

**INTRODUCTORY SEMINAR
ON ISSUES ON
INTERNATIONAL HEALTH**

by Dr. Richard A. Cash (Harvard University)

MAR. 28 – MAY. 23, 1990 Tokyo

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ON ISSUES ON
INTERNATIONAL HEALTH**



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INTERNATIONAL HEALTH**



Dr. Richard A. Cash

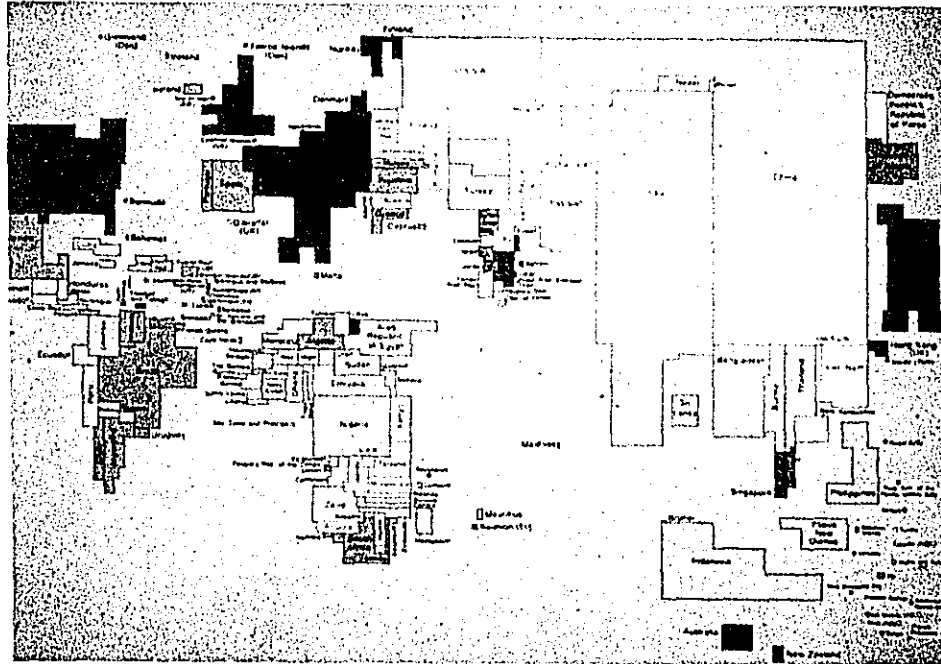


Fig. 1 World Map by Population Size

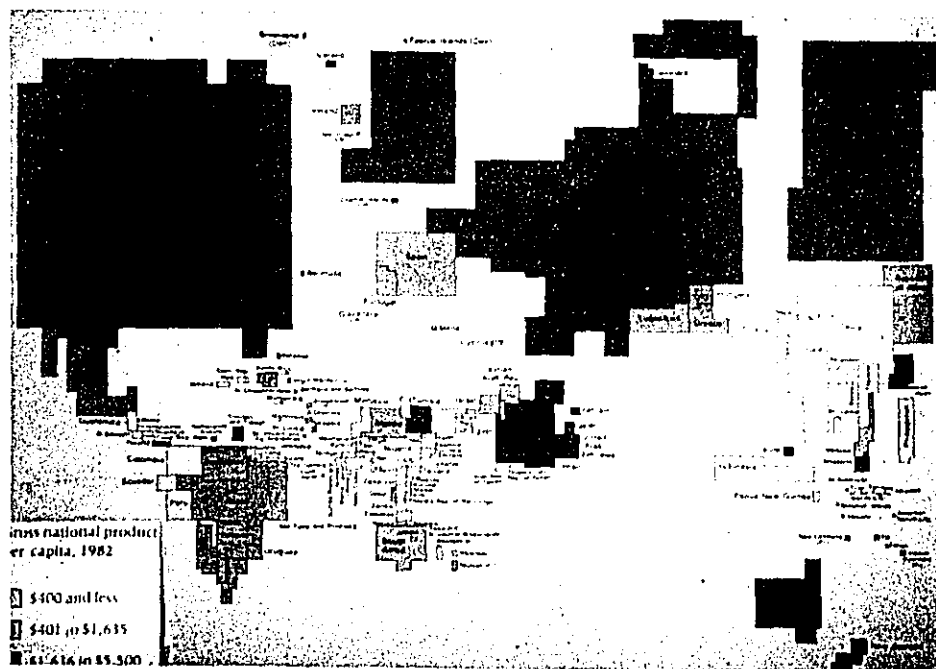


Fig. 2 World Map by Wealth

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Introduction to Lectures

This summarizes a series of ten lectures on issues in international health that were presented by Dr. Richard A. Cash at the Institute for International Cooperation in the spring of 1990. The lectures are not meant to be studies in great depth, but rather were designed to point out some of the important issues that must be addressed now and in the future. Additional readings are suggested for each topic for those who wish to explore these areas in greater detail.

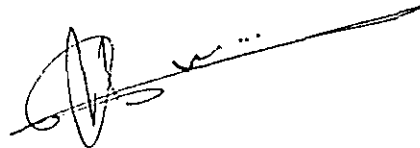
Dr. Richard Cash is a Fellow with the Harvard Institute for International Development of Harvard University, and the co-director of the education program of the Department of International Health and Population at the Harvard School of Public Health. A physician who has specialized in infectious diseases and public health, he has been working in international health for over 20 years. His career in international health began in Bangladesh (then East Pakistan) in 1967, at the Cholera Research Laboratory (CRL). While at the CRL he conducted research on diarrhea, being principally involved in the development of oral rehydration therapy (ORT) for the treatment of diarrheal disease. He has consulted on a variety of international health issues, (especially as they relate to diarrheal disease control programs) in many countries of the world, but more so in Asia, having worked in India, Nepal, Pakistan, Sri Lanka, Indonesia, Bangladesh, and the Philippines. Besides his work in diarrheal diseases, he has examined nutritional problems (especially vitamin A deficiency), health planning, the impact of economic development on health, and issues related to the AIDS pandemic. He believes that the control of many diseases and the improvement in the health of society, requires an interdisciplinary approach, bringing together health professionals, economists, anthropologists, engineers and others to understand and help correct the problem.

I hope this report would be useful in implementing the international health cooperation.

Finally, I am thankful to Dr. Cash and the participants to this

INTRODUCTION TO LECTURES

seminar, in particular, Dr. Tokiko Sato (JICA development specialist) who was the seminar leader.

A handwritten signature in black ink, consisting of a large, stylized initial 'A' followed by a long, sweeping horizontal line that ends in a small flourish.

Akira KASAI
Managing Director,
Institute for International Cooperation,
JICA.

LECTURE

Lecture 1: What is International Health?

What then is international health? For the purposes of these lectures and discussions I will define it as the study of health problems in developing countries—that is generally low and low-middle income countries. These countries are found in Asia, Africa, the Middle East, and Latin America. We may, however, find health problems that are thought to be typical only of developing countries in societies with much higher incomes (this is certainly true in some countries that have seen a sudden increase in oil resources).

Our perspective of the world differs greatly depending on from where we observe it from. If the land mass of the world is depicted by where people live – 93% of the world would be in developing countries. If it was depicted by who has the most wealth – 20% of the land would lie in the western countries and in Japan. Much of the world's resources are not where most of the world's population live. There is great disparity; there is great poverty. One finding that is a constant is that poverty and poor health go together.

Let me demonstrate some examples of relationship between this lack of resources and poor health. Good quality drinking water and adequate sanitation are major deficiencies in many parts of Asia, Africa, and Latin America. On the banks of a river in Bangladesh, a country where diarrhea is a major public health problem. Dishes and clothes are being washed, buffaloes wade through the water, and a young boy collects drinking water; further upstream latrines are perched on the edge of the river bank. It is no wonder that diarrhea is a problem. To purify and pump the drinking water to a house is expensive, and it is not easy to change people's habits. Malnutrition, and frequent but preventable or easily treatable infections in children are other problems.

Modernization, of course, is not always a good thing. In many countries where some groups have experienced a sudden increase in income, bottle feeding of infants has increased. Not only does bottle feeding deprive

LECTURE I

the child of the immunoglobulin found in breast milk but the water used to prepare the formula is often contaminated, increasing exposure to bacterial pathogens. The cost of the formula often leads the mother to reduce its nutritional content, by diluting the formula with more water.

Many of the health problems that affect developing countries are related to civil disorder brought by corrupt or unstable governments. Mortality of civilians is generally higher than it is for soldiers. For example, during the Bangladesh war for independence it is estimated that there was an excess of over 3 million civilian deaths. People were displaced from their homes and fled to India, many dying en route (especially young children and the elderly). They lived in refugee camps where severe crowding and poor sanitation facilitated the spread of disease. For those who remained in Bangladesh, there were often shortages of food because crops remained untended or food did not move between markets.

Common Characteristics of Developing Countries

There are characteristics common to many countries but it is the diversity that is much more apparent. What are some of these common characteristics? Low levels of productivity, low education levels (especially among girls), high population growth, high levels of unemployment or under employment, dependence on agricultural products, and minimal influence on international events are but a few commonalities. But then China has a population growth rate of 1.3% while Kenya's is over 3.4% (giving it a doubling time of less than 17 years). The greatest discrepancies occur in the area of education and literacy. Among the developed countries literacy is 90% or higher while some of the developing countries have achieved similar results (eg Sri Lanka and Kerala State in India); many developing countries overall literacy may be less than 30%, with female literacy less than 10%. Though wealth is generally positively correlated with life expectancy, this is not always the case. Saudi Arabia, whose per capita income is over \$6,000, has a life expectancy of 63 years, whereas China has a life expectancy of 69 years but a per capita income that is 20 times less.

LECTURE 1

(1988 World Bank data).

Diseases Patterns in Developing Countries

The diseases prevalent in developing countries are *very much* influenced by the age structure of the population and the geographic location. Knowledge of the infant mortality rate (IMR) can help one predict the disease patterns. In countries with a high IMR (above 100) one can be assured that diarrheal diseases, respiratory diseases (tuberculosis, pertussis, pneumonia), neonatal tetanus, measles, and other infectious diseases will be highly prevalent. If malaria is present in the country, this will also be a major contributor to the IMR. Morbidity will be caused by many of the above conditions as well as by *poliomyelitis*, a variety of intestinal parasites (depending on the geographic area), undernutrition, and accidents.

All countries are going through a period of health transition. That is, the disease pattern is changing from a situation where infectious diseases predominate especially in children, to a situation where diseases of an older population predominate. Cancer, cardiovascular diseases, and musculoskeletal problems make up increasingly larger proportions of morbidity and mortality. In addition, various aspects of modernization become more important; in this category one would consider the effects of tobacco use (cancer, emphysema etc.), automobile accidents, industrial pollution, and the effects of changing diets (especially more sugar and fat). Countries such as India (especially the middle class) are in the very early stages of this transition, Thailand is somewhat midway in the process, and Taiwan and Korea have completed the health transition.

In studying the health transition of a country, it is most important to observe how and what happened to other countries that have gone through this process. For example the IMR in Japan in 1915 was 165, by 1935 it was 107, by 1947 it was 77, by 1965 it was 18, and at the present time it is less than 5. How did Japan achieve such results in such a short period of time (ie less than 50 years)? This and other examples should be studied to provide clues to others as to what they might do.

LECTURE I

The Interaction Between Social Science and Medicine

To better understand how individuals and societies improve their health, it is important, I believe, to combine observations from both the social sciences and medical sciences. To explain this I would like to present a model developed by Mosley and Chen. As a rule, social scientists who examine those social science variables that lead to different levels of mortality do not explore the mechanisms by which the variable might affect mortality (see Figure 1); on the other hand those who use the medical model are very good at explaining the mechanisms of disease but do not examine closely those social and environmental factors that put the individual at risk or affect the outcome of illness. Figure 2 represents an attempt to bring these two models together; it attempts to diagram interactions between the social factors and medical factors. There are a number of proximate determinants that affect whether a person becomes ill and whether that ill person completely recovers, has permanent disability, or dies from the condition. The proximate determinants are as follows: maternal factors, environmental contamination factor, nutrient availability factors, injury factors, and personal illness control factors. Socioeconomic conditions affect each of these proximate determinants. Lets examine some of these proximate determinants in greater detail. Maternal factors would include her age, parity, and health status. Polluted air, polluted water, poor quality sanitation, and the presence of toxic products are just some of the environmental contamination factors that would effect the health of the individual and society. Nutrient availability factors would include food availability and food distribution both within society and within the home. Injury factors are unfortunately becoming increasingly common as a major cause of premature death is automobile accidents; the number of people killed per mile driven is much higher in many of the developing countries than in the USA or Japan. Access to effective health care, immunizations, and drugs are components of the last category, the personal illness control factors.

How might socioeconomic determinants impact on these intermediate variables? In many nutrition clinics, there are well organized feeding

LECTURE 1

programs. But even if they are, they may be ineffective in changing the conditions that have led to the malnutrition. What are the factors at home that have led to the child's state of undernutrition? Is this unwanted? Does the malnutrition really represent a form of abandonment or infanticide? Is the family too poor to afford another child? Are there strong preferences for males and thus a disproportionate number of girls who are malnourished (as does occur in some countries)? Is the wife abandoned? Has the husband recently lost his job? Without a knowledge of predisposing socioeconomic factors or the means to correct the circumstances, the children will continue to become severely undernourished.

Future Health Problems in Developing Countries: Urbanization and Aging

Let me close with a few words about two factors that are increasingly affecting health problems in developing countries—aging of the population and increasing urbanization. In the more developed countries, the percentage of the population over 60 years of age will be over 20% by the year 2020. This is going to be particularly true in East Asia. South Asia and Africa will continue to have predominantly younger populations (presently, children under 15 make up over 50% of the population in some poorer countries). In Latin America about 70 – 75% of the population live in urban areas. Asia, though still more rural than Central America, South America, or the Middle East, will continue to have higher percentages of its population living in urban centers. The urban poor are often marginalized by the health care system. Yet it is the urban poor who are going to require more and more services. These two trends and the increasing impact of health problems brought about by modern living (whether it is cars, tobacco consumption, nutrition, etc.) are just some of the challenges that the international health community will have to face in the future.

LECTURE I

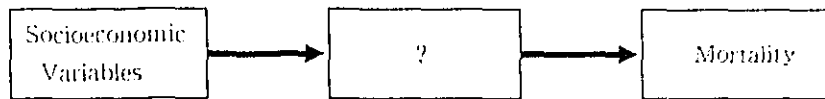
Summary

International health has traditionally focused on the health problems of the low and low-middle income countries. Conditions of poverty, and high population growth shaped a demographic and disease pattern where infectious diseases, especially affecting children, were the major causes of morbidity and mortality. This pattern still predominates in South Asia and most of Sub-Saharan Africa. In recent years, however, many societies have been undergoing a health transition where diseases are more chronic in nature and greatly determined by the environment and life style. Improved standards of living, greater education, rapidly increasing urbanization, an aging population, and changing life styles are just some of the factors contributing to these changes in morbidity and mortality. It is critical that we understand the interaction between the medical and social sciences if we are to further reduce premature death and decrease unnecessary morbidity in the future.

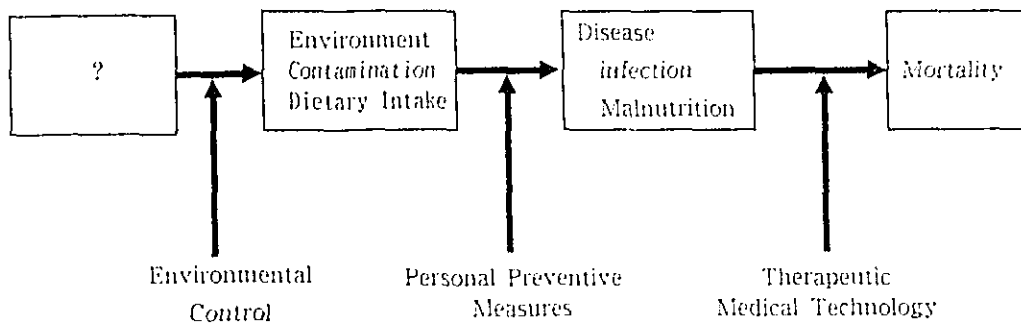
LECTURE 1

Figure 1. Conceptual Models of Social and Medical Science Approaches to Research on Child Survival

A. Social Approach

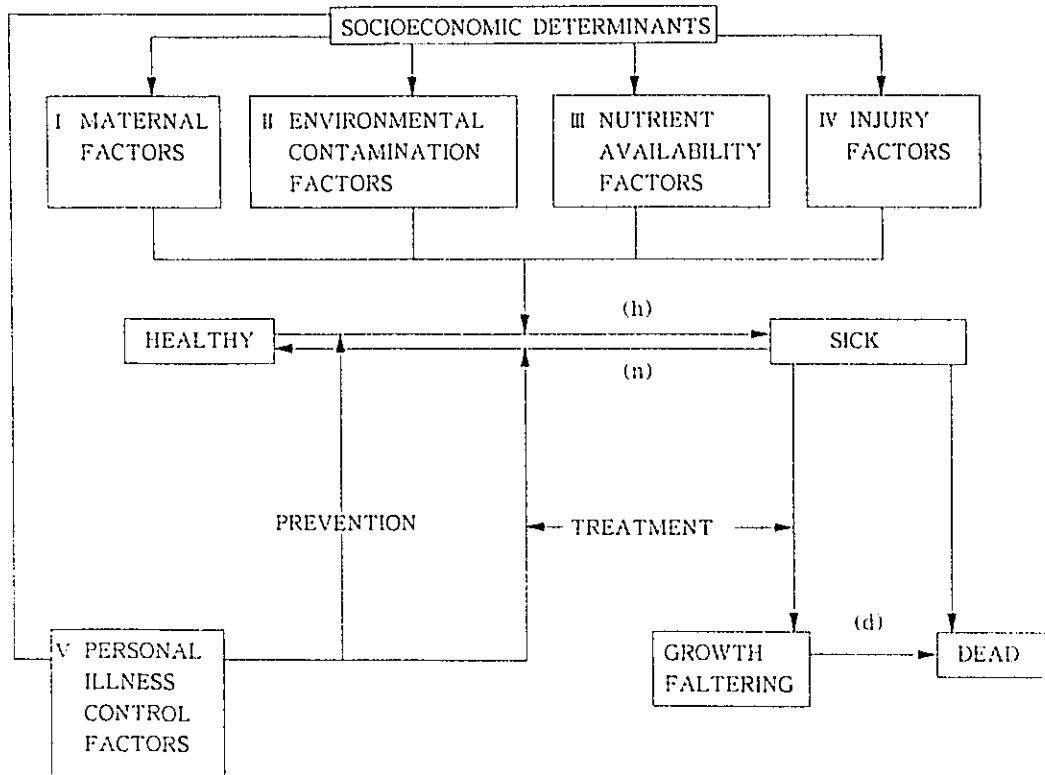


B. Medical Approach



LECTURE 1

Figure 2. Interaction



Lecture 2: The Prioritization of Health Problems

Why It is Important to Prioritize Health Problems

The first question is: Whose health priorities should we consider? There are the government's priorities as defined by the Ministry of Health, then there are the priorities of the international donors—as represented by either multinational agencies, such as the World Health Organization (WHO) or the World Bank or through bilateral arrangements (organizations or governments). Then there are the priorities of different constituencies of providers. Doctors, nurses, pharmacists, and traditional practitioners—all might put the emphasis on different health conditions or health delivery systems. Then there are the consumers. The community might express its sense of what they want the health community to focus on. But the community might only be represented by the men through the local governing council; the women might have an entirely different set of priorities, but they are never asked. All of these groups might have the same set of priorities but it is unlikely. All groups might make a different list. Who should be listened to and why?

Factors to Consider in Establishing Health Priorities

The Importance of Different Diseases

A recent book, "Establishing Health Priorities in Developing Countries," by Dr. Julia Walsh and published by the United Nations Development Programme, discusses a particular model of disease prioritization. (The World Bank is currently going through a similar exercise).

Table 1 represents one attempt to categorize the major causes of

LECTURE 2

death by age and income level of a country (wealthy, middle-income, and poor countries). If one examines the differences between the different age groups, the differences become less as one goes from the less to the more developed countries. That is, the differences get smaller in the older age groups. Let's look at the category of infections as an example. In the developed countries, infections at age 0 – 14 account for only 0.5 deaths per 1000, while in the least developed countries, 13.3 deaths per 1000 are caused by infectious diseases (a 26 fold difference). Among those over 65, infectious diseases account for 4.0 deaths per 1000 in the most developed countries, and 14.7 deaths per 1000 in the least developed countries (a 3.5 fold difference). For neoplasms, the differences between the groups is much less (though somewhat higher in the most developed societies); however, neoplasms may not be properly diagnosed in the least developed countries.

Preventive Measures

Table 2 examines the efficacy of different preventive measures. With measles, for example, there is an effective, low-cost (6 cents) vaccine; much of the cost, in fact, is not in the product but in the delivery of the vaccine. To prevent low birth weight, on the other hand, the cost is relatively high because it involves antenatal care and education. Tetanus vaccine, a very inexpensive vaccine (about 2 cents per dose), prevents neonatal tetanus. There is ninety percent efficacy when given to women of child-bearing age. Neonatal tetanus can, of course, be prevented by two approaches: insuring that all mothers receive adequate doses of tetanus toxoid); and insuring that the umbilical cord is cut with a sterile instrument, and that the umbilical stump is properly cared for.

Therapeutic Measures

Table 3 outlines the efficacy of different treatment measures. Cost for different conditions varies greatly by the disease and where the treatment takes place. The treatment for most bacterial pneumonia is relatively

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inexpensive if treated early, ranging from 8 cents to 20 dollars ; treated in the hospital, using expensive equipment, it can cost hundreds of dollars a day. For cancer, effectiveness of treatment is quite variable but usually very expensive ; chemotherapy, radiation therapy, and surgery can sometimes be effective but these forms of therapy can be very costly. As with maternal mortality, prevention is far more effective, and efficient, and inexpensive.

Short-term Control Measures

Efficacious short-term control measures can be seen in Table 4. The most common diseases found in developing countries are listed, as are those that most respond to short-term prevention and therapy. In fact, there are some effective preventions and therapies available, allowing us to prioritize the conditions.

Cost-Effectiveness

Tables 2 - 4 indicate the cost-effectiveness of selected health interventions in developing countries. Cost effectiveness is defined as the cost per capita for using a particular type of intervention. The effectiveness is the estimated number of deaths prevented per 100,000 population. Good cost-effectiveness data is difficult to obtain, and many assumptions must be made. For the treatment of diarrhea, oral rehydration therapy costs about 7 cents per person ; and when widely used, can prevent 69 deaths per 100,000 population. The key, though, is that it must be effectively used—that is, adequate amounts must be given early in the course of disease, and the child should continue to be fed. The cost per death averted has been estimated at 100 dollars. In the Indonesian Expanded Program on Immunization (EPI), each immunization will cost about 5 cents per person. Thirty-five deaths would be prevented for every 13 dollars spent. The vaccine, however, must be viable (not damaged by heat and properly given). One problem with this type of analysis is that it primarily examines deaths prevented ; it does not usually examine the other benefits that might accrue

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(ie. fewer crippled children from polio).

High Priority Interventions and Changing Priorities

Table 5 shows the different interventions, many given high priority, that are still being developed. It should be noted that low birth weight is not uncommon. Low birth weight can be prevented by birth spacing (family planning) and good prenatal care.

In Table 6 there is an outline of the priorities of countries with different levels of development and patterns of illness. In countries that have the first-level pattern of illness, the major control measures are improved water and sanitation, and community and public health. At the second level, more respiratory diseases and sexually transmitted diseases take on increasing importance. The major control measures at this level are vaccination and medication. The third – and fourth – level diseases are the kinds of illnesses one sees in societies progressing from the first and second levels. The degenerative diseases become increasingly important (see Table 7).

Problems change over time, and priorities will also change. In Thailand, diarrhea, respiratory infections, polio myelitis, and nutritional problems were common 20 years ago. Current problems now include more with cardiovascular diseases, tobacco related illness, and injuries, though infectious diseases still have an impact on many children. In the future the consequences of the high rate of infection with immunodeficiency virus (HIV) will have a significant impact on the health of Thais and on their health care system. For the future a society must give particular consideration to those conditions that are preventable and plan accordingly.

Summary

The health priorities of a society will be determined by a large set of variables. The health prevention priorities will be determined by a number of factors including the incidence of prevalence of the illness, the efficacy of the treatment and preventive measures, the costs of these interventions,

LECTURE 2

and their acceptability.

LECTURE 2

Table 1. Annual death rates (/1000) due to major causes of death by age group and level of development, around 1980.

AGE GROUP (years)	LEVEL OF DEVELOP.	ALL CAUSES	INFECTIONS	NEOPLASMS	CIRCULATORY SYSTEM	PREGNANCY	PERINATAL	INJURY	OTHER
0 - 14	World Total	12.0	6.4	0.1	0.3	0.00	2.1	0.4	2.8
	M*	2.1	0.5	0.1	0.1	0.00	0.7	0.2	0.6
	L	13.9	7.5	0.1	0.3	0.00	2.3	0.4	3.3
	LS	23.4	13.3	0.0	0.5	0.00	3.5	0.5	5.5
15 - 44	World Total	3.2	1.3	0.2	0.5	0.12		0.6	0.5
	M	1.4	0.1	0.2	0.3	0.01		0.6	0.2
	L	3.8	1.7	0.2	0.5	0.15		0.6	0.6
	LS	5.5	2.8	0.2	0.7	0.23		0.7	0.9
45 - 64	World Total	13.9	3.2	2.5	5.1	0.01		0.8	2.3
	M	8.5	0.4	2.7	4.1	0.00		0.6	0.7
	L	16.9	4.8	2.4	5.7	0.02		0.9	3.1
	LS	17.8	5.3	2.3	5.9	0.02		0.9	3.4
65 +	World Total	65.0	8.3	8.4	33.9			1.6	12.9
	M	57.0	4.0	9.9	35.3			1.5	6.3
	L	73.2	12.7	6.8	32.5			1.6	19.6
	LS	77.7	14.7	7.4	32.3			1.6	21.8

*M is Developed Areas; L is Developing Areas; LS is Least Developed Areas.
Source: Hakulinen *et al.*, 1986.

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Table 2. Efficacy of Preventive Measures

DISEASE	PREVENTIVE MEASURE	EFFICACY ¹ (%)	COST ² (\$)
Respiratory Infections			
Pneumococcus	vaccine (23 valent)	25-60	5 + / dose
H. influenza B ¹	vaccine	*	10 + / dose
Influenza virus A & B	vaccine	80	10 + / dose
	chemoprophylaxis (amantadine)	50-80	10 / dose
Measles	vaccine (EPI)	90	0.06 / dose
Pertussis	vaccine (EPI)	63-95	0.02 / dose
Diphtheria	vaccine (EPI)	90	0.02 / dose
Unspecified pathogen	change cooking stoves ¹	*	2
	decrease smoking ¹	*	*
	decrease low birth weight ¹	*	*
	improve housing ¹	*	*
	vitamin A ¹	*	< 0.05 / dose
Low Birth Weight			
	malaria prophylaxis	0-70	< 1
	antenatal care	50	10 +
	nutritional supplements	~ 20 to 50	10 +
	education	*	*
Circulatory System			
	Aspirin	0-20	1 - 2
	Control hypertension	20	30 +
	Reduce fat intake	0-25	30 -
Diarrheal Diseases			
Cholera	vaccine	30-60	1
Toxigenic <i>E. coli</i>	vaccine	under trial	*
Rotavirus	vaccine	under trial	*
Salmonella	water & sanitation ¹	0-60	2 - 46 ²
Shigella	water & sanitation	50	2 - 46 ²
Unspecified cause	water & sanitation	20-50	2 - 46 ²
	measles vaccine	10	0.06 / dose
	prevention of low birth weight	*	*
	nutritional supplements	0-25	10 -
	hygiene	20-50	*
	vitamin A	*	< 0.05 / dose
Measles	vaccine (EPI)	90	0.06
Injuries	modified cooking fires	*	*
Malnutrition			
	nutrition education	0-50	2 +
	nutritional supplements	0-50	10 +
Neoplasms¹			
	vaccine (HBsAg)	under trial	1 / dose
	periodic examinations	10-50	1 +
Malaria			
	mosquito control (insecticides, larvicides, environmental management, netting)	30-90	2 +
	chemoprophylaxis	0-80	< 0.02 / dose
	vaccine	under trial	*

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Table 2. Efficacy of Preventive Measures (cont.)

DISEASE	PREVENTIVE MEASURE	EFFICACY (%)	COST (\$)
Tetanus	vaccine	90	0.02/dose
	TBA training	40-60	*
Tuberculosis	vaccine (EPI)	0-80	0.10/dose
	active case identification	30-50	*
	chemoprophylaxis	70-80	1-2
Hepatitis B	vaccine	80	1/dose
Whooping cough	vaccine	80	0.02/dose
Typhoid	vaccine	50-60	2-5
Maternal Mortality	family planning	*	*
	TBA training	*	*
	rapid referral	*	*
	local delivery facilities	*	*
Meningitis			
Neisseria	vaccine (A,C,Y,W135)	60-90	10 + /dose
	chemoprophylaxis	70	1
Pneumococcal	vaccine	*	5 + /dose
<i>H. influenza B</i>	vaccine	0-80 ⁷	10 + /dose
	chemoprophylaxis	0-80	1
Schistosomiasis	chemotherapy ⁷	70-90	1 +
	mollusk control	30	1-3
	water & sanitation	0-25	2-46
Syphilis	condoms	*	*
	education	*	*
Amebiasis	water & sanitation	25	2-46
	hygiene	*	*
Chagas Disease	housing ⁷	*	100 +
	insecticide ⁷	*	5 +
	nets ⁷	*	2
Rheumatic Fever & Heart Disease	chemotherapy	50 +	1 +
Hookworm	water & sanitation	50	2-46
	footwear	low	*
Rabies	vaccine	60 +	*
Diphtheria	vaccine	90 +	0.02/dose
HIV (AIDS)	education	*	*
Dengue	mosquito control	0-90	*
Hepatitis A	water & sanitation	*	2-46
	hygiene	*	*
	immune globulin	60-80	1 +
Yellow fever	vaccine	90	1
Japanese B encephalitis	vaccine	60-80	*
Ascariasis	water & sanitation	*	2-46
	chemotherapy - mass	60-75	1
Giardiasis	water & sanitation	0-50	2-46

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Table 2. Efficacious Short-Term Control Measures*

DISEASE	PREVENTION	CURE
Respiratory Disease		
Pneumococcus	--	chemotherapy
<i>H. influenza</i>	--	chemotherapy
Measles	vaccine	--
Whooping cough	vaccine	--
Diphtheria	vaccine	--
Diarrheal Disease		
Rotavirus	--	oral rehydration
Toxigenic <i>E. coli</i>	--	oral rehydration
Cholera	--	oral rehydration
Measles	vaccine	--
Malaria	--	chemotherapy
Tetanus	vaccine	--
Hepatitis B	vaccine	--
Whooping Cough	vaccine	--
Meningitis		
Pneumococcus	--	chemotherapy
<i>H. influenza</i>	chemoprophylaxis	chemotherapy
<i>N. meningitidis</i> (A,C,Y,W135)	vaccine	chemotherapy
	chemoprophylaxis	--
Schistosomiasis	chemotherapy	chemotherapy
Syphilis	--	chemotherapy
Amebiasis	--	chemotherapy
Hookworm disease	chemotherapy	chemotherapy
Diphtheria	vaccine	--
Yellow Fever	vaccine	--
Ascariasis	chemotherapy	chemotherapy
Trichuriasis	chemotherapy	chemotherapy
Filariasis	chemotherapy	chemotherapy
Dracontiasis	protected water	--

LECTURE 2

Table 3. Efficacy of Therapeutic Measures

DISEASE	TREATMENT	EFFICACY ^a (%)	COST ^b (\$)
Acute Lower Respiratory Infections			
Pneumococcus	antibiotics	90	0.08-20 ^d
& <i>H. influenza B</i>			
Influenza	amantadine	60	1-5
Respiratory syncytial virus	ribavirine	60	100 +
Whooping cough	antibiotics	50-75	1
Diphtheria	antibiotics plus antitoxin	90	1-5
Unspecified pathogen	antibiotics	35-82	.08-20 ^d
Circulatory System	chemotherapy	~ ²	10 +
Low Birth Weight	nutrition & support	~ ²	*
Diarrheal Diseases	ORT ¹	50-90	0.01-1.0
Measles	~ ⁵	~	--
Injuries	first aid	~ ³	*
Malnutrition	nutrition and education	0-50	2 +
Neoplasms	chemotherapy	low ⁷	100 +
	surgery	low ⁷	100 +
	radiation	low ⁷	100 +
Malaria	chemotherapy	90	0.10-5
Tetanus	hospital care	65	100 +
Tuberculosis	chemotherapy ⁶	80	10-100
Hepatitis B	~	~	--
Whooping cough	antibiotics	50-75	1
Typhoid	chemotherapy	90	1
Maternal Mortality ^c			
Sepsis	chemotherapy	60-90	10 +
Hemorrhage	transfusion & surgery	90	100 +
Obstructed labor	surgery	60 +	100 +
Eclampsia	chemotherapy	90 ³	10 +
Meningitis	chemotherapy	80 +	1
Schistosomiasis	chemotherapy	90	1-5
Syphilis	chemotherapy	90	0.20 +
Amebiasis	chemotherapy	60 +	2
Chagas Disease	chemotherapy	poor	--
Rheumatic Fever	chemotherapy	50	1
Hookworm	chemotherapy	90	1
Rabies	~ ¹⁶	~	--
Diphtheria	antibiotics plus antitoxin	90	1-5
HIV (AIDS)	chemotherapy	under trial	100 +

LECTURE 2

Tabel 3. Efficacy of Therapeutic Measures (cont.)

DISEASE	TREATMENT	EFFICACY* (%)	COST ¹ (\$)
Dengue	-- ²	—	—
Hepatitis A	— ³	—	—
Yellow fever	— ⁴	—	—
Japanese B encephalitis	— ⁵	—	—
Ascariasis	chemotherapy	90 +	1
Giardiasis	chemotherapy	90	1
Polio myelitis	— ⁶	—	—
Leprosy	chemotherapy ¹¹	90	5-25
Leishmaniasis	chemotherapy	poor	—
Trichuriasis	chemotherapy	90	1
Filariasis	chemotherapy	under trial	—
Dracunculiasis	chemotherapy	poor	—
<i>Onchocerciasis</i>	chemotherapy	under trial	0 ¹²
African trypanosomiasis	chemotherapy	poor	—

LECTURE 2

Table 4. Efficacious Short-Term Control Measures*

DISEASE	PREVENTION	CURE
Respiratory Disease		
Pneumococcus	—	chemotherapy
<i>H. influenza</i>	—	chemotherapy
Measles	vaccine	—
Whooping cough	vaccine	—
Diphtheria	vaccine	—
Diarrheal Disease		
Rotavirus	—	oral rehydration
Toxigenic <i>E. Coli</i>	—	oral rehydration
Cholera	—	oral rehydration
Measles	vaccine	—
Malaria	—	chemotherapy
Tetanus	vaccine	—
Hepatitis B	vaccine	—
Whooping Cough	vaccine	—
Meningitis		
Pneumococcus	—	chemotherapy
<i>H. influenza</i>	chemoprophylaxis	chemotherapy
<i>N. meningitidis</i> (A.C.Y.W135)	vaccine chemoprophylaxis	chemotherapy —
Schistosomiasis	chemotherapy	chemotherapy
Syphilis	—	chemotherapy
Amebiasis	—	chemotherapy
Hookworm disease	chemotherapy	chemotherapy
Diphtheria	vaccine	—
Yellow Fever	vaccine	—
Ascariasis	chemotherapy	chemotherapy
Trichuriasis	chemotherapy	chemotherapy
Filariasis	chemotherapy	chemotherapy
Dracunculiasis	protected water	—

LECTURE 2

Table 4. Efficacy of Preventive Measures (cont.)

DISEASE	PREVENTIVE MEASURE	EFFICACY (%)	COST (\$)
Poliomyelitis	vaccine	80-90	0.03/dose ^{ff}
Leprosy	vaccine (BCG)	20-60	0.10/dose
	active case identification	50	1-2
	chemoprophylaxis	0-80	0.50
Leishmaniasis	animal and sand fly control	30-90	1-2
	water & sanitation	50	2-46
Trichuriasis	chemotherapy	60+	1
	mosquito control	60-95	.50-3
Filariasis	chemotherapy	50-90	5
	screens & nets	*	*
Dracunculiasis	protected water	90+	2
Onchocerciasis	simulium control	90	20+
	chemotherapy	under trial	0
	nodulectomy	poor	*
African trypanosomiasis	fly control	80	*
	chemoprophylaxis	80	*
	surveillance and treatment	*	2-4
Unspecified Infant & Child Mortality	vitamin A	20-30	< 0.05/dose
	child spacing	0-50	*

Table 5. High Priority Interventions - Efficacious, Prevent or Avert a Great Burden of Illness, Inexpensive, Feasible

GLOBAL	ENDEMIC AREAS
<ul style="list-style-type: none"> Immunization <ul style="list-style-type: none"> Measles Whooping Cough Tetanus Diphtheria Poliomyelitis Oral rehydration Antibiotics for pneumonia Vitamin A Family Planning 	<ul style="list-style-type: none"> Malaria Control Schistosomiasis chemotherapy Intestinal helminth chemotherapy Other immunizations, e.g., meningococcus

LECTURE 2

Table 6. EVOLUTION OF DISEASE DOMINATING PATTERNS

FIRST LEVEL DISEASES

- Infectious parasitic diseases of the intestinal tract
- Diarrhea and dehydration
- Water and food contamination
- Poor sanitation practices
- Major control: sanitation, community and public health

SECOND LEVEL DISEASES

- Non-enteric infectious diseases
respiratory diseases,
skin-entrance diseases, including vector – borne,
genital-urinary diseases including STD's.
- Major control: vaccination and medication

THIRD LEVEL DISEASES

- Degenerative diseases of affluence
- Major prevention and control: wellness

FOURTH LEVEL DISEASES

- Mental health problems and illness
- Major prevention and control: wellness

Table 7. EXAMPLES OF HEALTH PROBLEMS AFFECTING CHILDREN AND ADULTS. PRIOR TO AND AFTER THE HEALTH TRANSITION

AGE CATEGORY	PRE-TRANSITION	POST-TRANSITION
Children	Diarrhea ARI Polio, Tetanus Undernutrition Malaria	Congenital Defects Growth Failure Micronutrient Deficiency Mental Development Problems Injury
Adults and the Elderly	Tuberculosis Malaria AIDS/STDs Chronic Parasitic Injury Maternity Problems	Mental Disorders Circulatory Disease AIDS/STDs Cancers Injury

Source : Mosley, Jamison and Henderson 1989

Lecture 3: Manpower Development

Manpower development involves the determination of health personnel needs in both the public and private sectors, the training and licensing of health workers, the continuing education of these workers, and the development of guidelines for practice and reimbursement. This is a particularly important issue for Japan because much of Japan's international health aid is directed to the training of health workers, either in their own country or in Japan, and the development of training centers in the host country. Who should be trained, what fields should they be trained in, how should they be trained, where should health workers be trained, and what are the constraints to all of these activities?

The training needs of any society will depend on such factors as the type of health system that is present and is planned for, the health personnel presently available, the number of potential candidates, the type of reimbursement system, and the type of training facilities and instructors available. For example, in 1948 there were only 5,000 allopathic physicians in China. Since a community-based health system required many more practitioners, this situation led inevitably to the incorporation of traditional practitioners (herbalists, etc.) into the health system and the development of the barefoot doctors. The following discussion will cover the training of doctors, nurses, community health workers, and traditional practitioners.

Physicians

In the time of the ancient Greeks, physicians were paid to keep their clients healthy. Now we pay the doctor when we get sick. Though many physicians specialize in public health and preventive medicine and many practitioners incorporate preventive medicine techniques in their daily practice, the average physician specializes in curative medicine (though, in fact, most illnesses in an increasingly aging population are not really cured). Physicians are essential to the development of any health system. They are

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usually well-trained (some would argue too well-trained for certain situations), technically knowledgeable, and address the concerns of the sick. But there are disadvantages to having too many physicians, to having a health care system that is too dependent on physicians. Educating a physician is an expensive affair (over \$ 100,000 in even the poorest of societies), salaries or fees may be quite costly, and physicians drive up patient costs by their control over equipment purchases and tests that are ordered, their salaries or fees may be quite costly, there may be a high emigration rate of physicians.

Let's examine some of these problems in more detail. If their education is so expensive, perhaps physicians should be given a shorter course of training. Doctors who graduated from such a system would have a more difficult time emigrating (their medical degree would not be recognized outside of the country), but their training might be more relevant to their own society. In India, during the colonial period, a type of national doctor was produced in a shortened training period. These physicians worked more often in rural and other underserved areas than did the fully trained physicians. When India gained independence from Great Britain, however, the medical profession wanted to eliminate training programs that produced what they considered to be "second-class doctors" and these medical schools offering the abbreviated training were closed or converted to six-year schools. Physicians control the use of ancillary services and in many countries may own diagnostic and treatment equipment, laboratory services, and pharmacies. Their recommendations greatly increase total costs and really improve their salaries. Some countries such as Pakistan have consciously overproduced physicians who then emigrate (often to the Middle East), to make much higher salaries than they could make at home, and remit much of this hard currency back home; these physicians are a form of export for the producing country.

Nurses

Nursing is a caring profession, and more and more in today's world, the health problems have more to do with caring than with curing. It is

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a profession that has traditionally employed more women than men. In fact, it was not that long ago that the only professions open to women were nursing and teaching. In countries like the United States, there are many more nurses than physicians, the ratio being four or five to one. In many developing countries, however, because of tradition and restrictions on the activities of women, the ratio may be one to one or less. The advantages of having nurses be a critical part of any health system are clear. Training is shorter and less costly; they are trained more in caring for the patient and tend to be less concerned with the high monetary rewards that physicians often accrue. Since most nurses are women, they have an advantage in dealing with the health problems of women and children, especially in societies that are more conservative with respect to the rights of women. There are problems in some societies in the recruitment of women to become nurses. In some countries women may not be allowed to touch men; a woman may not be allowed to be away from the family, especially if she is single (this limits her ability to work in rural areas, for example). The role of women in a society has a clear bearing on whether or not they can be recruited for the nursing profession. A high percentage of nurses in India are from the southern state of Kerala, a state where women have achieved a far greater degree of equality than in most others (literacy for women in Kerala is over 90%). As many countries need nurses but don't produce them, they look to other societies to fill their need. The Philippines has used the export of nurses to earn in hard currency (much as others have done with physicians). In the long run countries that export nurses will in fact, do far better financially than those that export doctors, as the world's nursing shortage is much greater than the shortage of physicians.

Other Health Personnel

There are a number of other health care workers who have been trained for government or private service. Technicians such as those that work in laboratories or in x-ray services, are the first groups that come to mind. There are midwives, sanitarians, community health workers, and

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voluntary health workers to name just a few such categories of health workers. Then there are those health workers who specialize in vertical programs such as malaria control, family planning, immunization, and leprosy control are found in most countries. The training of all of these workers tends to be short term, and their salaries are lower. Also, they are not exportable so emigration rates are low.

Such health care workers (as with most others) tend to be less effective when they are given too many tasks to perform with little direction on which activities should have the greatest priority. Community health workers, for example, may be asked to be responsible for family planning programs, nutrition rehabilitation activities, and a series of disease control programs (ie. malaria, tuberculosis, leprosy, and diarrhea). When faced with a multiplicity of tasks, these workers will usually opt for those activities that are based in a facility and are curative in nature. Incentives must be found to get multi-purpose workers into the community and working on disease prevention.

There are other groups of providers for whom it is difficult to determine the type of training that is best. Pharmacists (they are usually just drug-sellers), often provide the first line of care, over 1/3 of first-contact primary care in some areas. There is little formal training for vast majority of those selling drugs. Then there are those who practice various forms of traditional medicine. China and India are two countries that have a strong tradition of traditional medicine. Different forms of their traditional medical systems have been used for centuries, and there are written texts and schools that train different practitioners of the various systems. Aruveydic medicine in India and herbal medicine in China come to mind. In many countries of Africa, there is less of a codified tradition; instead the different diagnostic procedures and treatments are being passed from one teacher to one student (often a family member). What role should these practitioners play in the delivery of health services to the public? Does it make any difference to the consumers what the government thinks on this issue? Should the government train these practitioners, and if so, who should be trained? Should the government set up schools of traditional medicine? These systems

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have generally not been scientifically evaluated ; they may have no benefit to the patient or may even cause harm. Should government require that they be evaluated before any support is given or before they are allowed to practice? One group of traditional practitioners who have been successfully trained and integrated into the official health system are the traditional midwives. Their role most closely approximates that of the regularly trained midwives, and because they are village-based, they are closest to the needs of many women.

Strategies to Improve the Quality of Training for the Development of Health Manpower

In devising a strategy to improve training we first need to assess the present situation. The following scenario is applicable to many countries.

The health system is dominated by physicians and there is a shortage of nurses. The monetary reward system is based on curative medicine, not preventive medicine ; physicians receive much higher wages (especially in the private sector) than nurses or other health professionals. Physicians tend to ask for the latest technology that the system will allow. There is little or no continuing education system for health workers, and teaching material and journals are in very limited supply. Health systems are strongly urban-based, with a much smaller fraction of money going to rural areas.

It seems that there should be renewed interest in training those who are not necessarily at the highest level of the health system. This would certainly include nurses and other mid-level practitioners. Second, the curriculum in all training programs should be reexamined. There should be increasing emphasis on those diseases that are important in the country. Public health practices and preventive medicine should receive greater emphasis, especially in regard to women and children. Training, particularly that related to new technologies, must be relevant to the resources and equipment available in the country. Nothing is more frustrating to any health professional than to spend time learning to do some technique only to return home to find that the proper equipment is not available. There needs to

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be more work, in fact, on the development of appropriate, effective, low-cost, easily repairable technologies that can be taught to developing country health professionals and introduced into their countries.

The structure of the country's health system will naturally shape the values of the health care providers. As long as the payment system rewards high-technology curative care, the health professional will move in that direction. Maybe we should return to the values of the ancients and give greater rewards for keeping the public healthy rather than paying for treatment of those who are ill.

Training imparts both knowledge and attitudes. Much of the attitude of the student comes from the instructor. If the teacher does not have a proper understanding of the health problems that the young physician, nurse, or other health worker will face, then the training and commitment may be deficient. Instructors should spend time outside of the training institution and see the health problems where they occur. This experience would also help them to better appreciate the culture of both the providers and the consumers of health care. The provision of health care remains a combination of both the science and the art of medicine.

Summary

The needs assessment of the health manpower of a country must be conducted periodically to determine who should be trained, and in what discipline, curriculum, reforms, distribution of manpower, reimbursement guidelines, and retraining needs. The type of health professionals and distribution will significantly affect cost to the government and the public. Factors such as the prioritization of different diseases, income, health and communications infrastructure will greatly effect the manpower mix. Physicians, though critical to the health system, are expensive to train and to support. More attention should be given to the training of lower level health workers, especially nurses. Whatever training is conducted—and wherever it is carried out, it should be designed to fit the health needs and resources of the population. Training in the use of drugs and technologies

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must pay particular attention to these issues.

Lecture 4: Women's Health

Why should women's health deserve special consideration? First, the health of women affects many other family members, especially children, both directly and indirectly. Secondly, the health of women has been ignored for a long time, and they are particularly vulnerable to certain conditions as is being demonstrated by the AIDS pandemic.

External Factors Which Affect Women's Health

Let us first examine those particular factors that may affect women's health in a potentially way. One such factor has been called a double day. By this I mean that the amount of time that a woman spends working in and outside the home and in the field usually far exceeds the amount of time a man works. A woman is responsible not only for the raising and bearing of children, but also for producing and cooking food, drawing water, obtaining fuel, and so on. Another factor is female poverty. For any particular activity, women are usually paid less, significantly less, than men. In many food-for-work programs the laborer is paid on the basis of the amount of dirt or bricks carried. Men have a clear physical advantage over women and consequently earn more even if they do not work as hard. Yet these women are often the heads of the household, and the food they earn is distributed to the same number of family members as that earned by men. If the laborers were paid by the number of hours of full work they contributed (a standard could be based on sex and size), then there would be equity. Last, women often have limited access to services and information, particularly in the areas of education and health services. Except for some notable countries or regions, the educational level attained by girls is far less than that for boys. Yet the single factor having the greatest correlation with low IMR is the educational level of women.

Figure 1 examines one model of how some of these factors interact —particularly the perpetuation of poor health among women and girls.

LECTURE 4

Poor maternal health during pregnancy leads to less healthy babies at birth. This in turn leads to the decreased ability to care for the child, which leads to the poor growth and health of girls and adolescent women. This in turn leads to impaired health of women and the circle continues.

Risks Associated with a Woman's Reproductive Role

There may be a 30 – 40 fold differential between the country in the world with the lowest infant mortality rate (IMR) and that country with the highest IMR. But when the best and worst countries with regard to maternal mortality are compared, the differential may be 100 – 200 fold. In Sweden, for example there are less than 4 maternal deaths per 100,000 live births. In many countries of sub-Saharan Africa, however, there may be 640 maternal deaths per 100,000 live births. As women in some of the poorer countries have multiple pregnancies and births, they may have a lifetime risk of dying during childbirth that is 400 to 500 times that of their counterparts in Sweden. Though the risk is much lower in the countries of East Asia, it is too high as well.

A related issue is the risk incurred from unwanted pregnancies. As much as 50% of the money spent for maternal care in hospitals may be used for treating women with incomplete abortions or the complications of abortions. In some countries 20 – 50% of the beds in gynecological services are taken up by women suffering from the consequences of abortion. In Nairobi, 60% of the gynecology beds are used for this purpose.

Woman's Health as it Affects the Newborn

Eighteen percent of infants born in developing countries are low-birth-weight babies (less than 2500 grams). Newborns weighing less than 2500 grams have a prenatal mortality 30 times higher than that of children with normal birth weights. Low-birth-weight babies also have a higher morbidity and mortality pattern through the first five years but especially in the first year of life.

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The nutritional status of the mother is critical in determining the birth weight. The different factors that go into determining the nutritional status of both mother and child are outlined in Figure 3. Her status depends on the quantity and quality of food available before and during pregnancy as well as her own nutritional status as a child. These factors, in turn, are dependent on the economic status of the family and any cultural taboos that might effect what foods can be eaten during pregnancy. Prevention is still the best therapy. It is far better to treat nutritional anemia prior to a woman's pregnancy than during pregnancy when it is more difficult to take large doses of iron every day.

Neonatal tetanus is a major health problem in many developing countries. Poor techniques for cutting the umbilical cord and in dressing the umbilical stump contribute to the high incidence of neonatal tetanus. But the single most important factor in the prevention of neonatal tetanus is the complete immunization of women prior to the delivery. All women of child-bearing age should be immunized with tetanus toxoid; 100% coverage of childbearing women with the tetanus toxoid is the most fundamental service/program that a country should provide its citizens.

In regard to the issue of the complications associated with childbirth, obstructed or prolonged labor is a major problem. There are many causes for this complication: poor nutrition may lead to a small pelvis; early marriage and first childbearing increases the likelihood of this complication; and female circumcision is a risk factor (this procedure is done primarily in Sub-Saharan Africa). The major consequences of obstructed or prolonged labor can be the death of the mother and/or the death of the fetus. The uterus may also be so damaged that infertility is the outcome; and infertility often leads to social disgrace and divorce, particularly in areas where women are measured by their ability to bear children.

What kind of prenatal care might produce and ultimately prevent maternal morbidity and mortality and reduce the incidence of low birth weight? At the primary care level, it involves conducting the following examinations early and regularly during the pregnancy; measuring weight gain, monitoring blood pressure, checking for peripheral edema, and examining

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for any vaginal bleeding. If the woman is young (especially if she is a primigravida) or if she is older and has had numerous pregnancies, she is also at higher risk.

Clear guidelines have been established to also identify women who are at high risk of a delivery that will compromise mother and child. What should be done if the woman is found to be at high risk? Figure 2 diagrams one type of referral system that provides appropriate care for all pregnant women. The key to this referral system is that there is a well-equipped facility to which a high-risk woman or a woman who experiences complications during delivery can be easily transported. The mere presence of a referral center has little meaning if it is not staffed with well-trained health workers, supplied with appropriate and working equipment and drugs, and physically accessible by local transport within a few hours.

Other Issues Surrounding Women's Health

I'd like to return to a number of issues that adversely affect women's health. The age of marriage is critical. The younger the mother, the higher the neonatal mortality. The ideal age of marriage would seem to be about 20–25, the age at which most Japanese women begin having children. Family size plays a role in women's health and infant mortality. The larger the family size, the higher the IMR. It is of interest, however, that small-size families tend to have higher IMRs than medium-size families. This may be because families with fewer than two children tend to have younger mothers. In developed countries usually the mother is older and the family is smaller than in most developing countries.

The health consequences of sexually transmitted diseases (STDs) in women has often been ignored. The STDs include gonorrhea, syphilis, AIDS, herpes, and chlamydial infection. (Other diseases such as hepatitis B are also spread by sexual intercourse, but the focus here will be on STD's). STDs usually harm women more than men because in women the illness often goes unrecognized in its early stages and therefore remains untreated for a longer time. Women also have less access to care, gynecological services

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being usually unavailable. With a married couple it is the man who is initially treated. Though his wife should always be brought in for examination and treatment, she may not be informed by her husband because of the implications of his illness. Her disease continues to progress until the symptoms become apparent. This situation is particularly true for gonorrhea, which is often difficult to detect in women during its early stages. Gonorrhea is probably the major cause of female infertility in many areas of the world, especially in East and Central Africa. In some areas the infertility rate in women may be as high as 10 – 15%. In addition, the rates of ectopic pregnancy are very high among women whose fallopian tubes have been scarred by the gonorrheal infection. If a woman has an active case of gonorrhea during delivery, the baby may develop an eye infection that can lead to blindness if untreated.

In recent years the organism Chlamydia trachomatis has been responsible for an increasing percentage of cases of STDs. In addition to causing acute pelvic inflammatory disease (PID), this organism can also cause many of the long-term effects attributed to gonorrhea. Chlamydia has increasingly been recognized as a cause of a number of conditions in the newborn, especially a form of pneumonia. Untreated syphilis affects multiple organ systems, especially the brain and heart; it is responsible for a number of deaths. Unrecognized syphilis in a pregnant woman leads to a congenital form of the disease in the newborn which, if not fatal, can cause severe birth defects.

AIDS is an STD that has rapidly progressed throughout the developing world, but especially in sub-Saharan Africa, with devastating consequences. The disease is caused by the HIV retrovirus and is spread through body fluids—blood, semen, and vaginal secretions. Those who are at risk then are those who exchange these body fluids with infected individuals—those receiving blood transfusions from infected individuals, intravenous drug abusers, and those who engage in unprotected sexual intercourse with an individual infected with HIV. Because it was first recognized in the homosexual population in the United States, most people who did not engage in homosexual behavior did not feel they were at risk.

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Now we know differently. In sub-Saharan Africa, especially in East and Central Africa, the disease is equally distributed between men and women. This equal distribution has now become the dominant pattern throughout the world. Like STDs, AIDS is a disease whose pattern reflects the sexual behavior of the population. Since the incubation period is very long 5 – 10 years (or more), infected people are unrecognized. At the moment it is assumed that all those with HIV infection will die from the disease (assuming no other event). About 30 – 40% of children born of HIV-positive mothers will be HIV-positive. The impact of this epidemic is already having profound health and behavioral consequences increasingly on women and children (this will be covered in greater detail in lecture # 8).

Differential Mortality in Women

For most countries male mortality exceeds female mortality at all ages. There is a large group of countries stretching from Bangladesh – across northern India, Pakistan, the Middle East and across northern Africa, where female mortality is equal to or greater than male mortality at most ages. What accounts for this difference is not always clear. There are male preferences in many of these regions. This may be reflected in the food given to the children, or how soon or frequently a child is taken to the clinic when ill.

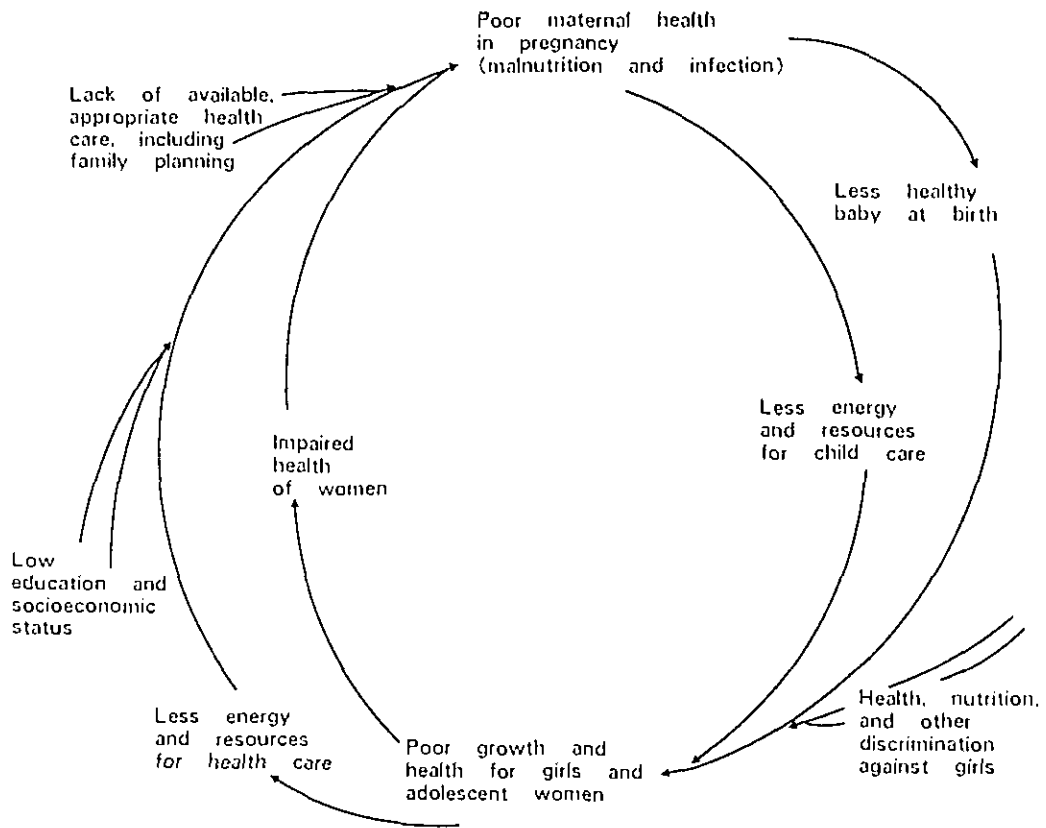
Summary:

Female health is often given less importance than it should. This is reflected in a deficiency in prenatal services, obstetrical services and gynecological services. This is particularly shortsighted as the health of all members of the family – especially newborns, infants and children – are dependent of mother's health.

STD's, especially AIDS, have increased. Without gynecological services and an awareness of the different clinical presentations of the disease many cases will go unnoticed.

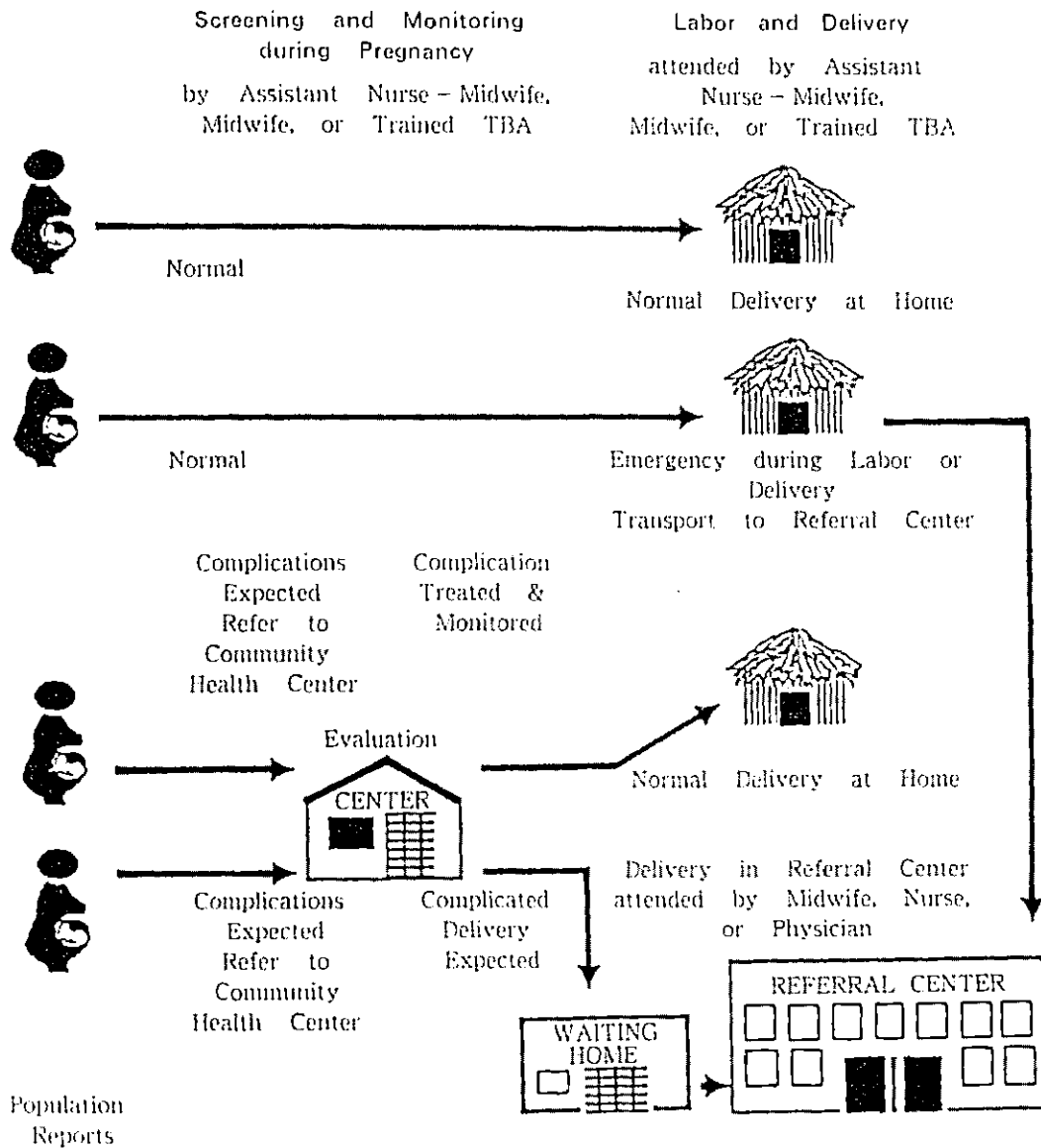
LECTURE 4

Figure 1. The perpetuation of poor health among women and girls



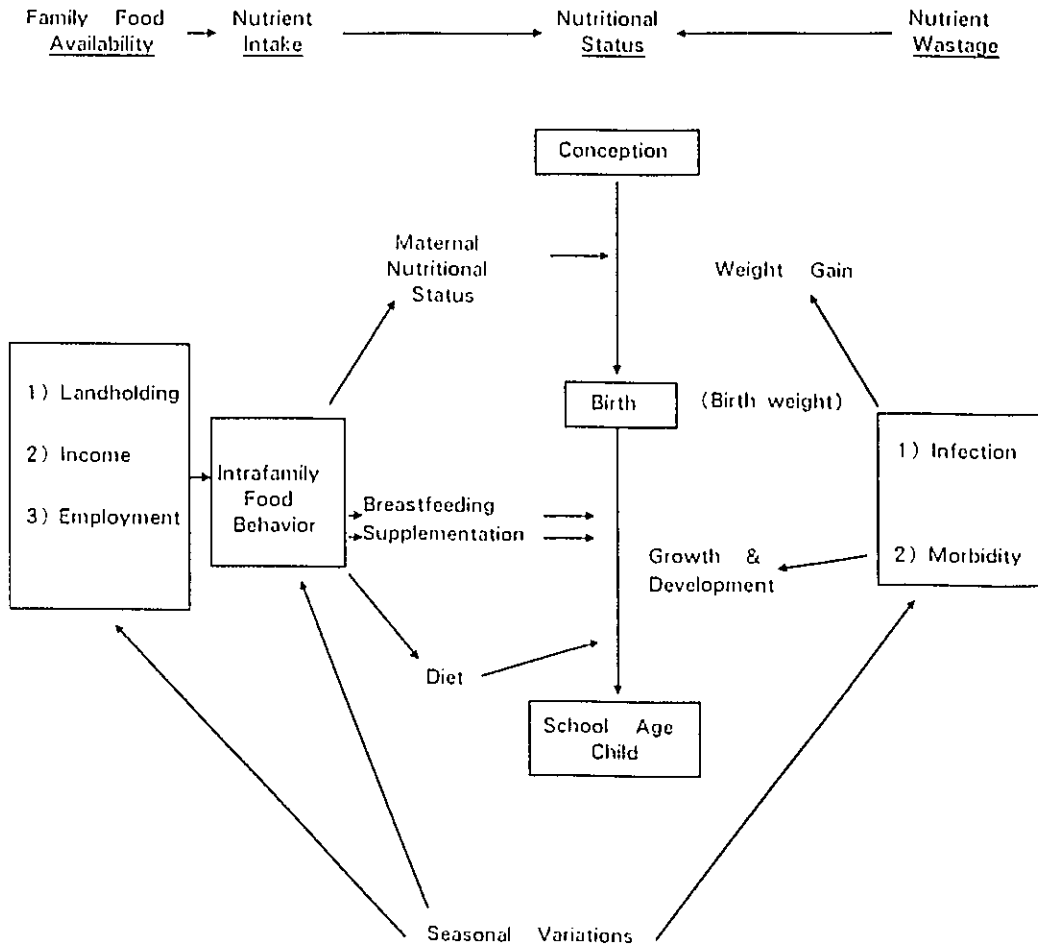
LECTURE 4

Figure 2. The Referral System : Providing Appropriate Care for All Pregnant Women



LECTURE 4

Figure 3. Framework of Malnutrition



Lecture 5: Primary Health Care

What Is Primary Health Care?

The objectives of primary health care as stated at the seminal conference at Alma Ata in the Soviet Union in 1978 are as follows: "Primary health care is essential health care based on practical, scientifically sound and socially acceptable methods and technology made universally accessible to individuals and families in the community through their full participation and at a cost that the community and country can afford to maintain at every stage of their development in the spirit of self-reliance and self-determination. It forms an integral part both of the country's health system, of which it is the central function and main focus, and of the overall social and economic development of the community. It is the first level of contact of individuals, family and community with the national health system, bringing health care as close as possible to where people live and work, and constitutes the first element of a continuing health care process."

This is a statement about good health care, but it is also a political statement. Examine the terms, "essential," "scientifically sound," "socially acceptable," "accessible," "full participation," "community," "at a cost the community and country can afford," "self-reliance." The statement addresses the main problems confronting a community which seeks to provide promotive, preventive, curative, and rehabilitative services. It mentions education on the prevailing health problems and methods for preventing and controlling them; the promotion of food supply and proper nutrition; adequate water and sanitation; maternal and child health care, including family planning; immunization against major infectious diseases; the prevention and control of endemic disease; appropriate treatment of common diseases and injuries; and the provision of essential drugs. It advocates maximum community self-reliance and participation. And lastly it relies on local health workers including nurses, doctors, midwives, and community health workers especially in their functioning as a team. It is an integrated

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multifactorial, multidisciplinary approach to dealing with the health of communities.

Issues in Primary Health Care

Prior to Alma Ata, it was recognized that curative services were taking a disproportionate share of money. Since most of the curative services were based in urban areas, some people thought this overemphasis on curative services was particularly damaging, because it was encouraging people to move to urban areas. The importance of disease prevention was also increasingly apparent. Diseases such as neonatal tetanus, measles, diphtheria, and polio were all easily prevented. Another trend prior to Alma Ata was the recognition that a lot of care can be provided by non-physicians.

A basic and fundamental concept of primary health care is equity, equity in the distribution of health services and the benefits from those health services. But equity without availability of trained personnel and adequate equipment is of little benefit. Many people in rural districts or poor urban areas have equal access to empty clinics. There must be not only access to services but access to scientifically sound services. At the time of Alma Ata, we were moving from the concept of treatment of the individual to the idea of treatment of the neighborhood to a more universal coverage.

An example of a PHC program that embodies many of the ideas of Alma Ata is the UNICEF GOBI – FFF Program : G for growth monitoring ; O for oral rehydration for diarrhea ; B for breastfeeding ; I for immunization ; and F is for female literacy, food, and family planning. This is a low-cost program, that stresses self-reliance and deals with common problems. The program deals with the common problem of education, food and nutrition, maternal-child health and family planning, immunization, and prevention. Some people criticized the program for being too selective (the problems of adult males are not specifically covered), too community-based, and too political. but it has been effective in mobilizing countries and communities and in generating funds, precisely because it is political.

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There is an ongoing debate in the PHC literature about whether a program should be vertical or horizontal. A vertical immunization program would be one where health workers only gave immunizations. An immunization which was part of a horizontal program would be one in which all programs are integrated with health workers providing treatment for a variety of illnesses, and a variety of preventive services. Another debate deals with whether programs should be planned from the bottom up or from the top down. Does the community come together and submit a health plan to the government? Or is there a general overall direction from the government which guides the community through the implementation process? In China, directions came from the center but implementation plans were developed locally.

The primary health care movement in developing countries has had a strong rural bias. Migration to cities continues to increase, however, so that a larger and larger population is now urban based. In the future, more emphasis must be focused on primary health care in urban areas.

The Political Nature of Primary Health Care

Let's look at the benefits that have accrued from primary health care movement. It is a political movement that has legitimized rural-based care and the decentralization of services. Dr. Carl Taylor, one of the early leaders in the PHC movement, wrote: "The major contribution of Alma Ata was to turn around by 180 degrees the political posture of leaders in many developing countries who had previously been obsessed with imitating the hospital-based, doctor-controlled health services of many industrialized countries." It has taken longer to get reallocation of funds to follow the rhetoric. It has been hard also for health professionals to make the sharp break needed in promoting new policies of using simple health technology, auxiliary personnel and efficient management to make services cost-effective, and to accept community involvement and intersectoral cooperation.

But the movement did give legitimacy to certain approaches to treatment and prevention. One example of how the political nature of PHC

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has been important in legitimizing a technology is the story of the use of oral rehydration therapy (ORT) to treat diarrhea. The first paper on the use of oral rehydration therapy was published in 1968. Some interest was expressed in this new, low-cost, appropriate technology but it really did not catch the imagination of health planners or physicians. More papers were published demonstrating that ORT was effective for diarrhea caused by many different organisms and in all ages. Still interest was limited. It was only after Alma Ata truly legitimized low-cost, primary health care that ORT became a popular technology. In the early 80's, the diarrheal program of WHO became important and ORT was widely distributed, though not as widely as it should be.

A major factor in the PHC movement has been that of equity. Again I quote Taylor: "The PHC/Health for All by the Year 2000 movement has been to get acceptance of the fundamental principle of equity in health care."

Using the foundation of the political will generated by commitment to PHC in developing countries it has, in the past 5 years, been possible to accelerate implementation by focusing on important priority interventions as part of "CSDR," (CSDR is the Child Survival Development Revolution). "As activities such as EPI developed greater sustainability within PHC there should evolve a process through which combinations of interventions and their relative priorities will vary and shift in adapting to local conditions." With a marked improvement in many countries, there will have to be a change in priorities. For example, in many countries they will have to add hepatitis B immunization to the EPI program. Hepatitis B is a major health problem in East Asia; it is a major cause of liver cancer, which is the major cancer in China. As you prevent that by giving hepatitis B vaccine at birth, hepatitis B vaccine is going to become a part of a number of EPI programs in some countries such as Thailand. The progress achieved in the last 10 years provides a basis for hope that Health for All will become a reality for the poor and deprived of the world by the year 2000.

Problems in the Primary Health Care System

There has been no fundamental structural change in most health systems in order to implement the PHC idea. What is the structure that has to change? The role of physicians must be altered so that they take more of a community approach. Treatment is still given more importance than prevention. The reward system still favors therapy, especially expensive therapy. If health workers are paid much more for providing highly specialized, highly technological care, or are given more praise or promotions than others for their work, there is less incentive for others (e.g. health educators) to work to prevent disease.

Supervision remains a major issue in PHC programs. The lowest level workers require supervision, positive reinforcement, continuing education, and some form of incentive (if only caring, and praise) to best carry out their tasks. Yet all of these inputs are very deficient. Those at the health center seem to have an aversion to work and travel away from the centers. How to increase these activities is a real challenge for PHC programs.

How much of PHC should be provided by the government? Recently the rhetoric has been directed toward making individuals and communities more self reliant. But we must be careful not to confuse self reliance with benign neglect. Benign neglect means doing nothing. You can teach people to do certain things, but that does not take away the responsibility for providing a minimum amount of quality care. This is especially a problem in very poor societies. In Mali, health spending is \$ 2.00 per person per year. You can do a lot with a little money if you plan carefully, but is \$ 2.00 really enough? What is the bare minimum you need?

A final issue is the concept of first-contact care. If primary health care is first contact care, we need to think about what that is, where do people go when they become ill, and what is the responsibility of government to ensure that this care is of the best possible quality—whether it is given by a health center, a pharmacy, or a traditional health practitioner, or whether it is free or fee-based.

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Summary

The basis of primary health care is to provide effective, accessible, affordable care to individuals, families and communities. The underlying principle is that of "equity" in health to the population. Debates have raged among PHC advocates as to whether PHC should have vertical programs (one activity) or always be organized in a horizontal (integrated) manner. This same debate is heard in developing priorities – focused or comprehensive. For others the major issue is how to make any PHC program work and divert an increasing share of health resources away from tertiary care to primary care. It is on this last issue – the redistribution of health resources – where progress has been less than expected, and where the real problem is.

Lecture 6: Water and Sanitation

The Importance of Water and Sanitation in Development

Water and sanitation are closely linked. Many of the poorer developing countries have a severe shortage of both water and sanitation facilities. Though we have just completed the water and sanitation decade, much more time will be needed to address the needs of most of the world's population.

Problems of water and sanitation were at one time only addressed from the perspective of supply—build enough latrines and the problem will be solved. Another perspective that is being increasingly addressed is the behavior aspect: Are people using available facilities correctly? If not, what can be done to promote better hygiene practices?.

As of 1980, 73% of the urban population in developing countries had access to good-quality water, whereas only 53% had access to sanitation facilities. In the rural areas, the proportions were 32% and 15%, respectively. There have been some improvements since then. Water supply, diarrheal disease, and infant mortality are interrelated. When availability is improved, the reduction is greater, and if quality and availability are both improved, the reduction is still larger.

To survive, humans need to drink one or two liters of water per day. This much is needed to replace water that is lost because of breathing and urination. For a reasonable amount of public health activities, it is estimated that about 30 liters per person per day are necessary. For modern socioeconomic and commercial activities, about 200 liters per person per day are required. Uses such as like swimming pools and watering the lawn require still more water.

The Four Categories of Diseases Resulting from Contaminated Water

How does water relate to disease? Table 1 shows four mechanisms by which water might affect disease transmission (this framework was developed by Fetcham, Bradley, and colleagues at the London School for Tropical Medicine and Hygiene.) In the first category are water-borne diseases—those conditions caused by bacteria and viruses that are carried in water. For this category, water quality is the important variable: contaminated water increases the risk of diseases such as hepatitis A, cholera, and other diarrheas. Generally speaking, the minimal infecting dose of bacteria or virus is fairly large (10³ or greater) such that the bacteria on contaminated hands are not sufficient to cause disease.

The second category contains the water wash diseases. That is diseases where not washing hands or other body parts is important in the spread of disease. These illnesses are dependent more on the quantity of water, rather than the quality. The infectious dose of enteric organisms in this category may be very small (i.e., 10). Dysentery, which is caused by shigella, is an example of this type of gastrointestinal infection. It takes less than 10 of these bacteria to cause dysentery. Since fecal contamination under the fingernail can cause illness, hand-washing is important. A study done in Bangladesh which examined the effect of hand-washing on the spread of shigella, reported an 80% reduction in dysentery when hand-washing was implemented. Scabies is another condition that is exacerbated by a lack of water. Whether a family has the quantity of water necessary for hand-washing or bathing will affect the incidence of diseases in this group.

The next category is the water-based diseases, diseases caused by the organisms that live in water. The classic example in this group is schistosomiasis. The parasite travels from human feces or urine into a snail, where it matures; it then emerges from the snail into the water, where it burrows through the skin of the person entering the water. Each contact with the infected water, and the duration of contact affect the risk of acquiring the infection and adding to the parasite load. Infection and

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sequelae??? are cumulative, though; there have been deaths in people with no previous immunity and one massive infection. Another disease in this category is gumwood worm.

In the last category are the water-related diseases. These infections are transmitted through vectors such as mosquitoes or flies which thrive in wet, swampy areas. Malaria and onchocerciasis are two examples of water related diseases.

The approach to prevention of each of these four categories of infections—water-borne, water-wash, water-based, and water-related—is different. For the first category the issue becomes one of providing good quality water and keeping the water from being contaminated. For the second category, it is important to provide an adequate quantity of water and to promote behavioral changes such as hand-washing. For the third category, the issue is preventing people from coming into contact with the water and keeping the parasite from entering the water. And for the last category, the issue is draining or cleaning up areas where mosquitoes and other vectors breed.

Evaluating Programs Which Improve the Bacteriological Quality of Drinking Water: An Example from Bangladesh

Real problems are encountered in evaluating programs that seek to improve water quality. Water programs often show little impact on reducing the incidence of diarrheal disease. It is, in fact, possible to substantially improve the quality of water without changing the diarrhea rates because the water may still be contaminated despite a large reduction in the number of disease-producing microorganisms present. Heavily contaminated, the level may have to be reduced to a very significant degree to begin to see some impact, especially if all drinking the water does not come from the same source.

In rural Bangladesh, tube wells were installed in a number of communities and the water was very good, bacteriologically speaking. Yet no great difference was recorded in the diarrhea rates between communities with tube wells and communities without tube wells. Why might this be

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so? The water from the tube wells had a high iron content and tasted it; the water was brownish, cloudy, and smelled metallic; it turned white rice to brown during cooking; hair washed in the water was difficult to comb (women in the area have very long straight hair). Some did not use the water for anything – not for drinking, cooking, or bathing. Fortunately for many, there were many alternative sources of water – the river, tanks, and canals. Residents might have received some of their drinking water from any of these sources or swallowed water while bathing in the tank or river. The tube well itself could have been contaminated when it was primed, especially if it was primed with contaminated water. Or because the wells were broken. (In this area 30 – 40% of the wells were not working (broken handle, broken pump).) Other sources of drinking water were used. No maintenance system had been established to ensure that broken wells were repaired. Lastly, clean water may have been brought into the house for storage but became contaminated in the home when unclean cups were put into the water storage jar.

There are other possible explanations for the similarities in diarrhea rates. There may be routes of infection other than through contaminated water: contaminated food, and fecally-contaminated hands are possibilities. The quality of water may improve, but hand-washing practices may remain unchanged. Food may be contaminated because it was not washed. For diarrheal diseases there are multiple causes and multiple routes of infection. Improving the quality of water may reduce diarrhea by a certain small amount and hand-washing may further reduce diarrhea a degree; the sum of the improvements might be additive, less than or greater than the sum (synergistic).

Water projects may have beneficial effects, other than the reduction of disease. Installing a tube well may reduce the workload of water carriers (usually women and children) and thus increase time for other activities. The tube well might also decrease the energy lost carrying a bucket of water. Having a convenient water supply may reduce the risk of contracting other diseases spread by contact with water (i.e., schistosomiasis) because it makes it possible to obtain water without having to wade into the water. If the

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effect of a water program is measured only by examining its impact on the incidence of diarrhea, the real value of the program may be overlooked.

Diseases Resulting from Improper Sanitation

Forty to fifty different diseases are transmitted by the bacteria, viruses, or protozoa that are found in human fecal material or urine (very few). The proper disposal of human feces is a major public health problem. This problem is made worse in developing countries by the fact that because of the high-fiber diet the amount of fecal material per person is usually greater than in a developed country. It is estimated that in Europe and the United States, each person may put out 100 to 200 grams per day of fecal material, whereas in many developing countries the amount can be up to 500 grams a day.

We can define six categories of infectious diseases that are related to human excreta. These categories can be organized according to five characteristics: the excreted load, latency, persistence, multiplication, and infecting dose.

The excreted load is the number of viruses, bacteria, parasites, or worm eggs that are contained in the stool. This is the infecting material. The latency period is that interval between the time that the organisms are excreted and when they become infectious. Most bacteria, viruses, and protozoa have no latency period. As soon as they are outside the body they are infectious. Some organisms such as roundworm and hookworm, however, are not immediately infectious.

Persistence is a measure of how quickly the organism dies after it is passed in the feces. It may be the single property most indicative of the fecal hazard. A very persistent pathogen will create a risk throughout the waste treatment process and during the reuse of excreta. If human fecal material is used as a fertilizer, as it is in many countries, and if all the pathogens die within a few hours, there is no problem in storing the excreta to be used the next day. However, if pathogenic organisms that are present persist for weeks or months, there is a problem.

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The term multiplication refers to whether the microorganism multiplies in the external environment where the feces are deposited. The ability to multiply will depend on the temperature, soil conditions, moisture, etc.

These four factors in combination (excreted load, latency, persistence, and multiplication) determine the infecting dose. It is very difficult, however, to determine exactly the infecting dose because it varies by person and environment. An adult in rural Bangladesh has been exposed to many intestinal pathogens during his or her lifetime, and has thus acquired some degree of immunity; therefore, the dose required to cause illness may be much higher than the dose required to cause illness in a person who has never been to Bangladesh.

Using the five characteristics described above, we can separate fecally transmitted diseases into the following six categories (see Table 2). (Many of the organisms also appear in the diseases related to water quality and quantity).

Category 1: Non-latent, low infectious dose. A small amount of fecal material under the fingernail or on the hand can lead to disease. Shigellosis fits into this category.

Category 2: Non-latent, medium – to high – infectious dose, moderately persistent, able to multiply. Here, we are dealing primarily with diarrheal diseases caused by bacteria such as cholera.

Category 3: Latent, persistent, no intermediate host. Roundworm and hookworm are examples of this category.

Category 4: Latent, persistent, intermediate host. Tapeworm is an example. There are several types of tapeworms that are transmitted to humans via intermediated hosts such as cows and pigs. Neither usually causes severe disease, but it is unpleasant to be infected.

Category 5: Latent, persistent, aquatic intermediate host. The fecal material goes into the water where there are aquatic intermediate hosts. Schistosomiasis is an example of this group.

Category 6: Excreta-related insect vectors: Insects such as flies often breed in human or animal feces. This process results in propagation

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of disease-carrying insects.

Let us consider situations for each category of disease.

For category 1, if we get rid of the fecally contaminated material but do not include hand-washing, we could still get this disease, because it has a low infectious dose. For category 2, if we keep the fecal material away from the drinking water we may reduce the incidence of the disease. For category 3, we have to keep the fecal material off the ground, because it is by walking on the material in bare feet that causes the disease. For category 4, we have to keep infectious material away from pigs and cows and eat only meat that has been well cooked.

In reviewing IMR data from Japan, one is impressed by the remarkable reduction in the infant mortality rate prior to the advent of modern medicine (much of the mid to late 1940's, when antibiotics were becoming widely available. Improvements in nutrition, water, sanitation, and housing were likely major factors in the lowering of the IMR. Thus, improvements in water quality and sanitation are relevant not only to the experience of Japan, but to most countries of the developing world.

Summary:

Large percentages of the populations in developing countries have limited to quality drinking water and good sanitation. We have just completed the water and sanitation decade with renewed interest generated on improving both water quality and sanitation. A major lesson learned during the implementation of these project is that the health benefits are not always apparent. Interventions did not always address the real problems.

At times changes in habits were more important, for example, the installation of new latrines. Only when we understand how disease is spread and how water quality and sanitation relates to the spread of disease, and the increase /decrease in risk, will appropriate water and sanitation programs be designed and evaluated.

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Table 1. The four mechanisms of water-related disease transmission and the preventive strategies appropriate to each mechanism

Transmission mechanism	Preventive strategy
I. Water – borne	Improve water quality Prevent casual use of other unimproved sources
II. Water – washed	Improve water quantity Improve water accessibility Improve hygiene
III. Water – based	Decrease need for water contact Control populations of snails or other vectors Improve quality
IV. Water-related insect vectors	Improve surface water management Destroy breeding sites of insect Decrease need to visit breeding sites Remove need for water storage in the home or improve design of storage vessels.

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Table 2. Environmental Classification of Excreted Infections

CATEGORY	FEATURES
I	1. Nonlatent, low infectious dose
II	1. Nonlatent medium or high infectious dose 2. Moderately persistent and able to multiply
III	1. Latent and persistent 2. No intermediate host
IV	1. Latent and persistent 2. Intermediate host
V	1. Latent and persistent 2. Aquatic intermediate host (s)
VI	1. Excreta - related insect vectors

Lecture 7: Rapid Epidemiological Assessment (with Emphasis on Disaster)

A disaster is an event, either sudden or chronic, that leads to increased hardship, which is usually reflected in an increase in morbidity and/or mortality. A disaster can be sudden, as in a cyclone, a flood, a landslide, or an earthquake; it can be chronic, as with drought or famine. Human behavior invariably complicates a disaster, whether natural (earthquakes, landslides, and flooding, etc.), or man-made (wars, famine). Industrial disasters seem to be occurring with increasing frequency. In 1984, the same year that the industrial accident occurred in Bhopal, India, there was a major fire outside a refinery in Mexico City, which led to 500 deaths. The effects of an industrial accident are not always immediate. Witness the Chernobyl nuclear accident, the impact of which will be present for many years.

Disasters are a neglected variable in national development strategies. The losses inflicted by catastrophes can reduce past economic growth in some areas to zero, or result in full scale economic regression. The United Nations economic committee for Latin America estimated that, between 1960 and 1974, five Latin American countries of the common market lost an average of 2.3 % of their gross national product because of disasters. The Economic and Social Committee for Asia and the Pacific estimated that, between 1961 and 1974, \$ 30 billion had been lost and over 600,000 people had died from natural disasters alone.

Myths

There are certain myths about disasters that should be dispelled. One is that massive epidemics invariably follow an acute disaster. In fact epidemics usually do not occur immediately, though they may occur long afterwards. The second myth is that medical supplies are always urgently

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needed in the wake of a disaster. They may be necessary, but usually there are other priorities, such as food, shelter, and water, which precede the need for medicines. The third myth is that corpses must be disposed of immediately, in order to prevent illness. Few epidemics have been related to the presence of corpses. They must be removed, of course, if only for aesthetic reasons and out of respect for the dead.

Man-made Disasters

Man-made disasters often result from political strife. Drought contributed to the famine in Ethiopia, but it was greatly expanded by a war, and was used as a weapon by the government to try to force a rebellious area to surrender. In the Sudan, the southern region of the country is trying to break away from the north. Both armies have withheld food, contributing to famine and starvation, with those wishing to alleviate the famine with food caught in the middle.

Until the communications revolution in the last half of the 20th century, famines often went unrecognized until they had inflicted severe damage. Now that we have satellites and extensive communication networks, famines are more easily identified. During their colonial rule in India, the British developed a famine code, which instructed field staff on the early signs of famine. The price of food rises, but household items become very inexpensive as people sell their possessions for food money. Paradoxically the price of meat may decrease as people sell their animals to raise money for food, and as the animals become too expensive to feed. One of the last signs of a famine is increase in land sales; the land transfers usually take place between those with marginal land holdings and the larger land holders. Famine invariably leads to a greater concentration of wealth.

In the Bengal famine of 1943 (Bengal is the area around eastern India, encompassing Calcutta and Dakka), it is estimated that there were over 3 million excess deaths. During World War II, the British, wanting to feed their troops and yet keep food away from the enemy, diverted food from Bengal, even though a food shortages were anticipated. In addition to an

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increase in mortality and morbidity, famines bring about social destruction : men migrate to the cities, women may even turn to prostitution, and land is sold.

Man-made disasters sometimes result from a breakdown in the technological system. Bhopal is an example of this. A gas (the quantity and type are still unknown) leaked from a chemical factory, causing much death and disability. There is no way of knowing exactly how much harm was done, as the areas affected were poor and the population unregistered. There has been an out-of-court settlement for \$ 400 million, but will the money ever reach those most in need? Very unlikely. Entire families died in the disaster. Whom, then, do you compensate?

The likelihood of people dying from these sorts of disaster in developing countries will increase for some time as the growth of riskier industries outstrips the ability to operate them. Many people live close to high-risk industries, and only limited environmental controls are in place. Countries take risks so as to keep production costs down, and the consumer movement needed to lobby for safe industries is weak and poorly organized.

Problems Exacerbating the Severity of Disasters

Some disasters are particularly devastating because of the high population density affected. Cyclones and flooding that occur in Bangladesh almost every year become disasters only when they strike highly populated areas. Population pressure, however, has led many people to risk living in such high-risk areas. Since communication facilities are deficient (though improving rapidly), reports of disasters are delayed. Relief goods may move slowly because roads and bridges are often in poor condition, trucks are limited in number, and railroads have very limited networks and capacity.

Disaster Assessment

In the past ten years, planning and prediction have reduced the damage caused by natural disasters. A major Belgium-based disaster center

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is devoted to the study of disasters, primarily natural disasters. They have identified four steps necessary in responding to a disaster: assessment (to be discussed in greater detail); treatment; rehabilitation; and reconstruction.

The first objective in assessing the health impact of a disaster is to determine the existing and potential health problems in both the affected population and the unaffected groups. Though the health of the affected population may be poor, it may also be no different from the unaffected population. Health interventions may then create a situation leading to unmet long-term expectations.

Second, we determine which health and personnel services are needed immediately, and what are needed in the months ahead. Third, the demographic profile of those affected must be determined. In many Cambodian refugee camps, there were far fewer children than expected. Many had died en route to the refugee camps; both the stress of the journey and their movement from their homes in nonmalarious areas through malarious areas led to significant child mortality because the children had no immunity. Fourth, we determine whether the presence of the affected people poses any health risk to those unaffected (i.e., the effects of crowding, etc.). Following the outbreak of hostilities in East Pakistan in 1971, (the beginning of the Bangladesh independent movement), many fled to India. In just a few months, there were 10 million refugees just across the border in India. A rapid assessment of the camps would have shown that water was a problem and that there would be low levels of immunity among the refugees. Diseases, especially those related to sanitation and crowding, spread rapidly in this environment. Following the breakup of the camps after independence, smallpox was reintroduced in large areas of Bangladesh, and unimmunized, infected refugees streamed back into the country.

Lastly, we determine the availability of personnel and other resources.

Most assessment, particularly in acute disasters, has to be done rapidly, within hours if possible. The value of whatever relief is given decreases in time.

The 1970 cyclone in Bangladesh illustrates this point. In early November of 1970, a tidal bore moved up the Bay of Bengal. Over a period

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of five or six hours, the water level rose until it was about 25 feet high. It completely covered entire sections of the heavily populated islands. A few days later, it was reported that many people had died. Dacca received reports of widespread famine, cholera, and small pox. The first reaction of many was to immediately bring in medical supplies. Two surveys were conducted in the area, the first one about two weeks after the cyclone. This seems late, but in 1970 communications were very limited. A follow-up survey was made about three months later. In the initial survey flights were made over the area to get an idea of the affected sections of the islands, and four two-man teams were dispatched to determine mortality, morbidity, housing losses, livestock losses, and long-term relief needs. The initial survey indicated that health relief was not immediately needed. According to a rough estimate, over 200,000 people had died within the first 36 hours. (Some estimated that as many as 500,000 perished.) The number of people on the islands was unclear, as many migrant workers were there for the harvest. How could there not be medical problems with so many deaths? First, only those who were healthy and strong survived the cyclone. Those who were sick and/or weak — primarily children, the elderly, and women — were killed. Those who survived were healthier than those from a control area. There was less malnutrition and disease. The survivors had more bruises, from holding onto trees for hours, than disease. The establishment of many hospitals would not have been a good use of scarce resources. Medicines were needed for common ailments, but to move in doctors and hospitals would have been inappropriate.

The immediate priority was food. In addition, the people had no cattle, plows, seed, or boats. Houses were destroyed. These findings provided the information as to what should be done immediately and what could be done further into the reconstruction process. When the situation was reassessed three months later, it was found that the original assessment had been fairly accurate. Because food could not be grown in the area, a measure of the impact of relief was whether malnutrition was increasing. In fact, there was less malnutrition in the disaster area than in an unaffected control area on the mainland.

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Once the assessment of the situation is completed, the prevalent diseases identified, and the demographic profile of the population determined, a strategy can be developed. Shelter, water, food, and drugs will probably be top priorities. Donors need to know exactly which medicines will be needed, so they will not send plane loads of inappropriate drugs, or drugs about to expire. The directions must be in the language of the prescriber. The food sent should be palatable to the population. Clothes should be appropriate to the climate and the local habits.

Many countries do not have a team of qualified personnel to make the initial assessment; thus inappropriate relief supplies may be requested and sent. It can be more expensive to pay people to sort through the free donations than to buy what is needed. Some organizations, in fact, profit by raising money for relief and giving only a fraction of what is donated. Better assessment of needs, and the development of relief committees within government will lead to a more rational approach to disaster relief.

Summary

Developing countries are particularly vulnerable to disasters, both natural and man-made. High population density has forced people to live in areas that are high-risk for floods, earthquakes, cyclones, etc. As many of these societies have a limited physical infrastructure (roads, railroads, trucks, etc.), and food stocks, they may be less able to deal with both the acute effects of a disaster and the long-term consequences. Rapid epidemiologic assessment of the health impact of a disaster is critical to appropriate intervention

Lecture 8: AIDS

Another New Infectious Disease

The acquired immunodeficiency syndrome (AIDS) is a disease that is caused by the human immunodeficiency virus (HIV – 1). We do not know as yet just what percentage of individuals infected with HIV – 1 will develop AIDS. The longer that HIV-positive individuals are followed, the more develop the clinical illness. AIDS is becoming the major public health tragedy of our times. The epidemic will certainly cause much suffering and death, especially in young adults, an age when few die of disease in any culture. The cost in lost manpower, orphaned children, and soaring health costs is staggering.

An important problem with AIDS is that the length of the incubation period, that is the time between infection with HIV – 1 and the first clinical signs, is very long. Based on our present understanding of the disease, the average incubation period is about seven to nine years. One can have the infection, feel perfectly well for years, and then begin to develop the signs of illness. At the present time, AIDS is incurable. We must now assume, for public health purposes, that everyone who becomes infected with HIV – 1 will eventually develop the disease and die from it (unless there is an intervening cause). Although we can hope that neither of these assumptions will remain true, it is better to proceed as though they are, at least until an effective cure and/or prevention is found.

The HIV – 1 virus appears to have first infected humans in central Africa. The first clinical manifestation of AIDS was recognized in 1981, and the virus was isolated in 1983. One of the great benefits of modern science has been the development of microbiological techniques that allowed for the early identification of HIV. As of July 1988, 100,000 cases of AIDS had been reported worldwide, though the actual number of cases of AIDS was more likely to have been more than 250,000. It has been estimated that the number of people who have been infected with HIV – 1 is between 8 and 10 million.

How AIDS is Spread

AIDS is known to be transmitted through blood, semen, and vaginal secretions ; it has also been suggested that in some cases it may be transmitted through breastfeeding. It is not, however, transmitted through casual contact, such as touching, kissing, drinking out of the same cup, or insect bites. Knowing how AIDS is spread tells us much about the groups at risk and how to control AIDS.

AIDS, like many other conditions, is a disease of human behavior. An individual can also get into the loop because of a transfusion with contaminated blood or through neonatal infection. AIDS was first recognized as a major health problem in the homosexual population of the United States. People thought that there was something about anal intercourse caused this disease, and that those who did not engage in homosexual behavior were safe from acquiring the illness. It has since become obvious that AIDS first became apparent in the homosexual community because an index case entered a group that was engaging in a great deal of unprotected sexual intercourse. The high number of unprotected sexual contacts increased the risk of infection. Now, however, heterosexual transmission is the major mode of transmission of AIDS in the world.

The chance of a woman getting infected from an HIV-positive man is greater than the chance of a man getting AIDS from an HIV-positive woman. This is probably because the amount of infected semen is greater than the amount of vaginal secretion to which the man is exposed. Moreover, the amount of body surface exposed to HIV - 1 (or any other virus or bacteria) is greater for the woman. The use of condoms protects both the man and the woman from sexual exposure to the virus, assuming that the condom is used properly.

Another way of contracting HIV infection is through blood products. In Japan, for example, most HIV infections were in people receiving blood products (i.e., hemophiliacs), because the blood came from the United States and elsewhere. Now the blood can be screened to determine whether it is infected. In many areas of the world, however, there is no access to screened

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blood. It is not surprising that the indications for transfusion have decreased significantly.

The most common way that infected blood is transmitted is by intravenous drug abusers. When heroin addicts or intravenous cocaine users inject the drug, they often pull blood into the syringe, mixing it with the heroin to insure that all the heroin will be injected. If addicts share syringes, the next user will inject his blood and the blood of whoever previously used the syringe. The reuse of needles might also account for the high HIV positivity among heroin addicts; the amount of blood in the needle, however, is far less than that in a contaminated syringe. The major problem is the contaminated syringe. The reuse of needles for injections — especially immunizations — does not yet appear to have led to significant numbers of cases.

The virus is also transmitted from mother to child during pregnancy. It is estimated that 20% – 50% of children of HIV-positive mothers will become infected. The virus can be transmitted through the placenta or during delivery, and it appears that it can be transmitted through infected milk, although transmission through this route is uncommon.

Four Patterns of Spread

Knowing that AIDS is spread through the above mechanism tells us something about the pattern of spread in different parts of the world. Table 1, developed in 1987, outlines three methods of spread, but another is suggested. It is important to note that these patterns are constantly changing and only reflect a moment in time. It will be interesting to reevaluate this table in another 2 – 3 years. A pattern of illness simply reflects a constellation of factors, but especially the behavior of high risk groups and the general population. When, during the course of the worldwide pandemic, AIDS entered a particular society will also determine its pattern. For example, we now have a means of detecting HIV – 1 in blood so cases from transfusions can be prevented.

Pattern 1 is seen primarily in North America, Western Europe,

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Australia, New Zealand, and a few South American countries. In this pattern, the disease starts in the homosexual and bisexual communities. It then moves to intravenous drug users. The people affected within these groups are predominantly men. The women most at risk are partners of intravenous drug users and those who engage excessively in unprotected sexual intercourse (i.e., female and male prostitutes). Educational efforts have produced a change in behavior in some groups and relatively few women have become infected in countries in comparison to pattern 2 countries. It is likely that people have reduced the number of their sexual partners, and when they do have sex they often wear condoms. The number of prostitutes appear to be less and the solicitation of their services from the general population is less. In developed countries behavior has changed drastically in response to the AIDS epidemic, and the incidence of infection, for the moment, may be less.

Pattern 2 has been described for sub-Saharan Africa, the Caribbean, and some areas of South America. Infection is predominantly heterosexual, with infection rates that are equal among men and women. Blood transfusions are a major source of infections in many of these countries; infection rates are high, and blood screening is often not done. Perinatal transmission is a major problem in some cities, as 5% to 15% of child-bearing women may be infected. In Kinshasa, Zaire, it is estimated that 7% of the children born in the 1990s will be HIV-positive, many of them dying before their first birthday. The IMR may increase by 40 per 100,000 in some urban areas.

Infection rates are high in infants, low in children, and then high in adolescents and adults from the mid-to-late teens into the early 40s, the age when men and women are sexually active. Men may become infected three or four years later than women, as girls become sexually active at an earlier stage; where there is prostitution, older men generally purchase the services of younger women.

In sub-Saharan Africa the countries with the highest infection rates are in the central and eastern regions. The infection rates are much higher in large urban areas, where there are many single men and women, prostitution in concentration and the population is transient.

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Pattern 3 is found in countries where HIV has been most recently introduced. Where this pattern prevails, HIV is spread primarily among people with multiple sex partners, both homosexual and heterosexual. Blood transfusion is not a significant problem at present, and as yet few children are infected. Most of the countries with this pattern are in Asia, the Middle East, Eastern Europe, and some rural areas of South America. Because HIV has been introduced only recently, many of these countries had felt that they were immune from the infection. They tended to deny that they may have major groups at risk. Thus education campaigns to help reduce risk, which could have been put into effect were not implemented. In Bombay, India, it is estimated that there are over 100,000 prostitutes; and the incidence of HIV seems to be rapidly increasing in this group. One observer has estimated that there are over 250,000 infected individuals.

I would add a fourth category that would cover countries such as Thailand and the Philippines. HIV has only recently been introduced to these countries, but it is spread homosexually, heterosexually, and by intravenous drug use. As there are large numbers of both female and male prostitutes and drug users, the disease has spread very rapidly. Until recently, control programs were limited. The lower-class prostitutes (many more contacts per day than those paid more per encounter) in Chiang Mai, Thailand, have an HIV prevalence approaching 50%, and IV drug users in Bangkok have a 60% prevalence of the infection. Among military recruits (a sample of men from throughout Thailand), the prevalence is over 2%. Since the virus has only recently been introduced, there is little overt evidence of the epidemic; at present (May 1990) there are fewer than 200 clinical cases of AIDS in Thailand. This scene will change very quickly, however.

Preventing the Spread of AIDS

What factors increase the chance of getting infected with HIV -- 1 if you are in contact with someone who is infected? Is there an exchange of body fluids (blood, semen, vaginal secretions) and how and what is exchanged? In what stage of the illness is the person who is infected?

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It is possible that genetic or hormonal factors may affect the risk of infection, but as yet no clear evidence has emerged to demonstrate increased vulnerability of any ethnic group or genetically identified cohort. For a time some people in Asia believed that they would not have an AIDS epidemic because somehow their genetic makeup made them immune. Clearly this is not the case.

At this point there is no effective treatment for AIDS. Although certain drugs can prolong life for some months, they are too expensive for most developing countries. The development of a vaccine will be very difficult, because the AIDS virus keeps changing its identity. Furthermore, it is an intracellular virus which attaches itself to the DNA, hides, and/or replicates itself. So the only way to get rid of the virus is to kill either the cell, prevent infection of other cells. As it will be so difficult to develop a vaccine against this virus, we should carry out our public health activities as if no vaccine will be developed and no cure will be found. Both an effective vaccine and an effective treatment are a long way away.

Behavior is the most important variable in the spread of the epidemic. We want to change sexual behavior but know little about the practices in each society. We want to reach IV drug users, but they exist outside the greater society. We want to reduce prostitution, but need to understand why women and men put themselves at such risk. Poverty and inequity clearly contribute to the problem. Thus the control of AIDS becomes more than just public health interventions and education. It must inevitably deal with economic, political, and structural problems and resource distribution. If we understand the AIDS epidemic, we understand much of public health.

Summary

The AIDS epidemic, though effectively only ten years old, has led to the death of over 100,000 people worldwide, with another 5 – 10 million infected with the HIV – 1 virus. The infection is spread through the exchange of body fluids (e.g., blood, semen, vaginal secretions) and not through casual contact. The incubation time is from 5 – 10 years and can be longer, making

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control of spread difficult. At the present time, there is no known cure for the disease, and no vaccine to prevent infections. The pattern of illness in any country or community reflects the behavior that puts individuals at risk. Measures to control the spread of the disease must focus on behavior of at risk populations so that exposure to the virus is significantly reduced.

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Table 1. Patterns of HIV - 1 Infection in the World as of February 1988 - 1,2.

Pattern 1	Pattern 2	Pattern 3
Homosexual/bisexual men & intravenous drug abusers (IVDA) are the major affected groups	Heterosexuals are the main population group affected	More recent introduction with spread among persons with multiple sex partners
<u>Sexual Transmission</u>		
Predominantly homosexual	Predominantly heterosexual	Both homosexual and heterosexual transmission just being documented
<u>Parenteral Transmission</u>		
Intravenous drug abuse	Transfusion of HIV - infected blood	Not a significant problem at present
<u>Perinatal Transmission</u>		
Primarily in - female IVDA - sex partners of IVDA - women from HIV - 1 endemic areas	Significant problem where 5 - 15% of women are HIV - 1 antibody positive	Currently not a problem
<u>Distribution</u>		
Western Europe North America & some South America Australia New Zealand	Africa Caribbean & some areas in South America	Asia Middle East Eastern Europe Rural South America

1. These patterns will continue to change over time.
2. From Plot, P., Plummer, F., Mann, J., AIDS: An International Perspective. Science, 239 : 573 - 579, February, 1988.

Lecture 9A: Health Transition

What is the Health Transition?

The health transition is that change that takes place in a country's mortality and morbidity patterns as it goes from a stage of high mortality (especially in infants and children) and short life expectancy to a point where both patterns approach that of the United States, Western Europe, and Japan. Health transition has two fundamental characteristics: first, the demographic structure of the population changes, resulting in an increasing percentage of people who are older than fifteen years of age; second, there is a change in the causes of mortality and morbidity. Studying the health transition in different societies can help us gain some ideas about what the future problems and needs will be.

Mexico is an example of a country rapidly going through this transition. Fertility rates have been decreasing since 1970, and since 1940, an increasing proportion of all deaths have been occurring within the oldest age group. In 1940, more than half of all deaths were of children under four years of age; by 1985, that had changed to about 20%. In 1940, about 70% of all deaths were due to infections; in 1985, this proportion was 30%. (This decrease began even before the introduction of antibiotics.)

Problems Appearing During the Health Transition Phase

Health transition does not occur evenly in all countries. There is an unevenness among regions or groups within a given country. In the transition phase the disparities between regions may become even more apparent. Though the overall health picture in Mexico is much better today than it was in 1940, there are much greater disparities in the health conditions between the economically better-off north and the poorer south. There have also been increasing disparities among countries; those countries that began the past decade with low IMRs have improved more than those who started

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the decade with high IMRs.

In addition to increased inequality in health status, other problems surface during the transition. Chronic diseases become more of a burden as the overall mortality declines. In Costa Rica, the ratio of chronic diseases to acute infectious diseases is about eight to one; in Mexico, it is only two to one. The ratio of adult deaths to all deaths increases, and the country must begin to focus more on the health problems of adults. The World Bank recently released a study that determined the percentage of people in the 15 – 45 age group who were dying; the levels were higher than expected. In every age group there were more male deaths than female deaths, except in one country (Pakistan). Finally, the study found that the rate of communicable disease declines as overall adult mortality declines.

The third problem that surfaces during the health transition is a larger gap between what is achievable and what is achieved. As a country moves through the health transition, it acquires the ability to prevent most premature deaths, but it lacks the money and other resources needed to actually prevent many of these deaths. This contributes to increased inequality because money becomes the determining influence on the kind of health care to which a person has access. In the 1880s, a king with an acute illness did not have much better health care than a peasant with the same condition — there wasn't much to be done. Now, however, the king can receive much better care than can the peasant.

A fourth problem is that there may be an increase in morbidity as a country moves through the transition phase, especially as income increases. Morbidity is defined here as reported illness. As incomes increase, individuals have better access to physicians (and the physician to population ratio increases). As the society becomes more willing and able to compensate individuals for disabilities or loss from work because of illness, these conditions might be reported with greater frequency.

Fifth, the value placed on the life of persons of different age groups may change. Consider the elderly. In many societies older persons were considered to be a severe burden on society after they reached a certain age. If the lives of the elderly are prolonged, our expectation of them may

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be different. What about the value placed on the life of a child? Does it change as we have fewer children?

There are also changes in the health organization. Not that long ago, hospitals were places where you went only to die. Hospitals could do nothing to help sick people and often made the situation worse. Hospitals are still too often the place where people die, but they can provide effective intervention. Unfortunately the disproportionate level of resources that are poured into hospitals during the health transition turns them into disease palaces, and they often consume a greater share of the health budget than they did.

Causes and Consequences of Health Transition

A variety of factors may stimulate the health transition: urbanization, improved water and sanitation, improved housing, modern medicine, better nutrition, increase in the age at marriage, improved literacy, social security programs, and better communication networks. All of these factors may contribute to a longer life expectancy. There have also been negative changes occurring during this period. Consider the diet in Japan and what conditions might have been affected by dietary changes. The falling incidence of stomach cancer may reflect some change; on the other hand, increasing the fat content of the diet will surely increase the risk of cardiovascular disease. The increase of tobacco consumption is yet another example. Most tobacco in the world is produced in Asia, with China by being far the largest producer. In fact, the largest increases in tobacco consumption have been in developing countries undergoing rapid health transition. China's cigarette consumption increased 3% per year from 1970 to 1985. For Brazil the increase has been 2.5% per year, and for Indonesia 5.8% per year. In China alone, by the year 2020 about 1 million people per year (mostly men) will die prematurely from increases in tobacco consumption.

Interventions Designed to Reduce Premature Deaths During the Health Transition Phase

A health system has two fundamental purposes. One of these is to prevent premature death. A child dying of neonatal tetanus, a woman dying during childbirth, or a death from measles are but a few examples. The second purpose is to prevent and relieve unnecessary suffering. A child affected by polio, injuries from automobile accidents, and blindness from either vitamin A deficiency or untreated glaucoma are three examples of preventable disability and suffering.

According to a recent World Bank study, there are many things a country can do in the later stages of the health transition to prevent premature deaths. Many of these interventions are unrelated to health care but rather to prevention. One would be to reduce tobacco intake. Government could take a number of measures to accomplish this reduction by greatly increasing tobacco taxes, encouraging crop substitution, prohibiting smoking in public spaces such as restaurants, and prohibiting smoking on airplanes. That is, the government could make it increasingly inconvenient to smoke and by so doing attach a stigma to smoking.

In many countries, premature death, especially in young males, results from injuries, especially auto accidents, as well as from homicides and suicides. Better designs for cars and highways, increased use of seat belts, and strong laws against driving while intoxicated would certainly decrease mortality and morbidity from automobile accidents. Deaths from homicides are more difficult to deal with, as they reflect socioeconomic conditions and societal values. It is clear, however, that the wide availability of handguns and other weapons contributes significantly to the high homicide rates in such societies as the United States.

Programs that deal with substance abuse (heroin, cocaine, etc.) and excessive alcohol ingestion will also decrease premature mortality directly and indirectly through a decrease in violence. Decreasing the spread of sexually transmitted diseases will clearly reduce unnecessary morbidity and, in the case of the HIV infection, reduce mortality. HIV is now the major

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cause of premature mortality of young men and women in New York City but will have an increasingly important impact on many other countries in the midst of the health transition (i.e., Thailand). Other interventions include giving hepatitis B vaccine to infants to prevent hepatocellular carcinoma in areas of high incidence and reducing dietary fat so as to reduce cardiovascular disease and possibly cancer of the colon.

Lecture 9B: Project Formation **—— the USAID Example**

Procedures of Project Formation

Countries and donor agencies have different procedures for the identification and funding of projects in developing countries. I would like to describe the process by which the United States Agency for International Development (USAID) develops projects (Figure 1). This process frequently undergoes changes but this is the general outline of how they work. USAID first produces a development report outlining a strategy for a particular country. The next stage is the preparation and approval of the project identification document (PID). This document describes what USAID or the recipient country thinks is an interesting project ; it is like an idea paper. If, upon receiving this document, the responsible people at USAID agree that the project would be worthwhile, they produce a project paper, which becomes an official request for a project. The paper at this stage says that the government in the developing country thinks this is a good project, and there is agreement that it is a good project. The U.S. government then seeks people who are interested in doing the project, by preparing a request for proposal (RFP). Every day, the U.S. government announces the projects that it is going to fund. When consulting firms, universities, or other organizations see a project that they would like to work on, they write up a paper or proposal telling the government that they would like to bid on the project, describing how they will do it, who will work on it, and how much money will be spent. Upon receiving these responses, the government selects a group to implement the project. Whoever is chosen to do the project negotiates with USAID and signs a contract. When the project is midway along and again when it is completed, an evaluation is carried out. This entire process can be quite complicated and can take up to four years.

An Example from Mali, Africa

In 1973, the Mali government's Ministry of Health asked the U.S. government to finance the purchase of drugs and equipment for all its rural dispensaries and maternal clinics in two regions of the country. At that time, USAID did not have a mission in Mali, but in 1974 a mission was opened and the request was still pending. USAID felt, as many donors do, that simply giving commodities was not really development. They suggested to the government that they broaden their request to include rural health services, treatment and control of communicable diseases, maternal and child health services, school hygiene, and health education. USAID wanted to improve the system as a whole, because they believed that the inefficient organization of the government, reinforced by political ideologies with which they did not agree, exacerbated the problems in the country. They wanted to improve the system through training and technical assistance.

USAID sent out three project identification teams over a six-month period in 1975. One of the teams recommended providing equipment and supplies to the Ministry of Public Health. Another team developed a plan for maternal and child health centers. The third team developed a plan for training. USAID then said that they did not like any of these plans and that they were going to formulate a single plan. In 1976, they sent out a fourth team. At this point, a governor of one of the regions said he was tired of seeing teams in his regions and that he did not want any more to come. Finally, that same year, a fifth team went out and was able to go beyond the project identification stage and develop a project paper. In 1977, USAID signed an agreement with Mali for a \$4 million project. Five months later, USAID sent out a Request for Proposal. In 1978, Harvard University, which had been involved with the fifth project identification team, was awarded the contract. It was signed in June 1978, and the first team went out in July. Five years had elapsed since the time when the government first requested assistance from USAID. Most of the people from the Ministry of Public Health originally involved in the project request were no longer there. Also, most of the people from USAID involved with the planning were

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gone. New people who inherit a project will likely have their own ideas on how the project should be run. They may not even have a strong interest in the project as it was not theirs. Agendas and ideas of participants can change over a few years. By examining cases such as this one, much can be learned from the experience of others so that the process of developing projects, which certainly affects their outcome, can be improved.

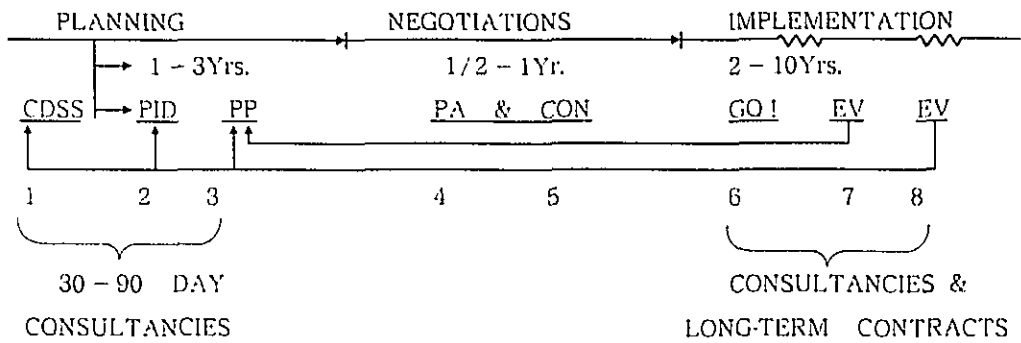
Summary

Each donor country or agency has developed their own strategy for program identification and approval. The method of the United States Agency for International Development is but one example. What is most important is to examine how the process actually works. In analyzing the development of a primary health care project in Mali some problems were highlighted. For example, the time between the generation of an idea (from either internal or external sources), and the implementation may take many years. During this time those actors from both the donor and recipient sides will have changed many times and their ideas may differ greatly from the originators of the project. These new ideas may, in fact, be an improvement. As Japan increases its involvement in international health it will need to confront these and other issues and should try to learn as much as possible from both the successes and failures of others who have gone before.

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Figure 1.

A.I.D. COUNTRY PROJECT PROCESS



STEPS

1. Country development strategy statement preparation and approval.
2. Project identification document preparation and approval.
3. Project paper preparation and approval.
4. Project agreement negotiation and signing.
5. Contract negotiation and signing.
6. Implementation.
7. Evaluation.
8. Evaluation.

Lecture 10: The Role of International Organizations in International Health Research

A Global View of Health Research

In March of 1990, the International Commission on Health Research for Development released their findings in a book entitled, "Health Research: Essential Link to Equity in Development." They noted a tremendous mismatch between the burden of illness, which is much greater in developing countries, and investment in health research, which is focused on problems of industrialized countries. Spending on health research throughout the world was estimated to be 30 billion dollars. Of this amount, only \$ 1.6 billion is being spent for the health problems of developing countries (Table 1). Although 93% of years of life lost in the world (because of premature death) are lost in developing countries, 95% of health research spending is for the problems that primarily affect industrialized countries. This spending pattern is predictable because the developed countries have the money.

Of the \$ 30 billion total, \$ 13 billion is spent by the pharmaceutical companies, which are based almost exclusively in developed countries. The market for these companies is in the developed countries. Consequently, there is much less interest in doing research on drugs that poor people need. The drug Ivermectin, which is very effective in treating onchocerciasis, or river blindness, was given by the drug company that developed it to the World Health Organization. Since the disease is found only in the poorest countries of Africa, there were no profits to be made. The public relations generated by this generous donation were far more valuable than whatever limited profits might have come from selling the Ivermectin.

Of the \$ 1.6 billion spent on the health problems of developing countries, about 40% comes from the developing countries themselves; most of it is government money. The remainder comes from industrialized

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countries ; however, this money is primarily spent in the industrialized countries (\$ 150 million is transferred each year to the Third World for health research). Most of the research money spent outside of Europe, the U.S., and Japan comes from eight nations : Argentina, Brazil, China, India, Mexico, Saudi Arabia, South Korea, and Taiwan.

Health research is supported by many different contributors, including industry (primarily the pharmaceutical industry) ; nongovernment organizations (NGOs) ; foundations (e.g. Sasakawa, Rockefeller and Clark) publicly funded research institutions (e.g. the National Institutes of Health in the United States) multilateral organizations (e.g. the WHO and UNICEF) and governments. Foundations are particularly effective in opening new areas of research as they are more flexible than governments.

Recommendations

Support for research on problems in the developing world tend to focus on problems of human reproduction and contraception, diarrhea, tropical diseases, and AIDS. Though there is still much to be done in all these areas, there are a number of other conditions where far more research could be undertaken such as : acute respiratory infections, tuberculosis, sexually transmitted diseases, injuries, mental and behavioral problems, and chronic diseases. The Commission also noted that "Especially lacking is support for research that informs health policy, management, and resource allocation decisions..."

The Commission offered four recommendations that can be summarized as follows :

1. "All countries should vigorously undertake essential national health research (ENHR) to accelerate health action in diverse national and community settings, and to ensure that resources available for the health sector achieve maximum results." It recommended that countries should invest at least 2% of national health expenditures to support ENHR.

2. The efforts of developing countries should be joined with efforts in industrialized countries so that the world's scientific capacity is focused

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on health problems of high priority.

3. "Larger and more sustained financial support for research from international sources should be mobilized to supplement investments by developing countries." Development assistance agencies should commit at least 5% of health project aid for research and research capacity building.

4. To monitor progress and to promote financial and technical support for this research, and international mechanism should be established.

Collaboration, Efficiency, and Increasing Resources for Research

We can hope that the future will bring more collaboration and joint projects between different donors. Every donor generally wants a project to be identified as theirs; this desire is understandable. The notion of collaboration between different donors is, however, gaining greater acceptance.

Collaboration reduces the risk of different groups working at cross purposes; it allows for a more efficient use of scarce funds, and it creates a critical mass of scientists working on one problem. Many countries must face the challenge of mounting debts and structural adjustment in order to reduce their debt burdens. Money for health programs and research is becoming increasingly hard to obtain. When countries start to pay off their loans, the social sectors – health and education – suffer the greatest loss of income.

The military and the bureaucracy usually seem to protect themselves from budget cuts. This trend will certainly impact on health programs and research. Will overseas development assistance (ODA) from the world's more affluent societies make up this difference?

The Role of Universities

In Japan, there is increasing interest in whether universities should play a larger role in international health and if so how that role should be defined. Let me give some examples from the academic institution with which I am most familiar, Harvard University. Within the university that are a number of departments, schools, and institutes that are involved in

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international health activities, the most prominent of which are the Harvard Medical School (HMS), the Harvard School of Public Health (HSPH), and the Harvard Institute for International Development (HIID). As I am affiliated with the latter two institutions, I will confine my remarks to them.

HIID is an interdisciplinary institution with a focus on development and with specialists in economics, agriculture, education, anthropology, sociology, and health. The institution is based on the idea that you cannot teach and write about development unless you are involved in development related activities. In Japan, there tends to be a separation between practitioners and academics. In addition, in Japan, the study of economic development or other fields of development does not seem to be recognized as an area in which one can specialize. Development studies has been recognized as a legitimate field of study at Harvard and HIID does allow faculty to be involved in these activities.

The institute then has three different mandates ; development assistance, teaching, and research. In development assistance, it responds to requests from developing countries. Advisors are sent to different countries, just as JICA sends advisors. One stipulation is that there be a strong element of training in each project that is their transfer of ideas and technology. If the country does not provide good counterparts then there is much less chance that anything of value will be left behind. The case-study method is used in much of our teaching ; projects provide limitless teaching material. We conduct both formal and informal research. Informal research simply means that in being an advisor, questions are always asked of the implementation efforts and results. Research is about asking question, and *the good researchers are the ones who know how to ask the right questions.*

There are two principles followed at HIID. First, we work with policy makers to help clarify their choices, not to make the choices or sell a particular point of view. As a university, we have an advantage because we do not have to promote policies of a government, foundation or donor ; we can be independent. Many countries ask for assistance because they recognize that we will give an independent view.

Health takes up 15 – 20% of HIID's activities. Some of the activities

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in which we are currently engaged include: a maternal and child health project in the Cameroons; a project that examines the relationship between the price of rice and the nutritional status of children in Malawi, a project that is examining the relationship between Vitamin A childhood morbidity and mortality in the Sudan; and the development of a school of public health in Zaire,. Another major activity is the Applied Diarrheal Disease Research Project. This supports interdisciplinary research by local investigators in such countries of Mexico, Pakistan, Indonesia, Thailand, Kenya, and Nigeria.

Harvard School of Public Health

The Harvard School of Public Health (HSPH) is one of the graduate schools at the university. About thirty percent of the students are from countries other than the U.S.. The School has four strategies in the international health area. The first is capacity building, which involves linking up with other institutions. There is, for example a long-standing relationship between HSPH and the Shanghai First Medical College, as well as the Center for Health Policy Analysis in Mexico. The second strategy is called the cross-roads approach, that is the linking students, faculty, and other groups. A major problem of students from developing countries is the lack of an adequate information system. Written material (e.g. journals, books) are difficult to obtain; it is also difficult to meet many people with similar interest outside their country. As it is especially difficult to do research in isolation, one of the things that the developed countries can do for people from the developing world is to help them to communicate with investigators from around the globe. The third strategy involves fields linkages, that is developing relationships with other countries so that student can go to learn there. Japanese schools could certainly benefit from such arrangements. The last strategy is advanced research, an activity in which any academic institution must be involved in.

There are several international health programs and research activities at HSPH. The Takemi Program in International Health, named after the former president of the Japan Medical Association, brings together

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international health scholars who come for one year to work on their research activities, and interact with different faculty members. The program, now in its sixth year has hosted over forty scholars and conducted three international symposia, and published books on each. The Commission on Health Research discussed earlier for Development was based at the HSPH. The AIDS and Reproductive Health Network brings together AIDS researchers from many different countries, especially from Africa. In addition there are a number of investigators working with colleges in different countries on AIDS related research. Other activities are examining the epidemiology of cancer worldwide and women's health issues. The list is long and ever changing.

The international health activities at HIID and the School of Public Health are funded from a number of different sources. These include the government, foundations, the world bank and private firms. It is important for any institution to have a diverse source of funding as it decreases dependency and increases the likelihood of academic freedom.

Summary

The money spent on health research worldwide does not reflect the health problems of the world's population. Only five percent of the money is spent on health problems that affect much of the developing countries. In addition the developing countries themselves spend little on research activities that would solve local problems, especially those that deal with policy and development. The Commission on Health Research for Development has just issued a report that has offered a four point plan to increase funds and support for this research. Universities in industrialized countries can be effective partners with their counterparts in developing countries in helping to conduct research and improve health care. In addition, by working on the problems in developing countries and incorporating these issues into their curriculum, they can provide more relevant training to foreign students and enrich the education of their own students and faculty.

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Table 1. Health Research for Development Total Expenditure, by Source

Source	1986 Expenditure US \$
<u>Industrialized Countries</u>	950
Public Research	350
Industry	300
Bilateral ODA	130
Multilateral Contributions	110
Foundations	50
Non-Governmental Organizations	10
<u>Developing Countries</u>	685
Public	650
Industry	20
Multilateral Contributions	15
Total	1,635

The seminar on "International Health Cooperation" was held from 28 March to 23 May, 1990 at the Institute for International Cooperation of JICA.

* Lecturer : Dr. Richard A. Cash (Harvard University)

* Class leader : Dr. Tokiko Sato (JICA Development Specialist)

* Seminar Coordinator : Tsuneo Kurokawa (Staff of JICA)

JICA