Special Report

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Epidemic Cholera in Latin America, 1991–1993: Implications of Case Definitions Used for Public Health Surveillance[1]

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This report presents the various cholera case definitions used by the affected countries of Latin America, shows the numbers of cholera cases and deaths attributable to cholera (as reported by Latin American countries to PAHO through 1993), and describes some regional trends in cholera incidence. The information about how cholera cases were defined was obtained from an October 1993 PAHO questionnaire.

In all, 948 429 cholera cases were reported to PAHO by affected Latin American countries from January 1991 through December 1993, the highest annual incidences being registered in Peru (1991 and 1992) and Guatemala (1993). The case-fatality rate over the three-year period, and also in 1993, was 0.8%. A general downward trend in the incidence of cholera was observed in most South American countries, while the incidence increased in most Central American countries.

A good deal of variation was noted in the definitions used for reporting cholera cases, hospitalized cholera cases, and cholera-attributable deaths. Because of these variations, broad intercountry comparisons (including disease burden calculations and care quality assessments based on case-fatality rates) are difficult to make, and even reported trends within a single country need to be evaluated with care. The situation is likely to be complicated in the future by the arrival of V. cholerae *O139 in Latin America, creating a need to distinguish between it and the prevailing O1 strain.*

For purposes of simplicity, wide acceptance, and broad dissemination of case data, the following definitions are recommended: Confirmed case of O1 cholera: *laboratory-confirmed infection with toxigenic* V. cholerae *O1 in any person who has diarrhea.* Confirmed case of O139 cholera: *laboratory-confirmed infection with toxigenic* V. cholerae *O139 in any person who has diarrhea.* Clinical case of cholera: *acute watery diarrhea in a person over 5 years old who is seeking treatment.* Death attributable to cholera: *death within one week of the onset of diarrhea in a person with confirmed or clinically defined cholera.* Hospitalized patient with cholera: *a person who has confirmed or clinically defined cholera and who remains at least 12 hours in a health care facility for treatment of the disease.*

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The cholera pandemic caused by toxigenic *Vibrio cholerae* O1, biotype El Tor, reached Latin America in January 1991 (*1*, 2). All Central and South American countries except Uruguay had been affected by the end of 1993, and cholera has continued to be a major public health concern in Latin America from that time to the present. The need to carefully observe the progress of this ongoing epidemic underscores the importance of employing a timely, effective surveillance system.

After cholera struck Peru, PAHO requested that Latin American epidemiologists provide weekly reports of the number of cholera cases, number of cholera cases hospitalized, and number of deaths due to cholera in their jurisdictions. This procedure enabled PAHO and other interested parties to follow the epidemic as it progressed through the region.

In April and May 1991, meetings were held with epidemiologists from all Latin American countries in an attempt to standardize a case definition for the illness. However, even though uniform case definitions for cholera were arrived at, various countries continued to use their own prevailing definitions. Therefore, this most basic element of surveillance (the definition of what constitutes a case) generally continued being formulated individually by the various countries.

This summary account presents the various cholera case definitions used by the affected countries of Latin America, shows the numbers of cholera cases and deaths attributable to cholera (as reported by Latin American countries to PAHO through 1993), and describes some regional trends in cholera incidence.

MATERIALS AND METHODS

During 1991–1993, information concerning the numbers of cases, hospitalizations, and deaths attributable to cholera was collected by the Ministry of Health of each Latin American country. These data were transmitted to the PAHO/WHO country representative (PWR), who then relayed them to PAHO Headquarters in Washington, D.C. Some of the countries provided data by geographic region, others by both region and locality. Most countries reported weekly totals to PAHO by mail, facsimile, or electronic mail. A few countries reported only cumulative totals. Some countries with extremely low cholera incidences, such as Paraguay, transmitted data only when cholera cases were detected.

In October 1993 we sent a questionnaire about cholera case definitions to all 20 countries of Central and South America that had reported the presence of *V. cholerae* O1 to PAHO since 1991, and also to Uruguay (the only South American country not reporting cases). The questionnaire asked how a reported case of cholera (whether confirmed, probable, suspected, or referred to in some other way) was defined and how hospitalizations and deaths attributable to cholera were defined. The questionnaire was sent to the PWR in each country, who sent it to the Ministry of Health. We followed up these questionnaires with telephone calls to all the PWRs who had not transmitted responses by the end of November 1993. In the case of those Central American countries from which no response was received (see Table 3) we used the 1993 surveillance guidelines for cholera that were published in the Central American bulletin (*3*).

RESULTS

Reported Cases

As Table 1 shows, the countries of Latin America reported nearly a million (948 429) cholera cases during 1991–1993. Of those affected, 7 955 died, yielding an overall case-fatality rate of 0.8%. In 1993, 204 524 cases were reported; of these, 1 558 resulted in death—again producing a case-fatality

Table 1. Total annual numbers of cholera cases and deaths reported to the Pan American Health Organization, by country, for 1991–1993. The 1993 data also show case-fatality rates (CFR) and incidence figures (cases per 100 000 inhabitants) based on population estimates derived from the United Nations' 1993 *Statistical Yearbook* (4).

	1991		1992		1993			
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Incidence per 100 000	CFR (%)
South America:								
Argentina	0	0	553	15	2 080	34	6.3	1.6
Bolivia	206	12	22 260	383	10 134	254	126.0	2.5
Brazil	2 101	26	30 054	359	56 286	607	35.0	1.1
Chile	41	2	73	1	32	0	0.2	0.0
Colombia	11 979	207	15 129	158	230	4	0.6	1.7
Ecuador	46 320	697	31 870	208	6 833	72	58.0	1.1
French Guiana	1	0	16	0	2	0	1.8	0.0
Guyana	0	0	556	8	66	2	8.2	3.0
Paraguay	0	0	0	0	3	0	<0.1	0.0
Peru	322 562	2 909	210 836	727	71 448	575	295.0	0.8
Suriname	0	0	12	1	0	0	0.0	–
Uruguay	0	0	0	0	0	0	0.0	–
Venezuela	13	2	2 842	68	409	10	1.9	2.4
Mexico and Central America:								
Belize	0	0	159	4	135	3	67.0	2.2
Costa Rica	0	0	12	0	14	0	0.4	0.0
El Salvador	947	34	8 106	45	6 573	14	120.0	0.2
Guatemala	3 652	50	15 686	207	30 604	306	305.0	1.0
Honduras	17	0	388	17	2 290	64	40.0	2.8
Mexico	2 690	34	8 162	99	10 712	193	12.0	1.8
Nicaragua	1	0	3 067	46	6 631	220	155.0	3.3
Panama	1 178	29	2 416	49	42	4	1.6	9.5
Total:	*391 708*	*4 002*	*352 197*	*2 395*	*204 524*	*1 558*		*0.8*

rate of 0.8%. All countries except Uruguay reported cases of cholera during the three-year period covered. From the beginning of the epidemic onward, Peru reported the largest number of cholera cases every year and, until 1993, the highest incidence. However, in 1993 Guatemala reported the highest incidence and the third highest number of cases in the region (see Figure 1). Brazil also reported an increasing number of cases each year, as did a majority of the Central American countries. The epidemic curves for Guatemala and Nicaragua (Figure 2) illustrate these latter trends.

Over the same time, downward trends were reported in several South American countries, two fairly typical examples being illustrated by the epidemic curves for Peru and Bolivia (see Figure 2). The most notable downward trend occurred in Colombia, which reported 15 129 cases in 1992 but only 230 in 1993. The accuracy of the reporting leading to these Colombian data is said to have been verified (Victor Cárdenas, personal communication, September 1994). However, official data confirming the trend were not published.

Case Definitions

Questionnaire responses and published definitions provided the cholera case definitions employed by 17 Latin American countries. Tables 2–4 show the various definitions of cholera cases in general, cholera cases in hospitalized patients, and cholera fatalities that were being used in 1993. In 6 of the 17 countries (see Table 2), laboratory confirmation of *V. cholerae* O1 alone (even without the presence of symptoms) qualified the infected person's illness as a cholera case, while in 9 others laboratory con-

Figure 1. The reported 1993 incidence of cholera cases in South America, Central America, and Mexico, by country.

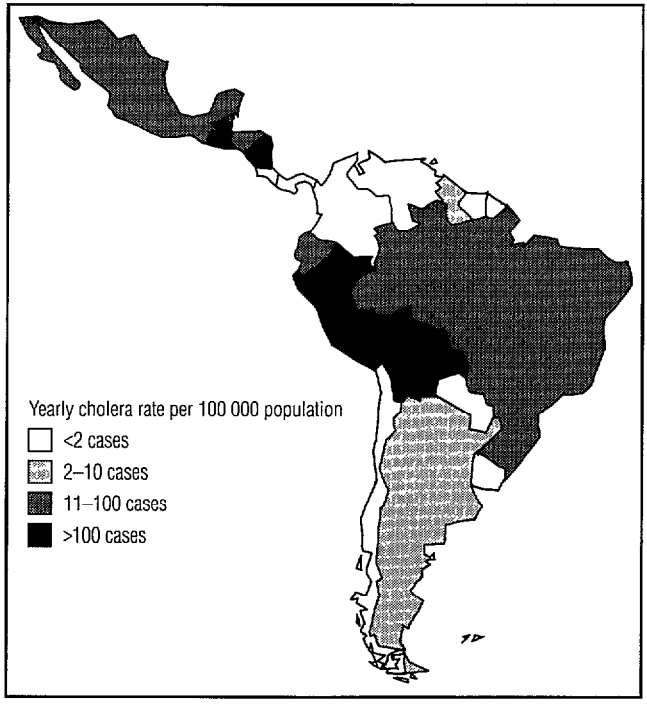
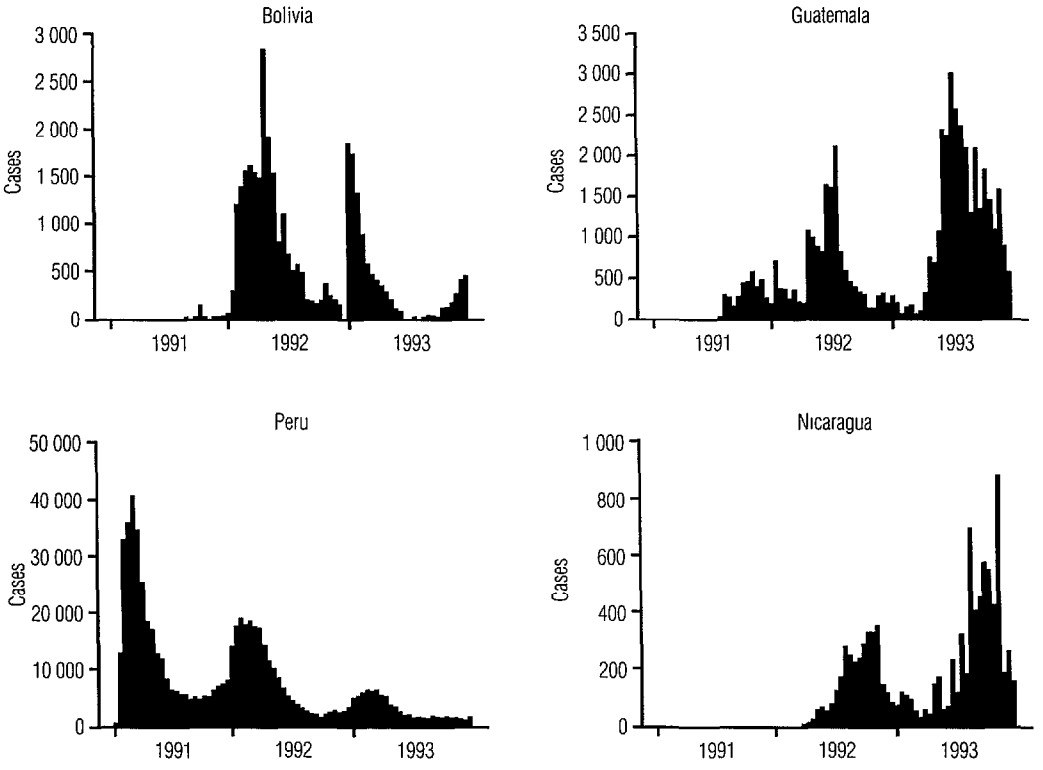


Figure 2. The numbers of cholera cases reported biweekly in Bolivia, Guatemala, Nicaragua, and Peru, 1991–1993.



firmation plus symptoms did so. Three countries (Belize, Costa Rica, and Mexico) required laboratory confirmation of all cases. On the other hand, one country (El Salvador) defined cholera solely on the basis of clinical criteria. Eight countries using a clinical case definition (for cases without laboratory confirmation)[7] required that a person with cholera meet one of two epidemiologic criteria: (a) contact with a person who had laboratory-confirmed cholera or (b) exposure in an area where the presence of *V. cholerae* O1 had been confirmed by a laboratory.

The definitions used by different countries for cholera cases affecting hospitalized patients also differed (see Table 3). In 7 of 11 countries, whether or not "hospitalization" had occurred depended on the length of time the patient spent at a treatment center or hospital. Four other countries had no time requirements, stating that if someone with cholera merely entered a health care facility for treatment, that was enough for the person to be considered hospitalized with cholera.

Cholera-attributable deaths (Table 4) were defined similarly to cholera cases. No country specified whether the number of days after onset of illness was used to help determine if the death in question resulted from cholera.

[7] Bolivia, Brazil, Chile, Colombia, Honduras, Nicaragua, Paraguay, and Uruguay.

Table 2. The criteria of 21 Latin American countries, as of October 1993, for disease cases meeting the surveillance definition of cholera. SX = symptoms are required, in addition to laboratory data, for laboratory-confirmed cases.

Country	Laboratory-confirmed	Clinical case definition		
		With epidemiologic criteria*	Only clinical criteria	Age-specific criteria
South America:				
Argentina†				
Bolivia	SX	X		Yes‡
Brazil	SX	X		Yes¶
Chile	X	X		No
Colombia	SX	X		Yes‡
Ecuador	X	X	X	No§
French Guiana†				
Guyana	X		X	Yes‡
Paraguay	SX	X		No
Peru	X		X	No
Suriname†				
Uruguay		X		No
Venezuela†				
Mexico and Central America:				
Belize	X			No
Costa Rica	SX			No
El Salvador			X	No
Guatemala	SX	X	X	No
Honduras	SX	X		No
Mexico	SX			No
Nicaragua	SX	X		No
Panama	X	X	X	No

* Qualifying epidemiologic criteria: (a) contact with a person who had laboratory-confirmed cholera or (b) exposure in an area where the presence of *V. cholerae* O1 had been confirmed by a laboratory.
† PAHO's 22 October 1993 questionnaire was not answered, and no published case definition was found.
‡ Children <5 years old with diarrhea must have laboratory confirmation that their illness is cholera.
¶ There is a complex system for determining age requirements, depending on the case definition.
§ Persons >5 years old with diarrhea and dehydration at the time of death are classified as having cholera.

DISCUSSION AND CONCLUSIONS

The PAHO/WHO surveillance system has been useful in determining disease incidence trends within particular countries. By the end of 1993, the number of reported cholera cases was decreasing in most South American countries, although in many Central American countries the number was rising. This information has proven useful for warning or reassuring travelers, and for following the rapid advance or retreat of the epidemic.

However, there is much variation in the definitions used by different countries for reporting cholera cases. Countries with epidemic cholera that are reporting only laboratory-confirmed cases are likely to greatly underreport cases, because they will miss the illness in persons whose stools are not cultured, and whose cases thus go unreported. These countries are also unable to count as cholera deaths those who die of cholera without a culture being taken, a circumstance that could falsely deflate the case-fatality rate. In addition, public health workers in other countries with complex

Table 3. The criteria of 21 Latin American countries, as of October 1993, establishing the amount of time a person needed to stay at a hospital or other treatment facility in order to be classified as a hospitalized cholera patient.

Country	Length of stay in treatment center or hospital			
	No time requirement	>12 hours	>24 hours	Unknown*
South America:				
Argentina				X
Bolivia		X		
Brazil†		X		
Chile				X
Colombia‡		X	X	
Ecuador		X		
French Guiana				X
Guyana	X			
Paraguay¶				
Peru			X	
Suriname				X
Uruguay¶				
Venezuela				X
Mexico and Central America:				
Belize	X			
Costa Rica				X
El Salvador			X	
Guatemala				X
Honduras	X			
Mexico			X	
Nicaragua				X
Panama	X			

* PAHO's 22 October 1993 questionnaire was not answered, and no published time-related information was found
† Patients who stay overnight are considered hospitalized patients.
‡ A cholera patient requiring intravenous fluids and staying >12 hours is defined as a hospitalized cholera patient A cholera patient requiring only oral rehydration but staying >24 hours is considered a hospitalized cholera patient.
¶ Paraguay and Uruguay have no formal definitions of hospitalized cases.

clinical-epidemiologic definitions of cholera cases may have difficulty applying those definitions and so may also undercount the number of cases.

It should be noted that while this report only indicates the cholera case definitions in use as of October 1993, some of these definitions have been changing. For example, since the end of 1993 Guatemala has employed the definitions recommended below (*5*). In general, however, the observed variations in these definitions demonstrate that broad intercountry comparisons (including disease burden calculations and care quality assessments based on case-fatality rates) are difficult to make, and that even reported trends within a single country need to be evaluated with care. On the other hand, it also appears that most definitions used in single countries have been relatively stable. (Direct comparison of rates tends to be most valid among countries using similar case definitions.)

The pandemic caused by *V. cholerae* O139 that has spread through Asia (*6–8*) has not yet (as of early 1996) affected Latin America. However, one case of this infection was imported into the United States in 1993 (*9*);

Table 4. The criteria of 21 Latin American countries, as of October 1993, for fatalities meeting the surveillance definition of deaths attributable to cholera.

Country	Laboratory-confirmed	Clinical case definition		1993 case fatality rate
		With epidemiologic criteria*	Only clinical picture criteria	
South America:				
Argentina†				1.6
Bolivia		X		2.5
Brazil		X		1.1
Chile	X	X		0.0
Colombia		X		1.7
Ecuador	X	X		1.1
French Guiana†				0.0
Guyana			X	3.0
Paraguay	X			0.0
Peru			X	0.8
Suriname†				–
Uruguay‡				–
Venezuela†				2.4
Mexico and Central America:				
Belize	X	X		2.2
Costa Rica†				0.0
El Salvador	X		X	0.2
Guatemala†				1.0
Honduras	X	X		2.8
Mexico	X			1.8
Nicaragua†				3.3
Panama			X	9.5

*Qualifying epidemiologic criteria: (a) contact with a person who had laboratory-confirmed cholera or (b) exposure in an area where the presence of *V. cholerae* O1 had been confirmed by a laboratory.
† PAHO's 22 October 1993 questionnaire was not answered, and no published case definition was found.
‡ Uruguay does not have a formal definition for deaths resulting from cholera.

17 more were imported in 1994 (*10*); and it is likely that *V. cholerae* O139 will also appear in Latin America. If it does appear, laboratory-based surveillance from a sample of sentinel sites will be needed to differentiate cholera caused by the O1 strain from that caused by the O139 strain. Surveillance reports would be most helpful if they included separate tallies of confirmed O139 cases within the total of confirmed cases. Although the clinical and epidemiologic characteristics of O139 infection are similar to that of O1, serotype-specific reporting will be critical for tracking this new pandemic wave, warning neighboring countries of its arrival, and developing specific preventive measures. A manual of standard laboratory methods for dealing with cholera, including identification of O139, has been published by the United States Centers for Disease Control and Prevention and PAHO (*11*).

Timely, accurate cholera surveillance at national and international levels enhances efforts to control the disease. Such surveillance also yields information needed to provide prompt international aid to those countries most affected. However, in order for cholera surveillance to be effective, case reporting should be simple and widely ac-

cepted, and the results should be broadly disseminated in a timely manner (*12–14*). The definitions for cases to be reported should likewise be simple, widely accepted, and broadly disseminated (*12, 13*). We recommend that the following definitions be used for reporting cholera cases in Latin American countries:

- *Confirmed case of O1 cholera:* laboratory-confirmed infection with toxigenic *V. cholerae* O1 in any person who has diarrhea.
- *Confirmed case of O139 cholera:* laboratory-confirmed infection with toxigenic *V. cholerae* O139 in any person who has diarrhea.
- *Clinical case of cholera:* acute watery diarrhea in a person 5 years of age or older who is seeking treatment.
- *Deaths attributable to cholera:* death within one week of the onset of diarrhea in a person with confirmed or clinically defined cholera.
- *Hospitalized patient with cholera:* a person who has confirmed or clinically defined cholera and who remains at least 12 hours in a health-care facility for treatment of cholera.

It should be noted that clinical cases are to be reported separately from confirmed cases, and that the term *confirmed* is used only for cases confirmed by the laboratory. In the setting of the Peruvian epidemic, the clinical case definition (which is simple and easy to use) has been 80–90% specific for cholera (*15–17*). However, given the number of causes of diarrhea among children under 5 years of age, the clinical case definition lacks specificity for cholera in this age group and so should only be applied to older subjects.

In addition, the clinical case definition may not be useful in countries where cholera is a rare cause of diarrhea. As this suggests, laboratory confirmation of some or all cholera cases is important in certain countries. Laboratory confirmation will also be important if *V. cholerae* O139 is introduced into Latin America.

We suggest a standardized definition of hospitalized patients with cholera for use in countries tallying hospitalized cases. Even so, because of the variety of clinical practices in different countries, we do not think international reporting of the number of hospitalized patients will be sufficiently uniform to be useful for making comparisons.

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Third Canadian Conference on International Health

The Canadian Society for International Health (CSIH) and the Canadian University Consortium for Health in Development are organizing the Third Canadian Conference on International Health, to be held on 10–13 November 1996 in Ottawa, Ontario, Canada. The theme of this year's conference will be "Effectiveness in Health Development."

The conference will include presentations of papers, poster sessions, symposia, and workshops. The theme encompasses such areas as the contribution of health development to sustainable development, effective health interventions, healthy public policy, commercial ventures in international health, balancing emergency relief and long-term development, and renewing health for all. Within those areas, presentations may focus on systems organization, services delivery, clinical issues, research, training, or other topics.

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