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Celebrating 100 Years of Health

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Editorial: 100 Years of Epidemiology at the Pan American Health Organization

This year the Pan American Health Organization (PAHO) celebrates 100 years of work dedicated to improving public health in the Region of the Americas. In this edition, the *Epidemiological Bulletin* presents a synopsis of the most important facts related to PAHO's role in epidemiology and health information during the past century. These facts also highlight the areas of work for which the countries have requested special efforts in the future.

Stemming from the countries' concerns about the increasing burden of contagious diseases and the need for international collaboration to prevent their dissemination, the Pan American Sanitary Bureau (PASB), PAHO's technical arm, was created in 1902 during the First International Sanitary Conference in Washington, DC. In 1907, the compilation and communication of public health information was mandated as one of the strategic functions of the Organization. As a result, PAHO was transformed into a center for exchange and distribution of information on health problems in the countries of the Region.

The first issue of the *Pan American Sanitary Bulletin* (that evolved into the current *Pan American Journal of Public Health*) was published in 1922. Initially, this publication presented a global summary of infectious disease notification. In response to social and economic consequences of the crash of the New York stock market, the *Weekly Sanitary Reports* were created in 1929 as the first systematic reporting of this nature.

An important milestone in PAHO's history was the ratification of the Pan American Sanitary Code in 1924. The code provides a solid legal base for the fulfillment of its functions and defines procedures and guidelines to curtail the spread of disease in the countries of the Region. As a result, PAHO

urged the countries to establish statistical services for mortality and morbidity, and medical services at ports of entry to diagnose contagious diseases. At the end of the 1930s, the first assessments were done on the collection and use of vital statistics for public health purposes and recommendations were given for the standardization of diagnostic methods and disease registration. Through this process, the foundations were laid for the development of public health surveillance, now recognized as an essential public health function. To complement information routinely generated by the countries, PAHO established technical services to study public health problems and, in 1946, established the Institute of Nutrition for Central America and Panama (INCAP).

In 1950, PAHO became the WHO Regional Office in the Americas, and its membership gradually increased. Its mandates for information collection, analysis, and dissemination were expanded. Information gathering was discussed in 1911, but the first evidence of health situation analysis on different aspects of health (such as health problems, or resources and response of the health services) in the countries of the Region was the first publication of "Health Conditions in the Americas", in 1954. This publication still represents one of PAHO's most important and continuous efforts to analyze and disseminate health information. It culminates this year with the publication of "Health in the Americas, 2002". The interest and use generated by this publication is highlighted by the more than 500,000 users worldwide that have consulted the Spanish and English versions on the Internet since 1998.

The PAHO electronic vital and health statistics databank was created in 1956, as an essential resource for health monitoring and analysis. The databank has continued and evolved

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into a more comprehensive system that, starting in 1996, presents not only mortality, morbidity, and population information, but also a Regional Core Health Data and Country Profile System. Besides socioeconomic information, this system integrates health risk factors, resources, access, and coverage of health services. It is available on the Internet, by means of a prize-winning tabulator. In an effort to revitalize the national vital and health statistics systems, the Regional Advisory Committee on Health Statistics was recently reactivated to guide and assist work in this area.

In 1979, in a changed epidemiological context and with the availability of more advanced information and communication technology, PAHO discontinued the publication of the *Weekly Sanitary Reports*. Subsequently, the role of reporting on infectious diseases globally was assumed by WHO through the *Weekly Epidemiological Record*. In 1980, the *Epidemiological Bulletin* was launched, and for 22 years it has disseminated relevant information about the practice of epidemiology (such as health situation analysis, methodologies for analysis and presentation of information, guidelines on public health procedure and standards) as a response to the changing needs of the health services in the Region.

The 1980s were an important period for the practice of epidemiology in the Organization and the countries. In November 1983, during a seminar in Buenos Aires (Argentina), the state of epidemiological practice for the control of diseases, health evaluation, and services planning was reviewed. Its implications for the progress in research, training in epidemiology, and the development of services were analyzed. In the countries, the results of the meeting had an important impact in the production and dissemination of knowledge through publications, scientific and epidemiological congresses, training of human resources, and the expansion of the practice of epidemiology in health services. As a result, workshops and national meetings in epidemiology and for the strengthening of health situation analysis were organized in the countries of Latin America and the Caribbean.

Responding to identified needs in training, the first Modules of Principles of Epidemiology for the Control of Diseases were produced. A second edition will be published in 2002. In 1991, PAHO commenced a Summer Session in Intermediate Epidemiology. This program reached its 12th session in 2002, and has already trained more than 350 epidemiologists in the Region. Taking advantage of computer and communication technologies that reduce the difficulties linked to distance, starting in 2000, PAHO has offered training courses in epidemiology through the Internet. Even though the needs for qualified human and technical resources for health analysis still exist, another challenge facing epidemiology is its use as an indispensable tool for the management of health services. For this, health situation analyses must be inte-

grated and translated into an accessible, specific, and effective format, allowing for the rational orientation of political decisions. This could in turn lead to the reduction of health inequalities, convergence of health interventions in the most vulnerable areas and population groups, evaluation of the efficiency of health interventions, and orientation of health plans and programs based on evidence and population needs. PAHO is producing methodological guidelines to facilitate health situation analysis and is generating technological tools (communication networks, geographic information systems, and information analysis systems to mention a few) that will facilitate and support this process. Country experiences will be an additional input that will further develop this process.

For 100 years, the Organization has adapted to changes in the health situation and to the needs of the region's population. Initially based on the control of infectious diseases, PAHO's technical cooperation evolved to include other diseases and dimensions of health such as health services, policies and financing, environment, nutrition, and healthy practices. Throughout the years, the practice of epidemiology has always had a significance in the activities of the Organization, among other things through constant efforts to compile and improve the quality of information, production of routine and special studies, and the wide dissemination of this information. Epidemiology also has evolved conceptually and methodologically. The definition of the use of epidemiology has extended from a critical instrument for the prevention and control of diseases to an intelligence tool for the holistic understanding of health, orienting priorities, utilizing resources rationally, and strategically conducting health services. Today, the training in and practice of epidemiology, and the production of health situation analyses and dissemination of relevant health information in the countries of the Region use new technology such as the internet. With these advances however, the epidemiological vision remains the same and PAHO's cooperation efforts are still directed towards improving the level and distribution of health of the peoples of the Americas.

ANNOUNCEMENT

In September 2002, a special issue of the *Epidemiological Bulletin* will present:

- The milestones of Epidemiology in 100 years of PAHO
- The Meeting of Directors of Epidemiology in June 2002 in Brasilia, Brazil
- The content of the time capsule for PAHO's Centennial

Dengue in Brazil: Current Situation and Prevention and Control Activities

Background

Aedes aegypti, the principal vector of dengue in the Americas, has found modern environmental conditions very favorable for its dissemination. Among these favorable conditions are rapid urbanization that has led to deficiencies in water supply services and urban cleaning, the intensive utilization of non-biodegradable materials such as disposable plastic containers, glass and aluminum, climate changes that accompany global warming, and intensified international transit of people and products.

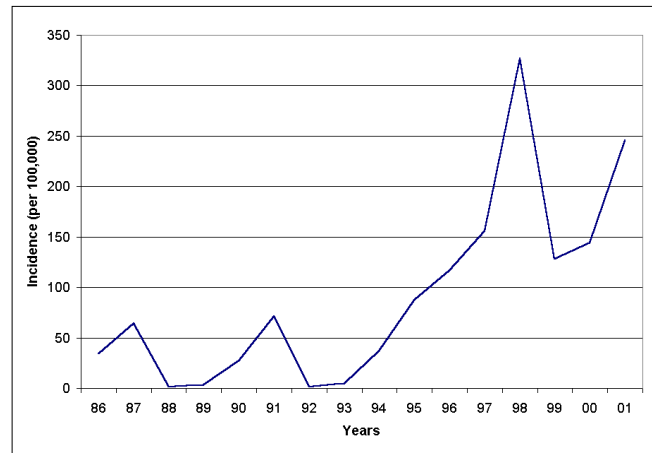
In 1973 it was declared that *A. aegypti* had been eradicated from Brazil. However, three years later, the vector reappeared and since then has gradually spread throughout the country. In the beginning of the 1980s the first cases of dengue were reported in the state of Roraima, in the northern region of the country. These reports showed circulation of serotypes 1 and 4 of the virus, however, at this time, no significant indigenous transmission was observed. Starting in 1986 the first epidemics occurred, reaching Rio de Janeiro and some capitals of the northeast. Since then, dengue has become endemic in Brazil, and is associated with epidemics that introduce new serotypes into previously unaffected areas. In the epidemic of 1986, circulation of the serotype DEN 1 was initially detected in the state of Rio de Janeiro and spread to six states by 1990. That year the circulation of a new serotype, DEN 2, was detected, also in the state of Rio de Janeiro.

During the nineties, the incidence of dengue increased greatly as a consequence of the dissemination of *A. aegypti* in the country, beginning mainly in 1994 (figures 1 and 2). Dispersion of the vector was followed by the dissemination of serotypes 1 and 2 in 20 of the 27 states of the country. Between 1990 and 2000, several epidemics occurred, principally in the major urban centers of the southeast and the northeast of Brazil, where the majority of reported cases were concentrated. The midwestern and northern regions were subsequently affected by dengue epidemics starting in the second half of the 1990s. The greatest incidence of the disease was observed in 1998, with 528,000 cases (figure 1).

Circulation of serotype 3 of the virus was detected for the first time in December 2000, also in the state of Rio de Janeiro and, subsequently, in the state of Roraima, in November 2001. The introduction of that serotype could have been due to the intense movement of people along the border region between Brazil and Venezuela, where the four serotypes of the virus circulate.

Several studies have been conducted to determine the genetic characteristics of each serotype in circulation in the country. Serotype 1 is of a Caribbean strain, serotype 2 is of a Jamaican strain and serotype 3 is of a Sri Lanka strain.

Figure 1: Incidence of Dengue per 100,000 population, Brazil, 1986-2001



Source: SES/FUNASA/CENEPI/ASDCE/COFAB

Current situation

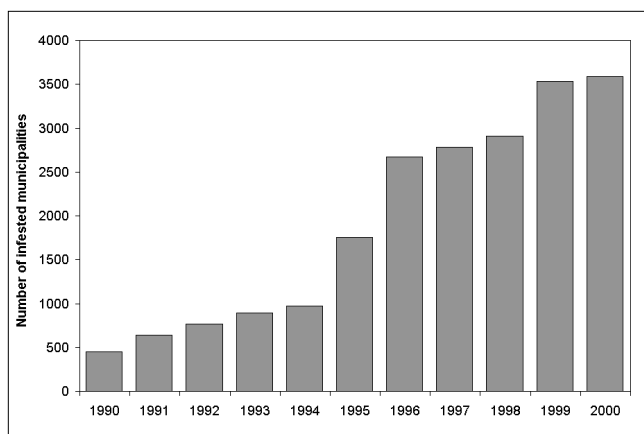
To better understand the epidemiological situation of dengue in Brazil, it is necessary to evaluate each of the five major regions, since behavior of the disease is different in each one.

In 2002, it has been observed that the diffusion of serotype 3 from the state where it was originally detected presents a different profile from the diffusion observed with serotypes 1 and 2. Previously, diffusion of a new serotype occurred slowly and some years elapsed before indigenous cases occurred in other states. In the first three months of the current year, the presence of the new serotype of the virus has been detected in ten more states (Bahia, Ceará, Goiás, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Pará, Paraíba, Pernambuco and São Paulo).

In the first months of the year, the suspected and confirmed cases of dengue increased considerably in some states, strengthening the trend toward the increase in cases observed in 2000 and 2001 (figure 1). In that period, epidemics occurred in several states of the country. The total number of cases reported from January to March in 2001 and 2002 in the regions and states of the country are presented in table 1.

In the southeast, the increase is observed mainly in the state of Rio de Janeiro, with nearly 145,000 reported cases until epidemiological week 13. This number corresponds to 45.8% of the total recorded cases in the country (preliminary data) (table 1). The metropolitan area, where the state capital city of Rio de Janeiro is situated, presents more than 60% of the cases recorded in the state. The results of monitoring the circulation of the virus reveal a predominance of serotype 3

Figure 2: Number of Municipalities infested by *Aedes aegypti*, Brazil, 1990-2000:



Source: SES/FUNASA/CENEPI/ASDCE/COFAB

in the current epidemic. From January to March 2002, the state of Espírito Santo presented an important increase in the number of cases in comparison with 2001, while the states of São Paulo and Minas Gerais reported a reduction in the cases recorded in that same period (table 1).

In general, the states of the northeast presented an increase in reported cases in January, in particular in Pernambuco which reported 53,000 suspected cases until week 13 (preliminary data). This number of cases could reflect the circulation of serotype 3 in that state, since it was isolated in the capital (Recife) and in other municipalities of the metropolitan area and of the interior. Bahia and Rio Grande do Norte also presented an increase in the number of reports, although the number of cases is lower than in the same period of 2001. In the state of Bahia, studies have shown a high prevalence of previous infection by serotypes 1 and 2, which indicates that the current increase of observed cases could have to do with the circulation of serotype 3.

In the midwestern region, the disease presented different epidemiological characteristics from previous years, in which the cases always increased starting in the third week of January. The number of cases in the states of Goiás and Mato Grosso do Sul began to increase starting in November 2001, nearly two months before expected, based on the seasonal behavior previously observed.

The states of the northern region, in general, presented a decrease in the number of cases reported from January 2001 to January 2002. The states of Roraima stand out, however, with indigenous circulation of dengue 3 starting in November, and a small increase of cases in January. The state of Tocantins experienced a marked increase in cases from November 2001 to January 2002 that coincide with the patterns observed in the Midwestern region.

In the southern region in January and February 2002, the state of Paraná presented a significant reduction in reported suspected cases in comparison with 2001. The states of San-

ta Catarina and Rio Grande do Sul remain free from indigenous transmission, although the number of imported cases has increased compared to the same period of the previous year.

The number of serious cases of the disease also presented an important increase in 2002. Health care services are reporting more frequent thrombocytopenia conditions below 100,000/mm³. The number of cases of dengue hemorrhagic fever (DHF) in the country also increased: the total number of cases confirmed until the epidemiological week 13 of 2002 was 1,559 with 60 deaths, while throughout 2001, 682 cases were recorded with 29 deaths. The number of confirmed cases and deaths by DHF are presented by state of residence in table 1.

Prevention and control

Favorable socio-environmental conditions facilitated the spread of *A. aegypti*, since its reintroduction in 1976. Methods traditionally used in the fight against vector-borne diseases in Brazil and in the continent have not been successful in controlling the vector. Previous programs centered on chemicals, with limited or no community participation, without intersectoral integration and with little utilization of epidemiological instruments. These programs were unable to contain the vector because of its great capacity for adaptation to an environment rapidly changing by urbanization and new customs.

In 1996, the Ministry of Health decided to revise the strategy against *A. aegypti* and proposed a Program of Eradication of the vector (PEAa). The new program took into account the difficulties of the previous control strategy and, paradoxically, it proposed an even more complex objective, stemming from the assumption that the vector could be eradicated. Though the PEAa stemmed from this mistaken assumption and presented omissions or deficiencies in important areas such as community participation and epidemiological surveillance, it had undeniable merits. For example, the program proposed multisectoral action and foresaw the participation of the three levels of government: federal, state, and municipal, in the endeavor.

In practice, the PEAa contributed to strengthening the fight against the vector, considerably increasing resources for the project. Prevention activities centered mainly around utilization of insecticides.

Results obtained in Brazil and at the international level, brought into question the viability of a short-term policy of eradication of the vector. This led the Ministry of Health to reevaluate the progress and limitations of the program, with the objective of establishing a new program to control dengue.

The increase in observed incidence of dengue in the last two years and the introduction of a new serotype (DEN 3), led to a prediction of increased risk of dengue epidemics and an increase of the cases of DHF. To face the expected risks for 2002, the Ministry of Health, in collaboration with the Pan

Table 1: Reported cases of Dengue and Dengue Hemorrhagic Fever (DHF) and deaths, by state and region of residence, Brazil, January-March 2001 and 2002*

State and Region	Dengue			DHF	Deaths
	Jan-Mar 2001	Jan-Mar 2002	Variation (%)	Jan-Mar 2002	Jan-Mar 2002
North	30,829	9,847	-68.06	0	0
Rondônia (RR)	1,216	1,222	0.49	0	0
Acre (AC)	2,043	554	-72.88	0	0
Amazonas (AM)	17,089	1,146	-93.29	0	0
Roraima (RR)	1,999	1,636	-18.16	0	0
Pará (PA)	4,780	3,264	-31.72	0	0
Amapá (AP)	64	893	1295.31	0	0
Tocantins (TO)	3,638	1,132	-68.88	0	0
Northeast	54,760	103,699	89.37	92	5
Maranhão (MA)	3,783	2,524	-33.28	0	0
Piauí (PI)	3,015	2,875	-4.64	0	0
Ceará (CE)	14,684	4,944	-66.33	18	3
Rio Grande do Norte (RN)	12,151	6,264	-48.45	0	0
Paraíba (PB)	927	4,171	349.95	1	1
Pernambuco (PE)	3,912	55,023	1306.52	73	1
Alagoas (AL)	654	2,875	339.60	0	0
Sergipe (SE)	1,016	975	-4.04	0	0
Bahia (BA)	14,618	24,048	64.51	0	0
Southeast	57,150	202,500	254.33	1,435	56
Minas Gerais (MG)	17,522	13,214	-24.59	16	2
Espírito Santo (ES)	5,885	17,766	201.89	9	1
Rio de Janeiro (RJ)	22,163	163,676	638.51	1,406	53
São Paulo (SP) ¹	11,580	7,844	-32.26	4	0
Sul	1,987	2,782	40.01	1	1
Paraná (PR) ¹	1,908	1,112	-41.72	1	1
Santa Catarina (SC)	43	727	1590.70	0	0
Rio Grande do Sul (RS)	36	943	2519.44	0	0
Midwest	10,717	38,787	261.92	1,717	70
Mato Grosso do Sul (MS)	2,573	14,126	449.01	54	1
Mato Grosso (MT)	1,010	8,587	750.20	4	0
Goiás (GO)	5,549	12,457	124.49	35	1
Distrito Federal (DF)	1,585	3,617	128.20	2	2
Brazil	155,443	357,615	130.06	1,622	66
Brazil without state of Rio	133,280	193,939	45.51	216	13

* Provisional data subject to change

¹ Confirmed cases

NOTE: The totals of cases for January and February, 2002 for SP, CE and PE are not known.

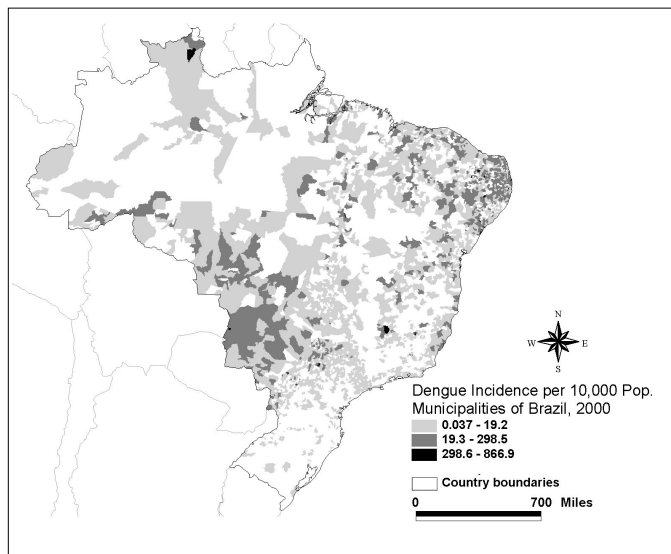
American Health Organization, carried out an international seminar in June 2000 to evaluate the situation and prepare an plan of intensification of dengue control activities (PIACD). The plan points out the 657 municipalities of greatest risk in the country (figure 3), with the objective of targeting action and more effectively utilizing the positive results of previously adopted initiatives. These include: 1) a large infrastructure for vector control in the states and municipalities (vehicles, spraying equipment, microscopes and computers), 2) nearly 40,000 agents trained in vector control, in more than 3,500 municipalities, and 3) a set of nationally standardized activities and technical standards for vector control.

The PIACD emphasizes the need to change the models of previous programs designed to fight dengue, basically in two essential aspects: 1) the preparation of permanent programs, since there are no technical signs that the mosquito can be eradicated in the short term, 2) information and motivation of people so that every family assumes a greater responsibility for the maintenance of a domestic environment free from possible vector breeding sites and 3) strengthening

epidemiological and entomological surveillance to expand the capacity for outbreak foresight and early detection.

The fight against dengue began to intensify in Brazil in October 2001, though strengthening of the infrastructure by procurement and distribution of vehicles for transportation of teams, supervisors, and equipment (such as insecticide sprayers and entomological microscopes) in the 25 states included in the plan. Eighty-nine thousand community health workers were trained to carry-out a broad program of the Ministry of Health aimed at expanding access to basic care. These workers disseminate information regarding domestic prevention of the mosquito *A. aegypti* and monitor suspected cases of dengue. A new model to monitor the activities of epidemiological surveillance was developed and is being implemented in the health offices of priority municipalities and states. This strategy utilizes informatics programs and optimizes analysis of the data generated by the system. These regularly carried-out analyses increase the sensitivity and capacity of outbreak detection and provide information that facilitate decisions related to intensifying control measures.

Figure 3: Incidence of dengue in municipalities of greatest risk, Brazil, 2000



Source: SES/FUNASA/CENEPI/ASDCE/COFAB

Note: Municipalities appearing in white did not report whether they had cases or not in this period.

Monitoring field activities in the struggle against the vector will intensify during the course of the year. Frequent surveillance will make it possible to detect deficiencies in activities, as environmental factors and the behavior of the population change. Deficiencies could range from the number of trained staff and supervisors to articulation of external measures in the health sector.

In several Brazilian municipalities, serotype 3 found suitable conditions for epidemics due to the high indices of infestation of the vector. A critical epidemiological situation has arisen due to insufficient quantity and quality of field equipment, an incipient or even absent mobilization of the population to enact control measures and to an early summer that began with a great deal of heat and rain since the end of the last year.

In Rio de Janeiro, the state with the greatest incidence of dengue and DHF cases, as well as deaths from this disease, the Ministry of Health, through the National Health Foundation (FUNASA), had to intervene directly to prevent major damages. In the beginning of February, a special working group was formed at the federal level with the participation of 1,000 endemic disease control agents transferred from other states to work in the most infested areas. At the beginning of March, 1,300 soldiers from the Army and the Navy joined that group to complement the municipal agents and guarantee the full coverage of all the municipalities of the metropolitan area of Rio de Janeiro. Furthermore, measures were adopted to improve the care of patients with serious forms of the disease, such as training of physicians, expansion of the availability of beds for fast care, and improve-

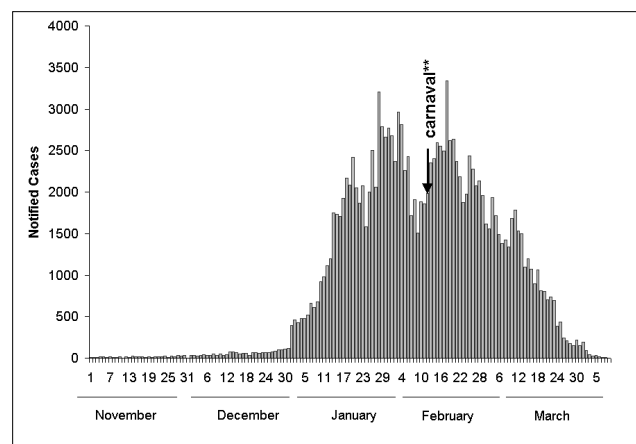
ment of the organization of the case referral system.

On March 9, a great mobilization known as “D-Day against Dengue” was carried out in Rio de Janeiro. With the support of an intense advertising campaign and of governmental and nongovernmental organizations, it was possible to mobilize nearly 715,000 volunteers and motivate families to carry out a self-inspection of their domestic environments that day. Similar initiatives have been carried out in other states, with equal success. A greater awareness of dengue has developed as well as a new perception that dengue should not be treated as a banal disease and that community participation is indispensable to control the vector.

The measures adopted in Rio de Janeiro were accompanied by a marked reduction in the number of cases (figure 3), outpatient consultations and hospitalizations. In other states a similar trend is being observed.

The introduction of the serotype 3 and its fast spread to eight states in only three months show how easily new serotypes or strains of the virus can be introduced. These facts point out the possibility that new epidemics of dengue and DHF could occur. In this epidemiological situation it is indispensable to intensify the set of activities planned and in progress, to better approach the problem and reduce the impact of dengue in Brazil.

Figure 4: Reported Cases of Dengue in the Municipality of Rio de Janeiro, RJ, November 2001-April 2002*



Source: Municipal Health Secretariat, Rio de Janeiro

* Data subject to change

** The number of reported cases always decrease on the week of the Carnival. This decrease could be explained by an increase in the number of unreported cases.

Source: Prepared by Drs. Jarbas Barbosa da Silva Jr., João Bosco Siqueira Jr., Giovanini E. Coelho, Paulo T.R. Vilarinhos, and Fabiano G. Pimenta Jr. from the National Epidemiology Center (CENEPI) / FUNASA / Ministry of Health of Brazil.

Introduction to Social Epidemiology

The study of social conditions and how these influence and determine the health situation of populations have always been a subject of interest and importance for public health in general. In recent years, a stronger tie between epidemiology and the social sciences has been forged,¹ promoted by the need to recognize and document the wide spectrum of health determinants, from a micro level, where individual biological factors operate, to a macro level that expresses social conditions in which populations live. This endeavor has given birth to the so-called “social epidemiology.”

The principal concern of social epidemiology is the study of how society and different forms of social organization influence the health and well-being of individuals and populations. In particular, it studies the frequency, distribution, and social determinants of the states of health in a population. Thus, social epidemiology goes beyond the analysis of individual risk factors to include the study of the social context in which the health-disease phenomenon occurs.²

In order to explain the path between exposure to social characteristics of the environment and its effects on public health, social epidemiology enriches the traditional epidemiological approach with concepts and techniques from social disciplines such as economics, sociology and demography, as well as biology. This fusion of techniques from different fields creates a methodological challenge. Examples of development in this field include the growing use of methods

of multi-level analysis in ecological design, control of the ecological fallacy, and the use of new applications of already known tools and techniques.

A constant and current concern in the global sanitary landscape is the presence of inequalities — particularly *social inequalities* — in health. Social epidemiology makes it possible to incorporate the social experience of populations in the traditional etiological approach to public health and, as a result, permits a better understanding of how, where and why inequalities affect health. In this regard, social epidemiology can contribute significantly to the health management process and the reduction of inequities in health.

As an introduction to this branch of epidemiology, we provide the readers of the *Epidemiological Bulletin* with an overview of its vocabulary, taking advantage of the Glossary for Social Epidemiology prepared by Dr. Nancy Krieger of the Harvard University School of Public Health. This glossary was recently published in the *Journal of Epidemiology and Community Health*, which kindly authorized its reproduction in the *Bulletin*. It will be published in two parts. The second part will be included in the June 2002 issue of the *Bulletin*.

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A Glossary for Social Epidemiology

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PART I

Why “social epidemiology”? Is not all epidemiology, after all, “social” epidemiology? In so far as people are simultaneously social and biological organisms, is any biological process ever expressed devoid of social context?—or any social process ever unmediated by the corporal reality of our profoundly generative and mortal bodies?^{1,2} Yet, despite the seeming truism that social as well as biological processes inherently shape population health—a truism recognized even in the founding days of epidemiology as a scientific discipline in the early 19th century—not all epidemiology is “social epidemiology”.^{3,4} Instead, “social epidemiology”

(which first attained its name as such in English in 1950^{3,5}) is distinguished by its insistence on explicitly investigating social determinants of population distributions of health, disease, and wellbeing, rather than treating such determinants as mere background to biomedical phenomena. Tackling this task requires attention to theories, concepts, and methods conducive to illuminating intimate links between our bodies and the body politic; toward this end, the glossary below provides a selection of critical terms for the field.

One brief note of explanation. Some entries contain only one term; others include several related terms whose mean-

ings are interdependent or refer to specific aspects of a broader construct. Additionally, each entry is cast in relation to its significance to social epidemiology; explication of salience to other disciplines is beyond the scope of this particular glossary.

Biological expressions of social inequality

Biological expressions of social inequality refers to how people literally embody and biologically express experiences of economic and social inequality, from in utero to death, thereby producing social inequalities in health across a wide spectrum of outcomes.^{1,2,6} Core to social epidemiology, this construct of “biological expressions of social inequality” has been evident in epidemiological thought—albeit not always explicitly named as such—since the discipline’s emergence in the early 19th century, as exemplified by early pathbreaking research (for example, conducted by Louis René Villermé (1782–1863)) on socioeconomic gradients in—and effects of poverty on—mortality, morbidity, and height.^{3,7,8}

Examples include biological expressions of poverty and of diverse types of discrimination, for example, based on race/ethnicity, gender, sexuality, social class, disability, or age. Whether these biological expressions of social inequality are interpreted as expressions of innate versus imposed, or individual versus societal, characteristics in part is shaped by the very social inequalities patterning population health.^{1,6} The construct of “biological expressions of social inequality” thus stands in contrast with biologically deterministic formulations that cast biological processes and traits tautologically invoked to define membership in subordinate versus dominant groups (for example, skin colour or biological sex) as explanations for social inequalities in health.

Discrimination

Discrimination refers to “the process by which a member, or members, of a socially defined group is, or are, treated differently (especially unfairly) because of his/her/their membership of that group”.⁹ This unfair treatment arises from “socially derived beliefs each [group] holds about the other” and “patterns of dominance and oppression, viewed as expressions of a struggle for power and privilege”.¹⁰

People and institutions who discriminate adversely accordingly restrict, by judgement and action, the lives of those against whom they discriminate.⁶ At issue are practices of dominant groups—both institutionally and interpersonally—to maintain privileges they accrue through subordinating the groups they oppress (intentionally and also by maintaining the status quo) and the ideologies they use to justify these practices, with these ideologies revolving around notions of innate superiority and inferiority, difference, or deviance.⁶ Predominant types of adverse discrimination are based on

race/ethnicity, gender, sexuality, disability, age, nationality, and religion, and, although not always recognised as such, social class. By contrast, positive discrimination (for example, affirmative action) seeks to rectify inequities created by adverse discrimination.

Social epidemiological analyses of health consequences of discrimination require conceptualising and operationalising diverse expressions of exposure, susceptibility, and resistance to discrimination, as listed below, recognising that individuals and social groups may be subjected simultaneously to multiple—and interacting—types of discrimination:⁶

Aspects of discrimination:

Type: defined in reference to constituent dominant and subordinate groups, and justifying ideology

Form: structural, institutional, interpersonal; legal or illegal; direct or indirect; overt or covert

Agency: perpetrated by state or by non-state actors (institutional or individuals)

Expression: from verbal to violent; mental, physical, or sexual

Domain: for example, at home; within family; at school; getting a job; at work; getting housing; getting credit or loans; getting medical care; purchasing other goods and services; by the media; from the police or in the courts; by other public agencies or social services; on the street or in a public setting

Level: individual, institutional, residential neighbourhood, community, political jurisdiction, national, regional, global

Cumulative exposure to discrimination:

Timing: intrauterine period; infancy; childhood; adolescence; adulthood

Intensity: severe to mild

Frequency: chronic; acute; sporadic

Duration: timespan over which discrimination is experienced

Responses to discrimination can similarly be analysed.⁶

Ecosocial theory of disease distribution

Ecosocial^{1,2} and other emerging multi-level epidemiological frameworks^{11,12} seek to integrate social and biological reasoning and a dynamic, historical and ecological perspective to develop new insights into determinants of population distributions of disease and social inequalities in health. The central question for ecosocial theory is: “*who and what is responsible for population patterns of health, disease, and wellbeing, as manifested in present, past, and changing social inequalities in health?*” Adequate epidemiological explanations accordingly must account for both persisting and changing distributions of disease, including social inequali-

ties in health, across time and space. To aid conceptualisation, ecosocial theory uses a visual fractal metaphor of an evolving bush of life intertwined with the scaffolding of society that different core social groups daily reinforce or seek to alter.^{1,2} A fractal metaphor is chosen because fractals are recursive structures, repeating and self similar at every scale, from micro to macro.² Thus, ecosocial theory invites consideration of how population health is generated by social conditions necessarily engaging with biological processes at every spatiotemporal scale, whether from subcellular to global, or nanoseconds to millennia.¹

Core concepts for ecosocial theory accordingly include¹:

(1) *embodiment*, a concept referring to how we literally incorporate, biologically, the material and social world in which we live, from in utero to death; a corollary is that no aspect of our biology can be understood absent knowledge of history and individual and societal ways of living.

(2) *pathways of embodiment*, structured simultaneously by: (a) societal arrangements of power and property and contingent patterns of production, consumption, and reproduction, and (b) constraints and possibilities of our biology, as shaped by our species' evolutionary history, our ecological context, and individual histories, that is, trajectories of biological and social development.

(3) *cumulative interplay between exposure, susceptibility, and resistance*, expressed in pathways of embodiment, with each factor and its distribution conceptualised at multiple levels (individual, neighbourhood, regional or political jurisdiction, national, inter-national or supra-national) and in multiple domains (for example, home, work, school, other public settings), in relation to relevant ecological niches, and manifested in processes at multiple scales of time and space.

(4) *accountability and agency*, expressed in pathways of and knowledge about embodiment, in relation to institutions (government, business, and public sector), communities, households, and individuals, and also to accountability and agency of epidemiologists and other scientists for theories used and ignored to explain social inequalities in health; a corollary is that, given likely complementary causal explanations at different scales and levels, epidemiological studies should explicitly name and consider the benefits and limitations of their particular scale and level of analysis.

More than simply adding “biology” to “social” analyses, or “social factors” to “biological” analyses, the ecosocial framework begins to envision a more systematic integrated approach capable of generating new hypotheses, rather than simply reinterpreting factors identified by one approach (for example, biological) in terms of another (for example, social).¹

Embodiment

A core concept for understanding relationships between the state of our bodies and the body politic; see definition in entry on “ecosocial theory”.

Gender, sexism, and sex

Gender refers to a social construct regarding culture-bound conventions, roles, and behaviours for, as well as relationships between and among, women and men and boys and girls.^{13–15} Gender roles vary across a continuum and both gender relationships and *biological expressions of gender* vary within and across societies, typically in relation to social divisions premised on power and authority (for example, class, race/ethnicity, nationality, religion).^{6, 15} *Sexism*, in turn, involves inequitable gender relationships and refers to institutional and interpersonal practices whereby members of dominant gender groups (typically men) accrue privileges by subordinating other gender groups (typically women) and justify these practices via ideologies of innate superiority, difference, or deviance.^{6, 13–15} Lastly, *sex* is a biological construct premised upon biological characteristics enabling sexual reproduction.^{14, 16} Among people, biological sex is variously assigned in relation to secondary sex characteristics, gonads, or sex chromosomes; sexual categories include: male, female, intersexual (persons born with both male and female sexual characteristics), and transsexual (persons who undergo surgical and/or hormonal interventions to reassign their sex).¹⁴ Sex linked biological characteristics (for example, presence or absence of ovaries, testes, vagina, penis; various hormone levels; pregnancy, etc) can, in some cases, contribute to gender differentials in health but can also be construed as *gendered expressions of biology* and erroneously invoked to explain *biological expressions of gender*.^{1, 16} For example, associations between parity and incidence of melanoma among women are typically attributed to pregnancy related hormonal changes; new research indicating comparable associations between parity and incidence of melanoma among men, however, suggests that social conditions linked to parity, and not necessarily—or solely—the biology of pregnancy, may be aetiologically relevant.¹⁷

Human rights and social justice

Human rights, as a concept, presumes that all people “are born free and equal in dignity and rights”¹⁸ and provides a universal frame of reference for deciding questions of equity and social justice.^{18–21} Operationally, translated to the realm of political and legal accountability, “international human rights law is about defining what governments *can* do to us, *cannot* do to us, and *should* do for us”¹⁹ [italics in the original], so as to respect, protect, and fulfill their human rights obligations.^{19, 20} Human rights norms are premised, in the first instance, upon the 1948 Universal Declaration of Human

Rights¹⁸ and its recognition of the indivisibility and interdependence of civil, political, economic, social, and cultural rights.^{18–21} A “health and human rights” framework thus not only spurs recognition of how realisation of human rights promotes health but also helps translate concerns about how violation of human rights potentially harms health into concrete and actionable grievances that governments and the international community are legally and politically required to address. Understanding of what prompts violation of human rights and sustains their respect, protection and fulfillment is, in turn, aided by *social justice* frameworks, which explicitly analyse who benefits from—and who is harmed by—economic exploitation, oppression, discrimination, inequality, and degradation of “natural resources”.^{21–24} Together, both frameworks provide concepts relevant for analysing social determinants of health and for guiding action to create just and sustainable societies.

Lifecourse perspective

Lifecourse perspective refers to how health status at any given age, for a given birth cohort, reflects not only contemporary conditions but embodiment of prior living circumstances, in utero onwards.^{25–27} At issue are people’s developmental trajectories (both biological and social) over time, as shaped by the historical period in which they live, in reference to their society’s social, economic, political, technological, and ecological context. One component may involve what has been termed “biological programming”, referring to “the process whereby a stimulus or insult, at a sensitive or “critical” period of development, has lasting or lifelong significance”²⁷; which of these processes, under what circumstances, are reversible is an important empirical and public health question.

Multi-level analysis

Multi-level analysis refers to statistical methodologies, first developed in the social sciences, which analyse outcomes simultaneously in relation to determinants measured at different levels (for example, individual, workplace, neighborhood, nation, or geographical region existing within or across geopolitical boundaries).^{28–31} If guided by well developed conceptual models clearly specifying which variables are to be studied at which level,²⁸ these analyses can potentially assess whether individuals’ health is shaped by not only “individual” or “household” characteristics (for example, individual or household income) but also “population” or “area” characteristics; the latter may be “compositional” (for example, proportion of people living in poverty) or “contextual” (irreducible to the individual level, for example, income distribution, population density, or absence of facilities, such as supermarkets, libraries, or health centres).^{30,31}

Poverty, deprivation (material and social), and social exclusion

To be *impoverished* is to lack or be denied adequate resources to participate meaningfully in society. A complex construct, *poverty* is inherently a normative concept that can be defined—in both absolute and relative terms—in relation to: “need”, “standard of living”, “limited resources”, “lack of basic security”, “lack of entitlement”, “multiple deprivation”, “exclusion”, “inequality”, “class”, “dependency”, and “unacceptable hardship”³²; see “socioeconomic position” (below). Also relevant is whether the experience of poverty is transient or chronic.

According to the United Nations, as elaborated in the *Human Development Report 2000*, two forms of poverty can be distinguished: “human poverty” and “income poverty”.²¹ *Human poverty* is “defined by impoverishment in multiple dimensions—deprivations in a long and healthy life, in knowledge, in a decent standard of living, in participation”; *income poverty*, by contrast, “is defined by deprivation in a single dimension—income”.²¹ From this perspective, income poverty constitutes a critical (but not exclusive) determinant of human poverty, including the latter’s expression in compromised health status.

*Deprivation*³³ can be conceptualised and measured, at both the individual and area level, in relation to: *material deprivation*, referring to “dietary, clothing, housing, home facilities, environment, location and work (paid and unpaid),” and *social deprivation*, referring to rights in relation to “employment, family activities, integration into the community, formal participation in social institutions, recreation and education”.³⁴ *Poverty thresholds* accordingly can be set at: (a) An income level (for example, poverty line) determined inadequate for meeting subsistence needs, or (b) “the point at which resources are so seriously below those commanded by the average individual or family that the poor are, in effect, excluded from ordinary living patterns, customs, and activities”, such that the poverty line equals “the point at which withdrawal escalates disproportionately to the falling resources”.³³

Social exclusion, another term encompassing aspects of poverty, in turn focuses attention on not only the impact but also the process of marginalisation.^{33, 35} Avenues by which social groups and individuals can become excluded from full participation in social and community life include: (a) legal exclusion (for example, de jure discrimination), (b) economic exclusion (due to economic deprivation), (c) exclusion due to lack of provision of social goods (for example, no translation services or lack of facilities for disabled persons), and (d) exclusion due to stigmatisation (for example, of persons with HIV/AIDS) and de facto discrimination.

Psychosocial epidemiology

A psychosocial framework directs attention to both behavioural and endogenous biological responses to human interactions.¹ At issue is the “health-damaging potential of psychological stress”, as “generated by despairing circumstances, insurmountable tasks, or lack of social support”³⁶. Typically conceptualised in relation to individuals, its central hypothesis is that chronic and acute social stressors: (a) alter host susceptibility or become directly pathogenic by affecting neuroendocrine function, and/or (b) induce health damaging behaviours (especially in relation to use of psychoactive substances, diet, and sexual behaviours).^{1, 4, 36} “Social capital” and “social cohesion”, in turn, are proposed (and contested) as population level psychosocial assets that potentially can improve population health by influencing norms and strengthening bonds of “civil society”, with the caveat that membership in certain social formations can potentially harm either members of the group (for example, group norms encourage high risk behaviours) or non-group members (for example, harm caused to groups subjected to discrimination by groups supporting discrimination).^{1, 37–40}

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Case Definition

Salmonellosis

Rationale for Surveillance

Salmonellosis is one of the main causes of foodborne disease. Detection and control of outbreaks is complicated by the fact that there are over 2,200 serotypes of *Salmonella* species, several of which have multiple phage types. Laboratory-based surveillance of salmonellosis with definitive typing and antibiograms allows for rapid identification of clusters. Investigations can then concentrate on individual cases infected with the "epidemic" strain and lead to better identification of risk factors and implicated food items. Utilization of molecular methods can lead to even more accurate identification of "epidemic" strains.

Recommended Case Definition

Clinical description

An illness with the following symptoms: diarrhoea, abdominal cramps, fever, vomiting and malaise.

Laboratory criteria for confirmation

Isolation of *Salmonella* spp. from the stool or blood of a patient.

Case classification

Suspected: An individual showing one or more of the clinical features.

Confirmed: A suspected case with laboratory confirmation.

Recommended Types of Surveillance

National: The surveillance of salmonellosis is a laboratory-based exercise. The samples examined by laboratories must be generated from cases presenting at health centres, hospitals, or in private practice, and practitioners must be aware of the importance of requesting examination of stool specimens for public health purposes, especially in cases where food- or water-borne transmission is suspected.

Surveillance is based on a network of laboratories that routinely report data on isolation of *Salmonella* spp. to central levels. All suspected outbreaks of salmonellosis must be reported to the central level and investigated. In addition, isolates of *Salmonella* spp. may be sent to a reference laboratory for further typing. Definitive typing data can be analyzed on a broad geographical basis; this allows for the detection of outbreaks that may not otherwise be detected.

A minimum data set should be collected on each outbreak at intermediate and central levels. This should be done after the outbreak investigation and include key variables on the nature and extent of the outbreak (time, place, person, possible source).

Note: The laboratory network for surveillance of salmonellosis should be as wide and complete as possible. The concentration of facilities for definitive typing in reference laboratories is useful in order to maintain quality. However, care must be taken when relying on the samples processed in such laboratories as they may not always be representative in terms of clinical spectrum or geography.

International: Reports on notifications, laboratory data and outbreaks to be sent to the *WHO Global Database on Foodborne Diseases Incidence* as well as to regional surveillance programs. Reports on investigations of specific outbreaks, particularly those implicating a commercial product, to the *WHO Global Database on Foodborne Diseases Outbreaks*. ENTER-NET (previously SALM-NET) is an international network where information on laboratory isolations of *salmonella* and *Escherichia coli* O157 is shared between countries on much the same basis as within countries. This allows for the detection of outbreaks of international significance and the early warning of countries about contaminated products.

Recommended Minimum Data Elements

Case-based data (from laboratory):

Unique identifier, age, sex, geographical information

Date of onset, date of specimen

Specimen type, organism(s) identified.

Aggregated data (from laboratory):

Number of cases by *Salmonella* species, geographical area and age group.

Outbreak aggregated data:

Specific *salmonella* identified by species and phage type

Number of people at risk / ill / hospitalized

Number of deaths

Geographical information, outbreak setting (e.g., restaurant, hospital, school)

Date of first and last case

Food or constituent implicated and evidence for implication (e.g., epidemiological investigation, isolation in food)

Factors contributing to the outbreak (e.g., inadequate storage, inadequate heating, cross-contamination, infected food handler, environmental factors).

Recommended Data Analyses, Presentation, Reports

Surveillance data

Frequent review of laboratory data for clusters of cases in

time, place or person All suspected clusters must be investigated to establish whether an outbreak has occurred. Incidence of laboratory identifications by week, geographical area, organism, age group and sex (map incidence by geographical area if possible).

Outbreak investigation data

Incidence of outbreaks by species, phage type, month, geographical area, setting of outbreak, attack-rate, duration of outbreak, foods implicated and factors contributing to the outbreak.

Principal Uses of Data for Decision-making

- Determine the magnitude of the public health problem
- Detect clusters / outbreaks in good time

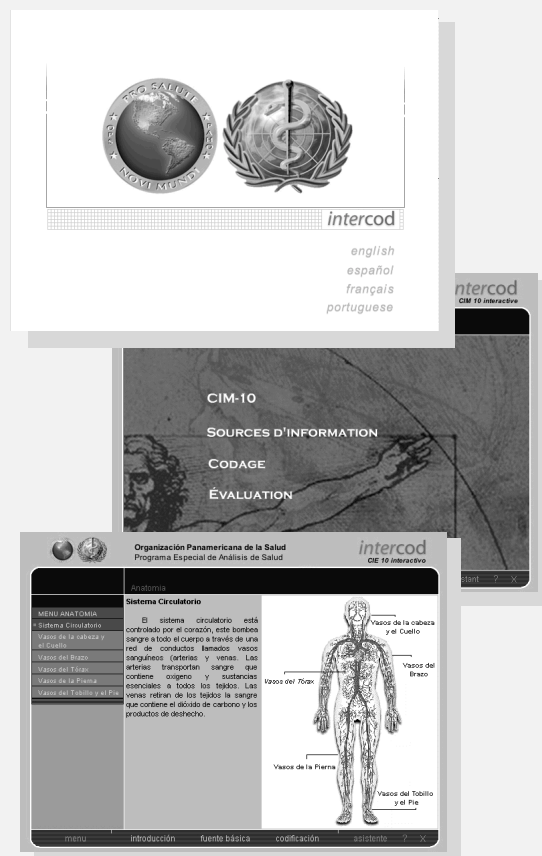
- Track trends in salmonellosis over time
- Identify high-risk food, high-risk food practices and high-risk populations for specific pathogens.
- Identify emergence of new species and phage types
- Guide the formation of food policy and monitor the impact of control measures
- Assess risks and set standards

Special Aspects

Human surveillance must be linked with food safety and control authorities.

Source: "WHO Recommended Surveillance Standards, Second edition, October 1999", WHO/CDS/CSR/ISR/99.2

Interactive Learning System for the International Classification of Diseases (INTERCOD)



With the purpose of maximizing the process of implementation of the International Classification of Diseases - 10th Version (ICD-10), the Pan American Health Organization through the Special Program for Health Analysis, along with the University of Guadalajara, the General Bureau of Statistics and Informatics of Mexico and the PAHO/WHO Collaborating Centers on the ICD, have developed the computer-assisted self-instruction system: INTERCOD. This program is available in English, French, Spanish, and Portuguese.

INTERCOD is structured into four principal sections:

- 1) **ICD-10:** this section presents the background information on the ICD, including its history, design and structure,
- 2) **Coding:** this section presents all the materials and principles related to the ICD, including an introduction to coding, the general principle and the selection and modification rules for determining the underlying cause of death for mortality and the main condition for morbidity,
- 3) **Basic sources:** this section presents formularies and certificates used in the registration of mortality information,
- 4) **Evaluation:** this section presents a self-administered evaluation, so that the user can measure the level of knowledge reached at the end of each section.

INTERCOD also provides an "Assistant" section, where additional information can be found on areas relevant to the use of the ICD, such as anatomy, physiology, and more.

For more information, contact the Special Program for Health Analysis, Pan American Health Organization, 525 23rd Street, NW, Washington, DC 20037 USA. Email: sha@paho.org Tel: (202) 974-3327

Special Announcements

Recent Issues related to Health Statistics

Editorial Note: Given the importance of adequate vital statistics as a basis for relevant and comparable health statistics at the international level, we are including the following Resolution, which emanates from the Meeting of Heads of WHO Collaborating Centers for the Family of International Classifications that took place in Bethesda (Mary-

land), USA on 21-27 October 2002. The area of health statistics was included for the first time in the Thirty-third Session of the United Nations Statistical Commission, which was carried out in New York (New York), USA on 5-8 March 2002. Highlights of the discussions on health statistics that took place during this session are also presented.

Resolution on Civil Registrations and Vital Statistics

The Heads of Collaborating Centres for the WHO Family of International Classifications have a broad interest in promoting and developing internationally comparable health statistics. Good quality information on the health of the population of Member States compiled by United Nations and other international bodies is essential for policy development and resource distribution.

A reliable flow of information on births and deaths is an essential component of health statistics. The Centre Heads welcomed a presentation on UN efforts to improve vital statistics, and the civil registration systems that underpin them, at their meeting in Bethesda (Maryland), USA on 25th October 2001.

The Centre Heads resolved to advise WHO of their views on the crucial importance of reliable, timely and internationally consistent vital statistics, and to ask WHO to advise the UN Statistical Commission of their position. Centre Heads agreed to advise their respective national statistical agencies of their position, and to urge the agencies to pursue the issue of improved vital statistics through the UN Statistical Commission.

Centre Heads recommend that:

1. Reliable, timely and internationally consistent statistics on births and deaths (vital statistics) are an essential component of information needed to promote soundly based policy development and resource distribution.

2. Complete registration of births and deaths is essential for the production of national birth and mortality statistics. Demographic surveys can be a useful complement to national vital statistics but are not a substitute for a complete vital registration system.
3. Mortality statistics should include cause of death coded and classified according to ICD-10. WHO and Collaborating Centres will make every effort to assist countries to implement ICD-10 for mortality.
4. Centre Heads commended the efforts to date of the UN Statistical Division, regional commissions and the United Nations Population Fund to assist the registration and vital statistics activities in countries, and noted that further work is needed in many countries. Centre Heads also noted the need for readily available training material, for technical assistance to countries (including resources for development in the country), and for the development of appropriate systems to monitor quality.
5. Centre Heads requested the UN Statistics Division to provide an update on progress in the development of national civil registration and vital statistics systems to the annual Collaborating Centre meetings.

Source: Final Report of the Meeting of Heads of WHO Collaborating Centres for the Family of International Classifications. Bethesda, Maryland, USA; October 2002

Report on the Thirty-third Session on Health Statistics of the United Nations Statistical Commission, March 2002

The Thirty-third Session of the United Nations Statistical Commission took place from 5 to 8 March 2002 in New York (New York), USA. The Commission reviewed the ongoing work of groups of countries and international organizations in various fields of demographic, social, economic and environmental statistics and on certain cross-cutting issues in statistics.¹ The Pan American Health Organization stimulated the inclusion of the issue of health statistics in the agenda and the item was discussed during the session for the first time in many years. A course of action was defined for all the statistical fields. In the particular case of health statistics, the Commission:

- (a) approved actions by the United Nations Statistics Division (UNSD) to support population and housing censuses to be undertaken by countries between 2005 and 2014;¹
- (b) requested the World Health Organization (WHO) to strengthen coordination of its statistical program with those of international organizations and countries and continue to improve the rigor of the methods used to generate statistics for its World Health Report;¹

The issue of health statistics was addressed by the Commission based on a report prepared by the WHO, which summarized the activities and plans of the Organization. One major area of WHO's statistical work as presented in the report is the measurement of levels and inequalities in health. For *overall population health*, WHO has been collecting mortality data on a routine basis, and is now trying to improve data collection on morbidity as well. Related statistical activities center around two inputs: age-sex specific death rates and prevalence of ill-health by age, sex and severity. In order to obtain detailed data on these components of healthy life expectancy, WHO has been planning to initiate a *World Health Survey* in all member states, and is developing approaches to solve the problem of comparability of self-reported data. In the area of *health inequalities*, WHO's plans involves the analysis of their extent using different approaches and methodologies. Other related epidemiological activities linked to the availability of health statistics include the regional and global *burden of disease* calculations; a *comparative risk assessment* project for 25 major risk factors worldwide; and

the construction of other *summary measures of population health*.²

Other areas of work of WHO mentioned in the report include health system performance, national health accounts, coverage of health systems interventions and the family of international classifications for health statistics.²

The United Nations Commission welcomed the WHO report on Health Statistics. However, the report generated a critical debate, which led to the following recommendations. The Commission:¹

- a) requested WHO to:
 - i) strengthen coordination of its statistical program with the statistical work of the involved international organizations and countries,
 - ii) continue to improve the rigor of the methods used to generate statistics for the World Health Report,
 - iii) hold further consultations with countries on methodology for the World Health Survey; and
 - iv) improve coordination and intensify consultation with interested countries and concerned organizations on developing a system of health statistics, before launching the World Health Survey;
- b) noted that WHO considers the vital registration system to be the preferred source for death statistics and emphasized the importance of supporting improved vital registration systems; and
- c) requested that the item of health statistics be included on the agenda at the next session of the Commission.

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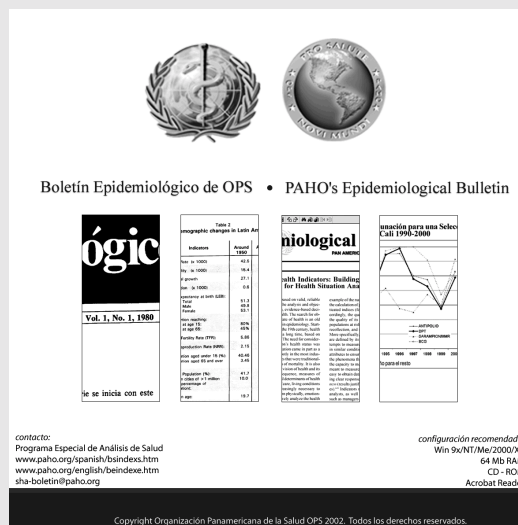
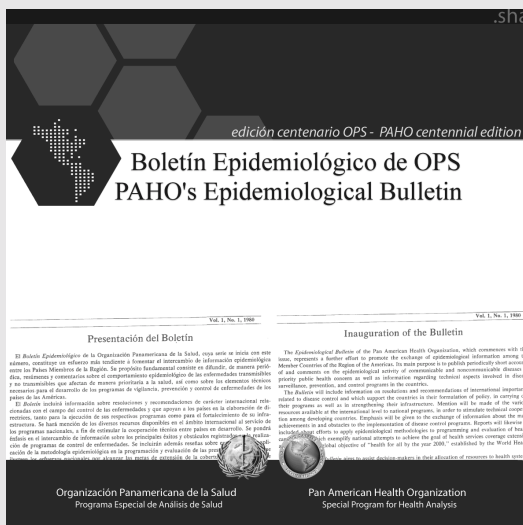
- (1) United Nations. Report of the Thirty-third Session of the Statistical Commission. New York, NY, USA; March 2002.
- (2) World Health Organization. Report on Health Statistics for the Thirty-third Session of the United Nations Statistical Commission. New York, NY, USA; March 2002.

Epidemiological Bulletin: 22 Years in CD-ROM PAHO Centennial Edition

Since its establishment in 1980, the main editorial line of PAHO's Epidemiological Bulletin has been the periodic dissemination of regional analytical summaries on diseases and health problems, with an emphasis on their epidemiological aspects. The Epidemiological Bulletin also publishes up-to-date information on methodological aspects that are needed for the development of health promotion, disease prevention and control programs, and for the programming and evaluation of health services. To supports essential public health functions, norms, standards, and recommendations for the practice of Epidemiology are regularly published as well. To keep its audience in tune with the latest developments in the field and with activities contributing to the development of human resources in Epidemiology, summaries of international meetings and information on courses, symposia, seminars, and others are also made available on a regular basis.

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