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CHAPTER 1

The Health Situation

A. Man and Disease in the Environment

1. There are many possible systems of disease classifications -- for example, by system of the body affected, or by type of disease organism (virus, bacteria, protozoa). The system of classification used here to describe the health problems of the developing world concentrates on the epidemiology of communicable disease: the cycle of disease transmission, in its social context. This approach makes it easier to understand the interrelationships between health and socio-economic development, and between disease and poverty, because the disease pattern of a society intimately reflects its standard of living, and indeed its whole way of life.

2. The epidemiological view of diseases produces a two part classification. First, the communicable diseases, which may be identified as (1) faecally related, (2) air borne, (3) parasitic, (4) vector borne and secondly, (5) nutritional diseases. Under the primitive environmental conditions of the poorer developing countries, the faecally related and air borne disease are particularly prominent and hence our analysis focuses largely on these diseases. The non-communicable diseases - accidents, cancer, degenerative diseases, etc. - have been neglected on the grounds that their incidence is relatively minor.

3. The diseases of childhood are of particular importance in the developing countries both because very high fertility rates have produced populations dominated by the young, and because high fertility and close spacing of child birth increase health hazards.

4. Health conditions in developing countries have improved considerably during recent decades; generally, this is associated with an improvement in economic conditions. There is a marked association between the present level of per capita income of a developing country and its health status. Also, there is evidence that health conditions among poverty groups in different countries are basically similar. A core disease pattern characterizes the poverty populations of Africa, Asia and Latin America. It is identified by malnutrition and the diseases transmitted by faecal contamination and by infected air. Socio-economic development has reduced these health hazards elsewhere through water supply and sanitation in the instance of the faecally transmitted diseases and, through better housing and reduced crowding, the air borne diseases.

5. Human and animal health are in some instances intertwined which raises the possibility that disease control will not only directly affect human welfare but will also promote economically valuable animal husbandry. Control of African sleeping sickness is a case in point. By evaluating the combined effects of health services, the economic justification for the efforts may become more evident.

B. Improvement in Health Conditions

6. Trends in life expectancy at birth and at various ages, are among the most reliable statistical indicators available for assessing changes in overall health conditions. The average life expectancy at birth for the developing world increased from 32 years before World War II to 49 years at the end of the 1960s (see Table 1). Starting from a low initial level, the improvement in life expectancy in the developing world was larger in both absolute and relative terms than for developed countries. The rate of improvement is declining: 2.7 years between 1950-55 and 1955-60, 2.6 years in the following quinquennium and only 2.0 years in the most recent period.

Table 1

Life Expectancy at Birth in Some Major Areas of the World
(in years)

	1935-39	1950-55	1955-60	1960-65	1965-70
Less Developed Regions	32	41.7	44.4	47.0	49.0
South Asia	30	40.6	43.4	46.1	48.8
East Asia	30	44.8	47.1	49.6	52.2
Africa	30	36.4	38.6	40.9	43.3
Latin America	40	52.3	55.3	57.9	60.2
More Developed Regions	56	64.6	67.8	69.2	70.4

Source: IBRD. Population Policies and Economic Development, No. 481, July 12, 1974, Statistical Annex Table 2.

7. Longer time series regarding changes in life expectancy are presented in Appendix Table 1. It is interesting to observe that life expectancy in India and Latin America remained at roughly similar levels (around 25) till the beginning of the twentieth century. Substantial improvement took place in certain parts of Latin America before the second world war - the average life expectancy level had climbed to 40 years by 1940. In the rest of Latin America and the Indian sub-continent, progress was much more limited during the inter-war period.

8. For many purposes, life expectancy at various ages gives a better profile of the health situation of a country than life expectancy at birth alone. The Table below gives data for selected countries. These data show that for countries with low expectancy of life at birth, surviving the first year after birth greatly increases the number of additional expected years of life. In Cameroon, for example, the expectancy of life at birth is only 34 years, but those persons who survive to age one may expect to live 40 additional years i.e., to reach on the average age 41. The implication is that the higher risks are during the first year

of life. On the other hand, countries with high life expectancy have low infant mortalities - and so survival to age one or age five does not add as much to their total expected life.

Table 2

Male Life Expectancy at Specified Ages in Selected Countries /a

Country	Age 0	1	5	10	15	20
Cameroon	34	40	42	41	38	35
Central African Republic	33	40	41	38	n.a.	31
Chad	29	34	34	31	n.a.	26
Colombia	44	50	52	48	44	40
Egypt	52	56	61	57	52	48
Gabon	25	34	38	36	n.a.	29
Guinea	26	33	35	32	n.a.	29
India	42	48	49	45	41	37
Japan	69	69	66	61	55	51
Mexico	61	62	60	56	52	47
Nigeria	37	45	49	47	43	39
Sweden	72	72	68	63	58	53
Taiwan	66	67	64	59	54	49
United States	67	67	64	59	54	49

a/ Number of years of life remaining.

Source: Data in U.N., Demographic Yearbook, 1968 and 1970. Data are for various years in the 1950s and 1960s.

C. Variations in Health Levels

9. Annex Table 2 presents a set of available indicators of country health levels and other demographic factors (life expectancy, infant mortality, crude death rate and crude birth rate) for the most recent period and lists countries in ascending order of GNP per capita. African countries, which have the lowest per capita incomes, also have the lowest health status. In contrast, the Latin American countries which have some of the highest incomes of all the developing countries, report some of the highest health status indicators.

10. There is a high positive correlation between GNP per capita and life expectation. The coefficient is 0.580 for all countries listed. If the U.S.A. is excluded, the coefficient becomes 0.726.

11. Superimposed on very substantial inter-country differences in health in the developing world are equally notable variations within countries between rural and urban areas, or between the poor segments of society, the middle classes and the affluent.

12. The crude death rate for 1960 in rural areas of the developing world was estimated by the UN as 21.7 per 1,000 population, compared to 15.4 for urban areas.1/ These statistics are cited only to illustrate intra-country variation in health status. Perhaps data regarding infant mortality are even more pertinent as they refer to the population which is most vulnerable to health hazards (see Table 3). Absolute levels of infant mortality are probably grossly under-reported and the degree of under-reporting is much higher, in all likelihood, for rural areas than for the urban in the two African countries cited. Even so, infant mortality rates are much higher in rural Guinea and Morocco than in the urbanized parts of these countries (see Table 4). These differentials are related to the marked dualism in the prevailing socio-economic conditions. Rural-urban differentials tend to disappear in advanced European countries where living standards are much less disparate than in Africa: however this is not the case even for rather advanced developing countries. In Romania, life table data for 1963 suggested that urban inhabitants could expect to live almost two years longer than their rural counterparts.

Table 3

Infant Mortality Rates
in Urban and Rural Areas

Country	Urban	Rural	Country	Urban	Rural
Guinea	189	218	Norway	16	17
Morocco	100	170	U.K.	20	17

Source: David Morley, Paediatric Priorities in the Developing World, Butterworths and Co., 1973.

1/ United Nations. May 1973. Demographic Trends in the World and its Major Regions, 1950-1970. E/Conf. 60/BP/1. Table 12.

13. The current health differential in developing countries between urban and rural areas is the exact opposite of that which prevailed formerly in countries which are now developed. In 1841 average life expectancy for males in England and Wales was about 40 years, but only 35 for London, and 25 and 24 years, respectively for the industrial towns of Liverpool and Manchester. 1/ The fact that in developing countries, health conditions are more favorable in urban rather than in rural areas has been attributed to the concentration of the highest income groups, as well as the highest school attendance ratios, superior environmental, and personal health services there even though standards of hygiene often remain low in comparison to those of the developed world.

D. The Disease Pattern

14. The full assessment of the health situation requires knowledge not only of infant mortality and death rates for other age groups but also the distribution of death and morbidity by cause. Reliable information on these aspects does not exist on a country-wide basis for Asian, African and Latin American nations. 2/ Nevertheless, it is possible to convey a general idea of the difference in disease patterns on the basis of stylized models developed by the UN (see Table 4). On this basis it seems that infectious parasitic and respiratory diseases are most important in developing countries while diseases of the circulatory system and cancer are prominent in developed ones.

Table 4

Percentage Distribution of
Deaths by Cause in Selected Model Populations

	Model A 1/	Model B 1/
All causes	100.0	100.0
Infectious, parasitic and respiratory diseases	43.7	6.5
Cancer	3.7	16.4
Diseases of the circulatory system	14.8	46.5
Violence	3.5	5.2
All other causes	34.3	25.4

1/ Model A is based on a population with a "young" age structure and a life expectancy at birth of 40, while Model B refers to a population with an "old" age structure and a life expectancy of 70.

Source: Adapted from United Nations, Population Bulletin of the United Nations, No. 6 (1963), pp. 111-112. See also pages 106-110 for a description of methods used in constructing these and other models.

1/ Department of Economic and Social Affairs, The Determinants and Consequences of Population Trends, Volume 1, United Nations, New York, 1973.

2/ There are many problems characteristic of such data: (i) under-reporting is more important for some diseases than for others; (ii) multiple-causation leads to misreporting; (iii) many deaths are registered without identification of cause (in Thailand these deaths account for 59% of the total, in Iraq 44%).

E. Diarrheal Diseases

15. As already indicated, the most important single disease group is the diarrheal diseases. For areas without community water supply, studies in the UAR, Iran, and Venezuela have shown a monthly incidence of diarrhea in children under six or seven of about 40-50%. 1/ Despite under-reporting problems, the category "bacillary dysentery and amoebiasis, enteritis, and other diarrheal diseases" was the leading identified cause of death in Paraguay (1971), Guatemala (1970), and El Salvador (1971). In Pakistan (1972), the category "all forms of dysentery" was the most frequently notified communicable disease. 2/ A case study in the Punjab (India) showed a death rate from acute diarrheal disease of 3,446 per 100,000 infants. 3/

F. Intestinal Parasitic Diseases

16. The most common chronic intestinal diseases are probably the Helminthic (i.e., worm) group, particularly intestinal worms. For example, an IBRD case study of the labor force engaged on civil construction at three sites in West Java, Indonesia, found 85% infected with hookworm. 4/ Again, ascaris Lumbricoides is one of the commonest and most widespread human parasites. Possibly one in every four of the world's population is infected. 5/ Another is whipworm. Case studies in Sri Lanka, Bangladesh, and Venezuela found an average infection rate in pre-school children of nearly 50%-70% for both ascaris and whipworm. At age six, in Sri Lanka, Bangladesh and Venezuela, the infestation rates for helminths were 95%, 97%, and 93% respectively. 6/

G. Air-Borne Diseases

17. The next most important disease group is probably the air-borne diseases. Air-borne diseases include tuberculosis, pneumonia, diphteria, bronchitis, whooping cough, meningitis, influenza, measles, smallpox and chickenpox. According to official statistics, they accounted for 24% of reported deaths in Bolivia in 1971, 29% in Guatemala in 1970, and 19% in Chile in 1972. A case study in Guatemala would support a similar order of importance for these diseases as cause of death in children 1-4 years old. Table 1 in the next chapter provides corroborative evidence.

1/ W. J. Van Zijl, "Studies on Diarrheal Diseases in Seven Countries by the WHO Diarrheal Diseases Advisory Team," in Bulletin of the World Health Organization, 1966, 35, 249-261.

2/ See Statistical Appendix, Table Three.

3/ N.S. Scrimshaw, C.E. Taylor, J.E. Gordon, Interactions of Nutrition and Infections, WHO, 1968.

4/ S. S. Basta and A. Churchill, Iron Deficiency Anaemia and the Productivity of Adult Males in Indonesia, Staff Working Paper No. 175, April 1972.

5/ Charles Wilcocks and P.E.C. Mansor-Bahr, Manson's Tropical Diseases, Seventeenth Edition, Williams and Wilkins, Baltimore, 1972.

6/ W.J. van Zijl, Studies on Diarrheal Diseases in Seven Countries, op. cit.

18. The core disease pattern of the developing world has now been described: faecally-related diseases, air-borne diseases, and malnutrition. In a recent study of various areas Latin America, faecally-related diseases, air-borne diseases, or malnutrition were the primary cause of death (with the sole exception of Jamaica), for over 70% of deaths under five not due to congenital anomalies and perinatal causes. This is shown in Table 5. Diarrheal disease alone was responsible for over 20% of all deaths under five in La Paz (Bolivia), Monterrey (Mexico), and Sao Paulo (Brazil); for over 30% in Medellin (Colombia), Recife (Brazil), and Chaco Province (Argentina); and for 40% in the San Salvador Area (El Salvador).

Table 5

Percentage of Deaths Under Five (Not Due to Congenital Anomalies or Perinatal Causes), for which Faecally-Related Diseases, Air-Borne Diseases, or Malnutrition Were the Primary Cause of Death

Areas	Deaths Caused by: Faecally-Related Diseases	Air-Borne Diseases	Nutritional Deficiency	Total
Chaco, Argentina, Rural	40	36	2	79
San Juan, Argentina, Central Urban	38	32	3	72
San Juan, Argentina, Subruban	34	38	8	80
San Juan, Argentina, Rural	35	42	8	84
Chaco Resistencia, Bolivia, Rural	52	27	6	84
La Paz, Bolivia, Ruban	29	55	3	87
Viacha, Bolivia, Rural	25	65	0	91
Resife, Brazil, Urban	42	41	5	88
Ribeirao Preto, Brazil, Urban	49	36	2	87
Ribeirao Preto, Brazil, Rural	50	29	3	81
Ribeirao Preto Franca, Brazil, Rural	55	20	7	82
Sao Paulo, Brazil, Urban	40	33	5	78
Santiago, Chile, Central Urban	31	37	6	73
Santiago, Chile, Subarban	33	38	3	74
Cali, Colombia, Urban	44	25	15	84
Cartagena, Colombia, Urban	38	23	17	78
Medèllin, Colombia, Urban	49	22	11	82
San Salvador, El Salvador, Urban	52	28	6	86
San Salvador, El Salvador, Rural	51	22	13	86
Kignston, Jamaica, Urban	37	21	5	63
St. Andrew, Jamaica Rural	23	23	23	69
Monterrey, Mexico, Urban	43	35	4	83

Source: Ruth R. Puffer, Carlos V. Serrano, Inter-American Investigation of Mortality in Childhood, Provisional Report, Pan-American Health Organization, September 1971.

H. Other Diseases

19. There are, of course, other important diseases which are more limited to particular geographical areas or particular ways of life. In general, however, "exotic" tropical diseases are of less significance than these core disease groups which are found in the poverty population of all societies - particularly in the younger age groups.

20. A disease of very great (but not universal) importance in the developing world, is malaria. In Sub-Saharan Africa alone, about 200 million people remain exposed to infection without any organized protection. In some areas, the infection rate is 90-95%. In all likelihood, only a tiny fraction of cases are reported. Nevertheless, cases reported per 100,000 were 15,247 in the Central African Republic (1972), 11,433 in Senegal (1972), and 10,439 in Upper Volta (1971). In Uganda in 1971, there were 1.6 million registered cases in a population of about 10 million. The disease is certainly a major cause of death in children. (See Table 1 in next Chapter). In Africa, the disease is endemic, and adults have built up a high degree of genetic and biological adaptation. In the Indian sub-continent, epidemics break out from time to time because adults do not have this level of adaptation. Malaria eradication campaigns launched in the 1950's and backed by international agencies were largely successful in 37 countries. 1/ However, there is evidence of a setback recently in Indonesia and possibly also in the Indian sub-continent. Populations living in areas where the eradication program is in the "consolidation phase" declined from 335 million in 1966 to 299 million in 1971.

21. For "sleeping sickness" (trypanosomiasis) the vector is the tsetse fly; it exists across a very wide band of middle Africa. "Although spontaneous recovery may take place in the early stages of trypanosomiasis, it is believed that when the disease has arrived at the stage of sleeping sickness, in the absence of treatment, death is inevitable." 2/ Some forms of trypanosome, also transmitted by the tsetse fly, are harmless to man but very infective for cattle. For a long while much of Sub-Sahara Africa did not have draught animals because of animal trypanosomiasis, and this was probably a major reason for slow technological development. In the early twentieth century, the increased population mobility stimulated by colonization led to a disastrous spread of the disease. In Uganda and the Congo, the population may have been cut by half. Subsequently, between the World Wars, mobile health teams, and enforced mass testing and treatment of populations substantially reduced the prevalence of the disease. By the 1950's, the disease was under control in most areas. In some cases, political independence dislocated control services (e.g., Zaire) and in others community-level support for control measures dwindled, so that there was a general recrudescence of the disease from the mid-1960's onwards. 3/

1/ T.H. Weller, "World Health in a Changing World."

2/ Charles Wilcocks and P.E.C. Manson-Bahr, Manson's Tropical Diseases, op. cit.

3/ In one campaign in Zaire in 1959, 20% of the population refused to be tested for trypanosomiasis. See J. Burke, "Historique de la Lutte contre la Maladie du Sommeil au Congo", in Colloque International sur la Lutte contre les Grandes Endemies, 1970.

22. The American form of trypanosomiasis -- Chagas' disease -- has a bed bug as its vector. It is a rural disease, endemic throughout most countries in South America, and is also found in Central America. The disease is typically a very chronic condition, which can continue for years. Many infections show no symptoms. Heart disease is a common clinical outcome, and no satisfactory treatment of the disease exists.

23. Schistosomiasis (Bilharzia) is a debilitating disease of varying degrees of severity. The most severe form of the disease is found in the Far East. There are, perhaps, 200 million clinical cases of schistosomiasis at present in the world, and the disease is of growing importance. Transmission of the disease is via snails. In arid regions, there is rarely enough surface water for large snail colonies, and hence the disease is not a major problem. Large areas of slow-moving water, and the growth of water-vegetation, provide an ideal habitat for the snails.

24. Onchocerciasis (river blindness) is a disease of much less importance than most of the diseases so far mentioned: it is, however, of critical importance in certain areas where it is hyperendemic, notably parts of Central America and particularly West Africa. It is a debilitating helminthic disease. Heavy infections of long duration yield the worst clinical results, which even apart from blindness can be very severe. In some places the disease had led to the depopulation of fertile river valleys. The vector is the simulium fly: its preferred habitat is swift running water. The man-made lake above a dam will tend to flood simulium breeding grounds, but the turbulent water near the sluice gates may well produce ideal breeding conditions below the dam.

25. Tetanus is a disease which relates to specific occupations or cultural practices. The disease agent is an anerobic bacteria that lives in dung or earth. In many areas of the developing world tetanus in newborn children is a major health problem, often because dung is used to stem bleeding of the umbilical cord. Without sophisticated medical care, the case fatality rate can reach virtually 100%. Again, agricultural workers who wound themselves while working may contract tetanus. Increased use of animal manure without understanding of the health hazards may worsen this problem. 1/ Finally, particularly in countries where abortion is illegal, induced abortion in unsanitary surroundings may lead to the women contracting tetanus.

I. Geographical Incidence of Disease

26. It may be useful to summarize the geographical incidence of the various diseases. Throughout the developing world, diarrheal diseases and airborne diseases, in synergism with malnutrition, are the most important killing diseases. In Sub-Saharan Africa, malaria is also very important;

1/ In Kenya incidence of tetanus increased rapidly and was highest in areas where agricultural activity was greatest. See N.R.E. Fendall, "Agronomy and Health," in the Lancet, October 2, 1965.

to a lesser extent, so is sleeping sickness. In some other areas across the developing world, malaria is still a major killing disease. Of the debilitating diseases, throughout the developing world intestinal worms are the most important. Onchocerciasis is important in Central America and Sub-Saharan Africa. Schistosomiasis is of particular importance in parts of Africa and the Far East. Trachoma (discussed in Chapter 2) is an extremely widespread disease throughout the developing world, with particular importance in North Africa and the Middle East. Filariasis 1/is also widespread; it is found in the Pacific Islands, but is also of growing importance in the large urban areas of the developing world.Chagas disease is important in South America and to a lesser extent in Central America. Cases of leprosy are found in various parts of the developing world, but perhaps most notably in Sub-Saharan Africa.

1/ A helminthic disease transmitted by the culex fatigans mosquito which breeds in heavily faecally contaminated water. It is, therefore, related to poor sanitation. According to Disposal of Community Wastewater, WHO Technical Report Series No. 541, Geneva, 1974, there are at least 200 million cases of filariasis in the world. It can have severe clinical results, including elephantiasis.

CHAPTER 2

The Ecology of Poverty and Disease

27. Climate and culture influence health but the impact of the prevailing socio-economic situation is much more massive. The disease pattern, the severity of sickness and mortality rates in Africa, Asia and Latin America can be understood much more in terms of the poverty of large segments of populations living there than of anything else. Equally, future progress in health conditions will depend very much on improved socio-economic conditions; particularly smaller families, improved nutrition and a more adequate infrastructure for water supply, sewerage disposal and shelter. The relation between poverty and ill-health or between development and improved health has many ramifications and these tend to interact cumulatively and synergistically. The aim of this chapter is to explore these relationships.

A. Demographic Factors

28. The last 30 years have witnessed a major decline in death rates, particularly of infants and young children in the developing world. One of the contributing factors has been the introduction of modern public health advances such as mass immunizations and disease eradication programs, in conjunction with improved nutrition, education and general standards of living. However, infant mortality remains at very high rates in the developing countries. These high mortality rates follow when large numbers of children are born into poor, crowded, unsanitary conditions with inadequate nutrition and medical services - all factors contributing to high mortality and morbidity rates. This in turn sustains high fertility in order that parents can ensure themselves of surviving progeny. Thus in large part the present demographic phenomena are linked to the poverty and health situation in developing countries.

29. A high proportion of the total population in those countries consists of children; those below 5 are 15-20% of the total population compared to about 8% in high-income developed countries. Accordingly, children's diseases predominate. Half of all deaths are of those under five years in developing countries.

30. High fertility levels combined with short intervals between births, both of which are characteristic of poor households, affect health adversely. The most important effect of large family size is reduction in child nutrition and child care; as the number of children increases, there is simply less food available per head,1/ and less maternal attention.

1/ A. Aguirre and J. Wray, cited in John Bryant, Health and the Developing World, Cornell University Press, Ithaca, New York, 1969.

Evidence of the correlation between malnutrition and large family size comes from Nigeria,1/Thailand, 2/and India.3/ Large family size, short birth intervals, anda relatively low national standard of living go together to make malnutrition a major direct cause of death among the population under five years.

Table 6: Major Causes of Death in the Under Fives (Percentage)

	Imesi Nigeria	Luapula Zambia	North Sumatra	Pusan South Korea
	(1957)			
Diarrheal diseases	12	18	25	15
Pneumonia	12	10	11	9
Malnutrition, primary	12	16	26	14
Malaria	8	15	8	3
Whooping cough	8		2	4
Measles	8	13	7	16
Tuberculosis	5		6	8
Smallpox	5			
Anaemia		7	5	
Other, mostly neonatal	30	21	10	24
Total number of children	-	340	1280	1036

Source: Reproduced from Shattock, 1971, in David Morley, Paediatric Priorities in the Developing World, Butterworths, 1973.

1/ J.D. Wray, "Population Pressure on Families: Family Size and Child Spacing," in Rapid Population Growth: Consequences and Policy Implications, Vol. 2, Johns Hopkins Press, Baltimore, Maryland, 1971. This article also has an excellent review of the literature.

2/ D. C. Morley, Joan Bicknell, and Margaret Woodland, "Factors Influencing the Growth and Nutritional Status of Infants and Young Children in a Nigerian Village," Transactions of Royal Society of Tropical Medicine and Hygiene, 62, 2, 164.

3/ C. Gopalan and K. Visweswara Rao, "Nutrition and Family Size," in Journal of Nutrition and Diet, 6, 258.

31. Perhaps, however, the importance of malnutrition comes out more clearly from a review of its role as an associated cause of death. Nutritional deficiency is a major, associated cause of death particularly among those under five. In addition, malnutrition is one of the variables contributing to premature birth and to low birthweight of babies (whatever the duration of gestation). Thus in a major study of Latin America (a comparatively well-fed part of the developing world) nutritional deficiency or immaturity (premature and/or small-for-date babies) were the direct cause of death for only 6% of deaths under five. However, one or the other was an associated cause in 57% of all deaths. 1/

32. That a low standard of living and large families produce malnutrition diseases, especially if there is a low level of education, is not a peculiarity of today's developing countries. Kwashiorkor, under the name "starch dystrophy," was common in Europe around 1900. Pellagra, another nutritional disease, was common in the early 1930s in the southern United States. General prosperity, welfare systems, and smaller families have made severe undernutrition a rare condition today.

33. In addition to these effects on the child, high parity directly affects maternal mortality, with a steady and sharp increase in risk after the third birth. 2/ From the third child onwards, the more children a mother bears, the higher the risks connected with pregnancy. For example, a review of 45,414 consecutive obstetric cases in the Johns Hopkins Hospital, Baltimore, USA, between 1869 and 1939 showed that, due to rupture of the uterus, hypertension, kidney diseases or hemorrhage associated with placenta previa, women of high parity had a mortality rate three times higher than women of low parity.

34. Population pressure at a family level is also related to induced abortion, which carries major health risks. Data on induced abortion are very difficult to obtain because it is illegal in most developing countries. Nevertheless, in 1958-60 abortion accounted for 8% of all admissions to National Service Hospitals in Chile, accounted for 27% of blood transfusions, and cost over $1 million in 1960 for hospital care. Studies in Turkey in the early 1960's estimated 500,000 abortions and 10,000 deaths due to abortion every year, in a population of less than 30 million. One study

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1/ Calculated from data in Ruth R. Puffer, C. V. Serrano, and Ann Dillon, The Inter-American Investigation of Mortality in Childhood, Pan American Health Organization/UNICEF, 1971.

2/ See Working Paper No. 8 for the World Population Conference, 1974: Health Aspects of Population Trends and Prospects. This is a most useful review paper of the inter-relations of health and population.

found 6.7 maternal deaths due to abortion per 100 live births. 1/ In three metropolitan areas, the abortion rate in Turkey recently was 56 abortions per 100 live births. Over 30 years of age there are 1.1 to 1.5 abortions per live birth. In Taiwan, a Knowledge-Attitude-Practice survey in 1967 found that over 12% of respondents had had at least one induced abortion. "The 1967 survey showed that the proportion of respondents who had experienced at least one induced abortion increased from 2.4% for women who had had one or no living child to 17.4% for those who had had more than six..."2/ Again, "in the Latin American cities studied, the higher the fertility the higher the rate of abortions of the pregnant women."3/ The bulk of the women who have abortions are married or in consensual union, and women in the youngest age group, under 20 years, have relatively few abortions. Abortion can therefore legitimately be interpreted principally as a recognition of population pressure on families, and an inferior substitute for contraception. Where it is illegal, it is often a dangerous substitute.

35. Besides the demographic factors which operate at the family level, there are important influences at the national level. 4/ Population pressure on the land may lead to overcropping, soil-degradation, and poor nutrition for an entire community, as it has in part of the Sahel. It may force migration with the resulting health problems of social disorganization. Population growth makes it harder to provide safe or sufficient water supply, garbage disposal, and sanitation for the community, and increases the cost of providing sufficient trained health manpower and facilities. Housing is liable to become more congested. The connection between crowding and disease is rather complex, and high population density in a favorable social environment may not create a major health problem. However, in a typical shanty town environment of poor physical conditions and the social disorganization related to urban drift, it certainly will.5/

1/ "Abortion and Public Health," in Abortion in a Changing World, Vol. 1, Robert E. Hall (ed.), Columbia University Press, New York and London, 1970. Figures should probably be regarded as highly approximate.

2/ "Abortion in Taiwan," in Abortion in a Changing World, op. cit.

3/ See "Abortion in Latin America," in Abortion in a Changing World, op. cit.

4/ See IBRD Population Policies and Economic Development.

5/ See John Cassell, "Health Consequences of Population Density and Crowding," in Rapid Population Growth - Consequences and Implications, National Academy of Sciences, Johns Hopkins Press, Baltimore and London, 1971.

B. Malnutrition - Disease Synergism

36. Malnutrition is not only a direct cause of death but also an important determinant of human reaction to disease. Living organisms respond to challenges which threaten them by acquiring immunity, or some form of biological adaptation. Malnutrition hampers this protective mechanism with which the human being fights infection, and thus increases the incidence and severity of clinical disease.

37. "If tuberculosis were caused merely by infection with the tubercle bacillus, the clinical disease would be highly prevalent. The fact is that an exposure that is readily resisted by most persons causes disease in a selected few. Furthermore, an attack is more likely to be severe, and even to prove fatal, in a malnourished or otherwise susceptible person."1/ There is evidence of the increase in the incidence of tuberculosis in a malnourished population, such as Germany in 1946; of malnutrition in Guatemalan children leading to more deaths from diarrhea; of an extraordinary number of deaths from bacillary dysentery among malnourished inmates of Japanese prisoner-of-war camps.

38. To take another case, in 1960-61, mortality from measles in Ecuador was 274 times as high as the United States. Measles immunization has only been recently developed, and the disease used to be highly prevalent and probably equally virulent in both countries. Despite this high level of prevalence, measles is not considered a killer disease in developed countries: in much of the developing world, it was and is (see Table 7). Partly this is because it attacks children at a younger age than in developed countries. However, a far more important factor in the difference in measles mortality between developed and developing countires is the difference in levels of nutrition. A recent study in Central and South America showed that high mortality was generally related to areas of poor nutrition: in Recife, Brazil, there was nutritional deficiency in 72% of measles deaths.2/ Case fatality rates of 5% or more are common in the developing world.3/ Similar case fatality rates used to exist in Britain at the turn of the century, with mortality closely related to socio-economic status.

39. Just as malnutrition can increase susceptability to disease, so also does disease bring on malnutrition. Epidemics of diarrheal disease are often followed after a few weeks by outbreaks of nutritional diseases; this has been a frequent and well- documented occurrence in many countries, including Mexico, India, New Guinea, Brazil, Central America, etc.4/ A

1/ N.S. Scrimshaw, C.E. Taylor, J.E. Gordon, Interactions of Nutrition and Infection, op. cit.

2/ Ruth R. Puffer, C.V. Serrano, and Ann Dillon, The Inter-American Investigation of Mortality in Childhood, Pan American Health Organization/UNICEF, 1971.

3/ See David Morley, Paediatric Priorities in the Developing World, Butterworths, 1973.

4/ N. S. Scrimshaw, et. al., op. cit.

key factor is that almost all infections produce an increased urinary excretion of nitrogen. Generally they also result in some decreases in protein intake and decreased intestinal absorption. The return to a normal nitrogen balance is frequently delayed beyond the clinical recovery from the acute episode. In addition, severe infestation with hookworm can cause anaemia, especially if diets are already iron-deficient.

40. Malnutrition is a very widespread phenomenon in low-income countries and particularly among the bottom 40% of their populations. It is a characteristic feature of poverty. All age-groups are affected but the untoward consequences are most grave for the 1-4 age-group.1/

C. Inadequate Infrastructure: Water Supply and Sewage

41. The most important killing diseases as well as others that cause debilitating illness throughout the developoing world share a common ecology. Many of them depend upon contamination of food, drinking and other water or soil with human wastes, and these can be described as being faecally transmitted.

42. Lack of safe water for drinking and adequate water for washing, fosters the diarrheal disease cycle by permitting easy transmission of disease from an infected person to new human hosts: so too does a lack of sanitation facilities. Typhoid, dysentery and cholera are spread in this way; so are other enteric infections which are often fatal to infants or undernourished young children, and cause much illness among adults.2/

43. Studies in seven developing countries showed that better water supply and sanitation reduced diarrheal diseases.3/ Privy construction in Costa Rica helped halve the death rate from diarrhea and enteritis between 1942 and 1954. 4/In a Philippines case study improved water supply and improved toilet facilities cut cholera incidence by about 70%. 5/ Perhaps the classic proof of the importance of better sanitary conditions occurred in nineteenth century Britain, where cholera was brought under effective control several decades before the causative agent, cholera vibrio, was ciscovered. Studies in California and Kentucky indicated that the incidence

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1/ See IBRD "Policy Guidelines for Bank Nutrition Activities", R73-247, October 1973.

2/ "Specific enteric pathogens may be isolated from only a relatively small percentage of individuals afflicted with diarrhea. Shigella is accepted as the most common cause of this clinical disease entity; Salmonella, entero-pathogenic Escherichia coli, and Vibrio cholerae may also cause acute diarrheal disease." Enteric Infections, World Health Organization Technical Report Series No. 288, Geneva, 1964.

3/ W.J. van Zijl, Studies on Diarrheal Disease in Seven Countries, op. cit.

4/ D.J. Schliessman, op. cit.

5/ Philippines Cholera Committee, "Field Evaluation of Environmental Sanitation Measures Against Cholera," Ch. 3, in Strategy of Cholera Control, WHO, BD/CHOLERA 71.5.

of Shigella for children varied dramatically depending on water and sewage standards of dwellings.1/ The incidence rate for children living in dwellings with inside water supply but outside privies was double that for children in dwellings equipped with water and a flush toilet inside. Incidence rates doubled again for children in dwellings using outside water supply and privy.

44. Despite the generally persuasive evidence relating sanitation and water-supply to less enteric infection, the exact causal connection is puzzling. Several studies have concluded that the source of water supply for a family matters less than might be expected, "the bacteriological purity of water as measured by type, city or well, did not influence infection rates."2/ The easy availability of water in quantity certainly has marked benefits, but its quality at source seems to matter less. The answer to this paradox is probably to be found in the cultural characteristics of the human population concerned. Drinking water is often stored in cooling jars, which are nearly always faecally contaminated. As a result, "we are, in fact, studying the impact of the availability of water, and not the availability of good drinking water."3/ Alternatively, families may continue to drink well or river water. 4/ The reason would vary -- greater convenience, better taste, associated social patterns

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1/ For a review, see D.J. Schliessman, "Diarrheal Disease and the Environment," in Bulletin of the World Health Organization, 1959, 21, 381-386. One problem with some studies may be that disease rates are not controlled for socio-economic level and hence for many factors other than sanitation which could affect disease, notably nutrition. In some studies this objection carries less weight, e.g. Arthur C. Hollister, M.Dorothy Beck, Alan Gittelsohn, and Emmarie C. Hemphill, "Influence of Water Availability on Shigella Prevalence in Children of Farm Labor Families," American Journal of Public Health, (1955), 45, pp. 354-364.

2/ W. H. Stewart, L.J. McCabe, Jr., E.C. Hemphill, and T. De Capito in American Journal of Tropical Medicine and Hygiene, 1955, 4, 718. See also Robert Saunders and Jeremy Warford, Village Water Supply and Sanitation in Less Developed Countries: Problems and Policies, (IBRD Public Utilities Department, Draft Research Working Paper, 1973).

3/ W.J. van Zijl, Studies on Diarrheal Diseases in Seven Countries, op. cit.

4/ See Table 4, "An Analysis of Water Habits, Sanitation and Health Conditions in Two Northeastern Thai Villages, 1971" in Richard J. Frankel, "A Systems Approach to Assessment of Rural Water Supply Program Effectiveness." Appendix III under Research Proposal on Impact of Potable Water Supply on Village Community Development. The study showed the inhabitants of the village supplied with piped water did not drink it, and had an incidence of water-related sickness similar to a control village without piped water.

or supposed special qualities. Thus often it is more the benefits of water for washing than water for drinking which count. Again, cases can be found where privies had little effect on disease prevalence,1/ or even a negative effect.2/ Here also, cultural habits may be the answer. A poorly maintained privy may be worse than none at all. Or again, "even where public acceptance of privy campaigns in areas of Latin America has been good, the privies have frequently been used as chicken-coops or grain silos."3/ Obviously, in such a case, the health benefits may be limited.

45. The diarrheal diseases so far discussed are principally "acute" infections, i.e., there is a sudden bout of illness. In many cases, life is threatened. By contrast, parasitic diseases are of a "chronic" nature; the illness lasts a long time. Such diseases rarely cause death except rather indirectly, and as a result, they do not figure prominently in cause-of-death statistics. Rather, they are diseases of life, a continuing burden on the sufferer. The exact transmission cycle varies from parasite to parasite. Sometimes it is oral-faecal, sometimes it is by contact of bare skin on infected earth. Certain parasites such as that responsible for schistosomiasis (also called bilharzia) have a more complicated transmission cycle, but one nevertheless based upon poor sanitation.

46. Another disease related to poor sanitary conditions is trachoma. Although the exact transmission cycle is still very much a matter of dispute, trachoma is certainly closely related to poor hygienic conditions (particularly lack of water for washing); dusty conditions exacerbate the disease. "No disease of the eye, or indeed no disease of any kind, has caused more suffering, blindness and personal and national economic loss." Perhaps one-sixth of the world's population suffer from trachoma.4/

47. Both water supply and sanitation bring about major changes in the man-disease ecological system. Simple storage of excreta away from human contact will greatly diminish the health risk. Within two weeks many of the harmful bacteria will have died, since they cannot survive for long outside the human host. Viruses are also delicate organisms. Parasites can remain health hazards much longer, particularly in the form of resistant cysts. Eventually the cysts too die, however. Another technique of waste disposal is sedimentation or filtration. In either case solid particles to which bacteria cling, are separated out and retained

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1/ N.S. Scrimshaw, C.E. Taylor, J.E. Gordon, Interactions of Nutrition and Infection, op. cit., p. 248.

2/ W.J. van Zijl, Studies on Diarrheal Diseases in Seven Countries, op. cit.

3/ E.C. Wagner and J.N. Lanoix, Excreta Disposal for Rural Areas and Small Communities, World health Organization, Geneva, 1958.

4/ Charles Wilcocks and P.E.C. Mansor-Bahr, Manson's Tropical Diseases, op. cit.

till harmless. In addition, there are two decomposition processes which render sewage harmless: oxidation (with oxygen from air or water), and anaerobic fermentation. Which of the two processes occurs is dependent upon availability of sufficient oxygen for oxidation. Both of these processes occur naturally; many "modern technology" processes such as 'trickling filters,' aeration systems, etc. are simply intended to speed the natural process. Most decomposition processes take place with the accompaniment of successive biological cycles which involve different algae; organisms harmful to man are destroyed during the course of these cycles. Even helminths can be killed by the heat generated by a composting system of anaerobic fermentation. The biological processes related to water supplyare essentially similar. If at all possible, a biologically pure source of water is chosen. If not, processes such as storage and sedimentation/filtration are employed. Also chemical treatment by chlorination of water is highly effective in destroying a wide variety of disease agents.

48. From this it is clear how effective a good water supply and sanitation system can be in interrupting many disease transmission cycles. Indeed, even if the biologically pure water of an official supply system is contaminated before it is used, water still serves to dilute disease agents (through washing and hygiene) and hence lower the typical challenge dose by which the body is confronted, so that successful resistance is more likely. One possible problem of water supply without sanitation, particularly in urban areas, is that excess water may lead to pools of water, often contaminated--a major health risk from the point of many diseases, notably malaria and filariasis. The extent of this problem would depend upon water consumption levels and the way supply is controlled. It also becomes clear how much population density under poor sanitary conditions fosters the spread of a wide range of parasitic and bacterial diseases.

49. Present infrastructure for water supply and sewage is entirely inadequate in many parts of the developing world.1/ The World Health Organization has recently completed a survey of water supply and sanitation.2/ Unfortunately, it has proved very difficult to achieve a consistent, world-wide definition of what constitutes "reasonable access" to water supply or what constitutes "adequate disposal" of excreta. Although the data are difficult to interpret, they are the only global picture available. Perhaps a realistic assessment would be that in the poorest developing countries most of the rural population defecate in the fields and that this continues to be the case till quite high income levels. For urban populations there

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1/ See IBRD; World Bank Operations: Sectoral Programs and Policies, 1972. Chapter on Water Supply and Sewerage.

2/ World Health Organization, World Health Statistics Report, Vol. 26, No. 11, 1973.

Table 7: Estimated Availability of Water Supply and Sewage Facilities a/

	Per Capital Income $ 1970			
	Less than $100	$101 to $150	$151 to $450	Above $450
Number of countries	15	17	34	12
	Percent of Total Population Served by Community Water Supply			
Rural with reasonable access	23	22	81	64
Urban	45	70	89	80
	Percent of Total Population Served by Sewage Facility			
Rural with adequate disposal	6	4	10	3
Urban	61	28	39	60

a/ These estimates were obtained by calculating the population - weighted average of reported coverage within the group of countries. The definitions of coverage and of urban and rural are those developed by the individual countries and hence are non-comparable. Furthermore, there has been no attempt to evaluate the quality of these statistics at the country level. The values reported in this table should therefore be interpreted only as crude, order of magnitude indicators.

Source: Appendix Tables 2 and 3.

is considerable reliance on buckets, pit privies and septic tanks which are not connected to the public sewer system. However, in the poorest countries, many people defecate in backyards or on waste lots. At higher income levels, a growing proportion of the population has access to a communal toilet, or even a family one: but in the shanty-town areas, defecation is still at random or on waste lots. Facilities connected with the city sewer system are not widespread except in the relatively high income developing countries, nor are they well utilized when present.

50. In most countries, only a small proportion of the rural population have access to functioning modern water systems; if such access exists, it will probably be to a public standpost. In urban areas of countires below a per capita income level of $150, roughly a third of the population depends on public standposts, and only the middle classes or better-off workers use more sophisticated facilities. A substantial part even of the urban population relies on polluted river water, or similar sources. For both water supply and sanitation, the proportion of the population which is well served rises with the level of socio-economic development, but rural and shanty-town population continue to have access to no facilities, or only the most rudimentary ones.

D. Inadequate Infrastructure: Housing

51. Another part of infrastructure which remains underdeveloped in many poor countries is housing. Very sizable proportions of the total population of cities in the Third World live in sub-standard dwellings lacking adequate space, ventilation, sunlight, and other basic amenities. These living conditions tend to increase the incidence of air-borne illnesses which are transmitted by the breathing-in of the disease agent. These air-borne diseases are the second largest killer and account for a large part of the sickness throughout the developing world.

52. In low-income countries, children often contract air-borne diseases at an earlier age than in developed countries, probably largely as a result of demographic factors and overcrowding. Another possible influence is that the extended family system brings the child into regular contact with many other children at a very early age: in "western" countries this first occurs when the child goes to school. On the other hand, the support and care functions of the extended family system certainly have great physical and mental health benefits, and so in some ways the system could be a favorable factor.

53. Other medical problems aggravated by inadequate housing are diarrhea, Chagas' disease and traumas such as burns and household accidents.

E. Causes of Improved Health

54. To recapitulate, the basic health problems throughout the developing world are created by the faecally transmitted and air-borne diseases and malnutrition, except for middle and upper income urban groups. These three major elements in the disease pattern react upon each other synergistically. This is particularly true for the Under-Fives, but also applies for older age groups. Improved water supply and sanitation check the faecally-related disease cycles. More spacious, well-ventilated accommodation cuts down the transmission of air-borne and faecally transmitted diseases. Better nutrition is of special importance for children and pregnant mothers; it reduces susceptibility to infection and greatly diminishes the severity as well as the duration of illness.

55. The role of direct health measures in improving health should be assessed in this context. Secular increase in health standards in Western Europe and North America was brought about much more by rising living standards and improving socio-economic conditions than by medical care per se. The incidence of cholera and typhoid fell in Britain and the United States long before effective methods of treatment were available; and to this day developed countries do not practice generalized immunization. In Sweden, death rates have been falling steadily since about 1800.1/ In the United States, tuberculosis deaths went from 200 per 100,000 population in 1900, to 3 per 100,000 in 1967. Yet sanitoria and collapse therapy were not widely available till the 1930's--when the rate was already down to about 70. Chemotherapy became available only in the 1950's when the rate was down to below 30.2/

56. A 1939-41 American study showed that males from low socio-economic groups had death rates for tuberculosis up to four times those for males from high socio-economic groups despite free treatment in sanitoria.3/ U.S. death rates from stomach cancer halved in the period

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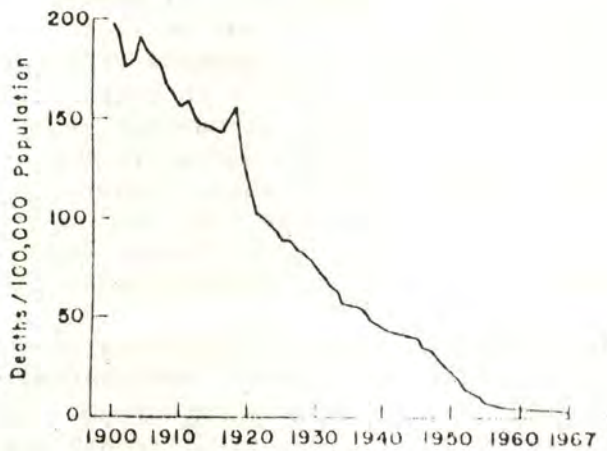
1/ N.S. Scrimshaw, "Myths and Realities in International Health Planning," American Journal of Public Health, August 1974. Scrimshaw argues that better nutrition has been the main factor in mortality declines in both the developed and developing countries.

2/ For a review of these issues, see Warren Winkelstein, Jr., "Epidemiological Considerations Underlying the Allocation of Health and Disease Care Resources" in International Journal of Epidemiology, Vol. 1, No. 1, Oxford University Press, 1972.

3/ White males over age 30 living in Buffalo, New York. Classification by economic level of census tract of residence. See M. Terris, "Relation of Economic Status to Tuberculosis Mortality by Age and Sex" in American Journal of Public Health. 38:1061-1070, 1948.

Figure 1: Annual Age Adjusted Tuberculosis Death Rates per 100,000 Population, Death Registration States of the U.S., 1900, 1967
(Adjusted to the age distribution of the U.S. population in 1940)



Source: Winkelstein, op. cit.

1930-60, despite the fact that, cancers once they have "developed to the pre-clinical stage, almost invariably progress to a fatal outcome regardless of treatment."1/

57. Another important, and perhaps surprising fact is how much of the disease pattern of both developed and developing countries resists the curative efforts of medical science. Major examples for developed countries are most cancers, diabetes, stroke, and coronary artery diseases. With regard to the disease pattern of developing countries, the same is true for many diseases of the very young: except for the occasional infant with shigellosis, and the small proportion of those with pneumonia in whom the pneumonia is bacterial in origin, we have only supportive treatments that we can put into the hands of a physician confronted with an infant with the diarrhea-pneumonia complex. In fact, diarrhea is still one of the top five causes of infant mortality in the United States.2/

1/ Winkelstein, op. cit. Suspended particular air pollution rates may have been a factor in the decline of stomach cancer.

2/ N.S. Scrimshaw, C.E. Taylor, J.E. Gordon, Interactions of Nutrition and Infection, op. cit.

That New York City infant mortality fell from 140 per thousand in 1898 to around 25 in the recent past, and at the same time infant deaths from diarrhea fell to 1% of their 1900 level, is a sign of the importance of factors such as better nutrition, sanitation and housing.1/

58. Rather few worthwhile studies of the effects of health services upon health have been done. Many of those that exist are hard to evaluate. In some cases, there may have been concurrent improvements in water supply, sanitation, or housing, which have not always been fully taken into account. Alternatively, nutrition may have improved and its impact has not been identified separately. Of course, the use of modern drugs can bring immediate relief but there may be little lasting impact on the health of a person who must return to a disease-ridden environment. Treatment for helminth infections is unlikely to prevent a person from becoming re-infected; at the very best, it may mitigate clinical symptoms. The medical school in Cali, Colombia,had a program for hospital care of premature infants with survival rates comparable to those in North America but 70% of the infants discharged from the premature nursery were dead within three months.2/ Thus sophisticated health services are inappropriate without community out-reach and preventive approaches.

59. Three research projects demonstrated that primary health care and increased nutrition could have a substantial impact on mortality among infants and those in the 1-4 age group. However, infant mortality in a primitive environment would still remain greatly in excess of that in a developed country, and child morbidity will remain at high levels. These experiments showed that such health care could be effective even if delivered by auxiliaries, with only limited referrals to physicians3/ or hospitals.4/ However, the relative importance of nutrition vis-a-vis primary health care is very difficult to determine.

1/ From the 1930's re-hydration treatment was available, but much of the fall in mortality preceded that date. Nutrition would have had a double importance. Improved child nutrition will have decreased susceptibility to disease; at the same time, improved maternal nutrition will have lessened prematurity, an important factor in high infant mortality rates.

2/ J.D. Wray, cited in John Bryant, Health and the Developing World, Cornell University Press, 1969.

3/ In the Guatemala Study, 99% of all visits were handled by the primary care personnel and only 1% referred to a physician. See Jean-Pierre Habicht et. al., op. cit., PAHO, 1973. Even if no such referral had been possible, and all those referred--i.e., 42 per 1,000 inhabitants a year--would otherwise have died, the fall in mortality would still have been considerable.

4/ During a year, at Imesi, roughly 30 children per 1,000 were referred to hospital. Even if no such referral possibility had existed and all these children had died, the fall in child mofrtality at Imesi would have been impressive.

Table 8: Experimental Impact of Health and Nutrition Improvements on Mortality[1]/

	Many Farms Study[a]		Nigerian Study[b]		Guatemala Study[c]	
	Before	After	Before	After	Before	After
Infant Mortality per 1,000 Live Births[2]	150[d]	70[e]	295	72[f]	139[h]	55
Age 1-4 Mortality per 1,000 Alive at that Age[2]	NA[d]	88[e]	69	28[g]	28	6

1/ All these programs involved costs such that they would be difficult to replicate on a national scale in a developing country. Health care costs were about $5-8 per child in the Imesi and Guatemala projects: some overhead costs may have been excluded. Exact non-health care inputs (e.g., nutrition) are not always clearly specified, or costed.

2/ The corresponding rates for the U.K. were: infant mortality rate-- 19; child mortality rate-- 0.8.

a/ Experiment provided nutrition; University supported, physican staffed primary care; and excellent hospital referral. See Walsh McDermott, Kurt W. Deuschle, and Clifford R. Barnett, "Health Care Experiment at Many Farms" in Science, 7 January, 1972. In the "Many Farms" study, there were two field physicians, two nurses, one Navajo teacher, and four Navajo auxiliary health workers for each 1,000 population. There were also several automobiles with two-way radio-telephones for visits to the homes, and in daylight with favorable weather critically injured persons could be removed by light airplane. There was a steady flow of consultants from the parent university.

b/ Experiment provided some nutrition, physician staffed primary care, and some hospital referral. See David Morley, Paediatric Priorities in the Developing World, Butterworths, 1973.

c/ Experiment provided nutrition, auxiliary staffed primary care and some referral to physicians and hospitals. See Jean-Pierre Habicht, et. al, (INCAP), "Delivery of Primary Care by Medical Auxiliaries: Techniques of Use and Analysis of Benefits Achieved in Some Rural Villages in Guatemala", in Medical Auxiliaries, Pan American Health Organization, 1973.

d/ Before the experiment.

e/ After the experiment.

f/ After one year the infant mortality rate was 48.

g/ After one year the child mortality rate was 19.

h/ This figure based on recall by mothers can be compared with the national official statistics at that time of 89.

60. In general, better water supply, sanitation, and housing alter the incidence of disease, and in this way affect morbidity and mortality. Nutrition alters both the incidence and the effects of clinical disease. Even under very favorable circumstances, curative health care can do little to alter the incidence of disease, 1/although it can reduce its harmful effects. Curative health care systems will therefore benefit the population principally by lessened effects rather than lessened incidence of disease, unless there is a very heavy emphasis on a strong preventive health bias in the service offered. 2/ For adults, personal health care can probably have a useful impact in diminishing the effect of debilitating diseases (e.g. medical management of diabetes) and the disabling or fatal effects of trauma.

1/ In the Navajo "Many Farms" scheme, very intensive and expensive curative health care with considerable efforts at preventive health, achieved significant reduction in the incidence of tuberculosis and otitis media (ear infection): this might well have been harder to achieve in a less scattered community. Incidence of active trachoma, and of the pneumonia-diarrhea disease complex, was not affected. Presumably in both cases the reservoir of infection and ease of transmission remained too great.

2/ It is very likely that health care in Imesi was so effective because of the strong emphasis on preventive health, including family planning. Desired family size was down sharply compared to a control village, although still very large (see Table 50, David Morley, op. cit.). Again, children attended clinic on average of 20 times a year in the age group 1-4 years old (Table 20, David Morley, op. cit.). In this context of overall concern for the health of community, it was possible to achieve a cut in the malaria parasite rate (Ch. 7, David Morley, op. cit.). How far this was due to curative health care is very unclear. Certainly health care this intensive is rarely available in developing or developed countries.

CHAPTER 3

Approach to Health Policy

A. Better Health as a Social Goal in Its Own Right

61. Better health is a legitimate goal in its own right and one which requires no further justification; it can be viewed as "consumption" which is the final aim of economic growth and development. Health care has an important human support function in comforting the afflicted and counselling the anxious. Whether or not illness can be cured or even mitigated, health care satisfies a felt human need, one to which people have been prepared to devote substantial manpower and financial resources in nearly all societies at all times. Different health programs will have a differential impact upon the welfare of various age-groups and socio-economic classes. A specialized facility in an urban hospital to look after stroke victims will cater largely to those in late middle-age, or older, and in all likelihood it will benefit mainly the urban, and the better-off classes. On the other hand, a maternal tetanus immunization campaign will lower suffering and death among the new-born, and would probably be of rather greater benefit to rural than to urban populations. Babies of lower income rural families, who are particularly likely to develop tetanus of the new-born from unhygienic delivery would receive the greatest benefit.

62. Sensible health planning aims at achieving maximum health benefits with the funds and manpower available. In realistic and in human terms, it is generally neither feasible nor desirable to expect an individual health worker not to do the best he can for a sick patient without regard for the costs involved. However, by decisions as to the type of drugs, facilities, equipment, and specialists available, it is possible to achieve a cost-effective allocation of health expenditures in broad terms.

B. Better Health as a Productive Investment

63. Better health contributes not only directly to individual welfare, but also to the productive capacity of a society. The main economic costs of ill-health result from its effects in (i) reducing the availability of labor for productive work; (ii) reducing the productivity of labor while at work; and (iii) directly wasting resources, such as food, natural resources, animal wealth and tourism potential. There is some suggestive evidence on these facets though it is not enough to provide a complete picture.

64. 1. Availability of labor: The availability of labor is reduced both by premature mortality and absenteeism from work. Mortality among adults is substantially greater in most developing countries than in developed ones. Nevertheless, the net effect of mortality differentials

between developed and developing countries cannot be said to impose an economic cost in itself owing to the existence of sizeable unemployment and underemployment in the latter group of countries. Also, these mortality differentials are greatest among the very young who have not yet joined the labor force. Health improvements could therefore increase the dependency burden rather than reduce it.

65. Morbidity among the labor force which leads to absenteeism may have a greater economic impact. It usually disrupts the production process; even under conditions of unemployment it will not usually be possible to temporarily replace absent workers without loss of output. Few surveys provide adequate data on this effect, but a recent Colombian study showed that 5% of annual man-days among males 15-64 were lost because of illness, accidents or injuries. 1/ A careful study of tuberculosis control in Korea concluded that an optimal disease program resulting in increased work life and decreased absenteeism would yield a return of $ 150 for each dollar spent. 2/ Additional examples of disease-control programs which have substantially reduced absenteeism include anti-malaria programs in the Philippines and Southern Africa, and yaws-control programs in Haiti. 3/ Various efforts have been made to cost the absenteeism due to disease, essentially by valuing days lost at the current wage. Often the resulting estimates are very large, although in conditions of high unemployment they would be misleading.

66. 2. Productivity of labor: Part of the effects of ill health on labor productivity is the loss of strength, stamina and ability to concentrate. Available evidence is rather limited. A recent Bank study involving construction and rubber plantation workers in Indonesia showed that these effects can be very important. In this case the prevalence of hookworm infestation was 85% and of resulting iron deficiency anaemia 45%. Treatment with elemental iron for a period of 60 days (at a cost of US$ 0.13¢ per laborer) resulted in an increase in productivity of approximately 19%. 4/

1/ Alfonso Mejia and Raul Paredes, "Health Planning for Colombia: Part 2", Milbank Memorial Fund Quarterly, XLVI (1968), pp. 276-289.

2/ Martin A. Feldstein, M.A. Piot, and T.K. Sunderesan, Resource Allocation Model for Public Health Planning: A Case Study of Tuberculosis Control (Geneva: WHO, 1973).

3/ C.E.A. Winslow, The Cost of Sickness and The Price of Health, (Geneva: WHO, 1951).

4/ S.S. Basta, and A. Churchill, Iron Deficiency Anaemia and the Productivity of Adult Males in Indonesia, Staff Working Paper No. 175, April, 1974.

In latex production alone this implied that the correction of this deficiency had a benefit cost ratio of 280:1 On the other hand, one of the most careful studies so far undertaken on the effects of disease on labor productivity in a developing country found the effects of schistosomiasis and certain other parasitic diseases in St. Lucia to tbe slight. 1/ However, the economic effects of many parasite infections including schistosomiasis depend upon the intensity of infection, and, in the case of St. Lucia, this may still be increasing, since the shift from sugar to bananas is recent, and so is the change in ecological conditions - more drainage ditches - which favors schistosomiasis. Also the St.Lucia form of schistosomiasis is not a very severe one.

67. A conceptually distinct effect of ill-health on productivity concerns its impact on education and training. Ability to learn is impaired by sickness and malnutrition. 2/ Absences from school on account of disease may reduce cognitive achievements. Early mortality and disability will reduce the period of time over which the pay-off from earlier human capital investment can be expected and thus diminish its productivity.

68. 3. Utilization of resources: A waste of resources comes with many parasitic diseases because of the nutrients consumed by the parasites themselves. A wastage of calorie intake also occurs in the case of fevers, because of the extra metabolic demands they impose on the body. In the case of enteric disease, intestinal absorption is also impaired. One study reports, for example, that the value of excess food consumed in each case of enteric infection in Panama amounted to about $ 10. 3/

69. Another enormous waste of resources occurs where poor health conditions restrict settlement in areas which contain fertile land and/or other natural resources. This has been the case with onchocerciasis in West Africa. Taylor and Hall cite several studies (including Nepal, Sri Lanka, and parts of Mexico)where malaria eradication has induced a

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1/ Weisbrod et.al., Disease and Economic Development, (Madison: University of Wisconsin Press, 1973).

2/ M. Selowsky and L. Taylor, the Economics of Malnourished Children: An Example of Disinvestment in Human Capital, Economic Development and Cultural Change, Vol. 22, No. 1, (1973), pp. 17-39.

3/ Office of International Health, Department of Health, Education and Welfare, Syncrisis: The Dynamics of Health, Vol. I: Panama (Washington, 1972).

movement of labor and capital into resource-rich districts from less well-endowed areas, with a net increase in total output. 1/ Similar examples exist for other diseases, e.g., "sleeping sickness". One successful settlement scheme was the Anchau Corridor in Nigeria. 2/

70. Certain human diseases also infect animals at least in certain areas. 3/ There is scope for programs which improve human and animal health simultaneously and facilitate exploitation of animal resources for meat or as stronger draught animals. The possibilities for fostering livestock development while benefitting human health are not limited to direct disease control programs, for a few special diseases. For example, the provision of water in very arid areas may permit livestock development, extra crop production as well as considerable health benefits for the human population. It may also save time spent in the carrying back and forth of water, which can be very considerable. 4/

71. The tourism potential of a country can be undermined if the likelihood of contracting some form of diarrheal disease is high or if some exotic disease is prevalent in an area of obvious tourist attraction. A case in point is "sleeping sickness" in game parks. Sudden epidemics of disease can have a particularly dramatic effect on tourism. Indeed, they may even affect commodity exports because of controls imposed by importing countries.

72. The occurrence of disease also leads to an expenditure on treatment costs, which would not otherwise have taken place. Coverage of the official health services is small in many developing countries, but there is nevertheless expenditure on treatment in response to diseases - self medication with local or modern drugs, payments to injection men, traditional healers, spirit doctors, etc. Whether modern or traditional medicine is effective or ineffective, the costs of treatment are nevertheless a burden upon the community, and one which a lessened incidence and prevalence of illness could diminish.

1/ Carl E. Taylor and Marie-Francoise Hall, "Health, Population and Economic Development", Science 157 (1967), pp. 651-657.

2/ See John J. McKelvey, Jr., Man Against Tsetse, Cornell University Press, 1973.

3/ The pork and beef tapeworm, trypanosomiasis, brucellosis, anthrax, hydatid disease, and sometimes schistosomiasis in the S. Japonicum form.

4/ See E. B. Wagner and J. N. Lanoix, Water Supply for Rural Areas and Small Communities, World Health Organization, Monograph Series No. 42, Geneva 1959. Also Warford and Saunders (IBRD).

C. Health and Population

73. Any generalized improvement in health in a developing country will lower mortality among the very young. This, taken by itself, will tend to increase population growth. Secondly, better health and nutrition will tend to increase fecundity (or ability to reproduce) by reducing the many diseases which interfere with completion of pregnancy. Lower maternal mortality will also increase the number of surviving women who can bear children. For example, venereal diseases lower fecundity; infectious hepatitis, tuberculosis and malaria interfere with completion of pregnancy; malnutrition may contribute to maternal mortality, foetal loss, shorter fertile time-spans and amenorrhoea (or absence of "periods"). Thus better health and nutrition may well increase ability to reproduce healthy babies with a good chance of survival. It remains to consider how the will to reproduce is affected.

74. A decline in mortality among young children could also lead to a reduction in fertility, if parents aim for a target number of surviving children. In fact, there is some evidence that parents respond to a child's death by a desire to replace it, so that a fall in child mortality would tend to be partly compensated by a fall in fertility. 1/ The relationship between a fall in infant mortality and a fall in fertility is represented below:

Table 9

Mean Rates of Decline in Infant Mortality Rate and Crude Birth Rate Since 1945-1949 by Interval Between Decline in Infant Mortality and Onset of Decline in Crude Birth Rate

Interval between decline in IMR and CBR	No. of countries	Rates of Change since 1945-1949 in: Infant mortality rate	Crude birth rate
0 years	1 /a	- .0361	- .0178
5 years	6	- .0196	- .0219
6 - 9	16	- .0373	- .0165
10 - 14	14	- .0353	- .0238
15 - 19	13	- .0327	- .0146
20	3	- .0288	- .0000
Total	53	- .0367	- .0178

a/ Dominican Republic experienced a temporary rise in infant mortality after 1950-1954 since reversed; crude birth rate has been declining since 1950-1954, so that the birth rate fall appeared to precede the death rate fall even though in 1950-1954, the CBR was 44.0 and the IMR was 79.7.

1/ See IBRD: Population Policies and Economic Development, Report No. 481, July 12, 1974, for a fuller discussion of these issues.

This suggests that a decline in the birth rate is significantly related to a fall in the infant mortality rate, but that the birth rate falls less. Studies of sharp changes in mortality such as those in Sri Lanka and Mauritius also suggest that the birth rate falls less sharply than the death rate.1/ Both national data and cross-country comparisons support the view that there has been a strong correlation between birth and death rates. However, it is sometimes hard to say which is the causative factor. Historical experience is sufficiently varied to refute any very strong generalizations about the relation over time between fertility and mortality. There are also cases, such as Jamaica, where death rates fell steadily but birth rates did not decline significantly for a long while. Nevertheless, on the whole, a fall in mortality seems to be compensated, but often only partly, by a fall in fertility. The speed and the extent of the response can be increased by motivational efforts and the delivery of effective family planning services. 2/

D. Better Health as Part of Socio-Economic Development

75. The economic policy criteria so far discussed have been partial, and as such, do not do justice to the very complex interrelationships involved. For example, as has been discussed, the whole disease pattern relates intimately to levels of fertility, standards of living and cultural habits. A more appropriate framework in which to analyze health policy is to view better health as part of balanced socio-economic development. Poverty, ill-health, high fertility and mortality, fatalism and short-time horizons constitute a possible low level equilibrium, although in practice this has already been disturbed in most less developed countries by a fall in the death rate and in some countries by the beginning of a fall in birth rates. Better health is one aspect of man achieving more positive control of his environment, and as such helps to justify and facilitate planning of his future - social or economic, public or family affairs. Within this framework, there are a large number of linkages. Economic and educational development may encourage family planning; 3/ family planning improves nutrition; nutrition improves health; health can improve attitudes to family planning and to development; health can also reduce absenteeism, increase labor availability and productivity, and facilitate exploitation

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1/ H. Frederickson, "Feedbacks in Economic and Demographic Transition", 837-847 in Science, Vol. 166, No. 3907, November 14, 1969.

2/ IBRD: Population Policies and Economic Development, No. 481, July 12, 1974.

3/ Especially education for women. See U.N. Secretariat, "Women's Rights and Fertility", U.N. World Population Conference, Bucharest, Romania, August 1974. Many of these factors affecting fertility have been discussed in Population Policies and Economic Development (IBRD) Report No. 481, July 12, 1974.

of natural resources with favorable effects on economic development; this in turn can lead to improved nutrition, housing, water supply, and sanitation, with large positive health effects.

76. Satisfactorily integrated with other socio-economic advances, health improvements are a vital part of the development process. Pushed in isolation, improved health could have unbalancing effects, so that the adverse effects of health expenditures on increased population growth may offset the positive gains. Viewed in terms of partial criteria, there can be a conflict between social and economic objectives. Ultimately, society must choose between a regime in which many births are offset by many deaths and high morbidity and the more attractive situation in which efforts are made to avoid high fertility, high mortality and its concommittant morbidity.

CHAPTER 4

Present Health Policies and their Impact

77. Few governments have attempted to apply in practice the approach to health policy spelled out in Chapter 3. Objectives of health expenditure in terms of consumption and investment have rarely been articulated. The administrative framework for decision making is usually fragmented and the data base is deficient. Specific measures are seldom evaluated for cost-effectiveness.

78. Few governments of low income countries spend more than one or two percent of GNP on health services. This amounts to a paltry sum per head of the population. This is one reason for the narrow coverage of public health services which tend to be concentrated around urban centers. A more important resason is the heavy emphasis placed on high-cost, person-oriented, curative medicine instead of environmental measures and preventive techniques. The bulk of government outlays are on expensive, high-technology hospitals manned by highly trained medical personnel. Meanwhile, large numbers of people living in the countryside or the city slum remain out of reach of the modern medical sector. Present health policies are inequitable as well as inefficient in many developing countries; the People's Republic of China is something of an exception in this respect.

A. Expenditures on Health

79. The focus of this paper is on government outlays on health. Limited data available on private expenditures suggest that this can be considerably larger than government spending and the ratio between the two varies widely (see Appendix Table 4). Government health expenditures as a proportion of GNP are generally less than one or two percent for countries with per capita incomes below $250; for relatively richer countries the proportion tends to rise somewhat. (See Appendix Table 18). The resulting pattern of government health outlays per head is summarized in Table 11. For 17 countries out of 65 for which data are available, government health outlays per capita are less than $1. In fact, the average figure for the very poor countries (below per capita income of $100) is only $0.87. The average rises to $1.42 for countries with per capital income between $101-200 and to $2.85 for countries with per capita incomes between $201-300.

80. The bulk of government health expenditure is allocated to curative services. This statement cannot be supported rigorously on the basis of available quantitative evidence but its validity is not in doubt judging by the comments of knowledgeable persons. Fragmentary data which support the view that most health budgets have a heavy bias in favor of curative services are presented in Appendix Table 5.

Table 10: Per Capita Government Health Expenditures in Developing Countries

GNP Per Capita	Total Number of Countries	Government Health Expenditures Per Capita					
		Less than $1.00	$1.01 to $2.00	$2.01 to $3.00	$3.01 to $5.00	$5.01 to $10.00	Above $10.01
		(Number of Countries)					
Less than $100	12	9	2	0	1	0	0
$101-200	15	7	3	4	1	0	0
$201-300	16	0	4	5	5	1	1
$301-600	14	1	1	3	4	4	1
$601-1000	8	0	0	2	1	0	5
TOTALS	65	17	10	14	12	5	7

Source: Based on Appendix Table 18.

B. Hospital Beds and Medical Manpower

81. A large part of government funds are spent on hospitals, particularly on in-patient services manned by expensively trained doctors and nurses. These modern medical facilities are concentrated in urban centers. In Ghana, for example, 62% of physicians were in urban places which had 15% of the total population.[1/] Similarly, the Greater Accra Metropolitan Area had 23% of the hospital beds but only 9% of the total population. Figures for other countries reinforce the impression of a very uneven geographical spread. (See Appendix Tables 9 and 10).

82. Physicians have commonly chosen to perform low priority medical tasks in the urban centers rather than to respond to the critical needs of rural and low income areas. Procedures which are of trivial importance and functions which are more appropriately in the realm of nurses or auxiliaries have absorbed the physician's surplus time. In addition many physicians from developing countries migrate to the developed world. Partly, they do so on a temporary basis, to obtain certain types of specialty training perhaps not available at home. Most of these physicians return home after about three years. As a result, some developed countries have large circulating pools of physicians from developing countries: the United States,

1/ M.J. Sharpston, "Uneven Geographical Distribution of Medical Care: A Ghanaian Case Study," in Journal of Development Studies, Vol. 8. No. 2, January, 1972.

about 12,000; the United Kingdom, 5,000; and Canada, 1,300. In addition, there is permanent migration of about 1,500 physicians a year from developing countries to the United States, and several hundred per year to the United Kingdom.[1] Similar flows exist to other developed countries. Appendix Table 11 gives further data on physician emigration from developing countries. Among other countries of emigration are India, Pakistan, Philippines, Thailand, South Korea, Argentina and Colombia. The highest rate of migration shown is for Thailand (67 percent). But only an estimated 4 percent of Thai emigrant physicians practice permanently abroad, whereas 17 percent of the 22 percent of Turkish MDs who emigrate do so permanently.

83. The costs of education for physicians are extremely high (see Appendix Table 12), often about $25,000 at 1974 prices but ranging up to $100,000. Such figures probably exclude any return on the capital costs of medical schools. In addition, the fact that a particular hospital is a teaching hospital is often used to justify very elaborate hospital facilities, but all such extra costs will not have been included in the costs of training physicians.

84. A considerable proportion of international assistance has been for medical training. Often the emphasis of such training has been on sophisticated clinical treatment of acute illness in individuals rather than improving the health level of a whole community on a continuing basis. The training abroad of clinical specialists has often served to increase the status of complex hospital work, and has almost certainly helped to divert both funds and manpower from an extension of health coverage.[2]

C. Coverage of Official Health Services

85. Although the evidence is only fragmentary, it appears that in many developing countries official health services cover only a small part of the population. In some cases so small a proportion is covered that the influence of these activities on the nation's health is bound to be negligible, at least in rural areas.

1/ "Migration of Physicians - An Illustrative Special Case," pp. 695 ff. in International Migration of High-Level Manpower, op. cit.

2/ Equipment may even be bought specifically to satisfy the "need" of a physician who has received specialized overseas training, without reference to the priority health requirements of the relevant population: see M.J. Sharpston, "Uneven Geographical Distribution of Medical Care," op. cit. On the general issue, see Thomas H. Weller, "Tropical Medicine: Obligations and Responsibilities," Presidential Address, in American Journal of Tropical Medicine and Hygiene, March 1965.

86. It is known that the great bulk of patients at a health facility come from the immediate vicinity, say, within five miles. For example, in Kenya 40% of the outpatients attending a health center lived within five miles of it; 30% lived five to ten miles from it; and only 30% lived more than 10 miles away.[1] An Indian study showed attendance at a dispensary halved for every half mile.[2] In another Indian study, over 60% of the patients came from within a mile of the primary health center concerned.[3] To a large extent, the distance patients are prepared to walk limits the area of influence of a health facility.[4] The fall-off in in-patient use of health facilities is somewhat less rapid, but still rather dramatic: in Uganda, it was found that the use of inpatient facilities halved every three miles whereas outpatient attendances halved every two miles. In Ghana, 80% of inpatients at the five major hospitals came from the urban district in which the hospital was located.[5] From this fact, (often known as the patient care "gradient"), it is possible to calculate the proportion of the country's population which lives outside a stated geographical radius of a health facility. This figure may then be adjusted downwards to allow for some coverage of this population, since a certain proportion of patients will come from outside this radius. One thus obtains a figure for population without coverage. The calculation may often seem to err on the optimistic side as it assumes that coverage within the chosen radius will be "adequate." Nevertheless, in Ghana only about half or so of the population was covered on this basis.[6] Again, "only 32% of the total districts in Thailand have physicians who have authority to diagnose diseases and treat patients.[7]

1/ N.R.E. Fendall, "Medical Planning and the Training of Personnel in Kenya," Journal of Tropical Medicine and Hygiene, 68:12, (1965).

2/ H. Frederiksen, Maintenance of Malaria Eradication, Duplicated Report WHO/Mal/429, 1964.

3/ India, Rural Health Training Centre, Najafgarh, The Services from a Primary Health Centre, 1964.

4/ For a review of this subject, see Richard Jolly and Maurice King, "The Organization of Health Services," in Medical Care in Developing Countries (ed. Maurice King), Oxford University Press, Nairobi, 1966. For additional supporting evidence for Tanzania, see studies cited in Oscar Gish, "Resource Allocation, Equality of Access and Health," in World Development, Vol. 1, No. 12, December 1973.

5/ Study by Saakwa-Mante, cited in J.J. Sharpston, "Uneven Geographical Distribution of Medical Care: A Ghanaian Case Study," in Journal of Development Studies, Vol. 8, No. 2, January, 1972.

6/ M.J. Sharpston, "Uneven Geographical Distribution of Medical Care,"op. cit. It was assumed that health care within the urban district (or similar sized area) containing a health facility was "adequate."

7/ Debhanon Muangman, "Rural Health Care in Thailand," at Quaker International Seminar, Philippines-Indonesia, July-August, 1973.

87. Geographical distance is a serious problem, given the poor transport typical of rural areas in the developing world. Tracks often become impossible to vehicles in the rainy season, and in any case travel on foot or by draught animal may well be the only form of transport actually available to an inhabitant of a rural area in an emergency. Yet speed of treatment can be essential. The effectiveness of a distant health facility, however competent, is therefore sharply reduced for both acute and chronic conditions. For infants with acute diarrheal disease, timely oral re-hydration by a medical auxiliary near at hand, is likely to be more effective than belated but sophisticated parenteral re-hydration at a distant hospital. To some extent, the same applies for adult patients. Thus for cholera it is estimated that a patient who arrives at a hospital within three hours of the onset of symptoms is saved; that those who arrive after 3-6 hours have 10% fatality, and after 6 hours 30% fatality.1/ There is a similar need for haste in the case of some abnormal pregnancies.2/ For chronic conditions, a long trek to a distant health facility may not seem worthwhile until a long period of increasing debility has already been suffered. By then irreversible damage may have occurred.

88. It has become declared policy in most developing countries to provide a "pyramid of health care" from health centers or health posts, through district hospitals up to a national referral-teaching hospital. Yet, the administrative problems of long distance use of health facilities seem almost insuperable in all but the most advanced, and geographically small developing countries, with exceptional transport and communications facilities. In Ghana, the Central Hospital absorbed 105 of the 298 physicians available to the official health services, yet only about 2% of the patients in this hospital had been officially referred from elsewhere in the health system. Another 6% had referred themselves, that is, came into the Accra Region from outside for treatment.3/

89. There may also be a wide cultural gap between a modern health facility and the tradition-bound people it is designed to serve. Even a low-level facility can encounter resistance: for example, in Ghana health posts were built with maternity beds, despite the fact that rural women apparently preferred to be delivered at home. As a result they were very

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1/ K.K. Mathen, D. Barua, B. Cyjetanovic and K. Vemura, "Costs of Treatment and Prevention and Economic Losses due to Cholera," Ch. 2 in Strategy of Cholera Control, World Health Organization, BD/CHOLERA/71.5.

2/ In theory it would be both possible and desirable to screen out the high-risk pregnancies in advance, so that as the woman went into labor the need for possible treatment was already organized. In fact, however, few such systems actually exist.

3/ Study by Saakwa-Mante cited in M.J. Sharpston, "Uneven Geographical Distribution of Medical Care: A Ghanaian Case Study," op. cit.

underutilized.1/ A study of rural Thailand found the health service very underutilized because people apparently have preferred alternatives such as herbalists, priests, spirit doctors, pharmacists, "quack" doctors or injectionists, traditional midwives, friends and relatives.2/ A survey in Cali, Colombia, found that 40% of the population used a well-staffed health center, 28% knew of it but did not use it, and 32% did not know anything about it.3/ This was in a peri-urban area. Even in a developed country, hospitals are daunting places to many people, only to be visited in extreme need. A villager is even more likely to react in this way to the sophisticated clinical facilities of an urban hospital. Indeed, the cultural gap between physician and patient--even if the physician is a national-may be so great that discussion of symptoms is very difficult.

90. There is direct evidence that the combined impact of geographical, administrative, and cultural factors seriously limits health coverage in many developing countries. In 1970, a country-wide health survey with a random sample was undertaken in Thailand.4/ It was found that on the average sickness occurred twice per year per person,5/ but that only 17% of the surveyed population utilized health facilities of the public sector during a year. Even in the Bangkok metropolitan area 45% applied self-treatment with the aid of a pharmacy; in the rural areas this became 61%. Private clinics were important in Bangkok (31%), and traditional doctors or priests were quite important in the rural areas (12%).6/ In Cali,

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1/ See M.J. Sharpston, "Health and Development," in Journal of Development Studies, April 1973.

2/ Clark E. Cunningham, "Some Social Aspects of Rural Medicine in North-Central Thailand: A Preliminary Data Paper," (mimeo, 1965), cited in John Bryant, Health and the Developing World, Cornell University Press, 1969.

3/ Personal communication cited in John Bryant, op. cit.

4/ Ministry of Public Health and the Faculty of Public Health, Mahedol University. Cited in Muangman, op. cit.

5/ This low figure implies a severe interpretation of 'sickness.' In the U.S. or U.K., in an average month one person in four consults a doctor--and disease incidence is certainly far lower, as already described. White, et al., cited in N.R.E. Fendall, "Primary Medical Care in Developing Countries," International Journal of Health Services, Vol. 2, No. 1, 1972.

6/ A Colombian study showed that only 23% of those who fell sick sought medical advice, of whom 28% consulted pharmacists, nurses, traditional healers, and others, (rather than a physician). However, nearly 40% are stated as falling sick in a two-week period, which suggests that even mild ailments have been covered, for which self-treatment would be normal in a developed country. See Ministry of Public Health, Colombia, and Colombian Association of Medical Schools, Health Manpower and Medical Education in Colombia, Vol. II: Preliminary Findings, Pan American Health Organization, 1967.

Colombia, where the doctor-to-population ratio is one to 910, 17% of children who die are not seen by a physician, and another 19% have no medical attention during the 48-hours preceding death. 1/ A study in rural Punjab found that there were 89 yearly contacts per 100 population with health personnel in the public sector, but 221 with registered indigenous medicine practitioners.2/ A recent study in a village close to New Delhi showed that only 7% of illnesses came to the attention of the medical services.3/ In a third study of the Punjab, 8,000 episodes of illness were reviewed: 36% of these did not require health services. Of the remaining 5,000 or so, 10% were dealt with by the public sector, 29% were dealt with by private practitioners (mostly indigenous), and 61% received no care at all. "In Egypt which has a more widely distributed health service than India, one study showed that only 20-25% of families made use of National Child Health Centers and up to 80% of mothers were dependent on traditional midwives for delivery."4/

D. Effectiveness of Official Health Services

91. A number of developments should be listed on the positive side of the ledger. The most striking of these is certainly the use of residual insecticides for malaria eradication, where very significant results were obtained with large scale international assistance. Other diseases have been controlled by environmental measures involving even more rudimentary technology. For example, trypanosomiasis ("sleeping sickness") has been controlled in much of Africa by cutting down undergrowth which forms a suitable habitat for the tsetse fly. Smallpox has been successfully controlled by immunization throughout much of the developing world; if sufficient coverage can be achieved, measles may be similarly contained soon.5/ Yaws has also been contained throughout much of the developing world, an achievement only possible since the discovery of penicillin.

1/ Dr. Guillermo Llanos, cited in John Bryant, Health and the Developing World, Cornell University Press, 1969.

2/ D.N. Kakor, S.K. Srinivas Murthy, and R.L. Parker, "People's Perception of Illness and their Use of Medical Care Services in Punjab." Reference No. 132 cited in D. Morley, Paediatric Priorities in the Developing World, Butterworths, 1973.

3/ O.P. Ghai, 1971, cited in David Morley, op. cit.

4/ David Morley, op. cit., his reference No. 315.

5/ A very efficient vaccine now exists. See for example David Morley, op. cit.

Cholera control has brought down mortality in India from this cause from up to 800,000 in epidemic years at the turn of the century, to 3,000 a year now.1/

92. How far personal health services have helped to reduce the effects of disease probably varies widely according to the level of coverage. For example, in Sri Lanka or Cuba, the impact of health care upon the effects of disease has probably been considerable, because of the excellent coverage and the availability of doctors, even in the rural areas. In the case of Sri Lanka, the provision of cheap or free rice has probably also served to improve general nutrition and hence also health levels. Elsewhere, health care provided by the official services may be of importance in the cities, where private sector doctors look after the health of the more affluent. In the rural areas--and to a considerable extent, in the urban slums--very little health care is available. It seems unlikely that incidence of the main diseases of the oral-faecal cycle and of the pneumonia-diarrhea complex has been much affected in most countries.

93. Recently several countries have initiated health services programs which rely on very low levels of technology, and which focus on community activities rather than exclusively on personal services. These programs have recruited indigenous providers and have systematically exploited public trust and social discipline in order to implement impressive programs of vector control, sanitation, health education and public health. The most notable of these programs is that developed in the People's Republic of China. Although available information is limited, it will be useful to summarize what is known.2/

94. In the 1950's, there was a considerable emphasis on building new urban hospital beds.3/ Probably in part because of Russian influence, "middle medical schools" were set up, where students who had reached the intermediate level of the secondary school system attended a three-year course to become "assistant doctors". At the time of the Great Leap Forward, an increased effort was made to provide rural health care, and to promote cooperation between practitioners of traditional and Western medicine. In the period which followed, interest in rural health services may have diminished somewhat. However, the Cultural Revolution brought major changes.

1/ K.K. Mathen, D. Barua, B. Cujebanovic and K. Vemura, "Costs of Treatment and Prevention and Economic Losses, due to Cholera," Ch. 2 in Strategy of Cholera Control, BD/CHOLERA/71.5.

2/ See also IBRD, Family Planning in China, July 1974, SecM74-487, for a description of health financing and health care services.

3/ Joshua S. Horn, Away with All Pests, Monthly Review Press, 1969.

"In medical and health work, put the stress on the rural areas," became the directive from June 26, 1965. Large numbers of "bare-foot doctors" started to be trained. These had a primary education background and received short periods of training of about three months with refresher courses thereafter. They give first aid and supervise immunization, refuse and excreta disposal as well as promote public health campaigns. Some divide their time between agricultural and health work according to the commune's decision. By now, about one million bare-foot doctors have been trained, or roughly one per 800 population. Still more junior, part-time workers also exist. These are perhaps local housewives, who had the title "Red Medical Worker."

95. The high level of social participation in China greatly facilitated attempts to lower the incidence of disease by public health measures. The result is that problems related to the oral-faecal cycle have been greatly diminished despite water and sanitation facilities which are rather primitive compared to those typical of a developed country. Typhoid still exists and the pneumonia-diarrhea complex of early childhood is still a major health problem. Syphilis may well have been brought under control. Schistosomiasis is still a health problem of some importance, although control efforts probably have greatly improved the situation. In Southern China, malaria has been brought under reasonable control by the use of DDT. Hookworm still exists, but its serious clinical effects are not in evidence. Tuberculosis has been greatly diminished, although it still exists on a larger scale than is typical in a developed country.1/ The same is true for trachoma.2/ "Barefoot doctors" have probably had a useful first aid function, not least in terms of human support. They have probably done little to supervise intensive nursing of sick infants, but by use of modern drugs (including those normally only prescribed by a physician in the "West"), they probably have had some impact on disease and suffering in older age-groups.

96. In summary, the People's Republic of China has probably achieved a health level similar to the U.S. in the 1930's. For a country with a standard of living still a fraction of that of the United States at that time, this is certainly a formidable achievement. Modern technology assisted in the control of malaria and syphilis; penicillin and other antibiotics certainly increase the effectiveness of health care. Immunizations have probably also had a significant impact upon health. Nevertheless, the single most important factors have almost certainly been better nutrition and painstaking environmental health measures on a massive scale with broad community support.

1/ Victor W. Sidel and Ruth Sidel, "The Delivery of Medical Care in China," in Scientific American, April 1974.

2/ W. McDermott and Eugene A. Stead, Jr., Pattern of Disease (mimeo) 1974.

CHAPTER 5

The Future of Health Policy

97. Per capita health budgets and availability of trained manpower vary greatly among developing countries. The potential for extending the coverage of official health services is therefore very different at different levels of development and so are the reforms that might be carried out. The more affluent countries may be able to think in terms of developing a network of services staffed mainly by well trained paramedicals, referring more complex cases to physicians and district hospitals, but such a possibility seems at the moment very remote for the poorest countries. The experience of a few countries, however, does suggest that it is possible for every very poor country to extend some sort of health services on a nationwide basis. How rapidly this target can be reached and what standard of service can be provided will, of course, vary from country to country: in the final analysis the allocation of public funds for this purpose remains a matter of value judgement and political feasibility.

98. What is required is not a marginal change but a radical transformation of the system for improving health. Substantial savings can be secured by curtailing hospital building, regionalizing hospital services, overhauling policies regarding the pricing of health services and reformulating the basic design of health systems appropriate for village communities and the urban poor. The central idea of the reformed health system is to emphasize environmental and preventive measures aimed at controlling the incidence of disease together with the use of standard drugs and simple procedures for treating illness. The implementation of this scheme will require a new approach to training of health personnel and organization of delivery systems: essentially, the aim would now be to promote health from within the community, on a continuing basis.

A. How much should be spent on Health?

99. There is no easy answer to this question. Let us consider health at three levels: (a) health for a special group of workers, or in a small zone of crucial economic importance, often in connection with a project for a non-health purpose, (b) health projects to control specific diseases, on a nation-wide basis, and (c) a generalized effort to improve the health status of the bulk of the population. In the first case, often the private market mechanism will direct resources to those health expenditures which have an attractive financial pay-off. Private corporations undertake disease control before opening up new land for commercial plantation or mineral exploitation. Private industry provides nutritional supplements or subsidized dispensary facilities for workers if this causes profits to rise as a result of reduced absenteeism and increased labor productivity.

Financially rewarding opportunities for health investment do exist but the market-mechanism breaks down all too frequently owing to ignorance, the riskiness of health technology, and the presence of indivisibilities, and of external economies and diseconomies.

100. In principle, public investment need not be circumscribed by imperfections of cost-price signals and many outlays on health can be justified if planners are sensitive to the health dimension of production or infrastructure projects. Lack of such sensitivity in the past has caused considerable damage to the health status of populations residing in areas in which government projects are located. The neglect of the health aspect has been most unfortunate in projects connected with water-use: hydro-electric dams, irrigation and drainage schemes. They may have contributed to the spread of water-related disease such as malaria, onchocerciasis and schistosomiasis. These adverse consequences can be mitigated by giving explicit attention to the health aspect at the project design stage and by introducing health components, if necessary. Wherever the extra cost of the health component is more than offset by additional benefits, the over-all economic return on the investment will rise. Economic benefits of health outlays, can usually be identified but there will be many instances in which they defy precise measurement. Accordingly, it is easier to specify the critical minimum size of the health component that should be introduced in a project than to determine its optimum level.

101. In the case of projects to control specific diseases on a nation-wide basis, the indivisibilities and external economies are such that the market mechanism is most unlikely to function. The application of cost-benefit analysis may, however, help to identify a sizeable volume of government expenditure on health which can be justified as "investment". Alternatively, cost-effectiveness analysis may provide suggestive evidence. However, even at this level, the possible importance of demographic effects may make a standard economic approach to project analysis hazardous.

102. In the case of generalized health measures, the market mechanism undeniably operates, but with very important distortive effects. Affluent groups in developing areas have a disease pattern which is fundamentally different from that of the rest of the country. Their needs are for sophisticated treatment by clinical physicans and well-equipped hospitals. In the past, benefits of government health expenditure have also been distributed rather unevenly in favor of the middle and upper income brackets in the cities. In fact, these groups have the economic capacity to pay at market prices for most of their health needs; public subsidy to them is not easy to justify by any standard. They have the necessary purchasing power to buy what they need from private practitioners and private medical institutions either at home or abroad. Governments would be well-advised to withdraw and to allow the private market to function in this sphere.

103. Governments should encourage (but not subsidize) private or public social security and insurance schemes. Typically these arrangements will only cover a small part of the population, i.e. employees in the

modern formal sector of the economy. Nevertheless, they facilitate the operation of the private market in medical care and thereby release public funds for other purposes.

104. Instead of being devoted mainly to a small number of urban hospitals, government health expenditure can be the instrument for redistributing welfare. Public health expenditure aimed at improving the quality of life of the poor segments of society can be justified on moral and economic grounds, as argued in Chapter 3; although because of the complex dynamic interaction of demographic, social, and cultural effects, it is very difficult to say on economic grounds how large such expenditure should be. Over time it should be possible to extend the coverage of official health services to all the people. How rapidly this target can be reached and what standard of service can be provided will, of course, vary from country to country. It is not easy to set specific targets on technical grounds; in the final analysis the commitment of public funds for this objective remains a matter of value judgement and political feasibility.

B. How to expand the coverage of official health services?

105. Debates and resolutions of the World Health Assembly have recognized that what is required is not a marginal change in allocations of financial resources and manpower, but radical transformation of the systems for improving health.

Funding expanded coverage

106. How much additional resources are necessary over and above the present level of government health expenditures to provide full coverage depends on the following factors:

(i) The concept and design of the reformed health service delivery mechanism.

(ii) Ability to restrict the building of new hospitals, and hospital improvement and expansion, so as to avoid devoting further substantial capital and recurrent budget costs to these facilities.

(iii) Capacity for rationalizing present services on the basis of cost-effectiveness considerations.

(iv) Capacity to mobilize funds through appropriate pricing of health services.

107. The concept and design of the reformed health service delivery mechanism are critical to the achievement of full health coverage of the

population of a developing country, with the financial and manpower resources available. By means of this reform, cost is substantially diminished and effectiveness increased. This concept is discussed in the following section. These ways of making more economic use of funds in the rest of the health service are considered, so as to free resources for the expansion of coverage.

108. Restricting hospital building and improvement with government funds is technically the easiest method of expanding coverage. However, it will go against the interests of the middle and upper income brackets whose disease pattern these facilities serve, and also against the interests of the majority of present physicians, who wish to work in hospitals. More generally, if health services in developing countries are subjected to a thorough cost-effectiveness analysis, it will be possible to secure substantial savings. First, too much is spent on in-patient services compared to out-patient ones. The former are extremely expensive. An average in-patient stay cost about $12 at a district hospital, $24 at a regional hospital, and $52 at a national hospital in Kenya in the mid-1960s.1/ These estimates exclude capital costs which are sizeable. A large part of recurring in-patient costs are essentially "hotel" costs --laundry, catering, heating, air-conditioning--which have a remote relation to treatment or cure. There is reason to believe that the bulk of serious illness typical of developing countries--diarrheal diseases, malnutrition conditions, leprosy, tuberculosis--can be treated effectively on an out-patient basis. Secondly, there are ways in which in-patient stays can be shortened--for example, the duration of a cholera patient's stay in a hospital can be shortened dramatically by the use of antibiotics.2/ Thirdly, there is great scope for realizing savings through administrative and cost control measures such as avoiding wastage through time-expiry of drugs, pilferage and bad maintenance of buildings and equipment.

109. Policy regarding pricing of health services requires reconsideration. There is a case for levying charges for curative cure at a reasonable level. To some extent, people may only value what they have to pay for. Certainly, people in developing countries are prepared to expend large sums relative to their incomes on transport to health facilities, and often also on visits to traditional healers. Fees will provide some additional income for the health services, discourage malingerers, and may help to equalize the geographical distribution of health care by increasing the total cost of a visit to a health facility (including transport) by proportionately more for those who live near than for those who live further away. However, excessively high charges may have the disadvantage of discouraging visits to health facilities at an early stage of illness when treatment is easier and can also rule out the very poorest members of the community, who may well be in the most urgent need of health care. In the light of these factors, a reasonable policy might be as follows:

1/ Richard Jolly, and Maurice King, "The Organization of Health Services," Chapter 2 of Medical Care in Developing Countries (ed. Maurice King), Oxford University Press, Nairobi, 1966.

2/ K.K. Mathen, D. Barua, B. Cjetanovic, and K. Uemura, "Costs of Treatment and Prevention and Economic Losses due to Cholera," Chapter 2, in Strategy of Cholera Control, World Health Organization, BD/CHOLERA/71.5.

(a) The cost of a visit to a community-based health worker should be lower than the cost of a visit to a health post; this in turn should be less than the cost of a visit to a health center. To discourage excessive self-referral to the largest health facility available, a visit to a hospital out-patient department should cost still more. Finally, charges for in-patient hospital treatment should be several times those for out-patient treatment.

(b) Differential charges for the poor and the rest of the population should be adopted, if this is feasible. Such a differential would be especially useful in charging for hospital in-patient services, since it would permit a substantial charge to be made to the non-poor.

(c) A useful method of raising extra funds from the better-off is to charge more than the extra marginal cost for facilities such as private rooms and air-conditioning, etc.

110. Fortunately, the expansion of the coverage of official health services need not cost as much as the present establishment on a pro-rated basis. This is so not only because of economies in hospital (para. 12) and revised pricing policies (para. 13) but more fundamentally because existing services seldom work in rural settings and other environments where poor sections of the population reside. The standard graduates of medical training institutions--doctors and nurses--who provide the existing services are not only extremely costly but also ill-equipped by training and orientation to address the health problems of the poor.

The community-based health worker

111. Instead, the concept of the reformed health service is to rely much more heavily on personnel who live and work in the community--the village or the urban ghetto. The health worker can be male or female, an old traditional healer or birth attendant, or a young primary school graduate: the choice should reflect cultural attitudes, and literacy would not be a necessary qualification. There would be community involvement in the selection of the person chosen, who in many cases would also have other employment. The worker would then be given brief training in how to treat some of the commonest disease conditions.1/ The teaching of clinical skills would be very limited; and indeed, this would be desirable, in order to ensure adequate time for environmental and preventive health work. Such workers would be taught the elements of maternal and child care,

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1/ A program of this kind, directed toward illiterate villagers exists, for example, in Niger. A similar approach is being adopted in Tanzania.

of delivery, and of monitoring the growth of young children for possible nutritional problems. They would organize mothercraft sessions for the feeding of malnourished children and the nutrition education of mothers. They would conduct immunizations. They would be responsible for encouraging family planning. They would also be responsible for organizing efforts in the fields of environmental health, water supply and sanitation. A very large range of technologies is available for excreta disposal, for example, pit latrines can be easily constructed with local labor, with only a minimum of technical assistance. Concrete slabs for squatting are desirable, and would be poured on site; however, use of cement is not essential (wood is one alternative). Extensive use of self-help labor and local materials is possible.1/ Provision of water at low cost, with only limited outside technical assistance, is often much more difficult, if water which is absolutely bacteriologically safe is to be supplied. One quite low-cost solution may be a hand-dug well, even apart from the construction of new water supply systems, it may be feasible and cost-effective to improve old ones. However, it will not always be feasible to provide absolutely bacteriologically safe water at a price which can be afforded, and with equipment which can be maintained. Planning for maximum water quality standards may in effect condemn much of the population to completely unimproved water supplies for an indefinite period. In other cases, there could be a trade-off between water quality and quantity. A consideration here is the fact that for health purposes, simple dilution of the disease agent is highly important. The technical issues involved are of critical significance, but are most appropriately left for fuller discussion in a paper on water supply policy.

112. Community-based health workers would probably best receive their training in stages, perhaps one day every two weeks if travel distances are short; otherwise perhaps a continuous training period of two weeks, then several months' interval, then possibly further training. The curriculum has to be very carefully designed, to be easy to comprehend and practically useful in the light of the exact disease pattern and cultural habits of the population of a given district. Although continuous "refresher" training of the same material would in any case be required, the teaching of further curative skills could perhaps be related to successful performance of preventive and environmental health work, as evidenced by indicators such as number of contraception acceptors, of immunizations performed, and of latrines built, and the state of the village water supply. In all likelihood, the traditional health care system will continue to be important for a long while. It is therefore most important that community-based health workers who are not themselves part of the traditional health care system should cooperate with it.2/

1/ For a review of this subject, see E.G. Wagner and J.N. Lanoix, Excreta Disposal, etc., op. cit.

2/ See address of Dr. Mahler, Director-General of the World Health Organization, to the World Health Assembly, 1974.

113. Such health workers would be a much better technological and social fit for the disease pattern of poor communities than the clinical physician. The health worker's great virtue would be his socio-economic and cultural origin - the same as that of the population he is servicing - and thereby his capacity to interact meaningfully with them in a style and idiom they understand. However, it should be recognized that his socio-economic origin is also the source of his weakness; he can easily be exploited by dominant groups in the village and his relatively brief training can be swamped by a life-time of tradition or custom. To be effective, the health worker must be monitored, supervised and supported by other ranks in the hierarchy of the health delivery system.

114. The immediate supervision of these community health workers would be provided by auxiliaries. Such auxiliaries would be full-time community health promotion workers, and would have perhaps 18 months to two years of health training, on top of primary or if possible middle school education. A substantial part of their training would be spent on water supply and sanitation technology, and on elementary medical sociology and traditional medicine. Some clinical skills would also be taught, but it would be most important to ensure adequate emphasis on community health promotion rather than disease care. Two alternatives exist for the higher management of the service. Under one system, the supervisory auxiliary would, in turn, report to a "primary care managerial physician." Compared to a typical clinical doctor, such a physician would have less clinical training, and with a different emphasis: much less on the degenerative diseases, and more on the treatment of infectious diseases common in developing countries. Such a physician would be trained to do "hot surgery" in emergency conditions with limited equipment. He would learn much more about epidemiology, the science of the causation of diseases in their social setting. More generally, he or she would be trained in community health promotion on a continuing basis rather than episodic curative health care on an individual basis. This would involve a study of local customs and an acquaintance with methods of traditional healers. He would need to have an elementary familiarity with agronomy, the nutritional value of crops and the place of livestock in rural life. He should be able to participate in a general effort at rural development, discussing health-related improvements with community leaders.

115. The great majority of medical schools in the developing world are not capable of producing primary-care managerial physicians of the type described in paragraph 114. However, efforts to re-orient training and education programs are now being made in Mexico, Colombia, Israel, and Cameroon. Experiments are underway in Mexico to move teaching away from lavishly equipped special hospitals to provincial hospitals and health centers under conditions which approximate normal operational situations. In Israel, attempts are being made to associate training with community health by giving medical schools some responsibility for health services in a district.

116. An alternative approach is to entrust the management of the reformed health service to people with a broad background in rural development, community work and administration, but who are not physicians. In this case, the managers would obtain some technical inputs from others with the requisite qualifications; although it would also be necessary for the managers themselves to receive some public health training. In comparing the two approaches to management, one may note that the curriculum proposed earlier for the primary care managerial physician is certainly a heavy one for any single person to absorb. Such persons might also feel -- with some reason -- that their advanced medical training was somewhat wasted. As another aspect of the same issue, the natural human pressures to do clinical work, and to save lives which perhaps only the physician can save, will tend to distract the managerial physician from community health promotion, supervisory, and particularly, administration work.1/ Non-physicians in charge of such programs would be free from these pressures, and if familiar with community work, will have an attitude appropriate to community health promotion. On the other hand, they would not of course enjoy the natural prestige which clinical activities confer. Nevertheless, a physician would be available to the team whenever medical technical input is needed.A final, practical point is that for the rural/urban ghetto areas, many countries will find it difficult to actually fill these posts with managerial physicians in the time limits to meet this new manpower requirement.

117. The reformed health service proposed here would be expected to provide greater access to health care, greater penetration into the community and lower unit costs. In order to operate economically it would be necessary to provide the system with procedures and drugs which are as simple and inexpensive as possible. The sophisticated diagnostic work-ups of advanced Western medicine would not be possible; thus the importance of safety looms large. The basis for choice should be that the procedures or drugs even if administered casually, should yet generally improve the health of the community. If community support is to be preserved, it is also important to guard against excessive (as viewed by the community) risks of untoward side effects. Failure to observe this principle would probably undermine the effectiveness of the health care system.

118. The downward impact of these factors on average cost will be offset to some extent by salaries for health workers at the community level under the reformed system. The failure to pay attractive salaries to all personnel would be a false economy and this can injure the entire package. On balance, the reinforced system is likely to be less expensive to operate per head of the population covered than the existing system.

1/ Professor John Bryant, in a personal communication - ...There is even talk of "sneaking the doctor in to see the auxiliary at night."

C. How to Increase the Effectiveness of Official Health Services

119. We have already considered measures to improve the cost-effectiveness of hospitals (see para. 12). The underlying premise of the reformed health service is the need to change the emphasis from expensive treatment of illness in individuals on an intermittent curative basis only to the promotion of health on a continuous basis at the community level. What is needed is a change in the ecological and cultural situation which permits disease to thrive. This will not be easy to accomplish. It requires a systematic and sustained approach aimed at changing living habits and attitudes as well as household and community action to improve water supply and sanitation practices. The point is not to ignore the demand for curative care but to bring about a balance between measures to treat disease and measures to control its incidence. Attempts at health education or environmental health will encounter resistance if divorced from curative care. The problem is to ensure that curative care does not pre-empt everything else.

120. The training and activity-mix of community health workers, auxiliaries and managers is designed with this aim in view (see paras. 111 - 114, 116). The reformed health service will provide limited curative care based on standard drugs and simple procedures which can be administered in the field by workers with brief training. These activities will be combined with a strong emphasis on measures to improve nutrition, water supply, sanitation as well as health education. To maintain this balance over time will require repeated reinforcement through monitoring and evaluation exercises aimed at preventing an unbalanced mix in favor of curative services for which there is a ready demand. In turn, the monitoring and evaluation should be linked directly to criteria for giving salary increases and promotions within the health service.

121. The case studies which have already been cited, and the experiences of the People's Republic of China, Tanzania and several Latin American countries, indicate that community-based health promotion services can be highly effective. However, in the practical implementation of community-based health promotion systems in particular developing countries, various factors may combine to lower their effectiveness in improving the health of the general population. At a technical level, insufficient emphasis on preventive and environmental health supervision, and health and nutrition education, may greatly diminish the impact on morbidity and mortality. At a socio-political level, inegalitarian distribution of power within a community may limit access by some of the population to such a service, and confer an undue part of its benefits on certain groups. Furthermore, the degree of effectiveness of a community-based health promotion service will inevitably depend upon the degree of social cohesion of a community, and its sense of social responsibility. Nevertheless, community-based health promotion services are still perhaps the best hope of achieving a major improvement in the health levels of the larger part of the population of developing countries, provided that there is adequate commitment on the part of the government.

Choice of health measures under a reformed system

122. Cost-effectiveness analysis can be used to refine details of the activity-mix of the reformed health system. Not much empirical work has been done on this topic but it is possible to illustrate by comparing the cost-effectiveness of immunization and sanitation measures. In the particular case of cholera, vaccination gives only about 50% protection for four to six months. The per capita cost of immunization is US$0.15. Under admittedly favorable conditions in the Philippines, it was possible to build rudimentary privies, for a cost of under $1 per privy (plus self-help labor): this is equivalent to a per capita cost of about $0.15 also. Such privies, if properly maintained, cut cholera rates by about 60%. Even with privy maintenance and replacement costs, it is clear that privy construction is more cost-effective than immunization. "Even when the costs of privies is three times that of immunization, the privy program will be cheaper after the sixth year."[1/]

123. In comparing privy construction with simply treating those who fall ill, the rate of incidence of faecally-related diseases is an important factor. Viewed as a means of diminishing the incidence of cholera alone, privy construction would tend to be slightly the more expensive alternative, even in a cholera endemic area. This is because clinical cholera only occurs in a small proportion of those infected and it is, in any case, a relatively rare disease even in endemic areas. However, privy construction can also reduce the incidence of a whole gamut of other killing or disabling diseases. Epidemiological models which represent biomedical realities adequately are extremely difficult to construct, so that rigorous cost-effectiveness analysis is difficult to conduct.[2/] Nevertheless, diseases amenable to a reduction by improved water supply or improved sanitation are so numerous, and account for so large a part of the total disease pattern that properly used and maintained facilities would certainly have an extremely high cost-effectiveness compared to personal health services.

1/ B. Cvjetanovic, "Sanitation versus Vaccination in Cholera Control, Cost-Effect and Cost-Benefit Aspects," Ch. 4 in Strategy of Cholera Control, op. cit.

2/ A very sophisticated attempt is B. Cvjetanovic, B. Grab, and K. Uemura, "Epidemiological Model of Typhoid Fever and its Use in Planning and Evaluation of Antityphoic Immunization and Sanitation Programmes" in Bulletin of the World Health Organization, 1971, pp. 45, 53-75.

STATISTICAL APPENDIX

LIST OF APPENDIX TABLES

Appendix Table 1: Life Expectancy Levels

(figures are years)

Year	Latin America			England & Wales, Sweden, U.S.	Ceylon	India	Japan	Mauritius	Taiwan
	Group A	Group B Average	Venezuela						
1850	....	....	....	40.0	....	....	....	....	....
1860	25.1	....	....	40.7	....	....	....	....	....
1870	25.9	....	....	42.3	....	....	....	....	....
1871-81	....	....	....	....	....	24.6	....	....	....
1880	26.6	....	....	45.0	....	....	....	....	....
1881-91	....	....	....	....	....	25.0	....	....	....
1890	27.2	23.4	....	47.7	....	....	....	....	....
1891-01	....	....	....	....	....	23.8	....	....	....
1895	....	....	....	....	....	....	37.5	....	....
1900	28.5	23.9	....	50.0	....	....	....	....	....
1901-5	....	....	....	....	....	....	37.9	....	....
1901-11	....	....	....	....	....	22.9	....	....	....
1910	30.5	24.6	....	53.5	....	....	....	....	....
1911-5	....	....	....	....	....	....	40.7	....	....
1920	33.0	25.5	....	57.0	....	....	....	....	....
1920-22	....	....	....	....	31.7	....	....	....	....
1921-31	....	....	....	....	....	26.8	....	....	....
1926	....	....	32.2	....	....	....	....	....	....
1928.5	....	....	....	....	....	....	45.8	....	....
1930	36.1	27.1	....	61.0	....	....	....	....	....
1931-41	....	....	....	....	....	31.8	....	....	....
1935-7	....	....	....	....	....	....	48.1	....	....
1936	....	....	33.9	....	....	....	....	....	....
1940	40.2	33.0	39.9	64.0	....	....	....	....	43.4
1941-50	....	....	....	....	....	32.1	....	....	....
1945-47	....	....	....	....	45.8	....	....	33.0	....
1950	48.9	40.7	52.6	67.5	....	....	57.9	....	....
1951-60	....	....	....	....	....	41.2	....	....	....
1954	....	....	....	....	59.9	....	....	51.4	....
1955	....	....	....	....	....	....	66.1	....	....
1957-58	....	....	....	....	....	45.9	....	....	62.2
1959-60	....	....	....	....	....	....	67.8	....	63.5
1960	58.2	50.4	....	71.5	61.7	....	....	....	....
1961	....	....	62.9	....	....	....	....	60.2	....

Source: Arriaga, E., and K. Davis, 1969.

Note: In the case of averages, each life expectancy was weighted by the population of the country. In the case of India, the life expectancy for 1911-20 was not considered because of the very low level due to the famine during that decade. For Latin America, Group A consists of Brazil, Chile, Colombia, Costa Rica, Mexico, and Panama; Group B consists of the Dominican Republic, Guatemala and Nicaragua.

EXPECTATION OF LIFE AT SPECIFIED AGES FOR EACH SEX: Latest Data for Selected Countries
(Average number of years of life remaining to persons surviving to exact age specified)
(See Table 3)

Country	Year	Sex	Ages in Years													
			0	1	2	3	4	5	10	20	30	40	50	60	70	80
Central African Rep. (African population)	1959-60	Male	33	40	...	...	...	41	38	31	24	17	12	8	5	...
		Female	36	43	...	...	...	44	40	35	30	25	18	12	5	...
Chad (African population)	1963-64	Male	29	34	...	...	...	34	31	26	21	16	11	8	5	...
		Female	35	40	...	...	...	40	37	32	26	21	15	10	5	...
Dahomey (African population)	1961	Both sexes	37.3	40.8	...	...	...	45.1	42.3	36.4	30.7	23.7	16.9	10.9	5	...
Egypt	1960	Male	51.6	56.2	59.7	61.0	60.9	60.5	56.6	47.7	39.0	30.5	22.4	15.1	9.1	4.9
		Female	53.8	59.9	64.4	66.3	66.4	66.0	62.0	52.9	43.9	35.0	26.3	18.0	10.7	5.3
Ghana	1960	Male	37.1	48.0	...	...	...	45.5	...	35.8	29.8	23.2	16.9	11.6	7.5	...
Ivory Coast	1957-58	Both sexes	35	39	...	...	...	41	...	33	27	20	15	9	5	...
Kenya	1969	Male	46.9	52.6	...	...	...	53.8	51.0	43.0	35.7	28.3	21.1	14.5	9.1	5.3
		Female	51.2	56.6	...	...	...	57.1	54.1	45.7	38.1	30.3	22.7	15.7	9.8	5.7
Nigeria	1965-66	Male	37.2	44.5	...	...	...	49.3	46.6	39.2	31.6	24.1	18.1	12.5	8.1	...
		Female	36.7	43.2	...	...	...	47.3	44.7	38.1	31.1	24.1	17.8	12.4	8.5	...
Togo	1961	Male	31.6	36.4	38.2	39.5	40.1	40.1	37.4	30.3	25.5	19.7	14.2	8.5	6.7	...
		Female	38.5	42.9	45.3	46.6	47.3	47.2	44.3	37.8	31.3	24.7	18.5	11.9	7.2	...
Upper Volta	1960-61	Male	32.1	37.7	...	...	...	44.0	42.1	34.5	28.1	21.2	15.2	10.3	5.0	...
		Female	31.1	36.7	...	...	...	42.9	41.2	33.1	27.4	20.8	13.9	7.8	5.0	...
Morocco	1960	Both sexes	49.6	54.1	...	...	...	53.2	49.3	41.0	33.6	25.5	18.0	11.0	7.0	5.0
Costa Rica	1962-64	Male	61.9	66.8	66.9	66.4	65.7	64.9	60.4	51.1	42.1	33.2	24.7	17.0	10.9	6.4
		Female	64.8	68.9	69.1	68.6	67.9	67.1	62.5	53.0	43.7	34.8	26.1	18.1	11.5	6.7
Dominican Republic	1959-61	Male	57.2	62.9	...	...	...	63.1	58.7	49.5	40.5	31.6	22.9	14.6	6.7	...
		Female	58.6	63.4	...	...	...	64.0	59.6	50.2	41.2	32.4	23.7	15.2	6.8	...
El Salvador	1960-61	Male	56.6	60.8	...	...	...	60.9	56.9	47.9	40.1	32.3	24.6	17.5	11.4	6.8
		Female	60.4	63.9	...	...	...	64.2	60.2	51.2	42.5	34.2	26.2	18.9	12.8	7.7
Guatemala	1963-65	Male	48.3	52.5	53.9	54.7	57.7	54.4	51.3	43.2	35.5	28.1	21.1	14.8	9.8	6.0
		Female	49.7	53.4	54.9	55.8	56.0	55.8	52.8	44.6	36.9	29.2	21.5	14.7	9.6	5.9
Jamaica	1959-61	Male	62.7	65.6	66.0	65.3	64.4	63.5	58.8	49.3	40.2	31.4	23.0	15.9	10.3	5.8
		Female	66.6	69.2	69.5	68.7	67.9	66.9	62.2	52.7	43.4	34.5	26.0	18.3	11.8	6.4
Panama	1960-61	Male	57.6	62.8	63.7	63.5	63.0	62.4	58.1	49.0	40.4	31.7	23.4	16.1	10.0	6.1
		Female	60.9	65.3	66.2	66.0	65.5	64.8	60.5	51.3	42.8	34.2	26.0	18.5	12.0	7.2
Trinidad and Tobago	1959-61	Male	62.2	64.6	64.1	63.2	62.3	61.4	56.6	47.1	38.0	29.0	20.8	13.9	8.9	5.6
		Female	66.3	68.4	67.7	66.8	65.9	65.0	60.2	50.5	41.3	32.4	24.1	16.8	11.1	6.1
Chile	1969-70	Male	60.5	64.9	64.1	63.3	62.3	61.4	56.7	47.3	38.5	30.0	22.3	15.5	10.2	6.5
		Female	66.0	70.1	69.6	68.8	67.9	67.0	62.2	52.7	43.4	34.5	25.9	18.1	11.6	7.1
Ecuador	1961-63	Male	51.0	57.1	58.0	58.5	58.7	58.5	54.7	46.3	38.3	30.2	22.3	14.9	9.1	5.0
		Female	53.7	59.0	60.0	60.6	60.9	60.7	56.8	48.1	40.0	31.9	23.9	16.6	10.0	6.0
Uruguay	1963-64	Male	65.5	68.0	67.2	66.3	65.3	64.4	59.5	50.0	40.7	31.7	23.2	15.9	10.1	6.0
		Female	71.6	73.7	72.9	72.0	71.0	70.1	65.2	55.5	46.0	36.7	27.7	19.5	12.3	7.0

Appendix Table 2 (continued)

EXPECTATION OF LIFE AT SPECIFIED AGES FOR EACH SEX: Latest Data for Selected Countries
(Average number of years of life remaining to persons surviving to exact age specified)

Country	Year	Sex	Ages in Years													
			0	1	2	3	4	5	10	20	30	40	50	60	70	80
Venezuela	1961	Both sexes	66.4	68.8	...	...	...	66.3	61.8	52.4	43.3	34.6	26.3	18.9	13.0	8.2
Hong Kong	1968	Male	66.7	68.0	67.4	66.6	65.8	64.9	60.2	50.5	41.0	31.7	23.1	15.7	10.0	5.5
		Female	73.3	74.4	73.8	73.1	72.3	71.4	66.6	56.9	47.4	38.0	29.0	20.5	12.9	6.6
Khmer Republic	1958-59	Male	44.2	49.6	...	...	...	50.9	47.6	39.4	...	...	...	...	...	...
		Female	43.3	48.5	...	...	...	50.2	46.4	38.4	...	...	...	...	...	...
Korea, Republic of	1966	Male	49.7	62.0	...	...	...	59.4	55.5	46.5	37.7	28.9	20.2	14.1	8.9	4.8
		Female	64.1	66.5	...	...	...	64.0	60.2	51.2	42.4	33.8	25.0	17.0	10.1	5.9
Pakistan	1962	Male	53.7	60.6	...	...	...	60.8	57.0	47.8	39.2	30.8	22.8	15.6	9.6	4.1
		Female	48.8	53.9	...	...	...	54.8	51.7	42.9	35.4	27.7	21.6	15.5	10.8	5.2
United States	1966	Male	66.7	67.5	...	...	...	63.8	58.9	49.4	40.3	31.2	22.9	15.8	10.3	6.2
		Female	73.8	74.3	...	...	...	70.6	65.7	56.0	46.4	37.0	28.1	20.0	12.8	7.1
Argentina	1959-61	Male	63.1	66.2	65.8	65.0	64.1	63.2	58.5	49.1	40.0	31.1	22.8	15.9	10.2	5.8
		Female	68.9	71.8	71.4	70.6	69.7	68.8	64.1	54.6	45.4	36.3	27.5	19.4	12.6	7.6
Sri Lanka	1962	Male	61.9	64.6	...	...	...	62.7	58.3	49.0	40.0	31.0	22.4	14.4	7.4	...
		Female	62.4	63.6	...	...	...	61.9	57.6	48.4	39.8	31.2	22.4	13.9	6.4	...
China, Republic of	1959-60	Male	61.3	63.2	63.2	62.8	62.1	61.2	56.6	47.2	38.1	29.3	21.0	13.9	8.3	4.3
		Female	65.6	67.3	67.5	67.2	66.5	65.7	61.0	51.5	42.4	33.5	24.8	16.9	10.3	5.4
Israel	1966	Male	70.9	71.6	70.8	69.9	68.9	68.0	63.1	53.4	44.0	34.5	25.4	17.3	11.0	...
		Female	73.7	74.2	73.3	72.3	71.4	70.4	65.5	55.8	46.0	36.5	27.3	18.8	11.8	...
Japan	1966	Male	68.4	68.8	67.9	67.0	66.1	65.2	60.4	50.8	41.5	32.3	23.6	15.7	9.5	5.2
		Female	73.6	73.8	73.0	72.0	71.1	70.2	65.3	55.5	46.0	36.6	27.5	19.0	11.6	6.3
France	1965	Male	67.8	68.2	67.3	66.4	65.4	64.5	59.6	50.0	40.7	31.6	23.1	15.8	9.9	5.5
		Female	75.0	75.2	74.3	73.3	72.4	71.4	66.5	56.7	47.1	37.6	28.6	20.1	12.5	6.7
Italy	1962	Male	67.2	69.4	68.7	67.8	66.9	66.0	61.2	51.7	42.3	33.1	24.3	16.7	10.4	5.7
			72.3	74.1	73.4	72.5	71.6	70.6	65.8	56.1	46.4	37.0	27.8	19.3	11.8	6.4

Source: United Nations, Demographic Yearbook 1972, (New York, United Nations, 1973), Table 27, pp. 600-619.

Appendix Table 3: Life Tables: Historical Data

EXPECTATION OF LIFE AT SPECIFIED AGES FOR EACH SEX: Historical Data for Selected Countries (Average number of years of life remaining to persons surviving to exact age specified)

Country	Year	Sex	Ages in Years													
			0	1	2	3	4	5	10	20	30	40	50	60	70	80
United Arab Republic	1936-38	Male	35.7	42.1	46.4	48.9	49.8	49.8	46.9	39.8	33.0	26.1	19.4	13.3	7.9	4.1
		Female	41.5	48.1	53.7	56.5	57.4	58.3	54.5	46.1	38.2	30.8	23.4	16.3	9.6	4.8
Canada	1930-32	Male	60.0	64.7	64.5	63.8	63.1	62.3	58.0	49.1	40.6	32.0	23.7	16.3	10.1	5.6
		Female	62.1	65.7	65.4	64.8	64.0	63.2	58.7	49.8	41.4	33.0	24.8	17.2	10.6	5.9
Jamaica	1910-12	Male	39.0	47.6	49.8	...	...	49.3	45.7	37.7	31.4	25.1	18.9	13.4	8.6	5.1
		Female	41.4	49.3	51.6	...	...	51.0	47.5	40.1	33.9	27.7	21.4	15.3	10.0	5.7
Mexico	1922	Male	31.7	38.9	...	...	...	41.7	37.9	34.9	29.6	24.6	19.5	15.1	10.1	6.9
		Female	33.5	40.4	...	...	...	43.8	40.1	37.5	31.7	26.0	20.3	11.7	9.8	6.4
Puerto Rico	1919-21	Male	38.2	44.3	...	...	...	46.2	43.0	35.6	30.4	24.6	18.8	13.9	9.6	6.4
		Female	38.9	44.4	...	...	...	46.5	43.2	36.0	31.4	26.7	21.1	15.8	10.9	7.2
United States	1919-21	Male	55.5	59.5	59.5	59.0	58.3	57.6	53.4	45.0	37.3	29.6	22.1	15.2	9.5	5.5
		Female	57.4	60.5	60.4	59.8	59.2	58.4	54.2	45.6	38.2	30.6	22.9	15.9	10.0	5.8
Argentina	1914	Male	45.2	...	...	...	...	52.1	48.0	39.8	32.6	25.2	18.7	12.9	8.3	4.8
		Female	47.5	...	...	...	...	53.9	49.7	41.8	35.0	28.2	21.3	14.8	9.4	5.6
Chile	1930	Male	40.4	50.6	43.1	...	...	52.4	48.4	40.5	33.7	26.9	20.5	14.7	9.8	6.1
		Female	41.0	50.7	53.3	...	...	52.8	48.9	41.5	37.1	28.7	22.0	15.8	10.3	6.3
Sri Lanka	1920-22	Male	32.7	39.5	40.6	41.6	42.6	43.0	41.3	34.8	28.4	22.2	16.7	11.5	6.7	3.6
		Female	30.7	36.4	37.5	38.8	40.0	40.6	39.0	32.8	27.6	22.5	16.5	10.6	6.0	3.2
India	1891-1901	Male	23.6	32.0	34.1	...	...	36.3	34.7	28.6	22.9	17.9	13.6	9.5	5.8	...
		Female	24.0	31.3	33.2	...	...	35.2	33.9	28.6	23.8	19.1	14.5	10.0	6.0	...
China, Republic of	1926-30	Male	38.8	45.9	47.7	48.1	47.9	47.5	43.6	35.3	28.1	21.7	16.0	11.0	7.0	4.2
		Female	43.1	49.4	51.7	52.7	52.9	52.5	48.8	40.6	33.5	27.7	20.7	14.2	8.7	4.8
Japan	1921-25	Male	42.1	49.1	50.6	51.0	50.8	50.4	46.5	39.1	32.6	25.1	18.0	11.9	7.1	3.9
		Female	43.2	49.4	50.9	51.2	51.1	50.7	47.0	40.4	34.7	28.1	21.0	14.1	8.4	4.4
Philippines	1902	Male	11.5	14.8	16.4	18.0	19.4	20.6	22.8	19.7	16.3	13.2	10.4	8.1	6.3	5.0
		Female	13.9	17.1	18.5	19.8	20.9	20.6	23.4	20.3	17.2	14.4	11.7	9.1	6.8	4.8

Source: United Nations, Demographic Yearbook 1967, (New York, United Nations, 1968), Table 29, pp. 704-741.

* less than one year.

Appendix Table 4: GNP Per Capita and Demographic Data

Country	GNP per Capita [a]	Crude Birth Rate [b]	Crude Death Rate [a]	Infant Mortality [c]	Life Expectancy [b]
Rwanda	US$ 60	50.0	23.6	...	41.0
Burundi	60	41.8	24.9	150 [d] **	39.0
Mali	70	46.7	23.5	120 [e]	39.0
Upper Volta	70	48.5	24.9	180	39.0
Somalia	70	50.0	22.1	200	41.0
Afghanistan	80	49.2	23.8	190	40.3
Ethiopia	80	49.5	23.8	162	40.0
Indonesia	80	44.8	18.9	125 [e] 87 [d]	45.4
Burma	80	39.5	15.8	[	50.0
Chad	80	52.9	24.4	160 [e]	40.0
Yemen Arab Republic	90	49.5	20.0	160	45.5
Nepal	90	42.9	20.4	200-300 [e]	43.6
Malawi	90	47.7	23.7	160 [f]	41.0
Zaire	90	45.2	20.5	104 [f]	43.6
Guinea	90	46.6	22.8	240 [f]	41.0
Niger	100	49.6	23.5	...	41.0
Sri Lanka	100	28.6	6.3	50	67.8
Viet-Nam, Demo. Rep. of	100	41.4	17.9	...	48.0
Dahomey	100	49.9	23.0	110 [e] *	41.0
Tanzania	110	50.1	23.4	160-165 [d] ***	44.5
India	110	41.1	16.3	139	49.2
Haiti	120	42.0	17.2	146.5 [g]	47.5
Sudan	120	47.8	18.5	130	47.2
Democratic Yemen	120	50.0	22.7	160	45.3
Laos	120	43.1	22.7	...	40.5
Khmer Republic	130	43.6	18.7	100	45.4
Uganda	130	46.9	15.7	110 [f]	50.0
Pakistan	130	47.6	16.8	130	49.4
Nigeria	140	49.3	22.7	150-175 [e] **	41.0
Madagascar	140	47.4	21.9	55.3	43.5
Togo	150	50.5	23.2	127 [e]	41.0
Central African Republic	150	43.2	22.5	190	41.0
Kenya	160	47.3	16.7	...	50.0
Mauritania	170	48.8	23.4	190 [f]	41.0
Bolivia	190	43.7	18.0	60	46.7
Cameroon	200	40.4	22.0	...	41.0
Liberia	210	50.7	22.3	159.2	43.5
Sierra Leone	210	41.9	20.2	197 [f]	43.5
Thailand	210	43.7	10.4	80-90 [e] ***	58.6
Egypt	220	37.8	15.0	120	50.7
Viet-Nam, Republic of	230	41.8	23.6	100	40.5
Philippines	240	43.6	10.5	62	58.4
Senegal	250	47.3	22.2	170 [f]	42.0
Ghana	250	48.8	21.9	150 [f]	43.5
Jordan	250	48.1	14.8	20.7	53.2

(continued on next page)

Appendix Table 4: continued - -

Country	GNP per Capita [a]	Crude Birth Rate [b]	Crude Death Rate [b]	Infant Mortality [c]	Life Expectancy [b]
Morocco	270	49.1	15.8	...	51.2
Congo	270	45.1	20.8	180	43.5
Paraguay	280	42.2	8.6	39	61.5
Mozambique	280	20.1	20.1	...	43.5
Korea, Republic of	290	28.7	8.8	...	60.6
Syrian Arab Republic	290	46.9	14.4	25 [g]	53.8
Honduras	300	49.3	14.6	36 [g]	53.5
Ecuador	310	41.8	9.5	87 [e]	59.6
Korea, Demo. Republic of	310	35.7	9.4	...	60.6
Southern Rhodesia	320	47.9	14.4	...	51.5
Tunisia	320	41.0	13.9	120	54.1
El Salvador	320	42.2	11.1	66.8 [e]	57.8
Ivory Coast	330	45.6	20.6	140 [e]	43.5
Turkey	340	39.4	12.7	153	56.4
Algeria	360	49.4	16.6	150 [g]	51.5
Iraq	370	49.2	14.8	25.5	52.6
Colombia	370	40.6	8.8	81.3	60.9
Angola	370	48.2	25.2	....	38.5
Mongolia	380	38.9	9.5	...	59.9
Zambia	380	51.5	20.3	160 [e] ****	44.5
Guatemala	390	42.8	13.7	83.1	52.9
Malyasia	400	39.0	9.8	43 [e]	59.4
Dominican Republic	430	45.8	11.0	61.9 [e] ****	57.8
China, Republic of	430	26.7	10.2	19.0 [d] ***	61.6
Iran	450	45.3	15.6	160 [e]	51.0
Nicaragua	450	48.3	13.9	45.3 [e]	52.9
Brazil	460	37.1	8.8	110 [e]	61.4
Peru	480	41.0	11.9	66.9	55.7
Albania	480	33.4	6.5	86.8 [d] *	68.6
Cuba	510	28.9	5.9	38.6 [g]	72.3
Saudi Arabia	540	49.5	20.0	...	45.5
Costa Rica	590	33.4	5.9	56.5	68.2
Lebanon	660	39.8	9.9	...	63.2
Mexico	700	42.0	8.6	63.3	63.2
Jamaica	720	33.2	7.1	27.1	69.5
Portugal	730	18.4	10.1	49.5	68.0
Yugoslavia	730	18.2	9.2	43.5	67.5
Romania	740	19.3	10.3	42.4	67.2
Uruguay	750	20.8	9.2	...	70.1
Chile	760	25.9	8.1	71.1	64.3
South Africa	810	43.1	15.5	...	51.5
Panama	820	36.2	7.1	33.7	66.5
Bulgaria	820	16.2	9.1	26.2	71.8
Hong Kong	900	19.4	5.5	17.5	70.0
Trinidad and Tobago	940	25.3	5.9	36.6 [d] ***	69.5
Venezuela	1,060	36.1	7.0	51.7	64.7
Singapore	1,200	21.2	5.1	19.2	69.5
U.S.S.R.	1,400	17.8	7.9	26.4 [d] ***	70.4
Japan	2,130	19.2	6.6	15.3 [d] ****	73.3
Israel	2,190	26.2	6.7	23.0	70.5
U.S.A.	5,160	16.2	9.4	19.8 [g]	71.3

Appendix Table 4: continued - -

Sources: /a IBRD, World Bank Atlas: Population, Per Capita Product and Growth Rates, 1973

/b United Nations projections, averages for 1970-1975 (unpublished data, 1973)

/c World Health Organization, The Fifth Report on the World Health Situation, 1969-1972, Part II, Review by Country and Territory, (Geneva, WHO, 1974)
(except where other sources are indicated)
(unless otherwise noted, figures are for 1970-1972)

/d United Nations, Statistical Yearbook 1972, (New York, UN, 1973), Table 21, Vital Statistics Rates, pp. 89-94

/e IBRD basic country data (latest available data)

/f World Health Organization, "Malaria Control in Countries Where Time-Limited Eradication is Impracticable at Present," Report of a WHO Interregional Conference, WHO Technical Report Series No. 537, (Geneva, WHO 1974), pp. 63-64
(data supplied by the countries themselves)

/g World Health Organization, Supplement to the Fourth Report on the World Health Situation, 1969-1970, Part I, Review by Country and Territory, (Geneva, WHO, 1972) (figures are for 1969-1970).

Notes: * For 1961
** For 1965
*** For 1968
**** For 1969

N.B. Crude birth and death rates are births and deaths per 1,000 persons per year. Infant mortality rate is number of deaths of infants one year of age or younger per 1,000 live births per year. Life expectancy is expected length of life in years at birth.

APPENDIX TABLE 5

Morbidity [1] and Mortality Rates
(per 100,000 population)

(Morbidity rates are on the left side and mortality rates on the right side of each disease column)

Country	Year	Dysentery, Amoebiosis [2]		Tuberculosis [3]		Measles		Influenza		Whooping Cough		Meningitis		Diphtheria		Tetanus [4]	
Rwanda	1972	B 18.3				1336.4				644.1		1.4					
Burundi	1972	1285.0															
Mali	1972	A 619.3				563.9		464.4		150.8		11.9		1.0			
Upper Volta	1971			a 22.9		339.5		49.1		201.1		107.9					
Chad	1972					34.3				103.2		124.8					
Zaire	1972	B 8.6				255.5				99.5		2.4					
Niger	1972	341.8				675.1		126.6		88.6		53.0.		1.1			
Sri Lanka	1972	5.9		a 49.4	9.2					2.2				1.6			
Haiti	1972	41.7		a 40.4*		8.6*				18.7		0.5		1.4*		12.0*	
Yemen People's Dem.Rep.	1972	983.8		p 56.3		73.6		785.9		346.5		4.6		0.3			
Laos	1971	157.8		p 16.0		18.5		533.6		49.0		0.8					
Khmer Republic	1970	98.4		a 196.3		21.5		395.3		9.5**		0.4**		1.2			
Uganda	1972											0.3					
Pakistan	1972	171.2		a 106.5		1.6				4.5		0.8		2.2			
Malagasy Rep.	1971	28.1		r 70.4				827.4		290.9		2.3		11.1			
Togo	1972	438.7				955.1				365.6		39.8					
Central African Rep.	1972			a 26.1		164.7						14.0					
Mauritania	1972	146.4								318.7		0.8					
Bolivia	1972	30.4	3.7*	a 172.7	16.8*	160.6	6.4	318.1		63.5	17.6			1.4		3.3	
Thailand	1971		18.8	r 56.9	20.7							0.06**					2.9
Vietnam	1971	A 7.1		r 153.2		56.2		142.0		49.7		3.1		2.9			
Philippines	1970	B 30.6	31.0*	a 347.9	68.6*	52.3	8.6*	994.3		51.0		1.6		4.5			8.4*
Senegal	1972	44.4		r 54.6		756.9		586.7		638.8		27.5		9.2			
Ghana	1972											9.4					
Jordan	1972	11.1				62.1		13.0		16.9		7.6					
Congo	1972	A 349.0		r 72.5		1318.5		1583.1		762.0		10.2					
Paraguay	1971	B 35.7	59.6	a 81.0	12.6	344.2	13.7			99.0	2.2	2.0**		4.1	1.2	17.7	9.6
Mozambique	1972					34.4						1.4					
Korea Rep.	1972					19.9				2.9							
Honduras	1970	441.2 **		a 63.2	5.1	158.1	11.5			110.2	15.2	3.0**		0.6	0.1	3.8*	2.4
Ecuador	1970			a 57.4	17.9	45.7**	38.3			27.7	28.3	1.1		2.6	0.9		18.8
Tunisia	1972	1.2		a 4.0								9.9		0.6			
El Salvador	1971	116.4 **		a 153.0	11.2	268.7	9.9			122.3	7.6	0.03**		6.2	1.1	6.8	8.5
Turkey	1971	B 1.9			7.3	63.8				16.5		1.9					
Algeria	1972	3.6				34.3				11.1		11.4					
Iraq	1972	18.6	1.9°	a1963.0	17.5°	379.9		83.0		161.8		8.9		7.8			
USSR	1972					117.7				13.9				0.2			
Colombia	1969			a 87.7	15.8	163.7	13.3			97.7	6.3	1.8**		3.7	1.2	3.2	5.3
Guatemala	1970	92.0**	348.3	a 67.6	24.6	60.7	44.5		133.8	39.6			40.9	1.3	0.6	2.2	3.9
Malaysia, West	1972	23.9	5.2*	p 70.1	10.3							0.1		3.6			
Dominican Rep.	1971	162.1**		a 11.5	5.7	39.6	3.5			58.5	0.3	0.2		8.8	2.2	5.3	10.6
Nicaragua	1969	234.3.**		a 63.3	6.2					38.6	10.6			0.3	0.2	0.9	19.6
Brazil	1971			a 39.4		39.8**										2.0	
Peru	1969	32.4 **	75.3°	a 317.0°	31.4°	371.3°	61.4°		38.5°	152.1*	15.1°	0.4**		0.7	0.3	3.9	3.9
Cuba	1971	A 29.9 **	5.2**	a 17.8	11.6	130.3	0.5			7.2		0.5**					
Costa Rica	1971			a 22.7	6.2	200.4	4.7			76.1	2.7	1.6**		3.9	1.1	4.5	7.7
Mexico	1971	95.7 **		a 37.1	17.9	69.6	14.0			43.6	11.1	0.01**		0.3	0.2	1.2	3.5
Jamaica	1970			a 17.6	3.4	55.7	1.4			13.6	0.7	1.9**		2.4	0.4	4.1	4.6
Portugal	1972									1.3		6.9					
Yugoslavia	1972	154.8				100.9				36.9		8.3		0.3			
Romania	1971	106.6		a 133.9		474.2		2447.6		96.1		1.9		0.05			
Uruguay	1971			a 39.0	8.1	21.1	0.2			2.3	0.1	17.0		0.3		1.0	0.4
Chile	1971	A 1.4	39.6		22.9	62.2	6.1	144.3	10.7	25.7	0.6	0.8		4.7	0.6		0.3
Panama	1971	40.0**	37.8	a 148.2	15.6	292.2	19.9			60.1	8.9	0.1		1.3	0.3	4.9	10.1
Bulgaria	1971	233.9		a 72.6		146.4		5632.6		21.5		1.3					
Hong Kong	1972	11.7				17.8				0.2		0.2					
Trinidad-Tobago	1968	20.1 **		a 19.5	3.2	36.5	0.1			12.2		0.3		4.7		2.7	
Venezuela	1971	111.2 **	51.7**	a 72.2	8.6 **	370.7	7.4			142.7	1.0	0.2		1.5	0.2	12.7	2.9
Israel	1972	B 137.0		a 13.5		13.1				1.9		1.0					

APPENDIX TABLE 5

Morbidity [1/] and Mortality Rates
(per 100,000 population)

(morbidity rates are on the left side and mortality rates on the right side of each disease column)

Country	Year	Typhoid & Paratyphoid		Malaria		Smallpox		Yaws		Polio		Leprosy		Cholera		Scarlet Fever		Schistosomiasis
Rwanda	1972									0.5								
Burundi	1972																	
Mali	1972	3.5		6568.3						6.5						61.3		
Upper Volta	1971	13.1		10439.6						1.9		54.8						
Chad	1972									0.4						0.04		
Zaire	1972									2.6						0.04		
Niger	1972	3.9								9.9		58.8		1.0				
Sri Lanka	1972	13.4		960.4						2.3		6.8						
Haiti	1972	12.9*						3.1*		0.1		0.3*				0.1		
Yemen People's Dem.Rep.	1972	19.9		360.3						2.0		0.6		60.0				5.7
Laos	1971	5.1		685.3						0.8		1.2						
Khmer Republic	1970	4.5		78.9						2.9**		1.6				79.2		
Uganda	1972									0.03								
Pakistan	1972	15.5				12.6				1.6		0.1				.02		
Malagasy Rep.	1971	18.5		2324.8						.08		32.5				0.6		121.9
Togo	1972									1.6								
Central African Rep.	1972			15246.7								64.5						
Mauritania	1972									2.4						5.2		
Bolivia	1972	16.5								0.9		11.3*				4.0		
Thailand	1971				12.4													
Vietnam	1971	15.9		212.6						3.2		16.5		1.3				
Philippines	1970			73.1						1.8**		0.6		2.7				
Senegal	1972			11433.2						3.5		43.7						175.5
Ghana	1972																	
Jordan	1972	4.1								3.5						0.8		
Congo	1972									15.6		51.4						
Paraguay	1971	4.5	.03	3.5**						11.5	1.9	23.4				7.4**		
Mozambique	1972									0.5								
Korea Rep.	1972									0.1								
Honduras	1970	21.1	1.2	621.7**						2.2**		9.9				328.2**		
Ecuador	1970	35.1	1.3	100.1						2.8	1.0	3.1*						
Tunisia	1972	16.8		0.3						1.2		0.3						
El Salvador	1971	9.9	1.4							2.4	0.5	0.1				43.1**		
Turkey	1971	5.8								1.1		0.3				4.6**		
Algeria	1972									1.4						0.4		
Iraq	1972	14.9		63.0						2.4		0.1				2.6		
USSR	1972	7.9								.07						129.1		
Colombia	1969	34.5	1.4					0.1		2.1*		1.5*				40.9**		
Guatemala	1970	6.2	4.4		60.8					5.6*		2.2				0.7**		
Malaysia, West	1972	12.1						2.9		8.1		4.3		3.0				
Dominican Rep.	1971	8.8	1.0					0.2		7.6	0.2	3.5				85.1**		
Nicaragua	1969	12.7	3.9	436.1**						9.9*		0.1						
Brazil	1971	3.1								2.1		4.4						
Peru	1969	96.0	5.0					0.3		1.7*		0.3*				3.4**		
Cuba	1971	5.0										3.7				0.4**		
Costa Rica	1971	3.3	0.2							1.4	0.1	1.4				2.2**		
Mexico	1971	5.1	4.9							1.2	0.4	1.5				4.9**		
Jamaica	1970	3.6	0.2					0.1				0.8				0.04		
Portugal	1972															1.3		
Yugoslavia	1972	6.7				0.8				0.5						47.8		
Rumania	1971	1.5								0.1						66.2		
Uruguay	1971	5.2	0.2							0.1		0.5				13.5		
Chile	1971	44.0	0.8							2.1	0.4					34.5		
Panama	1971	5.4	0.3							5.1	0.3					44.5		
Bulgaria	1971	0.3														34.2		
Hong Kong	1972									0.1								
Trinidad-Tobago	1968	6.8	0.4					36.2		6.9		6.4				68.4		
Venezuela	1971	1.7								5.0	0.6	4.2				182.3		
Israel	1972	6.1								0.3						16.1		

APPENDIX TABLE 5

Morbidity [1] and Mortality Rates
(per 100,000 population)

(morbidity rates are on the left side and mortality rates on the right side of each disease column)

Country	Year	Gonorrhea	Syphilis	Trachoma	Infectious Hepatitis	Deaths caused by "Symptoms & ill-defined conditions" as % of Total Deaths	Deaths [5] Due to Infectious Respiratory Disease as % of Total Deaths	Reported [6] Mortality Rate per 1000	Estimated [7] Mortality Rate per 1000
Rwanda	1972				72.9				
Burundi	1972								
Mali	1972	360.1	577.1	43.8					
Upper Volta	1971		187.6	1011.5					
Chad	1972				310.4				
Zaire	1972				26.8				
Niger	1972			53.2	66.7				
Sri Lanka	1972	30.8	5.2		32.0				
Haiti	1972	37.3*	32.8*		5.1				
Yemen People's Dem.Rep.	1972	61.6	9.0		71.9				
Laos	1971	90.5	29.2	31.5					
Khmer Republic	1970		77.6	44.1	2.2				
Uganda	1972								
Pakistan	1972								
Malagasy Rep.	1971								
Togo	1972								
Central African Rep.	1972								
Mauritania	1972								
Bolivia	1972	32.6	21.4		14.7	27.6	24.0	3.8	18.0
Thailand	1971	80.3	25.1			58.8	6.0	6.4	10.4
Vietnam	1971	37.5	11.8	153.2	8.3				
Philippines	1970	29.4	0.07		9.2	14.4	29.3	6.6	10.5
Senegal	1972			55.2					
Ghana	1972								
Jordan	1972				13.1				
Congo	1972								
Paraguay	1971	62.8	161.6		10.0**	26.9	19.4	3.8	8.6
Mozambique	1972				12.3				
Korea Rep.	1972								
Honduras	1970	189.5	95.3		17.7**				
Ecuador	1970	45.3	22.3						
Tunisia	1972			21.4	17.5				
El Salvador	1971	325.0	312.4		107.8**	35.0	9.6	8.1	11.1
Turkey	1971				20.8	9.2	19.7	2.3	12.7
Algeria	1972								
Iraq	1972	10.3	1.2	988.1	5.3	43.7	10.9	3.5	14.8
USSR	1972				194.1				
Colombia	1969	165.4*	64.2*						
Guatemala	1970	75.9	30.2		8.6**	16.7	29.2	14.6	13.7
Malaysia, West	1972					4.9	3.6	6.8	9.8
Dominican Rep.	1971	137.5	171.9		30.9**	37.5	6.8	6.0	11.0
Nicaragua	1969	89.9*	52.0*		12.0**				
Brazil	1971								
Peru	1969	95.0*	52.0*		31.0**	8.6	38.3	8.2	11.9
Cuba	1971	4.3	11.2		113.9**	1.0	9.7	5.6	5.9
Costa Rica	1971	285.6	83.8		108.1**				
Mexico	1971	26.2	24.1		7.9**				
Jamaica	1970	2232.3	83.5		14.3				
Portugal	1972				6.7				
Yugoslavia	1972				121.1				
Romania	1971	145.1	38.4		285.4				
Uruguay	1972	16.1	18.5		77.4				
Chile	1971		32.4		42.2	5.3	18.9	8.3	8.1
Panama	1971	141.5	59.4		47.8	18.0	15.2	6.7	7.1
Bulgaria	1971	87.2	10.3		174.4	5.4	15.5	9.7	9.1
Hong Kong	1972								
Trinidad-Tobago	1968	850.3	52.5						
Venezuela	1971	457.7	176.4		17.5	20.5	4.1	6.7	7.0
Israel	1972	37.9	3.8		88.3	4.1	3.9	5.9	6.7

SOURCES:

World Health Organization, The Fifth Report on the World Health Situation, 1969-1972, Part II, Review by Country and Territory (Geneva, WHO, 1974).

World Health Organization, World Health Statistics Report, Volume 27, No. 2 (Geneva, WHO, 1974).

Pan American Health Organization, 1972 Annual Report of the Director of the Pan American Sanitary Bureau, Regional Office of the World Health Organization, Official Document, No. 124 (Washington, D.C., PAHO, August 1973).

NOTES TO APPENDIX TABLE 5

NOTES:

* For 1970
** For 1971
*** For 1972

/a Morbidity rates are incidence (new cases) of disease "notified" in the specified one-year period. All rates are calculated from absolute figures reported by governments and collected and published by WHO (see sources).

/b A = data for incidence of amoebic dysentery only
B = data for incidence of bacillary dysentery only
Otherwise, morbidity data is for all cases of dysentery.
Mortality rates in this column represent number of deaths per 100,000 due to "bacillary dysentery and amoebiasis, enteritis and other diarrhoeal diseases."

/c a = all new cases of tuberculosis
r = all new cases of respiratory tuberculosis
p = all new cases of pulmonary tuberculosis

/d Reason for mortality rates being higher than morbidity rates for tetanus is unexplained in (PAHO) source.

/e "Infectious respiratory diseases" includes tuberculosis, measles, influenza, whooping cough, meningitis, diphtheria.

/f Calculated from case of death data (absolute figures) in World Health Organization, The Fifth Report on the World Health Situation, 1969-1972, Part II, Review by Country and Territory (Geneva, WHO, 1974).

/g Data from Appendix Table Four (United Nations Projections, 1973, unpublished).

Appendix Table 6: Coverage of Population in Developing Countries by Water Supply and Sewerage Systems

Country	Source	Year	% of Population Served by Community Water Supply					% of Population Served by Sewage Disposal Facilities			
				Urban /a			Rural /b		Urban /a		Rural w/
			Total	Piped to House	Public Standpost	Total	w/reasonable access	Total	Part of Sewer System	Total/c	adequate disposal /d
Burundi	WHO	70	2%	15%	62%	77%	0%	3%	14%	97%	1%
Mali	WHO	70	3	26	3	29	0	8	-	63	-
Upper Volta	WHO	70	25	20	48	68	25	4	-	95	-
Bangladesh	WHO	70	43	16	25	41	43	5	11	81	0
Somalia	WHO	70	15	2	19	21	13				
Afghanistan	WHO	70	3	10	15	25	1	21	1	100	15
Ethiopia	WHO	70	6	31	48	79	-	14	8	87	8
Indonesia	WHO	70	6	23	12	35	0	12	2	49	4
Burma	WHO	70	18	7	30	37	13	34	5	47	4
Chad	WHO	70	26	11	65	76	22	1	0	11	0
Yemen Arab Rep.	WHO	70	4	23	22	45	2				
Nepal	WHO	70	3	2	57	59	0	2	8	39	0
Zaire	WHO	70	13	41	14	55	5	6	1	8	6
Guinea	WHO	70	11	75	22	97	0	13	13	100	2
Niger	WHO	70	20	12	56	68	16	1	-	9	0
Sri Lanka	WHO	70	14	36	23	59	1	50	14	92	39
Dahomey	WHO	70	29	28	66	94	19	13	12	93	1
Tanzania	WHO	70	13	11	43	54	10				
India	WHO	70	16	39	17	56	6	18	34	80	1
Haiti	PAHO	72	8	16	28	44	0	13	-	70	1
Sudan	WHO	70	18	71	1	72	12				
Democratic Yemen	WHO	70	57	62	26	88	43				
Laos	WHO	70	48	65	32	97	39				
Khmer Rep.	WHO	70	45	64	34	98	38	14	83	100	2
Uganda	WHO	70	25	58	31	89	20	87	22	85	87
Pakistan	WHO	70	20	34	42	76	3				
Nigeria	WHO	70	20	22	36	58	8				
Madagascar	WHO	70	12	25	62	87	1	4	3	100	-
Togo	WHO	70	18	13	84	97	5				
Central Afr. Rep.	WHO	70	3	4	9	13	0	27	0	100	1

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Appendix Table 6: Coverage of Population in Developing Countries by Water Supply and Sewerage Systems

Country	Source	Year	% of Population Served by Community Water Supply					% of Population Served by Sewage Disposal Facilities			
				Urban [a]			Rural [b]		Urban [a]		
			Total	Piped to House	Public Standpost	Total	w/ reasonable access	Total	Part of Sewer System	Total [c]	Rural w/ adequate disposal [d]
Kenya	WHO	70	12	90	7	97	2	50	47	100	45
Mauritania	WHO	70	17	91	7	98	10	7	68	100	-
Bolivia	PAHO	72	27	48	29	77	4	9	-	24	2
Cameroon	WHO	70	32	13	64	77	21				
Liberia	WHO	70	17	43	57	100	6	4	26	100	-
Sierra Leone	WHO	70	12	27	48	75	1				
Thailand	WHO	70	17	52	8	60	10	17	-	66	8
Egypt	WHO	70	93	75	19	94	93				
Viet Nam,Rep. of	WHO	70	14	33	11	44	5	24	79	100	0
Philippines	WHO	70	35	55	10	65	20	30	4	88	0
Senegal	WHO	70	81	29	69	98	74				
Ghana	WHO	70	33	22	51	73	14				
Jordan	WHO	70	77	88	10	98	59				
Morocco	WHO	70	51	39	52	91	28	29	55	75	4
Congo	WHO	70	34	28	70	98	7				
Paraguay	PAHO	72	17	21	15	36	6	6	-	15	0
Korea, Rep.of	WHO	70	55	84	4	88	34	24	31	61	0
Syrian Arab Rep.	WHO	70	71	89	9	98	50				
Honduras	PAHO	72	37	65	33	98	11	14	-	46	0
Ecuador	PAHO	72	31	59	6	65	9	24	-	59	1
Tunisia	WHO	70	49	53	38	91	17	63	30	100	34
El Salvador	PAHO	72	50	40	33	73	35	13	-	31	0.5
Ivory Coast	WHO	70	44	28	69	97	29	5	12	23	-
Turkey	WHO	70	63	45	20	65	66				
Algeria	WHO	70	39	73	16	89	-	7	2	8	6
Iraq	WHO	70	49	77	21	98	6	46	5	96	0
Colombia	PAHO	72	61	70	15	85	28	48	-	59	32
Mongolia	WHO	70	21	20	38	58	-				
Zambia	WHO	70	37	71	26	97	19	16	6	16	16
Guatemala	PAHO	72	39	40	49	89	13	14	-	42	-
Malaysia	WHO	70	38	71	19	91	1	62	9	77	51
Dominican Rep.	PAHO	72	43	55	23	78	15	7	-	16	-
Iran	WHO	70	40	55	27	82	12	71	4	100	50
Nicaragua	PAHO	71	53	70	21	91	18	20	-	42	-
Brazil	PAHO	70	57	53	24	77	30	18	-	29	3

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Appendix Table 6: Coverage of Population in Developing Countries by Water Supply and Sewerage Systems

Country	Source	Year	% of Population Served by Community Water Supply: Urban[a] Piped to House	Urban[a] Public Standpost	Urban[a] Total	Rural[b] w/ reasonable access	Total	% of Population Served by Sewage Disposal Facilities: Urban[a] Total	Urban[a] Part of Sewer System	Urban[a] Total[c]	Rural w/ adequate disposal[d]
Peru	PAHO	72	54	19	73	13	40	30	-	65	0
Cuba	PAHO	66	76	13	89	60	79	21	-	34	-
Saudi Arabia	WHO	70	79	18	97	34	49	21	8	50	12
Costa Rica	PAHO	72	95	5	100	65	77	14	-	40	0
Lebanon	WHO	70	95	0	95	85	92				
Mexico	PAHO	72	68	5	73	31	56	29	-	48	0.5
Jamaica	PAHO	72	96	2	98	81	86	9	-	27	2
Uruguay	PAHO	72	86	10	96	28	83	41	-	40	46
Chile	WHO	72	68	26	94	9	67	28	-	38	6
Panama	PAHO	72	90	9	99	49	74	33	-	68	0.5
Trinidad & Tobago	PAHO	70	83	16	90	95	96	17	-	51	0.3
Venezuela	PAHO	71	76	24	100	46	83	33	-	47	4
Singapore	WHO	70	74	0	74	-	74	93	47	93	-

[a] The national definition of urban and rural population was accepted by WHO statisticians.

[b] "Reasonable access" implies that the housewife or members of the household do not have to spend a disproportionate part of the day in fetching the family's water needs.

[c] That part of the "total" which is not connected to the public sewer system uses a household system of pit privies, septic tanks, or buckets.

[d] It is clear neither in PHAO or WHO tables precisely what the figures in this column measure; "adequate disposal" is nowhere defined.

Sources: PAHO: Pan American Health Organization, 1972 Annual Report of the Director of the Pan American Sanitary Bureau, Regional Office of the World Health Organization, (Washington, D. C., PAHO, August, 1973), page 48.

WHO: World Health Organization, World Health Statistics Report, Vol. 26, No. 11(Geneva,WHO,1973)

APPENDIX TABLE 7

HEALTH EXPENDITURES IN DEVELOPING COUNTRIES

(1970/71 or other recent years, as noted)

Country	Source	Year	Health Budget as % of National Budget: Current (%)	Capital (%)	Total (%)	National Budget as % of GNP	Health Budget/2 as % of GNP (%)	Government Health Expenditures per capita US$
Rwanda	a		9.1	2.0	8.7	...	0.8 ***	.45
Burundi	c		6.7	...	...	...	0.7	.40
Mali	c	1967	12.4	1.8	8.4	...	1.4	.99
Upper Volta /4	b		...	...	4.8	16.0 **	0.7 ***	.56
Bangladesh	c		...	...	3.5	...	...	...
Somalia	c		8.4	0.1	6.7	...	2.0	1.40
Ethiopia	a		5.7	11.1	6.9	...	0.8 ***	.67
Burma	a		6.9	2.1	6.2	...	1.1 ***	.85
Chad	c	1965	...	...	9.9	...	1.2	.97
Malawi	a		6.9	3.6	6.1	...	0.8	.50
Guinea	c	1967	8.5	2.1	5.4	...	1.1	1.75
Niger	b		8.2	...	...	...	0.9 ***	.88
Sri Lanka	b		9.3	4.5	8.1	...	3.6	3.76
Tanzania	c		...	...	6.3	...	1.5	1.68
India	c		6.2	1.0	4.9	...	0.9 ***	.91
Haiti	c		...	...	13.7	...	0.7	.78
Sudan	b		...	...	7.3	23.0 **	0.7 ***	.60 /3
Laos	b		...	...	...	...	0.6 ***	.72
Khmer Republic	b		...	...	10.1	...	...	...
Uganda	c		...	...	9.6	...	1.7	2.24
Pakistan	c		...	...	...	...	0.1	.08
Nigeria	c	1969	7.7	0.6	5.0	...	0.4	.56
Madagascar	c	1968	7.1	2.1	6.0	...	1.7	2.38
Togo	c		...	...	6.5	...	1.0	1.51
Central Afr. Rep.	b		...	...	8.4	...	1.9	2.81
Kenya	a		7.0	5.2	6.4	...	1.7 ***	.14
Mauritania	c	1968	...	...	6.9	...	0.8	1.42
Bolivia	b		...	...	3.6	49.8 *	2.0	3.74
Cameroon	c		...	...	7.8	...	1.0	2.02
Liberia	c		...	...	7.4	...	1.4	2.90
Sierra Leone	c		8.0	2.2	6.2	...	0.9	1.95
Thailand	b		...	...	6.0	19.5 *	1.2 ***	2.45
Egypt	c		8.9	2.8	8.4	...	1.8	3.91
Viet-Nam, Rep. of	b		...	...	2.3	...	0.4	1.00
Philippines	a		6.4	2.3	5.4	...	0.5 ***	1.06
Senegal	b		...	...	9.1	...	1.4	3.49
Ghana	a		7.7	6.0	7.3	...	1.3 ***	3.76
Jordan	b		...	...	9.5	30.0 **	2.8 ***	10.10
Morocco	a		7.7	0.5	5.6	...	1.3 ***	2.80
Congo	b		...	...	6.1	...	1.8	4.82
Paraguay	b		...	...	26.4	9.0 **	2.4 ***	6.77
Mozambique	c		3.3	16.8	4.9	...	0.9	2.47
Korea, Rep. of	a		...	...	1.4	...	0.5 ***	1.33
Syrian Arab Rep.	a		...	...	2.6	...	0.7 ***	2.03
Honduras	a		10.3	0.6	7.6	...	1.3 ***	3.33
Ecuador	c		...	...	2.8	...	0.3	1.04
South Rhodesia	c		5.7	0.9	4.8	...	...	...
Tunisia	b		9.5	...	9.5	21.9 *	2.1 ***	5.62
El Salvador	b		...	...	12.6	12.5 *	1.5 ***	4.40
Turkey	b		...	...	21.4	12.0 **	2.6 ***	8.21
Algeria	a		7.2	1.4	5.3	...	1.4 ***	4.53
Colombia	a		10.5	10.2	10.4	...	0.6	2.04
Angola	c		4.5	7.4	5.1	...	1.1	3.95
Zambia /5	c		6.2	7.8	6.8	...	0.6	2.10
Malaysia	b		9.0	2.1	6.7	37.0 **	2.5 ***	7.18
Dominican Republic	b		...	...	8.6	16.0 *	1.4 ***	7.71
Iran	c		...	...	2.5	...	0.6	2.60
Brazil	c		...	...	1.4	...	0.2	0.80
Peru	b		...	...	...	...	2.4	11.65
Costa Rica	c	1969	...	...	5.8	...	0.7	4.23
Lebanon	c		...	...	3.5	...	0.6	3.80
Mexico	c		...	...	5.9	...	0.4	2.64
Jamaica	c		...	...	10.0	...	2.7	19.54
Yugoslavia	a		...	.	38.2	...	10.1	73.75
Romania	a		...	...	5.7	...	2.5 ***	18.56
Chile	b		...	...	15.3	...	...	...
South Africa	c		...	...	1.6	...	0.3	2.61
Panama	b		...	...	16.7	13.0 **	2.2 ***	16.70
Trinidad & Tobago	a		10.4	1.1	7.8	...	1.8 ***	14.27
Venezuela	b		...	...	18.4	23.0 *	4.1	43.18
Singapore	b/c		...	...	7.2	...	1.3 ***	14.19
Poland	b		...	...	7.8	49.7 *	3.9 ***	51.98 /3
U.S.S.R.	c		...	...	5.8	...	3.4	47.04
Libyan Arab Rep.	c		6.1	5.1	5.8	...	2.4	35.00
Ireland	b		...	...	23.0	17.0 *	3.9 ***	58.74 /3
Japan	c		...	...	1.9	...	0.3	5.45
Israel	a/b		...	...	2.9	67.0 *	1.9 ***	31.90
United Kingdom	c		...	...	9.5	...	4.3	105.16
United States	c		...	...	6.8	...	1.4	70.00

NOTES: * National data supplied in response to WHO questionnaire

** Taken from percentages of the GNP devoted to government final consumption expenditure published in the Yearbook of Nations Accounts 1971 - Vol. III, International Tables, Table 1A and 2A. UN.ST/STAT/SER.O/1/Add.2.

*** Figure presented as given in source indicated in first column. Those figures not marked (***) were calculated as described in Footnote /2.

a = IBRD, see notes following.

b = World Health Organization, The Fifth Report on the World Health Situation, 1969-1972, (Geneva, WHO, 1974).

c = World Health Organization, World Health Statistics Report, Vol. 26, No. 11 (Geneva, WHO, 1973), pp. 702-719.

1/ Except for Israel, all figures from Source b in Column 3 include health insurance expenditures by the government.

2/ Calculated by dividing "per capita expenditure" figure (last column) by IBRD (World Atlas) estimates of per capita GNP for 1971, except for asterisked figures (***), which were taken from source indicated. Any discrepancies are likely due to slight differences in GNP calculation.

3/ Calculated by multiplying Column 7 ("Health Budget as % of GNP") by IBRD (World Atlas) estimates of per capita GNP for 1971, and dividing by 100.

4/ GNP extrapolated from 1968.

5/ GNP extrapolated from 1969.

Appendix Table 7: continued

Ethiopia:	Both Central and Provincial Governments are responsible for provision of public health services but the extent of Provincial expenditure is not known. The budgetary expenditures exclude expenditures financed with foreign grants, for which the actual figures are not available.
Burma:	Included are expenditures for medical, health and nutrition improvement services, and sanitary services financed by the Union Government. Some public corporations provide medical services to their employees, but their expenditures are not included.
Malawi:	Budgetary expenditures cover foreign financed expenditures; however, whether technical assistance is also covered, is not clear. Public medical-health services are provided by the Central Government alone. However, religious missions play an important role in providing medical services too (40% in terms of the number of beds).
Sri Lanka:	Expenditure of the Ministry of Health accounted for 56% of the total government current expenditure. The rest represented expenditures by other ministries and levels of government.
Tanzania:	Expenditures represent "government budget not including Zanzibar".
India:	Medical and public health services are mainly provided by the State Governments. The health budget figures represent "the combined accounts of the Central and State Governments and Union Territories".
Sudan:	Public medical health services are almost entirely financed by the Central Government. Expenditures by other agencies or government levels are not included in the figures.

Appendix Table 7: continued

Pakistan: Government health budget includes current capital and development expenditures.

Nigeria: Data represent "Federal and Regional Government expenditure".

Central African Republic: Of total government health expenditures, the Ministry of Public Health and Social Affairs accounted for 40%, the intermediate government level for 25%, and the local government level for 35%. The data in the table represent the total amount of all spending on health.

Kenya: Medical services in Kenya are free. The services are provided by municipal and country councils.

Bolivia: Data are total government expenditure on health services, of which 77% was spent by the "central health authority", 3% by the "intermediate health level", and 20% by "the local health level". (Quoted from source).

Thailand: Foreign-financed expenditures are outside the budget.

Medical services are provided by the Central Government. Municipalities and Sanitary Districts provide some public health services, but major capital expenditures and a large part of current expenditures are financed by the Central Government. Data represents total expenditures of all government levels.

Philippines: Foreign loan-financed expenditures are included in the budget.

The Central Government is the main provider of public medical and health services. It operates about one half of the country's hospitals. The service for rural areas is provided through the Department of Health's rural health units.

Ghana: Budgetary expenditures include expenditures financed with foreign grants and loans. Practically all public medical-health services are provided by the Central Government.

Jordan: Of the 1971 total government health expenditure, 45% was spent by the Ministry of Health and 55% was spent by other ministries.

Morocco: The Ministry of Public Health is the major supplier of medical and health services. Some municipalities also provide these services but their expenditures are partly financed with subsidies from the Central Government.

Appendix Table 7: continued

Paraguay:	Of total government health expenditures, 30% were spent by the Ministry of Public Health and Social Welfare, 67% by other ministries, and 3% by local health authorities.
Korea:	Health services are mainly provided by the local governments, whose expenditure amounted to 6.6 billion wons in 1970. Data here is total government health expenditures.
Honduras:	Health services are provided mainly by the Central Government. However, the Social Security Institute, which is an autonomous agency, also has hospitals and their expenditures are financed with funds raised by the Institute.
Syrian Arab Republic:	The Central Government is the sole supplier of public medical health services. The figure given includes minor expenditures for welfare services; institutions for disabled persons and Palestine Arab refugees.
Tunisia:	Data represent Ministry of Health expenditure only.
Turkey:	Of total government health expenditure, spending by the Ministry of Health and Social Welfare accounted for 50%; spending by other ministries accounted for 40%, with local authorities spending 10%.
Algeria:	Medical-health services are rendered by the Central Government through health centers, dispensaries and hospitals. Some municipalities also operate hospitals.
Colombia:	Public medical-health service is shared by the Ministry of Public Health and decentralized agencies including the Social Security Institutions. The decentralized agencies receive grants from the National Government.
Malaysia:	Most health services are the responsibility of the Federal Government, but local authorities share public health services. Medical services in government hospitals are free.
Dominican Republic:	All public medical-health services are financed by the Central Government.
Brazil:	Government health expenditures in 1971 were 88% current and 12% capital spending.
Peru:	The Ministry of Health accounted for only 6% and other ministries for only 0.5% of total government health expenditure, the bulk of which was devoted to Social Security.

Appendix Table 7: continued

Lebanon: Total government health expenditures include development expenditures.

Yugoslavia: The Health Insurance-Scheme is combined with the Pension Insurance-Scheme to form the "Social Security Scheme". This scheme is financed by the Social Insurance Fund, which is a special-purpose extra-budgetary unit at the Republic Government level. Both federal and Republic Governments contribute to this Scheme.

Romania: Health expenditures are entirely financed with the State Budget.

Chile: The Ministry of Public Health accounted for 52% and the National Health Service accounted for 48% of total Central Government spending on health, which is what data here represent.

Panama: The breakdown of total government health expenditure in 1972 was as follows:

Ministry of Health	23%
Other Ministries	38%
Regional authorities	8%
Health area authorities	31%

Trinidad and Tobago: Almost all public medical-health services are provided by the Central Government. Local governments make some expenditures for environmental health services, but these are financed largely with the Central Government grants.

United Kingdom: Data represent "public sector including Central Government, local authorities, and public corporations".

United States: Data represent "federal government budget" only.

COMMENTS ON APPENDIX TABLE 7

Burundi, Mali, Somalia, Chad, Guinea, Haiti, Uganda, Madagascar, Togo, Mauritania, Liberia, Sierra Leone, Egypt, Mozambique, Ecuador, Southern Rhodesia, Angola, Zambia, Iran, Costa Rica, Mexico, Jamaica, South Africa, Singapore, U.S.S.R., Libyan Arab Republic, and Japan:

An Introductory Note in the same source for these countries reads:

> "Data represent annual expenditure for health purposes as recorded at different government levels (national, state or provincial, and local or municipal). Data were obtained in reply to WHO questionnaires or extracted from national health reports and international statistical publications... Due to different concepts and definitions of health expenditure, different classification systems, and coverage of the data in various countries, the data do not allow comparisons between countries."

Additional notes regarding the data for other countries from the same source appear below.

Niger, Laos, Khmer Republic, Viet-Nam, Senegal, Congo, and El Salvador:

Data for these countries represent "total government expenditure on health;" unless otherwise stated in the notes below, all country data have been reported this way.

Rwanda: Expenditures financed with foreign sources do not enter into the Budget. Public sector health expenditures financed with foreign aid amounted to 145.0 million francs.

a) The Central Government is almost the sole supplier of public services.
b) "Welfare" is included in "Health."

Upper Volta: Data are total 1972 health expenditure of the Ministry of Public Health and Population.

Bangladesh: "Government revenue expenditure".

Appendix Table 8: Breakdown of Government Health Budgets

Country	Year	Total Public Expenditures (in US$ millions)	% Public Halth/Prevention	% Curative Care	% Training and Research
Ceylon	1957-58	34.3	23.3	74.4	2.3%
Tanzania	1970-71	19.5	4.9	80.3	4.4
India	1965-66	236	37.0	55.5	7.5
Laos/a	1971-72	2.3	14.3 /b	19.9 /c	44.8
Kenya	1971	27.8	5.2	83.8	11.0
Thailand/a	1971-72	83.6	28.1 /d	46.6 /c	19.1
Paraguary/a	1972	10	10.5 /e	84.6 /c	n.a.
Tunisia/a	1971	15.8	...	86.3 /c	n.a.
El Salvador/a	1971	30.4	3.3 /f	52.9 /c	1.1
Turkey/a	1972	303.7	16.3 /g	...	13.5
Columbia	1970	203	18.7	79.3	2.0
Mongolia/a	1972	n.a.	...	...	7.2
Chile	1959	63.8	18.3	77.0	4.0
Panama	1967	28.4	30.0	----- (70%) -----	
Venezuela	1962	n.a.	18.0	76.5	5.5
Israel /a	1959-60	82.7	4.9	80.3	4.4

SOURCES: Brian Abel-Smith, Paying for Health Services, WHO Public Health Paper 17.
Brian Abel-Smith, An International Study of Health Expenditures, WHO Public Health Papers 32.
India: Government of India, Health Statistics of India, 1965.
Colombia: Economic Growth of Colombia, Vol. IX (IBRD), P. 11.
Kenya: Ministry of Health, Recurrent and Development Budget, 1971-72.
Panama: A.I.D. Syncrisis: The Dynamics of Health, Vol. I, U.S. Dept. of H.E.W.
Tanzania: Malcolm Segal, "The Politics of Health in Tanzania," Development and Change, IV, No. 1 (1972-73), pp. 37-50.
Laos, Thailand, Paraquay, Tunisia, El Salvador, Turkey and Mongolia: World Health Organization, The Fifth Report on the World Health Situation, 1969-1972, Part II, Review by Country and Territory, (Geneva, WHO, 1974).

NOTES:

/a Classification of residual categories of expenditure is unknown.
/b Expenditure for "environmental health services."
/c Expenditure for government hospitals only.
/d Expenditure for "control of communicable diseases, laboratory services, environmental health services, and occupational health services."
/e Expenditure for "campaigns against communicable diseases, maternal and child health and vaccinations, and laboratory services."
/f Expenditure for "immunization and vaccination activities, laboratory services, and environmental health services."
/g Expenditure for "mass campaigns against communicable diseases, immunization and vaccination activities, laboratory services, and environmental health services."

Appendix Table 9: Breakdown of Health Expenditure

Percentage distribution of total health expenditure in selected countries, 1961

Country	Personal Medical Services		Public Health Services	Teaching and Research
	Inpatient	Outpatient		
Kenya	-------89%------		8%	3%
Ceylon	50%	44%	5	2
Tanganyika	45	50	4	1
Yugoslavia	43	50	4	3
Czechoslovakia	48	44	2	6
U.K.	52	44	2	2
France	41	56	2	2
Sweden	53	42	1	4
U.S.A.	38	57	1	5

Source: From the Epidemiology Program, School of Public Health, University of California, Berkeley, California, cited in Warren Winkelstein, Jr., "Epidemiological Considerations Underlying the Allocation of Health and Disease Care Resources," in International Journal of Epidemiology, Vol. 1, No. 1, (London, Oxford University Press, 1972), p. 69.

Appendix Table 10: Private/Public Expenditure on Health

Country	Year	Private Expenditure on Health as % of Total Private Consumption (%)	Government Expenditure/a on Health as % of Total Govt. Expenditure (%)	Private Expenditure Per Capita ($)	Government Expenditure/a Per Capita ($)
Sierra Leone	1968/69	1.2	8.0 /b	...	1.95
Thailand	1967	3.6	6.0 /c	3.63	2.45
Philippines	1965	1.7	6.4 /b	2.23	1.06
Jordan	1964	0.6	9.5 /c	1.12	10.10
Colombia	1965	1.2	10.5 /b	...	2.04
Zambia	1967	3.8	6.2 /b	6.02	2.10
Malaysia	1966	2.4	9.0 /b	3.91	7.18
Jamaica	1968	1.1	10.0 /c	3.84	19.54
Panama	1969	4.0	16.7 /c	16.30	16.70
Cyprus	1967	2.2	5.4 /c	9.50	1.63
Singapore	1968	1.8	7.2 /c	8.85	14.19
Greece	1968	2.5	8.1 /b	15.15	11.37
Spain	1967	3.2	...	17.94	...

Source: World Health Organization, Statistical Report, Vol. 24 (1971) pp. 236-245 (Except for data from Appendix Table 7).

/a From Appendix Table 7.

/b Current government expenditures only.

/c Current and capital expenditure.

APPENDIX TABLE 11: AVAILABILITY AND UTILIZATION OF HOSPITAL BEDS

COUNTRIES	YEARS	ALL HOSPITALS: POPULATION PER BED TYPE	ALL HOSPITALS: POPULATION PER BED RATIO	ALL HOSPITALS: OCCUPANCY RATE	GENERAL HOSPITALS: POPULATION PER BED TYPE	GENERAL HOSPITALS: POPULATION PER BED RATIO	GENERAL HOSPITALS: OCCUPANCY RATE	LOCAL AND RURAL HOSPITALS: POPULATION PER BED TYPE	LOCAL AND RURAL HOSPITALS: POPULATION PER BED RATIO	LOCAL AND RURAL HOSPITALS: OCCUPANCY RATE
Rwanda	1971	T	769	T 62.7%	T	1,389	T 93.7 %			T 71.5%
Burundi	1970	T	787	.	A	5,556	A 78.4	T	1,923	A 99.3
Mali	1971	A	1,389	A 86.9	A	8,333	A 134.1	A	3,704	A 53.0
Upper Volta	1970	A	1,667	.	A	4,167	A 99.3	A	8,333	.
Bangladesh	1968	A	8,333	.			.			.
Somalia	1970	T	571	.	T	1,053	.			.
Afghanistan	1970	T	6,667	.	A	14,286	A 33.0	T	14,286	T 32.6
Ethiopia	1970	T	3,030	T 44.8	T	4,000	.			.
Indonesia	1970	T	1,724	.	A	20,000	.	T	1,887	.
Burma	1971	T	1,190	.	T	1,563	T 98.2	T	20,000	T 67.5
Chad	1971	T	775	.	T	2,439	A 52.3	A	4,000	A 48.0
Nepal	1971	T	6,667	.	T	8,333	.			.
Malawi	1970	T	637	T 88.6	T	2,381	.	T	1,667	T 96.1
Zaire	1970	T	318	.	T	446	.	T	2,778	.
Guinea	1968	A	813	.	A	2,564	.	A	1,887	.
Niger	1971	T	2,222	.	T	4,347	.	A	9,091	A259.7
Sri Lanka	1970	T	311	.			.			.
Dahomey	1970	A	862	.	A	1,887	.			.
Tanzania: Tanganyika	1969	T	699	.	T	862	.			.
Zanzibar	1967	T	407	.	A	763	A 85.7			.
India	1969	T	1,612	.						.
Haiti	1970	T	1,369	.						.
Sudan	1970	A	1,041	.	A	1,282	.			.
Democratic Yemen	1968	T	980	.	T	2,439	.	T	2,273	.
Laos	1971	T	1,190	.			.			.
Khmer Republic	1971	T	917	.	T	1,163	.	A	16,667	.
Uganda	1970	T	641	.	T	1,042	T 68.6			.
Pakistan	1969	T	1,667	.	T	2,326	.	T	100,000	.
Nigeria	1971	T	1,851	.	T	2,500	.	T	100,000	.
Madagascar	1971	T	352	.	T	1,515	.	T	893	.
Togo	1971	A	820	.	A	1,351	.	T	2,083	.
Central African Rep.	1970	T	465	.	T	1,754	.			A 67.3
Kenya	1970	T	775	.			.			.
Mauritania	1971	A	2,778	.	A	5,263	A 98.2	A	5,882	.
Bolivia	1969	T	490	.	T	699	.	A	3,704	.
Cameroon	1970	T	480	.	T	1,470	.	T	769	.
Liberia	1969	T	526	.	T	676	.		.	.
Sierra Leone	1970	T	1,041	.			.		.	.
Thailand	1970	T	847	.	T	1,250	.		.	.
Egypt	1971	T	463	.	T	862	.	A	4,000	.
Viet-Nam, Republic of	1970	T	478	.	T	833	.	A	100,000	A 53.9
Philippines	1969	T	855	.	T	1,250	.		.	.
Senegal	1970	A	730	A 77.2	A	1,351	A 72.0	A	5,556	A 63.7
Ghana	1971	T	758	.	A	2,632	.	T	1,370	.
Jordan	1971	T	962	.	T	1,563	.	A	7,692	.
Morocco	1970	A	690	.	A	1,370	.	A	9,091	A 51.5
Congo	1971	T	171	T 70.4	T	495	A 106.3	A	495	A 49.5
Paraguay	1971	T	625	.	A	1,010	A 48.6	A	25,000	.
Mozambique	1969	T	636	.	T	1,087	.		.	.
Korea, Republic of	1971	T	1,923	T 58.4			.		.	.
Syrian Arab Republic	1971	T	1,010	.	T	2,000	T 69.3		.	.
Honduras	1971	T	568	.	T	763	.	A	100,000	.
Ecuador	1971	T	434	T 58.6		.	.		.	.
Southern Rhodesia	1971	T	295	.	T	426	T 90.5	T	1,235	A 60.2
Tunisia	1970	A	410	A 77.9	A	671	A 79.5	A	2,326	T 64.7
Papua New Guinea	1970	T	152	T 66.0	T	671	T 73.6	T	1,370	.
El Salvador	1970	T	526	.	A	980	.	T	11,111	.
Ivory Coast	1970	A	676	.		.	.		.	.
Turkey	1971	T	490	.	T	813	.	A	10,000	.
Algeria	1969	T	341	T 69.9		.	.		.	.
Iraq	1971	T	775	.	T	813	.		.	.
Colombia	1970	T	446	.	T	625	.		.	.
Angola	1970	T	362	.		.	.		.	.
Mongolia	1970	A	108	.	A	262	A 75.7	A	800	A 75.7
Zambia	1969	T	314	.		.	..		.	.
Guatemala	1970	T	457	T 82.6	T	571	T 81.1			.
Dominican Republic	1971	T	348	.	T	543	T 39.6	T	4,348	.
Malaysia, West	1971	T	273	.	T	400	.		.	.
East: Sabah	1970	A	377	.	A	769	.	A	901	.
Sarawak	1971	T	394	.	T	840	.	T	4,545	.
China, Republic of	1969	A	2,941	A 70.1	A	6,667	A 49.6		.	.
Iran	1971	T	775	.	T	1,639	.	T	50,000	.
Nicaragua	1970	T	410	.		.	.		.	.
Brazil	1970	T	262	.		.	.		.	.
Peru	1970	T	474	.		.	..		.	.
Albania	1969	T	167	T 81.2		.	T 84.4		.	.
Cuba	1970	A	213	A 72.0	A	467	A 73.5	A	8,333	A 51.6
Saudi Arabia	1971	T	1,136	.		..	.		.	.
Costa Rica	1970	T	254	T 80.7	T	429	T 74.9	A	8,333	A 17.0
Lebanon	1970	T	260	.		.	..		.	.
Mexico	1970	T	935	.	T	1,887	.		.	.
Jamaica	1970	T	244	.	T	592	.		.	.
Portugal	1971	T	164	.	T	280	.		.	.
Yugoslavia	1971	T	179	T 89.2	T	278	T 89.5		.	.
Romania	1971	T	120	.	T	190	.	T	7,143	.
Uruguay	1971	T	161	.			.		.	.
Chile	1970	T	246	.	T	346	.	A	6,250	A 58.1
South Africa	1962	T	189	T 82.7	T	269	T 83.1	T	6,250	T 78.4
Panama	1971	T	319	.	T	585	..	A	12,500	A 37.9
Bulgaria	1971	T	129	T 82.1	T	184	T 78.1		.	.
Hong Kong	1971	T	240	.	T	338	.	A	25,000	.
Trinidad and Tobago	1968	T	226	.	T	508	.	A	3,704	A 94.8
Venezuela	1971	T	316	.	T	588	.	A	25,000	.
Singapore	1971	T	269	.	T	854	.		.	.
U.S.S.R.	1970	T	91	.		.	.		.	.
Libyan Arab Republic	1970	T	256	.	T	408	.		.	.
Japan	1971	T	79	.	A	325	.		.	.
Israel	1971	T	171	T 94.5	T	292	T 91.2		.	.
U.S.A.	1971	T	127	T 80.3	T	214	T 78.1		.	.

T = Total hospital establishments; A = Government hospital establishments; .... = Data not available.

Sources: World Health Organization, World Health Statistics Annual, 1970, Volume III, Health Personnel and Hospital Establishments, (Geneva, WHO, 1974).

World Health Organization, World Health Statistics Report, Vol. 26, No. 3, Table 3: Hospital Establishments, (Geneva, WHO, 1973), pp. 146-163.

Appendix Table 12: Indices of Utilization: General Hospitals

Country	Year	Beds	Discharges	Patient Days	Average Days of Stay	Occupancy Rate (Per Cent)
Malawi	1965	1,025	24,528	293,817	12.0	78.5
Morocco /a	1965	12,157	267,835	3,469,668	13.0	78.2
Senegal /a	1967	2,424	33,944	813,237	24.0	91.9
Tanzania	1967	12,732	348,427		9.4	85.7
Tunisia /a	1967	6,655	222,813	2,059,619	9.2	84.8
Colombia	1967	34,399	871,911	7,226,563	8.3	57.6
Honduras	1967	3,408	78,488	980,737	12.5	78.8
Jamaica /a	1967	3,034	82,565	914,679	12.5	78.8
Jordan	1967	1,980	43,087	293,618	6.8	40.6
Thailand	1967	20,161	790,338	4,606,036	5.8	62.6
Turkey	1967	32,686	895,912	7,235,542	8.1	60.6

Source: World Health Statistics Annual, 1967, Vol. III.

a = Government Hospitals Only

Appendix Table 13: Indices of Utilization: Local and Rural Hospitals

Country *	Year	Beds	Discharges	Patient Days	Average Days of Stay	Occupancy Rate (Per Cent)
Dahomey	1965	250	2,143	44,196	20.6	48.4
Malawi	1965	3,620	153,335	1,592,593	10.4	120.5
Morocco*	1965	1,639	30,826	288,255	9.4	48.2
Senegal	1967	591	14,327	132,575	9.3	61.5
Tunisia *	1967	2,317	86,364	602,640	7.0	71.3
Chile	1967	1,500	38,788	329,757	8.5	60.2
Costa Rica	1967	204	6,286	14,862	2.4	20.0
Surinam	1966	225	4,109	31,413	7.6	38.3
Cyprus *	1967	94	610	2,997	4.9	8.7
Laos *	1967	267	3,764	33,630	8.9	34.5

Source: World Health Statistics Annual, 1967, Vol. III.

* = Government Hospitals Only

Appendix Table 14: Public/Private Distribution of Health Care Services

	Beds in Government Hospitals				Physicians in Government Service			
	Year	Total Hospital Beds	Govt. Hospital Beds	Govt. Beds as % of Total	Year	Total Number of Physicians	Physicians in Govt. Service	Govt. Physicians as % of Total
Rwanda	71	4,995	3,194	63.9%	70	70	69	99.0
Burundi	70	--	650	--	70	60	--	--
Mali	71	--	3,718	--	71	124	124	100.0
Upper Volta	70	--	3,219	--	71	74	--	--
Bangladesh	68	--	7,139	--	69	7,893	--	--
Somalia	70	--	4,882	--	72	150	--	--
Afghanistan	70	2,479	2,324	93.7	72	937	937	100.0
Ethiopia	70	8,254	5,500	66.6	72	350	--	--
Indonesia	70	70,620	58,411	82.6	71	4,561	2,226	48.8
Burma	71	23,678			71	3,073	2,643	86.0
Chad	71	3,576	3,292/a	92.1	71	63	--	--
Yemen Arab Rep.		--	--	--	72	222	--	--
Nepal	71	2,006	--	--	70	--	221	--
Malawi	70	6,951	3,492	50.2	71	53	25	47.2
Zaire	70	67,624	33,449	49.5	71	758	--	--
Guinea	68	--	4,654	--	69	77	--	--
Niger	71	2,169/a	2,039/a	94.0	71	69	69	100.0
Sri Lanka	70	--	37,753	--	70	--	1,932	--
Dahomey	70	--	3,124	--	71	93	75	80.6
Tanzania: Tang.	69	18,014	9,548	53.0	70	598	316	52.8
Zanz.	67	875	851	97.3	67	43	--	--
India	69	331,633	--	--	70	112,000	--	--
Haiti	70	3,545	2,529	71.3	69	361	--	--
Sudan	70	--	--	--	71	1,168/b	1,007	86.2
Democratic Yemen	68	1,222	--	--	72	117	--	--
Laos	71	2,775	1,703	61.4	71	228	14	6.1
Khmer Republic	71	7,500	5,448	72.6	71	438	381	87.0
Uganda	70	15,294	10,538	68.9	70	1,065	351	33.0
Pakistan	69	31,565	--	--	72	14,601	--	--
Nigeria	71	25,716	20,896	81.3	71	2,878	912	31.7
Madagascar	71	18,620	16,720	89.8	71	685	512	74.7
Togo	71	3,088	--	--	71	68	68	100.0
Central Afr. Rep.	70	--	--	--	72	48	--	--
Kenya	70	14,537	8,359	57.5	70	1,437	--	--
Mauritania	71	440	--	--	71	68	62	91.2
Bolivia	69	9,779	8,406	86.0	71	2,143	--	--
Cameroon	70	19,141	12,886	67.3	69	225	135	60.0
Liberia	69	2,184	1,121	51.3	70	110	--	--
Sierra Leone	70	2,458	1,683	68.5	70	149	100	67.1
Thailand	70	40,393	37,908	93.8	70	4,313	2,626	60.9
Egypt	71	73,943	64,182	86.8	72	18,802	--	--

Appendix Table 14

	Year	Total Hospital Beds	Govt. Hospital Beds	Govt. Beds as % of Total	Year	Total Number of Physicians	Physicians in Govt. Service	Govt. Physicians as % of Total
Viet-Nam. Rep of	70	38,334	28,444	74.2	71	2,000	--	--
Philippines	69	43,492	19,525	44.9	71	--	4,051	--
Senegal	70	--	5,397	--	71	277	--	--
Ghana	71	11,374	7,581	66.7	71	715	418	58.5
Jordan	71	1,850	1,250	67.6	71	826	278	33.7
Morocco	70	--	22,570	--	70	1,170	--	--
Congo	71	5,541	5,187	93.6	71	112	--	--
Paraguay	71	--	3,865	--	70	1,023	--	--
Mozambique	69	11,557	10,263	88.8	69	498	--	--
Korea, Rep. of	71	17,506	--	--	71	14,964	1,136	7.6
Syrian Arab Rep.	71	5,945	4,786	80.5	72	1,914	--	--
Honduras	71	4,502	3,423	76.0	71	780	--	--
Ecuador	70	14,024	--	--	70	2,080	--	--
Southern Rhodesia	71	17,753	11,005	62.0	72	836	--	--
Tunisia	70	--	12,532	--	71	797	--	--
Papua New Guinea	70	15,911	7,516	47.2	70	233	--	--
El Salvador	70	7,058	6,617	93.8	70	969	--	--
Ivory Coast	70	--	6,221/b	--	70	277	223	80.5
Turkey	71	75,410	49,400	65.5	71	16,514	8,755	53.0
Algeria	69	39,073	--	--	69	1,698	--	--
Iraq	71	18,565	18,069	97.3	72	3,158	2,530	80.1
Colombia	70	47,318	36,363	76.8	69	9,468	--	--
Angola	70	15,205	6,375	41.9	70	650	--	--
Mongolia	70	--	11,926	--	72	2,553	--	--
Zambia	69	13,242	7,262	54.8	69	307	--	--
Guatemala	70	14,518	13,185	90.8	70	1,435	--	--
Malaysia, West	71	--	27,661	--	71	1,881	--	--
East: Sabah	70	--	1,747	--	71	83	45	54.2
Sarawak	71	2,118	1,999	94.4	71	90	47	52.2
Dominican Rep.	71	12,947	8,318	64.2	71	2,050	831	40.5
China, Rep. of	69	--	4,637	--	69	4,353	--	--
Iran	71	39,151	21,935	56.0	71	9,470	8,562	90.4
Nicaragua	70	4,841	4,330	89.4	70	961	--	--
Brazil	70	354,373	--	--	69	47,250	--	--
Peru	70	28,666	23,998	83.7	69	6,870	--	--
Albania	69	12,715	--	--	67	1,157	--	--
Cuba	70	--	39,468	--	68	7,000	--	--
Saudi Arabia	71	7,249	--	--	70	--	770	--
Costa Rica	70	6,843	6,843	95.6	70	1,067	--	--
Lebanon	70	10,727	1,602	14.9	70	1,900	--	--
Mexico	70	52,518/a	--	--	70	33,981	--	--
Jamaica	70	7,672	7,086	92.4	70	710	--	--
Portugal	71	54,477	25,624	47.0	71	8,410	--	--
Yugoslavia	71	120,481	--	--	71	21,902	--	--
Romania	71	173,296	--	--	71	24,720	24,720	100.0
Uruguay	71	16,603	--	--	71	3,170	--	--
Chile	70	35,861	35,105	97.9	70	--	4,401	
South Africa	62	87,905	--	--	71	10,500	--	--
Panama	71	4,735	4,300	90.8	71	1,006	924	91.8
Bulgaria	71	67,583	--	--	71	16,183	16,183	100.0

Appendix Table 14

	Year	Total Hospital Beds	Govt. Hospital Beds	Govt. Beds as % of Total	Year	Total Number of Physicians	Physicians in Govt. Service	Govt. Physicians as % of Total
Hong Kong	71	16,406	6,566	40.0	71	2,161	540	25.0
Trinidad & Tobago	68	4,514	4,271	94.6	68	441	--	--
Venezuela	71	32,632	27,899	85.5	72	10,202	--	--
Singapore	71	8,251/c	7,368/c	89.3	71	1,520	508	23.4
U.S.S.R.	70	--	--	--	70	577,300	--	--
Libyan Arab Rep.	70	7,574	6,947	91.7	-	--	--	--
Japan	71	338,056	376,699	28.2	71	121,254	--	--
Israel	71	17,369	8,917	51.3	71	7,723	--	--
U.S.A.	71	555,560	865,975	55.7	70	323,203	29,501	9.1

/a Incomplete data
/b Reporting hospitals
/c Other medical social establishments included.
R = Number of registered physicians, not all of them are residing and working in the country.
X = Coverage of data unknown.

Sources: World Health Organization, World Health Statistics Annual, 1970, Vol. III, Health Personnel and Hospital Establishments, (Geneva, WHO, 1974).
World Health Organization, World Health Statistics Report, Vol. 26, No. 3, (Geneva, WHO, 1973).

Appendix Table 15: Medical Manpower in Developing Countries: Supply of Physicians and Nursing/Midwifery Personnel in Developing Countries

Country	Year	Total of Physicians	Population per Physician 1950	Population per Physician 1970	Total Nurse/ Midwives [a]	Population per Nurse/ Midwife [b]	Ratio of Nurse/Midwives to Physicians [c]
Rwanda	71	70	. . .	58,800	212	19,400	3.03
Burundi	70	60	. . .	59,000	136	25,900	2.27
Mali	71	124	. . .	41,700	1,415 /a	3,650	11.41
Upper Volta	71	74	. . .	90,900	176 /d	38,190	2.38
Bangladesh	69	7,893 /f	. . .	7,600 /f	1,281 /f	47,500	0.16 /f
Somalia	72	150	. . .	21,300	899	3,560	5.99
Afghanistan	72	937	76,900	20,400	262	72,860	0.28
Ethiopia	72	350	125,000	76,900	892	30,160	2.55
Indonesia	71	4,561	66,700	27,800	10,858	11,680	2.38
Burma	71	3,073	8,600	9,000	8,020 /g	3,450	2.61
Chad	71	63	. . .	62,500	417	9,440	6.62
Yemen Arab Republic	72	222	. . .	40,000	. . .	. . .	. .
Nepal	70	221/g	. . .	50,000/g	309 /g	35,710 /g	1.40 /g
Malawi	71	53/i	41,700	76,900 /i	311	13,100	5.87
Zaire	71	758	24,400	30,300	1,892	12,120	2.50
Guinea	69	77	. . .	50,000	651	5,920	8.45
Niger	71	69	. . .	50,000	211	16,340	3.06
Sri Lanka	70	1,932/g	6,000	3,700	5,542 /g	1,290 /g	2.87 /g
Dahomey	71	93	. . .	29,400	332	8,240	3.57
Tanzania: Tanganyika	70	598	28,600	21,700	782	16,560	1.31
Zanzibar	67	43	7,500	8,200	217	1,620	5.05
India	70	112,000	. . .	4,820	105,000	5,530	0.94
Haiti	69	361	. . .	13,210	468	10,160	1.30
Sudan	71	1,168/e	52,600	15,900	187	99,380	0.16
Democratic Yemen	72	117	19,200	11,970	153	9,140	1.31
Laos	71	228	45,500	16,700	33	119,290	0.14
Khmer Republic	71	438	41,700	15,900	3,264	2,130	7.45
Uganda	70	1,065	23,300	9,300/f	6,385 /f	1,550 /f	5.99 /f
Pakistan	72	14,601	21,300	3,810/f	5,169	10,890	0.35
Nigeria	71	2,878	83,300	20,400/f	29,471	1,990	10.24
Madagascar	71	685	7,900	10,100	397	17,410	0.58
Togo	71	68	34,500	28,600/g	455	4,280	6.69
Central African Repub.	72	48	. . .	38,500	186/d	9,920	3.88
Kenya	70	1,437/f	10,000	7,800/f	10,981	1,020	7.64
Mauritania	71	68	. . .	17,200	101	11,540	1.49
Bolivia	71	2,143	4,100	2,300	948/d	5,230	0.44
Cameroon	69	225	29,400	26,300	641	9,230	2.85
Liberia	70	110	27,000	10,400	341	3,350	3.10
Sierra Leone	70	149	34,500	17,200	570	4,490	3.83
Thailand	70	4,313	13,000	8,000	7,088	4,480	1.64
Egypt	72	18,802	4,300	1,910	7,528	4,780	0.40
Viet-Nam, Republic of	71	2,000	. . .	9,200/i	2,963	6,220	1.48
Philippines	71	4,051/g	12,300	9,100/g	7,283/g	5,060/g	1.80/g
Senegal	71	277	. . .	14,900	741/d	5,560	2.68
Ghana	71	715	29,400	13,000/f	10,200	910	14.27
Jordan	71	826	6,800	2,680	505	4,390	0.61

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Appendix Table 15

Country	Year	Total of Physicians	Population per Physician 1950	Population per Physician 1970	Total of Nurses/ Midwives	Population per Nurse/ Midwife	Ratio of Nurses/Midwives to Physicians
Morocco	70	1,170	8,900	13,300	. . .	. . .	. .
Congo	71	112	. . .	7,250	238	3,420	2.12
Paraguay	70	1,023 /i	2,750	2,340 /i	499 /i	4,780	0.49 /i
Mozambique	69	498	. . .	14,700	835	8,750	1.68
Korea, Republic of	71	14,964 /f	4,900	2,210 /f	22,617 /f	1,460 /f	1.51 /f
Syrian Arab Republic	72	1,914	4,930	3,850	2,003	3,670	1.05
Honduras	71	780	6,130	3,700 /f	303	9,490	0.39
Ecuador	70	2,080	3,820	2,930	706	8,620	0.34
Southern Rhodesia	72	836 /f	9,520	6,410	5,724 /f	940	6.85 /f
Tunisia	71	797	6,450	5,950	3,214	1,480	4.03
Papua New Guinea	70	233	. . .	11,630	1,541	1,760	6.61
El Salvador	70	969	5,030	4,030	1,033	3,770	1.07
Ivory Coast	70	277	. . .	13,900	1,402 /g	2,210 /g	6.29 /g
Turkey	71	16,514	4,330	2,220	17,345	2,110	1.05
Algeria	69	1,698	5,130	7,870	1,890	7,090	1.11
Iraqw	72	3,158	6,490	3,270	1,232	8,380	0.39
Colombia	69	9,468	3,240	2,160	2,115	9,820	0.22
Angola	70	650	29,400	8,470	1,972	2,800	3.03
Mongolia	72	2,553	5,260	594	4,603 /d	330	1.80
Zambia	69	307	16,900	13,500	754	5,490	2.46
Guatemala	70	1,435	5,880	3,620	749	6,960	0.52
Malaysia, West	71	1,881 /f	9,800	3,860 /f	5,499 /f	1,320 /f	2.92 /f
East: Sabah	71	83	13,200	8,070	733	910	8.83
Sarawak	71	90	20,000	13,900	899 /g	1,390 /g	9.99
Dominican Republic	71	2,050	. . .	2,110	367	12,410	0.17
China, Republic of	69	4,353	2,360	3,170 /i	3,238	4,280	0.74
Iran	71	9,470	7,630	3,300	4,922	6,470	0.51
Nicaragua	70	961 /i	2,440	2,060 /f	407	4,900	0.42
Brazil	69	47,250	2,740	1,960	7,992	11,530	0.17
Peru	69	6,870	4,220	1,920	5,104	2,590	0.74
Albania	67	1,157	9,430	1,800	4,645	450	4.01
Cuba	68	7,000	1,030	1,150	4,373	1,850	0.62
Saudi Arabia	70	770 /g	. . .	1,010 /g	2,057 /g	380 /g	2.67 /g
Costa Rica	70	1,067	3,510	1,630	1,030	1,680	0.97
Lebanon	70	1,900	1,600	1,470	1,856	1,500	0.98
Mexico	70	33,981	2,250	1,450	8,997	5,580	0.26
Jamaica	70	710	4,170	2,630	1,088 /g	1,720	1.53 /g
Portugal	71	8,410	. . .	1,050	4,718	1,880	0.56
Yugoslavia	71	21,902	3,180	1,010	34,532	640	1.58
Romania	71	24,720	1,110	844	16,343	570	1.47
Uruguay	71	3,170	1,010	942	. . .	. . .	. .
Chile	70	4,401 /g	2,760	2,010 /g	2,666 /g	3,300 /g	0.61 /g
South Africa	71	10,500	2,070	1,970	20,895	520	3.80
Panama	71	1,006	4,480	1,550	1,120	1,400	1.11
Bulgaria	71	16,183	1,400	537	32.397	268	2.00
Hong Kong	71	2,161	3,850	1,520	6,392	510	2.96
Trinidad and Tobago	68	441	3,380	2,310	2,578	390	5.85
Venezuela	72	10,202	2,300	1,100	6,202	1,800	0.61
Singapore	71	1,520	3,400	1,520 /f	6,808	340	4.48

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Appendix Table 15

Country	Year	Total of Physicians	Population per Physician 1950	Population per Physician 1970	Total Nurses/ Midwives	Population per Nurse/ Midwife	Ratio of Nurses/Midwives to Physicians
U.S.S.R.	70	577,300	764	420	1,331,100	180	2.31
Japan	71	121,254	1,080	883	176,229	610	1.45
Israel	71	7,723 /f	433	400	5,542	560 /f	0.72
U.S.A.	70	323,203	754	634	727,100	280	2.25

Sources: World Health Organization, World Health Statistics Annual, 1970, Volume III, Health Personnel and Hospital Establishments, (Geneva, WHO, 1974)
World Health Organization, World Health Statistics Report, Vol. 26, No. 3, Table 2: Health Personnel, (Geneva, WHO, 1973), pp. 136-145
World Health Organization, Regional Office for the Eastern Mediterranean, Basic Country Information, Summary Tables, (Circular No. 6, March, 1974; restricted mimeo), (Alexandria, WHO-EMR, 1974)

NOTES:

a/ Includes nurses, midwives, and nurses with midwifery qualifications. It does not include assistant nurses nor assistant midwives.
b/ This figure is an approximate figure calculated by dividing the "Population per Physician, 1970" figure by the "Ratio of Nurses/Midwives to Physicians." Some lack of precision results where data from different years are combined in one figure. Data in WHO sources labelled "population per nursing and midwifery personnel" differ from data presented above because they include assistant nurses and assistant midwives.
c/ Total number of nurses/midwives (excluding assistants) divided by the total nuymber of physicians.
d/ For 1970.
e/ For 1971.

f = Number of registered persons, not all of them are residing and working in the country.
g = Personnel in government establishments only
h = Personnel in hospital establishments only
i = Coverage of data not known

Appendix Table 16: Population per Medical Doctor in Urban and Rural Areas

Country	Year	Population/Medical Doctor		
		Nationwide	Urban	Rural
Pakistan	1970	4,020	3,700	24,200
Kenya	1969	12,140	800	50,000
Philippines	1971	3,900	1,500	10,000
Honduras	1968	3,860	1,190	7,140
Colombia	1970	2,160	1,000	6,400
Iran	1969/70	3,330	2,275	9,940
Panama	1969	1,790	930	3,000

Sources: Panama, Honduras, Philippines: A.I.D. Syncrisis, The Dynamics of Health, Vol. I, II, IV, U.S. Dept. of H.E.W.
Pakistan, Iran: John Z. Bowers, Lord Rosenheim, Migration of Medical Manpower, (Josiah Macy Foundation), p. 26, 86.
Colombia: Economic Growth of Colombia, Vol. IX, IBRD), p. 3.
Kenya: Mark Wheeler, "Medical Manpower in Kenya," East African Medical Journal, Vol. 46, No. 2.

Appendix Table 17: Distribution of Medical Doctors Between the Capital and the Rest of the Country, 1968

Country	Nationwide Population/ Medical Doctors	Capital City Population/ Medical Doctors	Capital City % Medical Doctors	Capital City % Population	Rest of Country Population/ Medical Doctors	Rest of Country % Medical Doctors	Rest of Country % Population
Haiti	14,700	1,350	50	6	33,300	50	94
Kenya	10,999	672	54	5	25,600	46	95
Thailand	7,000	800	60	8	25,000	40	92
Senagal	19,100	4,270	63	15	44,300	37	85
Ghana a/	18,000	4,340	62	15	41,360	38	85
Tunisia	6,486	2,912	48	18	10,056	52	82
Colombia a/	2,220	1,000	74	31	6,400	26	69
Guatemala	4,860	875	82	16	22,600	18	84
Iran	3,750	906	47	11	6,220	53	89
Lebanon	1,470	650	76	40	3,000	24	60
Jamaica	2,280	840	70	26	5,510	30	74
Panama	1,850	760	70	25	4,400	30	75

Source: Panama, Colombia, Guatemala, Haiti: PAHO - Scientific Pub. No. 207, 1970.
Jamaica, Senegal, Thailand, Iran: John Bryant, Health and The Developing World.
Ghana, M. J. Sharpston, "Uneven Distribution of Medical Care: A Ghanaian Case Study." Journal of Development Studies.
Tunisia: (Unpublished data of La Ministerie de La Sante Publique, Tunisie)
Kenya: Mark Wheeler, "Medical Manpower in Kenya: A Projection and Some of its Implications." East African Medical Journal, Vol. 46, No.2
Lebanon: A. B. Zahlan, "Migration Patterns of the Graduates of the American University of Beirut, in The Committee on the International Migration of Talent, The International Migration of High-Level Manpower, (New York, Praeger, 1970), P. 293

a/ Major Urban Centers used instead of Capital City.

Appendix Table 18: Emigration of M.D.s to the Developed World

Country	Years	M.D.s Emigrating Each Year (as % of Total Graduating)	Permanent Loss Each Year (as % of Total M.D.s)
India	1961-1964	18% /a	7% /a
Thailand	1968	67 /b	4 /c
Philippines	1962-1967	20 /d	13 /e
Turkey	1964	22 /f	17 /g
Latin America/h (Total of below)	1965-1968	5 /i	...
Central America		25	...
Haiti		20	...
Colombia		14	...
Guatemala		8	...
Dominican Republic		16	...
Nicaragua		18	...
Brazil		1	...
Peru		2	...
Mexico		5	...
Jamaica			...
Chile		10	...
Argentina		3	...

Sources: India: Tobert J. Domrese, "The Migration of Talent from India," in The Committee on the International Migration of Talent, The International Migration of High-Level Manpower, (New York, Praeger, 1970), p. 223.
Thailand (1): Heather Low Ruth, "Thailand," in Ibid., p. 111
(2): John Z. Bowers and Lord Rosenheim, Migration of Medical Manpower, (Josiah Macy Foundation)
Philipppines: Ruth, "The Philippines," in The Committee on the International Migration of Talent, op. cit., p. 63.
Turkey: Peter Goswyn Franck, "Brain Drain from Turkey," in Ibid., p. 305.
Latin America: Charles V. Kidd, "Migration of Highly Trained Professionals from Latin America to the United States," in Ibid., p. 489.

Appendix Table 18: continued

a/ Data from table in source entitled, "Production of Indian University Graduates and Migration Abroad, Annual Flow, 1967;" of 5,500 M.B.B.S. degree recipients graduating each year (1961 through 1964) 1,000 "migrated" (18%) and 400 were "permanent loss" (7%).

b/ An estimate: "Of the two-thirds of the medical graduates who are expected to leave for study abroad immediately after internship, the average length of stay overseas will probably be five years." - quoted from Thailand source (1). Thailand source (2) reported that in 1965 50% of the graduating class emigrated to the U.S. and that the cumulative average emigration rate of medical graduates then was 20%.

c/ This figure calculated using 67% figure in b/ on the basis of statement in source: "Thai students have maintained a very high rate of return in the past (more than 95% from available statistics) and continuation of these high rates of return is reflected in the stated intentions of current students planning foreign study."

d/ Average percentage of graduating M.D.s emigrating to the U.S., 1962-1967.

e/ "The estimated 13% of total registered Filipino pysicians "permanently" practicing abroad is a relatively small number when compared with the 10,000 or 53%, who are not practicing medicine at all, but who have dropped from the labor force or have switched to other - primarily lower-level - occupations for lack of securing satisfactory employment in the medical profession." - quoted from source.

f/ "Of about 7,400 Turkish doctors asked....in 1964 whether they had any plans to go abroad, 1,600, or 22%, answered in the affirmative, and nearly half of these had chosen Germany has the country of destination. Twenty per cent had picked the United States." - quoted from source.

g/ "Based on a 10% random sample questionnaire collected from the 7,125 living graduates of Turkish medical schools, the Johns Hopkins team estimated that the cumulative total of emigre doctors was 2,248 as of 1964, or 18% of all known graduates...The Johns Hopkins team puts the current (mid-1060s) loss ratio at 17%." - quoted from source.

h/ Some 80% of all Latin American M.D.s are produced by six countries - Argentina, Brazil, Colombia, Cuba, Mexico, and Venezuela - and 67% are produced by Argentina, Brazil, and Mexico alone.

i/ With Cuban data included, this becomes 8%. Of those M.D.s who are potential scientists and teachers, an estimated 25% are lost annually by migration to the U.S.

Appendix Table 19: Comparative Costs of Medical Education, 1965
(in $)

Country	Per MD Graduated /b	Per Medical Assistant	Per Nurse Graduated	Per Auxiliary Nurse	Per Health Assistant	Per Auxiliary Sanitarian
Senegal	84,000		$ 835			
Jamaica	24,000		1,385			
Guatemala	19,200		2,700			
Thailand	6,600		1,200		700	350
Kenya	22-28,000	1,280	3,380	890 a/	750 a/	1,680 a/
Pakistan	12,600		2,960			
Colombia	29,000		3,000	1,000		
U.S.A.	19,630					

Sources: John Bryant, Health and The Developing World.
N.R.E. Fendall, "The Medical Assistant in Africa", Journal of Tropical Medicine and Hygiene, Vol. 71, No. 4 (April 1968), p. 92.

Notes:
a/ East Africa.
b/ Obtained by dividing total recurrent costs assignable to medical education by number of students graduating.

APPENDIX TABLE 20

HEALTH MANPOWER IN DEVELOPING COUNTRIES

Number of medical professionals, paraprofessionals, and technical personnel in the health sector in 91 countries

Year	Country	1 Physicians	2 Med. Assist.	3 Dentists	4 Dent. Assist.	5 Nurses Midwives	6 Emp. Trained Rural Asst. Midwives	7 Nurses	8 Auxl. Asst. Nurses	9 Pharmacists	10 Asst. Pharm.	11 Veterinaries	12 Asst. Vets.	13 San. Eng.	14 Sanitarians	15 Aux. San.	16 Physiotherapists	17 Lab. Tech.	18 Aux. Lab.	19 X-ray Tech.	20 Other Pro. Pers.	21 Other Para.	22 Health Aides	Population Mid-1970 (000)
1970	Rwanda	62	115	2		71	204	182	237			1	66		2	8	1		32	1			94	3,596
1970	Burundi	60	158	5		25	69	111	336	5		12	61	1	8					2			49	3,544
1970	Mali	121		5	6	115		1,300	584	11				2	8			23		17				5,018
1970	Upper Volta	58	1	2		47		129	1,444	13	19	20	29	1				1	24	10			13	5,384
1969	Bangladesh	7,893 /R		13 /R		557 /R	109 /R	724 /R		149 /R													142	70,500
1970	Somalia	132	62			110		757		13								59	51	97	20	238		2,828
1969	Afghanistan	808		4	162	125	51	475	96	22	372	18	234	4	3	220		230		64			551	14,300
1970	Ethiopia	336	166	12		827		215	3,016	49	37	49	135		191			390	52	137	71	14,939		24,625
1970	Indonesia	4,383		544		4,490	1,027	5,243	9,894	319	1,099				492	735	19	209 /G	256 /G	121 /G	31 /G	499 /G	5,776	115,567
1970	Burma	3,073	1,037 /G	49 /G	42 /G	3,816 /G	12 /G	3,660 /G		18 /G	784 /G			2 /G			41 /G						2,133 /G	27,584
1970	Chad	59		2		11	81	110	613	3					8	7		5 /G	7 /G	2		69	28	3,640
1970	Nepal	221 /G	86 /G	8 /G		148 /G		161 /G							9 /G			4		1 /G		9 /G	701 /G	11,060
1970	Malawi	59	461	3	10	40	154	52	224	15		14	268				3			3			204	4,440
1970	Zaire	718	136	21	3	300	1,361	1,635	7,795	111				5	233			67	11	5		40	575	18,800
1969	Guinea	77		10		214	81	437	1,391	8		18	35	2	27		6							3,980
1970	Niger	69		4	3	30		110	461	10				1			1	11		6			29	4,020
1968	Sri Lanka	3,242	1,251 /G	194		3,804		4,382		1,314								394 /G				119 /G		12,514
1970	Dahomey	93		6		192		227	698	24		10		2			4	2					34	2,708
1970	Tanzania	641	746	53	9	807		192	2,246	51	107	90	680	5			11	66	123				7,800	13,270
1970	India	112,000		9,000		39,000		66,000																538,129
1969	Haiti	361		96		48	11	420	937	50	7			7	122		4	78	23	32			182	4,867
1970	Sudan	985	631	60		2,152		8,052								269							972	15,695
1970	Laos	179		7		22	381	1	653	8	18	21	179				2	1	19	11				2,962
1970	Khmer Republic	427		51		376	1,042	2,248	660	81				1	470			42			5			7,485
1970	Uganda	1,065 /R	368	49	13	460	670		761	47	28	65	293				15	42	66		44	57	316	9,814
1970	Pakistan	14,061 /R		377 /R		616 /R	2,642 /R	4,543 /R		870 /R	5,476 /R												2,707	60,870
1976	Nigeria	2,683 /R		95 /R		14,367 /R			13,046 /R			137 /R												55,070
1970	Malagasy Republic	231	436	38	36	723		2,023		82					19	127	2	10		6	2	90		7,310
1970	Togo	70		3		111		204	265	6				3		84		14				8	108	1,956
1970	Central African Rep.	42	3	1	2	26	67	160	997	4	2	1	135		1		1	1	5	4			301	1,552
1970	Kenya	1,437		87		3,347		7,634		170														
1970	Mauritania	68		5	2	17		84	187	7	1	6	26					8	10	4				11,250
1970	Bolivia	2,143		903		45	40	542	1,264	1,600		250		1	74					9		1	178	1,170
1970	Cameroon	225		10		84		1,082	1,281	61		14		2				8	19	12	12			4,931
1959	Liberia	110		14		104	126	237	247									35		11	128		14	5,836
1970	Sierra Leone	149		12	3	113	163	457	251	7	158	6	36		31		6	10	260	11			73	1,520
1970	Thailand	4,313	106	389	159	5,699	4,275	1,389	3,782	1,155	164	67		71	309	3,991	52	417	741	146	143	4	1,293	2,555
1970	Egypt	17,419		2,188		2,326	13,347	3,872	16,489	5,921		2,314					92					373	11,221	36,218
1970	Vietnam	1,992	238	221		1,134	2,415	1,829	3,289	1,770	306	83			620 /G			262 /G	212					33,329
1970	Philippines	4,051 /G		626 /G	342 /G	2,761 /G		4,522 /G	2,319 /G	378 /G		149 /G		79 /G				649 /G		147 /G	168		3,175 /G	18,332
1970	Senegal	263		24	3	255	43	486	1,774	64	10			2			2	9	67	27			1,918	36,850
1970	Ghana	667	229	41	14	2,808		7,345	739	377	195	20	126		789	182	14	172	180	82	41			
1970	Jordan	609		84	33	179	420	193	1,363	171	292	3		3		576	3	24	137	69				3,870
1970	Morocco	1,170		162						373						85								8,640
1970	Congo	19		1		6		66	234	2		1						3						2,317
1970	Paraguay	1,023		186		239		260	1,016	31														15,495
1969	Mozambique	498				83	206	752	789	23 /G	40 /G	8 /G		1	77			68		38	14			1,090
1970	Korea, Republic of	14,404 /R	3,252	2,017 /R	105 /R	6,182 /R		14,506 /R	3,541 /R	14,648 /R		2,147 /R			237 /R		144 /R	1,119 /G		678 /R				2,379
1970	Syrian Arab Republic	1,623		376		566	338	883	518	857								140		48	13			7,729
1970	Honduras	696 /R		158 /R			116	282	2,048	7		38		9	74									31,793
1970	Ecuador	2,080		253		105		601	3,110						161			186						6,098
1970	Rhodesia	833	1,153	126	15	1,552	209	3,900	934	310							46	48		32	2	52	453	2,520
1970	Tunisia	864		73		203		3,299	3,748	158		42					23		12		21			6,093
1970	Papua New Guinea	208	184	24	54	274		1,020	323	31	19						7	8		61	14			5,310
1970	El Salvador	875		388				1,033	2,650	66		30		19	176			160						5,075
1970	Ivory Coast	355		36		189		1,736		91		25												2,420
1970	Turkey	15,856		3,245		11,321		4,688	14,062	3,011					21			100	83	103				3,534
1969	Algeria	1,698	99	222		378	159	1,512	3,362	265	72				295		19	103	638	247		139	37	4,941
1970	Iraq	2,890	1,193	379	94	139	1,486	1,093	3,114	855	278			5	1,446									35,230
1970	Colombia	9,468		2,743			8,663	2,115	17,633	1,200														14,330
1970	Angola	650				90	121	1,882	1,179	90	110	3						9	68					9,678
1970	Mongolia	2,172	2,125	87	93	383		4,220		148	700			1	58	591		541		186		49		21,632
1969	Zambia	307	937	29				754	665	69	50			1			22	50	34	22				5,501
1970	Guatemala	1,435		292				749	3,497	195		126		43	152			142		43	50		1,008	1,280
1970	Malaysia	2,518	159	412	342	852	3,509	5,675	2,797	194	367	18	39	1			26	61	229	143	9	276	1,805	4,136
1970	Dominican Republic	1,935		479		1	124	327	709					20	256			738	954	216	251	2,330	1,416	5,190
1969	China, Republic of	4,353		620	179	1,889		1,349		839	194				288			145		40	19			10,945
1970	Iran	8,693	67	1,630	960	1,571	609	2,888	5,974	3,166	741	1,002	422	72	73	1,038	82	2,629		2,382	828			4,068
1970	Nicaragua	961 /R		203				407	2,151	246		43		14	185									14,035
1969	Brazil	47,250		26,611		1,992		6,000	17,101	14,026		2,960												28,662
1969	Peru	6,870		2,167		994		4,110	13,200	2,161					190 /G			426 /G		236 /G				1,984
1967	Albania	1,157	600	144	323	1,037		3,608		221	334	2			1	25		315		111				92,764
1968	Cuba	7,000						4,373	7,650															13,586
1970	Saudi Arabia	770 /G				672 /G		1,385 /G		50 /G	447 /G							184 /G		98 /G				2,170
1970	Costa Rica	1,067		225				1,030	14,236	462		46		22	109			163			21			8,390
1970	Lebanon	1,900		510	117	416		1,440	800	612				6	21			38		20				7,360
1970	Mexico	33,981		5,101				8,997	22,211								9 /G	69 /G		41 /G		43		1,727
1970	Jamaica	710		91				1,088/G															2,726	
1970	Portugal	8,156		67	601	632	440	4,520	4,408	2,641	3,930	378											86 /G	50,670
1970	Yugoslavia	20,369		3,041	1,634	2,950	1,941	26,731	23,396	3,627	2,816	4,077	2,422				1,156	534	4,146	1,065	114	4,850	521	1,888
1970	Romania	24,000		4,000				812		4,684														9,635
1970	Uruguay	3,070		1,120				1,666 /G																20,540
1970	Chile	4,401		1,140		1,000 /G			13,768 /G	321 /G							174 /G	352 /G		1,179	397		651	20,253
1970	South Africa	10,912		1,594						3,984	270	704	963				1,191	868		48 /G	700	455	1,000	2,686
1970	Panama	924		158		172		1,012	1,671	60		16 /G		24 /G	130 /G		3 /G	148 /G			30 /G			9,780
1970	Bulgaria	15,819	4,994	3,111	1,252	5,389		25,265		2,382	3,399						732	3,696	855					22,160
1970	Hong Kong	2,176		486	120	2,661 /R	629	5,057	171	174	128	15 /G		13 /G	120 /G		51 /G	82 /G	18 /G	89 /G	21 /G		223	1,464
1968	Trinidad and Tobago	441		62		2,578				287		720	60	252 /G	458 /G		12	74 /G		12 /G	5 /G		438	8,490
1970	Venezuela	9,471	357	2,205				5,991	13,771	1,268		25		60	260	170	92							3,960
1970	Singapore	1,363		198	143 /G	3,130		3,083	1,383	245 /R	130 /G							512		134	311			1,027
1970	Israel	7,281		1,444		514		5,067	5,966	1,705	639						548	1,116						10,399
																								2,075
																								2,910

NOTES: APPENDIX TABLE 20

The information given in this table was obtained by WHO by means of questionnaires sent to the national public health administrations or from national annual reports.

The questionnaire was concerned not only with the chief medical and allied professions practised by fully qualified personnel - physicians, dentists, nurses, pharmacists, etc. - but also with "intermediate level" auxiliary personnel who have restricted functions within the various branches of the health organizagion - medicine, dentistry, nursing, pharmacy, etc. - and with aides. The level of general education and professional training received by these auxiliaries and the responsibilities entrusted to them vary from country to country. Although there are no internationally accepted terms for designating the different health professions in accordance with standard definitions, information was requested in the questionnaire for the following categories:

Occupation and level of education	Personnel to be included in the data
1. **Physicians** High (university) level	All graduates of a medical school or faculty actually working in your country in any medical field (practice, teaching, administration, research, laboratory, etc.)
2. **Medical assistants** Intermediate level	Health personnel performing duties ranging from simple curative procedures for common diseases to wider activities that may include a variety of diagnostic, curative, and preventive practices. These personnel have no medical education of university level or equivalent.
3. **Dentists/Dental surgeons** High (university) level	All graduates of a dental school (or faculty of odontology or stomatology) employed in dentistry in your country in any capacity.
4. **Dental assistants (operating dental auxiliaries)** Intermediate level	Personnel performing limited diagnostic, preventive, and curative services in dentistry. These personnel have usually not completed dental studies at university level or equivalent.
5. **Professional midwives** High level	All graduates of a midwifery school practising midwifery in your country privately, in maternity departments, or in other institutions.

Notes Appendix Table 20

Occupation and level of education	Personnel to be included in the data
6. Assistant midwives/Auxiliary midwives Intermediate level	Personnel authorized to perform certain midwifery duties, in principle under the supervision of a professional midwife. These personnel do not have the full training and theoretical knowledge of a professional midwife.
7. Professional nurses High level	All graduates of a nursing school practising in your country either as private nurses or in general and specialized nursing services (paediatrics, mental health, public health, health education, occupational health, etc.)
8. Assistant nurses/Auxiliary nurses Intermediate level	Personnel authorized to perform certain nursing duties, in principle under the supervision of a professional nurse. These personnel do not have the full training and theoretical knowledge of a professional nurse.
9. Pharmacists/Chemists High (university) level	All graduates of a faculty or school of pharmacy practising in your country in pharmacies, hospitals, laboratories, industry, etc.
10. Pharmaceutical assistants Intermediate level	Personnel in pharmacies, hospitals, or dispensaries who help to prepare and dispense medicaments, under the supervision of a pharmacist. These personnel have not studied pharmacy at university level or equivalent.
11. Veterinarians/Veterinary surgeons High (university) level	All graduates of a veterinary medicine faculty or school practising in your country in any branch of veterinary medicine, including teaching, public health, etc.
12. Veterinary assistants Intermediate level	Personnel authorized to provide limited diagnostic, preventive, and curative veterinary services. These personnel have not studied veterinary medicine at university level.
13. Sanitary engineers High (university) level	Professionally qualified civil engineers specialized in the design, construction, operation, maintenance, and repair of sanitary installations and equipment.
14. Sanitarians High level	Professional personnel (other than physicians) concerned with the surveillance of environmental hygiene, promoting measures to restore or improve it (food inspection, inspection of public premises, etc.), and supervising the implementation of these measures.

Notes Appendix Table 20

Occupation and level of education	Personnel to be included in the data
15. **Auxiliary sanitarians** Intermediate level	Personnel performing to a limited extent the functions of a professional sanitarian but who do not have the full training and theoretical knowledge of the professional.
16. **Physiotherapists/Physical therapists**	Professional personnel treating patients by exercise, physical agents, and massage.
17. **Medical laboratory technicians** High level	Professional technical laboratory personnel working under the direction of a scientific or medical specialist.
18. **Auxiliary technical laboratory personnel** Intermediate level	Auxiliary technical laboratory personnel working under the supervision of a professional laboratory technologist or technician. These auxiliary personnel do not have the full training and theoretical knowledge of the professional.
19. **X-ray technicians**	Qualified personnel operating the equipment of the radiological departments under the supervision of a physician.
20. **Other scientific or professional personnel** Examples: "Biochemists" "Physicists" "Entomologists" "Health statisticians" "Health educators" "Psychologists"	University-qualified scientific or professional personnel working in the health field, but not classifiable under previous categories (e.g., non-medical scientists).
21. **Other paramedical technical personnel** Examples: "Cardiology technicians" "Dental laboratory technicians" "Medical records officers"	Technical personnel not classifiable under previous categories.
22. **Health aides** Aid or single-skill level Examples: "Vaccinators" "Non-operating dental auxiliaries" "Traditional birth attendants" "Nursing aides" "Laboratory aides"	Personnel who may have received no more than a few years of primary general education and an elementary training (or have learned to carry out one particular simple technique) and who work in one of the various health fields: medicine, dentistry, nursing and midwifery, pharmacy, laboratory work, sanitation, etc.

Notes Appendix Table 20

Sources:

World Health Organization, World Health Statistics Annual, 1970, Volume III, Health Personnel and Hospital Establishments, Table 1, "Health Personnel, Medical and Allied Personnel by Country", (Geneva, WHO, 1974), pp. 1-40.

World Health Organization, World Health Statistics Report, Volume 26, No. 3, Table 2, "Health Personnel", (Geneva, WHO, 1973), pp. 136-145.

National administrations have endeavored to fit their own data into this framework; nevertheless, the various categories of personnel listed in national statistics are not all classified on strict principles. The most notable exceptions to the uniformity of classifications in this table are noted below.

G = Personnel in government service only.
H = Hospital personnel only.
R = Registered personnel only, not all working in country.
X = Coverage of data unknown.

Appendix Table 21: Medical, Paramedical and Auxiliary Manpower Per 10,000 of Population

Manpower Category	Sri Lanka Number in 1969	Sri Lanka 1969	Philippines (rural areas) 1971	Colombia 1965,67	Tunisia 1969	Bolivia 1968	Chile 1968	Haiti 1971	Kenya 1967	India 1965
Medical Doctors	3,569	2.9	1.0	4.5	3.4	2.9	5.8	.68	.95	2.13
Ayurvedic Practitioners	19,186	15.6								
Paramedical Personnel										
1. Professional										
a) Nurses	5,521	4.5	.448	.82	5.22			.847	.58	1.09
b) Dental Nurses	236	.2		1.0						
c) Midwives	3,349	2.7	.637		.38				.31	1.25
d) Dentists	275	.2		2.1	.092	1.5	3.3	.21	.04	.126
e) Pharmacists	248	.2		.8	.29			.22	.115	1.48
f) Laboratory Technician	445	.4							.05	
2. Auxilliaries										
a) Public Health Inspector	1,042	.9	.538							.058
b) Apothecaries	823	.7							.07	
c) Medical Assistants	1,226	1.0							.78	
d) Nurse Attendant	5,933	4.8		8.92	6.95			.35	1.15	.232

Sources: Colombia: Economic Growth of Colombia, Vol. IX (IBRD).
Sri Lanka: International Labor Organization, Matching Employment Opportunities and Expectations, Vol. II
Kenya: Development Plan for Kenya, (Health Sector), 1968/69-1973/74, (inpublished).
India: Health Statistics of India, 1965.
Haiti, Philippines: AID Syncrisis: The Dynamics of Health, Vol. IV, VI.
Tunisia: Annuaire Statistique, 1969.
Bolivia, Chile: Syncrisis: The Dynamics of Health, Vol. II.

Appendix Table 22: HEALTH COVERAGE

PERCENTAGE OF DELIVERIES IN VARIOUS COUNTRIES ATTENDED BY A PHYSICIAN OR BY A QUALIFIRED MIDWIFE (IN A HOSPITAL OR AT HOME)

Country	Year	In Hospital	At Home	In Hospital or at Home
Sri Lanka	1972	75.0% /b	20.0% /b	95.0% /b
Sudan	1971	...	...	10.0% /a
Madagascar	1971	...	...	71.1 /b
Bolivia	1971	5.5 /c	12.8 /c	18.3 /c
Thailand	1971	19.2 /c	...	...
Viet-Nam, Republic of	1972	80.3 /b	0.7 /b	81.0 /b
Paraguay	1972	...	...	55.4 /b
El Salvador	1972	26.0 /b	...	...
Iraq	1971	6.5 /c	21.7 /c	28.2 /c
Guatemala	1970	...	...	25.0 /a
Dominican Republic	1972	40.2 /c	...	...
Peru	1971	15.2/c	...	...
Panama	1972	...	...	69.2 /b
Venezuela	1972	61.5/a	/d	61.5 /a
Singapore	1972	80.0 /b	8.2 /b	88.2 /b
Poland	1972	...	...	99.9 /b
Libyan Arab Republic	1972	48.8/a	3.7 /a	52.5 /b
Israel	1972	...	...	98.3 /b
France	1971	97.0 /b	3.0 /b	100.0 /b

Source: World Health Organization, The Fifth Report on the World Health Situation, 1969-1972, Part II, Review by Country and Territory, Geneva, WHO, 1974.

a/ Percent figure calculated by dividing number of deliveries (given in source) by total number of live births (given in source)

b/ Percent figure given in source.

c/ Percent figure calculated by dividing number of deliveries (given in source) by IBRD estimates of total number of live births.

d/ Only 141 deliveries out of 412,435 live births.

NB Data not available.

NOTE: Those percentage figures that have been calculated from the total number of live births may overestimate the actual figure by one or two points.

APPENDIX TABLE 23

HEALTH COVERAGE

UTILIZATION OF MATERNAL AND CHILD HEALTH CARE SERVICES BY PREGNANT WOMEN, INFANTS, AND CHILDREN:
Number attending MCH Centers or receiving domiciliary care as a percentage of total population group eligible

Country	Year	PREGNANT WOMEN			INFANTS UNDER 1 YEAR OLD			CHILDREN AGED 1 to 5 YEARS OLD		
		Number cared for	Live Births	Per Cent Cared for /h	Number cared for	Total /c in pop.	Per Cent /h Cared for	Number cared for	Total /c in pop.	Per Cent Cared for
Upper Volta	72	a 37,085	267,000	13.8	a 173,930			a 1,874		
Sri Lanka	72	a 154,528)			a 328,322			a 463,823)		
		b 228,211)	386,000	99.1 /h	b 140,036	369,000	126.9 /h	b 111,415)	1,444,000	39.8
Sudan	71	a 89,516	779,000	11.5	. . . .	. . .	. . .	a 331,899 /e	296,300	11.2
Laos	72	a 14,941	126,000	11.9	. . . .	. . .	. . .	a 32,972 /e	508,000	6.5
Khmer Republic	71	a 69,180	319,000	21.7	a 39,468	289,000	13.7	a 80,096 e	1,045,000	7.7
Madagascar	71/72	a 246,440	353,000	69.8	a 354,809	311,000	114.1 /h	a 425,809	1,017,000	41.9
Bolivia	71	a 45,845	220,000	20.8	a 49,831	196,000	25.4	a 63,014	648,000	9.7
Liberia	72	a 19,305	79,000	24.4	a 9,408			a 6,671		
Thailand	71	a 364,951)			a 211,428)	1,448,000		a 325,770	5,146,000	6.3
		b 462,308)		53.0	b 644,117)		59.1			
Viet-Nam, Republic of	72	a 382,815)			a 62,540)			a 39,976	2,170,000	18.4
		b 17,199)	583,000	68.7	b 13,268)	558,000	13.6			
Paraguay	72	a 56,397	114,000	49.5	a 42,724)			a 58,938	367,000	16.1
					b 1,936)	104,000	42.9			
Tunisia	71	a 53,563	216,000	24.8	a 313,160)	195,000	160.5 /h	a 446,995	717,000	62.3
El Salvador	72	a 43,811)			a 100,883)			a 210,227) /e	397,000	56.9
		b 550)			b 11,908)	135,000	83.5	b 15,700)		
Columbia	72	a 137,081)			a 158,732)			a 15,450 /e	2,455,000	0.6
		b 15,539)	995,000	15.3	b 16,039)	908,000	19.2			
Mongolia	72	a 76,309)	54,000	211.8 /h	a 54,379)					
		b 38,100)			b 30,700)					
Guatemala	72	a 45,639	255,000	17.9	. . . .	. . . .	....	a 52,279 /d	981,000	5.3
Dominican Republic	72	a 77,327)	208,000	39.2	a 90,803)			a 195,352	532,000	30.9
		b 4,150)			b 25,870)	187,000	62.4			
Peru	71	a 123,452	575,000	23.5	a 243,119)			a 269,686)		
		b 11,924)			b 23,360)	531,000	50.2	b 31,899)	1,863,000	16.2
Panama	72	a 28,496			a 8,183	51,000	16.0	a 5,048	204,000	2.5
		b 4,143)	54,000	60.4						
Venezuela	72	a 69,629)						a 88,103) /g		
		b 37,440)	434,000	24.7	b 115,780 /f	788,000	14.7	b 59,879) /g	1,451,000	10.2

Table continued -------

APPENDIX TABLE 23 (contd.)

HEALTH COVERAGE

UTILIZATION OF MATERNAL AND CHILD HEALTH CARE CENTERS BY PREGNANT WOMEN, INFANTS, AND CHILDREN:
Number attending MCH Centers or receiving domiciliary care as a percentage of tatal population group eligible

Source: World Health Organization, The Fifth Report on the World Health Situation, 1969-1972, Part II, Review by Country and Territory, Geneva, WHO, 1974.

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c/ IBRD estimates for respective year.
d/ Includes infants under 1 year and children 1 to 5 years old.
e/ Includes only children 1 to 4 years old.
f/ Includes all infants under 2 years old.
g/ Includes children 2 to 6 years old.
a = number attending maternal or child health care centers.
b = number receiving domiciliary visits.
h/ While the Text of The Fifth Report, in giving the absolute numbers, clearly implies they are counts of individuals, it is likely they represent numbers of visits and thus a double-counting, to some degree, of individuals.

Appendix Table 24: Medical Care from Official Sources in Some Developing Countries in 1962

Country	Population (millions)	Hospital Admissions	Outpatient Attendances at Hospitals, Health Centers, & Dispensaries (millions)	Average Visits Per Person Per Year
Jamica	1.8	68,828	1.1	0.6
Guatemala	3.8	136,154	0.9	0.2
Senegal	3.1	65,673	7.8	2.5
Thailand	28.0	541.000	17.5	0.6
Kenya	9.3	146,740	5.2[a/]	0.5
Tanzania	10.0	231,598	26.0	2.6
Uganda	7.2	172,279	9.6	1.4

Source: N.R.E. Fendall, "Primary Medical Care in Developing Countries," International Journal of Health Services, Vol. 2, No.2, 1972.

a/ Estimate - probably low.