



PAN AMERICAN HEALTH ORGANIZATION  
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### **SURVEILLANCE AND PREVENTION OF FOODBORNE DISEASES**

Foodborne diseases pose a significant health risk to the populations of both the developing and the developed countries. WHO estimates that a high proportion of the 1,500 million cases of diarrhea and the 3 million consequent deaths in children under age 5 are attributable to contaminated food. Moreover, serious outbreaks caused by emerging pathogens in recent years have not only revealed the shortcomings of food protection programs for the prevention and control of foodborne diseases but increased the risks to the population and jeopardized the national and international food trade.

This document presents the PAHO response through the Regional Program for Technical Cooperation on Food Protection, created in 1986 in compliance with the mandate from the 31st Directing Council of PAHO of 1985 and backed up by the recommendations of the Inter-American Conference on Food Protection. The Plan of Action has five components: the organization of integrated national programs; strengthening of laboratory services, establishment of systems for the epidemiological surveillance of foodborne diseases, strengthening of inspection services, and promotion of food protection through community participation.

The Regional Program is coordinated by the Program on Veterinary Public Health and is executed by the Pan American Institute for Food Protection and Zoonoses (INPPAZ) in conjunction with consultants from the Program in the PAHO/WHO Representative Offices.

The Subcommittee on Planning and Programming is requested to offer observations and issue recommendations on the progress of the Regional Program and on the commitments that the countries and PAHO should assume to speed up activities leading to the organization of the food protection programs essential for the prevention and control of foodborne diseases.

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## EXECUTIVE SUMMARY

According to the statistics published by WHO, a high proportion of the annual incidence of 1,500 million episodes of diarrheal disease and 3 million deaths in children under age 5 are due to contaminated food. The data furnished by the countries to the Regional Information System for the Epidemiological Surveillance of Foodborne Diseases (FBD) in Latin America and the Caribbean indicate that in the period 1995-1996, there were 1,929 outbreaks, with 60,693 cases and a total of 146 deaths. According to information also submitted by the countries to the Caribbean Epidemiology Center (CAREC), 715 cases of FBD have been reported, and in the United States of America and Canada, considering only some of the enterobacteria that cause FBD, 99,103 cases were reported in 1995.

In the past 10 years, serious outbreaks of FBD caused by emerging pathogens have occurred in developed and developing countries alike. At the same time, changes in the global economy, the creation of the World Trade Organization, and subregional integration initiatives have led to a growth in world food trade, thereby increasing the risks of FBD in the population.

In response to this situation, in 1986 PAHO launched the Regional Program for Technical Cooperation on Food Protection, approved by the 31st Directing Council, which met in 1985. The Plan of Action includes five components considered fundamental for carrying out appropriate activities for the prevention and control of foodborne diseases.

In the component on the organization of integrated programs, the countries promoted and supported coordination among the health, agriculture, and private sectors for the creation of integrated food programs in Argentina, Guatemala, Panama, Paraguay, and Uruguay; a database on food standards was set up to facilitate national and regional harmonization.

In the component on strengthening the analytical capability of laboratory services, staff have been trained in the detection of microbial and chemical contaminants, with emphasis on emerging pathogens, and support is being provided for the organization of networks of laboratories with quality assurance programs. In the component on the strengthening of inspection services, personnel in Argentina, Colombia, Mexico, Panama, Paraguay, Peru, Uruguay, and countries of the English-speaking Caribbean were trained in the hazard analysis critical control points methodology (HACCP). In the epidemiological surveillance component, the information system was set up in 19 countries, and seven countries are receiving technical assistance on administering the national system at the local level. In the component on food protection through community participation, the countries received

support in analyzing the problem of food sold by street vendors and integrating the interests of consumers, producers, and official agencies into food protection programs.

In future programming, the evaluations of the Regional Program and current sanitary problems will be taken into account, as will the implications of regional and global economic change.

## 1. Background

### 1.1 *Nature of the Problem*

The prevention and control of foodborne diseases (FBD) is a global challenge today, since the real incidence of these diseases is unknown. WHO has estimated that the annual incidence is 1,500 million episodes of diarrhea, with a mortality of 3 million in children under age 5 and that, depending on the country, some 15 % to 79 % of these cases are attributable to contaminated food. In the United States, the Council for Agricultural Science and Technology (CAST) estimated the impact of foodborne diseases and concluded that 6.5 to 33 million cases and up to 9,000 deaths occur annually. Roughly 60 % of all outbreaks of FBD are of unknown etiology. Of those whose etiology is known, raw materials of animal origin appear to be most frequently implicated and the majority of these cases are due to the presence of bacteria.

Some foodborne diseases, while not new, are considered emerging diseases because they are occurring more frequently. In the past 10 years there have been epidemic outbreaks in several developed and developing countries, revealing the shortcomings of the programs for the prevention and control of foodborne diseases. Significant among these diseases are those caused by *Salmonella enteritidis*, in eggs; *Escherichia coli*, serotype 0157:H7, in meats; *Listeria monocytogenes*, in milk and cheeses, and *Campylobacter jejuni* and *Yersinia enterocolitica*, in pork and poultry. Another example is the cholera epidemic that struck the Region of the Americas in 1991. Contaminated water is the principal source of infection in this case, but there are several foods, primarily seafood, that can transmit the disease.

Other factors that can also contribute to the prevalence of FBD in Latin America include: the absence of integrated national food protection programs and a lack of continuity and articulation among the existing ones; lack of up-to-date legislation; inadequate training of the personnel in charge of food protection; inadequate infrastructure for the storage, transport, and distribution of food and food products; deficient sanitation and urban infrastructure, with the growth of shantytowns that lack basic drinking water and sewerage services; a deterioration in the economic situation of broad segments of the population and a growing number of food vendors on the streets whose products are not subject to any type of inspection; cultural factors that influence the preparation and preservation of food; and inadequate information for the general public and foreigners on the steps to take to reduce the risk of contracting a foodborne disease.

Other factors that should be considered are the changing world order, marked by the globalization of the economy and the creation of the World Trade Organization; changes in the microbial population that have led to the appearance of new pathogenic microorganisms resistant to antibiotics or to virulent strains of common pathogens; and,

from the socioeconomic standpoint, growth in the susceptible population due to aging, malnutrition, AIDS-related immunosuppression, and other medical conditions. Moreover, the long-term effects of food contaminated by pesticide residues and other substances, such as veterinary drug residues, is unknown.

## 1.2 Consequences

The data received in 1995-1996 by the Regional Information System for the Epidemiological Surveillance of Foodborne Diseases, coordinated by PAHO/INPPAZ from the reports submitted by the countries' national systems, indicate that there were 1,929 outbreaks, with 60,693 cases and a total of 146 deaths. Bearing in mind that the system is still in its infancy and that there still is a high percentage of underreporting, the magnitude of the problem of FBD in Latin America and the Caribbean is clear. In the English-speaking Caribbean, the countries reported a total of 715 cases of FBD to the Caribbean Epidemiology Center (Table 1 of the Annex), and this subregion is still in the initial stages of reporting outbreaks of FBD.

In the United States and Canada, salmonellosis accounts for more than 40,000 and 7,000 cases of FBD per year, respectively (Table 2 of the Annex). *S. enteritidis* has been the principal pathogen transmitted by eggs over the past 15 years. There have been outbreaks caused by *E. coli* O157:H7 found in meat, vegetables, milk, and apple juice. In both countries, there is considerable delay in the publication of national information on outbreaks of FBD.

Outbreaks of enterohemolytic *E. coli* O157:H7 infection with high morbidity and mortality rates and originating in meat products (chiefly ground meat), have led to the review of food inspection systems and an improvement in information and epidemiological surveillance systems for FBD in Australia, the United States, Japan, and United Kingdom.

Salmonella continues to be a leading cause of outbreaks from contaminated food, chiefly in the developing countries. In recent years the frequency of cases has risen in the majority of the countries, due to the emergency associated with the increase in *Salmonella enteritidis* in the industrialized countries and *Salmonella typhimurium* 10H(DT 104) in the United States and the United Kingdom.

Evidence of the possible transmission of *Cyclospora* through food imports was documented in an outbreak originating in raspberries affecting 15 provinces/states in Canada and the United States. Similar situations were observed in an outbreak of hepatitis A detected in strawberries.

An investigation of several outbreaks of disease caused by *Listeria monocitogenes* in the United States and Europe in the past 15 years has shown contaminated food to be the principle cause. The increasing numbers of people with

weakened immune systems, the growth of the food industry and mass cold-storage systems, and changes in dietary habits have contributed to these outbreaks.

Based on 31,218 questionnaires filled out by British travelers who visited the Dominican Republic in 1996, the subjective incidence of traveler's diarrhea was 67%; for Mexico, with 3,502 forms, it was 49%; for Saint Lucia, with 1,909 forms, 26%; and for Antigua, with 1,909 forms, 22%. Despite the subjectivity of this information, it is clear that food safety is important for the tourism industry, on which many countries in the Region depend.

In an analysis of seven pathogens in animal products conducted in the United States, it was estimated that the cost of FBD in humans could be as high as US\$ 34,900 million per year.

Beyond the effects on the health of their populations, countries suffer significant losses as a result of contaminated food in the national market, and for those countries that have a surplus to export, in the international market.

## **2. PAHO's Response: Regional Program for Technical Cooperation on Food Protection**

In compliance with the mandate of the IV Inter-American Meeting, at the Ministerial Level, on Animal Health (IV RIMSA) and the 31st Directing Council of PAHO, held in 1985 and backed up by the recommendations of the Inter-American Conference on Food Protection, in 1986 the Program on Veterinary Public Health launched the Regional Program for Technical Cooperation on Food Protection, which has been executed for four-year periods and evaluated in order to make the necessary adjustments.

The objectives of the Program are:

- to achieve a food supply that is safe, healthy, nourishing, pleasant, and inexpensive;
- to reduce human morbidity and mortality due to foodborne diseases;
- to reduce loss and damage in the production and marketing of food;
- to improve conditions for competition on the international food market, and to reduce rejections by the importing countries.

Coordination of the Plan of Action of the Regional Program for Technical Cooperation on Food Protection is the responsibility of the Program on Veterinary Public Health (HCV), while its execution is handled by the Pan American Institute for

Food Protection and Zoonoses (INPPAZ), created in 1991 through an agreement between PAHO and the Republic of Argentina, in conjunction with the consultants in the PAHO/WHO Representative Offices in the countries. The basic focus of the Program is preventing the risk of foodborne diseases in the population, covering every link in the food chain, from the farm to the table. The Plan of Action has five components.

## **2.1 *Organization of National Food Protection Programs***

Cooperation in this component is aimed at promoting and supporting the governments in strengthening institutional capacity in food protection, based on intersectoral articulation and the organization of national food commissions. As a result, integrated programs or commissions on food protection have been organized in Argentina, Jamaica, Panama, Paraguay, and Uruguay.

A database on food law was developed in collaboration with BIREME to facilitate the updating of food regulations and contribute to its efforts to harmonize standards and promote the food trade. The database currently includes all the legislation of Argentina and some of the legislation of Brazil, Paraguay and Uruguay. The software was given to the South American countries at a seminar workshop in which the participants discussed the food laws in their countries to be incorporated in the regional system. Workshops for the other countries will be held in 1998.

To promote the use of Codex Alimentarius standards, regional workshops with FAO have been held on microbial contamination in the international food trade, the protection of food imports, and the updating of laws to conform with World Trade Organization agreements and address current health problems linked with food safety.

A module has been developed for registering institutions and resources responsible for food protection in the countries of the Region. Information has been compiled from 18 countries, marking the beginnings of a data source to support technical cooperation among countries and international cooperation needs.

## **2.2 *Strengthening of Analytical Capability***

Cooperation in this component is geared toward organizing programs for the control of microbiological and chemical contaminants through laboratory networks with quality assurance systems that complement the epidemiological research and surveillance systems on contamination risks.

Through INPPAZ, PAHO/WHO has offered courses on the microbiology of food that has made it possible to train staff and organize the laboratories in all the countries. In response to the cholera epidemic, the HCV/INPPAZ program, in collaboration with FAO and the FDA, cooperated with all the countries, providing



training courses to strengthen their diagnostic capabilities and to meet the needs of the national and international food trade.

A project to institute techniques in the Region's laboratories to isolate and identify the most important emerging foodborne pathogens is being carried out in conjunction with the agriculture and health agencies of Argentina, with scientific and technical support from WHO Collaborating Centers in the United States and Brazil. The pathogens in question are: *E. coli* O157:H7, *Campylobacter jejuni*, *Listeria monocytogenes*, and *Yersinia enterocolitica*. In 1996 and 1997 two courses in this area were offered for 25 laboratory workers from South and Central America.

Under the coordination of HCV, a study was conducted in 1995 to evaluate microbial contamination in food sold by street vendors in La Paz (Bolivia), Bogota (Colombia), Quito (Ecuador), Lima (Peru), Mexico City and Culiacán (Mexico), and Santo Domingo (Dominican Republic). Some 2,433 samples were tested for *Vibrio cholerae*, *Staphylococcus aureus*, *Bacillus cereus*, *Salmonella SPP*, *Clostridium perfringens*, *E. coli* O157:H7, and fecal coliforms. *S. aureus* posed the greatest risk (8.4%), followed by *B. cereus* (7.89%), *C. perfringens* (5.07%), and *Salmonella SPP* (0.95%). *V. cholerae* was not found, and the presence of *E. coli* O157:H7 in one sample was confirmed. The study included a socioeconomic analysis of the food vendors.

Since 1992 INPPAZ has been consolidating an infrastructure that has made it possible for the institution to cooperate with the countries in the organization of laboratories to analyze the chemical residues that the countries consider pertinent to the national and international food trade—for example, PCBs, pesticides, antibiotics, mycotoxins, and heavy metals—to ensure that such laboratories operate under a quality assurance system consistent with the ISO-9000/GUIDE-25 standards.

To harmonize and standardize analytical methods, interlaboratory testing for chlorinated pesticide residues began in 1996, with the participation of 19 national health and agriculture laboratories in eight countries. Continuity will be provided through similar testing for other chemical contaminants.

The development of a bank of pesticide standards compensates for the lack of these substances in the national laboratories caused by the interruption of the free supply from the EPA in 1988. Thirty-six products have been prepared that include families of chlorinated and phosphorated pesticides; production is geared toward the supply of critical standards and reagents that are unavailable in commercial catalogs.

In 1994, INPPAZ began the development of a laboratory quality assurance system based on the standards of the ISO-9000/GUIDE-25 series. At present, the initial version of the sector's quality assurance plan for the analysis of chemical residues has been completed. For microbial contaminants, there is a preliminary guide that serves as the basis for quality assurance programs in laboratories.

An inter-American laboratory network is being organized specializing in methodologies for the analysis of microbial and chemical food contaminants. Its objectives are to promote and facilitate the harmonization of food safety laboratories in the Americas, to establish a quality assurance system for laboratory analysis, to strengthen the epidemiological surveillance systems, and to promote cooperation among the countries involved. A meeting to define the organization of the network is scheduled for 8-12 December at PAHO Headquarters, with participants from 18 countries and international technical cooperation agencies.

### **2.3 *Strengthening of Inspection Services***

Cooperation activities to strengthen national inspection services are geared toward the use of human resources education to promote direct advisory services, dissemination of information, and voluntary or compulsory adoption of the hazard analysis critical control points system (HACCP) as a prevention methodology covering the entire food chain.

The Organization has cooperated with Argentina, Colombia, Costa Rica, Mexico, Panama, Paraguay, Peru, and Uruguay in training personnel and disseminating information on this methodology. In countries of the English-speaking Caribbean, two courses were offered on the inspection of meat and poultry, based on the HACCP methodology. To support the training programs in the countries and disseminate the principles of HACCP, a guide was prepared that is currently being distributed.

In order to respond to the requests for technical cooperation to train personnel in the countries, two training courses on HACCP were offered in collaboration with the International Meat and Poultry HACCP Alliance. The course was attended by 11 participants from Argentina and 25 staff members from HCV and INPPAZ. This is the group in charge of organizing courses for the countries of the Region.

### **2.4 *Surveillance of Foodborne Diseases***

The objective of this component is to cooperate with the countries in setting up and operating information systems for the epidemiological surveillance of FBD. Such systems will provide information that will be useful in preventing outbreaks of disease caused by the consumption of contaminated food.

At the heart of the cooperation activities are human resources development and articulation between the countries' epidemiology and nutrition services to facilitate the organization of national surveillance systems for FBD.

The Regional Seminar-Workshop of Focal Points on Epidemiological Surveillance of FBD, held in 1995, brought together participants from 20 countries to

lay the groundwork for the implementation of these systems. In response to the recommendations issued, national meetings were held in Argentina, Chile, Guatemala, Mexico, Panama, Paraguay, and Uruguay. The VETA guide that was prepared with the collaboration of epidemiologists from the Region was used to upgrade the training of personnel.

The Regional Workshop on Ciguatera and Other Marine Toxins, held in collaboration with the University of Miami (USA) in May 1995, trained 23 government employees from 19 countries of the Region in aspects related to methodologies for identifying fish with toxic levels of ciguatera, the treatment of poisonings from that cause, and the organization of national control programs. This event gave rise to the initiative to create a subregional network of the Program for the Surveillance and Control of Marine Toxins in 1995, supported by Argentina, Brazil, Chile, and Uruguay. This Program, together with the one established in 1990 for the Central American and Caribbean countries, conducts surveillance of marine toxins in the Region.

As a result of the technical discussions with regional experts and authorities and the resulting situation analysis, the following principles have been recommended for the organization and operation of national information systems for the epidemiological surveillance of FBD:

- (a) The system is understood as the systematic collection, processing, and analysis of data on the presence and distribution of FBD, with the object of using the information to take the necessary steps for prevention and control of these illnesses.
- (b) The system is part of the national information system for the surveillance of communicable and noncommunicable diseases. Thus, a new infrastructure is not required for its operation.
- (c) The basic operational unit is the local unit, where most outbreaks originate. At this level, there should be adequate coordination among the different sectors responsible for the prevention and control of FBD.
- (d) The information should be utilized at the local level and sent to the regions and the central level, which should pass it on to the different levels responsible for prevention and control measures.

In the information bulletin *INPPAZ in the Americas*, the Institute provides data on outbreaks of FBD in the Region taken from the Regional Information System for the Epidemiological Surveillance of Foodborne Diseases (RISES-FBD).

In the 1995-1996 report, the countries notified 1,674 outbreaks of foodborne diseases, for a total of 57,611 cases and 144 deaths. It should be noted that there is still a high degree of underreporting and that some countries still do not notify the regional system coordinated by INPPAZ and PAHO/WHO. As indicated in Table 1 of the Annex, Cuba is the country with the most developed system. Detailed information on the etiologic agents, the most frequently contaminated foods, and the places where the outbreaks occur is presented in Figures 1, 2, and 3 of the Annex. Of the deaths cited, 43% were cases of poisonings, 16% infections, 10.8% toxi-infections, and 29.5% an unspecified agent (see Figure 4).

### **2.5 *Promotion of Food Protection through Community Participation***

Cooperation is directed toward orienting the promotion and prevention activities that the countries must develop through active community participation. The information on FBD reveals that a high proportion of disease outbreaks are attributable to improper food handling in homes and community kitchens, which suggests the need for interventions to secure a commitment by the population to preventing FBD and creating a culture of food safety.

In order to promote activities in this component, PAHO and INPPAZ, in conjunction with FAO, have supported the holding of the "Latin American Seminar on the Protection of Food Sold by Street Vendors," held in Uruguay in 1994, and the "Workshop on Integrating of the Interests of Consumers in Food Production and Protection," held in Ecuador in August 1996, to strengthen cooperation among consumers, producers, and government food protection agencies as part of a joint effort to ensure food safety.

The study on food contamination coordinated by HCV obtained indicators on the characteristics of street vendors and consumers of food in 10 cities of the Region and provided baseline data for guiding future activities in this area.

### **3. *Program Activities for the Bienniums 1998-1999 and 2000-2001***

Technical cooperation for the coming bienniums is framed within the five components of the Regional Program for Technical Cooperation on Food Protection and will focus on the prevention of the FBD risks in the population from contaminated food. The activities will place the greatest emphasis on the organization of integrated programs in every country, the organization of information systems for the epidemiological surveillance of FBD, the incorporation of Codex standards, the identification and detection of microbial contaminants, the formation of networks of laboratories with quality assurance programs, the incorporation of HACCP into inspection and control methodologies, and communication and education in health to foster active community participation.

Detailed information on this programming is found in the INPPAZ PAHO/WHO Program Budget for the bienniums 1998-1999 and 2000-2001 submitted to X RIMSA in April 1997.

#### **4. Final Considerations**

The problem of foodborne diseases that has been observed in recent years—for example, the cholera epidemic that began in Peru in 1991 and the outbreaks caused by emerging pathogens—have alerted the governments to the urgent need to develop food protection programs to prevent and control FBD.

Moreover, the changes in the world economy generated by globalization, the creation of the World Trade Organization, and the subregional integration initiatives have elicited a commitment by the governments to guarantee food safety in order to promote international trade.

PAHO technical cooperation, in collaboration with other international organizations such as FAO, is making it possible for the countries to organize integrated national programs that will help to prevent risks to the population from FBD.

To accelerate this process it will be necessary for the countries to commit themselves as soon as possible to organizing integrated national programs and for PAHO, through HCV/INPPAZ, to continue to provide articulated cooperation with epidemiology through alliances with other international organizations, mobilizing the existing resources in the countries, together with specialized national and international entities.

The Subcommittee on Planning and Programming is requested to analyze the progress of the Regional Program for Technical Cooperation on Food Protection and issue its observations and recommendations so that the countries and PAHO will accelerate their activities for the prevention and control of foodborne diseases.

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Annex

**Table 1. Cases of FBD in Some Caribbean Countries, 1996**

Countries	Cases			
	FBD	Cholera	Ciguatera	Total
Anguilla	0	0	15	15
Antigua and Barbuda	64	0	116	180
Belize	15	4	9	28
Bermuda	9	0	0	9
Dominica	0	0	0	0
Grenada	0	0	0	0
Guyana	0	0	0	0
Cayman Islands	0	0	3	3
British Virgin Islands	0	0	6	6
Montserrat	3	0	4	7
Saint Kitts and Nevis	0	0	0	0
Saint Lucia	0	0	0	0
San Vincent and Grenadines	17	0	0	17
Suriname	11	0	0	11
Trinidad and Tobago	414	0	0	414
Turks and Caicos	24	0	1	25
<b>TOTAL</b>	<b>557</b>	<b>4</b>	<b>154</b>	<b>715</b>

Source: CAREC. Surveillance Report, September 1996. Bahamas, Barbados, and Jamaica have reported to the RISES-FBD, which means that they were excluded from the present table.

**Table 2. Cases of FBD Caused by Some Etiologic Agents in Canada and the United States**

Countries	Agent	Cases	
		1994	1995
Canada	<i>Campylobacter</i>	11,767	10,499
	<i>Salmonella sp.</i>	7,441	7,138
	<i>Escherichia coli</i> 0157:H7 (enteritis)	1,014	1,277
United States	<i>Salmonella sp.</i>	43,323	45,970
	<i>Shigella sp.</i>	29,769	32,080
	<i>Escherichia coli</i> 0157:H7 (enteritis)	1,420	2,139
<b>Total</b>		<b>94,734</b>	<b>99,103</b>

Source: World Health Statistics Quarterly. Vol. 50, No. 1/2 1997 (WHO).

**Table 3. Outbreaks of FBD in the Americas, 1995-1996**

<b>Countries</b>	<b>No. Outbreaks</b>	<b>Cases</b>	<b>Deaths</b>	<b>Affected</b>
Argentina	6	162	0	162
Bahamas	36	3,980	0	3,980
Barbados	1	4	0	4
Brazil	86	6,563	1	6,564
Chile	334	4,036	2	4,038
Costa Rica	32	73	0	73
Cuba	1,091	37,129	12	37,141
Dominican Rep.	23	152	0	152
Ecuador	26	811	11	822
El Salvador	8	246	2	248
Guatemala	20	145	7	152
Jamaica	3	99	0	99
Mexico	124	4,319	51	4,370
Nicaragua	24	93	0	93
Panama	6	95	0	95
Paraguay	24	222	0	222
Peru	29	1,467	58	1,525
Uruguay	17	644	0	644
Venezuela	39	453	2	455
<b>Total</b>	<b>1,929</b>	<b>60,693</b>	<b>146</b>	<b>60,839</b>

Source: Country reports to the Regional Information System for the Epidemiological Surveillance of Foodborne Diseases (RISES-FBD), PAHO/INPPAZ.



Figure 1

Outbreaks of FBD in the Americas by Causative Agent, 1995-1996

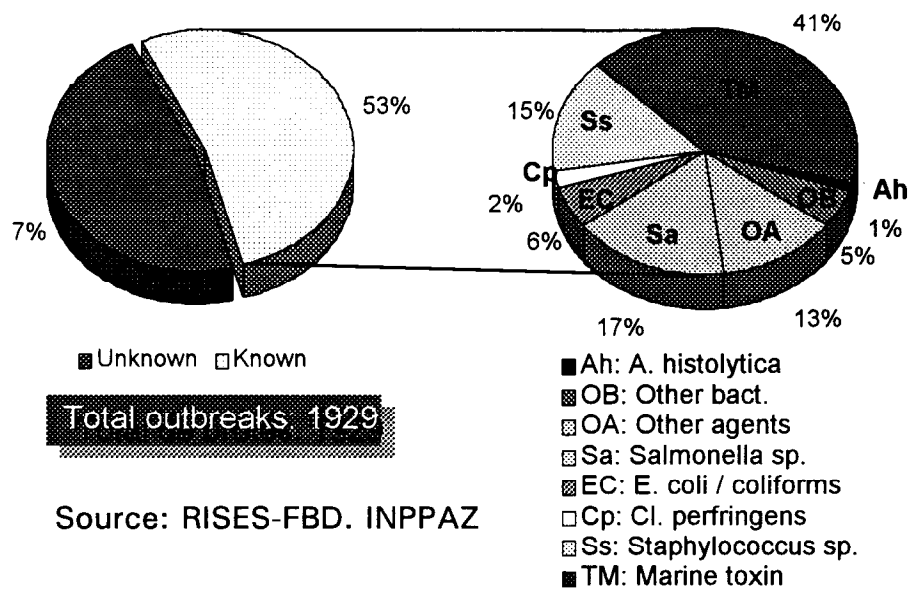


Figure 2

Outbreaks of FBD in the Americas by Place of Consumption, 1995-1996

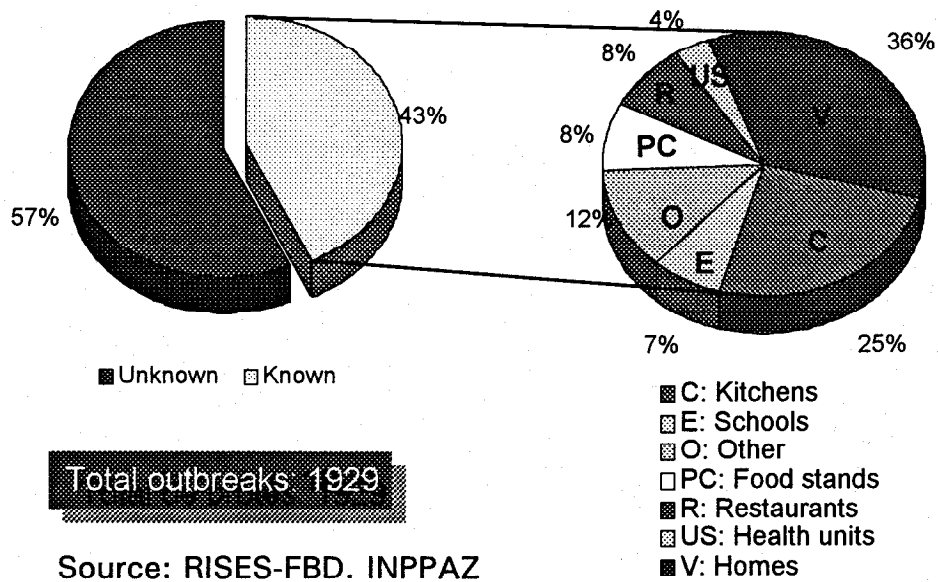


Figure 3

Outbreaks of FBD in the Americas by Food Implicated, 1995-1996

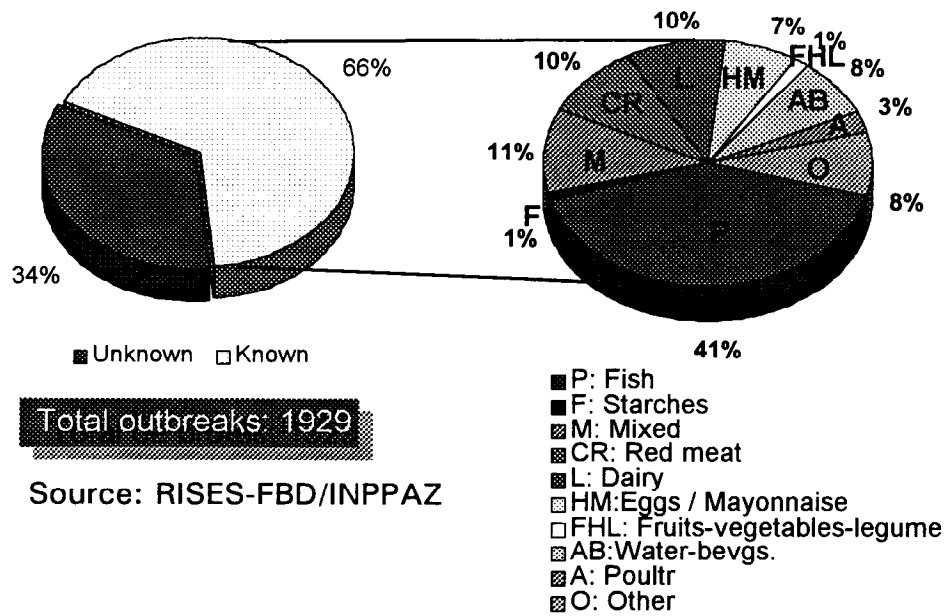
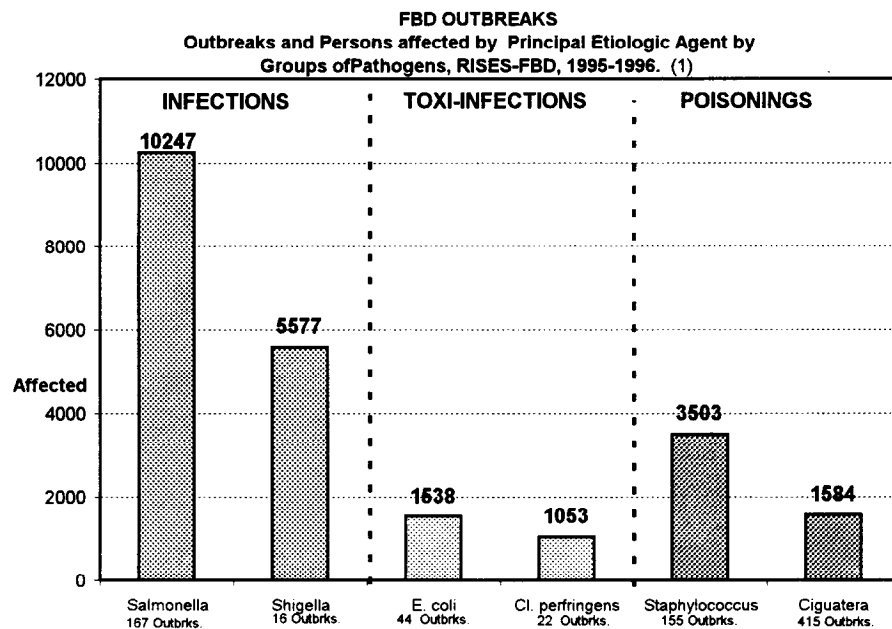


Figure 4



(1) Only the first two agents in each group are represented.