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Volume II

Economic Analysis of the Health Sector Policy Reform Program Assistance in Egypt

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Prepared by:

Jim Knowles, Ph.D.
Abt Associates Inc.

David Hotchkiss, Ph.D.
Tulane University School
of Public Health and
Tropical Medicine

Partnerships
for Health
Reform

PHR

Abstract

Volume II of Technical Report 5 analyzes the Egyptian economy's potential gains in efficiency and social benefits as a result of health reform strategies proposed by the Ministry of Health and Population and the United States Agency for International Development. The analysis is based on several approaches, including a perspective of Egypt's macroeconomic environment as it pertains to health sector reform; a cost-effectiveness comparison of several health sector interventions to the policy reform; estimates of the benefit-cost ratio and internal rate of return for the investment represented by the United States Agency for International Development's proposed Program Assistance policy reform; and an analysis of the benefits and costs of the individual strategies that make up the Program Assistance.

From data generated in these analyses, the report concludes that Egypt's health sector must attain only average levels of efficiency, as compared with 49 other developing countries represented in a World Bank report, to save US$1.7 billion and maintain its current health outcomes. The cost-effectiveness analysis indicates that if Program Assistance reduced just 10 percent of the Egyptian health sector's "efficiency gap," it could produce an extra year of life at a cost of only US$1.84. The benefit-cost analysis also illustrates that Program Assistance of $75 million would yield a benefit-cost ratio of 11.9 and an internal rate of return of 91 percent. An analysis based on welfare economics was also conducted on the individual policy reform strategies to be incorporated into Program Assistance. The analysis showed that substantial gains in efficiency could be expected from most components of the policy reform strategy. For example, using case-based reimbursement methods to allocate hospital funds could save as much as $36 million a year, making the Health Insurance Organization as efficient as the university hospitals. The analysis concludes that the policy reform program proposed by the Ministry of Health and Population and the United States Agency for International Development can play an important role in reducing the inefficiencies in Egypt's health sector and thus help reap substantial economic benefits.

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Acronyms

CCO	Curative Care Organization
CME	Continuing Medical Education
DALY	Daily Adjusted Life Year
DDM	Data for Decision Making
DRG	Diagnostic Resource Group
GDP	Gross Domestic Product
GIS	Geographic Information Survey
GOE	Government of Egypt
GP	General Practitioner
HIO	Health Insurance Organization
HMC/HC	Healthy Mother/Healthy Child Project
IMF	International Monetary Fund
LE	Egyptian Pounds
MCH	Maternal and Child Health Care
MOHP	Ministry of Health and Population
PHC	Primary Health Care
PM	Preventive Medicine
STD	Sexually Transmitted Disease
TB	Tuberculosis
USAID	United States Agency for International Development

Preface

This report is one in a series of six analyses conducted by the Partnerships for Health Reform (PHR) Project for the Health Office of the United States Agency for International Development/Cairo between June and September 1996. PHR was requested by the Mission to conduct these analyses to support and inform the design of its upcoming Health Sector Reform Program Assistance, which is intended to provide technical and financial assistance to the government of Egypt in planning and implementing health sector reform. The analyses examine the feasibility and/or impact of health sector reform strategies that were proposed jointly by the Egyptian Ministry of Health and Population and the agency. These proposed strategies are shown in the following table.

Technical Report No. 5 contains all six analyses. The analyses and their corresponding volume numbers are as follows:

Volume I   Suggested National Health Sector Reform Strategies, Benchmarks, and Indicators for Egypt

Volume II   Economic Analysis of the Health Sector Policy Reform Program Assistance in Egypt

Volume III   Social Vulnerability Analysis of the Health Sector Policy Reform Program Assistance in Egypt

Volume IV   Legal Analysis of the Health Sector Policy Reform Program Assistance in Egypt

Volume V   Analysis of the Political Environment for Health Policy Reform in Egypt

Volume VI   Analysis of the Institutional Capacity for Health Policy Reform in Egypt

Volume VII   Summary of Analyses

Proposed Health Sector Policy Reform Strategies	
Specific Strategy	**Generic Strategy**
1.	**ROLE OF THE MINISTRY OF HEALTH AND POPULATION (MOHP)**
1.1	**Rationalize the Role of the MOHP in Financing Curative Care**
1.1.1	Stop the construction of unnecessary hospitals and set strict guidelines for the completion of facilities under construction	Improve the allocation of the MOHP investment budget
1.1.2	Transfer existing hospitals to other parastatal organizations	Allow hospital autonomy
1.1.3	Expand cost recovery in government facilities	Expand cost recovery
1.1.4	Allow private practitioners to use the MOHP facilities	Allow private practitioners to use government facilities
1.1.5	Allow hospital autonomy	Allow hospital autonomy
1.1.6	Support hospitals based on efficiency indicators such as on a per capita, per bed basis, etc.	Use alternative budget allocation formula for MOHP hospitals
1.1.7	Examine the cost recovery of curative services at the primary health care (PHC) level	Expand cost recovery
1.2	**Strengthen the role of the MOHP in the provision and increased share of financing preventive medicine (PM) and primary health care**
1.2.1	Use cost effectiveness analysis to identify a package of PM and PHC services to be supported by MOHP to which every Egyptian is entitled	Increase the cost effectiveness of MOHP's program
1.2.2	Increase emphasis on Maternal and Child Health (MCH) programs	Increase emphasis on MCH programs
1.2.3	Provide incentives for the health care providers to specialize in PM, PHC, and family medicine	Increase the cost effectiveness of MOHP's program
1.2.4	Do not separate curative services at the PHC level	Continue to provide curative services in PHC facilities
1.2.5	Ensure adequate allocation of resources, e.g., personnel	Improve the allocation of the MOHP recurrent budget
1.3	**Reform the MOHP personnel policy**
1.3.1	There should be no guaranteed employment	Reduce the overall number of MOHP personnel

Proposed Health Sector Policy Reform Strategies	
Specific Strategy	**Generic Strategy**
1.3.2 Develop guidelines for MOHP personnel and apply them to redistribute personnel based on needs assessment	Improve the allocation of the MOHP recurrent budget
1.3.3 Reduce the overall number of MOHP personnel	Reduce the overall number of MOHP personnel
1.3.4 Provide incentives for the MOHP personnel to serve in underserved and remote areas	Improve the allocation of the MOHP recurrent budget
1.4 Develop the MOHP capacity for national health needs assessment, sectoral strategic planning and policy development	
1.4.1 Adapt the national health information systems, including Geographic Information Systems (GIS) for planning and policy decision making	Improve the allocation of the MOHP investment budget Improve the allocation of the MOHP recurrent budget
1.4.2 Prioritize the allocation of MOHP resources based on needs using health status indicators	Improve the allocation of the MOHP investment budget Improve the allocation of the MOHP recurrent budget
1.4.3 Create incentives for other health care providers to function in under served areas	Provide incentives to private health providers to function in under served areas
1.4.4 Target GOE subsidy to poor and indigent populations	Improve the equity of MOHP subsidies
1.4.5 Use cost effectiveness analyses in determining the essential health services	Increase the cost effectiveness of MOHP's program
1.5 Develop the MOHP role in regulation, accreditation, and quality assurance of health services	
1.5.1 Develop and adopt National Health Standards of Practice and health facility accreditation	Develop and adopt national health standards and accreditation
1.5.2 Establish a policy of continued physician licensing and continuing medical education (CME)	Establish CME and physician licensing

Proposed Health Sector Policy Reform Strategies	
Specific Strategy	**Generic Strategy**
2. **NATIONAL SOCIAL HEALTH INSURANCE PROGRAM**	
2.1 **Ensure the viability of the Health Insurance Organization (HIO)**	
2.1.1 Do not add any new groups of beneficiaries to HIO	Eliminate HIO's deficit
2.1.2 Eliminate the current HIO deficit	Eliminate HIO's Deficit
2.1.3 Reduce the proportion of the pharmaceutical costs	Redefine HIO's benefits
2.1.4 Unify the existing health insurance laws into one law	Unify existing health insurance laws
2.1.5 Change the HIO legal and legislative framework to ensure its autonomy	Ensure HIO's autonomy
2.1.6 Develop premium based on actual costs using copayments and deductibles	Redefine HIO's benefits
2.1.7 Identify and adopt an affordable health benefit package(s)	Redefine HIO's benefits
2.2 **Transform the HIO into a financing organization**	
2.2.1 Stop constructing new HIO hospitals	Transform HIO into a financing organization
2.2.2 Develop a plan to sell or transfer to other private or parastatal organizations, in phases, the existing HIO hospitals, polyclinics, and general practitioner clinics	Transform HIO into a financing organization
2.2.3 Develop different mechanisms to subcontract all health service providers, including private and MOHP hospitals	Develop alternative reimbursement mechanisms for HIO contracted services
2.2.4 Allow beneficiaries to choose service providers	Transform HIO into a financing organization
2.3 **Expand social health insurance coverage coupled with adequate administrative and financing mechanisms**	
2.3.1 Design and develop a single national health insurance fund for universal coverage	Expand social insurance coverage
2.3.3 Develop a well-defined standard package of benefits that every citizen is entitled to receive	Redefine HIO's benefits
2.3.4 Separate financing from provision of services	Transform HIO into a financing organization
2.3.5 Ensure legal and financial autonomy of fund	Ensure HIO's autonomy

Acknowledgments

Executive Summary

Egypt's macroeconomic environment has stabilized considerably since 1991. Economic growth, however, is still sluggish. Slow economic growth, combined with the discipline required by structural adjustment and the failure to expand the tax base, constrain growth in government spending, only about 3 percent of which has been allocated to health services in recent years. The real exchange rate has appreciated about 31 percent since 1991, and a devaluation may be on the horizon. Given the importance of drugs in total health sector spending (42 percent in 1990/91), a devaluation would have a strong adverse effect on both government and private health providers. Employment in Egypt is not expected to expand rapidly, if at all, in the two largest sectors (government and agriculture). The fact that the informal sector already employs an estimated 30 to 50 percent of the labor force hinders expansion of social insurance. Privatization has been progressing slowly, and substantial barriers to private-sector competitiveness remain. In health care, however, the private sector is playing an increasingly important role, already accounting for more than half of all health care spending.

An analysis of World Bank data from 49 developing countries indicates that Egypt's health system is the least efficient in the sample, with an average life expectancy at birth of almost 7 years lower than is predicted by a regression model, which includes as explanatory variables per capita gross domestic product (GDP), education, and the percent of GDP spent on health. The analysis shows that if Egypt were able to attain even the average level of health sector efficiency as other countries in the sample, it would be able to attain the same health outcomes at a saving of $1.7 billion. Cost-effectiveness analysis based on the regression analysis indicates that if the health sector policy reform Program Assistance were able to reduce only 10 percent of the Egyptian health sector's "efficiency gap," it could produce an extra year of life at a cost of only $1.84. In this case, the cost effectiveness of the Program Assistance would compare quite favorably to that of other health sector investments. Under the same assumptions, benefit-cost analysis indicates that Program Assistance in the amount of $75 million would yield a benefit-cost ratio of 11.9 and an internal rate of return of 91 percent.

An analysis of the individual policy reforms proposed by the Ministry of Health and Population and the United States Agency for International Development that are expected to be incorporated into the USAID Program Assistance indicates that substantial gains in efficiency can be expected with most components of the policy reform strategy. For example, using case-based reimbursement methods to allocate the recurrent budget to hospitals might save as much as $28 million. Applying cost-effectiveness criteria to the allocation of only 1 percent of Egypt's health spending could save as much as $12.2 million. If steps taken to eliminate the Health Insurance Organization deficit made that system's hospitals as efficient as university hospitals, the expected annual savings would be about $36 million.

In conclusion, Egypt's current macroeconomic environment places increasing pressure on the government to become more efficient. This aspect of the environment should provide impetus for health reform. Other features of the environment, such as the possibility of an impending devaluation, also bear careful monitoring. The fact that Egypt's health sector appears to be highly inefficient creates a unique opportunity to reap substantial economic benefits from health policy reform. The policy reform strategy developed by the ministry and the United States Agency for International Development has the potential to secure a significant share of these anticipated benefits.

1.0   Introduction

The economic analysis consists of three sections in addition to this brief introductory section. Section 2 describes the macroeconomic environment in Egypt as it pertains to health sector reform. Section 3 contains a multivariate analysis of international data that provides a basis for estimating the cost effectiveness of health sector policy reform Program Assistance compared with other health sector interventions and for estimating the benefit-cost ratio and the internal rate of return for the investment represented by the Program Assistance. Section 4 uses welfare economics to analyze the benefits and costs of the individual policy reform strategies included in the Program Assistance. Section 4 also discusses the economic implications of an important characteristic of the institutional setting for health reform in Egypt (i.e., the private practices of government and public sector physicians).

The economic analysis is not intended to evaluate the appropriateness of the proposed health reform strategy or its individual components. Instead, it is intended to elucidate the potential efficiency gains to the economy (i.e., net social benefits) associated with the proposed health reform strategy. Efficiency is only one dimension of the effects of the strategy (equity is the other dimension). The strategy also needs to be evaluated on the basis of its legal, political, and institutional feasibility. The economic analysis may be viewed as one input in the evaluation of the health reform strategy.

2.0 Macroeconomic Environment

Egypt has recently achieved a stable macroeconomic environment. Its slow rate of economic growth, however, severely constrains government spending, and certain other aspects of its macroeconomic environment—notably, its overvalued exchange rate—may pose obstacles to successful health reform in the near term.

2.1 Economic Growth

The overall rate of economic growth is important to health sector reform because it constrains both the rate of growth in the government budget and the population's ability to pay for health services. In 1991, after a series of economic setbacks, including inflation and declining foreign exchange reserves, Egypt began a broad program of economic stabilization with assistance from the World Bank and the International Monetary Fund (IMF). These reforms have largely succeeded. Egypt's current account is now in surplus, its foreign exchange reserves are equal to US$18 billion, and its inflation rate is currently below 10 percent. Although Egypt now has a strong macroeconomic base for sustainable economic growth, it has not attained rates of economic growth that would contribute to significant reductions in poverty (estimated to be 20 to 35 percent of the population) and unemployment (unofficially estimated to be about 20 percent of the workforce). Although there are signs that Egypt's growth rate has accelerated during the past year, it was only 4.7 percent in FY 94/95 and 3.9 percent in FY 93/94 (compared with a population growth rate of about 2.2 percent). The government of Egypt (GOE) has fixed a target rate of growth of 8 percent over the next five years.[1]

The keys to accelerating Egypt's growth will be steps to improve its export competitiveness, liberalize its foreign trade, and encourage its private sector. According to a recent U.S. Embassy economic assessment, "pervasive red tape remains the number-one complaint of both foreign and domestic investors." The principal sectors spurring economic growth in Egypt include: tourism (which has resumed vigorous growth), construction, the oil and gas sector (with strong foreign investment and major natural gas finds), and agriculture (led by liberalized cotton exports). Egypt, however, remains one of the world's leading food importers, and industrial growth has been sluggish in recent years.

The 1994/95 level of gross domestic product (GDP) per capita (valued at the Commercial Bank's exchange rate of 3.39 (LE) = $1) is $ 931. (Refer to Table 2 for an estimate of Egypt's 1990 GDP per capita compared with that of 48 other developing countries, valued at internationally comparable purchasing power parity prices.)

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[1] The discussion of economic growth rates is based on GOE sources. World Bank and IMF estimates of the rate of economic growth are considerably lower. For example, the Central Bank of Egypt estimated that real GDP grew by 3.6 percent in 1993/94, whereas World Bank and IMF estimates for the same period were 2.0 and 2.3 percent, respectively.

2.2   Fiscal Policy

Fiscal policy constrains the level of government resources available to the health sector. The latter depends on the size of the overall government budget as well as on the share of the government budget allocated to health. The ability of the government to tax the potential beneficiaries of expanded social insurance is another aspect of fiscal policy that has a direct bearing on health reform.

2.2.1   General

Government fiscal policy has been highly restrictive since 1991, when the budget deficit was equal to 17 percent of GDP. The budget deficit was only 1.5 percent of GDP in FY 94/95, and the draft budget for FY 95/96 predicted only a 15 percent increase in the deficit compared with the preceding year. The tax system still relies heavily on the taxation of enterprises and trade. A sales tax was introduced in 1991, but it applies only to importers and manufacturers. Plans to transform the sales tax into a full value-added tax by 1995 have been postponed indefinitely. A unified income tax with reduced marginal rates was implemented in 1995, but the tax base itself has not been broadened. Under these circumstances, the ability to tax the broader population to pay for additional health benefits, such as the expansion health insurance, is limited.

2.2.2   Health Budget

The central government's recurrent and investment budget expenditures on health during the period 1989/90 to 1993/94 are provided in Table 1. The recurrent health budget was about 1 billion LE (about US $300 million) in 1993/94 (preliminary estimate), up from 585 million LE in 1989/90. Recurrent health spending has amounted to 2 to 3 percent of total recurrent spending during this period, decreasing from a high of 2.61 percent in 1989/90 to a low of 2.07 percent in 1991/92, subsequently increasing slightly to 2.21 percent in 1993/94. In contrast, both the absolute level of health investment and health investment as a percent of the total investment budget have declined steadily during the same period, from 1.72 percent of the total in 1989/90 to 0.81 percent in 1993/94 (a preliminary estimate of 86 million LE in 1993/94). The declining shares of health spending in the recurrent and investment budgets have put a squeeze on many aspects of the Ministry of Health and Population's (MOHP) operations, particularly in the areas of operating expenses (i.e., non-salary recurrent expenditures) and renovation of the existing infrastructure.

2.3   Exchange Rates

The foreign exchange rate affects the cost to the health sector of a number of inputs, especially the cost of drugs. Because of the importance of drugs as an expenditure component

Table 1 Government Expenditures on Health, 1989/90 - 1993/94 (in millions of Egyptian pounds)					
Item	1989/90	1990/91	1991/92	1992/93	1993/94 (preliminary)
TOTAL RECURRENT EXPENDITURES	22,446	29,678	36,198	41,292	45,940
Central Government	19,813	26,638	32,961	37,304	40,936
Health	585	715	749	900	1,016
Health as percent of total recurrent expenditures	2.61	2.41	2.07	2.18	2.21
Local Government	996	1,102	1,170	1,336	1,759
Public Services Authorities	1,637	1,938	2,067	2,502	2,911
TOTAL INVESTMENT EXPENDITURES	9,803	10,178	11,848	11,097	10,653
Health	169	182	161	106	86
Health as percent of total investment expenditures	1.72	1.79	1.36	0.95	0.81

Source: International Monetary Fund (1995), Tables 48-49.

within the health sector,[2] a devaluation could result in the cost of health services increasing significantly compared with other articles of consumption.

In real terms, the LE has appreciated against the dollar and other key foreign currencies by approximately 31 percent since 1991. This appreciation, and the resulting decline in Egypt's export competitive, has been a continuing source of friction with the IMF, which has held up disbursal of the last tranche of the Paris Club's debt forgiveness of $10 billion (extended concurrently with the economic reforms undertaken by Egypt in 1991). Egypt is again in discussions with the IMF. Although the issue is extremely sensitive, it is possible that the LE will be devalued at some point in the near future.

2.4   Prices

The inflation rate affects the functioning of all health sector markets, but particularly the functioning of credit markets in relation to the private health sector. Inflation can also pose special problems for markets in which prices are controlled (e.g., pharmaceuticals) and for establishing cost recovery fees, as well as levels of health insurance deductibles and co-payments.[3] Among individual prices, those of medical care in general and pharmaceuticals in particular are of special concern.

2.4.1   Inflation Rate

According to GOE estimates, the rate of consumer price increase for the 12-month period prior to February 1996 was 6.3 percent, down from 10.2 percent during the preceding 12-month period. (The government estimates that the annual inflation rate for 1995 was 8.4 percent.)

2.4.2   Individual Prices

The GOE's consumer price index for medical care, which is prepared by (CAPMAS), increased 56.6 percent (i.e., at an annual rate of 11.9 percent) during the period 1990-94, compared with the increase in the index of all consumer prices during the same period of 62 percent (i.e., an annual rate of 12.9 percent).

Pharmaceutical prices continue to be regulated (one of the few remaining areas of administered prices in the economy). The government put a cost-based pricing formula into effect in January 1992, but pharmaceutical price controls are still a major concern of pharmaceutical companies. Removal of price controls would initially result in a major shock to health providers, insurers, and consumers.

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2 According to Berman et al. (1995), total drug consumption (public and private) amounted to 42.4 percent of total health sector spending in 1990/91.

3 In Egypt, insurance co-payments and deductibles have often been written into laws governing health insurance. This is generally not considered to be a good practice, since the value of such fees is typically eroded quickly by inflation and revision of the fees becomes a political, rather than a purely administrative, matter.

2.5   Employment

Levels and patterns of employment affect not only the ability of the population to pay for health services, but also the ability of insurers to form risk pools for the expansion of health insurance. The domestic labor force numbered 16.9 million in FY 1994/95. Official unemployment was 9.6 percent (unofficial estimates are around 20 percent, with under-employment affecting an estimated one-third to one-half of the labor force). Approximately 2.5 million Egyptians currently work overseas.

The government has virtually stopped hiring, and there is little prospect for employment growth in the government or agriculture sectors, Egypt's two largest employers.[4] Although a large pool of educated labor aspires to government employment and graduates continue, in theory, to benefit from guaranteed employment with the government, there is a 7- to 8-year waiting list.

The government's Social Fund for Development, established in 1991 with donor pledges of $617 million, has created 50,000 to 70,000 thousand jobs per year, almost one-quarter of all non-agricultural jobs created annually in Egypt. No reliable data exist on employment in the informal sector, which accounts for as much as 30 to 50 percent of economic activity and serves as the employer of last resort.

2.6   Privatization

The pace, patterns, and success of privatization in Egypt will affect the degree of difficulty in shifting MOHP and Health Insurance Organization (HIO) facilities to a more autonomous organizational mode (e.g., parastatal or private status). Privatization has been slow since 1991. The state enterprise sector currently includes about 300 companies, which account for approximately 70 percent of Egyptian manufacturing. Early in 1996, shortly after the installation of a new, more private, sector-oriented government, Egypt signified its intention to sell outright or sell minority stakes in 120 state enterprises. Privatization is expected to be one of the key indicators of the degree of success achieved by the new government.

There is an active private sector in health care. In 1990/91, it accounted for 54.6 percent of total health care spending: 14.2 percent of spending on hospital care and 76.2 percent of spending on non-hospital care. Private pharmacies accounted for the largest share of total spending (30.1 percent), followed by private medical practices (15.7 percent) and private hospitals (5 percent).

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4 In 1993 CAPMAS estimated that civil service employment accounted for 23 percent of the total labor force, with an additional 8 percent employed by state-owned enterprises. The same study showed agricultural sector employment equal to 31 percent of the labor force.

Economic Analysis of Health Sector Policy Reform

3.0 Economic Analysis of Overall Health Sector Policy Reform

It is instructive to compare the Egyptian health sector's performance with that of other countries. Table 2 lists World Bank data on the following variables for 49 developing and developed countries:

1) Average life expectancy at birth in 1990

2) GDP per capita in 1990 (parity power pricing estimates prepared by Summers and Heston)

3) Percent of GDP spent on health

4) Education stock (World Bank estimate)

These data can be used to estimate an international health production function, which explains variations across countries in average life expectancy at birth (a measure of health outcomes)[5] as a function of income, education, and the share of national income allocated to health spending. The basic regression model used in the analysis is:

$$\text{Life expectancy} = a + b*\text{GDP per capita} + c*\text{Education stock} + d*\text{Percent of GDP spent on health} + u$$

where a, b, c, d are fixed coefficients to be estimated and u is a random disturbance term. This specification is strictly linear. In fact, we experimented with a number of alternative non-linear functional forms to find the model that best fits the data. The results of the regression analysis are presented in Table 3. They show that average life expectancy is significantly related to income, education, and health spending, with the best-fitting function being non-linear in per capita GDP and in the percent of GDP spent on health.[6] The relationship between

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[5] Average life expectancy at birth is a summary measure of current mortality at all ages. It is an estimate of the number of years of life a newborn child could expect if he or she were to experience current age-specific survival rates through maturity. Compared with the infant mortality rate, another widely used indicator of health status, average life expectancy at birth is a more general measure of current health status because it reflects the probability of surviving at all ages, not just during the first year of life.

[6] The t-statistics listed in Table 3 (in parentheses under each estimated coefficient) are the test statistics that test the hypothesis that the true coefficient of each independent variable listed in the table is zero. Values of the t-statistic higher than about 2 are significant at the 0.05 level (i.e., there is only a 1-in-20 chance that the true value of the coefficient is zero). The R^2 reported in the table refers to the percent of the variation in the dependent variable (average life expectancy), which is explained by all the independent variables.

Table 2 **International Data on Life Expectancy, Per Capita GDP, Education Stock, and the Share** **of GDP Spent on Health, 1990 (49 developing countries)**				
Country	**Average Life Expectancy at Birth, 1990**	**GDP per capita, 1990 (thousands of US \$)[1]**	**Education Stock, 1990**	**Share of GDP Spent on Health, 1990[2]**
Argentina	71.23	4850	7.262	4.24
Bangladesh	51.57	1120	3.431	3.19
Bolivia	59.98	2080	5.567	4.13
Brazil	66.16	5170	4.682	4.20
Chile	71.96	6650	7.911	4.73
China	70.16	1940	4.588	3.51
Cote D'Ivoire	55.32	1610	2.111	3.36
Colombia	68.80	5340	5.365	3.97
Costa Rica	75.15	5030	6.649	6.54
Algeria	65.42	5720	4.695	6.95
Ecuador	66.11	3980	6.156	4.14
Egypt	60.22	3540	5.611	4.70
Ghana	54.65	1950	5.339	3.48
Greece	77.13	7600	9.074	5.39
Guatemala	63.16	3120	3.567	3.84
Honduras	64.88	1800	4.535	4.61
Haiti	54.36	1280	2.808	6.99
Indonesia	59.00	2560	4.500	2.01
India	59.02	1140	3.950	6.00
Iran	62.93	4430	4.127	2.54
Jamaica	73.18	3550	10.480	5.04
Jordan	67.28	5630	6.301	3.77
Kenya	58.87	1360	4.780	4.33
Korea, Rep. of	70.20	7610	8.256	6.61
Sri Lanka	71.13	2510	6.633	3.74
Morocco	61.78	3200	2.703	2.79
Mexico	69.70	6930	6.333	3.16

	Table 2			
	International Data on Life Expectancy, Per Capita GDP, Education Stock, and the Share of GDP Spent on Health, 1990 (49 developing countries)			
Country	**Average Life Expectancy at Birth, 1990**	**GDP per capita, 1990 (thousands of US $)[1]**	**Education Stock, 1990**	**Share of GDP Spent on Health, 1990[2]**
Mali	47.93	480	1.021	5.19
Mozambique	46.69	600	2.099	6.01
Malawi	46.45	750	3.691	4.98
Pakistan	56.00	1880	2.335	3.48
Panama	72.65	4490	6.937	7.10
Peru	62.72	3040	6.891	3.21
Philippines	64.35	2470	8.847	2.84
Portugal	74.93	9070	5.957	6.99
Paraguay	67.30	3380	6.105	3.06
Rwanda	48.11	700	2.994	3.68
Senegal	47.32	1680	1.805	3.77
El Salvador	63.56	2030	5.165	5.86
Syria	66.11	4900	6.135	2.57
Thailand	65.86	4860	5.828	4.98
Tunisia	66.73	4520	5.112	4.91
Turkey	66.61	4800	5.155	3.94
Tanzania	47.53	560	2.750	5.03
Uganda	46.89	1110	2.833	3.40
Uruguay	72.98	6480	8.309	4.62
Venezuela	70.12	7400	5.499	3.60
Zambia	49.74	1060	5.028	3.16
Zimbabwe	60.84	2100	4.711	6.23

Source: World Bank
[1] GDP valued at purchasing power parity prices
[2] Includes public and private health expenditures

Table 3 Regression Analysis of the Determinants of Average Life Expectancy at Birth (Dependent Variable) (based on 1990 data for 72 countries)	
Independent Variable	**Estimated Regression Coefficient (t-statistic)**
GDP per capita, in thousands of US $ (GDPPC)	12.308 (5.13)[*]
Square of GDPPC (GDPPC*GDPPC)	-2.1801 (-3.69)[*]
Cube of GDPPC (GDPPC*GDPPC*GDPPC)	0.1295 (3.04)[*]
World Bank measure of educational stock (HC)	1.3834 (4.15)[*]
Inverse (1/PEREXP) of Percent of GDP spent on health (PEREXP)	-15.767 (-2.21)[*]
Constant	40.627
N	49
R^2	0.86

Source: World Bank Data (the GDP data are valued using international purchasing power parity prices, based on the research of Summers and Heston)

[*] Statistically significant at the 0.05 level

Table 4 Countries with Relatively Efficient and Inefficient Health Systems (based on deviations from regression line estimated in column 1 of Table 3)			
Relatively Efficient		**Relatively Inefficient**	
China	+11.06	Egypt	-6.81
Sri Lanka	+6.33	Senegal	-6.76
Honduras	+5.55	Ghana	-5.51
Costa Rica	+4.50	Malawi	-4.18
India	+4.17	Uganda	-4.17
Source: Estimated regression function in Table 3 and data in Table 2.			

life expectancy and GDP is positive up to per capita GDP levels in the range of $5,000 to 6,000, where it becomes flat, thereafter regaining a positive slope. At Egypt's level of per capita GDP ($3.540), valued at international purchasing power parity prices, a $1,000 increase in GDP per capita would raise average life expectancy by approximately 1.76.[7] The relationship with education is linear, with each unit increase in the education stock adding 1.38 years to average life expectancy. The best-fitting relationship of life expectancy to the percent of GDP spent on health turns out to be non-linear (i.e., the inverse function 1/PEREXP, where PEREXP is the percent of GDP spent on health). At Egypt's share of GDP spent on health (4.7 percent), the estimated regression function implies that an additional 1 percent of GDP spent on health would raise average life expectancy about 0.7 years.[8]

One can use the estimated regression function to calculate the level of average life expectancy predicted by the model for each country, given the country's levels of GDP per capita, education stock, and percent of GDP spent on health. The difference between the country's actual level of average life expectancy (from Table 2) and its predicted level can then serve as a measure of the "efficiency" of the country's health system. Positive values (i.e., corresponding to countries with data points above the estimated regression curve) correspond to relative efficiency, whereas negative values correspond to relative inefficiency. A value of zero would imply that the country obtains the same level of average life expectancy that the model predicts it should, given its income, education, and percent of GDP spent on health.

Table 4 reports the results of these calculations for the five countries that appear to have the most efficient health systems, as well as for the five that appear to have the least efficient systems. Of the 49 sample countries, China (+11.06) and Sri Lanka (+6.33) appear to have the most efficient systems, whereas Egypt (-6.81) and Senegal (-6.76) appear to have the least efficient health systems. China, for example, had an actual average life expectancy in 1990 that was 11 years longer than the model would predict on the basis of China's level of GDP per capita, its education stock, and the percent of GDP it spent on health in that year. Egypt, on the other hand, had a 1990 average life expectancy almost 7 years lower than the model would predict. These results suggest that Egypt's health sector is highly inefficient in its ability to transform inputs into health outcomes. In this sense, the regression analysis suggests that there is considerable opportunity for reforming Egypt's health sector to make it more efficient.

3.1   Cost Effectiveness Analysis

The estimates in Table 4 imply that Egypt would be able to enjoy an average life expectancy 6.81 years longer if its health system performed at even an average level of efficiency, compared with the other 48 countries in the sample. If the health policy reform Program Assistance is able to bridge only 10 percent of this inefficiency gap, so that average life expectancy increases by 0.68, and if the Program Assistance provides $75 million (or approximately $1.25 per capita) to achieve this result, this implies that the Program Assistance

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[7] The slope of the estimated regression function is given by the quadratic equation, Slope (GDPPCD) = 12.31 - 4.36*GDPPC + 0.39*(GDPPC)^2, which is equal to 1.76 at Egypt's level of GDPPC (3.54).

[8] The estimated slope is given by the equation, slope (PEREXP) = 15.77/(PEREXP)^2, which is equal to 0.7 at Egypt's level of PEREXP (4.7).

could produce an extra year of life at a cost of $1.84. The cost effectiveness of the Program Assistance in producing health outcomes would in this case compare quite favorably with other health sector investments. For example, the Data for Decision Making (DDM) project has estimated that immunization in Egypt costs less than 200 LE ($59) per health year of life gained from deaths averted. The Healthy Mother/Healthy Child (HM/HC) project estimates that it will avert maternal and infant/child deaths at a cost of $468 to 2,848 per death averted. Taking the most conservative case of an infant or child whose life is saved, and assuming he or she lives an additional 70 years, the cost per additional year of life achieved through HM/HC would range between $6.69 and $40.69. There are differences in the two projects that would narrow these cost effectiveness estimates,[9] but it is clear that the health policy reform Program Assistance has the potential to be extremely cost effective compared with other health sector interventions. Even if the Program Assistance eliminated an extremely conservative 1 percent of Egypt's efficiency gap (compared with the 10 percent assumption used in the preceding discussion), the cost per year of life saved would be only $18.40, which still compares favorably to other health sector investments.

3.2   Benefit-Cost Analysis

If one assumes that the social benefits of health care are limited to its health impacts,[10] it is possible to use the estimated regression in Table 3 to calculate the potential social benefits of health policy reform. To do this, the estimated regression is used to answer the following question: "If Egypt's health sector had attained an average level of efficiency compared to the other countries in the sample in 1990, what percent of its GDP would it have had to spend to obtain the same level of average life expectancy as it obtained in that year?" The answer is that Egypt would have had to spend only 1.55 percent of its GDP on health in 1990, instead of the 4.7 percent of GDP it did spend, to achieve the same health outcome.[11] In relation to current levels of GDP (valued at the Commercial Bank's exchange rate), this savings would amount to $29, or a total of $1.74 billion. If once again one assumes that the Program Assistance is able to eliminate 10 percent of Egypt's health sector efficiency gap, the social benefits would be about $2.90 per capita, or $174 million. Table 5 provides estimates of the benefits and costs of the health sector policy reform Program Assistance over a 15-year period, assuming a conservative distribution of benefits and costs over time. It is assumed, for example, that benefits do not begin to accrue until year three, when only 10 percent of the total benefit level is attained. The full level of benefits (i.e., benefits equal to 10 percent of the "efficiency gap") are not attained until year nine and are assumed to remain at that level thereafter. The costs of the Program Assistance are assumed to be distributed as follows: 10 percent in year one, 20 percent in each of years two to four, and 30 percent in year five. Under these assumptions, and assuming a 10 percent discount rate, the

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9 One difference is that the HM/HC project is targeted directly to mothers and children, whereas the health policy reform Program Assistance benefits the broader population (although some of the individual policy reforms are designed to target benefits of the policy reforms to women and children). Another difference is that the HM/HC project is designed to reduce maternal morbidity as well as to reduce mortality. Although it is difficult to quantify, the health policy reform should also produce parallel reductions in mortality.

10 This is in fact the assumption that underlies the use of cost effectiveness ratios, such as cost per Daily Adjusted Life Year (DALY), as a criterion for allocating health system resources.

11 This estimate was obtained by substituting Egypt's 1990 levels of GDP per capita and the education stock (from Table 2) into the estimated regression in Table 3, setting average life expectancy (the left side of the equation) to Egypt's 1990 level (from Table 2), and solving for the percent of GDP spent on health, which would make the left side of the equation equal to the right side.

benefit-cost ratio is 11.9 and the internal rate of return is 91 percent. Even under the extremely conservative assumption that the Program Assistance succeeds in eliminating only 1 percent of the efficiency gap (instead of 10 percent), the benefit-cost ratio would be 1.2 and the internal rate of return would be 13 percent.

Year	Distribution of Benefits over Time	Benefits (millions of $)	Distribution of Costs over Time	Costs (millions of $)	Discounted Benefits[1] (millions of $)	Discounted Costs (millions of $)
1	0.0%	0.0	10.0%	7.5	0.0	7.5
2	0.0%	0.0	20.0%	15.0	0.0	13.6
3	10.0%	17.4	20.0%	15.0	14.4	12.4
4	20.0%	34.8	20.0%	15.0	26.1	11.3
5	30.0%	52.2	30.0%	22.5	35.7	15.4
6	50.0%	87.0	0.0%	0.0	54.0	0.0
7	70.0%	121.8	0.0%	0.0	68.8	0.0
8	90.0%	156.6	0.0%	0.0	80.4	0.0
9	100.0%	174.0	0.0%	0.0	81.2	0.0
10	100.0%	174.0	0.0%	0.0	73.8	0.0
11	100.0%	174.0	0.0%	0.0	67.1	0.0
12	100.0%	174.0	0.0%	0.0	61.0	0.0
13	100.0%	174.0	0.0%	0.0	55.4	0.0
14	100.0%	174.0	0.0%	0.0	50.4	0.0
15	100.0%	174.0	0.0%	0.0	45.8	0.0
Totals		1687.8		75.0	714.0	60.2

Table 5
Benefit-Cost Analysis of Program Assistance

Source: see text
[1] Assumes discount rate of 0.10

4.0   Benefit-Cost Analysis of Health Sector Reform Strategies

The preceding section presented a cost effectiveness analysis and benefit-cost analysis of the health sector policy reform Program Assistance at an aggregate level. This section discusses (and in some cases, attempts to estimate) the benefits and costs of the individual strategies of the Program Assistance. The analysis in this section is based on welfare economics. Each policy reform strategy is evaluated in terms of its likely effect on economic efficiency, with possible effects on equity identified. (The equity impact of the Program Assistance is the focus of the "Social Vulnerability Analysis.") The analysis is prefaced by a theoretical discussion of the possible implications for health reform of the widespread phenomenon in Egypt of government and public sector physicians who have private practices on the side. It is argued that private practices provide many government and public physicians with at least the opportunity to convert government subsidies to additional net income for their private practices and that, under these circumstances, the imposition of cost recovery as a way to reduce government subsidies to hospitals may be perceived as a direct threat to the economic position of these physicians.

The discussion of the benefits and costs of individual health reform strategies is organized around the strategies listed in the matrix, "Suggested National Health Sector Reform Strategies," prepared by USAID/Cairo. Table 6 shows how these individual policy reform strategies map to a smaller set of generic reform strategies, whose efficiency effects are analyzed in this section. In some cases, an individual strategy from the matrix maps to more than one generic strategy, as indicated in the table. Identification of the underlying generic strategies avoids wasteful overlap in the following discussion. The analysis itself consists of a theoretical discussion of the social benefits and costs of each strategy, followed by an attempt to estimate its benefits and costs using Egyptian data.

It is difficult in some cases to isolate individual strategies so as to accurately estimate their benefits and costs. For example, the welfare effects of eliminating the HIO deficit depend on how the deficit is eliminated, which is addressed by other strategies. Or the welfare effects of expanding cost recovery in MOHP hospitals depend on how the revenue is utilized. In some cases, there is no basis available at this time for preparing quantitative estimates of the benefits or costs. In other cases, the estimates are only indicative in nature. Although Egypt is not a data-poor country, access to data is highly restricted and published sources of MOPH data are particularly thin. The main purpose served by the analysis presented in this section is to identify conceptually the real economic benefits and costs of each reform strategy. A secondary objective is to adduce evidence bearing on the plausibility of the aggregate analysis presented in the preceding section.

<table>
<tr><td colspan="2" align="center">**Table 6**
Proposed Health Sector Policy Reforms</td></tr>
<tr><td align="center">**Specific Strategy**</td><td align="center">**Generic Strategy**</td></tr>
<tr><td colspan="2">**1.   ROLE OF THE MINISTER OF HEALTH AND POPULATION**</td></tr>
<tr><td colspan="2">**1.1   Rationalize the Role of the MOHP in Financing Curative Care**</td></tr>
<tr><td>1.1.1   Stop the construction of unnecessary hospitals and set strict guidelines for the completion of facilities under construction</td><td>Improve the allocation of the MOHP investment budget</td></tr>
<tr><td>1.1.2   Transfer existing hospitals to other parastatal organizations</td><td>Allow hospital autonomy</td></tr>
<tr><td>1.1.3   Expand cost recovery in government facilities</td><td>Expand cost recovery</td></tr>
<tr><td>1.1.4   Allow private practitioners to use the MOHP facilities</td><td>Allow private practitioners to use government facilities</td></tr>
<tr><td>1.1.5   Allow hospital autonomy</td><td>Allow hospital autonomy</td></tr>
<tr><td>1.1.6   Support hospitals based on efficiency indicators such as on a per capita, per bed basis, etc.</td><td>Use alternative budget allocation forumula for MOHP hospitals</td></tr>
<tr><td>1.1.7   Examine the cost recovery of curative services at the PHC level</td><td>Expand cost recovery</td></tr>
<tr><td colspan="2">1.2   Strengthen the role of the MOHP in the provision and increased share of financing preventive medicine (PM) and primary health care (PHC)</td></tr>
<tr><td>1.2.1   Use cost effectiveness analysis to identify a package of PM and PHC services to be supported by MOHP to which every Egyptian is entitled</td><td>Increase the cost effectiveness of MOHP's program</td></tr>
<tr><td>1.2.2   Increase emphasis on MCH programs</td><td>Increase emphasis on MCH programs</td></tr>
<tr><td>1.2.3   Provide incentives for the health care providers to specialize in PM, PHC, and family medicine</td><td>Increase the cost effectiveness of MOHP's program</td></tr>
<tr><td>1.2.4   Do not separate curative services at the PHC level</td><td>Continue to provide curative services in PHC facilities</td></tr>
<tr><td>1.2.5   Ensure adequate allocation of resources, e.g., personnel</td><td>Improve the allocation of the MOHP recurrent budget</td></tr>
</table>

Table 6 Proposed Health Sector Policy Reforms	
Specific Strategy	**Generic Strategy**
1.3 Reform the MOHP personnel policy	
1.3.1 There should be no guaranteed employment	Reduce the overall number of MOHP personnel
1.3.2 Develop guidelines for MOHP personnel and apply them to redistribute personnel based on needs assessment	Improve the allocation of the MOHP recurrent budget
1.3.3 Reduce the overall number of MOHP personnel	Reduce the overall number of MOHP personnel
1.3.4 Provide incentives for the MOHP personnel to serve in underserved and remote areas	Improve the allocation of the MOHP recurrent budget
1.4 Develop the MOHP capacity for national health needs assessment, sectoral strategic planning and policy development	
1.4.1 Adapt the national health information systems, including (GIS) for planning and policy decision making	Improve the allocation of the MOHP investment budget Improve the allocation of the MOHP recurrent budget
1.4.2 Prioritize the allocation of MOHP resources based on needs using health status indicators	Improve the allocation of the MOHP investment budget Improve the allocation of the MOHP recurrent budget
1.4.3 Create incentives for other health care providers to function in under served areas	Provide incentives to private health providers to function in under served areas
1.4.4 Target GOE subsidy to poor and indigent populations	Improve the equity of MOHP subsidies
1.4.5 Use cost effectiveness analyses in determining the essential health services	Increase the cost effectiveness of MOHP's program
1.5 Develop the MOHP role in regulation, accreditation,and quality assurance of health services	
1.5.1 Develop and adopt National Health Standards of Practice and health facility accreditation	Develop and adopt national health standards and accreditation
1.5.2 Establish a policy of continued physician licensing and continuing medical education (CME)	Establish CME and physician licensing

<table>
<tr><td colspan="2" align="center">Table 6
Proposed Health Sector Policy Reforms</td></tr>
<tr><td align="center">Specific Strategy</td><td align="center">Generic Strategy</td></tr>
<tr><td colspan="2">2.   NATIONAL SOCIAL HEALTH INSURANCE PROGRAM</td></tr>
<tr><td colspan="2">2.1   Ensure the viability of the HIO</td></tr>
<tr><td>2.1.1   Do not add any new groups of beneficiaries to HIO</td><td>Eliminate HIO's deficit</td></tr>
<tr><td>2.1.2   Eliminate the current HIO deficit</td><td>Eliminate HIO's deficit</td></tr>
<tr><td>2.1.3   Reduce the proportion of the pharmaceutical costs</td><td>Redefine HIO's benefits</td></tr>
<tr><td>2.1.4   Unify the existing health insurance laws into one law</td><td>Unify existing health insurance laws</td></tr>
<tr><td>2.1.5   Change the HIO legal and legislative framework to ensure its autonomy</td><td>Ensure HIO's autonomy</td></tr>
<tr><td>2.1.6   Develop premium based on actual costs using copayments and deductibles</td><td>Redefine HIO's benefits</td></tr>
<tr><td>2.1.7   Identify/adopt affordable health benefit package(s)</td><td>Redefine HIO's benefits</td></tr>
<tr><td colspan="2">2.2   Transform the HIO into a financing organization</td></tr>
<tr><td>2.2.1   Stop constructing new HIO hospitals</td><td>Transform HIO into a financing organization</td></tr>
<tr><td>2.2.2   Develop a plan to sell or transfer to other private or parastatal organizations, in phases, the existing HIO hospitals, polyclinics, and GP clinics</td><td>Transform HIO into a financing organization</td></tr>
<tr><td>2.2.3   Develop different mechanisms to subcontract all health service providers, including private and MOHP hospitals</td><td>Develop alternative reimbursement mechanisms for HIO contracted services</td></tr>
<tr><td>2.2.4   Allow beneficiaries to choose service providers</td><td>Transform HIO into a financing organization</td></tr>
<tr><td colspan="2">2.3   Expand social health insurance coverage coupled with adequate administrative and financing mechanisms</td></tr>
<tr><td>2.3.1   Design and develop a single national health insurance fund for universal coverage</td><td>Expand social insurance coverage</td></tr>
<tr><td>2.3.3   Develop a well-defined standard package of benefits that every citizen is entitled to receive</td><td>Redefine HIO's Benefits</td></tr>
<tr><td>2.3.4   Separate financing from provision of services</td><td>Transform HIO into a financing organization</td></tr>
<tr><td>2.3.5   Ensure legal and financial autonomy of fund</td><td>Ensure HIO's autonomy</td></tr>
</table>

4.1   The Implications of Private Practice by Government and Public Sector Physicians

The fact that many public sector physicians ("public sector" in the following discussion refers to both government and public sector physicians in the case of Egypt) also have private practices on the side is a feature of the Egyptian health sector. This fact complicates a discussion of the benefits and costs of certain policy reforms. Before proceeding, it is useful to review some of the possible implications of this phenomenon for the behavior of health markets. In order to do so, we assume that physicians who combine a private practice with a public sector job are trying to maximize their net incomes. Although all Egyptian physicians almost certainly do not behave this way, it is interesting to derive some of the implications of such a model for health sector reform. Its ability to explain the process and effects of health sector policy reform, and therefore its ultimate relevance, will be tested over time.

The simplest case to analyze is that of a public sector physician practicing in a heavily subsidized hospital that charges no fees to its patients and where quality of care is sufficiently high that the demand for services exceeds capacity. Some way must be found to ration the hospital's scarce resources among those who demand its services.[12] One way would be to provide care on a first-come, first-served basis. Lines of patients waiting to be admitted would form outside the hospital. The sickest patients would not necessarily get in first, and some patients who had good "connections" would undoubtedly be admitted before others waiting in line. It would not be long before physicians practicing in the hospital would discover that they could request "gifts" from patients desiring prompt admission to the hospital.[13] The acceptance of gifts by physicians practicing in public hospitals is a widespread phenomenon. In Egypt, however, as well as in some other countries, public sector physicians are permitted to institutionalize this practice by establishing private practices on the side.

The demand for the private outpatient services of public sector physicians is based not only on the professional care they provide, but also on their ability to get their patients admitted to the public hospital and, once admitted, to receive the best care available there. Each physician faces his own demand curve, and the price he commands will be a function of his influence and power within the hospital, as well as of his professional abilities.[14] Patients are willing to pay not only to receive additional professional services, but also because of their physician's ability to provide them with access to subsidized services inside the hospital. The subsidies that the government provides to the hospital will be effectively transferred to the physicians who practice there. Patients will have to pay a price similar to what they would pay if the hospital were private and charging fees to maximize its profits.

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12 If the hospital were private, price would be used to ration the hospital's services. Under these circumstances, if income were equally distributed, the hospital's patients would be those who needed its services most (they would be willing to bid the highest price for its services). With income distributed unequally, as it is in all countries, the hospital's patients would also include those with less serious needs but who could afford to pay more.

13 An alternative way to ration space in a high-quality, tertiary care facility is to impose a strict referral system in which patients are admitted only on referral from lower-level care institutions. This would improve the system's efficiency in that only the most serious cases would, in principle, be treated by the tertiary care facility. Before long, however, physicians making referrals would discover that they could also extract gifts in return for a referral. According to the model we present, physicians practicing in tertiary care facilities should be opposed to a strict referral system because it establishes an alternative set of gate-keepers, potentially lowering their own income-earning potential.

14 In technical terms, each private physician faces a downward-sloping demand curve (he is a monopolistic competitor) and is assumed to set his fees at a level that maximizes his net income.

The net income-maximizing public sector physician with a private practice on the side will be likely to exhibit the following behavior:

1) She will strongly support additional government subsidies (or donor-provided equipment) because this increases the demand for her services as gatekeeper to the hospital's resources. Through the prices she charges patients for access to these subsidized inputs, the physician effectively captures the subsidies for herself. (She effectively "rents" the hospital's inputs to her patients.)

2) He will strongly oppose the hospital charging any direct fees (cost recovery) because any amount that patients must pay the hospital will be subtracted from what they are willing to pay the physician. The physician will be most strongly opposed to cost recovery, which reduces the amount of subsidy the hospital receives from the government, since his own income is directly related to the level of subsidies received. If cost recovery revenue is retained in the hospital and used to improve the quality of care (particularly in the area in which the physician himself practices) and provides additional payments for himself and other physicians, and if cost recovery does not result in a reduction in the level of government subsidies to the hospital, the income-maximizing physician may be willing to accept limited cost recovery.

3) She will try to reallocate the hospital's resources internally so that her private patients receive more subsidized inputs and are therefore willing to pay her higher fees for having supplied them. Reallocating resources internally will be facilitated by the establishment of special wards for private patients, and these are likely to be supported by the income-maximizing physician.

4) In hospitals where subsidies are not sufficient to create excess demand (e.g., district hospitals in rural areas), income-maximizing physicians may try to re-allocate resources within the hospital to special paying wards (i.e., create a two-tiered system based on quality of care) to create a demand for their services as gatekeepers providing access to the subsidized resources available in the special wards. The more they are able to differentiate the quality of care provided in each tier, the more patients will be willing to pay, not only because of the resources their doctor is able to provide in the high-quality tier, but also because the quality of care in the rest of the hospital will be commensurately lower. As quality deteriorates in the lower tier, the hospital may exhibit low occupancy rates (particularly in the lower-quality tier).

5) Under a two-tier quality system, quality in each tier will be determined on the basis of what maximizes physician net incomes. The availability of additional funds to the hospital will not necessarily lead to higher quality of care, particularly in the lower quality tier.

6) Powerful physicians within a hospital are likely to oppose general salary increases, which benefit them only in proportion to their salaries. Instead, they will prefer to see government money spent on subsidized resources, which they can control and "rent" to their patients. For example, a hospital dominated by surgeons would prefer to have government money spent on upgrading the quality of surgical facilities rather than have the same funds used to affect a general increase in salaries. The improved surgical facilities will benefit them directly by permitting them to charge higher fees in their private practices.[15]

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15 According to this model, physicians who seek special facilities and equipment for the benefit of their own specialties are not only expressing the usual professional fidelity to the area in which they practice, but are also seeking investments that will increase their net incomes.

7)   The income-maximizing physician will divide his time between the hospital and his private practice in such a way as to maximize his net income. Even if not required to spend a minimum amount of time in the hospital as a condition of employment, the income-maximizing physician will want to spend enough time there to provide good quality care to his private patients. Increasing the salary of such a physician will not affect the amount of time he spends in the hospital, unless the salary is linked to time actually spent in the hospital (and strictly enforced).

8)   The benefits of public sector employment, in addition to a small salary and fringe benefits, include the ability to control access to public facilities and publicly subsidized resources that can be "rented" to their private patients. If public sector physicians were instead in private practice, they would be able to charge their patients the same fees, but they also would have to pay for all the hospital inputs their patients consume.[16]

9)   One would expect to find similar income-maximizing behavior among physicians employed by a social insurance scheme that operates its own facilities and allows its staff to have private practices on the side. Under these circumstances, the income-maximizing physician will charge a fee to private patients, which includes a "rent" for access to inputs subsidized by the insurance fund.[17] The income-maximizing physician will oppose the imposition of deductibles and co-payments, as these will reduce the amount she can charge in her private practice. She will oppose the separation of financing from provision of services because that will eliminate her access to subsidized inputs. She will oppose any attempt by the insurance fund to "contract out" for services (i.e., become a third-party payer), as that will create competition for her own private practice.

10)   The income-maximizing physician will support hospital autonomy only if it does not transfer managerial power to non-physicians. Physicians will want to zealously guard their control over the fees charged by the hospital and allocation of resources within the hospital.

11)   The income-maximizing physician will try to gain control over all aspects of the public system, so that he will be able to ensure continued flows of subsidies to the hospital in which he practices (or obtain a transfer to a more heavily subsidized hospital), exercise a maximum degree of power over the allocation of resources within the hospital, and control the use of any revenue collected by the hospital from patients.

        In summary, the most important feature of a system in which physicians practicing in a public sector hospital have private practices on the side is that subsidies provided by the government to the hospital increase the physician's personal income and fees charged directly by the hospital to the patient reduce his income. Again, it is important to note that this description of the behavior of the income-maximizing physician does not establish its usefulness in explaining actual physician behavior in Egypt. The point is that the implications of such a model are quite different from what health reformers often assume to be the interests of physicians practicing in a public health system. The ability to frame effective health reform strategies in Egypt will depend in part on a better understanding of actual physician behavior in the participating institutions.

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16 Alternatively, the patients would have to pay the hospital a separate fee, and this would effectively reduce dollar-for-dollar the fee patients would be willing to pay to the doctor.

17 This assumes that some types of care are rationed in the social insurance system or that its physicians are able to establish a two-tier quality of care within each hospital by re-allocating the subsidized inputs in such a way as to maximize their income-earning capacity.

4.2   The Benefits and Costs of Generic Health Reform Strategies

4.2.1   Improve the Allocation of the MOHP Investment Budget

The MOHP investment budget should be allocated geographically and by type of facility (e.g., hospital, health center) in such a way that the marginal social benefits of the last unit of hospital investment are equal. If the investment budget is not allocated in this way, it implies that social benefits can be increased by shifting investment from one use to another (i.e., the allocation is not optimal).

It is not conceptually difficult to estimate the welfare gains potentially available from improving the allocation of the MOHP investment. Given data by geographic area (preferably over time as well) on health outcomes (e.g., average life expectancy at birth), measures of health infrastructure (e.g., number of hospital beds, number of health centers), number of physicians and nurses, and socioeconomic characteristics of the population (e.g., income, education, age, percent living in urban areas), it would be possible to estimate a health production function for Egypt. Given the existing level and allocation of health investment, the estimated production function could be used to simulate how much of the investment budget could be saved, holding its effect on health constant, if the budget were allocated optimally. Unfortunately, although the data for such an exercise may be available in Egypt at the governorate level, they have not been published and we could not perform such an analysis.

Data are available on the investment budget by governorate (presented in Table 7), however, and the allocation of the investment budget can be compared to proxies for the marginal product of capital investments. For example, one would expect the marginal product of hospital investment to be positively related to the number of hospital beds already installed (i.e., the demand for investment for renovation purposes) and the bed occupancy rate in the preceding period (i.e., the demand for new capacity). Regressing the 1992/93 per capita MOHP hospital investment by governorate (HINVPC92) on the number of existing 1992 MOHP hospital beds per thousand population (BEDSPC92) and on the 1991 MOHP hospital bed occupancy rate (OCCUP91), one obtains:

$$HINVPC92 = 0.305 \quad + 0.044^* \; BEDSPC92 \; -0.523^*OCCUP91$$
$$(1.99) \qquad\qquad (-0.48)$$

$$R^2 = 0.23 \qquad N = 23$$

These results indicate that actual allocations of hospital investment are considerably different from what a model of efficient allocation would predict. They suggest that there are substantial benefits potentially available from improving the efficiency of the allocation of hospital investment.

Similarly, one would expect the marginal productivity primary health care (PHC) investment to be positively related to the number of PHC units already in place (i.e., the demand for investment for renovation purposes) and to an indicator of insufficient Maternal and Child Health (MCH) coverage (e.g., the infant mortality rate). Regressing 1992/93 per capita MOHP primary care investment (PINVPC92) on the 1992 number of MOHP health centers per 100,000 persons (PHC92) and the 1989 infant mortality rate (IMR89), one obtains:

$$PINVPC92 = -4.33 + 0.8487^*PHC92 + 0.064^*IMR89$$
$$(2.28) \qquad\qquad (2.62)$$

$$R^2 = 0.41 \qquad\qquad N = 25$$

These results are consistent with a model of rational allocation of primary health investment (although the relationship is not as close as one would like).[18]

One may conclude from the examination of existing allocations of MOHP investment that, particularly in the case of hospital investment, it is likely that a more efficient allocation is possible. Given that MOHP's investment budget was equal to 68.75 million LE in 1992/93, there should be opportunities for substantial welfare gains in this area.

The social cost of improving the allocation of hospital investment is the cost of improved planning of these investments. These costs are expected to be included in the technical assistance component of the Program Assistance.

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18 In fact, a set of socioeconomic variables (1990 mean number of school years completed, 1986 percent urban population, and 1986 percent of households with a television), together with the 1992 number of health centers per thousand persons, explains 82 percent of the variation between governorates in 1992 per capita primary health investment and 76 percent of the variation in total per capita health investment. In both cases, income (TVS) and urbanization are negatively related to investment levels, whereas education is positively related (all variables are statistically significant in both models).

Governorate	1992/93 MOHP Hospital Investment per capita (LE)	1992/93 MOHP Primary Health Investment per capita (LE)	1992 MOHP Hospital Beds per 10,000 Persons	1991 MOHP Hospital Bed Occupancy Rate	1989 Infant Mortality Rate	1992 Health Units per 100,000 Persons
Cairo	0.48	0.14	14.00	0.32	37.00	3.80
Alexandria	1.87	0.18	11.00	0.45	26.00	2.50
Suez	0.61	0.46	19.00	0.39	44.00	2.40
Port Said	0.54	0.92	26.00	0.43	26.00	3.60
Ismailia	1.58	1.30	12.00	0.41	36.00	2.80
Daqahlia	0.54	0.60	10.00	0.42	35.00	3.40
Gharbia	0.30	0.58	12.00	0.73	37.00	2.70
Qalyoubia	0.31	0.37	28.00	0.41	45.00	2.70
Damietta	3.27	1.15	30.00	0.47	31.00	3.60
Sharqia	0.66	0.45	9.00	0.42	41.00	2.00
Beheira	0.52	0.44	8.00	0.47	34.00	2.00
Menoufia	0.27	0.59	7.00	0.60	42.00	1.90
Kafr El Sheikh	0.26	0.66	11.00	0.46	29.00	1.90
Giza	0.29	0.28	11.00	0.56	46.00	2.90
Fayoum	0.21	0.44	11.00	0.60	50.00	2.60
Assiut	0.40	0.38	10.00	0.67	65.00	2.80
Beni Suef	0.32	0.37	12.00	0.68	65.00	3.30
Aswan	0.96	2.01	17.00	0.44	64.00	4.30
Sohag	0.25	0.48	10.00	0.62	62.00	2.70
Minya	0.24	0.33	11.00	0.58	71.00	2.60
Qena	0.22	0.55	9.00	0.62	70.00	2.50

Table 7
Governorate-Level Data Used in Analysis of MOHP Investment Budget

Table 7 **Governorate-Level Data Used in Analysis of MOHP Investment Budget**						
Governorate	**1992/93 MOHP Hospital Investment per capita (LE)**	**1992/93 MOHP Primary Health Investment per capita (LE)**	**1992 MOHP Hospital Beds per 10,000 Persons**	**1991 MOHP Hospital Bed Occupancy Rate**	**1989 Infant Mortality Rate**	**1992 Health Units per 100,000 Persons**
Matrouh	0.72	2.01	19.00	0.09	55.00	5.20
Red Sea	4.56	5.88	22.00	-	51.00	7.10
North Sinai	1.07	2.69	-	-	-	-
South Sinai	21.88	12.03	17.00	-	83.00	3.40
New Valley	1.04	5.41	26.00	0.43	58.00	6.90
Sources: Egypt Human Development Report 1994 and National Health Accounts for Egypt.						

4.2.2   Allow Hospital Autonomy

In a purely centralized health system, hospital managers either receive inputs in kind (employees are assigned to them and drugs and supplies are shipped to them) or they are given a budget with fixed proportions to be spent on each type of input and are typically required to return any unspent portion of their budget to the central authority. Under these conditions, managers are unable to adjust their inputs in such a way as to produce a given level of services at least cost. The result is inefficiency reflected in higher unit costs. Hospital autonomy provides managers with the opportunity to reduce inefficiency by seeking least-cost combinations of inputs. In addition to flexibility in input use, hospital autonomy provides managers with the ability to set and collect fees for the hospital's services and to retain and utilize the resulting revenue as they see fit. Autonomous managers also typically have the flexibility to change their output mix in response to consumer demand.

The potential welfare gains from making MOHP hospitals autonomous would come in the form of increased efficiency. Efficiency is a concept with several dimensions. To be technically efficient, hospitals must be able to produce the maximum level of a given type of service from the inputs they use for that purpose. To be economically efficient, they must combine the inputs they use so that each service is produced at least cost. To be allocatively efficient, they must assign inputs to different services so that no more of one service can be produced without reducing the output of another, and no other mix of services provided would be more highly valued by consumers. The attempt to simultaneously achieve these results in an environment of rapidly changing prices, technology, and tastes is the reason that centralized systems of resource allocation are almost always highly inefficient.

To estimate the potential gains from making MOHP hospitals autonomous, one needs to estimate production functions and cost functions using data on outputs, inputs, and costs of MOHP and other hospitals. The degree of technical inefficiency for various types of hospitals can be estimated using shift parameters referring to

different categories of hospital (e.g., MOHP, HIO, Curative Care Organization (CCO)), and the degree of economic efficiency can be measured by using the estimated production functions and relative prices to calculate optimal input combinations, which could be compared with those used by each category of hospital. By assigning market prices to the services provided by MOHP hospitals, it would be possible to estimate profit functions to evaluate the allocative efficiency of MOHP hospitals. The data necessary to perform such an analysis exist, having been collected under the Data for Decision Making Project (DDM), but unfortunately, analysis of this type has not yet been carried out. A major challenge confronting such analysis, however, would be to adjust for differences in quality from one category of provider to another.[19]

To estimate the magnitude of the potential social benefits available from improving the efficiency of hospital resource use associated with autonomous management, it is tempting to compare the unit costs of MOHP hospitals with those of autonomous hospitals, such as CCO hospitals. The difference in their unit costs could be interpreted as a first approximation to the net potential welfare gains from the improved efficiency available from making hospitals autonomous.[20] For example, any observed difference in cost per bed between MOHP and autonomous hospitals could be multiplied by the total number of MOHP hospital beds to obtain an estimate of the total potential welfare gains from allowing hospital autonomy. Unfortunately, even so simple an exercise is not possible in Egypt. There are no published data on unit costs for different categories of hospital, only data on unit expenditures, and these show that MOHP hospitals have the lowest unit expenditures (presumably because of the lower quality services they provide).[21] At this time, there is no basis for making even a crude estimate of the potential social benefits from granting autonomy to MOHP hospitals.

Although it is likely that the welfare gains from hospital autonomy would be substantial, there is some risk of welfare loss because of the way that hospitals would be likely to price their services. Since it is usually assumed that individual hospitals face downward sloping demand curves (i.e., they have at least some monopolistic power), it is possible that autonomous pricing may lead to output levels lower than those at which marginal social benefits are equal to marginal social costs, and hence produce a loss in welfare. The size of this welfare loss will depend on the price elasticity of demand facing the individual hospital. The elasticity will tend to be greater for hospitals with little competition, such as hospitals in isolated rural areas. For these hospitals, the government may want to regulate prices in the same way that governments typically regulate the prices of public utilities.

4.2.3   Expand Cost Recovery

Welfare economics dictate that all goods and services should be produced up to the point where marginal social benefits (i.e., the social benefits of the last unit consumed) are equal to marginal social costs. When social and private benefits and costs are equal, the operation of competitive markets can be expected to provide socially optimal levels of a good or service. In the case of social services, however, less than optimal levels of services are

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19 For example, it would not be surprising to find that MOHP hospitals use less inputs to produce a patient bed-day of services than other hospitals, such as those operated by CCO. Such a difference, however, is likely to be due to variations in the quality of services provided.

20 The differences would be net welfare gains, since the unit costs of CCO hospitals include additional managerial and administrative costs associated with autonomy. The observed differences, however, would not include possible additional welfare gains that may accrue from decreased administrative costs at the central and governorate levels, and additional training costs, which may be necessary to prepare MOHP hospital managers to exercise autonomy.

21 Estimates prepared by the DDM project (Berman et al., 1995, p. 29) indicate that expenditures per bed in 1990/91 varied from 5,966 LE for MOHP hospitals, to 17,231 LE for private hospitals, 21,789 LE for university hospitals operated by the Ministry of Education, and 46,474 LE for HIO hospitals.

often provided (in developing countries by governments operating under severe budget constraints).[22] Under these circumstances, cost recovery may generate the additional resources that make it possible to expand the production of services, such as health, to their socially optimal level.[23] When this occurs, cost recovery has positive welfare effects. It is conceptually possible to estimate these benefits, but it requires knowledge of the demand and supply curves for health services.[24]

An alternative objective of cost recovery may be to generate revenues from the collection of fees to enable government to reduce the level of subsidies it provides to curative hospital care, thereby freeing up additional resources for other, more socially beneficial activities (e.g., providing greater subsidies for preventive and primary health care). We assume that this is the objective of the expansion of cost recovery under the Program Assistance. The potential benefits of reallocating resources generated by the expansion of cost recovery are evaluated later in this report. It should be pointed out, however, that cost recovery designed to promote reductions in government subsidies is very difficult to achieve in practice. Reducing subsidies by one dollar for every dollar collected in fees is equivalent to transferring cost recovery revenue to a central authority. Such an arrangement effectively provides no incentive to a facility to collect fees and has never worked well in practice. In Egypt, where physicians have been particularly successful in capturing government subsidies by charging private fees (as discussed earlier), any reduction of government subsidies can be expected to be vigorously opposed.

The social costs of cost recovery are the administrative costs of collecting fees from patients and the costs of administering any special means testing procedures necessary to ensure continued access to services on the part of the poor. For mature cost recovery systems, these rarely amount to more than 5 to 10 percent of the revenue collected.

4.2.4 Allow Private Practitioners to Use Government Facilities

In circumstances in which there is underutilized hospital capacity, there are welfare gains from renting the excess capacity to private physicians (although this would put them into effective competition with the government physicians currently practicing in the hospitals and can therefore be expected to be opposed vigorously by them). If the allocation of hospital investment becomes more efficient, so that excess hospital capacity (beyond what is optimal) is substantially reduced or eliminated, the welfare benefits of providing private practitioners access to MOHP hospitals would be limited to possible economies of scale and scope available in inpatient care. Private hospitals in Egypt tend to be relatively small and serve a single specialty. Larger general hospitals, especially when well managed, are usually more efficient because the cost of shared functions, such as management, laboratory, radiology, housekeeping, and meal preparation are shared between several specialties. The costs of the potential economies of scale can be estimated by examining the pattern of unit costs by size in existing Egyptian hospitals.

The social costs of this reform are the additional administrative costs involved in selling underutilized capacity to private providers.

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22 Although the typical situation with social services is under-consumption, there are examples of over-consumption of some types of social services in almost every country. In Egypt, medical education is probably an example of an over-consumed social service.

23 Although it would in principle be possible to achieve such an expansion by increasing the level of government subsidies, the cost of generating the additional tax revenue may be higher than the additional administrative costs required to implement cost recovery.

24 In the case of curative health services, it is typically assumed that the demand curve is equal to the social benefits curve (although treatment for some infectious diseases, such as TB or STDs, would be exceptions). In the case of public health services, such as immunizations and vector control, it is necessary to estimate the social benefit curve. This is typically defined in cost-effectiveness terms, such as marginal DALYs per unit of expenditure.

4.2.5   Use Alternative Budget Allocation Formula for MOHP Hospitals

When health facilities receive a fixed budget from MOHP, which may be based on number of personnel or number of beds, they have little incentive to provide a sufficient quantity or quality of service or to control their costs. Linking budgetary allocations to the level of actual services provided can provide such incentives. One such approach is to reimburse hospitals, by case, for actual services rendered. The level of reimbursement might be fixed according to a limited number of diagnostically related groups or some other classification.[25] Under these circumstances, hospitals obtain revenue only when they treat patients and have an incentive to maintain quality standards to attract patients. In addition, case-based reimbursement schemes provide strong incentives to control the cost of treating each case admitted. With case-based reimbursement, relatively efficient (i.e., low-cost) hospitals would have a strong incentive to provide additional services (i.e., expand utilization). One would expect the overall effect of case-based reimbursement methods to be a reduction in costs over time. In the Unite States, for example, it has been estimated that the institution of a prospective payment system in Medicare saved the program 20 percent of its annual outlays. If MOHP had experienced unit cost savings of a similar magnitude in its hospitals in 1990/91, this would have produced a savings of 94 million LE ($27.7 million). It is important, however, to emphasize that these cost savings are far from certain, and they must be tempered by the increased cost of developing and implementing a prospective payment plan, as discussed later in this report.

The social costs of devising and implementing improved methods of allocating the MOHP budget would be the additional planning needed to design and implement an improved method of allocating resources. With case-based methods of reimbursement, as discussed earlier, there would be a need for cost studies that estimate the cost of treating cases with diagnostic (or other) characteristics. The costs of such studies could be covered out of the technical assistance component of the Program Assistance. The use of case-based methods, however, would also require additional managerial and accounting systems at the level of each hospital.

4.2.6   Increase the Cost Effectiveness of MOHP's Program

The objective underlying the use of cost effectiveness analysis as a basis for allocating health sector resources is to obtain better health outcomes from the health sector per dollar of resources consumed.[26] Essentially, this approach to health sector resource allocation assumes that the social benefit curve of health services is equal to the marginal health impact of an intervention (measured in terms of reduced mortality or a combined mortality-morbidity index such as the DALY). Consumer demand is not explicitly considered. If such assumptions are acceptable to health policymakers, substantial gains in efficiency may be obtained by using this methodology as a basis for allocating health sector resources. The magnitude of the potential benefits, however, will depend on the degree to which resources are not cost effectively allocated at present.

According to estimates prepared by the DDM project (Berman et al., 1995, p. 13) the cost per healthy year of life gained is as high as 36,000 LE ($10,620) for renal dialysis, versus only 200 LE ($59) for immunization. If spent on renal dialysis, 1 percent of all of Egypt's health spending in 1990/91 would have saved approximately 1,157 healthy years of life gained at a cost of 41.66 million LE. This same amount could have saved 208,300 healthy years of life gained if spent on immunization. Alternatively, the same number of healthy years of life gained

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25 Unfortunately, however, no reimbursement formula is perfect, and case-based formulas are no exception. Hospitals would have an incentive to overproduce (which may be managed through the use of global budgeting, i.e., reducing the level of reimbursement as the level of services provided increases so that the total reimbursement is confined within set limits). They also have incentives to misclassify patients into higher revenue-earning groups and to refer more serious cases within each group to other hospitals.

26 In this sense, this policy reform is conceptually linked to the system-level analysis of Egypt's health sector, discussed in Section 3.

from spending 41.66 million LE on renal dialysis could have been obtained by spending only 231,000 LE on immunization for a savings of 41.4 million LE ($12.2 million).

The social cost of reallocating health spending in the direction of more cost-effective interventions consists of the cost of conducting the necessary cost effectiveness analyses in Egypt, together with the real distortion costs of the measures taken to reallocate health resources in the direction of greater cost effectiveness (i.e., the distortion costs of the necessary taxes and subsidies or quantity restrictions). It is assumed that the costs of the necessary studies will be covered by the technical assistance component of the Program Assistance.[27]

4.2.7 Increase Emphasis on MCH Programs

In some cases (e.g., immunization, nutrition), a reallocation of resources is likely to improve efficiency or cost effectiveness (as discussed in the preceding strategy). In other cases, the primary effect may be to improve equity rather than efficiency. (Subsidizing these services may be an effective way to target subsidies to women and children, i.e., cash subsidies are not practical.) Alternately, on efficiency grounds, one may argue that women's and children's preferences are not adequately reflected in private market allocations (due to intra-household inequities). Also, society may place a premium on improvements in MCH indicators, so that the social benefits exceed the private benefits for MCH services. It is very difficult, however, to estimate the magnitude of these social benefits.

The social costs of this policy reform consist of the cost of assembling the necessary budget information to monitor the extent to which the reform has been implemented. It is assumed that this cost will be covered by the technical assistance component of the Program Assistance.

4.2.8 Continue to Provide Curative Services in PHC Facilities

This strategy does not appear to propose doing anything different from what is done currently. Curative care is part of PHC (e.g., oral rehydration therapy). There are probably some welfare gains from providing primary-level curative care in the same facilities as preventive care (e.g., preventive services can be scheduled or provided at the time curative services are sought, counseling can be provided in conjunction with curative care).

It is difficult, however, to identify the efficiency gains from continuing to provide curative services in government primary health facilities, since it is reasonable to assume that such services could be provided more efficiently by private providers. Since the private benefits of curative health care are the same as the social benefits in most cases (the treatment of infectious diseases, such as TB or STDs, would be an exception), it is even difficult to defend public subsidies to such services on efficiency grounds. On equity grounds, however, subsidies to curative care can be defended, particularly if they are targeted to the poor and other vulnerable groups (e.g., women and children). Vouchers can be used to subsidize care obtained from private providers. Direct provision of services would be more efficient only if the cost of administering the voucher scheme exceeds the cost savings from having services privately produced.[28]

4.2.9 Improve the Allocation of the MOHP Recurrent Budget

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27 Some of this analysis is currently in progress under the (DDM) project.

28 In areas with low population densities, the market may not be able to support more than one, or at most a few, providers. This raises the possibility of monopoly or oligopoly pricing with adverse effects on efficiency. Under these conditions, the government would have the option of either providing services directly or regulating the prices charged by private providers.

It is more expensive to produce health (and other social) services in remote areas. The cost of most inputs (but particularly of skilled personnel) is higher in remote areas because of transportation costs and the need to pay incentives to attract people to work there. If population density is low, it is difficult to achieve economies of scale or to maintain high rates of utilization. On efficiency grounds, therefore, one would expect lower access to services in remote areas because the marginal social cost of producing them is higher in such locations.[29] For policy purposes, the relevant issue is whether access is lower (or possibly higher) than would be optimal on efficiency grounds.

It is also possible that lower access in remote areas may be a result of inefficiency. For example, if a health center is constructed and equipped in a rural area but is understaffed because the government does not pay a sufficiently high salary differential to attract skilled personnel, access to services will be lower due to inefficiency. Even if it is desired to expand access to health services in remote areas on the basis of equity considerations rather than efficiency, it is sensible to begin the process by eliminating such inefficiencies first.

Theoretically, MOHP budgets should be allocated between governorates in such a way as to equate the marginal social benefit of each LE spent. If one assumes that marginal social benefits are defined on the basis of health outcomes (e.g., average life expectancy at birth) and that health outcomes are a function of socioeconomic characteristics and MOHP expenditures per capita, it is possible to estimate the marginal social benefit of each LE spent and investigate the possible welfare benefits from reallocating expenditures between governorates such that the marginal social benefit is equal. Regressing 1989 average life expectancy at birth (LX) by governorate on 1990 mean years of schooling completed (EDUC90), the 1986 percent of the population residing in urban areas (URBAN86), and 1989/90 MOHP recurrent expenditures per capita (REXPPC) and the square of REXPPC yields (t-statistics reported in parentheses under estimated coefficients; the data are presented in Table 8):

$$LX = 50.56 + 2.847*EDUC90 - 0.0677*URBAN86 + 0.4478*REXPPC - 0.0075*(REXPPC)^2$$
$$\qquad\quad (3.30) \qquad\qquad (-2.14) \qquad\quad (3.32) \qquad\qquad (-3.43)$$

$$R^2 = 0.59 \quad N = 25$$

The average level of MOHP recurrent spending per capita in the governorates (i.e., excluding MOHP headquarters spending) was 10.20 LE in 1989/90. However, there was a wide range in per capita spending across governorates (i.e., from 7.24 LE per capita to 61.39 LE per capita). Reallocating MOHP recurrent expenditures such that their marginal social benefit is equal in each governorate (i.e., effecting an equal per capita allocation of the MOHP budget) would make it possible to achieve the same level of health outcomes with 3.1 percent less total expenditure. Since the level of MOHP recurrent expenditures in the governorates was 521.5 million LE in 1989/90, such a reallocation would save about 16.4 million LE ($4.8 million) per year.

The costs of this policy reform are the cost of additional planning necessary to effectively reprogram resources to underserved areas (no additional resources are assumed to be available for this purpose, apart from the resources provided under the Program Assistance) and the cost of any incentives paid to staff to get them to relocate to underserved areas. The additional planning costs are assumed to be covered under the

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29 Governments may decide to expand access to services to promote equity rather than efficiency. The appropriate question in this case is whether equity is most effectively promoted through the subsidized provision of health and other social services, or by transferring additional income to households residing in remote areas.

Governorate	1989 Average Life Expectancy at Birth	1990 Adult Mean Years of Schooling	1986 Percent Population Urban	1989/90 MOHP Recurrent Expenditures per capita
Cairo	64.10	6.20	100.00	9.42
Alexandria	65.30	5.50	100.00	12.20
Suez	63.10	5.20	100.00	17.74
Port Said	67.00	5.90	100.00	23.05
Ismailia	63.30	4.50	48.80	13.49
Daqahlia	64.10	3.80	26.20	9.29
Gharbia	64.00	4.10	32.70	11.70
Qalyoubia	63.80	4.00	43.80	9.53
Damietta	64.80	3.80	25.20	14.18
Sharqia	63.40	3.60	21.10	8.96
Beheira	62.70	3.10	23.40	9.07
Menoufia	64.40	3.80	20.10	9.99
Kafr El Sheikh	63.20	3.10	22.80	9.23
Giza	62.20	4.70	57.50	7.24
Fayoum	62.40	2.90	23.20	9.55
Assiut	61.20	3.10	27.90	10.43
Beni Suef	60.20	3.00	25.10	12.42
Aswan	60.90	3.70	39.60	20.22
Sohag	59.80	2.80	22.00	7.79
Minya	56.40	2.90	20.80	8.93
Qena	61.50	2.80	23.40	8.05
Matrouh	61.90	3.10	50.80	18.40
Red Sea	67.40	5.10	85.50	30.63
North Sinai	-	3.80	61.60	27.92
South Sinai	61.30	5.20	39.50	61.39
New Valley	67.60	4.40	44.50	40.75

Table 8
Governorate-Level Data used in Analysis of the Determinants of Health

Sources: Egypt Human Development Report 1994; and National Health Accounts for Egypt.

technical assistance component of the Program Assistance. The cost of the incentives would be paid by the MOHP. In the exercise discussed earlier, for example, 49 million LE in recurrent expenditures would have to be reallocated from overfunded to underfunded governorates, about 77 percent of which would consist of personnel costs (37.7 million LE). Assuming that a 20 percent incentive would have to be paid on average as a relocation premium on salaries, the annual estimated cost would be about 7.5 million LE. In our example, given estimated benefits of 16.4 million LE, this would imply a benefit-cost ratio of about 2.2.

4.2.10   Reduce the Overall Number of MOHP Personnel

The government has for several years guaranteed the employment of all Egyptian graduates, including physicians. This practice, together with the difficulty in reducing the number of personnel already employed, has resulted in a situation in which most observers believe there are too many physicians employed by the MOHP.

It is generally believed that the MOHP employs too many physicians and too few nurses. The benefits of reducing the number of each type of physicians employed by the MOHP could be estimated if one had knowledge of the production functions for inpatient and outpatient health services, together with the relative prices of physician and nurse labor (valued on the basis of their opportunity cost, rather than on the basis of current MOHP salary levels) and other inputs. Under these circumstances, one could estimate the cost of producing MOHP services with the existing input mix and compare it to the cost of producing the same level of services with an efficient combination of inputs. Presumably, such an exercise would indicate that the MOHP currently employs more physicians and fewer nurses than is economically efficient.[30]

4.2.11   Provide Incentives to Private Health Providers to Function in Underserved Areas

If the alternative to providing such subsidies is to provide MOHP services to these areas (i.e., on the basis of equity), the potential benefits from this policy reform would derive from the increased efficiency of private providers compared to MOHP providers. One would need empirical production and/or cost functions for MOHP and private providers to estimate the magnitude of the potential efficiency gains.

4.2.12   Improve the Equity of MOHP Subsidies

A large share of MOHP subsidies are currently captured by higher-income households living in urban areas. Policies that reduce the level of subsidies provided to urban hospitals and increase subsidies going to PHC units and areas where low-income people live will tend to increase the equity of MOHP's program. Unfortunately, the transfer of subsidies from one group to another does not generate any efficiency gains within the framework of welfare economics. In some benefit-cost analyses, benefits accruing to different groups of people (e.g., the poor versus the rich or urban versus rural residents) are sometimes weighted differently, so that a preference may be given to a project that benefits certain target groups disproportionately. This methodology, however, does not extend to the evaluation of changing patterns of subsidies, which are considered by economists to be income transfers and therefore not suitable for benefit-cost analysis.

4.2.13   Develop and Adopt National Health Standards and Accreditation

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30 It is interesting to note that when the doctors per 10,000 persons and the number of nurses per 10,000 persons are added to the governorate-level health production function previously discussed, only the number of nurses is statistically significant.

Health markets are characterized by inadequate information on the part of consumers and, some would argue, on the part of providers as well, which can lead to inefficient market behavior.[31] Uncertainty of consumers regarding the quality of care they are likely to receive can lead to lower levels of consumption than is socially optimal. Additionally, in private health care markets, the cost of gathering reliable information on price and quality gives providers some price-setting power (monopolistic competition) in which even long-run equilibrium behavior is associated with inefficiencies.[32] The goal of national health standards and facility accreditation is to provide additional information to consumers on the quality of care available at different facilities, thereby facilitating their search for optimal price-quality offerings. Government intervention is required, it is argued, because information is a "public good" that private markets are unlikely to supply at a socially optimal level. To the extent that the information is reliable and widely disseminated, net social benefits (i.e., social benefits less the social cost of producing and disseminating the information) are potentially available.[33]

It is very difficult to estimate the net social benefits that could be obtained from developing a system of national health standards and accreditation. In markets that function competitively (i.e., in the absence of price-setting power on the part of sellers), one would expect any observed price differentials to be explained totally by variations in quality of the goods or services sold. The development of national health standards and accreditation should increase the association between price and quality, which would improve the functioning of health service markets by more closely approximating the efficient behavior of purely competitive markets. Estimating the magnitude of the social benefits obtained, however, requires knowledge of the demand and cost curves faced by a typical provider.

Under circumstances in which marginal social benefits are defined in terms of marginal health impacts (as in a cost-effectiveness framework), government intervention to maintain minimum quality standards may be a cost-effective use of public funds. Such standards prevent spending on substandard, ineffective forms of health care. One could estimate the benefits of maintaining health standards under these conditions from a health production function, which includes the quality dimension of inputs as independent variables. Unfortunately, the necessary data for such an exercise are not available in Egypt.

The social cost of this policy reform includes the cost of developing national health standards, as well as the cost of enforcing them. The costs of enforcing quality standards in Egypt would probably be substantial.

4.2.14 Establish Continuing Medical Education and Physician Licensing

The argument for stricter licensing requirements is also based on the belief that it is difficult for consumers to obtain price-quality information in health markets and that the resulting absence of information contributes to inefficient market behavior. By licensing physicians and other health providers, the government can improve the flow of information to consumers and, thereby, improve the efficiency of health service markets. Assured of a minimal quality standard, consumers may be more willing to shop for providers on the basis of price, and this can be expected to lead markets in the direction of purely competitive performance (i.e., maximum efficiency). There

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31 If consumers are risk averse, uncertainty about the quality of care they will receive from health providers can be expected to lead to under-consumption of services, even under conditions in which services are provided by public sector providers operating as price takers (e.g., the government sets prices). Even in systems in which no fees are charged, uncertainty about quality of care may lead to under-consumption due to the high cost of time and travel to consume health care.

32 To increase profits by charging higher prices, monopolistic competitors restrict output below levels that minimize unit costs (i.e., they produce with excess capacity).

33 Although it is difficult to estimate the net social benefits of national health standards, it is clear that they are highest for the private sector (or for a public sector that is permitted to set its own prices). The social benefits from improving price-quality information in the regulated health sector, while undoubtedly positive, are less than those in the private sector.

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are also costs to licensing, however, in the form of possible restrictions on competition permitting monopoly rents to be earned by those receiving licenses. The experience with stricter licensing in the United States does not support the conclusion that it necessarily leads to higher quality, although there is fairly strong evidence that it does increase the incomes of the professionals subjected to stricter licensing requirements.

Pursuing certification (e.g., board certification of specialists in the United States) instead of licensing would produce many of the same benefits without the danger of raising costs through restricting competition. It would also appear to be easier to implement in a society such as Egypt's, where denying a health practitioner the right to practice his or her profession would be very difficult to implement.

As with health standards, if it is assumed that the marginal social benefits are equal to marginal health impacts (as in a cost-effectiveness framework), government licensing of health providers may be a cost-effective use of public funds. One could estimate the benefits of licensing using a health production function, which includes indicators of the qualifications of personnel to be licensed as independent variables. Unfortunately, the necessary data for such an exercise are not available in Egypt.

The social cost of this policy reform includes the cost of developing and implementing stricter licensing requirements. The cost of developing the licensing requirements is assumed to be covered by the technical assistance component of the Program Assistance. Additional costs will be associated with the implementation of the licensing requirements by the MOHP, as well as any distortion costs that arise as the result of the licensing.

4.2.15   Eliminate HIO's Deficit

The existence of an HIO deficit (reported to be as much as LE 200 million per year)—and the expectation that it will be financed somehow by the government—removes responsibility from the HIO to control its costs (i.e., improve its efficiency). One may expect, therefore, that eliminating the HIO's deficit (and insisting that the HIO balance its budget in the future) would promote greater efficiency within the HIO. To estimate the potential benefits from increased efficiency, it would be necessary to have production and cost functions estimated for facilities of different kinds (as discussed in Section 4.2.2). In the absence of such estimates, it is instructive to examine expenditures per bed in HIO hospitals (46,474 LE per bed in 1990/91), compared with 21,789 LE per bed in university hospitals and 17,231 LE per bed in private hospitals. If HIO hospitals could become as efficient as university hospitals (i.e., reduce their expenditures per bed by 53 percent), this would correspond to a savings of 122 million LE per year, a significant share of the HIO's reported annual operating deficit.

In addition, some of the steps necessary to eliminate the HIO deficit—such as the definition of an appropriate benefits package and increased use of deductibles and co-payments— would also be expected to increase efficiency as discussed later in this report.

In addition to possible efficiency gains from eliminating HIO's deficit, it is likely that equity gains will result as well, since the government funds used to finance HIO's deficit can be equated to a transfer to HIO members, who tend to be concentrated in urban areas and come from middle-income groups.

The cost of reducing the HIO deficit is mainly the cost of the additional planning needed by the HIO to institute cost-saving measures. (The additional direct costs of some of these measures are discussed later.) These costs are assumed to be covered by the technical assistance component of the Program Assistance.

4.2.16   Redefine HIO's Benefits

The social benefits of all forms of insurance consist of the increased welfare, which the insured derive from reducing their risk of substantial losses. The social cost of insurance consists of the administrative cost of

providing the insurance (e.g., marketing, actuarial assessment, claims processing, profit). The net social benefits of any insurance program are maximized when the events insured against are limited to relatively rare, high-loss events, such as catastrophic illness. Net social benefits are lower (and may even be negative) when benefits cover the cost of such low-risk events as routine outpatient treatment of minor illnesses. Since a high share of HIO benefits are currently absorbed by the costs of such low-risk events, it is likely that there is considerable opportunity for increasing efficiency by redefining the benefits package.

Insurance also imposes social costs when it leads to the consumption of health services beyond the point where the marginal social benefit of the last unit consumed is equal to its marginal social cost. The social cost of excess consumption of health services is referred to as "moral hazard" in the health economics literature.[34] The use of deductibles and co-payments (i.e., that portion of service costs not reimbursed by the insurer) reduces both the social costs and benefits of health insurance. Net social benefits are maximized when deductibles and co-payments are at an optimal level.[35]

The cost of developing an appropriate package of social insurance benefits is assumed to be covered by the technical assistance component of the Program Assistance. The cost of implementing this policy reform is mainly the additional administrative cost of implementing an expanded system of co-payments and deductibles. In addition, some research may be needed to fix the appropriate level of co-payments and deductibles, which is assumed to be covered by the technical assistance component of the Program Assistance.[36]

4.2.17   Unify Existing Health Insurance Laws

The economic benefits of developing a single set of national health insurance laws would presumably take the form of reduced administrative costs. Presently, HIO members receive different sets of benefits, each with its own system of co-payments and other restrictions. Administering such a complicated mix of benefits undoubtedly adds to the HIO's operating costs.

The costs of this policy reform would be related to the studies and meetings needed to determine the most appropriate features of a single national health insurance fund, followed by the costs of whatever legislative reforms are required. These costs are assumed to be covered by the technical assistance component of the Program Assistance.

4.2.18   Ensure HIO's Autonomy

Presumably, HIO autonomy would yield cost savings similar to those provided by hospital autonomy. The magnitude of these savings can be estimated by comparing the costs of the HIO to those of other hospital systems, as discussed in Section 4.2.15.

4.2.19   Transform HIO into a Financing Organization

This is a difficult strategy to analyze on economic grounds. Presumably it reflects the judgment that the HIO has the potential to become an efficient financer of health services (e.g., as a third-party payer), but not to

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34 In the broader insurance literature, "moral hazard" refers to the tendency of an insured person to reduce efforts to avoid losses (e.g., farmers with crop insurance employ riskier cultivation practices or owners of buildings with fire insurance fail to install sprinklers).

35 Some empirical studies suggest that an optimal co-payment rate may be as high as 50 percent, or possibly even higher.

36 In the United States, the Rand Corporation conducted a randomized experiment of households in six sites for 3 to 5 years beginning in 1974 in part to measure how household consumption of health services respond to different co-payment rates.

become an efficient provider of health services at the same time.[37] One may expect some strong opposition to this reform by HIO physicians, since the separation of financing from service delivery would restrict their ability to raise their net incomes by "renting" HIO inputs to patients through their private practices (as discussed earlier).

The social cost of implementing this policy change would presumably be the cost of breaking up the existing system and establishing separate management for each component.

4.2.20   Develop Alternative Reimbursement Mechanisms for HIO-Contracted Services

Improved reimbursement mechanisms, such as the use of prospective payment plans for inpatient care (e.g., reimbursement based on Diagnostic Related Groups) and the use of managed care mechanisms, may be able to reduce the social cost of insurance by reducing excess consumption due to "moral hazard." They may also help reduce instances of fraud. At the same time, however, it is important to recognize that such systems can be abused, especially under circumstances in which quality of care monitoring mechanisms are weak and information on consumer satisfaction is not widely available.

The costs of completing the development of improved reimbursement mechanisms for HIO-contracted services will be covered by the technical assistance component of the Program Assistance. In addition, the use of efficiency-oriented reimbursement mechanisms may necessitate the development of improved quality monitoring mechanisms and a system to disseminate this information to consumers.

4.2.21   Expand Social Insurance Coverage

Under the assumption that the typical Egyptian consumer is "risk averse," expanding health insurance coverage can potentially improve welfare and efficiency by extending the welfare benefits of risk-pooling to a larger population.[38]

Most social insurance programs also promote equity by having relatively high-income members pay more than low-income members ("social solidarity"). They also frequently involve redistribution from younger to older consumers and from the healthy to the unhealthy. Redistribution of the latter variety may or may not improve equity.

The cost of expanding HIO coverage is the cost of doing the necessary strategic planning to expand coverage, together with the costs of informing consumers of the potential benefits from insurance. These costs are assumed to be covered by the technical assistance component of the Program Assistance. It is also assumed that the benefits of the additional covered population will be financed by additional premiums and taxes. One social cost would be the distortion costs imposed on the economy from raising these additional tax revenues.

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37 HMOs are examples of organizations that are, at least in some cases, presumed to be both efficient providers and financers of services. It is unclear that there is anything inherently inefficient about this type of organization. Instead, it is often presumed in discussions of health reform that this is a more efficient organizational type than a system of third-party payers and independent providers.

38 The efficiency contribution of health insurance rests on the assumption that people sustain a proportionately greater loss of welfare from a large loss of income, such as would result from catastrophic illness, than they do from a small loss of income, such as they incur in paying a relatively small insurance premium. Consumers who exhibit such preferences are said to be "risk averse."

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