yield incidence rates for COPD substantially in excess of the high current levels. Prospects for China appear particularly worrisome as possible reductions in COPD death rates, from improvements in staving off the still poorly understood risk factors, may be slow to occur while increased smoking-attributable rates may rise sharply.

23. Moreover, the prevalence of COPD deserves special attention in developing a strategy for China. Morbidity is many-folds higher than mortality--death may be preceded by 10-15 years of disability--and is characterized by prolonged periods of disability with intermittent hospital treatment. If incidence and prevalence are on the increase in China, the economic burden of COPD for China will become very large, i.e. perhaps much greater than today's 5-10 million patients, partially disabled, more prone to other illnesses, receiving increasingly frequent and costly treatment as they age.

24. Physician- and community-based intervention programs of all kinds, and regulatory programs, to reduce the incidence of smoking offer the best hope of primary prevention of new COPD along with the improvement in underlying COPD

rates that can be expected to accompany improved nutrition, living conditions, and economic growth. Because COPD results in lung function declines is directly related to the length of smoking experience, prevention of smoking in the young is particularly important. Cessation of smoking among those who have not yet developed disease returns lung function declines to normal rates of fall. Cessation of smoking among those who develop the disease arrests further prematurely rapid rates of decline in lung function but by then disability has been incurred. As in most countries, it will likely prove difficult to convince the young to be concerned about eventual, premature disability and mortality from COPD. This implies the need for strong and sustained leadership and funding for this health issue. Well- designed surveys to establish and track COPD incidence and prevalence should have high priority for China's universities and research institutes.

D. Cancer in China

25. Cancers (Table 2.1) are among the most serious of the chronic diseases in China. Cancers kill about a million Chinese annually, accounting for about 17% of mortality and much underlying morbidity. Higher urban rates are indicative of the increased future risk that China will face as industrialization and urbanization of the rural population continues.

Table 2.1
China: Leading Cancers
(Mortality Rates/100,000, all ages, 1986 DSP)

	Urban		Rural		Total	
	Male	Female	Male	Female	Male	Female
Total	150	91	94	60	126	78
Lung	41	24	14	6	29	16
Stomach	26	12	30	14	28	13
Liver	28	10	18	8	24	9
Esophagus	15	6	14	8	15	7
Others	40	39	18	24	30	33

Source: DSP data, 1986

26. There appears to be a worsening of overall cancer mortality rates in China, which may reflect increasing exposure to cigarette smoking (see Chapter 3) on the many smoking-related cancers. For the next several decades a rapidly deteriorating picture for lung cancer appears inevitable even if concerted preventive action is initiated soon. For stomach and esophageal, and perhaps liver and cervix cancer, China can probably expect long-term and rather substantial declines in mortality for a number of reasons. (The risks from smoking may offset this trend for esophageal cancer). For other cancers

the largely unregulated small industrial sector is likely to produce some localized excess risks, particularly from mineral fibers and other dusts.

27. The survival rates for all of these cancers are low; their treatment generally is costly and remains largely ineffective. Large-scale randomized evaluation of the effect (or lack of effect) of various treatments on mortality could help control these costs. Effective health strategy for China to deal with its most prevalent cancers must surely be based on primary prevention by effective discouragement of smoking, general improvement of diet (including reduction of salty, pickled and mouldy foods), and nationwide control of the hepatitis B virus (see section below on liver cancer). Investments in screening programs, secondary prevention, and treatment efforts by surgery, chemotherapy and radiation will be largely ineffectual for China's main cancers. Annex Chapter 2 provides detailed discussion on the epidemiology, risk factors, international trends in the leading cancers, and prevention considerations. Two major cancers merit discussion here because of the scope for their effective inclusion in a preventive strategy.

28. Lung Cancer. For all types of lung cancer, the five year survival rate in the medically most advanced countries is only 5-10%. Screening is not cost effective (see Box 7.2). Even after early diagnosis, there is generally no effective treatment - so, although a small percentage can be rescued by surgery, the only way to achieve a substantial degree of control is through primary prevention. The clear causal relationship between smoking and lung cancer mark it for special consideration among the cancers. Numerous studies overwhelmingly indicate that the relative risk of lung cancer for tobacco users is many times that of non-tobacco users and is proportionate to amount (dosage) of exposure. Among regular cigarette smokers, the main type of lung cancer eventually becomes about 20 times as common as among those who have never smoked.

29. The effect of duration of smoking on lung cancer is much more important than dosage however and very significant in assessing its likely course in China and other developing countries. A three-fold increase in the duration of regular tobacco use increase the annual incidence of lung cancer about 100-fold. Cultural and social changes in China and other developing countries and aggressive marketing by both foreign and domestic tobacco companies are influencing the starting age (earlier) and duration (longer) for smoking. These and the increasing percentage of the population that smokes will result in greatly increased rates of lung cancer in the future.

30. Other causes for lung cancer that have been identified include various sources of air pollution and industrial hazards, for example, for workers involved in the manufacture of chromates from chrome ore, plastics (from chloromethyl ethers used in manufacturing ion exchange resins), copper and cobalt (from the arsenic content of ore), pesticides, radioactive materials, and asbestos. Cigarette smoking interacts with these environmental factors to increase the risk of lung cancer as well.

31. DSP data, age-adjusted, show a lung cancer mortality rate in China about 50% of that in the United States but more than 25 times the rate in the lowest-incidence countries. From 1975 (Cancer Atlas survey) to 1986 (DSP

data), mortality from lung cancer grew about 9% a year, indicating an underlying increase in lung cancer rates paralleling the earlier experience in Europe and the United States. This growth is consistent with the current high prevalence and duration of cigarette smoking among Chinese males, especially in urban areas, and increased smoking, especially of manufactured cigarettes, over the last 20 years.

32. Because of the length of time between the start of smoking and the emergence of cancer, and the importance of duration, it can be expected that lung cancer will now begin to grow rapidly as a major cause of death in China, first among males in the urban centers, then across the countryside and among women who take up smoking.

33. Liver Cancer. Measured in terms of years of potential life lost (about 1.5 million YPLL, 21% of total YPLL below age 65), liver cancer ranks high among cancers in China, and the mortality rates are among the highest in the world. The overall Chinese death rate is more than 15 times that in the US and is high even among Asian and African countries.

34. Risk factors. Factors explaining the high incidence of liver cancer in China are chronic lifelong infection with the hepatitis B virus (HBV) and, perhaps, consumption of aflatoxins (naturally occurring from mold and fungus on grains and nuts). Comparing those chronically infected with HBV with those who are not, the difference in the incidence of liver cancer (and of some other chronic liver diseases) is so extreme that HBV is a clear cause of the large majority of all Chinese liver cancer.

35. Primary prevention. A high proportion (between 10% - 20% with some variation by region) of adult Chinese are chronic carriers of HBV, and most transmission of HBV which results in development of chronic carrier status in China occurs at birth. The clear primary prevention strategy is immunization at birth, which should lead to a low incidence of Hepatitis B illness episodes through life and a very sharp reduction in HBV-related mortality (from both liver cancer and cirrhosis) in middle and old age. Although reductions of mortality as a result of HBV immunization will take decades to become significant, complete avoidance of morbidity and disability attributable to acute HBV infection episodes will become apparent early in childhood and last a lifetime. A complementary strategy, which might produce a more rapid reduction in disease amongst those already infected, is to encourage the storage of carbohydrate foodstuffs in circumstances that discourage fungal or mold contamination. Moreover, it is thought that aflatoxins may play a substantive role in liver cancer occurrence among HBV positive individuals. Public health (and food processing) regulatory improvements to reduce exposure to aflatoxins could contribute to reductions in liver cancer occurrence amongst the hundreds of millions of children and adults who already are exposed to HBV.

36. Problems to be overcome in an HBV immunization strategy are two: effective inclusion of HBV in China's EPI program and an adequate, affordable supply of vaccine. Large-scale experiments already done in China and other developing countries have demonstrated the effectiveness and practicality of

adding HBV immunization to EPI programs as soon as supply and cost problems are resolved.

37. The first immunization must be given within 24 hours of birth, and two subsequent doses can be administered at the time of late childhood immunizations. (There may also be a need for a booster dose at 1-2 years of age: this is currently being investigated by a randomized trial in Qidong, Jiangsu). Because most births in China already take place at a medical facility, administration of the first dose of vaccine, training of birth attendants, pre-natal education of mothers, and administration of HBV vaccine should not pose problems except in remote areas where home births are more common.

38. Affordable supply of vaccine is more problematic. Until recently the cheapest source of HBV vaccine was that derived from blood serum. International efforts have brought the world market price of such vaccine down to about US\$1 per dose (US\$3 per full immunization course). The size of China's vaccine needs (about 50 million doses per year for at least 40-50 years) makes reliance even on inexpensive imported vaccine a doubtful strategy. China already manufactures some serum-based HBV vaccine, but of variable quality, and collection of large supplies of blood in China is difficult for a variety of social and technical reasons. Vaccine based on recombinant DNA technology would thus appear to be the best choice of supply if large-scale manufacturing can bring down costs. The Beijing Serum Institute has been manufacturing small doses of RDNA vaccine but with quality problems. Recent conclusion of a technology licensing agreement with an international manufacturer should rectify this situation if funding for a production factory is approved. Large-scale production could result in inexpensive, high quality vaccine within a few years and this project should have very high priority within China's national public health goals.

E. Other Cancers

39. Several other cancers are of interest because potential secondary prevention programs are feasible. These selected remaining cancers include cancer of the breast, cervix (see Annex Chapter 2 for more detail on this type of cancer), and colon. Rates of these cancers are still relatively low in China. However, increases in the rates of these cancers have been positively associated with economic development in the rest of the world. A positive association would also be expected in China over the next 30 years as exposure to environmental and occupational carcinogens increases with industrialization. Thus as economic development occurs, some secondary prevention programs may eventually become more beneficial because these cancers respond well to early detection and therapeutic or surgical measures. Nasopharyngeal cancer in certain locales may also be effectively reduced through removal of specific risk factors though further research is needed.

40. Cancer Strategy. The main effective strategy for China to deal with its most important cancers would appear to be one based on primary prevention by effective discouragement of smoking (for control of lung, esophageal and several less common cancers), and nationwide control of HBV (for control of liver cancer). Secondary prevention and screening programs may be of some

future relevance, but for only a few cancers (none of the most important ones). Attempts at treatment and cure of the leading four cancers are largely ineffectual and, (apart from surgery for selected patients) are wasteful of resources that could be directed at prevention. Treatment of these cancers is much too expensive in terms of cost per average years of life gained. There is a role for supportive treatment of cancer patients however. At a minimum, the medical care system must provide humane support and pain relief for patients suffering from incurable cancer.

41. The most important reductions can be achieved only through control and reduction in cigarette smoking. Failing this, China will inevitably experience an epidemic of smoking-related cancer deaths--about a million each year by the time current teenagers reach middle age (plus about a million deaths a year from other tobacco-related diseases). Economic losses from these premature deaths and the financial costs to the health system will be far greater than from any other single cause of disease.

F. Diabetes

42. Diabetes, though not widely recognized as such, is already a major problem in China. Chinese researchers who specialize in diabetes agree that despite fragmentary data, indications are that diabetes appears to be a growing chronic disease. There may be between 7 and 15 million diabetics today, and within the next 15 years, if prevalence similar to that in the West continues to develop, there may be 20-30 million diabetics. It is a major risk factor for stroke and many other cardiovascular diseases and may lead to blindness, renal failure, and damage of the lower limb tissues. Diabetes also directly increases the risks of complications in pregnancy. Although risk factors (other than obesity) for diabetes are not well understood, many of the life-threatening and disabling complications of diabetes are preventable. This calls for better epidemiological knowledge about the prevalence and incidence of diabetes and the inclusion in China's health care strategy of a strong program to deal with the emerging diabetic population. Here again, the need is for large, simple randomized trials to compare the long-term effects of whatever treatment alternatives might be widely practicable in China.

43. Mortality and morbidity from diabetes is very difficult to estimate because death certificates seldom list underlying causes of death. However, surveys indicate that the incidence of insulin-dependent diabetes mellitus (IDDM) may not be so much lower than the U.S. average of 15/100,000 annually and may be much higher (five to 20 times) than that reported in other parts of Asia. Much IDDM (juvenile) mortality may go undiagnosed as the symptoms mimic other common childhood illnesses. Survey data provide a crude estimate of current mortality of 20,000-40,000 juvenile (under age 20) deaths annually, accounting for one to two million YPLL annually. Although these approximations are too crude for policy actions, they indicate the need for establishment of IDDM registries so that policies can be developed. This is particularly important in the context of China's one-child family policy as most IDDM mortality will occur only when the parents' ages make a subsequent pregnancy risky or improbable.

44. In China, as in many countries, adult onset diabetes (non-insulin dependent diabetes mellitus--NIDDM) is often undetected because its subclinical symptoms can be masked by aging and ill health, including symptoms of the chronic diseases to which NIDDM is a primary contributing factor. In the U.S. NIDDM is the second or third most important attributable risk factor for both men and women for stroke, coronary heart disease, and peripheral vascular disease. These findings are particularly significant for China as it will experience an increased prevalence of these diseases in the course of the health transition. If the true prevalence of NIDDM is even half of the rates in the West, it will be a major contributing factor to the complications and mortality of all cardiovascular and micro-vascular disease. For example, given the risks and costs of dialysis and kidney transplantation as treatment for renal disease, increased attention to proper management of the diabetic-hypertensive patient is clearly a very cost-effective strategy for China.

45. Prevention. Causes of diabetes are not well understood, but risk factors include obesity, genetic and familial factors, and environmental (possibly viral) factors (for IDDM). At this time there are no known prevention measures for IDDM nor is there any cure: all that is available is long-term treatment. For NIDDM the risk increases sharply with age. The only known primary prevention against the risk of NIDDM is weight control, and its significance is not clear for individuals. Regular exercise appears to have primary prevention effects as well.

46. Chinese with diabetes should be encouraged to view themselves as a population with a disproportionate number of risk factors and should be encouraged to adopt healthful lifestyles, to control obesity, hypertension, and cholesterol levels and blood glucose levels, and to stop smoking. It is clear that these common risk factors interact with diabetes to produce further serious disease. For these high-risk people, education, dietary and social support systems and medical care are vital as part of an effective secondary prevention strategy to control the complications of diabetes including blindness and lower limb infections and amputations. This approach can best be pursued at the lower levels of the health system and barriers to accessing these services, including financial barriers, should be removed.

G. Other Chronic Diseases

47. Such chronic diseases as cirrhosis, rheumatic and musculoskeletal diseases, as well as mental illness, are known to affect many in China (sometimes severely in comparison to other populations). As mortality data rarely yield much insight into these disabling diseases, however, more research is needed to assess these problems and the options for their control. Little can be done at present to estimate their present or future burden but there are clearly important avenues for epidemiological and clinical research as these diseases will inevitably place claims on China's treatment and curative facilities and manpower (see Annex Chapter 2 for fuller treatment of these chronic diseases).

H. Injuries, Suicides and Other External Causes of Death

48. External causes of death are now recognized as a major and growing problem in China. During the health transition, the relative and absolute importance of injuries and suicides has increased. The impact of injuries and suicide is profound in terms of YPLL, disabilities, health care costs, wages not earned, and production and taxes lost to the economy. Detailed data for external causes of death are available for 1987 from MOPH reports to WHO covering a population of about 100 million. DSP data for 1987-88 show similar patterns (see Annex Chapter 2 for a more detailed discussion and charts).

49. The total mortality rate for external causes is 54/100,000, roughly 540,000 deaths annually for China. It is difficult to infer morbidity from injury mortality data, but some gross estimate is possible and points also to the need for further research and better surveillance. In the United States, there are approximately 16 hospital admissions and 380 outpatient emergency visits for each injury death^{1/}. For China these ratios would suggest more than 20 million injuries each year requiring emergency treatment and/or hospital admission. These order of magnitude estimates indicate that there is considerable scope in China for better injury prevention, with consequently lighter burdens on hospitals, physicians and overall economic productivity.

50. The most common circumstances of externally caused deaths in rural areas are suicide, drowning, motor vehicle accidents, and falls, with the same order for both sexes. In urban areas, motor vehicles are the leading cause for males, but for both sexes combined the order is suicide, motor vehicle, falls and drowning.

51. Death rates from motor vehicle traffic are about 8.5/100,000 implying about 85,000 deaths annually due to traffic accidents; Public Security Ministry official figures report about 50,000 traffic deaths in 1987. These two figures might reasonably be taken as the upper and lower boundaries of the true range of traffic deaths pending the availability of better data. Motor vehicle injury mortality is about twice as high in males as in females. The rates are highest among older males, increasing from about 18/100,000 for ages 55-59 to more than 40/100,000 for those 80 or older.

52. Suicides comprise about 30% of all externally caused deaths in China (in the U.S., the proportion is about 20%). The extremely high rate, especially among rural females (78/100,000 for ages 20-24), suggests the importance of determining and attempting to correct some of the underlying factors.

53. Drowning is a serious problem among children, especially 1-4 year old children in rural areas, whose death rate of 70/100,000 is almost ten times the drowning rate for the population as a whole.

^{1/} Rice DP, Mac Kenzie, EJ, et al. Cost of Injury in the United States. San Francisco, California: Institute for Health and Aging, 1989.

54. Years of premature loss of life (before age 65) to injuries are estimated at 16.8 million annually, 24.5% of total YPLL, and indicate the relative priority that China should attach to injury prevention. However, injuries are not now specifically designated as a health problem for which the Ministry of Public Health or local health agencies have surveillance or preventive mandates. In the past the health system has had access only to information on injuries reported by hospitals; these data often did not contain information on the circumstances of injury that would be needed for an epidemiological approach to injury prevention. Consequently, injuries are not a priority in China's health promotion campaigns and regulatory efforts are fragmented among many agencies.

55. In recent years a number of improvements have been initiated that may give China an advantage in dealing with its injury problem, specifically a system of regular reporting of serious injuries and mortality at the provincial level. This new system may provide an opportunity to take a planned approach to injury surveillance, epidemiological analysis of causes and risk factors, and to develop and implement actions for a "serious injuries" prevention program.

56. Experience elsewhere shows that death and injury from external causes can be substantially reduced through health education, public investments to remove and reduce the key risks, and regulations to control environmental, workplace and transportation risks. School-based injury prevention education programs could be developed and tested in simple, large-scale trials. Water and road transport safety education programs could also be evaluated in randomized trials. The contribution of alcohol consumption to injuries could be investigated. Further research and consolidation of reporting systems to provide better data should allow targeted injury avoidance and prevention programs that have high economic returns through their reduction of disability and premature death.

57. The burden on the health system to develop emergency care networks and treatment centers will inevitably grow, as will the patient care requirements for hospitals. Costs attendant on these trends will be high and probably unavoidable from a public demand perspective. Without balanced attention to injury and suicide prevention, investments in an emergency rescue system and treatment facilities will not provide an effective response by Chinese health institutions. Prevention is sure to be more effective than construction of expensive trauma care units for treatment of the injured. Trauma units without a supporting network of emergency rescue systems and widespread community-level, life-saving, first-aid knowledge will not be effective. Achievement of the right balance of prevention, first-aid, rescue and trauma care is difficult and will need special attention in health planning efforts.

CHAPTER 3 - RISK FACTORS IN CHINA

1. Since 1950, much has been learned about the avoidable causes of many types of chronic disease and about the complex ways in which these causes interact with each other. Risks can play many roles in different settings, can modify each other, and can operate simultaneously in several disease processes.

2. Unfortunately, China missed out on much of the world's experience in studying the epidemiology of chronic disease as this period in the West (the 1960s and 1970s) coincided in part with the Cultural Revolution in China. China's universities and social research institutions were closed, resulting today in a scarcity of trained epidemiologists, weak faculties of public health, epidemiology, and social medicine, and lack of attention until recently to prevention of chronic disease. Epidemiology has been considered largely a microbiological and laboratory-oriented research area. The social, behavioral and environmental aspects of disease risk factors and etiology have not yet become established parts of epidemiology programs in most Chinese medical schools.

3. Although China is somewhat behind the West in community understanding and action to reduce chronic disease risks, public awareness about mortality from chronic disease is creating strong pressures for more investment in treatment and curative facilities. However, this pressure for expenditure does not carry with it a balanced emphasis on prevention and does not recognize that treatment efforts are often largely ineffectual for chronic diseases. A better public and official understanding of the importance of preventive approaches and, therefore, of the risk factors for chronic disease is an essential element in China's second health care revolution. Annex Chapter 3 discusses details of the main risk factors for China.

A. Smoking

4. More Chinese are smoking today than ever before, and the young in China constitute the world's largest untapped market for tobacco products. If present smoking patterns in China persist, by the time the young people of today reach middle and old age, tobacco-related illness among them will account for about 2 million deaths per year, half from tobacco-induced cancer and half from other tobacco-induced diseases.

5. Smoking is the single most important risk factor for chronic diseases in the world. It is a cause of, and accelerates atherosclerosis, the underlying cause of coronary heart disease, and is a major cause of COPD. It is also a major cause of lung, larynx, oral cavity, and esophageal cancers and is a contributing factor for development of several other types of cancer, for example, most bladder cancer deaths among habitual cigarette smokers are caused by tobacco. It acts synergistically with other risk factors such as elevated blood fat levels, hypertension, and a sedentary life style to increase disproportionately the risk of illness and death from heart disease, stroke, aortic aneurysm and other arterial diseases. It is a major factor in

fetal mortality and low birth weight. In countries such as the U.S. or the United Kingdom where cigarette smoking has been widespread for many decades, tobacco now causes about one-third of all deaths in middle-age.

6. China's cigarette consumption is already the world's largest--data for 1987 show consumption of an estimated 1,400 billion cigarettes or 28% of the world's total. An estimated 228 million men and 24 million women smoke, each consuming an average of 15 cigarettes per day (see Table 3.1). The proportion of smokers who begin before age 15 is growing rapidly. There is a moderate inverse relationship between smoking and educational levels.

Table 3.1
China: Smoking Distribution

	Smoking Prevalence (1985)		Number of Smokers (1985 - in millions)		
	Age Group	Male	Female	Male	Female
"Tobacco causes more death and suffering among adults than any other toxic material in the environment.... No country is yet taking action against tobacco commensurate with the cost it imposes. The global use of tobacco has grown nearly 75 percent over the past two decades. In China, use has doubled [since 1980]....The worldwide cost in lives now approaches 2.5 million per year, almost 5 percent of all deaths." William U. Chandler Banishing Tobacco Worldwatch Paper 68	15-19	19	0	12.5	.2
	20-24	52	1	28.3	.3
	25-29	70	2	30.7	.8
	30-34	74	3	33.5	1.4
	35-39	74	5	24.9	1.6
	40-44	75	9	19.9	2.2
	45-49	76	14	19.1	3.0
	50-54	76	16	17.6	3.3
	55-59	74	18	14.3	3.2
	60-64	72	19	11.0	2.9
	65-69	68	18	7.6	2.2
	70-74	63	18	4.7	1.6
	75+	56	15	3.5	1.4
		Total		227.8	23.9

Source: Ministry of Public Health, 1984 Smoking Survey.

7. Total consumption of cigarettes in China has grown at a high rate--4.2% annually between 1952-65; 7.5% annually from 1965-78; and 9.6% annually from 1978-87. Overall consumption of manufactured cigarettes continues to rise rapidly and now equals, at least among males, the levels of wealthier countries that have suffered huge economic and social costs due to smoking-related illnesses (Table 3.2 below).

8. Smoking is today already responsible for most lung cancer deaths (totaling 80,000 yearly), a substantial minority of coronary heart disease deaths (240,000 yearly), chronic obstructive lung disease (1 million yearly), and some stroke, esophageal and other cancers, and other heart and vascular disease. An estimate of 300,000 tobacco-related deaths per year today, many of them in middle age, seems reasonable. (Epidemiological surveys to underpin a firm estimate are underway.) Much morbidity, including some among children, is also surely tobacco-related. What is far more serious, however, is that this burden of illness is likely to increase about 6-10 fold within a generation. This is largely an unrecognized threat to national welfare.

Table 3.2
Tobacco Exposure of China's Population

Cigarettes Production & Consumption

	1952	1957	1965	1978	1980	1982	1983	1984	1985	1986	1987
Boxes (in millions)	2.7	4.5	4.6	11.8	15.2	16.1	18.3	21.3	23.4	26.0	27.0
Cigarettes (in billions)	133	223	232	590	760	806	915	1066	1185	1298	1350
Packs (20's)/Year/Capita	11	17	16	31	41	44	49	55	61	63	65
Comparison of Tobacco Consumption (Cigarettes per annum per adult */)											
China a/	358	578	526	987	1206	1205	1326	1500	1618	1724	1748
Soviet Union			1325	1450	1375	1336					
Japan a/	1570b/	1690c/	2350	3497	3393			3270			
Finland a/	1780b/		2190d/				1829				
U.S.A. e/	3886	3775	4259	3967	3851	3753	3502	3461	3389		

* Adults = Age 15 and above.

a/ Data for these countries are cigarettes per capita for person age 15 and over. Source: International Agency for Cancer Research Monograph 74 for SOVIET UNION and Japan, and Monograph 38 for Finland.

b/ for 1953.

c/ for 1958.

d/ for 1963.

e/ for adults 18 years and older; office of Smoking and Health, DHHS.

9. At least four factors have inhibited recognition in China of the disastrous effect that smoking will have in the next century:

- There is a deceptively long delay between the time a person starts to smoke and the development of disease.
- Manufactured cigarettes, which are a particularly hazardous form of tobacco, have progressively replaced traditional smoking materials only in recent decades, so their full eventual effects are not yet apparent.
- Cigarettes are a growing source of financial income to the government (US\$3.9 billion in 1987).
- The knowledge of both personal and population-wide health effects of smoking has only recently started to be disseminated in China.

10. Mortality and morbidity from smoking today in China does not yet begin to reflect the smoking-attributable disease impact that will inevitably occur. The consequences of past smoking exposure will not become clear for 1-2 decades yet, and the highest mortality from smoking is therefore certainly many years away, with or without concerted prevention efforts. This fact is simply not understood in many circles.

11. Smoking is the prime risk factor for so many incurable diseases (and its risks effects for key diseases are cumulative and relatively irreversible) that control of the future effects of current smoking habits in China should

that control of the future effects of current smoking habits in China should be at the top of any agenda for the avoidance of chronic disability and premature death now and in the next century . Experience elsewhere shows that determined political action can reduce smoking prevalence (and health risks) substantially. Effective measures include a ban on cigarette advertising, health warning labels, health education programs, mandated tar and nicotine reductions and, most important, cigarette tax increases. Tax increases would reduce consumption, especially among the young, and overall they would produce a substantial increase in state income from cigarettes (see Annex Chapter 3 for detailed presentation of information on the financial rewards of tobacco, taxes, tobacco trade, and the role of foreign tobacco companies).

12. Smoking or Health Policies in China. As in most countries, the Chinese government's actions toward the smoking and health issue are paradoxical. Some agencies continue to press for expanded tobacco production and greater efficiency and quality of cigarette production. The courtship of Western technology further illustrates the contradiction between promoting health and encouraging tobacco consumption. Foreign tobacco companies were among the first to take advantage of special economic zones with preferential investment conditions. They are also pursuing joint venture investments and providing new machinery and technical assistance to farmers and factories alike for product quality improvement. In fact, there will be strong pressures to increase tobacco promotion over the coming years in China as arguments are advanced about why tobacco and smoking are good for employment, job creation and economic growth, and for free trade and government revenues.

13. Other agencies of government, led by the Ministry of Public Health, are aware of the dangers and economic burden presented by smoking and have begun anti-smoking efforts. Along with a media campaign (begun in the 1978) that includes warnings on the health hazards of smoking, China has a ban on cigarette advertising on television, and in theory on advertising in domestic magazines, on public posters, and at point-of-sale displays. The latter two regulations are not yet vigorously enforced. Smoking is banned in domestic airplanes (enforced) and trains and buses (not yet enforced) and in transport terminal waiting areas (widely ignored). There are no legal restrictions on tobacco sales to children, but smoking is forbidden in schools; plans are being discussed to prohibit smoking for anyone under 18. Smoking is widespread among college students, including medical students and faculty. Even smoking bans in hospitals are not always enforced.

14. However, in some ways China is already a leader among developing countries with the steps it already has taken to reduce smoking. Some of the policies needing yet to be adopted will incur strong opposition from domestic tobacco constituencies (tobacco farmers, cigarette manufacturing plants, and the China National Tobacco Corporation and its many subsidiaries).

15. The government will continue to be presented by both foreign and domestic tobacco interests with arguments and assertions contrary to suggestions in this report. Economic arguments in particular should be reviewed with care as much of the underlying reasoning is often specious. Other arguments may be couched in the guise of free international trade involve strong pressures to open markets to cigarette imports and to

in the disturbing experience of other Asian societies, such as Japan, Korea, Thailand and Taiwan, in their encounters with such pressures. Annex Chapter 3, Box C-3 contains information on foreign tobacco companies and tobacco trade trends, and Annex Chapter 5 provides more information on recommendations of a strategy for China to consider.

B. Hypertension

16. High blood pressure is a cause of several chronic diseases and conditions. The most important of these is stroke, but many other diseases are also caused by hypertension (e.g. cardiac disease, kidney disease and complications of diabetes). Hypertension-related disease appears currently to be responsible for about one-fifth of all deaths in middle age in China. There appear to be genetic, environmental, and behavioral contributors to developing hypertension itself, but neither the prevalence of hypertension nor the chief external causes of it have yet been fully investigated. Studies elsewhere, however, have indicated that:

- Salt ingestion has long been associated with blood pressure.
- Psychosocial stress has been linked to elevated blood pressure and reduction of stress with blood pressure reduction.
- Obesity and alcohol ingestion are associated with higher blood pressures.

17. In China, hypertension is a major health risk. Of 4 million adults surveyed in 1979-1980, almost 8% had elevated blood pressure (defined as greater than 140/90 MM Hg) and many more had blood pressure values almost in this range, and hence sufficient to increase their risk of disease. Thus, the total number of adults with elevated blood pressure in China was over 50 million in 1980 and is probably considerably higher now. Studies from Shijingshan Commune in Beijing suggest that community control of hypertension through screening and anti-hypertensive drug therapy led to both a reduction in blood pressure in 65% of participants and, over a five-year period, a 13% reduction in the cardiovascular mortality rate and a 23% reduction in stroke mortality.

18. The challenge for China in hypertension control is to identify its hypertensive population, to identify the main reasons for their hypertension, and to develop ways to lower their blood pressures, perhaps through dietary change, traditional Chinese medicine techniques, and anti-hypertensive drugs. Overweight individuals with hypertension should be advised to lose weight to lower blood pressure. Broader public health approaches to reducing salt consumption need to be instituted and studied for their efficacy. Since salt intake in many Chinese provinces is high, investigation of the extent to which practicable salt-avoidance strategies could help to control blood pressure levels would be particularly important.

19. Two complementary options in the control of hypertension exist:

- First, there is a "population" strategy involving the development of practicable ways of producing a moderate reduction in blood pressure in the population as a whole (particularly in provinces where stroke rates are high), perhaps coupled with the development of practicable ways of reducing other risk factors--for example, if blood cholesterol levels remain low then hypertension will not be a major cause of coronary heart disease. Likewise, in middle-age, hypertension is about three times more dangerous (as a cause of stroke and of coronary heart disease) among smokers than among nonsmokers. Thus a reduction in smoking will also reduce the absolute size of the adverse effects of hypertension.
- Complementary to the "population" strategy is the "high risk" strategy. People in middle-age who are at high risk of stroke (because of hypertension or because of other conditions, such as rheumatic heart disease, smoking, a past history of stroke, or some other occlusive vascular event) will particularly benefit from a reduction in their blood pressure (or, where relevant, from a reduction in their other risk factors). Screening for people at high risk is not the same as just screening for hypertension: hypertensives may gain particular benefit from the treatment of other risk factors, and those with other risk factors may gain particular benefit from blood pressure reduction.

20. This illustrates a common characteristic of chronic disease control: where many risk factors are relevant, they often interact not just additively, but multiplicatively, and it is the overall risk that determines the importance of a reduction in any one of them.

21. Development of direct therapeutic programs for those at high risk will need to be carefully designed for cost-effectiveness (screening and treatment in the West has proven to be expensive if not well focused) and for medical efficacy (Chapter 5 provides further recommendations). This is a topic where it is clear that China should conduct some large, simple randomized trials to find out what prevention measures are effective quickly and affordably and to demonstrate and evaluate approaches known to be effective.

C. Dietary Animal Fat

22. The Nationwide Nutrition Survey in 1982 indicated that the Chinese diet is not substantially deficient on average in either protein or fat. However, protein and energy malnutrition exist in China, with about 8%-10% of the population having energy intake lower than the RDA. The existence of nutrient inadequacy for poor households and regions is obscured by national average figures. In this context, specific programs targeted to poor regions and income groups should probably have priority over strategies aimed at improving national average food availability.

23. Dietary (animal) fat consumption is important because it can be a major contributor to overweight and to obesity, which are causes of hypertension and

the only known risk factors for diabetes; and because saturated fat consumption directly affects blood cholesterol levels (which, in turn, are directly related to coronary heart disease). At least for the present, current levels of fat consumption in China are well below Western levels.

24. However, animal fat consumption appears to be increasing sharply with economic gains. Obesity has not been a traditional problem in China but is now frequently commented on by pediatric researchers and by those who deal with the urban middle-aged. Blood cholesterol levels are believed to have been low historically. Currently available information indicates low average cholesterol levels, with modest standard deviation in rural populations and higher but still comparatively moderate levels in urban populations. Trends remain unclear, and dietary surveys of urban groups provide some cause for concern. Avoidance of large increase in animal fat consumption will be an important element in China's food strategy for control of chronic disease. It will also help to contain agricultural costs, since plant-based diets require much less agricultural land than animal-based diets do.

25. China's health establishment is well aware of the risks of higher animal product consumption, but it is not clear whether managers and planners in the agricultural and food processing industries pay much attention to health based recommendations to limit meat and fat consumption in the diet. This is an area where cross-sectoral meetings, research, and training may have very beneficial effects on the thinking of planners over the next 10 years.

26. There are also strongly protective aspects of dietary behavior. Adequate intake of fruit and vegetables provide vitamin and trace element sources which play a strong role in overall health, disease resistance and much better fetal and child development prospects and can be protective of oral health. Maintenance of adequate fiber is associated with lower rates of colorectal cancer.

D. Environmental Factors

27. The Government has for some years recognized the severe health risks posed by some aspects of environmental pollution. Large-scale efforts in the early 1980s to reduce particulate emissions from heating and power plants have significantly improved air quality in some major cities and probably have reduced exacerbation of existing respiratory disease. Substitution of cooking gas for powdered charcoal bricks in some regions has helped to reduce both indoor and outdoor smoke pollution, with consequent reduction in life-threatening exacerbations of chronic obstructive lung disease. These improvements to indoor air quality also may help to reduce the onset of other respiratory disease, especially in children. Research on indoor smoke pollution as a casual, or contributing factor in chronic obstructive lung disease has not been conclusive but it seems likely to play an important role. Indoor air pollution from cooking and heating fuels and from volatile substances released in cooking add to the environmental risks in the household, particularly among the poor where wood, dung and soft-coal fuels are more commonly used. Improvements to housing design, ventilation, stoves and gradual substitution of cleaner fuels may have long term benefits of

reducing respiratory disease and respiratory cancers, especially among women who may have higher risk exposures.

28. The Ministry of the Environment has implemented a number of programs to control and reduce major industrial pollution. However, both for major industries and for the very rapidly growing small industries little systematic information is available to allow a reasonable assessment of health risks for workers. Such information as is available suggests that many workers are sufficiently exposed to levels of dust, smoke and chemicals as to cause much chronic disease in future years. The situation appears to be attributable to a number of factors:

- Lack of appreciation of the potential importance of occupational safety and health
- Inadequate budgeting and staffing for occupational health services at the local government level
- Virtual absence of health education programs and funds to create recognition of risks and encourage preventive behavior among workers and managers
- Sheer number of such enterprises and their relatively unregulated working environment, which have overwhelmed the effective capacity of health and environmental authorities to deal with the risks

29. Most importantly, there is not yet effective cooperation between China's new National Environmental Protection Agency (NEPA) and the Ministries of Public, Labor, Industry and other governmental units. There is competition and duplication of effort between NEPA and MOPH and the two agencies lack an effective approach for strategy development, monitoring, collaboration and enforcement.

30. In a sample population of 157,000 small-scale industry workers throughout five provinces and two municipalities, the risk exposures appeared to be considerable^{1/}:

- Lead dust was 60 times Maximum Allowable Concentration (MAC); lead fumes 81 times MAC, and chronic lead poisoning prevalence 7.7%
- Mercury concentrations in the air were 12 times MAC.
- Chromium plating industries were within MAC limits but with 27% of workers showing lesions of nasal mucosa including erosion, ulceration and perforation of nasal septum.

^{1/} Chinese Academy of Preventive Medicine, Huang Wenying, et al: A Survey on the main occupational Health Problems in Small Industries; Chin. J. Ind Hyg Occup Dis 1987, 5 (1): 3-6.

- Silica dust exposures were 42 times MAC, with a prevalence of silicosis (determined through radiological examination) of 2.2% on average.
- Workers in small coal mines were exposed to dust at 5 times MAC and showed prevalence of anthracosilicosis of 9.6%.
- Asbestos plant workers were exposed to 24 times MAC and had clinical asbestosis prevalence of 6.7%.
- Noise exposures higher than 90dB were found in 75% of plants, with small textile plants having the highest levels of 112dB; prevalence of hearing loss for workers exposed to 106dB or more was found to average 79%.

31. These levels of risk exposure will create an eventual large burden of morbidity and premature mortality with accompanying economic losses and increased health care costs. In a number of regions, coordinated efforts by enlightened health, safety, labor and industry authorities offer some promise of reduction of risk exposure in the workplace. The industrial sector has been growing rapidly and with little regulation of environmental practice however. Incineration of heavy metal compounds, large and small scale effluent discharges rich in heavy metals and toxic organic compounds also poses substantial hazards about which little is specifically documented in China. Acute effects can be serious enough for these risk factor but their silent, longer term, cumulative impact seems likely to add substantially to the epidemiologic effects of the health transition (Box 1.1), with consequent increases in age-specific disease rates, which we cannot today predict clearly. Meaningful discussion of policies and specific strategy is difficult until better surveillance data are available. It would be reasonable however to assume on the basis of other countries' experience that within 10 years the additional costs incurred by the health care system on account of these environmental risks will begin to be substantial.

E. Viruses and Bacterial Infections

32. Viruses are also risk factors for chronic disease. The most important is the Hepatitis B virus (HBV), which is a serious communicable disease itself, and also is the primary risk factor for cirrhosis, chronic active hepatitis, and liver cancer. Other viral infections may pose risk factors for chronic disease, including insulin dependent diabetes, multiple sclerosis, and Parkinson's disease. Bacterial infection may also be important causal factors for some chronic diseases. The most important and obvious today is tuberculosis, with 6 million prevalent cases and about 300,000 deaths annually. Another example of bacterial infections as a risk factor is rheumatic heart disease. It is a result of poorly managed treatment of streptococcal infections of the throat among children and young adults. Rheumatic fever and rheumatic heart disease have virtually disappeared in the West, and new cases of rheumatic heart disease are becoming rare in China. Among those over age 35, however, rheumatic heart disease morbidity and mortality are still significant problems, and the disease will certainly increase in importance among the young if good access to primary health care services begin to deteriorate. The widespread development of drug resistant strains of bacteria in response to polypharmacy and relatively indiscriminate use of wide spectrum antibiotics poses an additional, potential risk of yet

unknown dimensions. Current financial incentives in favor of drug use only exacerbates the likelihood of this risk. This merits the informed attention of the Ministry of Finance, Price Commission and other central agencies, for the public good.

33. Bacterial and viral diseases, such as pneumonia, influenza and others, are also often the immediate cause of death from infectious disease in patients with other chronic disease, particularly those with COPD and heart diseases. Tuberculosis is sufficiently prevalent in China amongst those ages already most at risk or ill with the main chronic diseases that it is worth early attention in a preventive strategy to control premature death from chronic disease, as well as being a priority in its own right (Executive Summary, para 4).

34. Other types of infection, although not significant causes of mortality, may generate heavy demand for health services. China is already chronically short of dentists and oral health technicians. The aging population implies very large numbers of middle-aged and elderly adults who may experience periodontal disease. Even at relatively young ages poor oral hygiene and inadequate dental care is already evident in much of the population. Experience in the U.S. and Europe has shown that malnourishment amongst the elderly and varying degrees of disability are directly attributable to poor oral health with effects more severe than often anticipated. Relatively simple preventive strategies may benefit China even in these fields. Training in non-surgical periodontal treatment utilizing bacteriological control of the disease could be very cost effective, need involve only lower level manpower, and should be comparatively simple to add to the present in-service training programs for many of China's health workers.

35. With changing behavior, the sexually transmitted diseases (including chlamydia, gonorrhoea and syphilis) may spread rapidly in some areas. The spread of these diseases also raises the prospect that AIDS may gradually make a larger appearance in China. We should add that little is known about the specific relative risks and epidemiology of some of the chronic diseases. As the population ages these topics should become significant areas of epidemiological and clinical research. This has educational and funding implications for research which central planning, finance and educational authorities need to pay attention to as priorities between now and the year 2000. Specifically, China should aim to strengthen considerably its epidemiology, health education, health economics, and disease prevention institutions and their staff. To fail to do so would be the equivalent of not undertaking agricultural research when food shortages will clearly emerge in the future.

36. What we can say with certainty is that today's mortality and morbidity data cannot represent the consequences of today's risk factor exposures. We know that the effects of exposure to carcinogens, heavy metals and toxic wastes in the workplace and in the environment tend to be slow to incubate, are silent, progressive, cumulative and irreversible. Disease observed today is largely resultant from exposures of 5 to 30 years ago. Disease consequences of China's deteriorating environment today are still a decade or more away but cannot logically be expected to be anything but much worse than the effects observable now.

CHAPTER 4 - FUTURE TRENDS IN CHINA'S HEALTH

1. China's health strategy will necessarily continue to change in response to needs and demand for services. The key factors determining the direction and pace of change for health strategy are:

- The aging population profile will inevitably result in many more people living to middle age and beyond, when their chronic disease risk is much greater;
- The present masking-effect of the long incubation period for chronic diseases will disappear. In particular, the future large effects of current smoking patterns will materialize;
- Lifestyle, dietary, environmental, occupational and other risk factor exposures are changing, some increasing and some decreasing in duration and amount.

2. It is possible to estimate roughly the approximate future trends for the main chronic diseases. A projection model was developed for this report to make broad demographic, risk factor and disease estimation and analysis (Annex Chapter 4 presents the main features of the technical basis for this model). It provides estimates of the possible health status results of policy choices to emphasize or not various preventive efforts against chronic disease. The estimates should be interpreted only as indicators of future health status, not as precise forecasts. They are intended to sharpen and focus health policy discussions about the appropriate role of MOPH, the basic strategy for China and the critical health elements within the strategy.

3. The Present Approach. In overly simplified terms the health system in the past few years has been oriented mainly toward treatment and curative services, with relative neglect of public health programs of primary prevention. This trend in health service provision is a natural consequence of two factors: the economic and financial reforms being implemented in China, and the orientation and education of many doctors and health workers toward medical-biological approaches to illness, as opposed to socio-biological approaches to health promotion and maintenance. The former approach would generally tend to emphasize diagnosis, treatment and cure. The latter would tend toward understanding of disease causes and their relation to community and individual behavior and risks. It would emphasize primary prevention to avoid or postpone the onset of disease. In large part the different approaches are inherent in a medical approach to illness and a public health approach, respectively. Throughout the world these two approaches appear to be most effective when they are complementary rather than in competition for resources.

4. Every country needs to have both medical care and public health elements in its health strategy. In the last decade China's de facto (though not rhetorical) strategy has shifted toward treatment and cure, for a complex mix of reasons. For the projection model discussion below, a continuation of this

strategy is referred as "without" adoption of an aggressive preventive strategy. An alternative set of projections are referred to as "with" adoption of an aggressive preventive strategy. This means the results which might be expected with primary (and some secondary) prevention programs roughly equal to the best tried in other countries that have emphasized prevention of chronic diseases in the last three decades. With strong governmental backing and the right "mix" of policies China may be able to do much better in implementing a preventive strategy, achieving results far better than based on experience elsewhere.

A. Future Impact of a Preventive Strategy.

5. Demographic Considerations. China's present population profile, with a large "wave" of teenagers and young adults, will inevitably cause successive waves in the population ("baby booms") for the next several decades; as today's young adults and their children age, demand for health care and other social services will be substantially affected. Chart 4.1 (and Table 4.1) shows a profile of China's population for the next 40 years. The total population of young adults and children will not increase much in the next 40 years because of successful fertility control. However, increasingly after the year 2000, much large numbers of people will reach their middle-age and beyond and will constitute a much larger risk pool for chronic illness.

6. Chronic disease prevention strategy will have very little effect on the shape and size of these waves - these future adults are already alive. However, a chronic disease prevention strategy can have a large effect on the illness burden which will be incurred by each generation and on China's ability to bear such a burden. The table below summarizes some of main demographic differences likely to result from continuation of present strategy as compared to a switch to a more prevention oriented strategy.

7. "With" a preventive strategy, most of the increased death rates will be accounted for by elderly deaths rather than middle-aged. Life expectancy will continue to increase slowly. Many premature deaths can be avoided and while the adult population will increase, this will be a "one-time" effect. It will not feed back into the population growth rate because most adults saved will be people no longer in their reproductive years. The differences in these "with" and "without" trends imply an enormous the quality and productivity of the lives of those currently under age 45.

8. Epidemiological Impact. Without a model to allow detailed accounting for the interactive impact of simultaneous demographic and epidemiological changes in the health transition it is very difficult to sensibly discuss future trends (see Box 1.1). The interdependence between the two variables (aging and changing epidemiological risk) means that, on the present course, more people dying of some diseases which now have higher rates will mean that there are fewer deaths (and lower rates) from other diseases, both now and at a later time. Conversely, implementation of an effective preventive strategy against some chronic diseases in youth and middle age will mean that deaths and rates of other diseases, both then and later will increase.

Chart 4.1

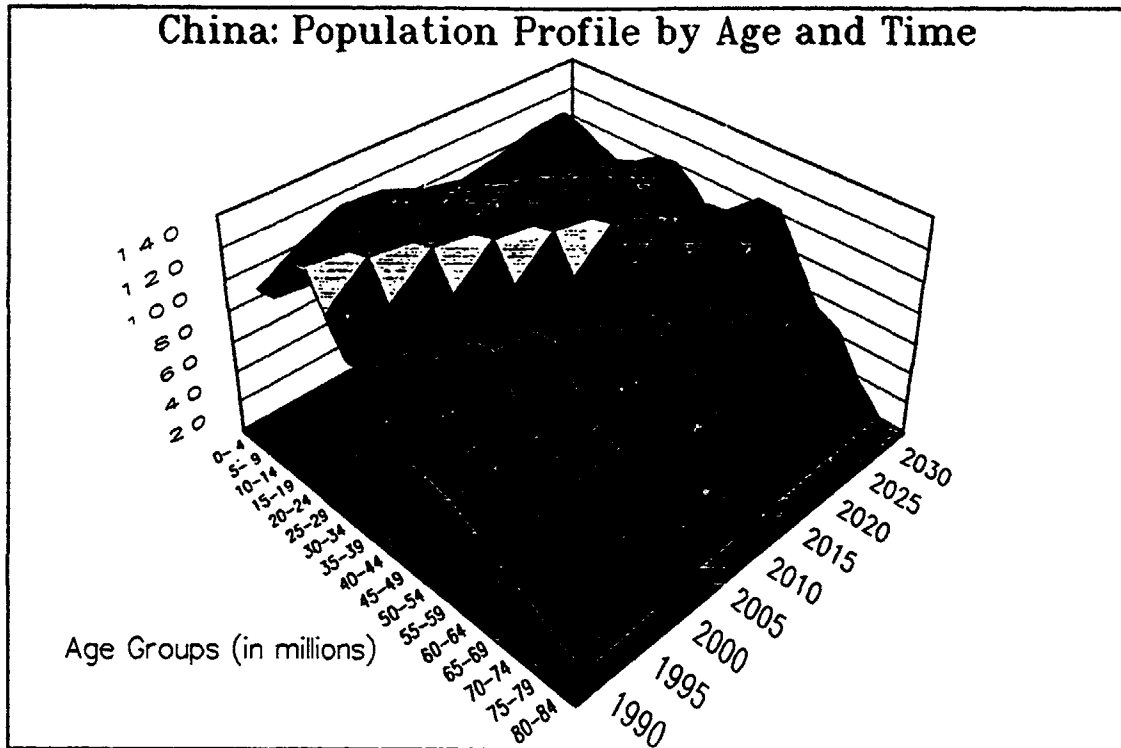


Table 4.1
China: Population Projections - Selected Age Groups
(in millions)

Age	1990	2010	% change from 1990	2030	% change from 1990
0-19	416	433	4	424	2
20-39	400	409	2	428	7
40-59	201	381	90	392	95
60+	100	164	63	321	221

Source: World Bank, Population Projections, 1989

9. As a general proposition we can predict confidently that, with what is known of China's disease patterns and risk factors the diseases which will show the largest rate increases in the future will be lung cancer, coronary heart disease, injuries and a broad category of all other diseases. This last category includes infectious diseases (e.g. pneumonia) and other gastric, neurological, and renal diseases that are causes of death particularly among the elderly and about which little can be done at an advanced age. This generality is not very helpful for health planning and resource allocation decisions however.

Table 4.2
Main Demographic Effects of a Preventive Strategy

		<u>Present</u> <u>Course</u>	<u>Preventive</u> <u>Strategy</u>
Annual Deaths (millions)	1985	5.4	-
	2010	10.4	9.1
	2030	17.3	13.9
Crude Death Rates (per 100,000)	1985	520	-
	2010	775	680
	2030	1150	895
Excess Deaths (millions)	2010	1.2	
	2030	3.4	
Net Population Increase (millions)	2010		33
	2030		64
Life Expectancy (years)	1985	70.8	
	2010	70.0	70.7
	2030	67.1	72.0
Survival Probability (%) (to age 65)	1985	77	
	2010	75	77
	2030	70	79

Source: World Bank Estimates from projections model.

10. The projection model allows us to track these interactions in assessing strategy and its effects. It confirms that in terms of preventing premature death and disability in middle age the most important diseases to concentrate a preventive strategy upon are the five main causes of chronic disease death discussed earlier - lung cancer, COPD, CHD, stroke and injuries. The impact of a preventive strategy on these causes of premature death will far outweigh all other disease groupings combined. However, this does not mean that China should neglect other cancers, heart diseases, degenerative and infectious diseases in its strategy. As causes of premature death, and as elements to be included in an effective preventive program for some subgroups of the population, these other diseases can also be important.

11. For each of the five main diseases, the Annex volume contains charts that show the rough distribution and magnitudes of deaths that can be expected, lives that can be saved with a preventive strategy and premature years of loss of life that may be avoided. Annex tables provide additional quantitative detail for these and the other main diseases now included in the model. The most important features are summarized below.

12. Lung cancer. Without a shift to a preventive approach, China can expect its health system, its industry, labor force and social institutions to have to bear an annual burden of 1.7 million lung cancer deaths by 2030, of which a third may be realistically avoidable. About half of all cancer deaths will result from lung cancer. It is by far the most important cancer to focus on because it is very susceptible to primary prevention efforts.

13. In addition, about half of all lung cancer deaths prevented will be among people in middle-age and potential years of life saved in middle-age

will increase greatly after 2010 and will be very much larger after 2030. No other leading cancer in China is as preventable and will have such a substantial impact on the structure of future society and productivity as lung cancer. The most effective primary prevention method is simply the reduction of cigarette smoking.

14. Chronic obstructive lung disease may account for an additional 3 million deaths annually by 2030, and perhaps 20-30 million ill and partially disabled persons. With vigorous efforts about a third of this death and a greater proportion of disability may be avoided, about half of it among people under age 65. Morbidity cost implications of COPD and chronic coronary heart disease (see below) are much more important than for lung cancer. Lung cancer kills in about 9 months while COPD and coronary heart disease may produce severe disability and medical care needs which go on for 5 - 10 years before producing excess mortality.

15. Heart disease. Heart disease of various types will account for another 1.5 million deaths annually and much underlying morbidity and disability. Even for types of heart disease for which new cases are relatively uncommon (rheumatic heart disease), the burden of illness will be great because of the large cohorts in the current population who have incurred such diseases during their younger years.

16. With current strategy, coronary heart disease will probably account for more than half of all future heart disease deaths (perhaps 800,000 CHD deaths annually by 2030). Many afflicted will still be in middle-age. A preventive strategy would probably yield nearly as many coronary heart disease deaths, but they would occur predominantly among persons over age 70. Interventions to prevent smoking, to reduce hypertension and modify diet, as well as exercise, are all effective primary preventions of coronary heart disease.

17. Stroke will remain a major cause of death in China, especially because rates rise very rapidly with age and the demographic change effects of the health transition will naturally create many more stroke deaths. Without changes in present risk factor distribution about three million stroke deaths be expected annually by 2030. With a strong preventive strategy, many of these deaths (perhaps half) may be averted, but about half of these will be among the elderly (70+) who will die within a few years, whether from stroke or other causes. The intensive rates of patient contact (for monitoring, advising, and providing drug therapy) that underlie the assumptions about management of hypertensive patients, the high costs of medical care for those who survive a stroke, the advanced age of many of the patients, and the unpleasant side-effects of some drug therapies (which makes patient compliance a problem) mediate against the wisdom of attempting sharp reductions in stroke death across all age groups by the treatment of individual patients. A strategy stressing stroke prevention in middle age by population-based measures, together with cost-effective measures against stroke incidence or recurrence in high-risk individuals, (plus affordable rehabilitative care for all ages) would be more appropriate. Very large projected savings in potential years of life underpin the need to direct a general stroke prevention strategy toward the younger and middle-aged population.

18. Injuries and suicides also will be enormously important. With continuation of the past decade's trend, by 2010 about 1.4 million people will die prematurely each year of injuries and suicide, and this may rise to perhaps 2.5 million by 2030. Because of the ages of those most frequently injured, prevention is especially important to avoid economic losses. The associated number of probable non-fatal injuries is likely to be very high. Prevention will yield benefits both of costly treatment and economic losses foregone, but also, often life-long disability and care needs. Injury prevention programs elsewhere have succeeded in consistent annual reduction in the age-specific rates of injury across a wide range of causes and segments of the population. If China can accomplish similar performance, the projections show that more than 500,000 injury deaths may be avoided annually by 2010, and perhaps 1.7 million annually by 2030.

19. Injuries and suicides are topics where preventive programs can be expected to show the earliest effect because they do not have long incubation periods after exposure to risk as do most chronic disease. This potential for quick benefit, for young age groups particularly, adds to the priority of injury and suicide reduction programs in any future health strategy.

20. Projections of a number of other disease conditions and of total deaths is also provided by the model. By comparison to the main causes of future death mentioned above, all other causes of death will be relatively less important, from two perspectives:

- The absolute amount of death attributable to any single cause will be far less.
- The potential for preventive strategies significantly to reduce death and disability from many of these other single causes is either not clear, or simply not possible, given present medical and risk factor knowledge.

21. The primary causes of death discussed above are of substantial absolute importance, and can be significantly influenced by preventive measures. Urban and rural, gender and age-specific details and their impact on priority and strategy are discussed in the Annex.

B. Dynamics of a Preventive Strategy

22. Use of the projection model allows insight into the dynamics of the situations that China will experience with or without adoption of a preventive strategy. Several important points emerge:

- Previously, control of the nutritional deficiencies and of the main infective and parasitic diseases had chief effect on mortality in childhood and early adult life, but had a lesser relative effect in middle and old age. Many of those spared from death by the successful previous campaigns for prevention of such diseases, may enjoy an additional 50 or more years of life. Because of this, the control of these diseases produced large social consequences -

increased life expectancy, a geometric increase in population growth, and considerable gains in economic productivity.

- In contrast, chronic disease control will have social consequences that are slower to emerge and have relatively much less impact on demographic trends. Chronic disease control will have its main effect in middle age. Those spared from death in middle age will enjoy an average of 20 or more extra years of life. Those spared from death in old age will, on average, die within a few years from other causes. The overall effect will be a marginally "older" society that is substantially healthier.
- This difference between the ages at which chronic and other diseases generally cause death has several implications:

First, even though the control of chronic disease is important, it will not have the large effect on life expectancy that control of the other diseases has produced. Preventing a substantial fraction of future deaths in middle age has a substantial effect on the odds of reaching old age but little effect on life expectancy in old age.

Second, control of chronic disease does not contribute to the spiral of population growth because the middle-aged have already produced their children. (For example, permanent avoidance of the adverse effects of tobacco might eventually increase the total population by about 2-3%, but this change would be a one-time occurrence, with virtually no increase in the number of adults still young enough to reproduce and no increase in the number of children).

Third, prevention of chronic disease may reduce health care costs for those in middle age, but subsequent effects on overall health care costs will depend mainly upon government's policies providing for access, payment, location, and intensity of tertiary care required to prolong life in old age.

Fourth, control of chronic disease can improve economic productivity per person because the size of the living, non-disabled population in their productive years will increase relative to the size of the retired population.

23. Two fundamental aspects underlying a preventive strategy emerge from this summary "with and without" analysis based on the projection model results.

- First, any reasonable preventive strategy takes many years to work and near-term gains in health status will be relatively few. For this reason, basic preventive programs are often not high on the social agenda in many countries. They represent monies spent with only small discernable current benefits (notable exceptions include injury avoidance and the effects of smoking cessation on absenteeism, ARI, sudden death and on fetal development). Nevertheless, failure to initiate preventive programs early in the

health transition has very high costs - it means that large numbers of deaths and associated illnesses simply cannot be avoided later on. The gains from preventive programs are more than proportionately reduced by postponement of their start-up because proportionately larger age groups of the population are (unnecessarily) exposed (longer) to risk. The future illness burden thus becomes much larger through failures to initiate prevention strategies early.

- Second, most prevention programs can only reduce, not eliminate, the burden of illness. Projections show the absolute number of deaths among middle-age Chinese growing at 4% annually "without" and at 2.7 % "with" adoption of a preventive strategy (due chiefly to the increasing numbers at risk). As a result, health strategy will still have to be concerned with providing illness care and treatment facilities to cope with several decades of rising demand because earlier preventive programs did not exist and because some share of disease cannot be prevented. Health sector policy must therefore be concerned with efficiency, controlling costs, and constraining demand. It also must be concerned with developing manpower, institutions and financing systems that can simultaneously provide effective "illness care" services and implement disease prevention and health maintenance programs.

C. Implications of the Health Transition for Future Health Care Costs

24. Growth in overall health expenditures should, in theory at least, be a function of four broad categories of variables: a) change in demand induced by the demographic factors - population growth and an aging population structure; b) change in demand induced by epidemiologic factors - higher (and lower) age-specific rates of different diseases; c) changed utilization due to higher (and lower) user- or provider-induced consumption of health services (because of better, or worse, access, insurance coverage, rising incomes, desire for more profit, etc.); and, d) changed unit costs because of new technology or practices in health services. To understand better what will happen with future health care costs it is helpful to look at these variables individually and together. The projection model in its current form is useful to examine the first two of these variables.

25. Measures of Health Spending. The first demographic factor (population growth) will mean inevitable future increases in health care spending in China. There will be more people and thus total health spending can be expected to rise. To avoid confusion caused by the simple growth in population size, spending can be measured as per capita health care costs. This effectively nets out population growth and allows us to concentrate only on changes due to demographic aging.

26. Two additional adjustments to our measure of health costs are also required. It is confusing to discuss future health spending when the rate of future inflation is unknown. This can be dealt with by expressing per capita health costs as a share of GDP, thus netting out the effects of future

inflation. If nothing changes in health services demand or supply, or in epidemiology, the share would be expected to remain constant.

27. To discuss the dynamics (trends) of future spending we can express per capita health costs as a share of GDP in terms of the rate of change compared to GDP. A positive rate of change indicates that more resources are being dedicated to health care by the rest of the economy. A negative rate of change indicates that the health system is spending less relative to growth of the rest of the economy.

28. The second aspect of demographic change is that more people will be living to ages when they will be heavier consumers of health services even with no change disease mix or incidence. China's population today is characterized by Mao's "baby-boom." The large numbers of Chinese in the teens and early twenties are enjoying the healthiest period of their lives; their health care demands are now the least. China's planners should count on having to spend more for health care as this population ages, without a doubt. This will be one key element which inevitably puts upward pressure (i.e. a positive rate of change) on per capita health costs as a share of GDP. The effect is similar to the way the aging population accelerates the health transition even if age-specific disease rates do not change (Box 1.1).

29. The second variable, epidemiologic change, is more difficult to summarize. As with the epidemiologic component of the health transition (Box 1.1) some age-specific disease rates (and thus costs) will be increasing with time while others will be falling. To sensibly discuss future trends, costs must be dealt with on a disease specific basis. The disease specific approach taken with the projection model can be used to do this. The model allows projection of both the epidemiologic variable underlying health spending changes as well as the structural aging of the population.^{1/}

^{1/} To provide the data for the model to project trends in health care spending, detailed studies of the cost of treatment by disease category were performed in two Chinese hospitals--one a typical medium-sized 300-bed institution, the other a more sophisticated 850-bed hospital with a wider and more intensive range of services. Lengths of stay, unit costs and total average costs of treatment were higher in the large institution. For use in the model, the two cost streams were weighted heavily in favor of the smaller institution to reflect average situations in China.

A more extensive hospital costing study is underway (Chen Jie, Shanghai Medical University) which will allow substantial improvement in the use of this part of the model. It covers 62 hospitals in widely scattered parts of China with good representation of both rural and urban areas and the range of technologies and management characteristics which exist. Detailed disease, input data and cost data emerging from this study will be extremely valuable for China's planners to use in developing policies to improve efficiency and ration ineffective care.

30. The results show that real per capita health care costs attributable just to the aging of the population and to epidemiologic factors are conservatively estimated to grow at an annual rate 2% higher than per capita GDP growth. This growth rate would result in health care costs increasing from today's share of about 3.2% of GDP to about 5% of GDP in 2010 and 7% by 2030, if all other factors are held constant. This is shown in the left frame of Chart 4.2, "Without Prevention."

31. A 2% annual rate of growth of the health sector's share in GDP would be far more modest than the experience of any OECD nation that has also faced the health transition. In the OECD, average per capita health care spending, in constant prices, has grown at an annual compound rate of about 5% from 1960 to 1984. (This growth, in theory, should be a function of the variables in paragraph 24 above.) The projection model results (para. 30 above) account for only the demographic and epidemiological variables.

32. For the utilization changes and unit cost shifts, the OECD's experience may provide a rough guide of one scenario China could expect. By very crudely assuming that 2% points of OECD's health cost growth are similarly attributable to epidemiological and demographic change, the past annual growth attributable to utilization and unit cost charges could be assumed to be about 3% (OECD's 5% minus 2%).

33. If China should experience utilization and unit cost growth of this magnitude during the next forty years, health costs as a share of GDP would reach the impossible levels of 10% by 2010 and 25% by 2030 (see right frame, Chart 4.2, "Current Path". This indicates clearly two things:

- the present utilization patterns and unit costs in China must be grossly inefficient (or inequitable, or both); and
- China cannot even begin to tolerate the utilization and unit cost growth in health care which OECD countries have experienced.

It broadly means that China, and probably other developing countries too, have to rely much more than the wealthier countries have done on prevention as

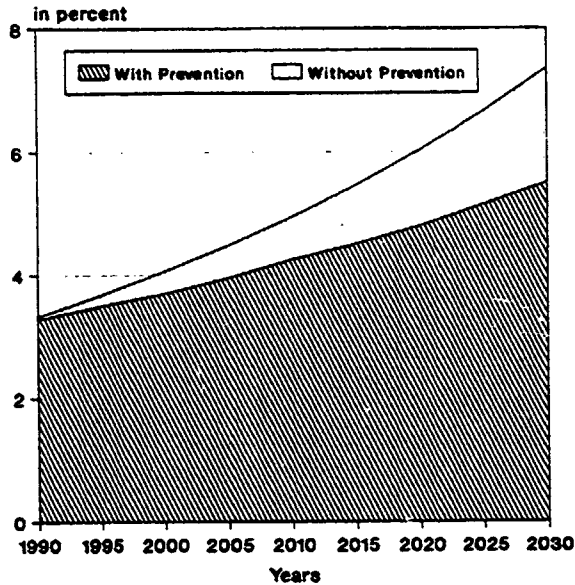
The costs, and factors to reflect morbidity (number of treatment episodes prior to death), were multiplied by the results of the projection model. Underlying assumptions were that utilization and technology variables would remain constant. From this it was possible to calculate a rate of growth in per capita health expenditures (in constant prices) attributable to the aging of the population and to epidemiological factors.

The projection does not account for higher costs attributable to more intensive treatment of any diseases, including communicable disease, nor for the costs associated with prevention programs, education of more health manpower, or investing in more expensive health facilities and equipment than are currently used. In this sense it gives a conservatively projected estimate.

their basic strategy, while achieving much greater efficiency and effectiveness in health service delivery to preserve equity.

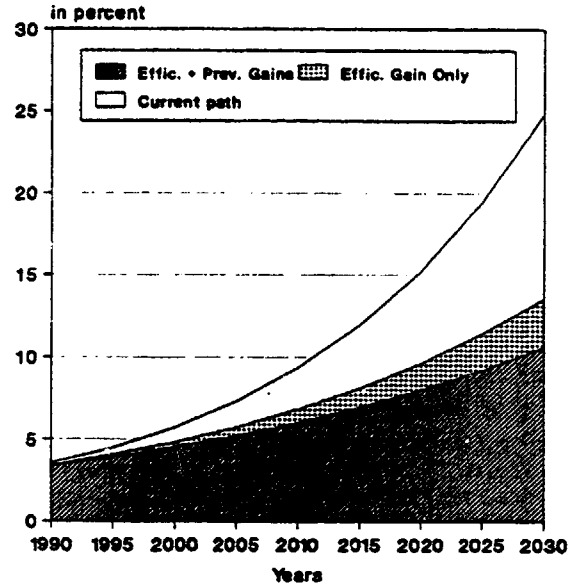
Chart 4.2

Probable Growth Range for Health Expenditures as a Share of GDP/capita Health Transition Factors Only



Source: World Bank Projections

Probable Growth Range for Health Expenditures as a Share of GDP/capita Current Path and Main Option Ranges



Source: World Bank Projections

34. Obviously China will be unable to follow the health care consumption practices of the OECD. But what can be done, and at what social and economic price, to control the cost growth? The answer has two parts. First, the epidemiologic and aging factors must be dealt with through public policy changes and programs to minimize their impact. Successful implementation of a preventive strategy as discussed earlier in this chapter would lower the rate of growth attributable to epidemiologic change and population aging from 2% annually to 1.4%.^{2/} (Chart 4.2, left frame, "With Prevention.") Even better prevention efforts would reduce the rate to 1% or less. Any delay in starting

^{2/} It is worth noting that spending growth projections attributable to the epidemiological factors are sensitive to changes in both the unit costs of treatment and to the number of episodes of treatment before death, but the latter is far more important. This reinforces the importance of an early start on primary prevention in order to postpone the onset of chronic illness and to reduce the total number of treatment episodes before death.

a better preventive strategy will only mean that a higher rate of spending growth from these factors is inevitable.

35. Second, there is a large scope for macro-economic policy changes and internal efficiency improvements in the current health system to sharply reduce the rate of growth attributable to the utilization and unit cost variables. A medium term target of constraining growth rates due to these factors to about half the OECD rate (say 1.5%) seems not unreasonable, though it will require substantial changes (Chart 4.2, right frame, "Effic. Gain Only"). Combining both these sets of changes (strong prevention of epidemiological change plus rationing and efficiency gains) would provide for health care costs growing much slowly to perhaps 6-7% of GDP by 2010 and 10-13% by 2030 (Chart 4.2, right frame, "Effic. + Prev. Gains").

36. It is possible that China may make the political and social choices necessary to improve substantially on the performance of successful prevention strategies used elsewhere with consequently much lower growth rates in health costs than projected here. The issues surrounding this possibility and an analysis of the most important concepts and variables for better performance are presented in Chapter 5.

37. China may also be able to avoid many of the policy and investment choices that in more developed countries have driven health costs higher than those that would have been caused only by the premature illness and death from chronic diseases. To be successful in the future a broad array of steps must be taken:

- reduction of length of hospitalization;
- a decrease in the ratio of health manpower to population; decreased use of ineffective medical technologies, drugs and practices;
- increased adoption and use of effective technologies;
- increased implementation of disease prevention activities that clearly result in avoidance or postponed onset of diseases of all types, and of injuries;
- discouragement and rationing of insured medical services which are ineffective or inefficient;
- increased public spending for operational costs to prevent disease and to preserve equity;
- increased public spending for investment in lower level health facilities and;
- decreased public spending for investment in higher level facilities serving only a few at very high cost.

These main factors that must be dealt with are treated in subsequent chapters:

- **more effective management of primary health care system and hospital resources (Chapter 6);**
- **policies in adoption and management of new health technologies (Chapter 7);**
- **effectiveness of strategy by which health manpower is educated, trained and deployed (Chapter 8); and;**
- **the financial questions which China must address to encourage efficiency and ration demand (Chapter 9).**

Failure to deal early and effectively with these issues will inevitably create a situation where a relatively few consumers of health services use most of the resources, and those who cannot pay are left out of health care services altogether.

CHAPTER 5 - PROSPECTS AND POLICIES FOR CHRONIC DISEASE MANAGEMENT

1. China has some of most extensive experience in the world in developing and implementing programs to deal effectively with communicable and endemic diseases. Its experience with policies for effective management of the chronic diseases is limited. A major element in its past successful experience has been the integration of primary prevention efforts with the primary health care system, with almost universal opportunity of access. If China can recapture this feature of its system in developing policies for chronic disease management it may be able to take quick advantage of much of what the rest of the world has learned about chronic diseases. This chapter reviews the current institutions, programs and policies for management of the future burden of illness in China; proposes a framework for chronic disease management in the future; and outlines priority strategies for risk reduction.

A. The Future of Public Health - Institutions and Roles

2. The types and magnitude of the health problems ahead for China will require considerable reorientation and strengthening of traditional public health approaches and principles. Concern with morbidity and mortality from communicable diseases will need to continue, particularly in the parts of China where these still remain common. Prevention and treatment approaches will need to be made more efficient for both communicable and chronic diseases in light of resource constraints. This will call for heightened skills in applied epidemiology, increased use of randomized trials and careful targeting of activities where risks are greatest, e.g. proven prevention programs for chronic disease effectively delivered to those most at risk; screening programs aimed only at those most at risk and for whom effective therapy possibilities exist. An efficient approach will also require development of excellent, but simple, disease surveillance systems that include rapid upward reporting to enable quick interventions during acute outbreaks of infectious disease.

3. The epidemiology of future public health efforts, however, will necessarily need to concentrate on risk factors. For adult mortality and morbidity, the long-term exposure to slowly acting, relatively irreversible risk factors calls for public health strategy based on primary prevention and concerned with social and behavioral factors. A much more detailed approach to behavioral epidemiology will be required, with careful analytical attention not only to vectors and risk factors, but age, sex, distribution patterns, behavioral characteristics, and the influence of other sectors in relation to health risk. Public funding for primary prevention programs involving health education, reorientation of clinical practitioners and health workers in their thinking and skills, and involvement of community groups will be required. Stronger regulatory and enforcement powers will probably be needed for health bureaus.

4. The Ministry of Public Health (MOPH) will continue to have to play a leading, probably much enhanced, role in effectively managing development of the health sector (see Annex Chapter 5 for a detailed description of the

organization and functions of the public health system and the various ministries and agencies). The resources with which MOPH has to work are already good in comparison to some other developing countries, but the MOPH will probably require some modification of role and approach.

5. The health bureaus at the city and prefecture level have technical expertise in their assigned responsibilities for the financing, provision, and regulation of health services. However, vertically-organized divisions within health bureaus have traditionally had little incentive to cooperate among themselves and to foster cooperation and broad approaches to the multi-factor, inter-linked disease and service delivery problems, now or for the future. Moreover, the recent reforms of the central government structure and financial decentralization have weakened the MOPH's influence, involvement and control over local bureaus. Other aspects of institutional development and reforms have led to programs that potentially will make a large impact on China's future ability to cope with illness and health maintenance.

6. The main features of the present system that seem most in need of further adaptation and the initiatives that seem the most promising are the following:

(a) Changes to broaden and encourage integrated or cooperative cross-sub-sectoral approaches must form part of future health strategy. This is true throughout the MOPH and for specific bureaus such as Maternal and Child Health, Drug Administration Bureau, and others.

(b) Development of good health data and epidemiological perspectives is crucial to formulation and management of health policy. The Academy of Preventive Medicine and the Epidemic Prevention Bureau are increasingly cooperating to establish better systems and to train expert staff. This process needs to be accelerated. (See also, Box 1.2)

(c) The Center for Health Statistics and Information now reports directly to the Minister and is gradually shedding its previous research orientation and beginning to define its role as compiler and provider of health management information of all kinds. These changes are appropriate and should be continued.

(d) The Academy of Preventive Medicine is gradually developing its expertise to deal with the complex, often synergistic risk factors and disease progressions that characterize chronic disease. The Academy has not yet been clearly charged with extending its role into these fields, but the need for this is apparent.

(e) The Academy of Medical Sciences and the national offices for control of cardiovascular diseases and cancers, and other specialized offices, have done pioneering work in frontiers of clinical and therapeutic medicine. Some of their efforts have not had the full effect that could be expected because these units have remained somewhat isolated from the mainstream of health services delivery and public health policy research. Basic laboratory, clinical and technological research (including substantial numbers of large, simple randomized

trials) will be an important foundation for China's health system in the future, but development of "magic bullets" against the chronic disease epidemic is unlikely. Closer integration of the Academy and the national chronic disease control offices with the mainstream public health programs is needed to ensure that basic research is realistically aimed at the main public health problems and not at fascinating, but marginally useful, frontiers of technological innovation.

(f) The Anti-Epidemic and Sanitation Bureau has recently been divided into two separate bureaus -- one dealing with communicable disease prevention and the other dealing with industrial hygiene and sanitation. While there may be sound reasons to subdivide these two functions for better policy analysis and control at the national level and in a few large provinces, it would appear to be very inadvisable to fragment the existing network of Epidemic Prevention Stations at Provincial level and below. Not only would this impose additional investment and bureaucratic burdens at each level but it would risk further fragmentation of coordinated health services which earlier have been successful. It will be particularly important to preserve unity of health institutions at the township level (where primary health care, prevention services, simple hospital care, disease surveillance and data analysis, and maternal and child health all are unified in a single institution today). Consideration of separate epidemic prevention and hygiene units at that level, outside the township health center structure seem particularly ill-advised.

The Epidemic Prevention Bureau and the new Hygiene Bureau have also not yet been given a clear mandate to deal with strategies of effective prevention of chronic disease and to modify and enhance their traditional preoccupation with infectious and endemic diseases and poor sanitation. An efficient approach to health care will require empowering these bureaus with regulatory authority and means for sanctions when routine surveillance reveals risks related to problems of the environment, food, water, and consumer products. Problems of contaminated foodstuffs, cosmetics, water supplies, and other products that are now identified as part of their inspection services need to be followed up immediately with actions to remedy or eliminate the risks. Today these bureaus have little enforcement power. They should aim to provide a more holistic approach to monitoring and prevention of risk from vectors, viruses and bacterial, environmental, dietary and lifestyle risk factors. These changes and considerable in-service training for reorientation of staff and managerial conceptions in the Epidemic Prevention and Hygiene Stations is urgently needed and will probably take a decade to accomplish.

(g) The Medical Administration Bureau, in charge of health care delivery and hospitals, clearly perceives the rapid development of the chronic disease burden even while the lingering problems of infectious disease remain. It is appropriate that the medical care system and its personnel take a great interest in these problems. There are, however, relatively few secondary prevention activities that can be carried out cost effectively, and there is considerable risk that large amounts of

resources may be absorbed in hospitals providing screening and treatment that turns out to be of marginal utility. A determined effort is needed to conduct trials to assess reliably the net effects of treatment on disease outcome, and then to base treatment firmly on this knowledge. There is also an urgent need for the medical care system to be brought under control and made much more effective in its delivery of services and use of resources. Considerable reorientation of staff and managerial attention will be necessary to achieve these improvements. Many recent financial reforms and the decentralization of financial responsibility have had an adverse impact on this part of the health system. (These topics are dealt with in more detail in Chapter 9.) Because of the fundamentally clinical nature of its health care functions, the Bureau is not the right unit within the MOPH to bear the main responsibility for primary prevention programs, although the Bureau and institutions under its guidance can be useful providers of primary prevention activities for inpatients, outpatients and their families.

(h) The vertical organization of the State Administration of Traditional Chinese Medicine (TCM) separates it from China's Western approach to medicine and results in considerable duplication of investment in facilities and equipment and less than optimal distribution and training of personnel. The long-run goal for China should continue to be eventual unification of the two systems. In the near term, reversal of recent policy to establish a complete system of separate TCM institutions is badly needed. Functional cooperation and eventual integration of both approaches to medicine must be achieved to avoid waste and duplication. Most important, mobilization and training of TCM practitioners could be a very effective part of the primary prevention strategy against chronic disease. As with other aspects of medical care, those features and practices of TCM which really do affect disease outcome should be determined by reliable, large, randomized trials.

(i) Medical education and training will also be a critical element determining the success or failure of future health policy. Reorientation of both pedagogical methods and the educational content of medical and health worker training programs is sorely needed. In the near term the focus must be on quality improvement of health manpower skills, especially among mid-level doctors, nurses, technicians and lower-level health workers. Later, emphasis on quantity expansion will be important (see Chapter 8). Revamping of curricula to include chronic diseases and preventive approaches, and the use of evidence from properly controlled trials, is urgently needed as a first step. Strengthening of epidemiology, public health management and planning, and social medicine departments are also high priorities. Development of a graduate school of public health should be a top national priority.

(j) Health Education. During the 1950s and 1960s, the Patriotic Health Campaign Committee (PHCC) contributed considerably to reducing the prevalence of many parasitic and communicable diseases. PHCC's high-level direction and control provided much of the foundation for this success. It also opened the door for some ill-considered campaigns

and abuses of the channel, and thus to weakening of structure and loss of credibility of this potentially important organization. In general, throughout the last two decades health education has been badly neglected, underfinanced, ineffective and fragmented. In addition, China has simply missed out on much of the world's advances in social and behavioral science, which today is fundamental to bringing about changes in lifestyle and individual responsibility for health maintenance. Ability to deliver effective health education programs to influence the attitudes, beliefs and practices of its one billion-plus population will be an essential condition for China's success in controlling chronic disease and providing affordable health care.

An effective, powerful and well-financed health education infrastructure will be an essential element in any reasonable approach to reduction in exposure to risk factors for chronic disease. This will be especially true for efforts aimed at smoking cessation, but also should include risks of animal fat and excessive salt consumption, the need for more fruits and vegetables, methods and benefits of better oral health, and many other primary prevention strategies, mainly based on the need for individuals to be responsible for their own health maintenance. Whether the PHCC can become an effective means for China to again disseminate a broad primary prevention strategy against tobacco, and against many other chronic and communicable disease risks, remains uncertain. If it is not to be the PHCC's mandate then the health education units and responsibilities of the MOPH must be greatly increased and modernized.

B. A Framework for Chronic Disease Management.

7. It is unlikely that any country could succeed in dealing with the epidemiological patterns, risk factors, and future scenarios presented in Chapters 1 to 4 without a clear, strategic framework for management of the challenge. Health officials have to understand the framework thoroughly and be able to formulate and implement specific plans and programs within it. More important, civil and political leaders must understand at least the outline of the framework and its concept, or it is very unlikely that they will provide sustained budgetary support for a long-term preventive approach and improvements in efficiency. This section outlines such a framework for China to consider. National and regionally-specific elaboration of this framework will be necessary for civil and health authorities to reach consensus on the details of health programs to meet China's heterogeneous regional needs.

8. The planning process is critical to developing a chronic disease prevention and control program. With any system, care must be taken in defining the problem, setting goals and objectives, designing the program, and evaluating results. This becomes an iterative process, with evaluation leading to refined definition of the problems, objectives, methods and evaluation. The field of chronic disease is so complex that a clear statement of the problem is especially important. The purpose and goal of any control effort must be clearly understood because many groups and individuals must direct their efforts to a common end. The development of strategic plans for chronic disease control and for each target is a basic step in this process.

9. The disease problem, condition, or risk factor to be targeted should be selected on the basis of the burden of illness that can be reduced. This burden is arrived at in general by considering the magnitude of the current (or, for chronic diseases, the future) problem in terms of morbidity, mortality, and cost; the preventability of the problem in terms of scientific state of the art; and the potential efficacy of the program. Measurable objectives should be established that form the basis for program activities and evaluation.

10. Programs to control chronic diseases can be viewed in several ways: by the type of prevention (primary or secondary, or by secondary or tertiary level hospital-based clinical intervention), by the groups targeted, or by the natural history of the disease. Most programs eventually involve some combination of these approaches.

11. Level of Prevention. The concepts of primary and secondary prevention and hospital interventions (treatment and cure) for chronic disease are complex because many conditions are also risk factors for other diseases.

12. Since most chronic diseases do not have a simple etiology, primary prevention is aimed at reducing of as many potential major risk factors as possible. There is scope and need for central and local authorities other than those in the formal health sector to concern themselves with primary prevention. Other state agencies, especially financial authorities, need to deal with vested interests such as the tobacco and food processing industries to uphold the common good over short-term financial gain. Many interventions targeted toward primary risk factors are broad-based and include, for example, use of the public media, reimbursement policies for health care, school health education, economic incentives, and regulations for industry and public safety. Some of these do not involve individuals, or individual behavior, but rather regulatory measures (e.g. mandated tar level reductions in cigarettes) or process improvements (e.g. animal fat avoidance in food processing) which do not today fall clearly in the scope of any government agency. There may be scope for a high level inter-sectoral health protection commission which focuses on identification and implementation of these non-individual-based primary prevention measures.

13. Secondary prevention is the prevention of an adverse outcome among people with a pre-established condition (e.g. treatment of hypertension to prevent stroke). Secondary prevention techniques are closely associated with particular chronic diseases and risk factors since the knowledge base for specific diseases and their treatment is substantial. Secondary prevention is thus mainly the responsibility of the health system, its professional personnel, and the patients themselves.

14. Secondary prevention can also address the quality of and access to care. Research has shown that these can have a substantial impact on the course of the chronic diseases. In this regard, both health and non-health authorities at local and national levels may wish to question whether the traditional approach--that is, acquisition and expansion of capital assets in pursuit of the medical model of health care--may pose a stumbling block for a prevention

strategy. Decentralization of financial responsibilities, collapse of the rural insurance system, and pressures for health institutions to earn revenues to cover their costs has accelerated the pace of urban investment in health care institutions and equipment, changed the nature of services being offered, and probably adversely affected access to care for many people. It has certainly resulted in less attention to primary prevention as a strategy. Chapters 6, 7, and 9 of this report deal in more detail with the related issues, which are summarized below.

15. Effective management of secondary and tertiary hospital interventions holds particular promise and risk for China. Many secondary prevention techniques for the chronic diseases, including physical therapy and high-quality medical services, enhance the quality of life and are also suitable for application at the secondary and tertiary hospital levels. Eventual application of public health principles to organ procurement and transplants will offer alleviation from suffering and cure for many by the end of this century. However, good tertiary hospital interventions have proven a very difficult area of management in the developed countries, and some segments of the medical profession in China, with its existing large stock of high-level hospitals and highly trained and sophisticated doctors, will no doubt make a strong claim for large expenditure of resources on technology and facilities (see Chapter 9 for data on current expenditure trends favoring hospitals). Some of these claims will press the margin of tertiary care toward questionable prolongation of life. Few professional, official, or public channels in China today offer opportunity for discussion and guidance in this subject. Chapter 7 and its annexes deal in more detail with some of the complex issues involved.

16. Target Groups. Since any group of individuals may share a set of known risks, preventive measures can be targeted to that group. A classic example is infant health. Primary prevention focuses on intra-uterine development and early childhood. Providing adequate nutrition, reducing toxic exposures such as to alcohol and smoking during gestation, and altering risk factors for genetic disorders are components of primary prevention. Immunization, adequate nutrition, early detection of disease and subsequent treatment, and school health education comprise a package of preventive measures aimed at children's diseases. The needs of adolescents and adults, though different, can be defined, and preventive interventions can be directed toward them as well. Defining other populations with known risks, such as minority groups or women of childbearing age, can establish them as the focus for preventive efforts.

17. The many needs of these groups may be addressed more efficiently on a collective basis rather than on a disease or condition basis. This approach underlies much of China's past success in primary health care. Although the principles still hold, the chronic diseases pose a somewhat different challenge in defining target groups.

18. The Individual. The natural history of each chronic disease can be divided into three periods: susceptibility; asymptomatic period; clinical illness, followed by recovery or death. Potential for intervention exists at each phase. During the period of susceptibility, individuals may reduce their

risk, generally by primary prevention techniques. During the asymptomatic period, detection and early treatment also has become a major focus. Finally, secondary prevention and treatment at both secondary and tertiary hospital levels are the major modalities during the period of clinical illness. In each period, however, the focus for prevention is on the individual at risk; it often requires his own active and continual involvement. It is often labor-intensive and cost intensive for professional health personnel, whose specialized knowledge is required during the periods of asymptomatic and clinical illness. The health system is not well-oriented today to a prevention strategy which centers on the individual-at-risk, in large part because the macro-economic and planning framework, and most current financial reforms, do not favor this (see Chapter 9).

19. Overall, prevention implies the need for a considerable change of approach from today's practices in China and from the current policies of the central and provincial governments, especially the financial and planning authorities. Rather than stressing capital accumulation, revenue earning, and decentralization in the health sector, the authorities may need to stress mainly public funding of recurrent programs costs, fiscal policy and financial charges to influence health delivery in favor of prevention, and greater central government influence, funding, and control over health activities to ensure consistency of approach and policy and to maintain equity.

20. Several basic strategies warrant discussion: educational, health service delivery, and social and environmental strategies.

21. Educational. Educational programs can increase knowledge, but influencing attitudes is more difficult. This must be done before behavior can be expected to change. Systems for education of the public, patients and health care providers must be established for this purpose. Media campaigns play a key role in increasing awareness about health problems and their solutions, for example in reducing common risk factors. Marketing is most effective when the target group can be reached through existing credible sources. Regulation can also reduce exposure to many high-risk factors: use of tobacco for example.

22. All parts of the educational, medical, and media systems need to transmit consistent health messages. A consensus should be based on the best available information and should be transmitted to health practitioners by integrating it into their basic and continuing education.

23. Health Care Service Delivery. The delivery of quality primary care is critical in preventing most chronic diseases. The increasingly pluralistic nature of China's economic system and the ongoing decentralization require that many approaches be used to facilitate availability of care at a variety of levels. Most Chinese will be mainly served by primary care facilities until well into the next century. It is important that state-of-the-art preventive care and thinking be established in these primary care settings. This should extend to the quality of services, including examinations, screening, laboratory testing, medical procedures and follow-up.

24. Social and Environmental. Many of the major risk factors are directly associated with cultural habits and mores. Changes can be effected by using social institutions such as the media, the legal system, schools, and neighborhood and professional associations. Economic incentives for healthy behavior could involve reduced insurance premiums (for meeting certain criteria); job requirements (to avoid injury); and taxes (on tobacco).

25. Regulatory approaches have a mixed history of success in most countries but can also be important. Regulation of the food and drug industry for quality has an undoubted beneficial effect. Industry's responsiveness to changes in habits and to governmental initiatives can also make a marked difference on health. Industrial sponsorship and financial contributions for major public media messages and for national and local voluntary associations (e.g. heart, lung, or diabetes associations) may hold promise for mobilizing additional support for prevention programs in China.

26. Other elements of multi-sectoral and multi-factorial intervention programs can be recommended for Chinese leaders to consider in development of preventive strategies:

- Agricultural policies, which influence diets;
- Manufacturing policies, which affect cigarette tar levels, micronutrient supplementation, animal fat avoidance, salt restriction, etc.
- Employment policies, which affect health risk behaviors;
- Disability, which can be reduced by eliminating barriers to productivity and mobility;
- Structure of the health care system itself, which can affect how it is used, access to it, and cost;
- Attitudes of health workers, which can be a barrier to access and can undercut even the best prevention programs.

C. Reduction of Exposure to Risk - Specific Strategies

27. First, the Ministry of Public Health needs to reach a consensus among its professional staff and its component institutions about the health transition, the nature evolving of the chronic disease problem, the importance of a risk factor approach and, on this basis, form a preliminary strategy on which it can begin to work itself, and with other parts of government.

28. Second, national awareness (official and public) of the nature of chronic disease needs to be raised. Without a concerted effort by the medical authorities to inform political and financial leaders of the needs and benefits for China in adopting a preventive approach to health issues, it is doubtful that adequate resources will be provided for prevention programs. The reasons are two-fold:

(i) Risk factors for the chronic diseases are often multifactorial, synergistic, and socially complex. Some programs for chronic disease control involve central or local government actions, but some must be based on the alteration of individual behavior. The success of such programs through the sum total of billions of individual acts of choice in favor of health preservation by China's people. Given individual variation and unavoidable social differences, a positive result depends on programs being able to bring about the desired choice in large numbers of people and being able to sustain these changes for decades.

(ii) Chronic diseases move in slow motion. The pathologic processes take years to develop and become manifest. The constellation of risks that produce the pathology are imbedded in community habits that change slowly. The sequence of maneuvers in a preventive program is difficult to discern and the effect on outcome even more so. With a full, general understanding of the challenge and the ways to meet it, financial, planning and political leaders cannot be expected to support and sustain the needed programs.

29. Actions to reduce some of the risk factors will affect strongly vested and powerful interests; others will involve the slow change of long-established tastes and habits. Prospects of making any real progress against most of the risk factors will necessitate a cooperative and integrated approach in a number of sectors and will need strong political support at the highest levels. It will almost certainly be necessary to make the best use of both Western and traditional Chinese medicine to encourage and support community behavioral change.

30. Third, the most important risk factors need to be targeted for long-term, national control efforts. By far the most important of all these efforts will involve control of cigarette smoking, (HBV vaccination and dietary change will also be key, though of lesser importance for the long term). China has a wide range of practical actions to consider for reducing the prevalence of smoking and protecting those who have not yet begun to smoke. These actions should include legislation, education and regulation. Other policy actions can be directed toward industry to restrain it from using techniques and tactics that have proven seductive and effective in other countries, including much of Asia.

31. The full range of options, and consideration of their details is dealt within Annex Chapter 5, which contains a section on Elements of a National Tobacco Control Program. Box 5.1 summarizes these elements.

32. Fourth, the MOPH, the Ministry of Finance, and the State Planning Commission need to develop and put into place health policies and provide funding based on disease-specific strategy considerations:

(a) Cancers. Of the leading cancers in China only lung cancer and liver cancer can be addressed effectively with primary prevention programs. For lung cancer only widespread smoking cessation policies of a wide variety can be expected to work. There is generally no effective

Box 5.1
Elements of a National Tobacco Control Program

International experience with tobacco control shows the necessity for a comprehensive approach of epidemiologic surveillance and analysis, legislation, regulation, and taxes, education and publicity, and help to those who want to quit smoking. Each of these activities would be important for China as part of a tobacco control program.

Surveillance. China's disease surveillance points (DSPs), provincial and county data systems, surveys and studies can equip government authorities with some of the information they need to make informed decisions to protect the people's health and to quantify the adverse social and economic costs of smoking.

Legislation and Regulations. Approaches include health warnings such as

- Smoking kills
- Smoking is addictive
- Smoking causes lung cancer
- Smoking causes heart disease
- Smoking in pregnancy harms your baby
- Quit smoking and feel healthier

Limits on Harmful Substances. Lowering tar in cigarettes can prevent about one-third of lung cancer cases. However, the tobacco industry should never be allowed, as it has tried in Western countries, to suggest that a lower tar cigarette is a "safe" cigarette.

Smoke-Free Areas. Smoking is not only unpleasant but also dangerous to non-smokers. China's efforts to ban smoking on internal airlines, on public transport, in waiting rooms, hospitals, schools and many public buildings is already well advanced, though enforcement efforts may need strengthening.

Advertising and Promotion. Public health authority budgets to combat the deluge of smoking propaganda are very small. Both on a national and local level China may wish to consider budgets especially for tobacco control. A complete ban on all direct and indirect forms of tobacco advertising and of tobacco promotion is also important.

Health Education. Programs usually have four objectives: to make the community aware of the dangers; to encourage smokers to stop; to discourage non-smokers from starting; and to promote the rights of non-smokers to a smoke-free environment. Doctors and medical organizations can be effective in giving background information, in counseling, and in advising government at various levels on anti-smoking action. Education, training and utilization of health personnel is thus an important element of programs directed at smoking cessation.

Taxation and Fees. Increasing taxes on cigarettes is a very effective way of discouraging smoking without loss of revenue to government. The World Health Organization concluded in 1984 that "millions of lives could be saved if steep taxes were imposed on tobacco." Total cigarette sales continue to rise rapidly in China despite present levels of taxation, which indicates that government could raise taxes further.

A number of simultaneous steps could be taken:

- removal of cigarettes from the basket of goods included in the consumer price index;
- elimination of the special category of imported cigarettes that are sold at a lower price through state stores and hotels;
- imposition of a health warning label stamp and fee on all cigarettes, both domestic and imported; and
- authorization to customs and public security and health bureau officials to seize and destroy all cigarettes found for sale without the appropriate health warning label stamp.

These changes would increase revenues to the state, provide the basis for a permanently financed health education and disease prevention budget, permit easy identification and seizure of illegal cigarettes, and provide immediate and lasting health and financial benefits to those who stop smoking.

treatment for lung cancer, and public money should not be wasted on it; secondary prevention measures are not cost effective and should not be publicly funded. For liver cancer, immunization against hepatitis B virus at birth may be the only effective primary prevention strategy, although a complementary strategy to limit fungal contamination of stored grains and nuts may eventually be shown to provide benefits to those already infected. The cancer impact of neonatal immunization efforts cannot expect to be visible for approximately 50 years, but a secondary benefit will almost immediately become evident in reduction of the morbidity from hepatitis B. Secondary screening programs for liver cancer are not cost effective with present technology, and effective treatments have yet to be demonstrated in large-scale trials at an affordable cost. There are no known proven primary prevention measures

for stomach and esophageal cancers (other than smoking control to reduce one risk factor), and screening and treatment are generally ineffective. China's rates of breast and colo-rectal cancers are low, but in selected regions and risk groups, secondary screening programs, may be beneficial. Cervical cancer rates are generally low, but in regions with currently higher incidence, and if social behavior begins to change to increase risks, primary preventive measures (mainly health education) and well-focused screening programs may be justified.

(b) Heart Disease. Primary prevention programs for coronary heart disease and underlying atherosclerotic disease are known to be cost effective and efficacious. Such programs should become part of China's normal public health arsenal, with considerable public funding and no attempt to earn fees from these services. Prevention efforts should include smoking cessation, reduction of high blood cholesterol, hypertension control, and perhaps, cardiovascular exercise. Secondary prevention programs are effective if properly focused. Better management of diabetes will reduce cardiovascular risk and the complications of diabetes itself. Secondary and tertiary level hospital interventions for coronary heart disease, and underlying atherosclerosis, can also be effective in very select circumstances. Considerable care needs to be exercised in developing cardio-vascular disease care units, intensive care units, and in purchasing expensive new technologies. Some of the issues surrounding these are explored in Chapter 7, Medical Technologies.

(c) Hypertensive heart disease will respond well to secondary prevention efforts to reduce hypertension. Treatment interventions beyond this are of limited effectiveness and efficacy. Rheumatic heart disease is preventable through good primary care of streptococcal infection. Rheumatic heart disease patients often benefit substantially from secondary prevention measures aimed at the reduction of risk factors for other forms of heart disease. For many patients with existing heart valve damage, surgical intervention is fully justified and can have good returns to the economy.

(d) Chronic obstructive lung disease (COPD) is directly and effectively preventable by smoking cessation, and perhaps by measures to reduce exposure to other forms of indoor and outdoor smoke, to improve children's nutrition and primary care in order to reduce childhood respiratory infections, and to improve housing and working conditions. Continued economic growth and rising incomes can be expected to have good effect on reduction of most of these risk factors, except for smoking and perhaps air pollution. Primary prevention efforts to accelerate reductions in these risk factors will be beneficial.

There are no treatment regimes that can be administered effectively for lung deterioration for most patients. Much improved outpatient and home bed programs will be beneficial and economic for those who do develop the disease. For the next 30-50 years secondary prevention programs may yield some hope of minimizing premature disability and death. Opportunistic screening programs can, at low cost, detect those with

diminished pulmonary function, though development of measurement protocols and standards should be done to fit China's population and conditions. Those who are detected to have early and mid-stages of disease or predisposition toward poor pulmonary function, can receive drug therapy to prevent infection and can be assisted with changes in lifestyle and living/working conditions which minimize further respiratory damage. Professional continuing education to raise physicians' awareness about the disease and the benefit of early detection and action could be an important element in preventive efforts.

(e) Stroke responds very well to primary prevention efforts to reduce hypertension. Smoking cessation is one good primary prevention strategy for vascular disease in the young and middle aged. The strategy for reduction and control of hypertension is much more problematic and deserves to be the subject of large, simple randomized trials to confirm the best approaches for China and to establish the most cost-effective methodology. Secondary prevention efforts for stroke victims who are not substantially disabled (e.g. with diuretics and/or aspirin) may be worthwhile. Treatment (surgery, hyperbaric therapy, etc.) may generally be of limited effectiveness, and public funding for such intervention needs to be approached cautiously. Effective rehabilitation programs to shorten hospitalization and to return patients to an active life should be considered an important adjunct of secondary prevention and are of high priority.

(f) Injury and Suicide. Primary prevention programs and investments of a wide variety can be important and effective in reducing morbidity, mortality and long-term disability from injury and suicide. As with all primary prevention, programs must be designed with both cost effectiveness and efficacy considerations in mind. Prevention programs periodically should be evaluated. Secondary prevention programs can also be effective in preventing long-term or permanent disability and in speeding recovery. The MOPH and local health bureaus are at present not organized, nor adequately provided with trained staff or empowered with authority to deal with injuries and their effective prevention. Secondary and tertiary level hospital treatment (emergency services) is, of course, effective and necessary in some cases to save lives, and as part of secondary interventions. At present, emergency services are provided very ineffectively; substantial bureaucratic, programmatic and financial reforms are needed to avoid the considerable waste of resources and loss of life that now occur.

(g) Other Diseases. The principles of cost effectiveness and considerations of efficacy should also be applied to primary, secondary prevention programs that deal with other diseases (communicable and chronic) and risk factors. Even though the above causes of death are the most important, about 25% of all deaths and a larger share of total morbidity are the result of other diseases, most notably pulmonary tuberculosis. Prevention of the complications of diabetes in the future is sure to offer cost-effective benefits. This will be increasingly true for other degenerative diseases as the population ages. Efficient

is sure to offer cost-effective benefits. This will be increasingly true for other degenerative diseases as the population ages. Efficient use of resources and well-developed strategies and protocols for their application are just as important for dealing with these other disease as for the main chronic diseases.

33. Fifth, dietary factors, particularly fresh fruit and vegetable consumption, and salt and animal fat avoidance, need to be considered in the context of agricultural and food pricing policies. Rural China does not yet have a serious problem with high cholesterol as a risk factor for cardiovascular disease. However, to avoid such problems will require modification of some accepted thinking about the desirable diet for the future. Further research should be undertaken to identify the groups which may be at increased risk of elevated cholesterol.

34. It is not clear whether pricing policies and present subsidy programs may provide an effective tool for influencing the composition of the diet, but this may be an additional option for policy makers to consider. However, assertions that agricultural and pricing policies should be used to stimulate changes in the national diet, toward higher animal fat and protein intake, should be examined with great care. Not only should the financial or economic gains for the state and its enterprises be considered, but also potential adverse health consequences should be evaluated. Societal-wide reduction in salt consumption, improved food preservation and processing efforts, and attention to safeguarding the nutritional intake of those most vulnerable to illness--mothers, children, the poor and the aged--should be among strategy components.

35. For the identifiable risk groups, health education programs should be initiated to help the public make appropriate diet choices. Considerable professional education efforts directed at physicians and nurses are likely to be even more important aspects of health education if a good level of community awareness and response is to be achieved.

36. This chapter has reviewed three essential elements for China to consider in dealing with its future health challenges--the health institutions and their roles, a conceptual framework for chronic disease management, and specific strategies for chronic disease control. Together the changes suggested may help in the development of a sound basis for dealing with the problems associated with the health transition. Improvements in the capacity and effectiveness of the health system, and in the manner in which economic resources are spent on health, are examined in the last four chapters.

CHAPTER 6 - HEALTH SERVICE INSTITUTIONS. PLANNING AND MANAGEMENT IN RELATION TO CHRONIC DISEASE

1. Now, and for the future, the most important point of contact for primary health care in China is with the village doctor/clinic or the urban street level clinic. However, other health institutions also play a significant role in primary care - maternal and child health centers, anti-epidemic stations, endemic disease control stations, and hospitals outpatient departments at all levels. Financial pressures in recent years have driven activities in all of these institutions toward services which are generally not cost effective and certainly not optimum as elements of a strategy to deal with the remaining problems of communicable disease and the emerging burden of chronic disease. The root cause is inadequacy of operational and, to a lesser degree, capital investment budgets.

2. Village clinic personnel no longer receive subsidies to pay the cost of conducting communicable disease surveillance, immunizations and other basic preventive services to the community. They have become more dependent on earning their livelihood from patient examinations, simple diagnostic work, and most importantly, prescription of medicines. Anti-epidemic stations have not the operational funds to conduct widespread surveillance and control activities. Instead they spend their time sampling water samples from industries who can pay fees for the service, testing foods and cosmetics for firms which want hygienic certification, and performing laboratory examinations and chest x-rays for industrial workers' annual physical checkups, another money earning activity. Health education units are confined to traditional, relatively ineffectual efforts of health propaganda. Endemic disease control stations operate like small general hospitals to earn extra funds; maternal and child health centers offer programs which require mothers and children to come to the centers rather than concentrating on outreach services (with tetanus toxoid, hepatitis B vaccination, and modern birthing methods and prenatal care advice) to those mothers and children most at risk.

3. Even if the budgetary shortages which create many of these problems were solved there would remain serious obstacles to these health service institutions functioning as the Ministry and Provincial Bureaus of Health would like. Most important among these is the skills and knowledge gap which exists amongst most lower- and many mid-level health workers. On the positive side, most existing workers know clearly the main communicable disease, sanitation and hygiene problems which confront their areas, and how these can be tackled most directly today. There is also a tremendous capacity within the existing system to organize and train lower level health workers in simple techniques for more effective assault on key health problems.

4. The main weaknesses lie in two areas - health workers understanding and behaviors on matters which affect efficiency and the quality of care; lack of knowledge, priorities, methods and leadership to begin a preventive strategy against chronic diseases. Remedy of the first weakness is primarily a matter of reforming incentives appropriately and providing strong in-service training and better management for quality improvement. The second weakness requires

operational research in epidemiology and social/community medicine to find solutions suitable to China. It then requires increases in categories of scarce specialty workers, widespread, practically focussed training programs and more commitment from civil leadership to make chronic disease prevention a primary strategy element. The manpower planning, training and educational issues are dealt with in Chapter 8.

5. The relevance of manpower quality, skills and management issues for health service institutions should be kept in mind throughout the discussion in this chapter and the next. No amount of investment or expansion of hospitals, technology improvement or disease prevention and control program hardware will yield much hope of improvement without accompanying serious efforts to better train, lead, and motivate existing health service personnel.

A. Hospital Resources

6. The role that hospitals in China should play in preventing and treating chronic illnesses effectively and efficiently is of utmost importance in the health transition. Hospitals already absorb the majority of funds spent for health care. In the future both mortality and morbidity may be on the rise. Crude death rates for many chronic diseases are still relatively low. The demographic effect of the health transition will cause a 240% increase in the middle age population, and thus a large increase in crude death rates and underlying morbidity. This group, and the elderly, will increasingly begin to experience higher rates of illnesses for some diseases as the result of risk factors to which they are exposed now and in coming years. In addition, mental illness and rheumatoid and other crippling diseases, although rarely a cause of death, imply substantial hospital care requirements.

7. Within the next few decades the hospitals will also have to serve increasing numbers of victims of crippling diseases and mental patients. The hospital sub-sector is already struggling to cope with today's problems. Planning and financial authorities do not appear to have a clear vision of what they expect over the next decade from the hospitals, at least in view of the issues raised thus far in this report.

8. Capacity and Characteristics. Hospitals serve as main points of patient contact in primary health care services in China. A typical 300-bed county hospital will serve about 300,000 outpatients per year. Large urban institutions frequently have outpatient visits numbering well over a million annually. More than half of all visits to hospital outpatient and emergency departments occur in hospitals at county level and above (see Table 6.1). On average for China's entire population there are two out-patient contacts per year with the hospital system, primarily for basic care services, but including a component of preventive services. This is equivalent to the average contact of the population with any part of the health system or any type of health worker in some other countries.

Table 6.1
Number of visits to O.P.D. and Emergency Departments, 1986

	Number of visits in millions
County and above county hospitals	1,218
Health sector	754
Enterprise and other sectors	39
Collective ownership	68
Township Health Centers	1,078
Other hospitals	53
Total	2,349

Source: Chinese Health Statistical Digest 1986, Ministry of Public Health, Beijing, 1987.

9. Below the county level are township hospitals or health centers (typically with 15 - 50 beds), and village and rural clinics, some of which have a few beds. Township hospitals today have only limited care and intervention capability. Average length of stay is short, bed occupancy ratios are low, equipment is rudimentary. However, the township hospital system potentially can provide a much strengthened primary health care. In densely settled parts of China the MOPH is also developing major township hospitals to serve as enhanced care (referral) units between the township and the county level hospital. In such cases the county level hospital is able to function more as the tertiary referral unit in such regions.

10. The strategy of developing township hospitals is basically sound. The better of these institutions also have offices which provide support to the village level doctors in surveillance, immunization, disease control, laboratory work and health education. They are important links which today function only weakly due to financial, manpower and investment constraints. The township hospitals are primarily dependent upon the township government for budgets and investments. Poor townships are predictably at a disadvantage. Townships located close to urban areas and county capitals have little incentive to strengthen their hospitals, thus adding to the pressures on the higher level institutions. The need for an integrated system (and management) of all hospitals in a region is discussed below.

11. In 1986 China had about 60,000 health care institutions with a total of about 2.3 million beds and a bed/population ratio of 2.18 beds per 1,000, not including the 272 military system (PLA) hospitals. However, many small health institutions do not provide the basic services required for critically ill inpatients. Thus, it is more realistic to calculate China's hospital bed/population ratio by only taking into account the hospital beds at county level and above--1.58 beds per 1,000 population.

12. Beds in relation to population show up to 17-fold differences among cities and between urban and rural areas. MOPH reported that cities (without counties) of more than 500,000 population had on average more than five beds per 1,000 population (see Table 6.2). On average, Chinese cities have reached or surpassed bed/population ratios that in a number of Western countries are

the planning ceilings (below 4.5/1,000) for acute short-term somatic medical care. Overall urban bed provision (4.48/1,000) compared to rural areas (1.54/1,000) is even greater in reality since the majority of the township health centers, and other lower level health care institutions, which hardly qualify as hospitals, tend to be located in rural areas. The PLA hospitals are located predominately in urban areas, further increasing the uneven distribution between urban and rural populations.

Table 6.2
Hospital Beds Per 1000 Persons in Cities (Without Counties) 1985

City by population size	Average	High	Low	City by population size	Average	High	Low
Above 2,000,000	5.1			200,000-500,000	4.4		
Harbin		6.4		Jining		10.5	
Tianjin		4		Zhongsan			0.6
1,000,000-2,000,000	6.1			Less than 200,000	3.3		
Taiyuan	8.3			Lhasa		8.9	
Nanjing		4.4		Zhuhai			3.2
500,000-1,000,000	5.8			All cities	4.6		
Jinzhou	8.8						
Ningbo		3.1					

Source: China Urban Statistics 1986, State Statistical Bureau of the People's Republic of China, Beijing, 1987.

13. In 1986, about 75% of the hospitals at county level and above were general Western-type hospitals. Traditional Chinese Medicine hospitals represented 13% of the hospitals in 1986 and are increasing as a share of the total. Specialized hospitals (sanatoria, psychiatric, MCH centers, infectious disease hospitals, with an average of 163 beds) also increased their share to 12% in 1986 (see Table 6.3).

14. Hospital size varies widely in China, ranging from 15 to 1,200 beds. Large hospitals are mainly the product of incremental expansion and rarely present a coherent and functionally integrated facility operated in an efficient way. The administrative complexity and "dis-economies" of over-sized facilities, plus the fact that geographical access by the population becomes more difficult in proportion to increasing hospital size, are at odds with the limited managerial resources available to operate large institutions and with the severe constraints on patient transportation. Despite relatively favorable endowment of hospital capacity in general and in urban areas in particular, most hospitals and health bureaus are pressing for further expansion. However, based on research from the West, and taking advantage of medical technology, humane health care can be provided efficiently and in proximity to the population, from hospitals with under 400 beds.

Table 6.3
Specialized hospitals in China
Average number of beds, 1986

Type of institution	Number of institutions	Average number of beds per institution	Type of institution	Number of institutions	Average number of beds per institution
Leprosy hospital	52	251	Orthopaedic hospital	22	130
Tuberculosis hospital	117	241	Cancer hospital	85	126
Children's hospital	28	239	Occupational diseases	41	108
Rehabilitation hospital	13	230	E.M.T. hospital	12	97
Psychiatric hospital	374	194	Other special hospital	71	93
Infectious diseases	138	179	MCH center	284	91
Sanitarium	638	174	Oral diseases	44	40
			Total	1919	163

Source: Chinese Health Statistical Digest 1986, Ministry of Public Health, Beijing, 1987

15. Role of hospitals. Hospitals in China primarily provide inpatient, outpatient, and emergency care. Only a few operate hospital-based home care programs, and provide community-oriented outreach programs for disease screening and health maintenance.

16. Admission rates for patients per 1,000 population rank low compared to other regions in the world, but hospital occupancy, with the exception of enterprise hospitals and lower level (township) hospitals, tends to be high. The average length of stay (LOS) is very long. Demand for higher-level inpatient care far outstrips the availability of beds, which means that, particularly at higher level hospitals, admission is denied to those who require hospitalization (see Table 6.4 for the leading causes of hospitalization). The pressure on the higher-level hospitals results partly from the self-referral by patients seeking better equipped institutions.

Table 6.4
10 Leading Diseases as % of Hospital Admissions
Urban Health Department Hospitals

Type of disease	1955	1984
1. Digestive system	25	19
2. Respiratory	12	18
3. Childbirth	11	8
4. Infectious diseases	9	7
5. Trauma and intoxication	6	9
6. Urinary tract	3	4
7. Malignant tumors	3	4
8. Heart disease	3	4
9. Eye diseases	3	3
10. Female reproductive organs	3	*.*
11. Locomotor system	*.*	2
Total % for 10 leading diseases	79	7

Source: Summary of Chinese Health Statistics 1984, Ministry of Public Health, Beijing, 1987.

17. Emergency care. Nationwide data on the incidence of emergencies for which hospital treatment is necessary are not available, but mortality statistics on injuries (Chapter 2) indicate that the incidence of emergencies due to suicides trauma and poisoning is high. Emergencies due to acute episodes of heart disease and stroke are also known to be numerous, particularly in urban areas.

18. The emergency care situation is deficient in all its main components: communications, resuscitation and life-saving intervention, transport, and overall appropriate emergency care. Staff are poorly trained, inadequately paid and managed, and financial reforms in recent years have emphasized payment for services at the expense of availability and access. Only a few cities, have a toll-free emergency telephone number. Provision of ambulance services is insufficient; the ambulances are inefficiently managed and are often physically unsuited to emergency use and not always fully operational. China's Ministry of Public Health and the National Association of Emergency Medicine (NAEM, an advisory body to the MOPH) is well aware of the weaknesses in the present situation. Higher level attention from national leadership in the context of overall health sector reform and development of a sound prevention and care strategy will be needed to implement many of the changes called for by the situation.

19. To improve the potential for extra-mural resuscitation and life-saving interventions, actions are being undertaken in many localities to diffuse among lay people the understanding of, and the proficiency in, applying basic life-saving and first-aid measures. Much current thinking about the development of an appropriate emergency care system places priority on strengthening the communication and transport components. Experience in other countries has shown this emphasis by itself will be ineffective, even harmful. That all elements of an emergency care system must be developed in balance and be well coordinated in order to avoid the co-existence of both bottlenecks and idle capacities. Planning and finance authorities should consider controlling investment in emergency system equipment and infrastructure until manpower training and compensation, service pricing and financial and operational issues are resolved, or considerable wastage of resources is likely to result. Planning and finance authorities also need to recognize that their current policies have caused, or contributed, to the health sector's inability to deal with some of these issues.

20. Home Beds. Some hospitals are experimenting with home care programs as a substitute for inpatient care. As of 1984 about 500,000 home beds existed throughout the country. Expansion of the use of home beds is constrained because of the distances between hospitals and patients' homes, shortages of hospital staff, and lack of transport for medical staff and lack of operating funds. Low-care facilities, called temporary beds, have also been installed at certain hospitals or off-site. Some hospitals use nearby hotels for housing patients during recuperation phases of treatment.

21. Mental health services deserve special mention. While the prevalence of mental illness in China is not unusual compared to other countries, present therapeutic and confinement practices are unsatisfactory. An increase in

total psychiatric beds is needed as is sharply improved management of patients and provision of more modern recreation and rehabilitation programs. More importantly, widespread establishment of community mental health counselling services in general hospitals and development of community-based rehabilitation networks would provide large gains in efficiency. Strict implementation of guidelines to cease outmoded therapeutic practices and to adopt modern psychotropic drug regimes would substantially improve efficacy and return of moderately-troubled patients to the community. With suicide ranking as the leading single cause of death for persons aged 15-35 the social priority of improved mental health services is very high.

22. Chronic Disease Activities. Most hospitals have become interested in screening for chronic disease in recent years. This provides opportunities for secondary prevention. While some of these efforts are effective and well-managed, the high cost of case finding and the relative ineffectiveness of secondary prevention for many chronic diseases is seldom recognized. Much of the interest in such activities appears to be attributable to hospitals' revenue earning potential (see Chapter 9). For example, many hospitals emphasize the "need" to expand cancer detection efforts, despite the poor prognosis for the main cancers in China regardless of the stage of detection.

23. By contrast, most hospitals report only token activities or participation in programs aimed at health maintenance and primary prevention of chronic disease, for example modest programs to change diet and active counseling of patients and their families to stop smoking habits. Outpatients and their relatives are sometimes exposed to health maintenance messages (e.g. posters). But smoking is often allowed on hospital premises and by hospital staff, despite Ministry of Public Health guidelines.

24. Hospital Management. Rational use of existing facilities and shortening of the average LOS is one key management issue in Chinese hospitals (see Table 6.5 for tentative comparison with the West). Reducing LOS would contribute towards absorbing waiting lists and unmet demand. It could also help defer capital investment for expansion of facilities. The key factors affecting LOS include the following, many of which are susceptible to managerial intervention to effect improvements (see Annex Chapter 7 for a fuller description of these factors):

- severity of cases;
- extended care arrangements;
- long LOS in traditional Chinese medicine hospitals;
- lengthy treatment plans ordered by physicians, which could be avoided through targeted LOS and discharge quotas according to diagnosis or medical specialty;
- lack of pre-admission diagnostics, which likely would reduce LOS by two or three days;

- poor scheduling of patient care and optimum facility use, which cause bottlenecks and idle capacity simultaneously, and which may be influenced by pricing, for example, of intensive care;
- hospital-acquired complications, such as infections and on-site accidents;
- difficult post-discharge situations that would affect care, for example, sub-standard housing;
- overuse of hospitals induced by the health insurance benefit structure.

Table 6.5

LOS in OECD countries, in Shanghai 1st and 8th People's Hospital and in No. 1 Attached Hospital, Beijing Medical University

- Selected disease categories -

Type of disease	Average length of stay in days			
	OECD 1980	8th 1986	1st 1987	No 1 1985
All heart disease	18.4	32.6	36.4	
Hypertension	15.4	43.9	28.4	
Malignant tumor	16.5	49.0	41.3	
Accident and trauma	10.7	19.4	25.5	
Pneumonia	21.6			18.2
Bronchitis	13.2			30.8
Cholecystitis	15.5			19.0

Sources: Financing and delivering health care, OECD, Paris, 1987.

Chen, J., The cost of hospitalization in Shanghai 1st and 8th People's Hospitals, (unpublished), Shanghai, 1987.

Che Chuen Feng et al., Primary analysis of factors influencing average length of stay. Hospital Management in China, vol 3:4, 1987, pp. 199-201.

25. There are also strong cultural factors affecting hospital LOS. As was the case in the west 30 years ago, hospitals are seen not only as a place for acute care but also as a place for convalescence. These cultural perceptions of the hospital's function will be difficult to change and pose a barrier to shorter LOS but the alternatives of massive additional investment in new hospital capacity or increasing inequities in admission to hospital, seem even more undesirable.

26. Other key issues of hospital management include quality assurance and risk management. Although some aspects of quality assurance are recognized as important, specific programs, such as utilization review, peer review, infection control, radiation control, and accidents control, are generally inoperative, at best. Other areas of concern include the absence of a

hospital accreditation program, poor quality laboratory work because of defective equipment and poorly trained and insufficient manpower (see Chapter 8). Early steps to address these shortcomings are underway but budgets provided at both the national and provincial levels are insufficient to make much progress. Hospitals do not have formal arrangements for infection control or appropriate use of antibiotics. A preliminary survey on nosocomial infection in 21 hospitals for 1983 indicated that the incidence of hospital-acquired infection was 8.4% (Table 6.6). Misuse of antibiotics must be a substantial problem by virtue of the volume and multiplicity of agents used. No official data is yet available, but this is an obvious area for careful study under MOPH guidance. Meanwhile, a Program of Surveillance and Control of Nosocomial Infection has recently been started by the MOPH.

Table 6.6
Nosocomial Infection in 21 Hospitals in China

Department	% Infection
Surgery	13.2
Orthopedics	10.3
Pediatrics	9.1
First Aid	8.5
Obstetrics	8.1
Gynecology	7.4
Internal Medicine	7.2
E.N.T.	4.0
Ophthalmology	0.8
Other	5.2
Total	8.4

Source: Wang Shu-Qun, Status of Nosocomial Infection Study in China, Program of Surveillance and Control of Nosocomial Infection, Ministry of Public Health, Beijing, 1986.

27. Hospital Facilities Management. A significant number of urban hospitals date from before 1949, and a large part of the total stock was constructed in the early 1950s. The infrastructure of these older hospitals is poorly maintained, and much of it presents serious fire hazards. Newer facilities average more space per bed, but work areas are cluttered with out-of-order equipment and refuse. Lateral circulation and patient transportation are often hampered by small doorways, steep ramps or stairs, malfunctioning elevators, and by the absence of covered walkways between individual buildings.

28. Deficiencies in plumbing and the presence of wet areas cause rapid deterioration of walls, ceilings, and inside partitions; dampness also provides an environment for fungus growth in patient areas. Surfaces that should be dustfree and antiseptic often are not. Measures for energy conservation have not been implemented in the design, construction, or materials of the buildings, with patient areas often unheated.

29. Maintenance budgets are wholly inadequate for the aging hospital stock, and even the amount normally spent on maintenance (Annex Table 9-6) is often

spent on small additions to physical plant and on purchases of new equipment, especially items that enhance a hospital's revenue earning activities.

30. Overall, existing hospital facilities are in very poor condition and are being allowed to deteriorate further because of financial pressures and the general incentives in China to undertake new capital construction rather than better maintenance and use of existing buildings. In addition, examples abound of relatively new hospitals that are very poorly designed, wrongly located in relation to the populace, and not needed in relation to other nearby capacity--and that are equipped and managed in ways that will only drive health care costs higher.

31. Hospital information systems. Patient-related information is available in medical records and various logbooks in diagnostic and treatment areas. Some diagnostic or procedure-related information is retrievable for management purposes. Abstracting of medical records for purposes of review, planning, inter-hospital comparison, case-mix adjustment, etc. is not customary. Data on resources, utilization, and production are available although not in a standardized form. Financial data are structured around type of income or expenditure, and relating cost data to hospital products such as cases or product lines is not practiced. Use of computers for managerial purposes is exceptional.

32. Management Resources. Since the end of the Cultural Revolution, Party Cadres have been replaced as hospital administrators by clinicians. The director is a general manager and the ultimate decision-maker with respect to hospital affairs such as investment choices, operating policies, negotiations with health bureaus and other authorities. This development has been reinforced by the "director-responsibility" system and related financial accountability objectives. Recently, accountability for balancing budgets at departmental level in hospitals has been emphasized by the technical responsibility system and by incentives such as bonuses related to departmental output. In view of the financial trends in the health sector (see Chapter 9), China should examine this management situation carefully. It may well be that during the last five years, China has been paying much more for lesser quality hospital care that benefits relatively fewer people than in the past.

33. The general tendency to appoint practicing physicians as managers is defended on the grounds that this guarantees that experience in medical affairs will be continuously available for management decisions. This drain on scarce medical resources that would otherwise be available for patient care, and the conflicts of interests between patient care requirements and management duties (and financial incentives), are acknowledged but considered not to outweigh the advantage of having practicing physicians in control. In view of the findings in other sections of this report, this position would seem to be in need of careful review.

34. In Western countries, lay managers, specially trained for health services management, are in charge. On average, they provide better analytical skills and also special expertise in management areas. Officials

at MOPH consider the situation of clinician-managers as temporary and in line with general economic reforms, such as in industry, whereby administrative cadres are replaced by professionally qualified management. It is expected that in a next stage of health services reform, properly trained health care managers, with or without a medical background, will gradually replace the clinician-managers.

B. Hospital Planning

35. The Seventh Five Year Plan (1986-1990) provided for yearly increases of 80,000 hospital beds, based on provincial investment plans. Separately, 18 key hospital projects (five at central level, the remainder at provincial or municipal level) are being financed specially by the State Planning Commission. Most of the investment will be in reconstruction of existing facilities, each of which is about 800-1,000 beds. It is not clear that these high-level hospitals can, or are intended to, serve more than a select segment of the population, with few downward linkages and little in the way of replicable example. Use of such hospitals will entail higher costs and will lead to patterns of higher technology interventions that have little relevance to most of China's health needs for the next half century. Further such investment is perhaps best avoided.

36. Elements of current planning and related targets that give cause for concern are that 20% of the national hospital beds will be for Traditional Chinese Medicine, 20%-25% of the bed stock expansion will be provided by the enterprise sector, each administrative unit at county level and above will have a TCM hospital, and each provincial capital will have a cancer hospital. The financial implications of these planning elements, the likelihood of duplication of capacity, of bias toward high technology, and of yet further escalation in health costs obviously should be of concern. Substantial revision or cancellation, of all four of these planning objectives, would be a step in the right direction to freeing resources for efficient investment and to avoiding further high cost and ineffective development of the system.

37. Meanwhile, the "1/3 rural counties" program intended to update and renovate successive thirds of the county hospitals over a number of years has fallen behind schedule. Priorities in expansion of hospital capacity are given to existing hospitals at the higher provincial and municipal-prefectural level. These investment choices are rationalized on the basis of improving the poor quality of service currently provided at county and lower-level hospitals. This rationale results in incremental growth of large institutions and no redressing of the basic problems at the lower levels.

38. A defined strategy for an articulated (both horizontally and vertically) and balanced hospital system does not exist. The tendency of Health Bureaus to develop hospitals coterminous with every administrative sub-division of the country, and the development of hospitals by various owners independently, result in a duplicative, fragmented and multi-tiered, hospital system: township/neighborhood level; county/district; municipal/prefecture; provincial/municipal; and national. Other countries have either a two-level

hospital system (medium and large), or at maximum, a three-level hospital system, including small, 100-150 bed hospitals.

39. To counteract fragmented development of uncoordinated hospital resources, a number of countries (e.g. Sweden and the United Kingdom) have defined health regions within which the development, deployment and functioning of health facilities is analyzed, guided, coordinated, re-directed, re-structured, re-allocated as necessary. These health regions are not bound by the existing geographical or administrative boundaries of the country and contain in principle a population base (between 1-5 million) large enough to support self-contained comprehensive, basic and referral care facilities required by the population in the region and deployed within acceptable proximity of those served.

40. For the future, there is no doubt that China must increase, rehabilitate and upgrade its existing stock of medical care institutions, even with very effective disease prevention programs. When, and how, to do this are issues that must be tempered by consideration of efficiency improvements, control of costs and rationed, equitable access. A simple response stressing expansion of hospital bed capacity cannot possibly work. The implicit demands of over a billion people, with easily foreseeable illness patterns, and present managerial weaknesses will overwhelm any imaginable response of the Chinese economy and the government's budget simply to construct more hospitals (public or private) and use them in the present way.

41. Alternatively, simply to raise the price of hospital admission as a means of reducing demand will surely be unacceptable to the middle-aged and elderly. A heavy burden of development has already fallen on them; to ignore those citizens whose incomes are not adequate, and admit without restriction those who are, fortunately, insured, would be contrary to many of China's fundamental social goals. Likewise, to borrow heavily (domestically or abroad) as other nations have done to provide social care today at the expense of the productivity of future generations is unlikely to be a wise choice.

42. Yet a way combining features of all these alternatives must be found and initiated fairly quickly as the present course is resulting in a neglect of prevention and worsening of medical care. Efficiency improvements to gradually reduce by half the present long average length of stay would be equivalent to doubling the number of available hospital beds, and with careful attention to quality of care issues, offers considerable benefits. In addition, internal reforms and adjustments to a wide range of medical care practices and incentives must be made for hospitals to improve their cost effectiveness and efficacy regardless of the development plan chosen for the longer term. Without consensus on a new course for hospitals, the massive existing system is likely to consume inexorably increasing amounts of economic resources, with little discernable impact on China's health status. The experience of other nations with escalating health care costs, mainly for hospital services, should provide China indisputable evidence of this. These themes will be examined in greater detail in Chapter 9.

C. Hospital Management Principles for Future Strategy

43. Co-ordination of the hospital sectors. The fragmentation of hospital services among sectors (MOPH, Western and TCM hospitals, enterprises, PLA, and collectively-owned hospitals) results in uneven development, inequitable distribution, and duplication of scarce resources. The coordination of the various hospital sectors towards an integrated system should be an important policy option for the government to study. This should go beyond the current efforts to make the various hospitals accessible to the general public instead of being reserved for special sub-populations such as workers of a given industry or a collective. Management arrangements and the coordination method adopted should in particular address development and deployment of hospital resources and related health technology in a given region regardless of ownership. Whether this is best done through a hospital association, or regional corporation or other means, needs to be studied, but current incentives for competition and duplication of service are not appropriate. To substantially modify current policy of treating each hospital as an accounting unit responsible to earn revenue enough to cover its operational costs is an obvious, high priority topic for reform. The problem of coordinating the various hospital sectors is compounded by the current national commitment to strengthen and protect the TCM institutions under the State Administration of Traditional Chinese Medicine, which intends to develop separate TCM hospitals down to county level. This strategy needs adjusting in light of all the other considerations. The MOPH also needs to reconsider carefully its current policies supporting further establishment of functionally specialized hospitals for cancers, infectious diseases, dental services, mental health and other specialities which are probably much more cost-effectively and equitably provided as specialized departments in general hospitals.

44. Designation of Health Regions. China should consider establishing, below the provincial level, Health Regions that would be given area-wide health planning responsibility and would be coterminous with the nearest existing administrative sub-division of the country (prefecture or municipality). This is particularly important for remote areas and for densely populated metropolitan areas where the advantage of co-terminosity outweighs the advantage of separate boundaries for health affairs.

45. Area-wide Health Planning. Within Health Regions a defined authority should be charged with the planning and coordination of health services, including deployment of manpower and expensive technology. The planning and co-ordination should be based on the analysis of health care needs and the availability, accessibility and utilization of all existing resources. The health planning agency should guide and coordinate future resource development and utilization and, when necessary, have the authority over local governments to re-allocate resources or re-direct their location. Area-wide medium-term and long-term phased investment plans for new facilities, for expansion of existing facilities, for renovation and upgrading, and for reconversion should be developed. These plans should revise hospital hierarchies downwards to a maximum of three levels regardless of sectoral ownership. Also, special attention should be given to forestall "dis-economies" of hospital size, in

particular those resulting from proliferation of small-sized institutions and from on-site expansion of large facilities. The development of specialized hospitals, particularly cancer hospitals and infectious disease hospitals, should be discouraged in favor of specialized departments within general hospitals.

46. It is important that appropriate lines of authority, communication, and accountability be established between the area-wide health planning agency and, respectively, the Provincial Planning Commission, the Provincial Health Bureau, and the agencies responsible for health facilities owned by industry or other sectors. Given the strong vertical and sectoral traditions in China which mediate against horizontal coordination and cooperation between different sectors and enterprises this will be difficult to achieve. To facilitate the process central agencies may have to mandate tax changes and budget subsidy revisions to make narrow, industry-based or administrative-level-based health institutions financially unattractive to be continued. Expansion of alternative care facilities and homebeds should be encouraged, and an ambulatory care strategy should be emphasized throughout the hospital system to reduce costs, postpone the need for expansion, and improve overall efficiency.

47. A further step in the coordination of hospital services should be the establishment of multi-hospital networks linking lower levels hospitals laterally and with their immediate referral hospitals in order to allow efficient two-way patient referral, rational deployment of expensive equipment, skilled staff, and shared support services, and to allow scope for multi-unit management. Considerable emphasis should be placed on improving the quality and breadth of medical services at the lowest levels (township and village centers) to avoid unnecessary overlapping of county and city hospitals, and to improve effective, equitable services. Strengthening and improvement of patient transportation systems, which is needed in principle, is even more important for successful operation of a multi-hospital network.

48. A comprehensive and integrated health information system is mandatory for effective implementation of area-wide health planning. The complexity of the health services in China and the constraints on resources require experienced professional health care managers and an active program of health services research to guide and evaluate policy decisions. The prevailing policy of entrusting practicing clinicians with the management of health institutions should be seriously reconsidered. The current, modest efforts to train health care managers and to undertake health services research should be amplified.

CHAPTER 7 - MEDICAL TECHNOLOGIES IN CHINA

1. Technology is knowledge applied to specific purposes. Medical technology, defined as the drugs, devices, and medical and surgical procedures used in health care, as well as management and supportive technologies, is critical for the health care system of any country and offers a major tool for efficiently improving the overall health of the population. In countries where costs of health care have been growing rapidly, an issue of importance and visibility is the choice of cost-effective technology. Technology assessment is any method that increases understanding of the consequences of technological choices, choices that can be assisted by collection of data on specific technologies. The process of developing such information is not yet established in the health sector in China.

2. In most industrialized countries, public policies, especially in health care payments and financing, strongly influence the adoption and use of medical technology. For example, drugs are regulated to assure efficacy (benefits) and safety, usually by a pre-marketing approval process. Increasingly, medical devices are regulated in similar fashion. Very expensive technologies usually are subject to licensing controls. In addition, government insurance plans, private insurance companies, and illness funds generally have explicit benefits packages that indicate services that can be provided and their reimbursable cost. These packages in effect define a form of technology regulation by financiers of health care.

A. Medical Technologies in China

3. China has a variety of problems managing medical technology. These range from an emphasis on local production of drugs and equipment, with concomitant quality problems, to inappropriate pricing policies. China's policies toward planning, organization, and payment for medical services have been developed in light of earlier social and economic goals, with little attention to the issue of technology. In light of current trends in health costs and likely future health needs, it may be time for these policies to be examined explicitly for their effects on medical technology.

4. Appropriate management of technology in China is complicated by the fact that this is the time of the most rapid technological change in history, and such change will probably accelerate during the next 40 years. China should not acquire the newest technologies uncritically, however. It could save itself costly mistakes by rapidly adopting new medical technologies only when they are proven and obviously cost-effective. For example, lasers are increasingly finding a place in vascular surgery. Rather than investing in manpower and facilities for coronary artery bypass surgery, China may be well-advised to examine and invest in laser technology if it is proven to be cost effective. In other areas, many procedures previously done by surgeons can now be done by non-surgeons, meaning that there may be less need of surgeons in the future. Another example is that biotechnology is leading to new diagnostic test kits that may replace much expensive automated laboratory equipment. To move slowly in importing automated diagnostic equipment or in

establishing production lines for local manufacture of such equipment may benefit China, with technological advances in the next few years resulting in sharply lower investment costs.

5. Evaluation of Technology. The evaluation of the effectiveness, safety, and costs of new and traditional drugs and equipment technologies for diagnosis, treatment, and prevention is assuming much greater importance because of the high costs involved. Large, simple randomized trials could have a large part to play in this. No such trials, however have been done in China. Included in Annex Chapter 7 are simple case studies of key technologies being used in China or rapidly being acquired by the health system. These examples outline approximate costs and the apparent issues to be considered by China as it develops its technology assessment policies. These are not meant to provide definitive analysis for items of equipment but to stimulate further investigation in potentially important areas (see also Chapter 9 on technology and the pricing system).

6. An important related issue is how to plan for technology to meet future health needs. Real and perceived increases in chronic disease rates have already fostered a demand for investment in modern technologies, which will continue. Balanced investment in prevention, diagnosis, treatment, rehabilitation, and long-term care is essential. For this purpose, China needs to improve its knowledge of the relative merits of different technological choices and its ability to plan and regulate these.

7. Domestic Medical Technology in Use Now. Sources and producers of domestic medical technology, issues of quality control for medical equipment and for drugs, and the structure of the domestic industry are discussed in detail in Annex Chapter 7. China is essentially self-sufficient in drug production, and drugs are generally readily available. The use of pharmaceuticals is quite high; in fact, the cost of drugs may account for more than 50% of total health expenditures. An average of 2.3 drugs are prescribed at each patient visit. Two reasons apparently explain this high rate of drug use:

- Polypharmacy practices seem preferred by doctor and patient alike in order to ensure that a cure is accomplished. In this aspect China is not different from many other countries. The remedy lies in the widespread introduction of large randomized trials to develop effective prescribing protocols, better physician education, clearer and stricter enforcement of prescribing protocols, occasional hospital drug audits by department and by doctor, and widespread public education about the dangers and inefficiencies of polypharmacy.
- Payment policies and financial incentives for both practitioners and institutions encourage the prescription of more drugs (see Box 9.1).

8. Under the Bureau of Drug Policy and Administration, as mandated by the 1984 Pharmaceutical Law, the Drug and Biological Production and Quality Control Institute has the responsibility for controlling production, supply and use of drugs, as well as quality control. MOPH must certify that a drug

is needed before it can be imported. Imports of diagnostic reagents, radiography materials, some antibiotics, and some cancer chemotherapy drugs are also regulated.

9. Key types of equipment and supplies are in short supply, and medical devices generally are not regulated for quality (refer to Annex Chapter 7 for detailed information on medical equipment, quality problems, shortages, maintenance, and regulatory and policy aspects). Imported medical equipment is very popular, reputed to be of better quality and is beginning to diffuse rapidly, with many associated problems. Municipal and provincial hospitals generally are fairly well-equipped, township hospitals and rural clinics generally poorly equipped, although there seem to be many exceptions and no consistent patterns.

10. The diffusion of Western medicine and technologies in China has been rapid and extensive, with some technologies already widely available throughout the health system. For example, the MOPH estimates that there were 170 computer tomography (CT) scanners in China in 1986, although unevenly distributed across the country--as of early 1988, Beijing had 34, a rate of more than 3 per million population. This high rate is one aspect of questionable technology investments being proposed by health institutions, especially in diagnostic equipment. There seems to be a general desire to increase sophistication of diagnosis with relatively little attention to the contribution of the diagnostic accuracy to the efficiency of therapy in terms of the outcome for the patient. At the same time, there is a shortage of well-trained diagnostic technicians.

11. Moreover, outmoded diagnostic equipment is in widespread use, especially in cardiology. Vectorcardiographs, ballistocardiographs, and cerebral resistance measuring machines should be removed from service as a matter of priority in order to prevent further waste of resources. Fluoroscopy should be phased out, both in the interests of protection of patients and workers from radiation, and because it is an inefficient diagnostic procedure. Overall, the situation argues strongly in favor of a strengthened role for MOPH to do technology assessment and regulation (see Annex Chapter 7 for details of a program for radiological equipment and services and additional information on technology regulation, X-ray services in particular, and on the variety of problems and issues to be considered for further development of regulations. Annex Chapter 7 also contains a brief review of the status and issues surrounding important ancillary technology services for blood banks, laboratories, etc. in the health system).

12. Technology and the Pricing System. China's present pricing system for medical technology (including drugs) is resulting in overutilization of some medical technologies, particularly in diagnosis, and consequent over-expansion of capacity. The structure of the pricing system needs to be adjusted to be more neutral in relation to incentives for utilization. Current policy mandates that the prices charged by health care institutions for medical procedures be adequate to cover costs, not including salaries (which are covered by budgetary allocations). Sometimes the prices approved by local and provincial price bureaus appear to meet this principle, and sometimes the

prices far exceed or fall well short of the principle. As would be predictable, the health system is responding to price signals and to decentralization trends that emphasize financial profits at the level of the individual hospital. These tendencies help to explain why China's health care costs are increasing so rapidly and why fewer people are likely to benefit from services unless reforms are begun to constrain utilization (see Chapter 9 for a full explanation of technology and the pricing system, and Annex Chapter 7 for examples of the use and pricing of various medical services).

13. Obvious disadvantages of present pricing policy include: higher and accelerating health expenditures, increasing equity gaps between the poor and the insured, widespread and growing health problems created by polypharmacy and by excessive use of some drugs, a skewing of attention away from primary care and prevention and toward sophisticated treatment activities, and potentially excessive investment in the domestic drug industry to create capacity beyond that required if drug use were reduced to minimum, medically-justified needs. Obvious financial, but perhaps not economic, benefits of the current drug pricing policy include increased profits, employment and, therefore, justification for expansion in the domestic drug industry. Overall there is a clear case for beginning substantial price reforms for drugs in particular, to minimize tendencies of misuse, overuse and proliferation of competing, similar types. This, however, will require a change in the means by which gross-roots physicians are paid and by which health institutions are financed. (See Chapter 9).

B. Toward a Medical Technology Assessment Policy

14. The evaluation of the effectiveness, safety, and costs of drugs, procedures, and prevention measures has always been a key factor in medical science and practice. Generally speaking, effectiveness can best be established by well-controlled prospective studies, which have rarely been done in China. Because selection of the control and treatment groups is an important issue, the standard for testing effectiveness is the large randomized controlled clinical trial, in which a group of patients is randomly assigned to either a study group or a control group. The application of such studies has grown rapidly in the West. In China, controlled studies of drugs are often done but these are generally either small or non-randomized, and proper trials of other medical interventions and technologies appear to be rare.

15. Evaluation of the effects of medical innovation, and interventions, comes only later, or not at all. Technologies that have been in widespread use in the West and now appear to be ineffective include: radiotherapy (and much other therapy) other than as palliation for many types of cancer; a variety of operations for coronary artery disease (coronary artery bypass graft, in use for 10 years or so, is known to be effective only in some cases); insulin and electroshock treatment for schizophrenia; electronic fetal monitoring (not effective in relation to monitoring by stethoscope); vectorcardiography (not effective relative to electrocardiography); oral drug treatment for diabetes; and several secondary preventive programs, such as

mammography of all adult women for breast cancer (only effective for women over age 50, possibly, for those with a positive family history, over age 40).

16. Evaluating diagnostic procedures raises particular problems, since they do not themselves produce health. Safety of interventions is a factor that must always be considered as well. Therapeutic results may be relatively obvious; if a therapy does not benefit many people with a disease, it probably should not be used. Risks of an intervention are not so obvious; they may occur at much lower rates and require population studies to be done. Safety is difficult to assess for the same reasons that it is difficult to recognize risks. Long-term studies of large numbers of people are needed (See also Box 7-1).

Box 7.1

Technology - Themes for Consideration

Detailed discussion with health professionals of China's current levels of medical technology, its regulation, uses, problems and potentials rather easily yields seven simple themes for consideration by policy makers. To get decisions to take action is more difficult. The following themes may usefully be made the topic of national and provincial workshops and policy deliberations:

1. Outmoded therapy (cost ineffective, medically useless) should be discontinued;
2. Sophisticated technology needs to be located at the right level (usually a relatively high level) with appropriate networks and referral patterns;
3. Simple technology needs to be located at the right level (usually a relatively low level) with convenient conditions of access for patients;
4. Prices charged for use of both simple and sophisticated technologies need to be made relatively more neutral in relation to the costs incurred in their use in order to discourage marked over- and under-use;

5. There is a need for China to develop better quality, medically useful, domestically made medical machines and devices. Much closer integration of the State Pharmaceutical Control Administration with the Ministry of Public Health is needed to accomplish this;

6. Some technologies should not be further diffused in China. Strengthening of regulatory practices to control technology diffusion is needed;

7. There are clear trade-offs between some technology investments for treatment of disease versus funding for good disease prevention programs. Planners and civil authorities at all levels need to understand this much better to wisely safeguard adequate funding for disease prevention programs.

These seven points suggest an operational policy-research and educational agenda which within a few years could yield China large benefits in terms of both waste reduction and more effective health care.

17. Some interventions have important social or psychological consequences that need to be assessed or taken into account, for example, genetic screening of the fetus for Down's syndrome. In China, parents have sometimes used amniocentesis to learn the sex of the child and have aborted female children. This is certainly not cost-effective, and demographic forecasts have shown the future consequences and likely social and economic costs of this action.

18. The financial costs of technology are a critical factor in any widespread health care program. Choices must be made within limited funds available for health expenditure. Economists have developed techniques to answer the question of relative value of interventions. The standard technique is cost/effectiveness analysis, in which costs are measured in financial terms and effectiveness is measured in outcome terms, such as years of life gained or quality-adjusted life years (QALYs). Using these techniques, different interventions can be directly compared, for example, the cost effectiveness of a doctor's advice to quit smoking versus the cost effectiveness of a coronary artery bypass graft, to treat a common medical

complication of smoking. A process of evaluating an intervention by these methods is also part of technology assessment. China could very beneficially begin to apply cost-effectiveness criteria to screening programs, medical procedures and proposed purchases of new technologies. This would help both civil leaders and medical professionals to make wise choices in allocation of financial resources. (See for example Box 7-2 on why lung cancer screening is not a cost effective approach to follow. Further examples of cost-effectiveness methods and values are presented in Annex Chapter 7). China's economists and medical schools have little experience in such technology assessment approaches. In view of the findings of the earlier chapters of this report, this would appear to be a very high priority area for development and research.

19. Today China is badly hampered by a lack of information on the risks, benefits, costs, and other implications of any technology, new or old. In many countries, including China, when such information is not collected or is ignored by policymakers, the result is that medical technologies:

- are often accepted for general use without evaluation;
- are often accepted for use before evaluation is completed, making it difficult to act on subsequent results;
- are often over-supplied relative to reasonable estimates of the health needs of the population;
- that have been evaluated are often used for conditions beyond those that have been covered in the evaluation;
- that have been evaluated and accepted are often used at levels well beyond those known to be efficacious and necessary; and
- even those that avoid the above characteristics, may be cost-ineffective, in that an equally effective and lower-cost technology exists but is not utilized.

20. China can easily and quickly overcome some of these problems by learning about methodologies for the assessment of technologies and by drawing on experiences in other countries. Still, two important questions remain:

- How is the evidence on technology to be assembled, synthesized, and disseminated so that appropriate policies on technology can be developed and applied?
- To what extent does the current system of organizing and financing health care in China help or hinder these processes?

Box 7.2
Why Lung Cancer Screening May Not be Cost Effective for China

Lung cancer is the most common lethal cancer in men in most industrialized countries, and may soon become the leading cancer in China. Male respiratory cancer rates appear to have been rising for at least 50 years in the United States, and female rates began to rise 25 years ago and now are increasing rapidly. The same trends are inevitable for China over the next 3 - 4 decades. In 1988, there were an estimated 152,000 new cases of lung cancer in the United States and 139,000 deaths (American Cancer Society). Approximately three-quarters of the cases and the deaths are in males. For China, it is likely that in 1988 there will be more than 120,000 men and women who may die from lung cancer.

Lung cancer does not generally cause symptoms until relatively late in its course. At that stage, standard treatments with surgery and radiation therapy (and sometimes chemotherapy) do little to modify the ultimate course of the disease. Only about 10 percent of patients survive 5 years after diagnosis (Eddy).

The poor prognosis has led to proposals in the West to attempt earlier case finding through screening programs. Two tests can be used to screen for the disease: a chest x-ray and a microscopic examination of cells coughed up in sputum (sputum cytology). However, these tests are associated with many problems. False negative readings of chest x-rays are very common. Sputum cytology is even less effective and detects less than half of potentially-treatable lung cancers (U.S. Preventive Services Task Force). Even with early case finding, treatment results are not very encouraging. Further, the screening and necessary diagnostic testing of those with positive findings are very expensive.

The scientific literature does not show any significant benefit from screening for cancer of the lung, even in high risk groups (Eddy). Several randomized clinical trials have found no effect on mortality from a program of screening. The U.S. National Institutes of Health has examined the efficacy of chest x-ray and sputum cytology screening in over 30,000 male smokers in three large clinical trials. In each study, lung cancer mortality did not differ between experimental groups and control groups (National Cancer Institute). A recent controlled clinical trial from Czechoslovakia had similar findings (Kubik and Polak).

Although cigarette smoking is the major risk factor for lung cancer, the great majority of smokers (about 8 out of 10) will never get the disease. This means that the screening of this high risk group is not very productive. Moreover, screening of this same group would have to be repeated at frequent intervals to have success with early detection. If the population of smokers is systematically screened, the impact on life expectancy of two examinations a year is less than 20 days, according to a model developed by Eddy. Moreover, screening programs of both types are very expensive.

In the United States, these considerations led to recommendations by the American Cancer Society that lung cancer be attacked through programs to help individuals change their smoking behavior (Eddy). In addition to population-wide smoking cessation programs, if screening for other diseases such as hypertension and other cancers is done, information on the harmful effects of smoking can also be provided to those being screened. In the United States, the American Cancer Society, The National Cancer Institute, the Food and Drug Administration, and the American College of Radiology have recommended against routine screening for lung cancer. This conclusion is also supported by the Royal College of Radiologists and the World Health Organization (U.S. Preventive Services Task Force).

In China, lung cancer seems to be rapidly developing as an important cause of death, especially in males. This result is to be expected, given the high and growing rate of smoking cigarettes in the Chinese population. The increases in rates of smoking indicate large increases in lung cancer incidence and deaths in the future. Already local authorities and sometimes national bodies are proposing lung cancer screening programs. Screening programs are unlikely to be cost-effective in China for the same reasons as they are not in the West (low incidence of positive findings, need for repeated testing, expense of testing). This implies the need for China to adopt broad, vigorous smoking cessation programs and policies as early as possible to minimize the otherwise inevitable illness and premature deaths which will occur in the next century.

21. In regard to the first question, it is important to recognize that information on medical technology has the characteristic of being useful for different decisions, but it does not itself often yield financial profits to the user. Costs of gathering information on medical technology may be high, although the costs of dissemination of the findings may be low. Thus, most national and regional efforts at technology assessment have to be publicly funded so that all parties share both the costs and benefits of the information.

22. One way of providing a focal point for information gathering is to develop a national program for medical technology assessment and establish a body to manage and implement this program. (Details for development of a

National Medical Technology Assessment Council are discussed in Annex Chapter 7.) This agency would identify new and emerging technologies, select important technologies for careful assessment, fund certain clinical and economic evaluation, synthesize and disseminate available information, provide liaison with international agencies making similar efforts in this field in other countries, and act as a general information clearing house to China's health planners, hospital and doctors. One important, early role for the Council would be to stimulate the collection of data on technology in use in China.

23. Obvious members of such a Council could include agencies of the Ministry of Public Health (MOPH), the State Pharmaceutical Administration (SPAC), the State Science and Technology Commission, the State Planning and Price Commissions, and the PLA medical institutions. Knowledgeable medical specialists and research experts would also be needed. Because provincial governments would be among the major consumers of the information, their representation on such a council is probably appropriate.

24. A program for technology assessment would need both money and staff, although much of the work could be done in research centers, such as major universities. However, academic researchers often have a poor understanding of the needs of policy makers. A core (permanent, technical/economic) staff is important to give direction to the researchers and interpret the assessment results.

25. Linking education to technology assessment will also be important. All higher-level medical students should be taught the basics of technology assessment so that they begin to think in terms of costs and effectiveness of their actions, and continuing education for physicians should include an introduction to principles of technology assessment. The NMTAC could ensure use of appropriate course materials and serve as the national resource center for such information.

26. While this is underway, China needs to address itself to the second question, which has been alluded to in various parts of this report. The present health care system in China does not include incentives for either appropriate adoption or utilization of technology. Almost all aspects of the present system reinforce tendencies toward technological expansion without regard to efficacy or effectiveness. The public, the health care providers, the policymakers, the drug manufacturers, and administrators all see such expansion as being desirable. Only a few voices caution about problems of excessive use of some high technology devices or about growing problems of mal-distribution and inequitable management of technological services. Policy options (dealt with elsewhere in this report) to reverse these trends and begin to constrain costs are complex and multifaceted; their implementation will take experimentation and time.

CHAPTER 8 - HEALTH MANPOWER: RESOURCES, NEEDS AND PRIORITIES

1. China has received justifiably high praise for showing how a populous, very low-income country can in a remarkably short time reduce death rates nearly to those now found in the industrialized world. This success was attained in part through the innovative (and rather unconventional) deployment of its human resources. However, it is not at all clear that China's future health needs will be best served by further development and deployment of health manpower along the hospital-intensive lines of staffing (see Chapter 6) followed by many other countries that have entered the health transition.

2. The health transition in China is creating the need for policy choices about the emphasis in strategy to be given to treatment versus prevention programs, individual versus group orientation of the health delivery system, institution-based versus community-based care, "sophisticated" technologies versus "appropriate" technologies, and urban versus rural health needs. Most industrialized countries have emphasized the former choices, and there will be strong pressures from the health professions and from the urban and more prosperous rural populations for China to follow this route--financial reforms have already weakened China's ability to take a preventive, appropriate-technology orientation. By making individual health institutions (and levels of government) financially responsible for their own health programs, the higher-level authorities have lost some of their power to direct institutional priorities.

3. The alternatives that China faces in this situation with regard to health manpower development are striking in their differences and may call for some resumption of higher-level influence over the pace and direction of developments.

A. Manpower Training

4. During the twentieth century China has passed through four phases in its training of health manpower:

- pre-1949, a tiny number of highly trained doctors serving urban elites, and the balance of the population using traditional Chinese medicine (TCM);
- from 1949-mid 1950s, a consolidation of small medical schools, transfer of some schools to remote areas, a rapid expansion of output of all health manpower categories, development of a unified entrance exam and unified curricula with some lowering of entrance and course requirements, the introduction of formal training programs in TCM, improvement of teaching conditions, and development of an assignment system for medical personnel;
- mid 1950s-latter 1970s, development of excessive rigidity in the curricula under influence of the Russian model of medical education, followed by much disruption of formal training programs

due to the Great Leap Forward and the Cultural Revolution, and a major expansion of informal or very short-term programs during the late 1960s ("barefoot doctor" period); and

- latter 1970s-present, a gradual restoration of quality and upgrading of formal training programs, much emphasis on upgrading lower-level personnel, and continued emphasis on quantity.

5. Levels of training and occupational categories. A great deal of heterogeneity characterizes the current demand for, distribution and skill levels of health manpower. While the discussion in this chapter is representative of the general situation. Considerable regional differences may exist and mandate slightly different approaches and timing of effort in different parts of the country. For example the stress on manpower quality improvement for the next 15 - 20 years mentioned at the end of this chapter needs tempering in some poor and western regions of China by a concerted effort at quantity expansion in the next 5 - 10 years.

6. Three levels of health workers are trained in China (see Annex Chapter 8 for a complete listing). High level personnel are trained in medical colleges, generally not affiliated with a university, or at universities offering a bachelor of medicine degree (for example, in public health, stomatology, TCM, etc.), with masters and doctoral degrees offered for specialization. Most medical college programs last at least five years, including an internship year. Some provincial and regional medical colleges offer three year programs. The MOPH has designated its own 13 medical universities plus their affiliated teaching hospitals and several other well established provincial colleges as "key" institutions. These medical universities have been given additional faculty and other teaching resources to help them provide leadership in the training of high level manpower.

7. Middle level personnel are trained in secondary level medical or "health" schools as assistant (or associate) doctors of Western medicine or TCM, of public health, or as nurses, technicians and assistant level pharmacists, stomatologists, and other such categories. Most secondary medical schools require at least nine years general school education (and sometimes 12 years) for admission. Most secondary level medical schools last three years though some require only two.

8. Primary level health workers include a variety of independent-practice and support-level personnel, ranging from the rural doctor upgraded from the "barefoot" category, to the village midwife, nurse aide, and assistant technician. This broad category of personnel generally has received 6-9 years of general schooling, perhaps some brief pre-service training, and varying amounts of in-service training and continuing education.

9. Manpower production. Estimates on the annual intake and output of China's many training institutions are approximate due both to the rapid changes that occur from year to year and to substantial local autonomy regarding enrollment. Tables 8.1, 8.2 and 8.3 provide estimates for recent years.

Table 8.1
Graduates of Secondary Health Schools by Speciality

1979-1986

Graduates	Number of Graduates in			
	1979	1980	1981	1986
Asst. Western Doctors	6,676	11,217	6,332	5,380
Asst. Doctors of Traditional Chinese Medicine	3,486	6,981	5,571	1,305
Nurses/Midwives	19,632	17,047	38,484	34,540
Asst. Doctors of Public Health	904	2,792	3,273	1,139
Asst. Pharmacists	1,400	3,234	1,820	2,604
Asst. Dentists	41	384	418	693
Techr.icians/Others	5,187	12,074	12,189	11,526
TOTALS	37,326	73,729	68,087	57,187

Source: Ministry of Public Health

10. China has gone through several major policy changes with regard to the orientation of its training programs. Prior to Liberation, China was influenced primarily by Western models of university and departmental organization and curriculum design. In medical education the U.S. experience was especially important, with the Rockefeller Foundation-supported Peking Union Medical College leading the way among medical schools. After Liberation, ties with the West were severed, and the period of Soviet influence began (see Annex Chapter 8 for more detail on China's adoption of the Soviet model and its effects).

11. Educational curricula for each of the major health careers have been developed by the MOPH based on the Soviet experience. At the university level the State Education Commission (SEdC) function to review and advise on curricula strengthened this trend. At the secondary school level the MOPH had primary influence. These curricula underwent minor revisions in the 1960s, became irrelevant during the turbulent years of the Cultural Revolution, and by 1978 the earlier norms were once again introduced with some minor revisions. Although still in effect in 1989, a major revision is under development (see Annex Chapter 8 for details). The guiding principal of the new norms is flexibility. The MOPH and SEdC seek to provide national guidance to the high-level medical colleges in designing their educational programs while leaving college deans the opportunity to adjust the details according to local conditions.

12. Curricula reform at the national level can facilitate but not guarantee improved teaching at the institutional level. Educational authorities point to their obvious resource limitations--lack of adequate classroom accommodations, audiovisual and reference materials, and qualified faculty--but for many an even more critical constraint is institutional resistance to change. Faculty/student ratios are for the most part generous, averaging around 1:6 or 1:7 for most higher level medical colleges. The challenge is to find ways to motivate both faculty and students to break long-established educational patterns that rely on lectures to large groups, memorization by rote, and light teaching in favor of research. The usual barriers to new ways

of thinking are compounded by vivid memories of the excesses of "educational reform" that occurred during the Cultural Revolution. Despite these problems, some encouraging developments are underway at various medical colleges and secondary health schools:

- campus-wide efforts to modernize the medical curriculum, to reduce duplication, to promote a more active student role in the learning process, to provide more electives and more time to take them, and to make greater use of audio-visual and self-instructional materials;
- development of full- and part-time continuing education programs in order to train new faculty and upgrade existing faculty skills;

Table 8.2
Medical Colleges, 1977-1981:
Institutions, Students, Enrollments and Graduates

	1977	1980	1981	1982	1984	1986
Number of Colleges	89	109	112	112	114	118
Number of Students	93,822	139,569	158,986	164,038	143,855	170,137
New Enrollees	34,932	31,277	29,241	29,486	33,278	40,647
Graduates	34,860	17,656	9,512	25,963	28,437	27,907
Traditional Medicine	5,332	3,069	1,071	4,268		
TOTALS	169,035	191,680	198,922	223,867	205,684	238,809

a/ In addition to these 112 medical colleges, there are four facilities of medicine in general universities.

b/ This reduction in number of graduates is the result of lengthening the program from three to five or six years.

Source: Ministry of Public Health

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- sister-institution relationships so that lower level training institutions can benefit from the special resources of higher level institutions;
 - creative arrangements to permit primary level personnel to upgrade their qualifications to the middle level;
 - Learning Resource Centers, which have been established at a few medical colleges to serve as regional resources for the development and dissemination of audio-visual materials;
 - establishment in a few medical colleges of education departments or institutes in order to promote innovations and conduct research on the process of medical education;

13. Nevertheless, the process of educational reform appears handicapped by the lack of:

- external domestic (budgetary) funds to promote innovation, such that most educational institutions must depend entirely on support from

internal (institutional) sources; this problem is compounded by the general scarcity of operational budgets to conduct and disseminate reforms, new practices and increase manpower effectiveness;

- skilled personnel and institutional mechanisms for evaluating the results of educational innovation. By 1987 some seven of China's 130 medical colleges had centers or institutes for the study of medical education, and at least 40 more had research units, though most of these were very small and staff skills were limited;
- mechanisms for sharing experience across institutional boundaries. Recent efforts to correct this problem have resulted in small-scale but encouraging initiatives such as the Journal of Higher Medical Education, the Journal of Chinese Medical Education Research, and the Society of Medical Education, which has had four annual meetings and operates under the auspices of the Chinese Medical Association.

Table 8.3
Medical Colleges - Estimates of Manpower Supply
1982-1990

Medical Colleges	Graduates expected in 1982	Graduates in 1985	Graduates expected in 1990
TOTAL	29,963 a/	29,190	42,919
Medicine	21,098	16,823	22,885
Public Health	1,183	1,345	2,510
Pharmacy	1,385	906	1,671
Pediatrics	266	558	776
Stomatology	462	571	1,079
Traditional Medicine	4,388	3,795	4,020
Traditional Pharmacology	917	648	1,423
Others	264	4,432	8,508
Nurse (High Level)*	-	112	756

a/ These numbers are usually high due to temporarily expanded enrollment in 1977/78.
* High School + 4-5 years in medical college, new career

Source: Ministry of Public Health

14. Specialization. Available manpower statistics provide approximate estimates of the number of doctors, nurses, etc., but little reliable information on the number of health care workers according to specialty. This is especially true of those many specialties (as many as 49) in both Western and traditional Chinese medicine that are acquired following undergraduate training, such as surgery, internal medicine, etc. Some specialties, most notably pediatrics, are in fact sub-specialties of another field (in the case of pediatrics it is taught within the department of medicine at most Chinese schools), thus further complicating data collection and interpretation. The trend toward detailed specialization started with Russian influence in the 1950s but a number of specialties have been added only in recent years. Two methods of pursuing specialization currently exist - as part of the normal medical school education and through a residency/study period following qualification in basic medical education. The latter approach probably offers China a number of advantages given the need to produce doctors today with a

basic education that equips them to cope with radically changing health care needs and technological change during their coming working years.

15. Despite the lack of specific data, several categories appear to be in very short supply, including:

- in public health, especially epidemiology, biostatistics, program planning, policy and evaluation, health administration, health services research, health education, and public health nursing;
- in medicine, especially the fields of emergency medicine, rehabilitation, gerontology, and mental health;
- in oral health, the current 1:100,000+ ratio of stomatologists to population essentially negates any program of oral health until many more students are graduated.

16. The extremely limited supply of oral health personnel warrants additional comment. Stomatologists are trained in a five-year program that includes both dentistry and maxillo-facial surgery, based on the Soviet model. This pattern would appear to be very wasteful of an extremely scarce resource. Good head and neck surgery requires both extensive surgical training and a sufficient case load to maintain proficiency--training and practice that are almost totally irrelevant to the requirements of good dental skills. Moreover, as was the case with medicine during the decades following Liberation, China should probably emphasize the training of middle-level oral health personnel during the next few decades rather than invest heavily in high-level personnel. As oral health will become a subject of much greater importance with the aging of the population (poor oral health is a leading cause of morbidity among the elderly in all developed countries), these topics deserve urgent and careful attention.

B. Manpower Deployment, Recruitment, Retention

17. Nursing roles, education and future prospects deserve particular attention. China is currently employing a particularly inefficient approach to nursing care, in effect delegating it "upward" to physicians rather than developing a skilled, professional nursing corps. Most nursing today is provided by secondary school graduates (about 40,000/year) who have only limited clinical and medical skills. Their functions in hospitals are too often confined to semi-skilled and housekeeping functions, with true nursing duties being assumed by some of the 27,000 secondary school doctors graduated annually. Only about 300 "university level" nurses are being produced annually now. Many of these eventually work abroad and remit earnings home because of the rigidities in the present system against them assuming higher levels of responsibility in patient management and hospital administration. A concentration on manpower quality on preventive strategies and on an ambulatory care approach as recommended in this report will require a watershed change in China's approach to nursing education, in-service training job functions, career prospects and physician attitudes. Overall cost of and efficiency in future health care will in part be a function of how successful or unsuccessful China is in developing and maintaining professional nursing.

18. Manpower deployment. Enormous improvements in the supply and quality of health personnel have taken place since the 1949 Liberation. Annex Chapter 8 provides data on quantitative and qualitative improvements in manpower supply. Manpower to population ratios have risen markedly despite a near doubling of the population. Table 8.4 shows how the supply of health care personnel has increased rapidly since 1949.

19. These data must be interpreted with considerable caution, however, due to:

- major fluctuations in supply statistics due to changing occupational definitions and the lack of a national credentialing system;
- high level of data aggregation, which makes it difficult to estimate supply according to such variables as urban/rural, employer, or type of work activity; and
- differences in terminology and ways of classifying occupations, which make it difficult in some cases to compare Chinese manpower data with that of other countries.

The concluding section of this chapter presents recommendations for the improvement of manpower and manpower statistics.

20. Manpower recruitment and retention. About all new health workers, except rural doctors, enter salaried employment, and the typical graduate of a health training program at any of the three levels is assured of a job, usually in a community near where he was trained. This situation may change significantly by the mid-1990s once the government no longer guarantees every graduate a job within his or her area of training. Most middle and lower-level employees have been remarkably long-staying in their jobs, primarily for reasons of custom, scarcity of jobs, and the difficulty of arranging transfers. In fact, most employees stay with the same employer throughout their working lives. The present system has the ability, through the location of training programs, to retain graduates even in less attractive regions, but it has the disadvantage of not being able to correct local and regional manpower imbalances.

21. Policies leading towards a greater liberalization of the job market and greater autonomy in setting wage policies will undoubtedly affect job retention and turnover rates for health care workers--and may affect health care quality and equity. Greater liberalization in the labor market will provide the opportunity for wage and benefit policies to be used to redress regional imbalances, but it seems likely that many of the most skilled personnel will be attracted to urban centers and higher-level institutions.

22. Wages for doctors and workers in health institutions are now set by the central government and adjusted to at least four regional scales that take into account geographic differences in income and cost-of-living. With only a bit more than a threefold spread from the lowest to the highest category, and less than a twofold spread from the lowest to the highest step, China has

Table 8.4
Number of Hospital Beds and Health Personnel,
By Type and Level (1949-1986)
 (Unit = 1,000)

Year	Total Beds	Total Hospital Beds	County level and above Beds	Nursing Homes Beds	Beds in Other Health Organizations
1949	85	80	80	4	1
1955	363	221	221	58	84
1960	977	655	600	107	215
1965	1,033	766	621	98	169
1970	1,262	1,105	712	48	109
1975	1,764	1,598	948	37	129
1980	2,184	1,982	1,982	68	134
1985	2,487	2,229	1,487	108	152
1986	2,563	2,297	1,559	111	155

Health Personnel

Year	Total a/ Personnel	Sub-total Technical Personnel	Sub-total Physicians	Drs. of Traditional Chinese Medicine	Drs. of Western Medicine	Ast. Dis. of Western Medicine	Nurses	General Health Personnel
1949	541	505	383	278	38	49	33	109
1955	1,053	874	500	332	70	98	107	287
1960	1,769	1,505	596	346	82	168	170	739
1965	1,872	1,532	763	321	189	253	235	534
1970	1,793	1,453	702	225	221	258	295	456
1975	2,594	2,057	876	229	293	358	380	799
1980	3,535	2,798	1,153	262	447	444	466	1,179
1985	4,313	3,410	1,413	336	602	472	638	1,359
1986	4,446	3,507	1,444	341	619	482	681	1,382

Source: Ministry of Public Health

attained, by Western standards, a remarkable degree of base salary equity. These amounts can be increased significantly, however, by supplements, bonuses, secondary employment income, vacations, and pension benefits, particularly if the institution is successful in earning substantial revenue. Hence there is a relation between current wage policy and institutional pursuit of revenue earning activity and the consequent growth of health care costs. In general, even with these tendencies, health workers' salaries and their total remuneration remain far behind the levels of earnings attainable in the agricultural and industrial sectors in recent years. Attrition of scarce health manpower, nurses and technicians in particular, is becoming a problem in some areas.

23. Manpower policy and planning. Almost all health manpower planning and policy formulation have been simple, pragmatic, and have displayed considerable ingenuity in using existing resources and building on strengths. However, manpower targets bear little relation to larger health objectives. Health manpower requirements are unduly linked to hospital planning; the bed/doctor ratio objectives have apparently not led planners to develop sub-

targets for service activities, service capacity, other personnel, or the attainment of distributional or productivity objectives. Nor have operating costs provided through the budget been examined in light of overall targets to determine if they are financially realistic.

24. China's "system" for health manpower planning and policy formulation has been, at least until recently, not very quantitative. Judged against a theoretical model of how planning should be done, China's methods will be found wanting. Past decisions appear to have been based more on guiding principles than on detailed analysis, yet except for the excesses of the Cultural Revolution, they seem to have produced generally good results. The key questions now are whether this approach will be sufficient to guide future policy and, if not, what alternative approach should be used. An overview for planning resources at the national level is outlined below. (Annex Chapter 8 describes in some detail how the manpower components of two plans were carried out.)

25. Planning units. Educational, or supply-side, planning is done by the State Education Commission (SEdC), which has several units of about 30-40 people concerned with all higher and secondary level education. A third unit is responsible for adult education, which includes part-time continuing education activities. An SEdC unit responsible for high level education has a five-person section that devotes exclusive attention to the health sector. The MOPH, which is concerned with the demand-side of the manpower equation, has several units that have some responsibilities related to health manpower, though there is no single person or unit that has this as a prime responsibility. There is no unified manpower planning system or responsibility in the current system. Annex Chapter 8 gives detailed information on the responsibilities of the various MOPH units. These include the Department of Finance and Planning, the Department of Medical Science and Education, and the State TCM Administration (STCMA).

26. Both the MOPH and the STCMA have some responsibilities for manpower data collection, but their capacity to do much data analysis or planning is limited.

27. Plan Implementation. The MOPH, SEdC and other national level institutions may find themselves increasingly constrained in their ability to promote the attainment of health manpower objectives, whatever their origin. National monies descend through the system to help fund training programs, but most of the decision-making for allocating these funds among the various career specialties is now at the provincial level or lower, even at the institutional level. Accordingly, the national level has no means for readily directing how many health workers of a given type should be trained in a particular region. Two areas, hospital staffing and educational programming, illustrate ways in which policies affecting manpower get translated into action.

28. Hospital staffing. The MOPH has a significant although indirect role with regard to hospital staffing. Starting in the late 1950s and largely based on Soviet standards, the MOPH developed hospital staffing standards linked to the number of beds. Neither staff densities nor inter-occupational

staff ratios have changed much since the 1950s. However, in 1978, recognizing that the standards had become outdated, the MOPH surveyed several hundred hospital directors for their suggestions on desirable staffing ratios. From that survey the 1978 (and still current) standards were devised. These provide for the following staff per bed ratios: 1.3-1.4 staff of all categories for hospitals of less than 300 beds; 1.4-1.5 for hospitals of 300 to 500 beds; 1.6-1.7 for hospitals of more than 500 beds; an additional staff increment of 12%-15% for hospitals affiliated with medical universities; and slightly higher staffing densities for TCM hospitals in recognition that they require more pharmacy staff and have both TCM and Western diagnostic services.

29. The revised standards are meant to provide staff for all in- and outpatient activities and include provision for administrative and other support staff. The standards further specify that "medical and technical staff", i.e. doctors, nurses, technicians, pharmacists and other professional support staff, should together represent approximately 70%-72% of all staff, and that within the medical staff category the allocations should divide approximately as follows: doctors, 25%; nursing staff, 50%; pharmacy staff, 8%; laboratory staff, 4.6%; radiology staff, 4.4%; all others, 8%. No recommendations have been made or are under consideration about the desirable distribution of medical and surgical specialties.

30. Several major realities have served to keep staffing densities at government hospitals either at or below the MOPH norms. First, before they are in operation, new hospitals must seek approval from the State Bureau of Institutional Staffing, with further input from the local Health Bureau and the Labor and Personnel Bureau, for their proposed budget and staff. These authorities, in the absence of other criteria or compelling arguments to the contrary, are usually opposed to any staffing density higher than the MOPH norms, and hospitals are understandably not anxious to apply for less staff. Since hospitals must submit their budget requests annually along with their statistics on use, staff complement, and vacancies, and since any significant upward change in the staff density without corresponding workload increases would be readily identified (and rejected), the MOPH staff ratio soon becomes a permanent reality.

31. The net effect is that the MOPH standards, even though not enforced at the national level, have had a remarkable ability to determine hospital staffing densities in the majority of China's hospitals.

32. Educational programming. Decisions about the size, number, distribution, and areas of specialization of health-related educational programs are made primarily at the provincial or sub-provincial levels, with the important exception of matters related to the MOPH's medical colleges and to the allocation of special funds by the SEDC. The main participants at the sub-national level are the (provincial) Educational Commission (which allocates educational monies), the Labor and Personnel Bureau (which advises on manpower priorities), and the Health Bureau. All three agencies are interested in health manpower issues but usually have neither the staff nor data necessary to make informed decisions on allocation of funds among the various health careers. Instead, they must rely on the advice of, or be subject to the pressures of, hospital administrators and medical educators.

33. In the case of the educators, the incentives are obvious: enrolling more students means more money (e.g. ¥1650 per additional student at a provincial medical university in 1986, about ¥2000 in 1989; key medical universities get a higher rate). Training of middle level health personnel also is funded mainly from budget provided by provincial and local levels of government. The SEDC provides budgetary resources for the higher level medical universities.

34. Sub-provincial authorities and individual institutions have shown considerable initiative in coping with manpower shortages unresolved by the formal educational system. A number of hospitals have established self-study, in-service or contractual arrangements with training institutions in order to upgrade their personnel or even, in some cases, to train entirely new staff outside the formal educational system. These arrangements are particularly common for upgrading nurse aides to nurses or for training technicians.

C. Perspectives for the Future

35. China's aging population and increasing prosperity will force it to confront policy choices that have major implications for health manpower. However, to make an informed choice, China must have a better sense of the alternatives. The balance of this chapter examines the possibilities for manpower development. As shown in the table below, estimates of future demand alternatives for health manpower have been made for four possible routes to improvement of health services, along with a baseline projection that would represent preservation of the status quo. (Annex Chapter 8 presents detailed information for these requirements projections; also tables Annex Chapter 8 include similar data for projections on supply of personnel.)

36. Each of the four options would result in substantial improvements in both staffing densities and in the ability to deliver health services; their implications for the nature of the delivery system--characteristics, costs, and the types of health problems addressed--are very different. Two broad paths, with many variants, can be proposed nevertheless:

37. The first path (encompassing both the "maximum" estimate and the "hospital emphasis" estimate--and the one that has been followed in many of the industrialized countries, gives primary emphasis to institution-based medical care, with high reliance on the application of technology. This path would require a rapid increase in the number of hospital beds, equipment, high level personnel, and a relatively higher ratio of nurses to doctors. It could, but does not necessarily, mean a policy favoring relatively larger hospitals and relatively greater emphasis on the urban population. As postulated, the high costs associated with this path would probably make achievement of a parallel development of preventive, ambulatory and extended care services difficult. To attain the service and staff densities proposed by the "hospital emphasis" and "maximum" projections would require a very heavy investment in training, and by 2025 nearly a trebling of manpower numbers over those required by the "baseline projection," (today's situation) to that time.

Table 8.5
Summary Projections to 2025 of Resources, Services and Personnel

	Base Year Estimates	Baseline Projection	Trends Projection	Hospital Emphasis	Ambulatory Emphasis	Maximum Projection
SERVICES AND RESOURCES						
Hospital discharges per 1000	40	40	70	90	70	100
Average length of stay	17	17	15	14	15	14
Bed turnovers per year	19	19	21.5	24.9	23.2	24.8
% of beds in small hospitals	34	34	34	26	31	33
% of long-stay & home beds	18	18	18	14	24	16
Number of discharges (000s)	41640	61480	107590	138330	107590	153700
Estimated bed-days per capita	.7	.7	1.1	1.2	1.1	1.4
Required beds (000s)	2191	3234	5005	5552	4629	6195
Required beds per 1000	2.1	21	3.3	3.6	3	4
Required hospital modules	137	276	428	367	365	504
Doctor & nurse visits per capita	2.2	2.2	3	4	5	5
Doctor & nurse visits (000,000s)	2290	2281	4611	6148	7685	7685
Percentage of visits in hospitals	66.7	67	76	65	40	57
Stomatologist visits per capita	.05	.05	.3	.4	.6	.7
Stomatologist visits (000,000s)	52	77	461	615	922	1076
PERSONNEL (000s)						
Doctors & asst. doctors	--	991	1699	2623	2165	3216
Nurses	--	959	1634	2333	1568	2772
Nurse aides	--	593	1033	1723	909	1851
Laboratory technicians	--	203	304	485	456	622
X-ray technicians	--	188	289	413	370	532
Pharmacists & asst. pharmacists	--	210	314	446	416	562
Administrators	--	339	539	699	551	825
Stomatologists & assistants	--	28	100	128	197	214
TOTALS						
Medical/tech. staff (000s)	--	3502	5894	8829	6608	10566
Population per health worker	--	439	260	174	233	145
Hosp-based staff/general bed	--	1.3/1.7	1.5/2.1	2.0/2.5	1.5/2.1	2.0/2.9
Nurses & nurse aides per doctor	--	1.6	1.6	1.5	1.1	1.4

Source: World Bank mission estimates

38. The second path (encompassing both the "trends" projection and the "ambulatory emphasis" projection) would place relatively more emphasis on the development of community, ambulatory and extended care services, though it would also allow major improvements in the provision of hospital services. The possible consequences of this path are best illustrated by the "ambulatory emphasis" projection. This alternative would likely require lower capital investment and operating costs, lower personnel requirements (not quite a doubling of the "baseline" equivalent), more patient contacts with the health system, and probably would call for a more nearly equal doctor to nurse ratio.

39. Either path could provide good, or wasteful, care just as either one could result in significant improvements in health status. Moreover, the

paths are not mutually exclusive but rather have to do with relative emphasis. However, and for a given level of expenditure, it appears that the Chinese people will be best served by a system that gives highest priority to keeping them healthy and treating them in the community, rather than one that by choice, or lack of other option, makes the hospital the primary locus of care. This conclusion is consistent with the findings of all earlier sections of this report and offers the best possibility for containment of future health care spending to reasonable levels.

40. The detailed manpower strategy for China to address the needs of an aging population will basically be determined by whether China can initiate an effective mix of preventive strategies with policies to ensure rationed, equitable and efficient curative services or whether it will subscribe to the predominant Western model of high technology, high cost services, and high reliance on institution-based care. Details of the strategy choices remain to be worked out, but for manpower development the logical main next steps seem clear. A number of forward looking development in the medical schools give some cause for optimism - curriculum for public health students has been revised to include introductory courses on a preventive strategy for chronic disease; community bases have been established in some areas to give students first hand experience with preventive approaches in a primary health care setting; pilot sites have been established to experiment with different approaches to teaching reforms to accelerate and enhance the learning process; there are changes underway amongst the staff in some schools to strengthen teaching of preventive approaches.

41. Quality and a Preventive Approach First. For the next 15-20 years (to 2005-2010), first priority should be on improving the overall quality of undergraduate training and especially on upgrading the qualifications of existing health personnel; significant quantitative improvements should be made in selected manpower categories, most notably nursing, technical, public health, oral health, and well-prepared administrators for health service "systems." These changes should be occurring in an environment where overall hospital numbers are reduced, average hospital size increased, aggregate hospital bed capacity gradually increased, hospital productivity improved, and staffing densities slightly improved. Major emphasis should be given to upgrading rural ambulatory services; public health resources should be increasingly shifted from communicable disease to chronic disease problems; and the statistical and institutional bases for improved planning need urgently to be developed. During this medium term, manpower strategy should aim for: a better numerical balance between the different levels of health manpower; qualitative improvements in all manpower categories, but especially at the nursing and technician levels; and significant improvements in the ability to monitor the health manpower situation and to do manpower planning. During this period key quantitative and qualitative constraints should also be addressed by remedying the current mal-distribution of manpower. The suggested reforms toward regional hospital ownership-management (Chapter 6) would facilitate this but there will also be a need for Provincial and MOPH efforts to reallocate some manpower between regions and provinces. To do this may require special funding and career development incentives so that present personnel system rigidities can be overcome.

42. Continuing professional education programs can play an important role in the quality improvement strategy. Correspondence courses now being offered by the Chinese Academy of Preventive Medicine provide an excellent example of innovative content and methods in such continuing education programs. Resistance to establishment and certification of such courses by the SEdC threatens to impede what should be one of the most important quality improvement elements in health manpower development. Concerns of the SEdC about proliferation of substandard, overly specialized courses in a number of technical fields may be justified "on average" but need to be applied with considerable discretion and vision to the health sector. Further, review of manpower strategy for the sector seems called for by SEdC and MOPH.

43. Quantity and Effective Care for the Longer Term. For the 15-20 years thereafter (2005-2025), renewed priority should be given to increasing the quantity of personnel so that major gains can be made in improving staffing densities as large numbers of people move into middle and old age (Table 4.1). However, increasing the quantity of manpower should be the focus of strategy only after a good balance has been attained among the various levels and after the quality of the existing supply has been substantially improved. Thus, continuing education and staff upgrading will have to receive priority. Continued improvements should be made in hospital productivity as well, especially in strengthening ambulatory care throughout the system. This latter is important as the only feasible way to guarantee equity within the system at an affordable cost. Prevention programs for chronic disease should continue to receive high priority. Long-term and home care services will need to be rapidly expanded and strengthened.

44. These recommendations are consistent with and imply changes in health system organization as discussed in Chapter 5. A regionalized system of health care (Chapter 6, Hospital Management) will make implementation of many of these changes more manageable and still allow for appropriate local variation.

45. Annex Chapter 8 elaborates on a more detailed possible sequence of logical, priority manpower development steps that China will need to take as part of its health strategy, assuming it gradually moves toward development of health regions as the focal point for planning and management, as suggested throughout this report.

CHAPTER 9 - HEALTH SECTOR EXPENDITURES AND FINANCES

1. China has received international recognition over the last several decades for its success in providing health services and disease prevention programs that were effective and low in cost, both to the consumer and to the economy. In part this was attributable to low costs of labor, and inexpensive investments in equipment and buildings. Priority in funding, manpower and political attention was given to disease prevention/health promotion as fundamental strategy elements.

2. In recent years, however, the rates of some chronic diseases may have been increasing moderately, and some infectious diseases that had been virtually eradicated are reappearing. In part these changes are a consequence of the health transition. However, a share of these changes also may be attributable to changes in spending patterns for health and in the sources of health financing. At the same time, it seems clear that prevention of premature illness from chronic disease has been largely neglected, even as spending for higher level hospitals and for new equipment for treatment of the chronic diseases has increased.

3. The Bank's 1984 health sector report devoted attention to determining the levels of health expenditures, their sources and composition. In light of the changing demographic and epidemiological situation, this chapter reviews current trends in sources and composition of financing and analyzes the dynamics of health expenditures, particularly with relevance to prevention and cost effectiveness in health care. The general picture that emerges raises questions about the impact of recent economic reforms on the health sector and whether these are compatible with a health strategy to address the disease burdens over the next half century. Current trends can be summarized as follows:

- Real, per capita health spending (from all sources) has been rising faster than overall economic growth (annual growth of health spending in real, per capita terms has averaged 11% compared to GDP growth of 8.7% during 1980-88);
- Public subsidies for health are increasing in absolute terms but are declining as a share of total health spending (from 30% in 1980 to 19% in 1988);
- Insurance payments are increasing absolutely but their relative shares may have declined from 53% to 41% (1980-88) and cover only about 20% of the population;
- Patient fees are increasing absolutely and as a share of total health expenditures (from 14% in 1980 to 36% in 1988), but may be unevenly distributed across the population, thereby raising questions of equity and access to health care for the most needy;

- An increasing share of health spending is accounted for by hospitals, and by treatment costs, rather than by prevention and health maintenance programs;
- Equipment purchases and new construction have been undertaken, with both public subsidies and health sector revenues, but with little apparent attention to future recurrent cost implications and with relative neglect of funding for disease prevention programs;
- Drug consumption seems to account for a high proportion of health expenditure and may point to the need for substantial changes in the drug industry, in the way drugs are priced, and in the way doctors and hospitals are paid.

4. Many of these trends in expenditure are directly linked to incentives provided by administrative system reforms and by incomplete price reforms from 1981 to the present. The most important factors are:

- Few insured consumers of health services have co-payment or deductible charges to discourage excessive consumption of services;
- Reforms intended to encourage resource mobilization and efficiency by requiring most health institutions to earn revenues sufficient to cover operational costs and some capital costs have resulted in "provider-encouraged" consumption of those health services on which a profit can be earned;
- Some prices are set well above costs and provide an incentive for hospitals and physicians to prescribe use of these services and items; other prices are well below cost and cause losses that discourage their use;
- Lack of effective referral and triage systems mean that fee-paying patients seek care from higher level facilities; these hospitals consequently have high utilization rates and therefore make additional plans for expansion, using the public investment budget;
- These reforms have also resulted in the redirection of some efforts away from basic prevention programs and toward revenue earning prevention activities. In some cases, basic preventive services can now be charged for in an attempt to encourage health workers to continue to provide preventive services;
- Few incentives exist at present in the health system for improvement of internal efficiency or greater cost effectiveness in providing service.

5. These trends may be signs that priorities for spending in health care are no longer as clear as they once were and that the increasing level of health expenditures may not have the impact on China's health status that once might have been expected.

6. Alternatives to continuation of the present trends hinge on whether the government decides to provide substantially greater levels of public subsidies for preventive health care, to remove some revenue earning incentives and pressures from health institutions and providers, to continue price reform in order to eliminate incentives for inappropriate use of technologies and drugs, to develop and experiment with a variety of risk sharing (insurance) programs, and to develop hospital management and hospital service evaluation systems to encourage greater internal efficiency and cost effectiveness, including alternatives to hospitalization. A broader educational background will be required for most physicians, with an emphasis on prevention, expanded use of less specialized health personnel, and gradual development of a public (social) consensus on priorities and methods for treatment and care of the chronically-ill, middle-aged and elderly population.

7. The trends and key issues summarized above are not widely understood in China, in part because of the lack of a consolidated system of tracking health expenditures and analyzing their composition and implications. Each of these trends and the key points surrounding its cause and effects are summarized in this chapter and are dealt with in detail in Annex Chapter 9 on the basis of estimates of consolidated health expenditure accounts.

A. The Health Financing System

8. The sources and channels of health financing in China are extremely varied and complex. They include both direct and indirect government spending, different types of insurance plans, and expenditures by industry, by collectives and by private practitioners and patients. (Annex Chart 9-1 shows in detail the many sources, flows, channels and users of recurrent and capital funding for health services). It is possible to make only estimates of total health expenditures in China--the government itself has no systematic estimate of total expenditures. This is complicated by the lack of any consolidated system of accounting and confusion over concepts and categories of expenditures^{1/}. Sources of health financing are disaggregated, and the agencies responsible for the different major sources do not routinely share data nor do they often aggregate data in a useable form.

9. The MOPH has traditionally kept accounts only of health expenditures funded from the public budget. With decentralization in recent years, the Provincial Finance Bureau now keeps these accounts, as most recurrent budget funding for all sectors is channeled through these bureaus. Data on

^{1/} For example, in addition to capital investments funded from the Planning Commissions, some expenditures for equipment are financed from the Finance Bureau's (nominally) recurrent budget allocations. Health institutions also sometimes use allocations for maintenance and depreciation to construct new buildings. Earnings of the institutions can be used for capital investment also, though on the books of the Finance Bureau and the institutions all of these expenditures are often accounted for as recurrent costs.

expenditures paid from insurance funds (from cooperatives, township and village enterprise accounts, and collectives) and patient payments are much more difficult to collect; only limited surveys exist for some of these sources. No reliable record of expenditures by purpose (drugs, diagnostic tests, etc.) is kept by any bureau.

10. However, it is possible to construct broad estimates of total health expenditure by source of financing and thus derive a rough approximation of costs by type of expenditure. Because of the importance and rapidly changing levels of health expenditures, establishment and implementation of a system of estimating total health costs by source, by type, by institution, by user, etc. should be a high priority for further research and development.

B. Sources of Health Financing

11. Government Budgets. Government has always provided an important share of health financing in China (Table 9.1). The capital investment share of publicly funded health expenditures has increased over time (until 1988), with the government budget financing most capital investment in the sector. A high rate of growth of the capital investment budget in recent years, relative to recurrent funding through the budget (16% compared to 12% annual growth rate, respectively, for 1980-88), may cause further acceleration of future recurrent expenditures. Capital investment in health facilities and equipment usually requires subsequent annual recurrent budget outlays of 15% or more of their purchase price for their continued use or operation. Continued higher growth in capital investment relative to recurrent expenditures has added to escalation of health sector costs in other developing countries and, as shown below, may explain partly why recurrent expenditures financed from non-budget sources in China have grown so quickly.

12. Only a portion of recurrent costs are financed from the public health budget, mainly staff salaries in the health bureaus, in public hospitals and other public health institutions, but not for rural doctors, who are essentially fee-for-service practitioners. The recurrent budget (through the Finance Bureau) also finances some equipment purchases and construction, but Planning Commission appropriations (national, provincial and local) cover most major investments. As a share of total health expenditures, the publicly funded portion has become less important, largely because most hospitals and other health institutions have been encouraged to become self-financing. This means increasing their earnings from fees for services. This movement away from greater public risk sharing to a fee-for-service system is consistent with the trends in other system reform in China.

13. The Insurance Systems. There are four main categories of health insurance in China today. (Details of the systems, their expenditures and coverage are in Annex Chapter 9).

- The Government Insurance System (GIS), which insures about 24 million civil servants (up from 16 million in 1980), but not their dependents; it requires no deductibles or co-payments.

Table 9.1
Estimated Health Sector Expenditures
(RMB millions - 1980 Constant Prices)

	1970	1980	1985	1987
Total	4621	12057	22964	30274
Insurance	2462	5998	9703	12490
Patient Fees	663	1701	5944	10884
Government Health Budget	1327	3586	6111	5727
(share of total)	29%	30%	27%	19%
Recurrent	924	2731	3836	4698
Capital	227	855	2276	1029
(as share of budget)	17%	24%	37%	18%
Other Sectors	218	820	1253	1221

Source: Ministry of Public Health, World Bank Staff Estimates. Recurrent budget data have been adjusted to eliminate approximate amount of capital investment financed through that channel. Recurrent data are thus slightly different from official accounts shown in Annex Table 9.2

- The Labor Insurance System (LIS), which provides compulsory coverage to about 75 million workers of state-owned enterprises and half the costs of medical care for their dependents; co-payment requirements, if any, are generally very low.
- Collectively-owned enterprise insurance schemes (covering a maximum of about 35 million workers and township and village enterprise schemes (covering perhaps 49 million workers have grown rapidly in the last few years; and
- Remnants of the old commune insurance system and a number of experimental mutual insurance systems or societies all over China.

14. Collective and mutual insurance systems provide a lower level of coverage, and they vary in the extent of coverage accorded to family members. The rates of reimbursement are generally much lower than in the GIS or formal LIS schemes. Lower reimbursement rates, some co-payment requirements, and ceilings on total amounts of payment help constrain costs and utilization while still providing some minimal measure of overall protection.

15. The labor pool and dependents covered by these various insurance arrangements appear to be about 20% of China's population. Another 10%-15% may have limited communal insurance coverage. However, this means there are about 800 million uninsured Chinese, whose access to health services and, increasingly, to disease prevention services depends on their ability to pay.

16. Patient fee payments are difficult to estimate and monitor as a source of health financing. For all practical purposes, all rural, primary health services are now provided on a fee basis. Rural doctors charge a small consultation fee and earn the bulk of their income from profits on the medicines they dispense. Uninsured patients also must pay the full fees charged by clinics, hospitals and other health service institutions (public, enterprise or military). Like everywhere else in the world, patients show a willingness to pay for good care, with strongly increased consumption of illness care services as incomes increase. Assessment of the level, trends and participation of self-paying patients is made more difficult where health cost control measures are being experimented with. In these areas, insured patients are known to present themselves for treatment without declaring their insurance status in order to save costs^{2/} and avoid physicians' over-prescription of diagnostic services, treatment, and drugs. These patients later seek reimbursement, but hospital books would show them as "self-paying" nevertheless.

17. What remains unclear is whether the shift in financing of some prevention services from the public budget to the patient is resulting in better public health. For those who can afford to pay for health care, this shift has mobilized additional resources for health and helped to increase the level of total health spending more rapidly than overall economic growth. It is uncertain, however, whether the less affluent continue to have about the same access to care as before, or whether there has been an overall deterioration in access to health services as a result of changes in the financing patterns. Detailed case studies of a number of areas in order to investigate these trends more carefully would be an important focus for further health policy research.

C. Levels, Trends and Comparisons in Health Spending.

18. Total health expenditures have been growing rapidly and at an increasing rate in recent years, in both real and current terms (Chart 9.1). Expenditures per capita (in constant 1980 prices) have increased about 500% in the last 20 years but still remain low in absolute terms at about ¥40 (US\$8.50 per person). Within the total, public health expenditures have grown more

^{2/} Some regions have attempted to establish a two tier pricing system for health services to avoid unnecessary cost escalation. Self-paid patients and those under the GIS system would be cared for a one set of prices. Those under the LIS and other systems would be cared for at rates approximately twice as high for some services. The intent was to reduce the burden on the public budget and to provide some cross-subsidy to protect the poor and uninsured. The predictable result was that some enterprises asked staff to report themselves as self-paying patients when they presented for care. Later, the staff would be reimbursed by the enterprise which would thus lower its overall health care bill. In some cases, workers are allowed to retain the money equivalent of entitlements if they do not exceed specified amounts. This also encourages disguising insured status among presenting patients.

slowly. As shown in Table 9.2 below, the general pattern of health financing during this decade has seen a reduction in the role of public subsidies for health and a sharply increased reliance on cost recovery through insurance payments and payments by patients. Cost recovery in China now approximates 82% compared to about 71% in 1980, probably the highest level for any low-income country. (Annex Chapter 9 presents detailed estimates of health expenditures by source of financing.)

Table 9.2
Health Expenditures - Approximate Annual Growth Rates, 1980-88

	Recurrent Costs	Capital Costs
Total Health Expenditures	18%	
Health Budget Expenditures	12%	16%
Government Insurance System	20%	
Labor Insurance System	14%	
Patient Fees	32%	

Source: Ministry of Public Health, World Bank Staff Estimates

19. Expenditures for meaningful disease prevention programs are mainly incurred by institutions specializing in disease prevention, such as the Anti-Epidemic and MCH Stations and are mainly funded from the public budget.^{3/} Prevention expenditures thus might be estimated to absorb about 15% of the public funding for health and less than only 2% of total health costs. This does not include preventive care expenditures in hospitals and in the township health centers which do receive subsidies for salaries and undertake some primary prevention work. However, it still represents an extraordinary shift in health strategy for a country that achieved nearly unprecedented health gains by a deliberate, simple strategy of large-scale publicly-funded disease prevention programs and nearly universal, publicly-funded illness care.

20. Health Expenditures in Relation to the Economy. Table 9.3 presents time series trends in China's health expenditures. Comparison with OECD countries are provided in Box 9.1. (and in more detail in Annex Table 9-5).

^{3/} Many primary level preventive services are mainly provided by the rural doctors and village clinics (and street clinics in urban areas) and delivery (but not vaccine) costs for immunization are now charged for in many areas as "communicable disease insurance" fees. Thus, even these services which used to be a public good are now being paid for privately.

Chart 9.1

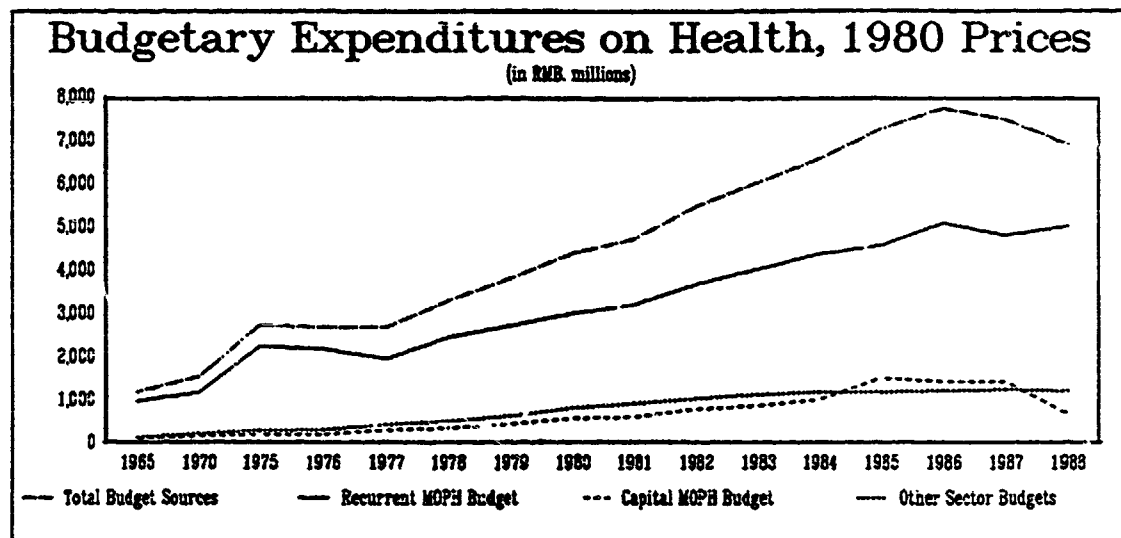
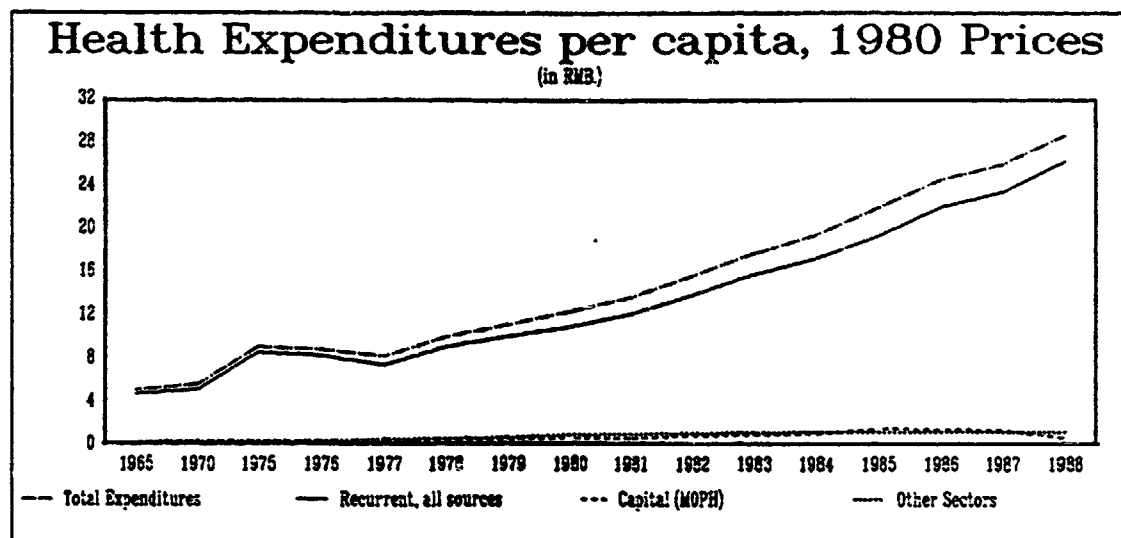
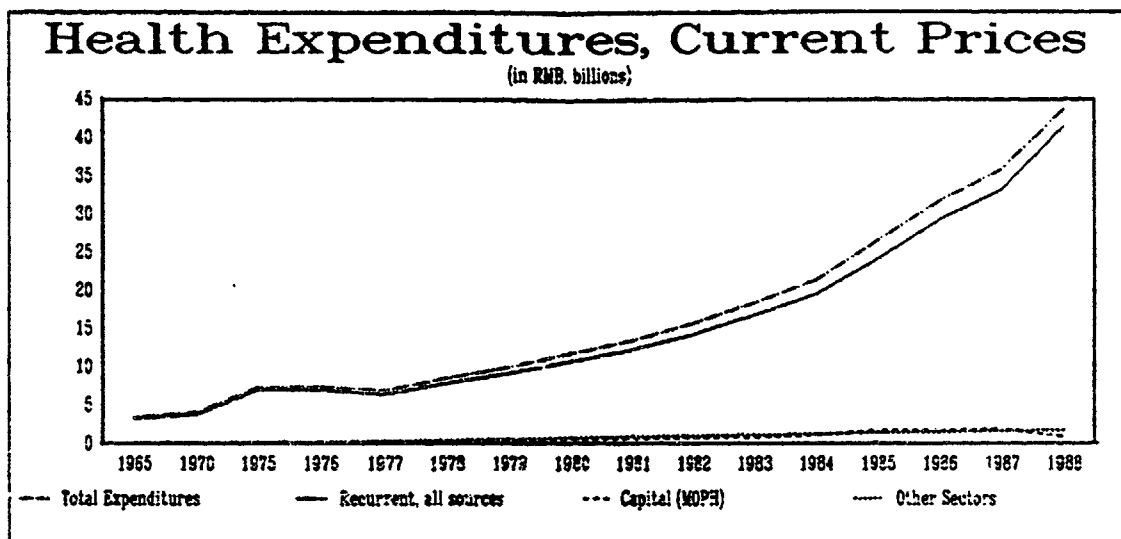


Table 9.3
Health Expenditure Ratios

	1965	1975	1980	1985	1987
	(in percent)				
Health Budget: Total Rec. Health Costs	28.0	28.0	28.0	23.0	18.0
Health Budget: Total Govt Budget	3.0	4.0	3.0	3.3	3.1
Health Budget: Gross Domestic Product	0.6	0.7	0.7	0.6	0.6
Total Health Costs: Gross Domestic Product	1.8	2.4	2.6	3.1	3.2

Source: Ministry of Public Health, World Bank Staff Estimates

21. The data for China's past performance are impressive. At face value, both the levels and the trend through 1980 would appear to be laudatory and signs of continuing commitment to important social goals. However, budget-funded expenditures for health are falling as a share of both total expenditures on health (-36% since 1980). Total health expenditures have been growing faster during 1980-88 (15.6% annually) than both total public expenditures (10.3% annually) or GDP (13.4% annually). As a public financier of its people's health, China now compares unfavorably to most OECD countries (except the U.S.), and in terms of controlling overall growth of health spending it seems to be following the path of the richer nations when faced with the growing chronic disease burden.

22. The balance of this Chapter examines the dynamics of the health financing problems China is facing and looks at the causes and possible solutions. Topics covered are:

- the changing shares the sources of total recurrent health expenditures and their implications;
- the relative growth in health expenditures in relation to the rest of the economy;
- the changing purposes of health expenditures;
- factors underlying the changing purposes of health expenditures: price incentives, financial decentralization, and adaptation of health institutions and workers to financial signals;
- the effects of decentralization in a partially reformed economic environment; and
- key future issues and options in health care finance.

Box 9.1
Comparisons with Other Countries
Financial Issues and Alternative Approaches

The OECD countries as a group are struggling with many of the same health financing issues as China. While they all devote more of their economic resources to health care than does China its proportion is already high for a poor country and it has increased sharply in recent years (see chart below). One of their most urgent tasks for all of these countries over the next decade is to make their health systems less costly and more effective. For none of the countries, nor for China, will it be easy - strongly vested professional, industrial and organizational interests are threatened. Paradoxes abound in the different aspects to be considered:

Medical practice is similar everywhere and technological advances diffuse quickly in all the countries, yet there are bigger differences among OECD countries in the organization and financing of health care than in perhaps any other field.

There is little connection between the amount a country spends and the health of its people. Improvements or deterioration usually stems from factors outside the field of health spending - changes in diets and smoking prevalence for example.

Though there are very different health systems, the questions faced are the same - how to achieve:

- financial discipline in health spending,
- adequate treatment for the poor and old,
- needed numbers of lower level health workers,
- enough attention to prevention of illness rather than striving to cope with its treatment.

In China demand is restrained mainly by the limits population. Those with insurance generally pay no deductibles. While China used to provide a high proportion of health care from public financing this has radically changed. Increased patient payments and insurance reimbursements now dwarf public expenditures. (See chart below. Note: For China, insurance payments are counted as private expenditures as they are a part of the basic wage package for most covered workers. In the selected OECD countries shown most insurance schemes are part of compulsory national insurance systems). The majority of people in China are not now insured and of these many are not wealthy enough to pay substantial costs for health care. While it cannot today be documented, social and health status inequities seem likely to have resulted from the demise of the previous nearly universal insurance system. All hospitals are publicly owned but with many characteristics induced by recent financial changes which cause them to operate with revenue and service orientations similar to private institutions. Patients can self-refer to the highest level hospitals and the sophistication and apparent quality of care correlates directly with hospital level. Physicians and hospitals often directly benefit financially from increased provision of care and have few incentives to economize.

Sweden provides a very high proportion of public financing of health care through taxes raised at the county level with supplemental funds from its general social insurance scheme. It has instituted relatively high co-payment requirements for beneficiaries to help control demand. Competition between public hospitals is being debated as a possible way to try to enforce efficiency. General practitioners are numerous and referral to specialists and to hospitals are very frequent. The system is run by local county councils which guard their autonomy against central incursions. Sweden is one of several OECD countries where health spending as a share of GDP has leveled off in recent years.

Germany spends less of its GDP on health than Sweden but has issues of equity and access. Compulsory social welfare insurance now absorbs about 13% of the wage bill. Wealthier, often the healthier, citizens opt out of public health care schemes. Their private insurance coverage provides better and more expensive care amid a system which may have too many doctors, too many hospital beds and too much medical equipment. Most doctors work on a fee for service basis and there are few constraints on provider induced spending. Federal efforts to control spending are having some effect but to the consternation of almost all the affected parties.

France also has a compulsory social insurance system but its operation is quite different. The state-paid share of medical costs (about 70% of the total) are supplemented by private insurance for many people and there are relatively high co-payment requirements for insured patients for most routine expenses. Despite the deterrent effect of high charges France spends a bigger and fast rising share of its wealth on health care than Germany. Providers are a main cause - doctors outside hospitals compete for customers, hospitals have few safeguards against tendencies toward cost escalation and stress "quality of care", much as today happens in some Chinese hospitals. France's recent adoption of DRG reimbursement systems to control hospital costs may begin to reverse this tendency.

Most European health systems are similar to one of these three models. Britain's National Health Service differs from Sweden's largely in being centrally (not locally) financed and run. Ireland, Denmark and Norway also pay for most health care from taxation and deliver it through publicly owned institutions. America is unusual in paying for over half its health care privately. Canada switched over to public financing in the early 1970s - which helped to contain its health care spending to 8.5% of GDP while America's has risen to over 11%.

The problems to be solved in finding a path toward health care rather than illness care are formidable. In all countries there is a severe lack of information about the costs, benefits and output of all health services. Incentives to more are still common in some systems doctors earn more money if they do more tests and provide more treatment; hospitals often have a financial interest in keeping patients in hospital as long as possible; physicians who want to justify new investments find that it helps to appear to be overloaded, even if that means inefficiency; people are having to pay more almost everywhere and while it is thought this helps to deter unnecessary use, it does little to discourage unnecessary or ineffectual provision of care as willingness to pay by the acute or chronically ill appears to bear little relation to cost.

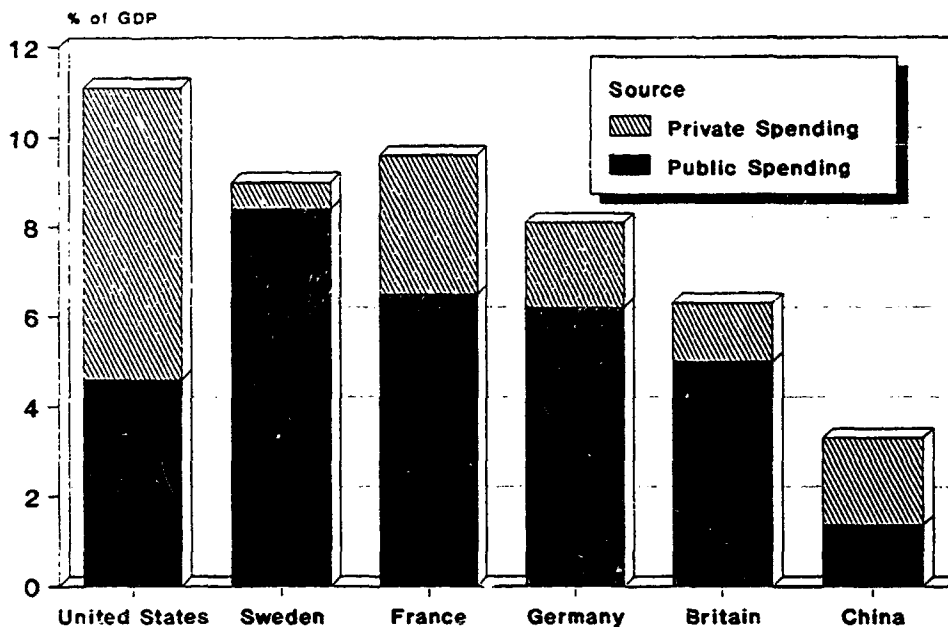
However, budget approaches based on case mix and reduced utilization are operative in a growing number of countries.

"Prevention" is widely discussed as being preferable to "treatment and cure" but is seldom backed up by budgets. "Preventive" instead of "treatment and cure" is a fallacy. The benefits of most prevention are generated in the future, while current morbidity requires care. A number of studies have clearly demonstrated that on average personal preventive care augments medical care

costs down the road (see L. Russell et al.) Prevention as needed in its own rights, for its benefits. The appropriate strategy thus is to develop prevention on top of treatment and cure. There are few examples in the world of well-funded public programs with long-term strategic goals of concentration on prevention and control of key disease, and their premature onset.

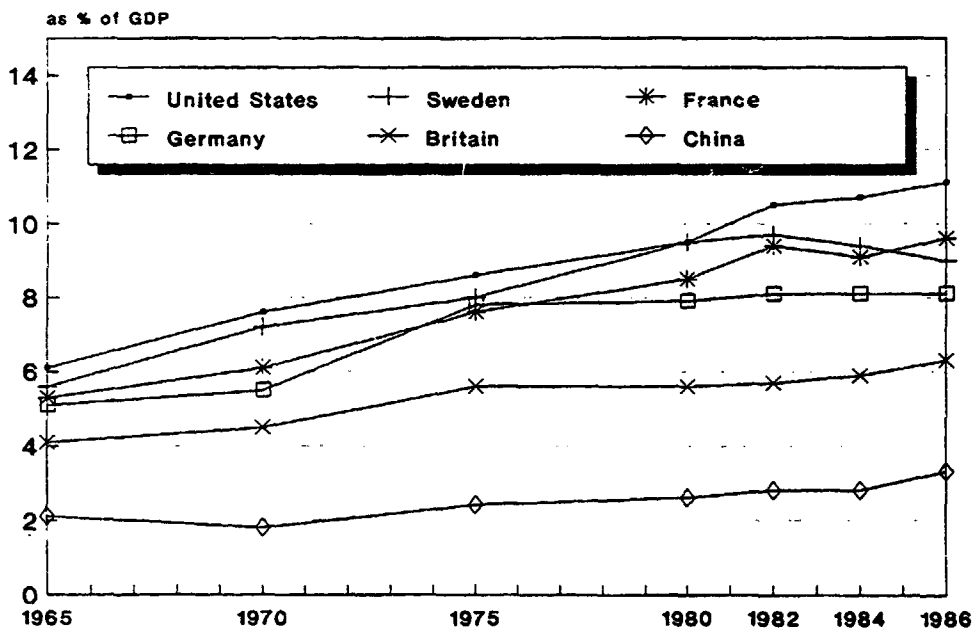
Examples abound of health systems which spend very large amounts to diagnose and treat illnesses about which little can be done. Answers to the questions of how to achieve strategic progress in controlling disease and ensuring the affordability of health care may depend on effective approaches being found in poor countries like China.

Spending on Health as a Share of GDP (1986)



Source: OECD, World Bank

Trends in Health Spending as shares of GDP



Source: OECD, World Bank

D. The Changing Shares

23. Chart 9.2 indicates the trends in the relative shares of total recurrent health expenditures accounted for by budgetary sources, by the GIS for civil servants, by labor insurance for enterprise workers, and by patient payments. The movements and their implications are complex. The first frame shows the trend and the levels of expenditure from each of the sources. The overall upward trend for each source looks encouraging in comparison to the experience in many other poor countries during the past decade. Labor insurance and patient fee payments account for the majority of recent growth, and these have the highest rates of growth.

24. The second frame of Chart 9.2 shows the shares of each source relative to estimated total recurrent health expenditures. Budgetary expenditures on health services and programs have been declining relative to other sources since 1980. Relatively few Chinese benefit from the formal insurance systems, and the shifts thus seem to reflect a skewing of health service provision away from the majority of the people.

25. The third frame demonstrates this point more clearly. It presents a picture of the trends in per capita health expenditure based on the assumption that only the uninsured benefit from recurrent budgetary expenditures and patient payment expenditures. Insured people are benefitting from an absolutely greater amount of health care in recent years. Uninsured people would appear to receive substantially fewer health services.

26. Another expression of the trends is that insured people are consuming an excessive share of health services relative to those who are uninsured. It appears that physicians and hospitals have not hesitated to provide as much care to insured people as the market (i.e. the insurance funds) would pay for.

27. In relation to the relatively greater rate of growth in capital expenditures noted in Chart 9.1, it would appear that health institutions and local governments (through their capital development budgets) have mainly been investing in increased capacity to serve the insured. The high average per capita insurance growth rates (about 15% annually for both GIS and LIS) could be interpreted to explain the financing of the recurrent cost consequences of the capital expenditure growth. This implies a move away from China's principles of equity and social care.

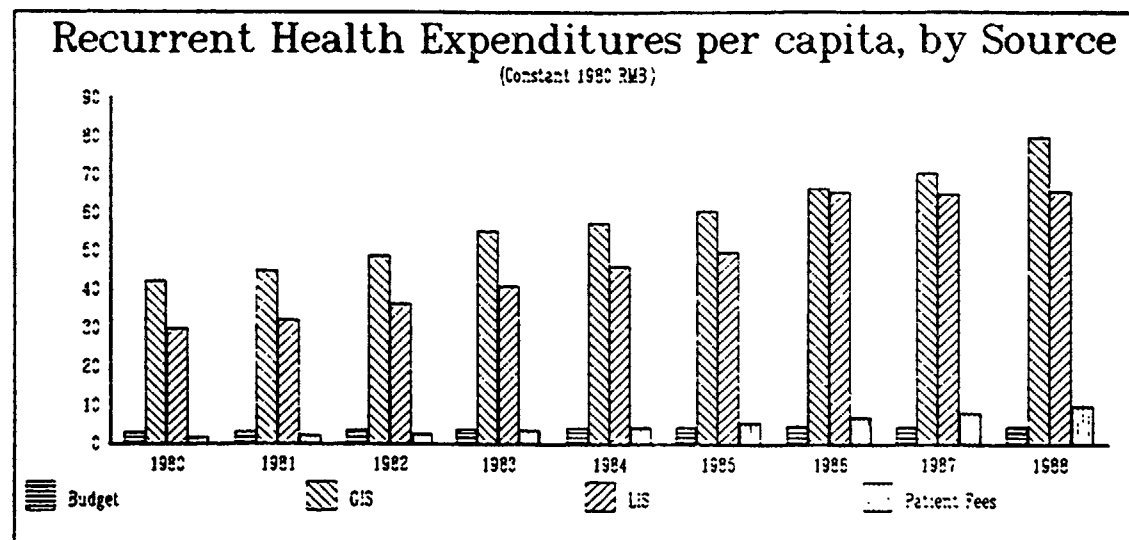
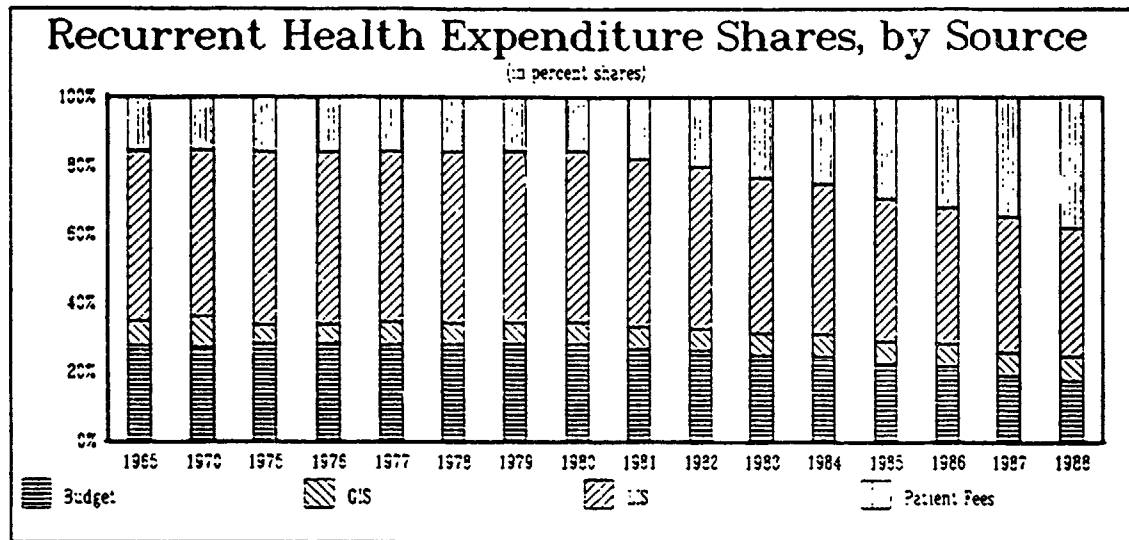
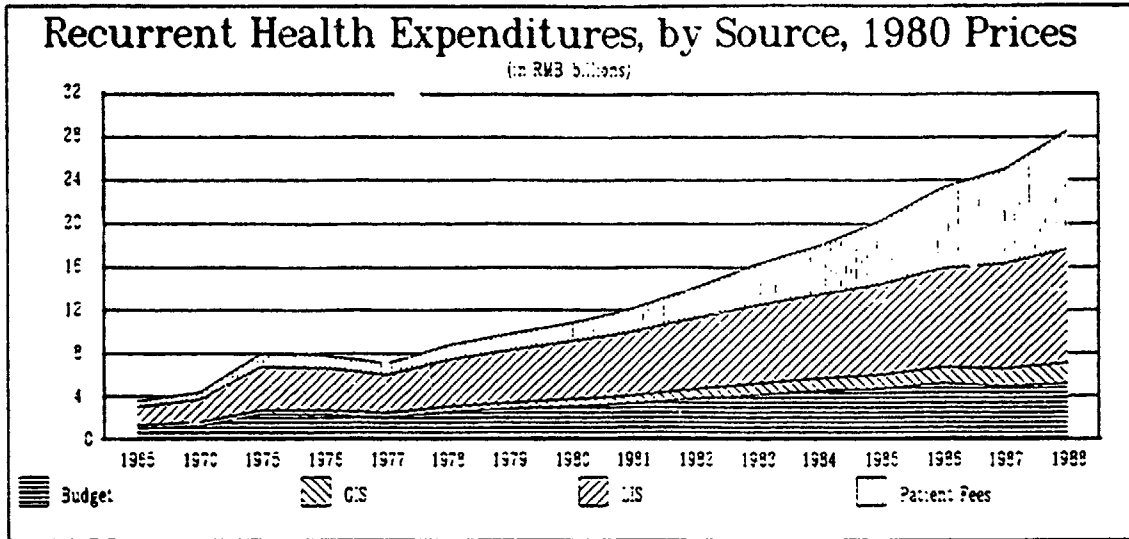
E. Relative Growth of Health Expenditures

28. The first frame of Chart 9.3 shows the per capita, real, annual rates of growth in total health expenditures, in the health budget, and in approximate GDP.^{4/} Over the last decade, health expenditures and the health budget have in general grown considerably faster than GDP, meaning that the share of total income absorbed by the health sector has gradually grown at the expense of other sectors (see Chapter 4 for a discussion of the four main factors that create pressures on the growth rate of health expenditures).

29. Management of the growing relative share of resources to health thus far has not been smooth, and probably has not even been recognized by many policymakers in China because of the lack of consolidated information on

^{4/} The non-economist reader should note that all data have been adjusted for the effects of inflation and for population growth.

Chart 9.2



expenditures. The second frame of Chart 9.3 shows the annual percentage difference in growth rates between total health expenditures and GDP, and between the public health budget and GDP. Points above zero indicate more rapid growth than GDP growth; below the line indicates slower than GDP growth. Zero percent annual difference would indicate that health expenditures and GDP were growing at the same rate. No particular rate of growth difference between health expenditures and GDP can be said to be correct or better, as these considerations depend on a society's financial and health objectives. However, it is certainly not appropriate to have such wide and inconsistent swings, which indicate weaknesses in planning and control of overall demand and supply in the system. Substitution of private and insured spending for public budget spending is clearly visible in this graph and implies adverse trends for equity and declining attention to "public prevention programs."

30. Such sudden shifts in growth are particularly inappropriate in a sector where prices for essential services are quite inelastic and where building, equipment and manpower investments are by nature long-term and relatively inflexible. These oscillations translate at the local level into a concern with meeting short-term health demands and objectives, haphazard and inefficient investment decisions, and a neglect of basic long-term activities with predominantly recurrent costs (a characteristic of most good disease prevention programs). Instead of developing cost-efficient institutions and strategies to meet medium and long-term health needs, administrators plagued with such spending swings naturally try to compensate--by (i) maintaining a "shopping list," even if its contents are not well-considered and integrated into a logical longer-term plan, to absorb funds when they are available, and (ii) stressing revenue earning by all institutions and departments so they can sustain themselves through lean periods. These two reactions are visible throughout Chinese health institutions today and exacerbate the pressures for yet further growth in health expenditures. Put simply, the inadequate recurrent budgets, the present planning process itself and the decentralized management and pricing policies that have been put in place since the early 1980s are the major causes of the cost escalation problems now confronting the health system.

F. Changing Purposes of Health Expenditures.

31. Annex Table 9-4 shows China's public health budget expenditures (not including capital investment) for 1979 through 1987 by province. Notable features include the increasing share of the budget claimed by higher level hospitals (38% in 1980, rising to 48% in 1987) and the decreasing share available to township level hospitals (23% in 1980, dropping to 18% in 1987) and the anti-epidemic stations (AES): >15%, 1980, dropping to <14% in 1985 and increasing only slightly by 1987.

32. These changing patterns reflect two things: (i) the health transition with, in partial consequence, the increasing demand for higher level hospital care for chronic diseases; and (ii) reduced resources available for disease prevention and health promotion activities, which usually are most effective at the lowest levels of the health system. The situation may be worse than these time series statistics for budgetary expenditures reveal. The review below of health expenditure patterns and institutional practices and behavior may help to illustrate this point and the apparent neglect of primary prevention as the fundamental plank of health strategy.

also have provided incentives that only exacerbate the situation (refer to discussion below). Given the influence of the population groups being served by these hospitals (civil servants, insured workers and wealthier peasants) this trend is unlikely to be redressed without central guidance and funding incentives.

34. Moreover, the interests of both health service providers and those who most frequently use their services coincide substantially in the present system. In a decentralized environment that stresses financial profits, there is virtually no restraint on these shared interests.

35. The Disease Prevention Institutions. Unfortunately, the same tendencies are visible in the disease prevention institutions in China's system. AES are in general making poor use of their labor and capital resources because they are under too much budgetary pressure to earn additional income. As a result, sizeable budgetary funding provided to them for preventive activities are ineffectively used while AES managers and staff concentrate their time, laboratory facilities, and equipment on local efforts to generate revenues for the AES (see Annex Chapter 9 for information on examples of ineffective AES activities).

36. The parts of the AES that work best are those for which regular program funding is available--most notably the childhood immunization activities. These have benefited not only from central government support but also from a considerable amount of external assistance in obtaining refrigeration equipment and supplies. Even these programs are now being starved for operational funds however, as part of financial decentralization. As a result, many regions are experimenting with so-called "immunization insurance" for childhood diseases.

37. Some areas respond well to the AES revenue earning effort. For example, parents are said to value what they pay for and hence to be more cooperative about getting their children immunized on schedule and ensuring that immunization records are current. In many urban areas, school and health authorities have combined efforts to encourage immunization by making it a condition for school or day-care enrollment. The earned funds provide incentives for AES staff as well, to encourage their productivity and undertake other programs. Officials point out that the revenue earning scheme also provides a way to pay rural doctors to carry out immunization work, which otherwise is uncompensated and detracts from their profitable patient treatment. On the whole, these may be good developments though data to assess the acceptability and effect of charging for immunizations is fragmentary. It

Box 9.2
Cost Escalation - Behavioral Patterns of Health Workers and Institutions

Provider-driven escalation of health costs is common today in China, as in various other countries. The reasons for it are two-fold: incentives at the health institution level to earn more revenue by providing more, and more expensive, services; incentives at the provider level to increase costs as one means of accruing funds from which bonuses can be paid to compensate for excessively low wage rates for the sector. The means by which health care providers accomplish this are found throughout the system (for example, see Box 9.3). Part of the incentive to do this is attributable to prices, which are set too high or low in relation to costs. But there are other, indirect reasons, too.

It is difficult to disaggregate the self-interest of providers from that of institutions on these matters. Often an institution's financial interest corresponds directly to the self-interest of its staff. The little labor mobility that exists is largely related to the expertise that workers can develop by becoming specialized in higher technology. Health workers' status, transfer and promotion prospects are thus partly linked to the sophistication of the services that their institution offers, and staff of an institution therefore have a natural interest in acquiring and using intensively the newest technology or medical procedures. To the extent that prices charged for using these technologies are above marginal cost to the institution, the institution itself makes a "profit," which is used for yet more sophisticated equipment purchases, or for

expansion, or to be paid into workers' welfare funds or given as incentives and bonuses.

The pricing issues are complicated by the fact that health institutions often receive equipment through the capital budget, or as gifts from well-meaning institutions and friends abroad. There are no incentives in the present financial system to account for the depreciation and maintenance expenses associated with using this equipment. The units thus see themselves as benefiting from its use whenever revenues exceed cash operating costs, and this spurs intensive use.

In reality the units are enjoying a significant economic subsidy and are depleting the capital stock that the budget transfers had been intended to provide them. Gifts of equipment from overseas Chinese, from commercial companies and from foundations have added to this problem. More experienced hospitals and researchers do not hesitate to use overseas connections and conferences to foster such donations. The costs to the economy, the images conveyed to the populace and doctors alike about what constitutes "good" health care, the longer-term hidden subsidies, and the signals conveyed throughout the health system by these pricing and gift phenomena do not bode well for China's prospects of future success in dealing with the issues presented in chapters 1 through 4 of this report.

would seem wise from a public health perspective, however, to be cautious in extending the practice of charging for immunization to low-income, remote and culturally different areas.

38. The AES is also responsible in most areas (with the local Patriotic Health Campaign Committee) for health education programs and for many kinds of disease prevention programs. With only a few local exceptions, these activities of the AES are starved for resources to the point of being inconsequential, but no other funding in the health system is earmarked for disease prevention and health education programs (see Annex Table 9-4).

39. In China, as in many other countries including the U.S., financing of prevention and education programs is often one of the last budgetary priorities and is subject to neglect in favor of "more urgent" curative and treatment programs. The lack of a guaranteed, adequate level of funding for disease education and prevention programs is one of the most serious, systemic problems facing the health sector. Experience around the world shows that if funding for these programs is left solely to local authorities, it inevitably results in long-term deterioration of the programs. If funding for these programs is primarily from the national budget, its priority and consistency

tend to be eroded by the budgetary claims of other sectors, except for short-term increases directly related to outbreaks of major diseases.^{5/}

40. Effective disease prevention and health education over a sustained period require a continuous, high-level, political commitment and a designated source of financing for prevention activities, not subject to annual budgetary reallocations.

G. Factors Underlying the Changing Purposes of Health Spending

41. The Role of Prices. China's present pricing system for medical services and technology (including drugs) is resulting in overuse and overcapacity of some medical services and technologies. The structure of the pricing system needs to be adjusted to become more neutral in relation to incentives for provision and use of services and technology.

42. China's policy is that prices for medical procedures should cover costs, not including basic salaries (which are covered by MOF recurrent health budget allocations). Sometimes the prices approved by local and provincial price bureaus appear to meet this principle, and sometimes the prices far exceed, or fall well short of the principle. Annex Chapter 7 provides a number of examples about the pricing of various medical services. These examples highlight a number of aspects of the way the health system is responding to price signals and to decentralization trends that emphasize financial profits at the level of the individual hospital. These tendencies help to explain why China's health care costs are increasing so rapidly and why fewer people are likely to be able to benefit from these services unless reforms are initiated.

43. Part of the problem China faces in applying the general principle that prices should cover costs is that uncertainty surrounds the concept of cost. There are capital costs for purchase and installation of equipment. There are recurrent costs associated with the ownership and use of the equipment. Recurrent costs include fixed costs (such as interest on debt, depreciation on equipment, salaries for permanent staff, etc.), which are the same from month to month whether the equipment is used or not; and there are variable costs (such as for electricity, reagents, films, spares and maintenance, etc.), which vary with use of the equipment. Some costs are real, in the sense that cash must be paid out to meet them (i.e. supplies, power, water or gas, etc.); other costs are notional or accounting costs, which may accrue on the financial statements but may not have to be paid out for many years, or not at all (i.e. depreciation).

44. The concept of costs is often further confused by uncertainty about whether prices should be sufficient to cover average costs, the average variable costs, or the marginal costs of performing a procedure, and so on. As China's financial system is rapidly evolving and as financial goals for

^{5/} The early 1988 outbreak of hepatitis A in China produced exactly the same kind of short-term response and high level political attention but no longer-term reform and responses.

welfare sector institutions are a subject of considerable debate everywhere, it is not surprising that lack of clarity and direction exists in China on these points.

45. Three broad categories of health service prices exist today: (i) prices that as a result of various historical factors have turned out to be clearly below costs; (ii) those that for similar reasons have ended up clearly above costs; and (iii) prices for drugs, which have always been deliberately set to allow for a profit.

46. Before the late 1950s, medical care prices were also set according to costs (there were still definitional problems). However, in the late 1950s, the Chinese government implemented a policy that health care should be seen as a social service for which cost recovery was not so important; the spirit of this policy led to reductions in prices three times during the 1950s. This action brought fees for technologies and services then in use well below costs, especially for registration fees, inpatient fees, surgical operation costs, and many medical care items.

47. The result of this policy was higher government subsidies to keep hospitals solvent. As part of overall price reform in 1985, prices for many items began to be increased, with the objective of eventually restoring them to approximately the 1952 "real" level (i.e. approximately the marginal cost of use). However, today prices for most of these "older" medical technologies, procedures and services are considerably below cost.

48. For new medical and diagnostic procedures, however, older price guidelines do not exist, and as it is difficult to establish what "costs" are, prices are often set by negotiation among the hospital, the local health bureau, and the local price bureau, based on "average costs" expected to be incurred. The most sensitive assumption in the setting of average cost (and thus price) is the number of times the service or technology will be used. In general, hospitals have an incentive to present their purchase plans and pricing requests based on projected moderate usage, with consequent moderate prices. In practice, the service or technology is extensively used, with resulting profit accruing to the hospital unit.

49. A number of new technologies have fees set above costs, the CT scanner being the most prominent example. Hospitals may keep a portion of the profits from operating a machine such as a CT scanner, and they use these funds to acquire additional equipment, which then further supplements their incomes.

50. As illustrated in a number of the case studies cited in Annex Chapter 7, some technologies tend to be used very intensively, probably far more than anticipated at the time when price approvals were given. This shows the problems and dangers inherent in trying to apply market pricing estimation techniques to services whose supply and demand are both controlled by the providers of the service. Just as in the West, escalating health insurance and patient-fee payments are the predictable result.

51. Pricing policy for drugs has deliberately been set to provide a modest profit margin to the hospital. Hospitals pay a controlled wholesale price for drugs and mark them up 10%-18% (13% on average). The mark-up is intended in theory to cover the costs of maintaining hospitals' inventory and preventing spoilage, for example. However, there appears to be an obvious incentive for over-prescription, and the very high percentage of national health expenditures going for drugs (perhaps 50%) seems to substantiate this. The de facto subsidization of the domestic drug industry by the health system, and by the insurance systems in particular, should be the subject of a thorough review by the Chinese government.

52. Obvious disadvantages of this pricing policy include: higher and accelerating health expenditures; increasing inequity between the poor and the insured; widespread and growing health problems created by polypharmacy and excessive use of some drugs; a skewing of attention away from primary prevention and toward treatment; and potentially excessive investment in the domestic drug industry to create capacity beyond that required if drug use were reduced to minimum, medically-justified needs. It is possible, of course, that if prices were lower and everyone had easy access to them, the same or even greater productive capacity would be needed. Obvious financial, but perhaps not economic, benefits of the current drug pricing policy include increased profits, employment, and justification for expansion in the domestic drug industry.

53. The State Price Commission is aware of the anomalies in the current pricing system for services and agrees that the situation is contrary to stated policy. (Problems inherent in the present pricing of drugs do not seem widely recognized, however.) The Commission is also concerned that prices truly set at the level of marginal costs may make health care inaccessible to more people, and it wishes to continue the philosophy that health care is a social service while encouraging cost-effectiveness in the services. Unfortunately, current arrangements and incentives in the system work strongly against both of these objectives. In the meantime, the Price Commission allows the situation to continue while it looks for an overall solution.

54. Today, the principle applied in most provinces seems to be that prices should be sufficient to cover recurrent costs (not including basic salaries) averaged over the number of procedures performed per year. The temptation of course is for health institutions to argue that they will use new equipment purchases very judiciously, thus yielding a higher average cost calculation. Prices for many newer items of technology are set well above the financial costs, with the result that there is a strong incentive to use them as intensively as market conditions will allow in order to earn financial profits for the institution. At the same time these prices are often low enough in relation to total capital and recurrent cost (including depreciation, debt and salaries) that China's economy is incurring a financial deficit by using this equipment (i.e., other parts of the economy are subsidizing hospital use of some technologies).

55. The solution to these pricing questions is easy in principle. China should price technology use (including equipment, drugs and hospital services

of all types, even beds) close to "marginal cost" net of items covered by the health budget, and thus make it "price neutral" for the health care provider. The profit or loss incurred by the hospital or doctor in using the technology should be so small that it will not influence the choice of technology, its duration, or intensity.

56. In fact, this simple solution implies very difficult changes. First, establishing the detailed information and level of understanding concerning the true nature of costs for different technologies in China will inevitably take a number of years and considerable development of cost accounting techniques in the health system. These are now rudimentary at best and thus badly constrain policymakers from dealing with the complex issues of pricing in relation to cost.

57. Second, the present funding system for hospitals depends heavily on their being able to profit from some technologies and drugs. Eliminating these profit margins would necessitate providing other sources of funding (from overall service income), which would risk worsening the equity of access and may create other problems of cost escalation similar to those experienced in many Western countries. Without a large-scale national insurance system for the majority of the people, this approach also would almost surely risk the hospital network's becoming an elitist system. Even with an insurance system there would be all the usual problems of constraining demand by establishing higher deductibles and development of a Disease Related Groups (DRG) pricing system or other rationing mechanism.

58. An alternative would be to price some services and technologies deliberately higher than marginal cost to subsidize those that are below cost. This approach would necessitate taking the "profits" from the individual hospitals and reallocating the subsidies among various parts of the health system in accordance with overall health and policy priorities--quite different from what China has chosen for the moment. No matter what approach is taken, consolidation of hospital management and revenues in a given health region would be a step in the right direction (see Chapter 6) as it removes incentives for competition among local hospitals to acquire the same "profitable" equipment and would allow cross-subsidies to lower-level units to help decongest higher level facilities.

59. Development of the information and management systems to make either of these approaches work would be a heavy task for China and could distract from the already serious problems of mounting an aggressive prevention strategy for the communicable and chronic diseases--i.e., it is obvious, though easily forgotten in the complexity of the situation, that it will clearly be in the best interests of both China's people and its economy if it can develop a good "health care" system rather than concentrating on developing a good "sickness care" system.

60. This implies that a third, perhaps preferable approach would be for China once again to decide that health care is indeed a "public responsibility" and that much of its costs need to be funded through the public budget, with subsidies derived from the economy at large rather than

from among the users of any particular hospital or health service (see Box 9.1). The level and composition of overall health expenditures would need to be decided in relation to the other priority claims on public resources, and those decisions should be made as concrete and transparent as possible. They should not be allowed to occur, and to grow out of control as they now are, through a series of relatively hidden transfers and subsidies (the labor insurance system, for example) in a way where expenditures cannot be judged in relation to needs and effectiveness. Such an approach would necessitate a significant increase in the budget for health (though not necessarily for overall resource flows) and an improvement in planning and control systems. It would also mandate development of new sources of revenue to finance the public health budget. As should be clear from Chapter 3, fees and taxes on tobacco appear to be a first, and preferred, choice as a source of such revenue.

61. Trends in growth of health expenditures, their composition and sources, are unlikely to change without a thorough reassessment of health needs and redefinition of objectives and strategy. Without this, over the medium term, health expenditures will probably grow rapidly until they absorb an unacceptable share of national income while providing benefits to only a fraction of the population. Inequities and strong institutional prerogatives will likely become more firmly established and difficult to change. The growing burden of chronic disease among an aging, increasingly urban population will probably result in yet further financial pressures on the health system which will detract from prevention and cause further escalation of spending.

H. The Effects of Decentralization in a Partially Reformed Economic Environment

62. Some part of the changing pattern of health expenditures and their increased growth relative to economic growth can also be attributed to the ongoing decentralization efforts in China. Decentralization has effectively removed the ability of central authorities to influence local expenditure patterns, and local authorities lack an adequate framework and experience to observe health expenditures overall and their long-run consequences.

63. Incentives to induce efficiency of resource use in health care are not reflected in the pricing and decentralization reforms. Provision of more services, meeting the demand for services, and the incentives of the financial responsibility system are more or less linked to expansion of capacity, not to enhanced efficiency and rationing of service (see Box 9.3). Serious consideration should be given to reestablishing mechanisms for policy direction from central and provincial levels of government, procedures for review and approval of capital investment plans, and some approvals over the use of health sector earnings.

64. With decentralization, the Ministry of Public Health, which has a better understanding of the long-term trends and their implications for China, has lost some of its influence at the provincial level and below. The MOPH has only input planning criteria (ratios of beds to populations, doctors to

population, standard lists of equipment for hospitals and AES of different size, etc.) to use as policy tools, largely inherited from the Soviet approach to health planning. In general, these are inappropriate planning and policy tools and tend to be misused at the local level because they generally strengthen the position of health institutions, which argue for increased investment, budgets and personnel.

65. For the future, the MOPH hopes to rely on a set of health laws or regulations to influence local authorities and institutions toward better planning, investment and programs. Experience elsewhere has shown that the legal framework provides a policy lever of only limited effectiveness for a central government to use to influence local governments and institutions in a quasi-federal environment. Without a return to some kind of direct budgetary policy levers (for financial influence), and perhaps some cooperative efforts by both MOF and MOPH to use fiscal tools to influence health sector spending it is very unlikely that China's central authorities will succeed in arresting the general escalation of health budgets as the health transition continues. The result is likely to be continued inflation of health costs, less equity of access and an erosion of the shares of GDP available for other sectors of the economy.

I. Key Future Issues and Options in Health Care Finance

66. The most important event of the last decade in the health sector for China was the implicit decision by non-health authorities, in implementation of the economic reforms, to make the health sector more dependent on cost recovery as the foundation for its financing. This process was initiated with the collapse of the commune system which had provided the source of much health care financing. The process accelerated with financial system reforms and decentralization policies which were accompanied by the failure of government at all levels to provide for new resource flows to the sector to pay for recurrent costs, including adequate salaries.

67. The macro-economic environment within which the health system had to operate was radically changed and became relatively hostile to social goals. It stressed competition, financial self-sufficiency at the institutional level and basically favored the so-called productive sectors. To cope with these changes, the Ministry of Public Health and provincial and local bureaus of health, initiated a wide range of policy changes within the sector. Many of these were well-intentioned efforts to improve efficiency and service. But they were also mainly attempts to mobilize needed resources for the sector. By and large these attempts have succeeded, but with unintended effects. Health sector expenditures have grown, but these efforts have created serious new problems and weakened the prospects of dealing with the difficult issues facing the sector in the future. To deal with the situation action and further study by Government is needed.

68. First, China needs to know reliably how much it is spending on health, from what sources, and for what purposes (i.e., types of services, inputs and diseases). Development of an accounting system to permit this on an ongoing

Box 9.3
Incentives Which Inflate Health Care Costs

At every level of health institution in China there is visible response to the opportunity for financial profits. One area where this is apparent is in use of medicines. The following are examples.

Health providers at all levels make a profit from the sale of both western and traditional Chinese medicines. Profit margins set by the price bureaux are 10 to 20% for western drugs and 15 to 25% for traditional drugs. This pricing structure puts into place clear incentives for over-prescription habits and polypharmacy behavior which poses health risks for the future.

It is common to find patients being treated with multiple antibiotics, in some cases quite inappropriately even by chinese prescribing norms. It is also common to find all doctors and hospitals, western and traditional, prescribing substantial amounts of traditional medicines along with western pharmaceuticals. The normal explanation for this practice is that patients demand and expect this, and it is helpful to the patient. Patient perceptions of good medical practice are usually influenced by what they are accustomed to and by what physicians have advised them. Years of multiple prescription habits have by now indeed created a patient demand and expectation which will be difficult to suppress. However, there appear to be two real reasons for polypharmacy practices and excessive prescription habits - i) weak clinical and laboratory skills which exacerbate poor diagnostic skills and encourage physicians to take a broad spectrum approach to prescriptions, and ii) substantial financial rewards from increased prescriptions of medicines.

Outpatients are frequently treated with intravenous drip infusions of glucose and a combination of antibiotics, vitamins and other drugs. When IV infusions are not available, injections of drugs are administered. For the most part, such intensive use of IV infusions, of injections, of intensive, multi-drug-multi-vitamin therapy does not constitute good, or justified, medical practice. While patients have now come to expect such practices and feel they may be getting value for their money by being infused or injected, a real, if not explicit, motivation for the practitioner is profit.

Hospitals and health clinics often "manufacture" for sale and profit a portion of their own supplies. Sterile water, glucose and saline solutions are examples. By using a glucose infusion laced with antibiotics, multivitamins and perhaps other therapeutics the hospitals not only profit from the sale of the pharmaceuticals but earn an even larger marginal profit on the IV solution and on the fee charged for administration of it. The incentives for use of injections is similar, a fee charge in addition to the medicine charge. In the case of rural doctors and

clinics it is common to find extremely small dosages of medicine prescribed or dispensed so that the patient has to return to the doctor in two or three days. A small additional fee can thus be earned by the doctor during the repeat visits and the overall profit on sale of medicine is the same. Doctors claim that it helps ensure rural patients complete their course of treatment and are adequately checked as they return to good health.

A similar situation prevails in institutions which sell traditional Chinese medicines. Some of these are relatively easy to compound and process and can be formulated and packaged in the hospital with minimal investment and training. It is common to find Western, and traditional Chinese medicine hospitals, with bulk stocks of traditional medicine raw materials. By simple mixing and packaging of these the hospital can increase the profit margin which it receives beyond the level inherent in the markup which it gets on the manufactured equivalent.

Interestingly, hospital administrators often explain these packaging operations as an attempt to control costs and reduce charges to poor patients. Traditional medicine manufacturers have in recent years been trying to enlarge market shares through innovative packaging techniques to attract the consumer and to encourage sales of more expensive items by the health institutions and physicians. Some traditional medicines are now commonly packaged in a wide range of containers ranging from decorative plastic glasses and vases, to thermos flasks, ladies travel cases and attractive food storage tins. Prices for products in these containers are substantially higher of course and the drug companies encourage, through higher marginal retail profits on these items, their sales to consumers. Some of these packaged items are dispensed to insured patients and help to explain a part of the escalating insurance bill - this in effect constitutes a subsidy paid from Ministry of Finance and enterprise labor insurance funds to the drug industry. Fancier packages are in theory not supposed to be sold through hospital pharmacies or charged against insurance but both practices seem to occur commonly and would be difficult to regulate.

Whether it is through sale of medicines and products packaged or produced in the hospital or through sale of pharmaceuticals acquired from manufacturers, the incentives is strong to increase volume of sales and sales of higher profit margin items in order to increase hospital revenues.

basis will take a decade or more, and in the meantime sample surveys and case studies will provide valuable insights into methodologies for data collection and assessment. This should be a priority area for research and development of the MOPH's programs.

69. Second, although encouragement of efficient and manageable forms of risk sharing is an obvious social priority about which the government is well aware, management of these in a decentralized system, with fairly firm requirements of financial self-sufficiency, will likely be a slow and difficult process. Development of a pluralistic, decentralized system of insurance plans would be extremely difficult and time consuming in any country, but given the pricing, financing and institutional behavior problems, will be particularly hard for China. Experiences with such systems in other countries have not often proven very satisfactory. Costs still escalate rapidly, vested interests of health institutions and providers still operate, the regulatory and accounting burden of such systems is high, and major segments of the population are often left unprotected by the systems. Most OECD nations have faced this choice and have instituted a form of national health insurance, often financed on a capitation basis. Even the United States may be moving closer to adopting such a system. It is remarkable that just at this time China has moved away from a relatively successful system and is experimenting with approaches that have proven complex and difficult to manage in even the best of circumstances.

70. A key question is whether it will be more practical, equitable and economical for China to return to some form of national health insurance, with greater central management of the plan and its benefits--and with full, public, risk sharing--than to depend on the health system's reacting to demands arising from changing income levels, epidemiology and demography. Otherwise, a long period of continued experimentation and development with accounting, costing and risk sharing systems is virtually inevitable.

71. On the basis of the broad information presented in this chapter, the MOPH may wish to commission a number of detailed surveys and studies to propose options for government to consider. Further efforts to define clearly the issues for consideration and to explore potential solutions are needed.

72. The key questions to be explored include:

- how to pay for primary prevention services; how to select which of these services to offer; how to ration access to them?
- how to pay for secondary prevention services that benefit the individual but also offer economic benefits (or loss avoidance) to the economy as a whole; how to evaluate which services should be offered and to whom?
- how to pay for treatment and care; which conditions and medical procedures fall into categories that all people should be entitled to; which conditions benefit only the individual so specifically and are so expensive or of so little efficacy that payment for them should be primarily the responsibility of the affected persons; how to provide risk sharing mechanisms for those who wish to protect against such conditions?

- which behaviors by individuals or industries create such significant future health burdens and economic losses that they need to be regulated or taxed in order to protect the public benefit for the future; who should pay, and how, for health costs that result from high risk behavior and practices by individuals and industries?
- how to pay for health maintenance care for the elderly; and how to provide and pay for the chronically and terminally ill among the elderly; which conditions can be effectively dealt with and how-- and which cannot?

There are no easy answers to these questions. Many countries are struggling to develop answers that match their ethical, social and economic objectives. While China will have to debate, experiment with and evaluate its own approaches to these questions, the themes explored throughout this report are likely to provide useful reference points:

- primary prevention is likely to be cheaper than any alternative for all diseases that can be prevented
- primary prevention must be started early and sustained, or its benefits are lost, or are much slower to materialize
- secondary prevention efforts must be approached with caution to ensure their priority and cost effectiveness
- all primary prevention programs, and many secondary prevention efforts, will be at risk of eventual collapse unless primarily and permanently funded from public sources, as recognized public goods
- many features of treatment, curative, rehabilitative and maintenance medical care share some features of public and private goods and benefits; some are cost effective and efficacious and others are not; institutions and procedures (and not reliance on market forces) will be necessary to keep these under constant review and to facilitate continuing public consensus on what should be provided and paid for and what should not, and from what sources.

73. It is important that planning and finance authorities at different levels of government recognize accurately the nature of the adverse changes in the health sector and thus, the remedies. Health sector spending growth was probably not too high overall during the last decade but it was inequitably distributed in favor of private and insured spending, much of it inherently ineffective and counter to social welfare. Budgetary spending growth was relatively too small and mainly misdirected because of the hostile macro-environment. What is needed for effective reform in the sector are macro-reforms to transfer a good share of present spending in the sector from private to public sources coupled with a wide range of internal sectoral reforms to favor prevention, control costs, and improve productivity and social welfare.

74. Planning and finance authorities should not interpret the contents of this chapter as a simple argument for reducing health spending or its rate of growth. Instead this chapter calls for a redistribution of spending, with more of it coming from public sources and aimed at public needs, as China used to do. The basic message is simple but sure to be unpopular with Ministries of Finance and Planning - allocate more resources from general or special revenues to the health sector, mainly for operational costs, and at the same time instruct the health sector to undertake reforms which stress prevention and discourage ineffective, illness-care spending, particularly from the private sector and insurance systems. Details of how to do this can be the topic of further study and research but to initiate the process, quickly, is important to avoid further deterioration and loss of previous socio-economic progress.