The Strategy of Health-Sector Planning

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In no other country has the role of health as both a means and an end of economic development been trumpeted so loudly and consistently as in the People's Republic of China. Yet health programs in other countries of the underdeveloped world have failed to effectively deliver health services to a large proportion of the population or to control many infectious and parasitic diseases for which well-developed preventive measures exist.[1]

Two questions emerge immediately. First, what was the strategy underlying China's health programs, and its role within the context of China's overall development program? Second, what has been the impact of these programs on the health of the Chinese people? Our focus shall be primarily on the first question.

Between 1949 and 1965 China's health policy paralleled that of many less-developed countries (LDCs) in terms of its bias in allocating both medical manpower and financial resources to the urban sector, rather than to the rural areas where the bulk of the Chinese population is concentrated, as is the case in many other LDCs. Shortages of both financial and medical manpower resources in these areas has created critical barriers to the development of a rural health network in most LDCs. How have the Chinese attacked this problem?

The Policy Environment of Health: The Rationale and Resource Constraints to an Emphasis on Health in the Chinese Development Strategy

The Chinese emphasis on health reflected both an awareness of its political significance for the maintenance and development of

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popular support for the regime, and a belief in its crucial role in facilitating and expanding the productivity of the economy. Better health is an end of development in and of itself. Reduction in child and maternal mortality, expansion of available health delivery services, and control of mass infectious diseases were important benefits to be expected from a revolutionary government. These benefits are "consumption goods" that must receive some attention, regardless of whether they also have some developmental impact.

The Chinese have placed equal stress on the importance of health as a component of their economic policies. Repeatedly in the statements of China's leadership one hears that "the firm guide of health work is to proceed from production, coordinate closely with production, and serve production."[2] Similarly, in the context of a China with a high dependent population under the age of fifteen, a

> . . . policy of health first is connected with our long range national interest and our national health. A student begins school at age seven and graduates after age twenty. If, during such a long period of time, attention is not given to his health it will affect the physical condition of the entire nation.[3]

Indeed one often finds a castigation of the so-called "dangerous bourgeois" view that health should be supplied only for health's sake.[4]

Yet the implications for policy of the linkages between health and economic development are vague. Should one divert investible resources from industry or agriculture to health? One may assert that investments in health lead to an expansion in an individual's lifetime productive capacity, or ultimately have positive effects on slowing the rate of population growth through reductions in child mortality, or reduce the consumption losses implied by early deaths. Nutritional programs may prevent irreversible brain damage and losses in individual productivity. Since the validity of these assertions and the magnitude of the purported linkages are still unproved for both health and economic planners, it is difficult to assert that the Chinese have explicitly or implicitly allocated resources to health strictly on a cost-benefit basis.[5]

Similarly, should the public sector at the provincial or central governmental level financially ensure an adequate level of health services to the population? In most LDCs virtually all rural health services, and a substantial proportion of urban services, are delivered within the public sector. This mix of private and public

sector responsibilities is not based on any firm theoretical delineation of the "public" and "private" components of health as a "commodity." Health has both investment and consumption characteristics and is of importance both to individuals and society.

It is a "public good" in the sense that man is in the transmission cycle of many infectious and parasitic-borne diseases. Thus an individual's actions and his personal health may affect the health and the utility of others. Likewise, society may derive social benefits, or prevent social losses, from the provision of better health for its members. Yet health is also a private good in that it is "consumed" by the individual, yields in large part its utility to the consumer, and is to a high degree not shared jointly with others. This justifies the individual's absorption of a certain proportion of the costs of providing better health. Society collectively absorbs a share of the costs in order to insure a socially adequate level of consumption of health services.

In most LDCs the commitment by the government to assure a minimal level of health facilities to the population becomes transformed into a financial commitment to bear the costs of these services. The effect is to place a substantial financial burden on the government's recurrent budget, and to ensure that the budgetary constraint limits the possibility for an expansion of such health services.

A problem confronting any policymaker is the determination of what constitutes "delivery" of this consumption good, "health." Is it manifested through popular feeling that immediate health needs have been satisfied? Is it manifested by a perception that the health of oneself and one's children is improved? Is the economic payoff to increments in the quality or quantity of health services greater where economic change is more apparent, viz. the urban-industrial centers? In the agricultural sector, where there may be a surplus of labor, does it really matter in terms of economic development whether an individual peasant's productive capacity is improved? Given the massive relative size of China's peasantry, and the limited financial and health resources available, would not a rural-oriented, egalitarian strategy spread these resources so thin as to vitiate any economic impact, while prejudicing high quality care for urban centers?

Should one emphasize the provision of maternal-child health care and nutrition programs, or the elimination of parasitic dis-

eases and curative services to reduce losses in work activity among active workers? What role should the commune or production team play relative to the central government in the financing and implementation of health programs?

The answers to some of these questions hinge on several critical assumptions about the role of health in the production of human capital that are not readily verifiable. Moreover the political weights attached to each group and, perhaps as important, the way in which the peasants and workers perceive the utility of health, crucially determine the relative allocative priorities of the political decision maker. If the mass of peasantry attach a high utility to the consumption of health, that is, to the availability of basic services, whether or not they receive sophisticated services, then regardless of the economic impact this may provide support for an "egalitarian" health policy.

Since 1949 one can observe a conflict, still not fully resolved, within Chinese policy-making circles as to the relative emphasis to be placed on the urban versus rural sectors, the proletariat versus the peasantry. The emphasis can be seen to vary over the last twenty years, paralleling the relative balance between agriculture and industry in national economic policy. The position of the pendulum has decisively affected the observed policies, primarily through its effect on the allocation of limited budgetary and manpower resources between the two sectors. Indeed the cyclical recurrence of tightness of budgetary constraints upon agriculture crucially shaped the feasible range of health policies in that sector.

Since the Cultural Revolution the stated emphasis of policy has been oriented towards the rural peasantry. Mao has stated that the goal of health policy should be

> to satisfy the medical need of the broad peasant masses and to change the public health appearance of the rural areas, as well as to provide material conditions for building the new socialist countryside.
> The peasant is the forerunner of the Chinese worker, the main factor of China's industrial market, the source of the Chinese army, the backbone force of China's democratic politics, and a major target of Chinese cultural movement.[6]

Policy Setting: 1949

In 1949 one facet of China's underdevelopment was the range and severity of the diseases that afflicted its population. Com-

municable diseases such as smallpox, tuberculosis, typhoid fever, shigellosis, kala-azar, schistosomiasis, and many others decimated the population.

The Japanese occupation and the civil war had disrupted agricultural and industrial production, causing extensive food shortages and consequent malnutrition beyond previous levels. China's infant mortality rate in 1949 ranged upwards of 200:1,000; even in Peking it was 117.6:1,000.[7] The crude mortality rate was at 25–30:1,000. Worth has estimated that 30 per cent of Chinese children died before the age of five.[8] The maternal mortality rate was at 2–3 per cent.

At the time of the revolution China's medical resources were meager in contrast to the medical needs of the population. Health facilities were staggeringly few: There were only 2,580 hospitals, with 84,000 beds, approximately 30 per cent of which were either privately or foreign owned. At least 70 per cent of these facilities were said to be in urban areas. Nationally there were approximately 6,550 persons per hospital bed; in the rural areas the ratio rose to 19,600.[9] The average *hsien*, comprising about 300,000 people, had only seven health "institutes," each averaging 7.8 beds. There were fewer than 400 health centers in rural China. C. Y. Cheng's paper on health manpower in this volume (p. 139) indicates that by any Western standards there were tremendous shortages of personnel at all levels, particularly in the rural areas. It is clear that there was negligible capacity to rapidly attack China's health problems with any substantive impact. To add to these constraints, China was heavily dependent on imports for the bulk of its modern pharmaceutical needs.

Policy Constraints

Despite the emphasis attached to an expanded health program by Chinese leaders, the magnitude of any effort in the health sector was severely constrained by two factors that are similar to those found in other LDCs. First, China was not a wealthy country: its per capita income in 1950 was approximately U.S. $50, and by 1966 it was no more than $130.[10] Second, the character of China's health effort was constrained by the limited priority attached to health relative to other competing sectors in the central government's development program, and by the allocation of this health budget between the urban and rural sectors.

Since there are no published statistics on the level of government expenditures in the health sector, one must fall back on secondary estimates (Table 1). During the period prior to 1966 not more than 16 per cent of central government resources were spent on "culture, education, science, social welfare, and public health." It is reasonable to assume that the first three accounted for the largest proportion—certainly above 75 per cent—because this sector included ever-mounting expenditures on nuclear research.

On the other hand, this may be an underestimate of the total social resources allocated to health. First, while a certain number of military or agricultural projects with health components may have been financed by the central government, they were probably not significant. Second, we have omitted expenditures made at the non-central-government level; we can obtain a crude estimate of the importance of this omission by examining the level of capital investments in health in the total economy (Table 1). Even if we were to assume that the ratio of capital investments to recurrent outlays was 10 per cent, which seems extremely low, in 1958 the level of total outlays on health would have been no more than 1,210 million yuan. If the level had risen at the same rate as total state outlays in the "health and other" sector, total health expenditures in 1966 would still have been less than 1,810 million yuan. As a proportion of the GNP in 1966 this would have been no more than 1.2 per cent;[11] as a proportion of state expenditures, health accounted for no more than 4 per cent. Table 2 lists comparable statistics for a set of other LDCs.

Assuming the above statistics are not severely underestimated, China's health allocations are not significantly above average—China has not supported its policy emphasis with unusually high expenditure per capita. Indeed it has been argued that one important motive for the decentralization of rural health services arising during the Cultural Revolution was to shift the cost of providing services from the central government to the communes.[12-14]

The gross inequalities between urban and rural areas in most LDCs were similarly observed in China prior to 1966. The formal structure of curative health facilities resembled a pyramid, with local dispensaries and health centers feeding into larger hospitals. Yet the distribution of these health institutions and the level and quality of their equipment, facilities, and personnel were highly skewed towards the urban areas, the apex of the pyramid. In the

Table 1. Allocation of Central Government Resources
(in million yuan)

Expenditure Category	*Final Accounts*					*Estimates*	
	Ratio—1954/57 %	*1958*	*Ratio* %	*1959*	*Ratio* %	*1966*	*Ratio* %
National economic construction	50–52	262.7	64.1	321.7	61.1	184.0	46.0
Culture, education, science, social welfare, and public health	15–16	43.5	10.6	58.6	11.1	64.1	16.0
National defense		50.0	12.2	58.0	11.0	85.0	21.3
Administrative expenses		22.7	5.6	29.0	5.5	22.0	5.5
Debts and foreign aid		11.8	2.9	13.2	2.5	20.0	5.0
Other		18.9	4.6	47.2	8.9	25.0	6.2
Total		409.6	100.0	527.7	100.0	400.0	100.0

Source: People's Republic of China, State Statistical Bureau, *Ten Great Years* (Peking: Foreign Languages Press, 1960); and Union Research Institute, *Communist China 1969* 1 (March 1968).

Table 2. Approximate Level of Government Expenditures on Health in Some Less Developed Countries

	GNP Per Capita—1965 (in U.S. Dollars)	*Government Health Expenditures as a Percentage of:* General Government Expenditures (1963–64) %	*Government Health Expenditures as a Percentage of:* GNP (1963–64) %	*Government Health Expenditures per Capita — 1963–64 (in U.S. Dollars)*
Indonesia	99	2.8	0.23	0.20
Nigeria	83	12.0	0.62	0.50
Thailand	126	3.4	0.5	0.60
Malawi	40	5.8	1.6	0.64
Sudan	95	4.8	1.07	1.02
Guatemala	300	9.1	0.78	2.36
Senegal	170	6.6	2.4	3.47
Colombia	277	11.0	1.26	3.5
Jamaica	460	11.0	2.08	9.6
Kenya	85	6.0	1.3	1.1
Tanzania	70	9.2	1.3	0.90
People's Republic of China (1966)	85–100	≥4.0	>1.2	≥0.99

Source: Combined from John Bryant, *Health and the Developing World* (Ithaca: Cornell University Press, 1969); International Bank for Reconstruction and Development, *World Tables 1968*, Mimeographed (Washington, D. C., 1970); and People's Republic of China, State Statistical Bureau, *Ten Great Years* (Peking: Foreign Languages Press, 1960).

rural areas accessibility to curative services was more a function of proximity and individual financial capacity than degree of medical need. Prior to 1958 only in the maternal-child health area can one find any modern medical curative programs geared to the rural areas. Not until 1965 do we find any blossoming of the commune curative health systems that began in 1958.

In some provinces upwards of 80 per cent of total government health expenditures were allocated to urban hospitals and clinics. This is further shown by the nature of the central government's budgetary responsibilities in the health sector, which encompass the financing of: (1) hospitals at the county level and, in large and medium cities, at the district level; (2) medical educational facilities; and (3) the manufacture and distribution of medical equipment, drugs, and supplies.[15]

Omitted are the costs for the bulk of preventive health campaigns, and for basic medical units in urban and rural areas. In the rural areas these were financed, if at all, at the commune or district level, and were obtained from "after-state tax" disposable income. This probably means that the financing of health was at best proportional, if not regressive.

This differential is further substantiated by C. Y. Cheng's study on medical manpower in this volume. From his statistics we have estimated the number of doctors per capita in the urban and rural areas, using the oft-quoted assertion that 60 to 80 per cent of China's medical manpower is located in the urban areas. The resulting ratios of doctors to population range from 1:7,640 to 1:15,400 in the rural areas, to 1:680 to 1:890 in the urban areas; in Kwantung Province the ratios range from 1:600 in Canton to 1:10,000 in the rural sector.[16]

In the formal structure of China's health policies we therefore find that the level of state resources allocated to health, and its distribution between urban and rural areas, would not appear favorable for the implementation of anything more than a skeletal rural health program. Yet throughout the postrevolution period, and increasingly after 1958, one observes a set of significant adaptations to this formal structure, based on the government's ability to mobilize and allocate effectively additional resources for health purposes. Prior to 1958 these adaptations occurred primarily on the preventive level; thereafter, an alternative strategy for curative health care began to emerge, which began to snowball only after 1965.

Preventive Health Strategy: 1949–1965

Prior to the Cultural Revolution the most significant innovations in China's health strategy occurred in the area of preventive health. There were two central elements to their policies. First, the Chinese were able to mobilize additional human resources for their preventive health program in what might be termed a "surplus labor absorption" strategy. Second, and more central, these resources were used directly in effective preventive health measures. This prevented any bottlenecks to a large-scale preventive health program arising from shortages of trained public health personnel.

To carry out this policy only minimal allocations were needed from the state budget; the chief burden could be transferred to the commune and individual levels. On the other hand, adaptations were needed among a much wider target group than would be true for organizational changes in institutions that fall more traditionally within the health sector. A mechanism capable of inducing an adequate level of individual and communal participation in health programs, often termed "moral" as opposed to "material" incentives, needed to be developed.

There were four specific components of China's preventive health program. First, the Chinese began to develop a basic preventive health infrastructure throughout the country, although it was more elaborate in the urban areas. The basic underpinning for this policy was provided by the state's investment in facilities to train a core of professional public health workers, and in a network of epidemic prevention centers located principally in the urban areas. These centers disseminated information on the means of containing the spread of infectious diseases, and managed mass immunization campaigns. With the elaboration of decentralized curative health networks in municipal areas—hospitals, work clinics, dispensaries—virtually all urban children were routinely immunized against smallpox, tuberculosis, and diphtheria.[17] In the rural areas, particularly in the principal villages, comparable institutions were far more skeletal and only childhood immunizations received the degree of financing from the state necessary to make the program moderately successful; the rural immunization rate was probably half that of the urban areas.

In certain cities there was evidence of active maternal and child health programs at the district level that sought out children and

mothers rather than let the provision of health be dependent on parental initiative. Some centers were said to combine curative and preventive work, systematically providing check-ups to children under age seven, and offering health education and family planning guidance to mothers. Whether these district and street health centers were available in all urban areas is not clear.[18]

This institutional infrastructure was complemented by extensive state investment in urban sewage systems and water supplies. Sewage treatment plants were set up, tapwater availability was expanded, and regular garbage collections were instituted. This engendered rural medical problems in that urban human waste was often transported for use in agriculture, which resulted in the transmission of various infectious diseases.[19] Such state-financed investment was not made in the rural areas, where it occurred far more gradually, if at all, and was dependent upon local and eventually communal financing.

Second, one observes the use of continuous social pressure to induce changes in individual behavior and attitudes toward personal hygiene, environmental sanitation, and nutrition.[20] Whether these behavioral changes occurred in the rural areas prior to 1965 is more uncertain. The relative difference in the success at the urban and rural levels was likely to be a function of the differential quality of curative health networks that existed prior to 1965. These provided a vehicle for health education that was particularly necessary among relatively uneducated workers or peasantry to insure that the linkage between a given set of individual actions and its effect on personal health was clearly understood.

Third, mass mobilizations of the labor force in short intensive campaign periods and the use of peasant public health teams provided both the resources and inputs critical to the program's success. In both rural and urban areas, however, prior to 1965 this preventive work through mass mobilization distinguished the Chinese experience from other LDCs. Throughout the period there were reports of short bursts of frenzied activity, lasting anywhere from a week to a month, against the various "villains" of health. Initially this involved mass immunization campaigns against smallpox and cholera. The patriotic campaigns against the purported American chemical-biological warfare during the Korean war involved mass extermination campaigns against the four pests—bedbugs, flies, mosquitoes, and rats—with extensive publicity given to

the numbers killed. In virtually all areas of China mass sanitation campaigns to dispose of garbage and manure and to clean the streets and homes appear to have been regular occurrences.[21-23] These action campaigns were extended to the repairing of water channels and road surfaces in order to destroy the breeding grounds of mosquitoes and flies.[24,25]

The campaigns also involved the use of what Salaff calls "community action and self-help" in mass *curative* services designed to attack one point in the transmission cycle of certain infectious and parasitic diseases.[26] At various times, medical teams were sent from the urban areas to train corps of medical workers drawn from the peasantry and proletariat in simple diagnostic and treatment methods and control procedures for a limited number of diseases. This approach was initially developed for an antisyphilis program, but such techniques have more recently been used in campaigns against schistosomiasis.[27,28]

A byproduct of these campaigns was the transmission of health information to the Chinese population. Salaff states that this approach had an "unknown, but undoubtedly great, influence on depressing the incidence of all diseases."[29] This is a critical prerequisite for any attempt to induce changes in individual behavior and attitudes toward disease problems.

There is both a political and an economic rationale to the use of mass action campaigns on so large a scale as was manifest in China. Mass campaigns for health purposes are politically safe vehicles for engendering popular support for collective social action and united effort. The same medical teams that lead the population in health campaigns or provide mass immunizations are in a crucial position to stress and disseminate the ideological message of the regime because they already have the trust of the people.

The Chinese consciously attempted to integrate the realization of health and agricultural objectives in the hope of economizing on the resources devoted to both sectors. For example, one aspect of the antischistosomiasis campaign was mass action work in developing irrigation networks and expanding cultivable farm acreage.[30] In the process of digging new irrigation canals and filling existing snail-infested canals, the snails that serve as the intermediate hosts could be uprooted and buried. Throughout the entire farming season, repeated emphasis was placed on increasing the consciousness of the peasantry to eliminate the snails.[31] Similarly,

various localities have mobilized half a million laboring people and some 200 tractors; thirty-one conservancy projects for elimination of snails have been started successfully.[32]

To the extent that this effort was focused on periods when there was a slackening in the level of agricultural work, it proved a relatively costless means of taking such preventive health action. To the extent it was combined with agricultural efforts, its cost was further reduced, thus effectively providing a productive outlet for surplus labor. The use of mass campaigns and community effort provided a model for the latter reforms implemented after 1965, both in preventive and curative health measures.

Furthermore, the emphasis on self-reliance and social mobilization as key ethics of socialist public health policy implies a strategy of resource allocation different from that commonly observed in the health policies of most LDCs. First, the Chinese government has emphasized that the primary burden of financing health measures must be borne out of the disposable incomes of those directly benefiting from them: the rural communes, production brigades, and production teams. Although the central government clearly subsidizes elements of the health program, this is not the budgetary constraint that fixes the level of the program. Both an ability at the local level to mobilize resources and the availability of resource allocational options are required to show the people enough health output to assure continued popular support for the resource burden. If the cost of public health programs proves high to the peasantry they will be less willing to pay the price.

This mode of resource mobilization is a classic strategy involving the mobilization of "surplus" labor. What is crucial in the Chinese strategy is less the fact that it is heavily labor intensive, which it obviously is, than that: (1) it implies a transfer of the burden of health activities to those whom it directly affects; and (2) the Chinese have found the institutional and organizational keys that allow them to use a labor-intensive strategy where so many other LDCs have tried and failed.[33]

The extent to which "surplus" is an appropriate term is unclear since either the individual or the society will usually bear some of the cost of this activity. Three examples may be cited: (1) If the peasant's marginal productivity is not zero during the period in which he is mobilized for health purposes, the commune clearly

faces a trade-off between present agricultural output and the output of health improvement, even though the latter may have dynamic implications for the former; (2) in slack seasons it involves a trade-off by the individual of the utility derived from leisuretime and that derived from his own improved health and that of his family and the community because of his actions; this may require the individual to recognize that his peers are similarly engaged; and (3) when the health input is realized by an individual's reorganization of the way he meets certain basic physiological needs, such as cooking fish rather than eating it raw, and defecating in a latrine rather than in a field. The cost is the lost utility arising from the period of adjustment to new habits. Of the three possible sources of surplus, only the first involves an explicit trade-off in output; the latter two clearly add to output.

In all three cases the resources are *not only mobilized* but *directly used for health purposes*. An alternative option might be to utilize these resources to generate a marketable output, the revenues from which could then be used to purchase specialized health sector inputs. In most LDCs the latter option is often adopted because the possibility of the former has not been recognized.

The Chinese strategy of self-reliance rests on the assumption that there are a range of health actions that can be taken by individuals or by rudimentarily trained personnel whose primary occupational focus lies outside the health sector. As can be seen in Table 3, many of the fundamental actions required to bring about a dramatic improvement in the health status of a rural peasant population require only a small input from advanced health sector personnel. Many of the major causes of mortality and morbidity at the time of the revolution could be dealt with on a preventive level, with only a minimal level of curative health infrastructure—health centers, hospitals, laboratories, and pharmaceutical supplies. They require improved environmental sanitation, changes in individual behavior with respect to personal hygiene and nutrition, control of certain disease-bearing insects or animals such as dogs, rats, fleas, bedbugs, and mosquitoes, a supply of simple drugs, and the minimal competence necessary to give mass inoculations. As a resource allocational strategy, concentration on mass preventive measures circumvents specialized manpower constraints by rationing their use to managerial and pedagogical purposes.

There is no intention to minimize the role played by the organ-

Table 3. Selected Major Diseases in China in 1949, and Chief Means of Attack

Smallpox	Vaccination
Diphtheria	Immunization
Tetanus	Immunization; maternal hygiene
Tuberculosis	Immunization; social improvement; case finding; and chemotherapy
Venereal disease	Social improvement; chemotherapy
Cholera	Environmental sanitation and personal hygiene
Typhoid fever	"
Shigellosis	"
Intestinal parasitism	"
Schistosomiasis	"
Typhus	"
Malaria	Eliminate breeding; kill infected mosquitoes; chemoprophylaxis and therapy
Some Other Problems:	
Malnutrition Maternal and infant mortality Heart diseases Cancer Mental diseases	Social improvement; education; trained personnel; and professional facilities

ized health sector, for it provides the critical input of an informational transmission mechanism to the peasantry. Most individuals in any society are ignorant of the "technology" of personal health, particularly if it involves the presence of parasitic organisms. This ignorance may inhibit an individual from allocating individual labor and financial resources in a manner that would rationally be in his and his family's self-interest. The individual's behavior must be predicated on his maintaining confidence that such activities are socially and personally significant. Over the long run the organized health sector must convince the people, through visible results, that the technology has tangible benefits.

Promotion of this type of "self-reliance" strategy is predicated on the ability to induce basic changes in an individual's allocation of labor, leisure, and financial resources. A factor of obviously critical

importance is the mechanism by which the Chinese were able to mobilize these campaigns (see Robert Chin's paper in this volume, p. 113). Winckler and Skinner noted a cycle in the choice of instruments used for inducing social action.[31] At various points in the cycle there was coercion, mass exhortation and propaganda, and remuneration. The relative emphasis on each of these in the health sector was critically determined by the target group involved. For example, one might have expected that a high degree of coercive pressure was required to achieve the resettlement of large numbers of medical professionals in the rural areas in the late 1960s, as well as for mass agricultural actions.

In concluding this section it should be noted that this type of preventive health strategy is inherently *limited* in its potential impact on the critical disease problems of a community. As one controls the major infectious diseases, the importance of trained personnel, sophisticated drugs, and proper facilities becomes more important—and more costly. Indeed the basic success of these preventive health programs will shift the central health problems to those for which these health sector inputs do become critical. One must point out, however, that success of the preventive health strategy may itself be limited by the degree of development of the curative health infrastructure.

Structural Changes in the Rural Curative Health Strategy

Despite the apparent inequality in allocation of state health funds between the urban and rural areas, the Chinese were nevertheless able to mount a substantial rural preventive health program. The budgetary inequality became most evident with respect to curative health services. Both in terms of manpower and budgetary resources, substantial inequalities on a per capita basis existed prior to 1965, and were not offset by any substantial, sustained effort by the commune to mobilize resources for these services. Indeed such an effort was not likely to have had a major impact given the high cost of curative services prior to the Cultural Revolution. What marks the Cultural Revolution is its impact on lowering this cost and increasing the financial feasibility of such services in rural areas.

The inadequacy of rural health services became apparent during the Cultural Revolution. As mobile medical teams from the urban areas returned from brief stints in the countryside, forums were

held to evaluate their experiences. These meetings were peppered with descriptions of the neglect of curative health services for the peasantry. They indicated extreme shortages of funds, equipment, personnel, facilities, and, equally important, an ignorance of the appropriate technology of medical care for use under such constrained circumstances.

For example, the average *hsien* of 300,000 people usually had no more than one major hospital with 100 to 200 beds. Furthermore, even though many communes constructed health centers during the Great Leap Forward, the level and quality of care was often extremely poor, and medical equipment to perform routine examinations was often lacking. Many examinations necessitated long journeys to the *hsien* hospital, journeys often rewarded by possible exacerbations of a patient's illness, loss of working time, and lengthy delays in obtaining both treatment and drugs. Such rewards often proved inadequate to induce people to seek them.[36] Most health centers had inadequate inpatient facilities; chronic understaffing and low quality personnel were common; and many had no doctors. Although most medical graduates were obligated to spend several years in the rural areas, this had only minor impact because of the magnitude of the need and the infrequency of any mobile medical work within the *hsien*. Moreover the most skilled medical graduates were usually sent to the urban areas, and the needs of the urban hospitals were sufficient to attract doctors after their stints in the rural areas.

Medical and pharmaceutical supplies were often unavailable, and even Chinese herbal drugs were frequently in short supply.[36] Many production brigades and teams were not readily accessible even to the commune health center, and this could not be offset, given the limited number of personnel;[37] home visits were infrequent and usually limited to maternity cases.

Perhaps as important as the shortage of funds and services was a basic ignorance of the most efficient and inexpensive means of organizing and treating the health needs of the rural population. An expansion in the level of budgetary support by the government was not likely. The high cost of modern forms of medical technology and medical care organization, in terms of budgetary costs and specialized manpower, was brought home to Chinese health planners after the initial forays of the mobile medical teams.

The modern or "Western" medical educational system transmits

a "decision process" for doctors that emphasizes the importance of increasing the probability of the correct diagnosis of a patient's illness by requiring complementary inputs to attain an ever-increasing degree of certainty. Although the normal medical doctor's experience and degree of perception allows for shortcuts and rationalizations of diagnostic and therapeutic procedures, there exists a basic hesitation to synthesize this ability in a way that can be used by lesser-trained personnel. Hence the basic specialization of medical function with low potential for substitutability remains.

Application of this technology under severe budgetary constraints and shortages of these personnel inputs is inherently limited in extent. Modern medical technology would be described by economists as a "fixed-coefficient" technology. For a given output of inpatient and outpatient services it conventionally requires capital, as well as pharmaceutical and specialized personnel inputs organized in a fairly determinate structure.[38] Any substantive improvement in rural health care would thus require technological and organizational adaptations so that these input requirements might be drastically lowered, with as small a loss in the quality of health service as possible. In December 1965 Chinese Minister of Health Ch'in Hsin Chung stated that "we know very little about . . . the way to find medicines and apparatuses which are economical and convenient to use and yield good results."[39]

The absence of curative services engendered both political and economic problems while presenting obstacles to the successful implementation of preventive health policies. As they began to prove successful, the changes in the characteristics of China's disease problems made the absence of curative services more critically apparent. Many childhood diseases went untreated, and the drop in infant mortality allowed more to survive with one or another illness. A critical factor was that unavailability of basic curative services was politically detrimental to the continuing support of the regime by the peasantry. The economic objectives attributed to health policies, whether real or fictitious, were similarly unlikely to be realized in the absence of available medical care.

We define "curative" services in terms of personnel with a basic level of specialization in medical science. This does *not* imply that their health activities are wholly restricted to treatment, for indeed many preventive health measures, particularly for childhood diseases, must be delivered within the framework of curative insti-

tutions or by their personnel. This not only relates to their capacity to deliver curative services, but to their ability to work with the target group to help them become receptive to health education:

> It is essential to combine therapeutic and prophylactic measures to emphasize early diagnosis and early treatment at the nearest clinics. Either prevention without treatment or treatment without prevention would be an imperfect method of practice. The chief concern of the parents is the cure of their children's diseases. Once this is obtained, they would be glad to accept suggestions on prophylactic measures and to propagate them consciously among the inhabitants.[40]

The deficiency in the quality of the medical network in China meant that continuous health pressures could not be maintained. Reports during the Cultural Revolution that family health workers and barefoot doctors were fighting "the habit of paying no attention to health work" indicates that a spotlessly clean rural society did not yet exist:

> In the countryside, it has become a new fashion to pay attention to public health, eliminate diseases, do away with all fetishes and superstitions, and change old customs and habits.[41]

The post-1965 reforms in rural curative health care were aimed at remedying this deficiency in curative services.

The Cultural Revolution and its aftermath were frontal attacks on two primary causes of the dysfunctionality of modern medical science in the rural curative health system: (1) The unwillingness of the practitioners of modern medical technology to adapt and compromise this technology, and the organizations within which it is delivered, to the reality of curative services in inadequately equipped and staffed rural health institutions; and (2) the bias in medical and organizational research toward new modes of treatment of more advanced medical problems in a well-equipped setting. The effect of the first was to constrain health planners to a narrow range of options as to the form and substance of the health delivery system. The lag in organizational research on rural health problems retarded the development of those alternative options that could have relieved the inflexibilities of the existing system. The primary characteristic, or potential effect, of the Chinese adaptations since the mid-1960s has been to increase the number of viable policy options open to health planners.

The Rationalization of Medical Technology in China: The Role of Traditional Medicine and Its Practitioners

Thus far little attention has been paid to the role of the traditional Chinese medical system, a key element in rural curative health services, particularly before 1965. Very quickly after Liberation the critical policy decision was made to support *chung-i*, traditional medicine, as an integral part of the health program. As early as 1944 the Communists had abandoned their previous rejection of traditional medicine as "pre-modern."[42,43] The shortage of Western medical personnel, coupled with the deep-rooted confidence of the peasantry in the efficacy of Chinese medicine, made this decision inevitable:

> Chinese medicine is still the principal strength on which the great masses of our people depend in overcoming disease and maintaining health.[44]

and:

> If traditional Chinese medicine were to be prominently held up by the party as being equal to Western medicine, and used as part of the government medical services, the already existing faith in it should serve as a powerful force to the political advantage of the party and a step forward in healing the cultural wounds of the Chinese people.[45]

An equally important factor was that this was not merely a transitional decision; it would be accompanied by an expansion in the stock of Chinese medical practitioners through the establishment of separate colleges of Chinese medicine. This may have been related to logistical difficulties in training enough Western doctors within ten or twenty years.

The scientific merits of Chinese medicine thus received a political legitimacy that was further reinforced by the establishment of several research institutes in Chinese medicine. Yet throughout the period only partial rapprochement occurred between the two systems, government attempts at integration notwithstanding. As of 1966, Western medical doctors were enrolled in programs of Chinese medicine in order to provide a core of researchers familiar with both systems and capable of providing a firm scientific ground for the yet inexplicable efficacy of acupuncture and of many Chinese herbal cures. The success of this early integrative effort is unclear. The vice-minister of health reported that:

> There are some young ones who study Chinese medicine but there are few specialists and professors who do so; there are some practitioners who study it, but there are few among theoreticians; there are people who make a cursory enquiry, but there are few who make a prolonged and systematic study.[46-49]

Although traditional medical practitioners were increasingly "integrated" within the institutional apparatus, this proved to be more of a bureaucratic than a scientific merger. Patients were theoretically given freedom of choice as to which door of the health center they could enter, but this choice was often moot, particularly in rural areas. Moreover, as long as a screen existed between the two technologies neither would benefit from the other, and the result would be an inefficient two-track system of health.

An evaluation of Chinese government policy prior to the Cultural Revolution would therefore have to conclude that traditional medicine's role was more a reflection of its political inviolability and of the lack of any alternative in the rural areas than a component of an evolving unified health system. As put by Ho Cheng, former minister of health, traditional medicine's importance in many eyes

> originated from a temporary viewpoint and for the sake of meeting the present emergency [in the belief] that Western medicine would ultimately replace Chinese medicine.[50]

Although the stock of traditional practitioners in the rural areas was large relative to that of modern doctors, both were primarily concentrated in the major villages. As with the commune health centers, inaccessibility often limited their outreach to the community. Moreover, the price of their services often outstripped the capacity of most peasants' incomes.

Likewise, Chinese medicine as practiced was not sufficient to treat the entire range of rural disease problems. It is quite clear that despite the shakiness of their theoretical underpinnings there were many illnesses for which the use of acupuncture, moxibustion, and traditional herbs could be quite efficacious.[51] Yet the effectiveness of different medical practitioners and the herbs and treatments they prescribed were undoubtedly subject to considerable variation, which was not reduced by the secrecy of individual practitioners that inhibited any free flow of medical information to the body of

practitioners at large. To assert that the rural areas were served by a stock of such practitioners does not therefore relate to the breadth and character of the medical services offered.

The Cultural Revolution appears to have accelerated markedly the evolution of an integrative process between the two systems. One observes greater interaction between the two types of medical practitioners at the mobile medical team and health center level. Short training courses in certain areas of modern medicine are offered to rural practitioners by visiting mobile medical teams. At the health centers emphasis is placed on joint diagnosis and treatment, and this effectively offers the traditional doctor further on-the-job training in modern medical procedures. One purported reason for the increased consultative arrangements derives from the political insecurity of both types of practitioners. Because of the ability of patients to file complaints with local party secretaries, one way of spreading the risk is through consultation.[52]

One would expect this increased interaction to have an impact on the quality of medical manpower in the rural areas, and on the suitability of the technology chosen for particular health problems. Encouraging greater examination and research into Chinese medicine and increasing the interaction between the two types of practitioners should lead to the identification of those elements of traditional medicine that can be substituted for comparable modern treatment, with substantial savings in costs. The recognized effect of acupuncture as an anesthetic and for the treatment of certain diseases is an obvious example of a technology that is more practical in a rural setting.

Similarly, a wide range of traditional herbs may have an impact on certain diseases; to the extent that these may be easily cultivated and prepared by commune members, this may be a less expensive and more accessible form of treatment than modern pharmaceuticals.[53,54] Emphasis is placed on Mao's dictum to "inherit and develop the motherland's medical legacy," which is interpreted to mean discarding what proves useless and developing what is effective, regardless of whether the mechanism that explains the effectiveness is known. By encouraging the private and communal cultivation and collection of herbs, the health centers' external financing requirements and dependence on subsidies are effectively lowered, while their capacity to afford other health services is potentially increased.[55] At the brigade level, 85 per cent of pre-

scriptions are for herbal drugs; at the production team level virtually all prescriptions are for traditional herbs.

This interaction contributes to an upgrading of the quality and versatility of traditional practitioners, and to an increase in the efficiency with which they interact with modern rural health services. As their diagnostic capacity and their awareness of the limitations of traditional medicines improve, they will operate more effectively as curative agents and channel the more complicated disease problems to the communal health center:

> The correct attitude toward Chinese doctors should be to ascertain that the unification of Chinese doctors is a long-term policy . . . *because* it is a powerful force in the public health enterprise of our country. In fact, more than half of the urban populace and practically the entire peasantry of our country is still dependent on the existing several hundreds of thousands of Chinese doctors for treatment.[56]

By joint treatment, the traditional doctor also becomes a vehicle for the introduction of modern curative techniques and health education against which there are often many superstitions and taboos. Indeed one could argue that even if partial reliance on traditional medicine is at the expense of better health for a given bundle of resources, its value lies in crucially facilitating the dissemination of modern forms of medical care.

Implementation of this policy has not been without certain strains. The intensified use of herbs was often excessive and not based on scientific tests of effectiveness. When combined with the hasty expansion in the number of barefoot doctors and People's Liberation Army corpsmen, and with quick "cookbook" courses in acupuncture and herbal medicine, there was unquestionable resistance to these curative services in many areas. Chinese medicine is not applicable in all instances, and the experimentation with new herbs often proved unsuccessful. Reports of herbs insufficiently baked or processed, and incorrect applications of acupuncture treatments, have not been uncommon.[57,58]

> The "barefoot doctors" usually treat their patients with medicinal herbs. However, reportedly the patients do not always trust them and have doubts about the efficacy of wild herbs in the treatment of illness.[59]

Conversely, many groups, particularly in urban areas, still reject all traditional medical practices as "unscientific" and "pre-mod-

ern."[60,61] Hence it is clear that there are limits to the rate at which integration of the two systems of medicine can be paced to gain general acceptance by some social groups.

Motivating Technological Change: Medical Technology and Income Distribution

> At present, the set of methods of examination and treatment in hospitals is basically unsuitable for the countryside. The method of training doctors is also for the cities. But China has over 500 million people who are peasants.[62]

A second policy development emerging from the Cultural Revolution was a focusing of medical research and the medical school curriculum on the problems of effective delivery of mass health services. On the one hand this represented an attempt to reorient the direction of technological change in both medical science and medical care organization.

In the terminology of economists this argues for technological research and for new criteria that embody: (1) change in output objectives, viz., the prevention and treatment of common rural diseases as opposed to urban illnesses; and (2) a new set of factor price criteria reflecting the high cost of capital and skilled labor inputs. Such adaptations refer not only to new medical science developments that are strictly technological, but to what might be considered organizational adaptations.

On the other hand this development was an attempt to move toward a reallocation of health inputs, within the framework of existing medical knowledge, and toward a new output mix as between the urban and rural sectors. Beyond the need for a reallocation of medical inputs as *between* the rural and urban sectors, it required innovations in existing medical care technology organization and education that involved: (1) rationalization of existing medical knowledge and the priorities in its transmission; (2) a reconsideration of the basis for the functional delineation of responsibilities as between different levels of medical personnel; and (3) a reorganization of the process of health delivery within existing rural health institutions.

The first policy was manifested in an attempt to pressure urban physicians into focusing their research efforts on the problems of the rural areas and to ensure that medical students were oriented to

service in these areas. These policies were an attempt to remedy what the Maoists view as the dysfunctional perspectives engendered by the modern medical educational system.

The modern doctor undergoes a rigorous period of training in the most advanced areas of medical knowledge, utilizing the sophisticated medical equipment available in most medical schools. In the absence of complementary capital inputs, these technologies become inapplicable. Hence the doctor immediately has a basic professional resistance to practicing in areas where there are inadequate medical facilities. Adaptation to the rural environment requires a compromise with the standards of quality with which a Western-trained physician is professionally imbued. The character of training required for service without sophisticated resources also differs, in that the doctor must be capable of making quick diagnoses without the benefit of a battery of laboratory tests or diagnostic equipment.

Deep-seated resistance to any delegation of responsibility to nonprofessional practitioners, whether or not traditional doctors, is inherent in the training process. Reliance on Western-trained doctors as the core of a rural medical program can thus immediately narrow the range of allocative options, for they cannot render quality service in sufficient quantity. The policy trade-off is between the benefit from expanded coverage, that is, a greater number of patients treated, as against a lower probability of correct diagnosis and treatment for any given patient.

Similarly, the medical education process induces motivations that are inconsistent with a mass perspective. The technical expertise inherent in the profession, the long periods of schooling, and explicit specialization of functions lead to an elite approach that makes it difficult to communicate easily with the uneducated. As in Western societies, this impels the urban-trained physicians not to settle in rural areas. An outgrowth of the urban-oriented perspective is a paucity of research on the ways in which Western medical techniques can be applied outside the context of well-equipped urban hospitals.

A primary motive for urging doctors to settle in the rural areas of China was to force them to develop a greater awareness of both the character of the disease problems found there and the primitive condition under which such diseases must inevitably be treated. This might be considered an expansion of their awareness of factor

price ratios and budget constraints. Mobile medical teams from the urban areas were of necessity forced to devise new techniques based on their rural experiences. Often this involved no more than an exploration into the areas of medical procedure that could be modified without substantial damage to the success of the treatment. Examples of "alternative" technologies included: substituting grass sheds for sterilized rooms; simple tables for operating tables; willow tree branches for swab sticks; kerosene lamps and flashlights where electricity was unavailable; and distilling spring water.

Similarly, research was focused on ascertaining the pathogenic characteristics of the common rural diseases. Ideological factors also motivated greater contact with the peasants and their life styles as a way to weaken the doctors' narrow, elitist class orientation.

A second set of policies attempted to prevent the present generation of medical students from developing the types of dysfunctional medical competence that had characterized their elders. A restructuring of the medical curriculum appears to have occurred, with increased emphasis on clinical work and a shortening of the length of formal courses. The policy statement of the June 26th Commune of Shantung Medical College best exemplifies the reformers' arguments. It involved: (1) the integration of the medical school and teaching hospitals with nearby nursing schools; (2) the establishment of rural branches; (3) the merger of preventive, modern, and traditional medicine; (4) a change in the class composition of the student body, with increased emphasis on peasant youth recruitment and their return to rural areas; and (5) reduction in training from five to three years.[63] Medical and pharmaceutical courses were shortened by half, and an expanded part of the training was to be taken with mobile medical units. Whether these reforms have been instituted in all the country's medical schools is not clear.

Implicit in Chinese policy is a theoretical perspective on the way technology and class interest interact. For example, one could view these policies narrowly, as an attempt to expand available technologies in a labor-intensive direction, and to increase the capacity of the medical educational plant to produce physicians who are able and willing to use different techniques at existing wage rates. The goal appears to be to expand the capacity of the health sys-

tem, at a given budgetary level, to handle the magnitude of rural health problems by reducing the average cost of treatment.[64,65]

Yet this policy shift is not without cost. If there is a reduction in the quality of medical education or of the student body, many advanced modern technologies will be neglected and the professional competence of Chinese medical personnel weakened. This would presumably be reflected in a deterioration in the quality of available medical care. Similarly, the reorientation of research will retard the development of Chinese research relative to that of the West.[66] Whether it is necessary to bear this cost depends on whether it is possible to continue to train modern-style physicians at *past* levels of quality and still ensure that they make the adaptations necessary to deliver the desired quality of medical services. Recent Chinese policies suggest a rejection of this possibility. Although more rigorous and better quality training *will* allow a physician to make the adaptations to rural conditions with a *smaller* loss of quality, the training will also instill in him a value system that substantially resists making such compromises or settling in rural areas under present conditions of poverty. The technology implicit in the medical education process cannot be separated from the range of income distributional outcomes that this technology renders probable. If one rejects the distributional effects of high quality training, one must accept a less rigorous, more practical educational process. The best that can be hoped for of the *current* stock of urban physicians is some resettlement and a more detailed focus on developing new cures for the health problems of the rural areas. On the other hand, an emphasis on seeking medical students with peasant roots reflects an attempt to ensure that their perspective will be correctly focused.

> To make health work strike root in rural areas, greatest attention must be paid to the training of rural medicine workers not detached from agricultural production . . . of desirable family background, ideologically sound, having certain cultural levels . . . *not* detached from production, [they] live among masses, can easily perform mass work.[67]

Future medical graduates will thus be able to deal better with rural medical problems.

What remains to be evaluated is the advisability of trading off quantity for quality in the training of modern doctors. This was only one aspect of a larger trade-off between quality and quantity

in the delivery of health services implicit in the entire range of technological and organizational changes proposed after the Cultural Revolution. Yet the issue of optimization of resource utilization must be separated from optimization of output. Given the status quo it is extremely difficult to judge scientifically whether a greater quantity of lower quality medical services will have a positive or negative impact on either the Chinese economy or the health status of the bulk of the population.* The policy chosen also reflects income distributional issues subject to the broader mandates of political and ideological policy. Given a decision on this larger issue we must then judge alternative organizational strategies in terms of their relative impact on policy objectives.

Even with a quantity-oriented goal system there remain important arguments *against* a dilution of the quality of medical graduates. The "individualistic" argument was aptly expressed at the Canton forum of mobile medical teams that had returned from the rural areas. They argued that

> without proper medical instruments and equipment, teaching and study cannot be carried out, and at most you will reach a level equivalent to part-time rural medical workers and you will not be counted as university graduates when you finish your studies.[68]

Moreover, to the extent that a policy of quality dilution is adopted in all of the nation's medical schools it will have serious dynamic implications for the future quality of the Chinese medical system. In the same way that the success of past preventive policies led to their present insufficiency, the success of present curative policies may lead to greater requirements for sophisticated medical expertise. Hence the Chinese should be concerned with the impact of present policies on their future options. In a quantity-oriented system, with a broad base of semiskilled health workers at the first

* For those more versed in economic terminology, one can specify the following functional relationships that reflect the nature of the quality-quantity trade-off in political and economic terms. First, let health = f (quality of health care, x_1, x_2, x_3, . . . x_n) where x_1, . . . x_n are a range of possible environmental and physical factors. Let cost = g (quality of health care, y_1, y_2, . . . y_n). Let individual productivity = h (health, z_1, z_2 . . . z_n). Let us hold all vectors x, y, z fixed. If h′, f′ >0 and h″, f″ <0, and g′ >0, g″ >0, then for a given cost it might be important, in terms of productivity, to provide a greater quantity of low quality health than vice versa. If there is a diminishing marginal utility to better health, this is reinforced from a political point of view. If, however, different groups have different vectors of associated factors, particularly the level of capital equipment in h( ), the economic argument is weakened.

level of treatment, it may be crucial to have high quality modern doctors at the apex for treatment, education, and management.

The significance of this trade-off also depends on the character of the rationalizing process in medical education. If it involves no more than a trimming of the truly superfluous or marginal elements, then the loss in qualitative effect may be small. Furthermore, the Maoists have argued that "one must solve the problem as to what purpose one should raise one's skill," and the "M.D.'s should not remain in urban areas to 'add flowers to embroidery'."[69] Finally, to the extent that the previous arguments on the negative ideological impact of a high quality education are correct, they may provide further support for the "quantity" arguments.

Organizational Adaptations: Resource Reallocation Between Urban and Rural Areas

There were two phases to the reallocation of urban medical personnel to the rural areas. The publication of Mao's famous directive to right the urban-rural imbalance[70] led initially to the formation of mobile medical teams, ideally composed of a representative cross section of urban medical personnel. These toured the rural areas for one to three months and were expected to remedy the deficiencies in rural curative and preventive care while correcting their own ideological perspectives, both as to class interest and medical focus. Base camps were set up for one or two weeks in the major villages of a county. While some team members held clinics and training sessions for barefoot doctors and family medical workers, the others traveled to outlying towns for two- to three-day clinics. The doctors were also expected to assist the health departments of each commune in the operation and development of their "cooperative medical service."[71]

At the same time it was hoped that the doctors would receive ideological education from the peasants and party cadres, thus involving them in "serious class struggle" and effecting a "revolutionization" in their ranks.[72] At any one time it was expected that one-third of urban medical personnel would be moved to the rural areas. Both Western-trained and traditional doctors were presumably included in these teams and training sessions involved the interchange of basic techniques of both types of medicine (see the next section of this paper).[73]

For example, a reported 1,000 doctors, nurses, pharmacists, and

chemists left Shantung; fifty medical workers left Hupeh; 150 doctors and nurses left Shanghai; 3,000 doctors left Szechuan. Overall, in 1965, 165,000 city doctors and other medical personnel were reported to have formed 10,000 mobile medical teams that went to the rural area.[74] As a component of the strategies of aiding the rural areas and reorienting the medical workers, this undoubtedly required both ideological and coercive pressures, due to the relatively elitist composition of most of the mobile teams.

The resistance of the medical educational system to these assignments may be gleaned from the nature of the criticisms directed at them as late as 1970 by students at various medical colleges.[75] The resistance proved particularly deep, extending to the vested urban party interests. It became apparent that the proposed mobilization of one-third of urban medical workers was often unrealized in many rural areas of China. Lower-level personnel were often promoted to the rank of "doctors," the least competent doctors were often assigned to the teams, and the length of rural stay was often shortened in order to prevent the deterioration of the urban medical corps. Moreover the effectiveness of the tours in terms of their various objectives was often vitiated by their short duration. In one month "we cannot even see clearly the places; we cannot accomplish the rural health work . . . Three months is better, but doesn't help us much in ideological reform."[76]

By 1967 there had been a shift in policy geared toward the gradual resettlement of one-third of urban medical personnel. Over the last several years there have been many reports of large numbers of physicians being forced to settle permanently in rural areas.[77,78] Although such resettlement does seem to be occurring, a lack of statistics prevents any assertion on either the magnitude, extensiveness, or degree of permanency of this change. The permanent settlement policy is undoubtedly aimed specifically at new medical graduates, so that over time there may be a gradual convergence to an optimal distribution. The major rationale for the emphasis on admitting medical cadres from the peasantry into medical schools is a reflection of the difficulties and resistance encountered in transferring urban-oriented personnel.[79]

Negatively, the reallocation policy *may* have affected the quality of urban health services, depending on which health services were reduced and on the substitutions in paramedical staffing that were made within and between urban health institutions. In some cases

the policy has led to urban training courses comparable to those in rural areas in order to replenish the stock of health workers. In Shanghai, for example, industrial workers were given short courses in medicine in order to replace health workers transferred to the communes. In 1969 there were reports of shortages of urban doctors and personnel, which led to: (1) a reduction in services and the level of care in hospitals, sanitoria, rest homes, and special clinics; and (2) an increased sharing of responsibility by medical personnel —nurses doing diagnoses and giving treatment, workers performing nursing functions, etc.[80]

The Reorganization of the Delivery System of Rural Curative Health Services

Perhaps the most important set of policy innovations that occurred after 1965 related to the expansion in financing and physical accessibility of curative services in the rural areas. They constituted an attempt to expand rapidly the supply of medical manpower to, and the facilities in, these areas. For their success they had to overcome several critical bottlenecks. First, there was a supply bottleneck in terms of the capacity of medical manpower training institutions to accelerate their production of medical auxiliaries. Second, the manpower had to be effectively integrated within the existing health system in order to assure a more effective rationing of skilled medical resources. Third, additional resources were required to finance both the construction of basic-level health stations and, more important, their operating costs.

Prior to 1965 the provision of rural health services was fragmented among the commune health centers, the *hsien* hospitals, private clinics, and traditional medical practitioners. The *hsien* hospitals were at the top of the health pyramid. In size they ranged from thirty to 300 beds, and they usually had the equipment and staff to handle more advanced medical problems. Their staff generally included specialists in internal medicine, obstetrics, preventive medicine, pediatrics, traditional Chinese medicine, pharmacology, and radiology.[81,82]

Theoretically the *hsien* hospital served two primary functions. Since it was usually located in the major population center of the *hsien* it provided outpatient services for the community. Second, and more important, it served as the final medical referral point for the entire *hsien* population. One would therefore expect inpa-

tient services to have been rationed to those individuals with illnesses requiring the sophisticated medical skills available only at this level. Yet this rationing could occur successfully only if there existed a set of local curative health institutions with sufficient capacity to absorb a large proportion of the basic demand for health services. Such a primary health care system was nonexistent until 1958.

Prior to 1958 access to curative services was not a function of the degree of medical need, but more of financial status and physical proximity to the *hsien* hospital's outpatient clinic. Hence the pool of patients that reached the outpatient clinic was not subject to a rationing process. This was compounded by the congestion at the clinics arising from their incapacity to process the existing level of demand. The inaccessibility problem was not affected by the presence of traditional practitioners in that they also tended to be located in the major villages and their fees were often prohibitively expensive.

At the time of the Great Leap Forward the commune health systems emerged in a flurry of capital construction and communization. Health centers and "medical rooms" were constructed at the commune and production brigade levels, respectively. The former became the focal point of most curative services for the commune's population, while the latter served primarily as a first-aid clinic. The health center was usually staffed by a graduate of a regular medical school and one or two "middle doctors," graduates of medical secondary schools and comparable to the medical auxiliaries found in many LDCs, and several untrained nurses who served effectively as apprentices to the doctors.[83]

Often the commune established a cooperative medical system to finance the health center's activities, and it was this system that provided the model for those adopted after 1965. Access to this health system was available to nearly all commune members. Each individual paid annual dues of one to three *yuan*, and a matching contribution of ten *fen* was paid by his production brigade's collective welfare fund. In addition, a token registration fee of five *fen* was often required for each visit. In most instances these fees covered all treatment and medicine.

> Those in serious illness [would] stay in [the] hospital and 60 per cent of the charge for medicine would be paid from the brigade account.

> For those who suffer from chronic ailments and frequently using medicine, 50 per cent of the charge for medicine is to be paid by themselves.[84]

Thus the system was potentially self-financing at the commune level, which could imply that the government was able to shift the fiscal burden of these costs downward.

By 1965 the commune health systems were still inadequate to deal with the basic problem of the unavailability of curative health services in the rural areas. Many communes had either not constructed primary health centers or had not provided sufficient financial support to sustain them. In 1961 Vice-Minister of Health Hu Yun-pei noted that:

> The organization of public health in the villages is the general wish of all commune members. It is hoped that this system will be gradually introduced, and that each locality will take positive measures in this direction.[85]

Even in those communes with fully operative centers, their outreach was primarily localized to the immediate commune village area. At the production brigade and team levels, health services were often inaccessible. Long distances proved to be sufficient deterrents for many peasants in the outlying areas of the commune. Lengthy queues, inadequate equipment, and shortages of drugs were additional obstacles to the effective diagnosis and treatment of those who did seek out these services. The lack of any formal screening process at the health center level further exacerbated the basic shortage of trained personnel.

The resulting output of services did not therefore meet the most important medical problems. Trained personnel often found their time poorly spent in screening cases that could have been dealt with by less skilled personnel. The physical inaccessibility of the system implied that many sick peasants never reached the health center. The same type of congestion and inefficiency in the allocation of skilled medical resources observed at the *hsien* hospital level was also to be found at the commune level.

There were four primary aspects to the post-1965 new curative health policy: (1) further decentralization of health institutions at the family, production team, and production brigade levels; (2) use of mobile medical teams to provide a linkage mechanism with these institutions and the health center; (3) reorganization of the

delivery process *within* the commune health center; and (4) rapid expansion in the capacity to train a corps of semiskilled medical personnel—the so-called barefoot or peasant doctor—to staff these new facilities. Also involved were policies relating to the cultivation of traditional herbs, the increasing integration of traditional and Western practitioners, and the merger of curative and preventive activities. These changes were introduced on an experimental basis in 1966, and by 1968 they had become a firmly established policy. As reported by Radio Yunnan in July 1969: "The system should now be established in places which have not yet adopted it."[86]

The core of the reforms lay in the establishment of brigade health stations and "red medical" (herbal) rooms at the production brigade and team levels, respectively. The former now became the primary curative unit in the new rural medical system, with the latter serving as a first-aid dispensary. Each health station was to be staffed by at least two part-time peasant doctors and two midwives. Thus for a large proportion of the commune's population the health center was transformed from a primary to a secondary referral institution. The brigade health stations were expected to be readily available screening mechanisms to screen out cases that could be handled quickly and easily by semiskilled medical personnel. Moreover, by locating them at the grass-roots level, peasant doctors would be in a position both physically and socially to actively identify those in medical need who were reluctant to utilize the health service. They could also serve as instruments for social control and education with respect to various preventive activities, family planning, nutrition, and environmental sanitation. "Peasant doctors," for example, would receive training in the insertion of intrauterine devices.

The rationale for this should be apparent. By adding an additional base of medical services, a preliminary screening and treatment mechanism was created. Simultaneously, scarce medical resources could be rationed to those with medical problems for which no lower-cost or lesser-skilled substitute existed. The bulk of curative problems could for the first time be diagnosed and treated. One could not argue that the "quality" of health care was negatively affected by these peasant doctors, because for many peasants they represented the first set of curative services that had ever been effectively available. Those for whom access had not previously been a problem were not legally bound to consult the peasant doc-

tor first. Indeed the peasant doctor's services were contingent on the general support of his production brigade.

The success of this strategy hinged on: (1) whether the Chinese could in a short period of time create a corps of medical workers capable of meeting a large proportion of the rural population's curative needs; and (2) whether the peasant doctors could gain the confidence of the population. They had to be able to distinguish those diseases that could and could not be treated at the brigade level. For the former their treatment had to be relatively effective; for the latter they had to assure that the referral process would actually operate. The training process had thus to provide the peasant doctor with a basic core of skills necessary to satisfy both objectives. The confidence factor would yield a critical momentum that could either support or undermine the viability of the decentralized program. Conversely, a narrow capacity to treat problems would not prevent congestion at a higher referral level.

The creation of this corps of medical manpower was fundamentally intertwined with many of the policies of the Cultural Revolution discussed earlier. Some urban doctors on mobile medical teams were expected to double as medical educators. They were to develop on-the-job training courses that would, within the span of three or four months, provide a basic core of relevant medical skills to a group of secondary school peasant youths chosen by individual production brigades. Thus the process of training was initially distinct from ongoing medical training institutes, and was integrated as much as possible with the actual process of rural health delivery. The course regimen has been aptly described by Joshua Horn:

> For the first two weeks they studied anatomy and physiology, dissected pigs, and attended lectures illustrated by models and lantern slides. After this introductory course they learned the elements of bacteriology and pathology in the mornings and clinical medicine and hygiene in the afternoons. They learnt to identify germs in contaminated water and to recognize the eggs of worm parasites in excreta. They learnt how to make drinking water safe, how to treat night-soil, how to sterilize needles and syringes, and how to give injections. They learnt how infectious diseases are spread and how to diagnose them. They accompanied their teacher-doctors on their rounds, learnt the use of the stethoscope, how to take a medical history, how to diagnose common diseases, and how to detect the signs of serious ill-

> ness. They examined patients who came to the clinic and discussed their findings with the doctor in charge. They concentrated on a few diseases commonly seen in the neighborhood, and on the use and dosage of some forty drugs. They memorized fifty acupuncture points and the symptom complexes which they control, and they practiced the technique of acupuncture. Each student was issued with a well illustrated book specially written for peasant doctors.[87]

The barefoot doctor's first period of training was therefore intended to provide the minimum threshold of skills required to perform curative services effectively. In subsequent years he or she would be able to return to these training "clinics" in order to obtain a more thorough theoretical underpinning for his curative skills. For example, Horn notes that

> . . . last year, they studied anatomy and physiology as a whole in a short, concentrated, superficial course. This year, they are re-studying it in relation to diseases of particular organs . . . last year they studied only commonly seen diseases, but this year they systematically study all the diseases of particular organs.[88]

It should be noted that the content and duration of these courses exhibited considerable variability throughout China, particularly in the period directly after the Cultural Revolution.[89-91] Some reports indicated that peasant doctors were being trained at medical secondary schools or at separate joint farming-study departments within the medical colleges.[92,93] They were aided by medical handbooks on the uses of herbs and on the symptoms and treatment of a range of common diseases.

The cost of training was minimized by scheduling the courses during the slack season in agriculture, thereby not impinging on the size of the brigade's work force. The cost of teaching personnel was lowered by combining the teaching and curative responsibilities of the mobile medical teams as much as possible. Clinical teaching occurred at the commune health center. The trainees and the community provided the labor to construct primitive dormitory facilities.

The risks involved in sole reliance on this corps of hastily trained personnel were lowered through the elaboration of a linkage mechanism between the peasant doctor in the field, the trained professional medical personnel at the commune health center, and the urban mobile medical teams. Brigade health stations were linked

by telephone to the commune health center, ensuring both a viable backup system for critical cases and the provision of guidance to the peasant doctors. Mobile medical teams made regular visits to each production brigade, thus providing an additional source of medical education to the peasant doctor.

This type of organizational structure struck at the goal of integrating agricultural production and health. At the brigade level the peasant doctor divided his time between agriculture and medicine; often he was fully employed in agriculture and performed his medical duties in his free time. For this reason the "political" criteria underlying the brigade's choice of those who were to be trained as barefoot doctors reflected their degree of social dedication and communal spirit. If the peasant doctor found that he required more time for his medical duties, his brigade allocated work points for this service. What is important is that these were indeed peasant doctors engaged at least part time in agricultural activities. Their training periods were spaced over several years and occurred during the slack agricultural periods, so that the cost to the brigade of preparing these medical personnel was not excessive. Where work points were allocated, this reflected a communal decision that could be changed if it was felt that the peasant doctor's services were not sufficient or that he was unqualified. At the production team level, family health workers were full-time agricultural workers. Hence these reforms represented a net addition of health services at the commune level, with the financial burden clearly thrust upon the brigade collectively, rather than on the commune, *hsien*, or state.[94]

The brigade health rooms were constructed with brigade funds, although abandoned buildings were frequently repaired to serve this function. The continued emphasis on the use of traditional herbs likewise implies that only a minimal amount of health supplies need be purchased externally.[95] Similarly, emphasis was placed upon treating diseases at the point where costs were minimal, given the differential cost of treatment at the health center, brigade room, and hospital. The fiscal burden for treating minor ailments was therefore transferred to the brigade level, thus expanding the level of resources the total community expended on health.

An "antiregularization" campaign has been waged to prevent commune hospitals from becoming mirror images of the county

and urban hospitals, reflecting more efficient allocation of staff resources and greater responsiveness to the needs of the peasantry.[96] The campaign manifested itself in a reduction in specialization, a simplification of bureaucratic procedures, economies in laboratory work, and more mobile medical activities. At the Chin Yuan *hsien* hospital, for example, the five windows for registration, medical histories, cost estimations, payments, and dispensing of medications were merged into two; likewise the departments of internal medicine, surgery, pediatrics, gynecology, and the "five organs" were merged into internal medicine, surgery, and gynecology-obstetrics.[97] The pressure toward rationalization may also have been motivated by the abuses observed in the earlier system, such as multiple visits to both Chinese and Western-type doctors, overuse of drugs, etc.[98]

Perspectives on Curative Health Reforms in Rural China

There is considerable theoretical attraction to the basic thrust of the changes made in the rural curative health system. Given the apparent resource bottlenecks to providing these services within the existing technological framework, one observes a search for ways to expand the substitutability of less costly methods of providing a given health output. By rationing access to more expensive and better qualified personnel on the basis of relative need, and by creating new categories of health manpower, one may reduce the quantity of highly qualified medical personnel from that which has been *applied* to the minimum *required* for a particular medical problem. Less urgent problems are caught at an earlier stage by health workers with a level of competence sufficient to treat them. Congestion at the health center level is lessened, and the capacity of the overall system is enlarged. The cost rises with the possible "misdiagnosed case" that is not properly channeled to the higher level, and the increased "time" cost to the seriously ill patient who must be reexamined several times.

Likewise, innovations or adaptations in equipment and drugs required may prevent them from serving as bottlenecks to the use of lesser-skilled personnel. Again the question becomes one of expanding the capacity of the health system, reducing queueing and congestion, and economizing on skilled resources at the cost of a loss in the quality of health care.

The second attractive adaptation is an economical use of the

state's budgetary resources allocated to those health programs—curative, preventive, and research—for which there is limited effective substitutability of private for public action. Hence the state must either be actively involved or assure that the private sector—the communes—can adequately meet the level of demand. The role of the state involves: (1) provision of inputs to the lower levels—production of Western medicines, and training of certain types of health personnel; (2) the fostering of research in new medical technologies; (3) implementation of mass preventive campaigns for which interregional coordination is necessary; and (4) provision of more advanced curative services. By shifting the burden of basic health provision and financing to the private sector, the state may allocate more of its scarce budgetary resources to those health programs with broad national benefits.

What remains unclear is whether these substitutions are occurring and whether they are technologically feasible, effective, and socially acceptable. For example, in those rural areas where physical or financial obstacles prevented access to the communal health center for anything but major illnesses, the availability of the barefoot doctor was probably a positive change. If he proved ineffective there was minimal loss relative to the status quo. But in areas where the health center outpatient department was accessible, did one find that the barefoot doctor was ignored and ineffective? The reports emerging seem to indicate that this was not a problem.[99] Have the Chinese developed a mechanism to ration access to health center personnel? What effect does a lack of confidence in the barefoot doctor have on the peasants' acceptance of other preventive, health-related actions proposed by the political cadres and the government?

What is the proper strategy in developing a cadre of minimally skilled medical corpsmen who will be accepted by the rural masses? The Chinese opted for a rapid buildup with an upgrading according to skill over time through on-the-job clinical experience and two- to three-month classes annually. The cost is that the corps of barefoot doctors may often be insufficiently trained *initially*, which breeds a resistance by the masses that may be difficult to overcome at a later stage. The alternative strategy, the slow development of cadres with a specified standard of competence, trades off the provision of health care at the present time for a higher probability of popular acceptance.

What is the nature of the interaction between the medical cadres and the skilled medical personnel at the health center level? How are their activities functionally delineated? Are the barefoot doctors competent enough to know the limitations of their training and the points at which referral is critical? Is there adequate potential at the apex of the system to receive the referral flow? The lower the level of skill at the base, the less impact the decentralization will have on reducing congestion at the apex. Further, the extensive reliance on traditional medicine, primarily for budgetary reasons, means that there are limits to the range of disease problems that the barefoot doctors can treat. Certain preventive and curative actions by necessity require Western drugs or Western medical skills. Are these nonsubstitutable inputs being supplied through the mechanism of mobile medical teams?

For the Western scholar these unanswered questions are at the heart of any final evaluation of the desirability of transferring the Chinese adaptations to other LDCs.

The Chinese Gift to LDC Health Planners: An Existence Theorem

Beyond curiosity, a major motivation for this study was to determine whether the Chinese have developed a viable, alternative health strategy of immediate relevance to other LDCs. What fresh insights into the problems of health delivery and disease prevention may be gleaned from the Chinese experiment? While we do believe that the Chinese have utilized a basically different strategy—its uniqueness being left unsettled—its transferability is far less clear.

There are three primary characteristics of the Chinese strategy. First, there is an extensive and successful reliance on a variety of measures, voluntary or coercive, for inducing social and individual behavioral actions in support of national policies, including health. The strategy not only increases the level of social resources allocated to health but provides an efficient means of striking at some of the roots of China's disease problems. These instruments appear to be a fundamental aspect of the *overall* process of development in China; whether they can be applied *piecemeal* for health alone remains unclear.

Complementary to this is the degree of priority attached to "red" over "expert," and the willingness to maintain this dominance by coercion. It seems probable that the Chinese will be able to funda-

mentally reorient the technicians toward adapting their technology to the "for whom" of the health problem. In most LDCs the insufficiency of resources for an adequate program, under the existing technology of health delivery, is obvious. Yet the ability of the system to compromise on this technology is thwarted by the attitude of its practitioners. This is not to argue that the Chinese alternative is wholly successful; the probability is much higher that it will evolve towards a more effective solution.

Second, problems have arisen in China from an unbalanced strategy with respect to preventive and curative health services. The insufficiency of resources for the latter in the rural sector weakened the impact of the fundamentally innovative reforms on the preventive level. The Cultural Revolution in health reflected an attempt to remedy this imbalance, to provide the complement of curative services. The implication is that, in the absence of an ability to make adaptations on the curative level, other LDCs will find there are limits to the impact of preventive measures on the health status of their populations.

On the other hand, if in 1950 the Chinese had attacked their curative health problems with the zeal of the post-1965 period, it is not clear whether this would have had as much of a substantive impact. It may have required the earlier period of preventive health action as a precondition for the delivery of these services with an *effective* impact. It would always have had some impact, but whether it would have been no more than a "finger in the dike" effect is not clear.

Third, the Chinese were blessed with a medical legacy at a demonstrated level of effectiveness, and a substantial stock of practitioners to deliver it. Although there are limits to its applicability, there existed a large stock of "medical" manpower in which the masses had a high degree of confidence. The "modern medicine demonstration" effect had not yet permeated the value system of the mass of the peasantry so as to render these practitioners suspect and untrustworthy. Moreover, the pharmaceutical base of the traditional technology was relatively inexpensive and did not constrain the operation of the system. This is not a wholly unique legacy, in that most LDCs are "blessed" with comparable groups of practitioners. Are their technologies viable, and can they be incorporated as instruments of an integrated health delivery system? If not, China's traditional technology could conceivably be

exported to other LDCs. Its acceptability by the masses and by the Western health care system is more questionable.

The curative adaptations are no less transferable. Indeed the theoretical role of the "medical auxiliary" in East Africa and other areas is remarkably similar to that of the barefoot doctor. Handbooks on the diagnosis and treatment of the common diseases are equally available. What often constrains these other systems is the mode of financing the health service and the training costs of the medical auxiliary. These financially constrain both the capacity of the system to expand its stock of nonmedical personnel and its ability to support their recurrent cost requirements. By pushing for a cooperative, self-financing medical system that draws on part-time agricultural effort, the financial barrier has been mitigated in China. By emphasizing a gradual upgrading of quality and extensive on-the-job training, the cost of preparation has been lessened.

A final reflection that emerges from this study is that the capacity to introduce severe "shocks" into the operational system is critically important. Such shocks can prevent ossification of the system and insure that it remains responsive to the needs on which its existence is predicated. The post-1965 reforms in health were attempts at effecting such a jolt to a health system that was inappropriate to the needs of the mass of the population. This type of periodic jolt has substantial short-run costs and is susceptible to substantial resistances. It may be what is necessary, however, to prevent the system from deviating from the optimal path. To insist that this is indeed a prerequisite to a structural reform of health policies in an LDC is perhaps to be overly pessimistic. While many adaptations of details can be transferred without the need for a "jolt," to exert major structural changes in such key areas as budgetary and skilled manpower allocations may indeed require such "jolts" to the system.

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