Epidemiological Bulletin

PAN AMERICAN HEALTH ORGANIZATION

ISSN 0256-1859 Vol. 7, No. 4, 1986

Problems of Occupational Health in the Americas

In the Region of the Americas knowledge of the problems of occupational health is limited by significant restrictions in available information. There is no ordered or complete information system on occupational morbidity[1] and mortality. Few countries have up-to-date information on occupational accidents and diseases, and in most the data refer to events that are no longer current. This situation is partly due to the fact that most of the working population is not protected by social security systems; broad labor sectors resort to other health services (official services of the ministries of health, private offices, healers, and others) where work-related diseases and accidents are not recorded. When information is available; accidents constitute most of the health problems recorded by workers and this seriously hinders the diagnosis of other work-related diseases.

The lack of information on occupational diseases can be explained in terms of the following factors:

- Many physicians who work in the health services of specialized labor centers and as general practitioners are not acquainted with specific work pathology and interpret it as common pathology. Consequently, occupational diseases may not be diagnosed as such. This fact is related to a deficiency in occupational health teaching in medical schools.
- For the same reasons indicated, broad sectors of the worker population do not have access to occupational health services, and when they are served by general services, labor pathology is registered as common disease.
- Occupational diseases, unlike accidents, do not always violently interrupt the labor process; the worker who suffers from a morbid process caused by work usually continues his functions, although his capabilities are diminished. The onset of occupational diseases is usually slow and progressive and, since functional reserves are potentially high, manifestations likely to be detected by the worker or health personnel appear only in the later stages, sometimes even after the worker has retired from his work place.

The situation described is aggravated because most countries do not have classification lists for occupational diseases or, if they have them, they are very heterogeneous; moreover, compulsory mechanisms for

[1] For the purposes of this article, occupational morbidity is understood to mean the range of acute and chronic illnesses that take place in the worker population during work performance, deriving from work, or owing to factors present in the workplace. This concept includes accidents at work, chronic diseases that occur in workers exposed to harmful factors, and accidents while commuting.

IN THIS ISSUE . . .

reporting of occupational diseases generally do not exist, and the information collected is rarely analyzed.

Another element that restricts knowledge of the problem is the limited amount of research carried out in this field. There is a notable contrast between research on occupational health and that developed in other health fields. In general, research in the clinical area predominates to the detriment of epidemiological and social studies. Execution of this type of research, framed in the general and specific conditions of each country, should be the basic principle supporting occupational health actions.

In spite of the above, there are some demographic data that make it possible to examine the relative magnitude of the labor population in recent years, and its variations in accordance with the level of development of the countries of the Region. In the period between 1960 and 1981 the countries with high industrial and agricultural development showed the highest percentages of economically active population, as was the case of Argentina, Canada, the United States, Trinidad and Tobago, and Uruguay. On the other hand, in 1981 countries with single-crop agricultural export economies, such as Haiti, Honduras, and Nicaragua, showed the lowest percentages of active population: 53% for the first and 50% for the last two. It is interesting to note the changes in the trends of these percentages between the years 1960 and 1981 (Table 1). While there were countries such as Colombia, Costa Rica, and Trinidad and Tobago where the working population increased by 10%, there were others, such as Cuba, Ecuador, El Salvador, and Nicaragua where it remained stable, and still others, such as Argentina and Haiti, where the work force suffered a significant relative reduction.

The population occupied in agricultural activities in 1980 ranged between 2 and 5% in the United States and Canada, respectively, and 74, 63, and 55% in Haiti, Honduras, and Guatemala, although all countries with high percentages of agricultural work force in 1960 showed an appreciable decline in 1980. This situation appears to be related to the mechanization of agriculture and the trend of rural population migration to the cities. Technological changes in agriculture, such as the use of agricultural machinery and pesticides, have

Table 1. Percentage of the work force by economic activity in 24 countries of Latin America and the Caribbean.

Country	Population (in thousands)	Economically active population (%) (15-64 years old)		Work force (%)					
				Agriculture		Industry		Trade	
	1980	1960	1981	1960	1980	1960	1980	1960	1980
Argentina	27,064	64	63	20	13	36	28	44	59
Bolivia	5,600	55	53	61	50	18	24	21	26
Brazil	123,032	54	55	52	30	15	24	33	46
Canada	23,940	59	67	13	5	34	29	52	66
Chile	11,104	57	62	31	19	20	19	50	61
Colombia	27,090	50	60	51	26	19	21	29	53
Costa Rica	2,245	50	59	51	29	19	23	30	48
Cuba	9,833	61	61	39	23	22	31	39	46
Dominican Republic	5,431	49	53	67	49	12	18	21	33
Ecuador	8,354	52	52	57	52	19	17	23	31
El Salvador	4,813	52	52	62	50	17	22	21	27
Guatemala	7,260	51	54	67	55	14	21	19	25
Haiti	5,010	55	53	80	74	6	7	14	19
Honduras	3,691	52	50	70	63	11	15	19	23
Jamaica	2,192	54	54	39	21	25	25	36	53
Mexico	71,910	51	52	55	36	20	26	25	39
Nicaragua	2,703	50	50	62	43	16	20	22	37
Panama	1,840	52	56	51	27	14	18	35	55
Paraguay	3,070	51	53	56	44	19	20	25	36
Peru	17,780	52	54	52	39	20	18	28	43
Trinidad and Tobago	1,140	53	63	22	10	34	39	44	51
United States of America	227,158	60	66	7	2	36	32	57	66
Uruguay	2,899	64	63	21	11	30	32	50	57
Venezuela	13,913	51	55	35	18	22	27	43	55

Sources: Pan American Health Organization. *Health Conditions in the Americas 1977-1980*. Scientific Publication 427. Washington, D.C., 1982, Annex I-2, p. 169; World Bank. *World Development Report 1983*. Washington, D.C., 1983, Table 21, p. 188.

had a significant impact on workers' health. Several studies carried out in Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua recorded 19,330 cases of intoxication related to agricultural use of insecticides between 1971 and 1976. Considering that these results represent only the most seriously ill patients who sought hospital care, it can be assumed that the total figures are considerably greater *(1)*.

The steady increase of the population occupied in trade is significantly related to the increase in unemployment and underemployment, which are the results of the current economic crisis and of the search for informal work opportunities in this area of activity. A large portion of the latter population lacks medical services and any type of occupational health protection.

In recent decades, a considerable number of agricultural workers has been migrating from the countryside to the city where it constitutes a poorly skilled work force exposed to new and adverse labor conditions. This marginal population of urban areas is also subjected to other consequences, such as the deterioration of food intake, environmental pollution, inadequate housing, precarious health conditions, and unemployment. The latter currently constitutes one of the most important problems in the countries of the Region. Around 20% of the economically active population is unemployed and, if underemployment is added to this, the total would reach 40% of the work force in some countries. Occupational health actions have made few inroads in this field and it will be necessary to consider the different activities performed by this commonly named "informal sector," to determine its morbidity and mortality profiles and the role that occupational health should play in their control.

One problem that stands out in many countries of Latin America and the Caribbean is that of the participation of minors in the work force. It is known that minors between the ages of 5 and 14 make up 13% of the working population *(2)*. Information on this subject is limited and the little data available do not reflect the magnitude of the child labor problem. Theoretically, labor laws in most countries prohibit the employment of minors, which means that in certain production centers child labor does not appear on official records. On the basis of studies carried out in some countries, it is estimated that in 1984 there were approximately 15 million children under 15 years of age working in Latin America *(1)*. Official documents showed that in that same year, in 13 countries of Latin America and the Caribbean, the number of child workers between 10 and 14 years of age came close to four million (Table 2). This critical situation is all the more complicated since these children are usually not protected by any occupational health program or, worse still, by any type of health service.

Table 2. Child workers: economically active population between 10 and 14 years of age[a] in some countries of the Region of the Americas.

Country (Year)	Total	Child workers (%)
Argentina (1983)	198,034	8.1
Bolivia (1976)	71,636	31.1
Brazil (1980)	1,922,218	14.2
Costa Rica (1983)	19,859	13.7
Ecuador (1982)	64,957	6.3
El Salvador (1980)	85,727	13.6
Guatemala (1981)	78,878	10.4
Haiti (1982)	138,823	24.0
Honduras (1983)	78,755	14.8
Mexico (1980)	1,121,816	12.1
Panama (1980)	9,572	4.2
Paraguay (1982)	45,140	11.8
Peru (1981)	124,231	5.7
Subtotal, 13 countries	3,959,646	
Colombia[b]	3,000,000	11.4
Total	6,959,646	

[a]Adapted from *Yearbook of Labor Statistics*, International Labor Organization, 1984.
[b]Data on Colombia estimated by the Ministry of Labor and Social Security (information for 1979).

Another element to be considered is the quantity and quality of occupational health services. In the Region there are various academic and operational organizations engaged in services research and training of human resources in occupational health; among them, the institutes of social security, secretariats or ministries of health and labor, universities and institutes, and also the occupational health services of corporations. In most cases, social security, as the institution responsible for protecting the worker population, has attained the greatest degree of development in occupational health programs. Unfortunately, social security coverage in some countries does not even amount to 10% of the total labor population, and the great majority remains completely unprotected.

Although labor legislation in most countries envisages requiring companies to provide health services, only a few fulfill this requirement. Those that do so, mainly set up centralized curative medicine services, where the component for industrial hygiene and safety, toxicology, or ergonomics is either very limited or nonexistent.

Universities have an important role to play in the training of professionals through education and research activities on occupational health. However, there is such a broad range of educational systems in the different countries, that some have programs at the undergraduate, graduate, and continuing education levels, while others do not include occupational health contents even in the undergraduate curriculum of the medical schools.

Fundamental changes in morbidity and mortality profiles have emerged in most countries. While infectious diseases have shown a declining trend, accidents and work-related diseases have been increasing. This is reflected in the death rate due to traffic accidents, inasmuch as many of them are work-related. Venezuela, Mexico and Panama had the highest rates in 1980 with 37.4, 26.8 and 20.0 deaths per 100,000 population, respectively *(3)*.

A significant number of traffic accidents occur during travel to and from work centers, adding further complications for the worker population that is suffering from the impact of new living conditions in large cities. In Colombia, for example, morbidity rates due to accidents for the period between 1977 and 1980 were higher in men than in women, this difference being more pronounced in the group between the ages of 15 and 44 years, which "could be attributed to the greater risk deriving from work, since 40.0% of the accidents are related to labor activity" *(4)*.

A study carried out in Mexico analyzed the heterogeneity of industrial labor processes as reflected in the various patterns of physical deterioration among workers. The authors identified three groups: the first, representing 12% of the workers, engages in simple manufacturing processes characterized by rudimentary technology, considerable physical effort performed during a long workday, and wages that are below the average industrial wage. The typical pattern of deterioration in this group is expressed in infectious-nutritional and musculoskeletal pathology. The second group includes 30% of the workers and it labors in machine processes characterized by a growing fragmentation of tasks which can reach the extreme of comprising only a few movements performed in less than 15 seconds. These workers' deterioration pattern is expressed in a growing number of accidents, together with psychic, psychosomatic, and osteoneuromuscular pathology. The last group, which represents 55% of industrial workers, performs its functions in discrete automatic processes or continuous flow processes, which for the most part are not very complex in technology or in the number of phases involved. In this group deterioration is manifested by diseases derived from prolonged psychic tension, serious accidents, and malignant tumors *(5)*.

Another study, also carried out in Mexico, was centered on electricians who work with high-voltage current. It showed that this group of workers not only suffers a higher frequency of accidents but also a number of diseases that according to common medical interpretation do not appear to be work-related. Thus, hypertension and diabetes rates were four times greater than those of the control group; those for ischaemic heart diseases, six times greater; and those for peptic ulcer, eleven times greater. Morbidity excess was also expressed in a reduced survival rate, since after 10 years of retirement only 61.6% of those exposed to high-voltage electricity were still alive as opposed to 93.4% of the control group *(5)*.

The International Labor Organization points out that in 1984, 6,843 fatal cases of work-related accidents were recorded in the Region. This figure seems unrealistic when compared to the figures provided by the countries. Brazil alone, with a worker population of 25 million, notified 1,117,832 work-related accidents in 1982 with death rates reaching 18 per 100,000 population. In regard to morbidity, WHO studies that include other countries such as Bolivia, Chile, Colombia, Ecuador, and Peru point out that the annual incidence of work-related accidents affects between 21 and 34% of the active population.

With work diseases the situation is more critical, since existing information is very limited. While accidents account for more than 90% of the total morbid processes officially recorded as work-related, work diseases recorded in some countries do not reach 1%.

In a survey carried out in 1984 by the Pan American Health Organization on occupational diseases in 12 countries of Latin America and the Caribbean, it was found that 25% of work pathology is due to lead poisoning, pesticides, and alcohol; 24% to respiratory diseases, which include silicosis, byssinosis, and asthma; 20% to occupational dermopathies; 14% to hypoacusis and deafness, and 17% to diseases of the musculoskeletal system, and infectious and mental diseases. Most of this pathology was produced in the mining industry. The foregoing illustrates the need for occupational pathology, and especially toxicology, to be given special attention within the epidemiological surveillance of worker's health.

From what has been stated it may be derived that knowledge of the type and magnitude of health prob-

lems related to work is incomplete and that there is an urgent need to develop and expand occupational health programs. However, this will only be feasible after adequate knowledge of the problems involved and of their determining factors is obtained. For this reason it is essential to organize information and epidemiological surveillance systems, preferably under common guidelines, in order to determine with firmer technical bases the true extent of biological and social damages, and the current effectiveness and efficiency of existing programs.

(*Source:* Workers' Health Program and Health Situation and Trend Assessment Program, PAHO.)

References

(1) Pan American Health Organization. *Enfermedades ocupacionales. Guía para su diagnóstico.* Scientific Publication 480. Washington, D.C., 1986.

(2) Pan American Health Organization. *Health Conditions in the Americas, 1981-1984.* Scientific Publication 500. Washington, D.C., 1986.

(3) Pan American Health Organization. Traffic Accidents in the Americas. *Epidemiological Bulletin* 5(2):1-4, 1984.

(4) Colombia. Ministerio de Salud. *Población y morbilidad general. Morbilidad sentida 1977-1980.* Bogotá, 1983.

(5) Laurell, A. C. Epidemiología, proceso colectivo de salud y enfermedad. *Información Científica y Técnica* (México) 7(103), 1985.

Acute Respiratory Infections in a Cohort of Malnourished Children in Mexico City

Introduction

Acute respiratory infections (ARI), along with diarrheal diseases, are the most common causes of morbidity and mortality among children in developing countries. It is estimated that each year there are 2.2 million ARI-associated children deaths *(1)*. The burden imposed by these infections on health services is considerable; in many clinics, they account for about one quarter of all consultations. Besides, they have other important consequences; one to two weeks of school per child per year may be lost because of ARI *(2)*.

In spite of the excessive mortality and morbidity rates due to ARI, little is known about associated risk factors. Malnutrition is said to increase children's risk of contracting ARI *(3)* but this claim has not been clearly substantiated. It is, however, associated with increased mortality by that cause *(1)*. In Mexico, for instance, childhood mortality due to ARI is about 30 times higher than in the United States and Canada *(2)*, and malnutrition is often given as the underlying cause *(4)*. Complications of ARI have been found significantly more frequently in malnourished children *(5)*.

Two studies provide information about the occurrence of ARI in malnourished children. A longitudinal study by James *(5)* concluded that the attack rate was the same for malnourished and normal-weight children, but that the average duration was significantly longer for the former. This study evaluated nutritional status several times during the follow-up period but it was assumed to remain constant at the level assessed at entry. In addition, duration was defined as the sum of all days ill during the year, without controlling for number of episodes. A cross-sectional study by Wray *(6)* found the prevalence of ARI to be similar in normal and malnourished children. However, as in most cross-sectional studies, the direction of causality could not have been established even if an association had been found.

The objective of the present longitudinal study was to examine the association between nutritional status and the incidence and duration of ARI. The results indicate that nutritional status, defined in anthropometric terms, was not a predisposing factor for increased incidence or prolonged duration of ARI in this population.

Methods

This study was based at the Center for Primary Health Care Studies (CPHCS), a joint venture of the Ministry of Health and the National Autonomous University of Mexico. The Center is located in Tlalpan, a district in the southern part of Mexico City, and

serves a community with a wide socioeconomic range, including urban squatters. A group of physicians and nurses from the Center was trained in interviewing and standardized anthropometric assessment, according to WHO guidelines *(7)*.

To identify and recruit a cohort of about 300 children with equal representation in the different nutritional categories under consideration (normal, mild and moderate), 3,241 children under 3 years of age from the community served by the Center were identified and measured (weight and length) for screening purposes. The National Center for Health Statistics (NCHS) tables were used as standards. The categories normal, mild malnutrition, and moderate malnutrition were defined as in Table 1. Exact age of all children was obtained from birth certificates. Of all the children measured, 63% had normal weight-for-age, 31% had mild malnutrition, 5% had moderate malnutrition and less than 1% had severe malnutrition. The few children in the latter group received special medical intervention to improve their nutritional status, and were combined with the moderate malnutrition group for analysis.

All available children under 2 years of age with moderate malnutrition were matched for age, sex, and place of residence (neighborhood) with children from each of the other two categories, by randomly selecting for all potential matches. A sample size of 300 children was selected in this manner. However, 16 of these children moved away just before the study started, leaving a total of 284 subjects. Written informed consent was obtained from the parents of all the children in the study.

The children were measured (weight, length and arm circumference) at the beginning of the study and every three months thereafter; thus, there were five measurements for the 246 individuals (86.6%) who completed the 52-week study. Children were weighed nude or with minimal clothing on semiportable scales, precise to the nearest 10 grams. All scales were regularly calibrated. Length was measured to the nearest 0.5 cm, with the child recumbent on a portable platform and at least two people involved in the measurement.

Information on frequency and duration of ARI was obtained in weekly home visits. The visiting teams (a doctor and a nurse) interviewed the mother and examined the child. An episode of ARI was defined as having signs and symptoms of any of the following syndromes: common cold; otitis media; pharyngotonsillitis; bronchitis; or pneumonia. The first three syndromes, which frequently coexist, were also classified as upper respiratory infection (URI). The last two syndromes were considered lower respiratory infection (LRI). An

Table 1. Relative risk (RR) of acute respiratory infection according to nutritional status (defined anthropometrically).

					Adjusted RR[b]		
Weight/age	% of standard	No. person-years	Episodes per year	Crude RR[a]	Sex	Age	Quarter
Normal	>90	101	8.7	1.0	1.0	1.0	1.0
Mild	75-89	135	9.1	1.0	1.0	1.0	1.0
Moderate	<75	37	9.5	1.1	1.1	1.1	1.3
Height/age							
Normal	>95	121	8.6	1.0	1.0	1.0	1.0
Mild	90-94	101	9.2	1.1	1.0	1.1	1.1
Moderate	<90	51	9.4	1.1	1.1	1.1	1.1
Weight/height							
Normal	>90	214	8.9	1.0	1.0	1.0	1.0
Mild	80-89	51	9.3	1.0	1.0	1.0	1.1
Moderate	<80	8	8.6	1.0	1.0	[c]	1.0

[a]Relative risk, taking "normal" category as standard.
[b]Adjusted by direct standardization.
[c]Not computed because of scarce numbers.

episode was considered ended when the child remained free of symptoms for two consecutive days.

Frequency and duration of ARI were obtained for every child during each three-month period between anthropometric measurements. In the event that the mother or an informant on the child's health was not present, the visit was considered incomplete, and as many as three more attempts were tried during that week. If the child was absent for four or more consecutive weeks, he or she was dropped from the study. Only weeks for which a visit was completed contributed to follow-up time. Thus, occurrence of ARI was expressed as incidence-density, having person-time experience as denominator *(8)*. In data analyses, this person-quarter information was accumulated for the four quarters to make person-years, assuming that each person-quarter of observation is independent. That is, a child who changed nutritional status during the study could contribute person-time to more than one category of nutritional status. Direct standardization was employed to compare the mild and moderately malnourished children with the normal children, which were taken as the standard *(8)*.

Formal tests of significance or confidence limits were not computed for the rate ratios in Table 1, due to the fact that the observations were not independent. This was true for two reasons: more than one episode of ARI might have occurred per child, and the person-quarter contributed by a child was accumulated to make person-years. Measures to control the nonindependent nature of the observations, such as a multivariate model incorporating an autoregressive variable were not included in this analysis.

Results

A total of 284 children under 2 years of age started the study and 246 completed the follow-up for one year. Migration was the only cause of loss to follow-up; no deaths occurred. The mean age at the beginning of the study was 12.7 months. The sex distribution was almost equal throughout the year (Table 2).

In spite of the attempt to have a balanced number of children in each one of the nutritional categories, by the time the study started several children in the normal and moderate categories had already moved to the mild category. During the year of follow-up, 46% of the children changed their nutritional status. Thus, at the beginning of the study the number of children with normal weight-for-age was 93, with mild malnutrition 130, and with moderate malnutrition 61. In addition, during the follow-up period the number of children in the moderate malnutrition group decreased at every nutritional assessment.

Table 3 shows the crude number of episodes of ARI per child-year of observation, and the breakdown by age and sex. On the average, these children suffered nine different ARI episodes in a year. Males had 14% more episodes than females. The incidence density of ARI was similar for the different age groups.

The relative risk of ARI according to nutritional status is shown in Table 1. Nutritional status was defined anthropometrically by three separate classifications: weight-for-age (underweight), length-for-age (stunting) and weight-for-length (wasting). The risk of ARI for mildly and moderately malnourished children,

Table 2. Number, age (months), sex and nutritional status (weight-for-age) of the children at the beginning of each quarter and at the end of the study.

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	End of study
Number	284	284	269	252	246
Sex					
% males	51.1	51.1	52.0	53.2	54.1
% females	48.9	48.9	48.0	46.8	45.9
Age					
Mean	12.7	15.7	18.8	21.7	24.7
SD	± 5.9	± 5.9	± 6.0	± 5.9	± 6.0
Weight/Age					
Mean	84.0	84.4	86.5	88.2	87.6
SD	±12.4	±11.5	±10.7	±10.3	±10.1

Table 3. Number of acute respiratory infection episodes per person-year by age (months) and sex.

Age	Males		Females		Both sexes	
	Person-years	Episodes per year	Person-years	Episodes per year	Person-years	Episodes per year
0-5	6	8.3	6	8.9	12	8.6
6-11	25	9.9	24	9.0	49	9.4
12-17	42	9.6	39	8.8	81	9.2
18-23	42	8.8	36	8.1	78	8.5
24-29	23	10.0	21	8.0	44	8.1
30-36	3	11.6	6	8.2	9	9.4
	141	9.7	132	8.5	273	9.0

relative to the normal, was calculated in a crude form and after adjusting for sex, age and quarter (season) of the year. Preexisting malnutrition was not shown to be a risk factor for subsequent ARI, regardless of the anthropometric classification adopted.

Duration of ARI was defined as the number of days an episode lasted. There was no appreciable difference in the mean duration of ARI episodes by nutritional status, sex and age (Table 4). Episodes of ARI in the last two quarters (cold season) were 56% longer ($p<0.05$) than episodes during the first two quarters (warm season).

Table 4. Mean duration of acute respiratory infections according to nutritional status, sex, age (months), and quarter.

Weight/age	No. person-years	Mean duration	(±SD)
Normal	86	5.0	(±3.3)
Mild	118	5.0	(±4.3)
Moderate	31	5.1	(±3.6)
Sex			
Male	122	5.1	(±4.1)
Female	113	4.9	(±3.7)
Age			
0-5	9	3.7	(±2.4)
6-11	43	5.1	(±4.4)
12-17	69	4.8	(±3.8)
18-23	68	4.4	(±2.6)
24-29	39	6.2	(±4.7)
30-36	7	7.0	(±5.3)
Quarter			
Q1	56	3.4	(±1.8)
Q2	62	4.4[a]	(±2.6)
Q3	63	5.9[b]	(±4.9)
Q4	55	6.3[b]	(±6.3)

[a]Statistically significant ($p<0.05$) difference with respect to the first quarter.

[b]Statistically significant ($p<0.05$) difference with respect to the second quarter.

Discussion

The results of this study suggest malnutrition is not a predisposing factor for ARI in children. Since children had their nutritional status reassessed every three months, the failure to observe an association cannot be ascribed to increasing misclassification that would otherwise occur in a study with prolonged follow-up. Furthermore, age and sex were not good predictors of ARI. Children suffered a mean number of nine different episodes of ARI during a year, with a mean duration of five days per episode. Thus, on the average, children spent 13% of the year with ARI. These episodes were significantly longer during the cold season compared to the warm season.

There are limitations in this study that should be noted. The number of children in the moderate malnutrition category at the beginning of the study was considerably lower than in the other two categories, and that difference increased with time. That is, there was a specific loss of children in the moderate category due to nutritional improvement. The effect of severe malnutrition on ARI occurrence could not be studied, because no severely malnourished children were followed up. In addition, the diagnosis of ARI was based on the best judgment of the health teams visiting the homes, and sometimes only on the mother's description of the syndrome. This nonspecificity of diagnosis does not permit analysis of the effect of malnutrition on

individual syndromes, or on their relative frequency of occurrence. At best, it is only possible to separate with reasonable specificity between upper (URI) and lower (LRI) respiratory infection. In this study, URI accounted for 96% of all ARI episodes. Thus, the specific relationship of nutritional status with LRI, a potentially more serious illness, was not addressed.

It is possible that infection by such a contagious disease as ARI is unrelated to nutritional status. The potential effect of malnutrition on ARI might be manifested only through the more frequent complications *(5)* and increased mortality *(2, 4)*. Much larger studies would be needed, however, to address the relationship between malnutrition and occurrence of complications or death. The deleterious effect of ARI on nutritional status also deserves closer investigation.

References

(1) Bulla, A. and Hitze, K. L. Acute respiratory infections in children: A review. *Bull WHO* 56:481-498, 1978.

(2) Chretien, I. *et al.* Acute respiratory infections in children: A global public health problem. *N Engl J Med* 12 de abril de 1978.

(3) Pan American Health Organization. Acute respiratory infections in children. Washington, D. C., 1983. (RD/21/3.)

(4) Puffer, R. and Serrano, C. V. *Patterns of mortality in childhood. Report of the Inter-American Investigation of Mortality in Childhood.* Scientific Publication 262, Washington, D.C., Pan American Health Organization, 1973.

(5) James, J. W. Longitudinal study of the morbidity of diarrhoeal and respiratory infections in malnourished children. *Am J Clin Nutr* 25:690-694, 1972.

(6) Wray, J. and Aguirre, A. Protein-calorie malnutrition in Candelaria, Colombia. *J Trop Pediatr* 15(3):76-98, 1978.

(7) World Health Organization. *Medición del cambio del estado nutricional.* Geneva, 1983.

(8) Rothman, K. J., and Boice, J. D. *Epidemiological Analysis with a Programmable Calculator.* Boston, Epidemiology Resources Inc., 1982.

(Source: Based on: Sepúlveda Amor, J. Malnutrition and Infectious Diseases: A Longitudinal Study of Interaction and Risk Factors. Ph. D. dissertation, Harvard University School of Public Health, Boston, Massachusetts, May 1985.)

Editorial Comment

This study demonstrates that it is possible to use data from household visits to perform sound epidemiological research which yields results of interest to disease control programs. Its findings coincide with those of similar research in other countries, namely, that no evidence of association has been found between the incidence of any form of ARI and any degree of malnutrition. However, the association between malnutrition and the occurrence of severe forms of lower respiratory tract infections (pneumonia and bronchopneumonia) has been found to be quite strong.[1]

In the present study, the author points out that (the usually mild) upper respiratory infections accounted for 96% of all ARI. Malnutrition was also predominantly mild, and children with severe malnutrition were not studied at all. The effect of moderate malnutrition was evaluated to a certain extent, since only about 20% of the children had moderate malnutrition at the beginning of the study, and—due to nutritional improvement—even fewer children were in this category at the end of follow-up. Thus, the conclusions regarding the absence of a predisposing effect appear to be restricted to mild malnutrition and mild forms of ARI.

In line with the recommended practice of seeking alternative explanations for the observed results, two kinds of conjectures deserve consideration. The first one deals with the possibility that mothers of better nourished children might tend to detect and report minor respiratory signs more often than some of the mothers of malnourished children. Should such be the case, then it would lead to a systematic error which would tend to obscure an existing effect. The second set of conjectures deals with the potential duration of the effect of malnutrition on ARI. If such an effect does indeed exist, and if it should persist for some time after the malnutrition has been corrected, then this effect might not be detected by the analysis as performed. Rather, it would be necessary to keep the children in the nutritional category corresponding to their original assessment for a time period as long as the assumed duration of the effect. Fortunately, many of the different hypotheses for effect duration can be explored with the data set at hand, and it is hoped that this may still be done.

In summary, this study, like any study that has been designed and carried out with care, provides answers to some questions while suggesting others. Future research is expected to focus on more severe forms of ARI, and on incidence of ARI in children with more severe forms of malnutrition. Surely, these studies will suggest new questions in their turn. In the meantime, actions should not have to wait, and what is already known should be applied without delay.

---

[1]The magnitude of the problem of acute respiratory infections. In: *Acute Respiratory Infections in Children. Proceedings of an International Workshop, Australia, August 1984.* University of Sydney, Australia, 1985, pp. 3-16.

Preliminary Report on an Epidemic Outbreak of Active Rheumatic Disease in Chile

Since the mid-seventies the South East Metropolitan Health Service (SSMSO) of Santiago, Chile, has been pursuing a line of clinical-epidemiological research in conjunction with programs for the prevention and control of streptococcal infection (SI) and its delayed sequelae, active rheumatic disease[1] and chronic rheumatic cardiopathy (ARD/CRC) and acute glomerulonephritis (AGN). The area served by the SSMSO is inhabited by 700,000 people of low and low-middle income levels, 80% of whom are cared for by the State's health system, which includes a 1,000-bed general hospital and ten local dispensaries (nine urban and one rural) scattered throughout the area in addition to eight rural posts and one 20-bed rural hospital.

For the purpose of determining the incidence of these diseases over a 10-year period, the epidemiological surveillance of SI and ARD/CRC was added to control activities in 1976 in conjunction with the launching of a National Prevention and Control Program sponsored by the Ministry of Health. The same work was begun for AGN in 1980 in the SSMSO alone.

Since 1977, the SSMSO has observed a sustained downtrend in the incidence of ARD, generally coincident after 1979 with the behaviour of the rates calculated for the Metropolitan Region, of which the SSMSO is a part, and for the country (Figure 1). An epidemic outbreak of AGN was detected in 1984; it continued throughout 1985 and has been slowly diminishing since 1986. After presenting in 1985 the lowest incidence throughout the period of observation, active rheumatic disease has given rise to an abnormal situation, which became obvious in February 1986. During the first third of the year a total of 17 cases was reported (15.08 per 100,000 inhabitants), more than expected for the same period judging by the 1980-1985 figures (6.85 per 100,000). If this situation continues, the annual rate for 1986 will be much higher than the rates seen in the six preceding years (Table 1). Figure 2 shows the estimated rate for 1986, and compares it with that of acute glomerulonephritis during 1980-1985. The ARD outbreak described came on the heels of a similar scarlet fever outbreak in the same geographic area, which began in December 1985 and should correspond to the pharyngeal SI phase that necessarily precedes ARD manifestations.

Figure 1. Annual incidence of active rheumatic disease for Chile, the Metropolitan Region (MR) and the South East Metropolitan Health Service (SSMSO), 1975-1985.

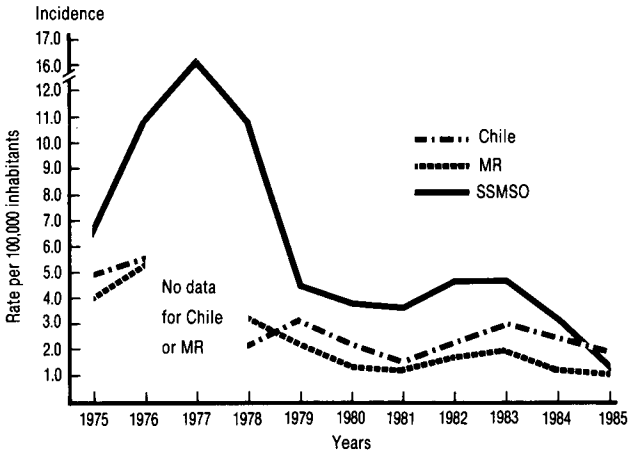


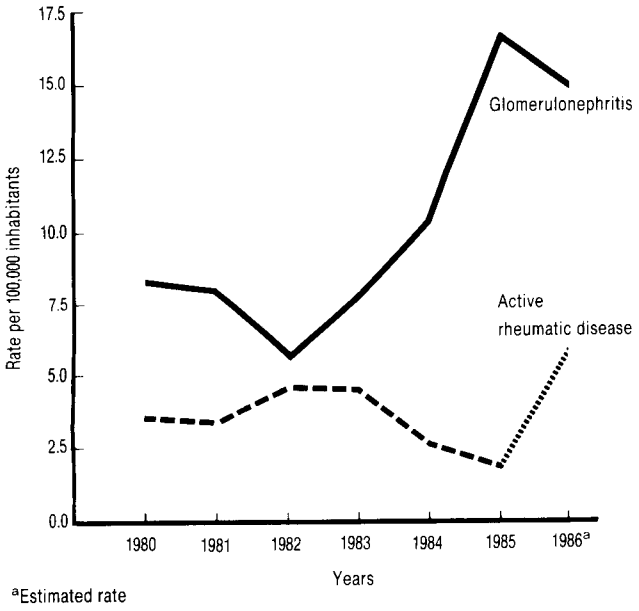
Table 1. Incidence of active rheumatic disease, cases and rate per 100,000 inhabitants, for 1980-1985 and estimate for 1986 (South East Metropolitan Health Service, Santiago, Chile).

Year	Cases	Rate
1980	22	3.9
1981	22	3.7
1982	29	4.7
1983	30	4.7
1984	22	3.4
1985	9	1.3
1986	17[a]	–
1986	51[b]	6.7[b]

[a]First four months of 1986.
[b]Estimated cases and rate for 1986.

[1]The clinical diagnosis of acute rheumatic fever (referred to by the author as active rheumatic disease) is based on the criteria proposed by Jones in 1944 and revised by the American Heart Association in 1955 and 1965. The presence of two major criteria (polyarthritis, carditis, chorea, erythema annulare, and subcutaneous nodules) or of one major and two minor criteria (previous episode or rheumatic fever or presence of chronic rheumatic cardiopathy, arthralgias, fever, raised levels of acute-phase reactants—sedimentation rate, C-reactive protein, leucocytosis—and a prolonged PR interval on the electrocardiogram) indicates a high probability of acute rheumatic fever if supported by evidence of a preceding streptococcal infection.

Figure 2. Annual incidence of acute glomerulonephritis and active rheumatic disease in the South East Metropolitan Health Service, Santiago, Chile, 1980-1985 and estimate for 1986.



An epidemic outbreak of ARD affords an unusual opportunity for the study of infection by group A beta-hemolytic streptococci (A-BHS) and its sequelae. This requires a careful examination of the relevant clinical and laboratory parameters of the rheumatic episode proper, of the preceding streptococcal infection, and also of its epidemiological characteristics. It will then be possible to compare the severity, progress and prognosis observed in the endemic phase of the disease; the age, geographic and seasonal distribution; the types of A-BHS involved, and the response to treatment. It also offers an invaluable opportunity for testing the hypothesis of the existence of A-BHS types of different rheumatogenic potential by comparing the strains isolated from rheumatic cases with those isolated from cases of AGN that continue to occur at the same time and with strains isolated from the general population in the area. Their thorough study and examination could shed light on the mechanism of the pathogenic power of A-BHS to produce these late manifestations.

The ARD outbreak is currently under investigation in the SSMSO. The following developments may be tentatively cited as significant:

- Wide distribution of the disease in all the Health Service's districts, but with attack rates higher than those in the preceding endemic period.
- An age distribution skewed toward older ages than the age bracket in which the incidence of the disease is highest (5 to 14 years). There are two unmistakable cases in 40-year-olds.
- A-BHS is being isolated from about 30% of pharyngeal smears, far higher than the 6% to 8% seen during the endemic period.
- The cases comfortably satisfy Jones' criteria. The most frequent major manifestations are carditis and/or polyarthritis. No skin manifestations have been seen. An upturn of chorea is expected in the early spring months (October, November, and December in the Southern Hemisphere), following the normal pattern for the endemic period.
- Most of the episodes are new cases, and cases of recidivation are subjects who have been discharged from secondary prophylaxis or have abandoned the program.
- The energetic immunologic response in all cases measured by tests with antistreptolysin O and anti-DNA-ase B. Responses to the streptozyme test are inconsistent.
- The difficulty of eradicating A-BHS from the pharynx is greater than in the epidemic phase.

The strains are being serotyped. In the preceding endemic period, the type isolated from most rheumatic patients and their family contacts was M5.

The observed facts must be properly studied and their significance accurately determined. Meanwhile, all customary measures have been taken for control of the outbreak: epidemiological surveillance, primary prevention of rheumatic disease, protection of contacts at risk in homes and institutions, and reinforcement of adherence by patients to secondary prophylaxis against rheumatic disease.

We have been prompted to report this epidemic outbreak by its unexpectedness and suddenness. It would also be very useful to know what is happenning in other geographic areas in regard to the problem presented, particularly to the streptococcal infection that precedes an ARD episode, in order to compare findings in regions and countries where the incidence of the disease is different.

(Source: Dr. Ximena Berríos, Dr. Sótero del Río Hospital, Servicio de Salud Metropolitano Sur Oriente, Escuela de Medicina, Universidad Católica de Chile, Santiago, Chile.)

Editorial Comment

Rheumatic fever is prevalent in many developing countries of Africa, Asia, Latin America and the Caribbean, often starting at earlier ages, and with more severe carditis and higher mortality than in developed countries. In the latter, acute rheumatic fever and chronic rheumatic cardiopathy are virtually nonexistent. In developing countries, although their frequency is gradually diminishing, they are more heavily concentrated in the lower socioeconomic strata of the population. Hence, national averages do not reflect the wide socioeconomic disparities that exist in these countries. The lack of systematic control programs and adequate epidemiological surveillance systems makes it impossible to detect the local variations concealed by a national average.

The present report illustrates the early detection of an unusual rise in the number of cases of acute rheumatic fever in an area of metropolitan Santiago that has a control program. Hence, it represents an example of efficient and timely use of information for action. The whole point of epidemiological surveillance lies in the collection of information and in its proper use. It is hoped that a thorough study of this epidemic outbreak of acute rheumatic fever will help shed light on the rheumatogenic potential of the beta-hemolytic streptococcus strains prevalent in that area, and particularly whether the cases in this outbreak are mostly new or due to recidivation. In the former event, they could be local variations in the natural history of the disease and, in the latter, the most plausible explanation would necessarily have to be sought in quantitative or qualitative deficiencies of secondary prevention in the population at risk.

Registration of Chronic Disease in Canada: An Overview

These general remarks on disease registration in Canada were published as a preface to more detailed reports; they bring up to date a previous review *(1)*. Most of the literature on registries is focused on specific diseases and is too extensive for complete review. Some authors, however, have provided a more global perspective *(2-6)*. Recent reviews relating to particular disease groups include cancer *(7-10)*, congenital malformations *(11)*, and rheumatic diseases *(12)*.

Various definitions and typologies of registries have been proposed *(5)*. According to Weddell *(3)*, "the principal objectives of registries can be summarized as collating information collected from defined groups over time, which may be used in the prevention or treatment of disease, the provision of after-care, the monitoring of changing patterns of disease and medical care, and the evaluation and planning of services."

Weddell also points out that "registers, designed to collect information on one specific topic, must be distinguished from master patient files and record linkage systems, which provide means to collect, store and retrieve information on many topics not predetermined or limited in their scope." This is an important distinction which leads to the question as to whether it is necessary to have a separate registry for each disease rather than a single system in which each individual is followed and all disease episodes recorded. The latter approach has long been anticipated as a spin-off from centralized health insurance *(13)* but is slow in coming. However Roos and Nicol *(14)* have demonstrated that it is feasible in the Canadian context.

It is sometimes claimed that the patients themselves benefit from being included in a disease registry because of more efficient follow-up. This may be true in some special cases (e.g. Pap smear, handicap) but would be difficult to support in general, since it presupposes that follow-up does more good than harm which needs to be shown. Nor does the individual physician have much to gain from a disease registry unless he/she is contributing enough patients to make survival analysis worthwhile. Clearly most, if not quite all, the benefit is epidemiological, in the broadest sense of the term, and it is difficult to maintain the interest of individuals in an exercise for the public good, however well-intentioned they may be. Population based registries cannot rely on notification by the physician but must have access to hospital, laboratory and death records to achieve completeness. Making disease notification obligatory by law does not help, as we know from infectious disease notification. However Enterline *et al. (15)* have

studied cancer reporting laws in relation to cancer registration in the United States. They found "that the existence of a state cancer reporting law did not ensure the creation of a cancer reporting system and, conversely, many registration systems existed in states having no reporting laws. However, states with reporting laws were more likely to have a registration system than states without such laws." They stress that "provision should be made in each law to provide for access to disaggregated data by qualified researchers. Without such access, the utility of a cancer surveillance data base is minimal."

While it is true that population-based disease registries are useful as a source of cases for case-control studies, and as the end-point for cohort studies and as a start-point for survival analysis, surely their "raison d'être" must be to provide estimates of disease incidence (or prevalence at birth in the case of congenital disease). If epidemiology is the study of diseases in populations and the essence of science is measurement, then if epidemiology is to be a science in its own right, and not a branch of pathology, measurements of disease incidence are indispensable. We cannot be content with mortality as a proxy for incidence.

If an unduplicated count of all new cases of disease in a defined population at risk is the primary goal, what other information should be collected? Would known risk factors other than age and sex be included, for example, smoking or occupation? If the prevalence of such factors in the general population is known from a census or health survey, then differences in incidence by time or place can be adjusted for such factors. Should the incidence cases be followed up to ascertain disability and death? Some epidemiologists discount measures of survival, pointing out that the only valid method of comparing treatments is a randomized controlled trial. This is true, but treatment is not the only factor influencing survival, and is there not a place for a descriptive epidemiology of survival as well as incidence?

But the most important question is: who will pay? Disease registration is expensive and research-funding agencies are loath to assume a long-term burden. As Adelstein *(16)* has pointed out, the first disease surveillance system, the Bills of Mortality, was based on fear of the plague, and was paid for by wealthy subscribers who would move out at the first sign of an epidemic. Fear was probably an important factor in raising public support for infectious disease notification and, more recently, reporting of congenital malformations and AIDS. Registration of some chronic diseases such as tuberculosis, cancer and end-stage renal disease has been a by-product of special treatment. How can public support be mobilized for registration of other important diseases such as cardiovascular disease, diabetes, arthritis and chronic neurological diseases, where contagion is not an issue and treatment is diffuse? Must we rely on charity?

(Source: Article by G. B Hill, *Chronic Diseases in Canada* 6(4):72-73, 1986.)

References

(1) Chron Dis Can 2:41-50, 1982.

(2) Bellows, M. T. Case registers. *Public Health Rep* 64:1148-1158, 1949.

(3) Weddell, J. M. Registers and registries: a review. *Int J Epidemiol* 2:221-228, 1973.

(4) Brooke, E. M. *The current and future use of registers in health information systems*. Geneva, World Health Organization, 1974.

(5) Goldberg, J., Gelfand, H. M., and Levy, P. S. Registry evaluation methods: a review and case study. *Epidemiol Rev* 2:210-220, 1980.

(6) Feinstein, A. R. Clinical epidemiology. In: *The architecture of clinical research*. Philadelphia, W. B. Saunders Company, 1985, pp. 474-477.

(7) Clemmesen, J. Uses of cancer registration in the study of carcinogenesis. *J Nat Cancer Inst* 67:5-13, 1981.

(8) Benn, R. T., Leck, I., and Nwene, U. P. Estimation of completeness of cancer registration. *Int J Epidemiol* 11:362-367, 1982.

(9) Austin, D. F. Cancer registries: a tool in epidemiology. In: Lilienfeld, A. M., ed. *Reviews in Cancer Epidemiology*. Vol. 2. New York, Elsevier, 1983, pp. 110-140.

(10) Curnen, M. G. M., Thompson, W. D., Heston, J. F., and Flannery, J. T. Cancer prevention: the tumor registry connection. *Cancer Detect Prev* 7:191-199,1984.

(11) Weatherall, J. A. C., de Wals, P., and Lechab, M. F. Evaluation of information systems for the surveillance of congenital malformations. *Int J Epidemiol* 13:193-196, 1984.

(12) Allander, E. Registry data: how to harvest the seed of others. *J Rheumatol* (suppl 10) 10:89-91, 1983.

(13) Newsholme, A. Medicine and the state. London, George Allen and Unwin Ltd., 1932, p. 120.

(14) Roos, L. L. and Nicol, J. P. Building individual histories with registries. A case study. *Med Care* 21:955-969, 1983.

(15) Enterline, J. P., Kammer, A., Gold, E. B., Lenhard, R. Jr., and Powell, G. C. United States cancer reporting laws: structure and utility. *Am J Public Health* 74:449-452, 1969.

(16) Adelstein, A. M. The early recognition of environmental hazards. *Trans Soc Occup Med* 19:41-47, 1984.

Editorial Comment

Although some of the elements described in this article are only applicable to industrialized countries such as Canada, it has been considered of interest to publish this discussion for it presents criteria that are valid for all countries in the Region of the Americas. It is also an interesting complement to the discussion on cancer registries appearing in the *Epidemiological Bulletin,* Vol. 6, No. 6, 1985.

Epidemiological Activities in the Countries

Establishment of the National Epidemiology Commission of Argentina

The Secretariat of Health in the Ministry of Health and Social Action of Argentina has decided to establish a National Epidemiology Commission (CONEP), which will be chaired by the Undersecretary for Health Programs and administered by a professional in epidemiology from the Health Promotion and Protection Directorate.

The Commission's honorary advisory board will be formed by professionals from the National Health Promotion and Protection Directorate, the Dr. Juan H. Jara National Institute of Epidemiology, the Dr. Emilio Coni National Institute of Epidemiology, the School of Public Health of the Medical School of Buenos Aires University, the School of Public Health of the Medical School of Córdoba National University, and the Pan American Sanitary Bureau.

The Commission will function in an advisory capacity on all aspects related to the development of epidemiology and the implementation of the recommendations originated at the Seminar on Epidemiology of Argentina, whose final report is part of Resolution (SS) No. 275 of 7 July 1986, establishing the National Epidemiology Commission.

Scientific Challenges in the Application of Randomized Trials

In recent years, scientific challenges in the application of randomized trials have become more apparent, especially with the extension of such trials to the assessment of nondrug treatments, such as health education, psychotherapy, and health care provision. Six issues (individual versus group randomization, blinding and unblinding, the effect of trial participation on outcome, selective subject participation, treatment compliance, and standardized versus individualized treatment) are discussed in terms of their impact on internal validity, generalizability (external validity), and clinical relevance. Specific design strategies may be necessary to enhance these methodological and clinical desiderata. Attention to these challenges should lead to improvements in future randomized trials.

The randomized controlled trial (RCT) is generally regarded as the most potent scientific tool for evaluating medical treatments. Its appeal stems from its apparent similarity to the laboratory experimental setting, where two or more groups of genetically identical animals (or tissue cultures, cells, or cellular extracts) are subjected to different maneuvers or manipulations, and some outcome of interest is then measured. Although human beings do not share the homogeneity usually achievable with mice or fibroblasts, randomization into treatment groups is generally relied on to account for known or unknown baseline attributes, also called confounding factors, which might otherwise predispose to or protect from the outcome of interest, independent of treatment.

Randomized trials have contributed greatly to the evolution of more effective treatments and preventive measures for a variety of medical conditions. Randomized controlled trials represent an increasing proportion of the articles published in leading medical journals and have become the *sine qua non* for the proof of efficacy the U.S. Food and Drug Administration requires for marketing new drugs. Despite the obvious advantages and impressive track record of RCTs, clinical investigators have become increasingly aware of certain difficulties in their interpretation, feasibility, and ethics. Some of these difficulties have been overcome; others await resolution. None, however, has challenged the scientific validity of the method itself. In recent years, especially with the extension of RCT methodology to assessments of nondrug treatments, including health education, psycho-

therapy, and health care provision, new concerns have emerged that challenge an uncritical reliance upon the RCT as an automatic scientific "gold standard" in clinical research.

It seems timely, therefore, to consider a critical reappraisal of some of the scientific issues involved in randomized trials. The purpose of this paper is not to discredit the method but rather to emphasize difficulties and challenges inherent in its application, especially in studying behavioral outcomes or outcomes that might be influenced by behavior (e.g., cardiovascular mortality). When such difficulties arise, specific design strategies may be necessary to enhance scientific validity and clinical relevance. Some of the issues being raised have already surfaced in previous clinical trials; others remain theoretical and await empirical demonstration. The authors focus on six aspects of RCT design: (1) individual versus group randomization, (2) blinding and unblinding, (3) the effect of trial participation on outcome, (4) selective subject participation, (5) treatment compliance, and (6) standardized versus individualized treatment.

The first two of these issues threaten the internal validity of a trial, i.e., the extent to which the treatment comparison is unbiased. The next three affect the generalizability, or external validity, of the trial's findings. The last issue concerns the clinical relevance and utility of the treatment comparison.

After discussing each of the six issues the authors summarize their conclusions as follows:

Although the RCT design appears to come closest to approximating the laboratory experiment, the complexities of the human psyche can affect participation, compliance, blinding, and outcome in a trial. This is especially true when the outcome is either itself an observed behavior (e.g., maternal-infant bonding) or an event that is known to be etiologically linked to behavior (e.g., cardiovascular mortality). These human psychological factors can affect the internal validity of the treatment comparison, the generalizability (external validity) of the results to a larger population, or the clinical relevance of the conclusions.

These same factors also operate in observational, nonexperimental research studies. In fact, they can also influence treatment selection, and thus lead to selection bias in such studies. In an RCT, randomization usually occurs after the decision to participate, and selection bias is thereby eliminated. This is a strong argument in favor of the RCT, since selection bias affects the internal validity of a treatment comparison. Internal validity is a necessary prerequisite for external validity and should always, therefore, receive highest methodological priority.

When selective participation seriously threatens external validity, trade-offs will occur between higher participation and a risk of selection bias in observational studies, compared with an unbiased (internally valid), but possibly less generally applicable, result in randomized trials. This kind of trade-off arises, for example, in studying putative health effects of breast-feeding. If an RCT were attempted, women agreeing to be randomly assigned to breast-feed or formula-feed their infant would be so few and so atypical that the results would have little meaning for mothers and infants in general.

For most questions involving treatment efficacy, the RCT remains the research methodology of choice whenever randomization is feasible, but a study's use of this methodology does not necessarily confer certainty on its conclusions. In the majority of cases in which scientific challenges arise, implementation of specific design strategies should enhance internal and external validity. In other cases, a trial's conclusions may have to be tempered by inescapable methodological limitations.

The purpose here has not been to denigrate the value of the RCT, but rather to discuss some scientific difficulties and challenges inherent in its application. As has been noted, the model of methodological rigor represented by the RCT invites close scrutiny for any departures from the ideal. It is hoped that a critical reappraisal of some of the scientific underpinnings of the randomized trial may help bring about changes in attitudes and practice. The interests of medical research and the public it is intended to benefit may not be best served by an unquestioning acceptance of the results of a study merely because it uses an RCT design that can, in certain circumstances, lead to scientifically invalid or clinically irrelevant inferences. Most importantly, the authors hope that attention to these challenges may facilitate improvements in future RCTs.

(*Source:* Based on: Kramer, M. S. and Shapiro, S. H. Scientific challenges in the application of randomized trials. *JAMA* 252:2739-2745, 1984, ©American Medical Association. The complete article as well as its bibliographical references can be obtained from the Health Situation and Trend Assessment Program, PAHO.)

Editorial Comment

This article describes one of today's most potent tools for evaluating the efficacy and safety of a medical treatment. All existing methods for evaluating treatments and programs implemented at the community level are more or less rigurous adaptations of this procedure. Therefore, it has been considered of interest to publish those parts of the discussion that describe the main challenges resulting from the application of this instrument.

Diseases Subject to the International Health Regulations

Cholera, yellow fever, and plague cases and deaths reported in the Region of the Americas up to 31 December 1986.

Country and administrative subdivision	Cholera cases	Yellow fever		Plague cases
		Cases	Deaths	
BOLIVIA	–	*24*	*17*	*94*
Cochabamba	–	1	1	–
La Paz	–	23	16	94
BRAZIL	–	*9*	*8*	*34*
Bahia	–	–	–	20
Ceará	–	–	–	3
Goias	–	5	5	–
Mato Grosso	–	3	2	–
Paraiba	–	–	–	11
Roraima	–	1	1	–
CANADA	*1*	–	–	–
Ontario	1[a]			
COLOMBIA	–	*2*	*2*	–
Arauca	–	1	1	–
Meta	–	1	1	–
PERU	–	*92*	*83*	–
Ayacucho	–	1	1	–
Cuzco	–	5	4	–
Huánuco	–	5	5	–
Junín	–	21	17	–
La Libertad	–	1	1	–
Madre de Dios	–	11	11	–
Pasco	–	1	1	–
San Martín	–	47	43	–
UNITED STATES OF AMERICA	*17*	–	–	*9*
Arizona	–	–	–	1
California	–	–	–	3
Florida	1	–	–	–
Georgia	1	–	—	
Louisiana	14	–	–	–
Maryland	1[a]	–	–	–
Nevada	–	–	–	1
New Mexico	–	–	–	4

[a]Imported case.

PAN AMERICAN HEALTH ORGANIZATION
Pan American Sanitary Bureau, Regional Office of the
WORLD HEALTH ORGANIZATION
525 Twenty-third Street, N.W.
Washington, D.C. 20037, U.S.A.