

Annual Report 2007

French Institute for Public Health Surveillance

Monitor, alert, prevent



FRENCH INSTITUTE
FOR PUBLIC HEALTH
SURVEILLANCE

Annual Report 2007

French Institute for Public Health Surveillance
(Institut national de veille sanitaire)

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Abbreviations and acronyms

ABENA	Diet and nutritional status of food aid recipients (Alimentation et état nutritionnel des bénéficiaires de l'aide alimentaire)	DDASS	District health and welfare bureau (Direction départementale des affaires sanitaires et sociales)
AFSSA	French Food Safety Agency (Agence française de sécurité sanitaire des aliments)	DGS	Directorate-General of Health (Direction générale de la santé)
AFSSAPS	French Health Products Safety Agency (Agence française de sécurité sanitaire des produits de santé)	DIT	InVS Department of International and Tropical Diseases (Département international et tropical de l'InVS)
AFSSET	French Agency for Environmental and Occupational Health Safety (Agence française de sécurité sanitaire de l'environnement et du travail)	DRASS	Regional health and welfare bureau (Direction régionale des affaires sanitaires et sociales).
ARI	Acute respiratory infection	DSE	InVS Department of Environmental Health (Département santé environnement de l'InVS)
BHI	<i>Weekly International Bulletin</i> (<i>Bulletin hebdomadaire international</i>)	DST	InVS Department of Occupational Health (Département santé travail de l'InVS)
CALBAS	Basse-Terre diet survey (Enquête Comportements alimentaires en Basse-terre)	DT1/DT2	Diabetes type 1/Diabetes type 2
CAPTV	Poison and toxicity monitoring centre (Centre antipoison et de toxicovigilance)	ECDC	European Centre for Disease Prevention and Control (Centre européen pour la prévention et le contrôle des maladies)
CCA	InVS Alert Coordinating Committee (Cellule de coordination des alertes de l'InVS)	EHPAD	Nursing homes for the frail elderly (Établissement d'hébergement pour personnes âgées dépendantes)
CCLIN	Nosocomial infection control coordination centre (Centre de coordination de la lutte contre les infections nosocomiales)	ELFE	French longitudinal study beginning in childhood (Étude longitudinale française depuis l'enfance)
CCTV	Toxicity monitoring coordinating committee (Comité de coordination de la toxicovigilance)	ENHIS	European Environment and Health Information System
CDI	<i>Clostridium difficile</i> infection	ENNS	National nutritional health study (Étude nationale nutrition santé)
CépiDc	National Centre for Death Statistics and Epidemiology (Centre d'épidémiologie sur les causes médicales de décès)	ENTRED	National representative sample of diabetics (Échantillon national témoin représentatif des personnes diabétiques)
CIRAD	Agricultural Research Centre for Developing Countries (Centre de coopération internationale en recherche agronomique pour le développement)	EPAC	Permanent survey of home and leisure accidents (Enquête permanente sur les accidents de la vie courante)
CIRE	Regional (or interregional) epidemiology unit (Cellule interrégionale d'épidémiologie)	ESBIO	Expert Team to Support Biomonitoring in Europe
CLOI	Local orientation and information commission (Commission locale d'orientation et d'information)	ESCAL	Health and diet survey in Martinique (Enquête sur la santé et les comportements alimentaires)
CMV	Cytomegalovirus	ESPrI	Epidemiology and surveillance of self-employed workers (Épidémiologie et surveillance des professions indépendantes)
CNR	National Reference Centre (Centre national de référence)	GRE	Glycopeptide-resistant enterococcus
CNRS	National Centre for Scientific Research (Centre national de la recherche scientifique)	HLA	Home and leisure accidents
CRVOI	Indian Ocean Regional Centre for Health Surveillance and Research (Centre de recherche et de veille de l'océan Indien)	HVAC	Heating, ventilation, and air conditioning
CST	Scientific and technical committee (Comité scientifique et technique)	ICD	International Classification of Diseases
		IDU	Injecting drug user
		IMD	Invasive meningococcal disease

INERIS	National Institute of Industrial Environment and Risks (Institut national de l'environnement industriel et des risques)	PIP	Prevalence of infected patients
INPES	National Institute for Health Education and Prevention (Institut national de prévention et d'éducation pour la santé)	PNNS	National Nutrition-Health Plan (Plan national nutrition santé)
INSEE	National Institute of Statistics and Economic Studies (Institut national de la statistique et des études économiques)	PNSE	National Environmental Health Plan (Plan national santé environnement)
INSERM	National Institute for Health and Medical Research (Institut national de la santé et de la recherche médicale)	PSAGE	Surveillance, alert, and management programme (<i>Programme de surveillance, d'alerte et de gestion</i>)
INSPQ	Quebec Public Health Institute (Institut de santé publique du Québec)	RIVM	Netherlands National Institute for Public Health and the Environment
InVS	French Institute for Public Health Surveillance (Institut national de veille sanitaire)	SAMOTRACE	Workplace mental health observatory for Rhones-Alpes and Centre (Santé mentale observatoire travail Rhône-Alpes Centre)
IRD	Development Research Institute (Institut de recherche pour le développement)	SAMU/SMUR	Mobile emergency medical services (service d'aide médicale urgente/service mobile d'urgence et de réanimation)
MRSA	Methicillin-resistant <i>Staphylococcus aureus</i>	SARS	Severe acute respiratory syndrome
NUTRIMAY	Mayotte general population dietary and nutritional health survey (Alimentation et état nutritionnel en population générale à Mayotte)	STD	Sexually transmitted diseases
OSCOUR	Organization of coordinated surveillance of emergency departments (Organisation de la surveillance coordonnée des urgences)	USEN	Nutritional epidemiology surveillance unit (Unité de surveillance et d'épidémiologie nutritionnelle)
		WHO	World Health Organization

Continuing to learn from crises and preparing to meet new challenges



This report describes some outstanding points of InVS's activity during 2007. It is not exhaustive, but instead presents the most exemplary activities and results, in terms both of quality of results and of problems and challenges in accomplishing our tasks of alert and surveillance.

What we offer here is a reflection of these activities and these challenges.

At InVS, 2007 was marked by sustained activity in the fields of surveillance, monitoring, and alerts. We received and handled 74 alerts, primarily for infectious diseases. In this domain, the burden of nosocomial infections by antimicrobial-resistant bacteria must be noted, as well as the increasing role of environmental alerts.

Lessons from crises

We have worked especially hard at continuing to draw lessons and information from past crises. After the epidemic eruption of chikungunya in Reunion, InVS organized together with the CRVOI (Indian Ocean Regional Health Surveillance and Research Centre) a scientific conference that allowed all of the scientists who worked on it and the healthcare professionals of Reunion to assess their work and learn from it.

The considerable research around this epidemic shows the importance of the constant availability of resources for research. We need research to develop more effective surveillance tools, and we provide research with new fields and new questions, in the social as well as the biomedical sciences. It is, after all, essential to study and understand the socioeconomic determinants of the impact of health threats. The conference confirmed that the organization of this "loop" between surveillance and research, of which the Reunion CRVOI is a remarkable example, is of major importance for InVS.

Surveillance systems

In 2007, InVS pursued its participation in the preparation for an influenza pandemic and for diverse threats, ranging from heat waves to the emergence of arboviroses around the Mediterranean and deeper into Europe. We had also drawn another important lesson from the 2003 heat wave: threats often come from where you are not expecting them. This explains the priority given over the past 3 years to the development of SURSAUD, a nonspecific monitoring system.

SURSAUD relies on several sources of daily data: hospital emergency departments, SOS Médecins, and death certificates (INSEE and INSERM). Its coverage rate — of both hospitals and territory — continues to grow but is not yet homogeneous

throughout France. Nonetheless it already gives us a good view of the principal hospital diagnoses and causes of death on a daily basis and should now be able to reveal any major emerging diseases or disasters.

Infectious disease surveillance also confirms that the threats we have considered to be under control or even extinct never really are. We see this, for example, with the resurgence of syphilis and of multidrug-resistant tuberculosis. This confirms, if confirmation were needed, the importance of continuous surveillance of health indicators, such as mandatory-reporting diseases, and the complementarity and inseparability of specific surveillance of known diseases and nonspecific surveillance if InVS is to accomplish the tasks the legislature has assigned it.

New challenges

If surveillance of infectious diseases is a daily fight against a constantly adapting enemy, environmental threats constitute an increasing challenge for health surveillance. The difficulties particular to this field are equaled only by the very legitimate worries of our fellow citizens about the impact of these threats on their health. The Grenelle Environment Forum thus underlined some of the most difficult challenges that InVS must face in the years to come, including but not limited to climate change, exposure to toxic substances, and the workplace environment. The word challenge is not too strong, because the effects of the environment on health are characterized by many exposures, which make it difficult to establish a causal link with a single risk factor or substance, and sometimes by very long periods between risk exposure and disease onset. This presents the arduous problem of reconstructing exposures, their intensity, and their duration.

The job-exposure matrices on which InVS has continued to work in 2007 are a unique tool for this reconstruction. Workers are the first exposed to an environment where toxic substances are often especially concentrated, and they must receive priority attention in environmental topics.

In 2007 InVS also continued its work on the particularly worrisome subject of psychosocial risks and also its surveillance of the consequences of the AZF factory explosion in Toulouse. Our teams have acquired experience in this domain and we now have available a rapid response plan for major industrial accidents, a plan designed to follow all of the exposed population from the first hours after the disaster.

InVS is also heavily involved in assessing the consequences of the most important sites of soil pollution in France. One example is its work on the consequences of chlordecone toxicity in the West Indies.

Alerts about "sick building syndromes" or mass psychogenic illnesses multiplied in 2007. They show the differential sensitivity of our fellow citizens to health and especially environmental threats: these collective syndromes, which are not severe and for which no toxic cause is usually found, generate major anxiety and receive extensive media attention. At the same time there is almost no media coverage of serious threats such as CO poisoning or lead poisoning, which seriously burden people's lives — often those of the most disadvantaged among us.

InVS in the health surveillance system

InVS plays an essential role in the health security system of France, but also of Europe and the international community. It must, because health threats know no borders and because only the European and international networks are likely to help us assess threats in their entirety (eg, the distribution of an infectious agent and of resistance to it). We must also put our findings in perspective and compare them with those of our European neighbours, and we can do that only if we work with common methods and common references.

We must also think on a European scale for large surveillance and biosurveillance cohorts. These are still too rare in France, given that they alone can answer questions about effects caused by the environment, by socioeconomic, nutritional, or other health factors.

In 2007, InVS continued to work toward the implementation of the ELFE cohort, which will be the first French cohort of this scale. This commitment will continue in 2008. The national nutritional health study was also completed in 2007. A prefiguration of these large cohorts, this study used health examinations and biosurveillance.

In 2007 as in other years, InVS worked to characterize risks that are still not well identified. The ESPRI study, for example, showed the extent of asbestos exposure among tradespeople.

Similarly, InVS met its fundamental obligations to public health service in its tasks of surveillance, its response to diverse referrals, and its constant work to develop ever more effective tools.

InVS and its networks

It is important to underline the InVS work method. It could not accomplish its assigned duties, especially in terms of

health surveillance and alert response, without its networks. We note first the territorial grid composed of the regional and interregional epidemiology teams, the CIRE. Codirected by the DRASS (regional health and welfare bureaus) and InVS, they serve as an expert surveillance and response centre that local authorities can call upon for rapid aid. They make it possible to implement surveillance adapted to each region's characteristics, while benefiting from the support of InVS's scientific departments. The overseas CIRE are especially important: They put InVS on the spot and exercise high-level surveillance in these zones, where the risks of emergence or re-emergence of infectious diseases and environmental risks are especially elevated.

Most especially, InVS could not perform its duties without the collaboration of healthcare professionals, including general practitioners, pathologists, and hospital emergency care specialists, or without that of healthcare facilities and laboratories such as the national reference centres (CNRs) for infectious diseases and the CCLIN (nosocomial infection control coordinating centres). More than 250 agreements and memoranda of understanding link InVS with these partners. Their contribution and commitment to our surveillance systems, nonspecific and specific, are essential.

After this year of consolidation, InVS must advance still further, especially in developing its capacity for crisis anticipation and in reinforcing its alert system against emerging threats, as it is doing in preparation for pandemic threats. In terms of surveillance, it must provide ever-increasing attention to vulnerable populations that are, as we know, the first and most seriously affected by health threats. We need to work still harder at taking into account the socioeconomic determinants of the impact of diseases and threats, to understand better all of the determinants of health damage. InVS must optimize its decision support for public authorities on public health matters.

As InVS approaches its 10th anniversary, these stakes become still more important. InVS and its teams are more than ever engaged in the service of public health, that is, the health of each of our fellow citizens.

Dr Françoise Weber
Executive Director InVS

Emerging and re-emerging infectious diseases

In a globalized world, emerging and re-emerging infectious diseases, such as dengue and multidrug-resistant tuberculosis, constitute one of the major public health challenges for the decades to come. They are also at the heart of the tasks and the interventions of InVS, which in 2007 organized a multidisciplinary conference on this topic. Several aspects of the work of InVS illustrate the stakes of emerging and re-emerging diseases.

The 20th century saw a very real decline in infectious diseases, due to advances in medicine (eg, penicillin), the development of prevention (eg, vaccinations), and a general improvement in the standard of living. This trend culminated with the eradication of smallpox in 1977. Since then, however, several new and often lethal diseases have appeared: Ebola fever, AIDS, severe acute respiratory syndrome (SARS), West Nile fever, variant Creutzfeldt-Jacob disease, and others. At the same time, diseases that had been thought in decline re-emerged, such as dengue and tuberculosis. At the same time, despite some recent progress, infections associated with

health care remain worrisome and the emerging resistance to anti-infectious agents is a major public health challenge.

Against these emerging diseases, surveillance systems — such as those established by InVS — must be able to identify each new threat as early as possible. To face these risks of dissemination increased by the development of globalization, in the 1990s, the World Health Organization (WHO) created a specific division, and the International Health Regulations were revised in 2005.

Avian influenza: an international threat

Influenza in its different forms has long been the object of epidemiologic surveillance. This surveillance is handled most particularly by the network of regional influenza observation groups and by the Sentinelles network, both of which have been feeding databases since 1984. In 2003, InVS reinforced influenza surveillance. It monitors the hospital admissions for influenza weekly in a network of emergency departments, which is expanding progressively to cover the entire country. At the same time it monitors the deaths attributable to clinical influenza in a network of 22 district health and social bureaus (DDASS) throughout metropolitan France. All the data are summarized in a weekly influenza surveillance bulletin, available on the InVS website and distributed each week to all who request it.

From seasonal influenza to pandemic influenza

The situation changed radically with the reappearance in 2003 of the avian A (subtype H5N1) influenza virus, which is also responsible for human cases of avian influenza. Since then, this emerging virus has continued to circulate — at diverse intensities, mainly in poultry populations — in Asia, Africa, and Europe. For the moment, the number of human cases remains low, but should the virus adapt to humans, it could cause an influenza pandemic, the fourth documented since the 19th century. The most serious was the "Spanish flu" (A subtype H1N1 virus in 1918-1919), with at least 40 million deaths, followed by Asian flu (A H2N2 virus in 1957-1958) and Hong Kong flu (the H3N2 virus in 1968-1969).

The emergence of avian influenza, or bird flu, shows the importance of the early detection and surveillance of animal outbreaks to limit the risks of contamination and of viral evolution to adapt to humans. It also shows the importance

of preparedness by public authorities for the possible onset of a pandemic (see the national plan developed by the government, with local variations: National influenza pandemic plan).

InVS, facing the rise in emerging diseases (SARS appeared during the same period as avian influenza), set up a system of international surveillance, aimed at detecting any threat occurring abroad that might affect the French population within France or outside its borders. Since then, the Department of International and Tropical Diseases (DIT) of InVS has been attentively following the trends of influenza in general and bird flu in particular. This health surveillance simultaneously covers the international epizootic situation and human cases. It rounds out epidemiologic surveillance of the French population and all of the alert mechanisms, focusing most especially on the onset of case clusters and on potential virologic changes likely to engender antiviral-resistance phenomena. This international surveillance has led to the publication of diverse documents, including the weekly international bulletin, which began in October 2005 (see sidebar page 8).

An epidemic that did not die in 2007

The epizootic and human cases should be distinguished. In animals, the avian influenza A subtype H5N1 virus continued to circulate in 2007 on the 3 continents affected since the beginning: Asia, Europe, and Africa. In 2007, 29 countries reported outbreaks of this avian A H5N1, 4 of them for the first time (Bangladesh, Benin, Ghana, and Togo). Outbreaks were described regularly in Europe, all in countries already affected during the winter of 2005-2006 (Germany, France, Great Britain, Hungary, Poland, Romania, Russia, and the

Czech Republic). The virus continues to circulate among poultry and wild birds, in a mode similar to that observed in the preceding years.

During 2007, 85 human cases of avian influenza A (H5N1) — including 59 deaths, for a lethality of 69% — were reported in 8 countries, 4 affected for the first time (Burma, Laos, Nigeria, and Pakistan). This brings the total number of human cases reported since November 2003 to 348 in 14 countries, with 216 deaths (lethality rate of 62%). There were also 2 episodes involving suspected human-to-human transmission within families (in China in November and in Pakistan in December). Nonetheless, it was related to repeated close contacts, remained limited, and did not lead to any secondary community transmission.

Health surveillance of suspected human cases of avian influenza continues in France. Since 2004, of approximately 550 suspected cases of influenza virus A (H5N1) reported to InVS, 43 were considered possible cases. Virologic analyses subsequently ruled out avian influenza for all of them.

Although public attention has faded in Western countries, health surveillance of avian influenza remains a major public health priority in France and internationally.



Weekly international bulletin

Launched in 2005 by InVS, the weekly international bulletin (*BHI*) summarizes concisely and very operationally (tables, graphs, maps, etc.), all of the health events occurring abroad and likely to have implications for the French population. Today it has approximately 1,500 subscribers — public authorities, health agencies, embassies, physicians specializing in infectious diseases, military medical departments, multinational corporations, and transport companies. In addition, the bulletin is repeatedly forwarded by subscribers, with 25 000 page views of the corresponding content on the

InVS website. To ensure the reliability of the bulletin, the DIT conducts continuous detection of primary signals, sorts them according to specific criteria, and then validates, analyzes, and interprets them before publishing them. Since its creation, the Bulletin has reported approximately 450 health events, a good portion of which concern avian influenza (epizootic and human cases).

To learn more:

www.invs.sante.fr/display/?doc=international/bhi.htm

Dengue in the West Indies: a re-emerging disease

Dengue is a viral disease transmitted by a mosquito of the *Aedes* genus. It is expressed by high fever, most often accompanied by headaches, nausea, vomiting, and joint and muscle pain. In its classic form, it is not dangerous, although it sometimes induces asthenia. It can however present severe (eg, fulminant hepatitis, severe neurological problems, and heart damage) and hemorrhagic (approximately 1% of the cases worldwide) forms, all life-threatening. Thus 60-100 million people are infected each year and there are more than 20 000 deaths (from 200 000-500 000 cases of dengue hemorrhagic fever). There is no vaccine or preventive treatment and no specific curative treatment. The most effective individual prevention lies in protection against mosquitoes and the most effective community prevention in the regular elimination of all mosquito breeding sites, indoors and out (eg, flower pot saucers and water tanks).

First described in 1779, dengue is not at all a new disease. But a clear upsurge has been going on for some 30 years now — especially for its severe and hemorrhagic forms — in several

tropical regions including the Caribbean area. In Latin America, the number of cases reported annually multiplied by 60 between 1989 and 1993. In recent decades, dengue has been circulating in an endemic/epidemic manner in the French districts in the Americas — French Guyana, Guadeloupe, and Martinique. Large epidemics struck French Guyana in 2006 and the West Indies in 2007.

37 000 cases in 5 months

In Guadeloupe and its neighbouring islands (La Désirade, Marie-Galante, and Les Saintes), the epidemic ran from late August through December 2007 and extended into 2008 in the more northern islands (Saint-Barthélemy and Saint-Martin). With an estimated 19,000 cases, 0.8% of them severe forms, it clearly exceeded in scale and severity the preceding epidemic in 2005 (11 500 estimated cases, 0.4% severe). During the epidemic period, 272 hospital admissions and 3 deaths were attributed to dengue.

In Martinique, the epidemic began in mid-August 2007 and ended in mid-January 2008. With an estimated 17 900 cases, 1% of them severe, it too exceeded in scale and severity the last epidemic, also in 2005 (14 500 cases, 0.3% severe). It did not however reach the level of the 2001 epidemic (24 000 cases). The epidemic of 2007 caused 352 hospital admissions and 4 deaths.

Intensification of epidemics

Several factors cause experts to fear the intensification of dengue epidemics in the French West Indies and, more generally, in the entire Caribbean area: the occurrence of 2 epidemics in 3 years, with a strong seasonal upsurge in the year between them, an increase in the number of severe cases between 2005 and 2007, and the co-circulation of 4 distinct serotypes of dengue.

The health response included the dengue epidemic surveillance, alert, and management programme (PSAGE-dengue), operational in 2004 but not officially established until July

2006 in Martinique and September 2007 in Guadeloupe. It made possible the early detection of the epidemic onset, the declaration of alerts, and the organization of an appropriate response. Its effect can be seen especially in the improvements in the level of surveillance, the mobilization of necessary hospital resources, the implementation of vector control, and the provision of information to the population. The system was able to adapt continuously, through the analysis of various indicators by the committee of infectious disease experts in each district that regularly made recommendations to the health authorities. This group met frequently throughout the epidemic and helped to prevent a health crisis. It also determined when the epidemic ended in Guadeloupe and Martinique and recommended the passage to phase 5 of PSAGE-dengue (end of epidemic).

Mobilization of all participants remains essential, however, to intensify the battle against the proliferation of habitat (especially artificial containers in urban areas) and thus try to prevent any evolution towards a hyperendemic situation.

Chikungunya: lessons from an epidemic

Since April 2007, Reunion and Mayotte have been in an "inter-epidemic" phase after the chikungunya epidemic that plagued these 2 French islands in the Indian Ocean in 2005 and 2006.

This epidemic, caused by a mosquito-borne arbovirus (*Aedes albopictus* in Reunion), is a good example of the considerable and diversified impact that emerging or re-emerging diseases may have. The virus infected more than a third (38%) of the nearly one million inhabitants of these 2 islands.

The chikungunya epidemic also showed hitherto unknown epidemiologic characteristics of this disease. It led to numerous programmes of clinical and virologic research and epidemiologic and entomological surveillance.

The body of knowledge thus acquired must be shared with the various professionals who participated in the management of this epidemic and in the research that ensued. Between 2004 and 2007, numerous Indian Ocean countries and Italy faced chikungunya epidemics. We thought it was important for them to share their experience.



Aedes albopictus

International conference in Reunion

Accordingly, InVS and the CRVOI (see sidebar page 10) organized an international conference on chikungunya in Saint-Pierre de Reunion on 3 and 4 December 2007. Its objective was to take stock of the knowledge acquired as part of the health surveillance and research conducted around the recent epidemics. It also involved debating the results and drawing conclusions useful for preventing and responding to emerging and re-emerging arbovirus epidemics in the tropics.

The Agricultural Research Centre for Developing Countries (CIRAD), the Reunion DRASS, the Pasteur Institute, the Development Research Institute (IRD), the National Institute for Health and Medical Research (INSERM), the University of Reunion and the Exotic Disease Society participated in the organization of this event.

The papers presented reflected the multidisciplinary approach to this health crisis and covered the following topics: its epidemiologic aspects; its clinical, pathophysiologic, virologic, and immunologic aspects; the natural history of the disease in humans and animals; its entomological aspects; the contribution of the social sciences to understanding the phenomena of emergence and prevention; and aspects of health crisis administration (eg, vector control, community mobilization, and communication).

The participants presented both basic research and studies with operational aims. Unsurprisingly, most papers focused on chikungunya, but other emerging or re-emerging arboviruses in tropical environments, especially dengue in overseas France, were also discussed.

This conference, opened by the Minister of Health, included 48 oral presentations (available online at the InVS website) and 51 posters, selected by a scientific committee. The large audience included 400 participants from Western Europe and the Indian Ocean, with speakers from South Africa, Australia, the Comoros, India, Italy, the United Kingdom, and the Seychelles. Representatives from WHO also spoke.

Work presented at the conference appeared in a special issue of the *Bulletin of the Society of Exotic Diseases* and other work will appear in 2008 in a special issue of the InVS weekly epidemiologic bulletin.

Finally, this conference provided a rich and concrete basis for the collaboration between the CRVOI and InVS.

Possible extension to Europe

The total absence of any resumption of the epidemic in Reunion in 2007 does not mean that the health threat of this disease has ended. The epidemic in Italy in August and September 2007 reminds us of the real risk of the introduction of chikungunya in areas where the *Aedes albopictus* mosquito is found. It affected more than 200 people in the area around Ravenna. Although the attack rate (5.4% in the village most highly affected) remained much lower than that observed in Reunion (38% of the entire island), this epidemic demonstrated the possibility of chikungunya in temperate climates in areas where a competent vector is present.

The implantation of the mosquito vector of chikungunya and dengue (*Aedes albopictus*) in some areas of Alpes-Maritimes, Upper Corsica, southern Corsica, and the Var thus emphasizes the reality of the risk in metropolitan France.

To limit the risk of importation and implantation of vectorborne diseases in metropolitan France, in 2006 the Ministry of Health set up a national plan to control the spread of chikungunya and dengue. It plans to reinforce entomological and epidemiologic surveillance to assess and prevent the risks of dissemination. Early detection of the presence of the *Aedes albopictus* vector and of potentially viremic patients should make possible the swift coordinated implementation of measures of vector control and human protection. The surveillance system is based on the mandatory reporting (since July 2006) of confirmed infections by the chikungunya or dengue viruses in all metropolitan districts. Moreover, in the districts where vector implantation is already known, a procedure has been set up for the reporting of suspected cases with an accelerated confirmation procedure by the chikungunya CNR between May and November of each year.

At the European level, the chikungunya epidemic in the Indian Ocean and its extension to Italy led the European Centre for Disease Prevention and Control (ECDC) to conduct a study of the Italian epidemic and to launch a quantitative assessment of the risk of the dissemination of chikungunya and dengue in Europe. InVS is contributing actively to this study.

A multidisciplinary conference, 24 April 2007

Anticipation, detection, and response to emerging risks in France

Given the persistence of emerging threats, especially the influenza pandemic, France and most other European countries agree that it is imperative to be prepared for the emergence of an imported or indigenous epidemic. To share analyses on this theme, InVS organized a conference and invited all of the actors involved in health and especially clinicians, microbiologists, and public health authorities, as well as veterinary specialists. Beyond examples such as SARS or chikungunya, infections that have appeared in France were considered, including invasive meningococcal disease (group B) in Seine-Maritime and the epidemic of *Clostridium difficile* infection (see section Surveillance of infectious diseases: a major preoccupation, page 41).

The specific issues of zoonoses and crossing the species barrier were discussed, as well as the essential contribution of microbiological tools and mathematical modeling. From the perspective of InVS's surveillance mission, the conference helped to develop an epidemiologic procedure for the anticipation, detection, and investigation of emerging infectious phenomena. Each of these stages was approached from a multidisciplinary viewpoint and with the goal of improving decision support.

To learn more:

www.invs.sante.fr/display/?doc=publications/2007/colloque_emergences

Three questions for Jean-François Girard

Former Director-General of Health, president of the IRD, the CRVOI, and the scientific council of the French Food Safety Agency, Jean-François Girard talks about the chikungunya epidemic and its implications.

What conclusions have you drawn from the chikungunya epidemic?

This was the first epidemic of this scale on French territory for nearly a century, with an attack rate of 38% in Reunion. Fortunately, it caused few deaths, but chikungunya raises all the questions of large pandemics. In rereading what our predecessors wrote about the Spanish flu, I was struck by a number of constants. I think first of the initial difficulty in understanding the role of the vector, here the *Aedes albopictus* mosquito. I also think about the population's incredulity in the face of such an epidemic. While "those in the know" succeed in understanding the phenomenon fairly fast, the same is not necessarily true for the general population. This dimension must be increasingly integrated into the management of health crises. More generally, I will say that chikungunya has taught our modern society anew what the irruption of an epidemic is.

InVS provided the alert and epidemiologic surveillance from the beginning of the episode. IRD also fulfilled its responsibilities. We were the only one, together with the Pasteur Institute, to have the necessary competence in entomology, particularly in our Montpellier laboratory, which works on harmful insects. This crisis also showed the importance of entomology, a discipline just emerging from a long period of abandonment.

It also showed the need for a cross-sectional approach.

An epidemic is not the sum of the sick people seen by physicians. The example of Reunion confirmed the need for a cross-sectional and multidisciplinary approach. It demonstrates the interest of disciplines such as entomology, climatology, and chemistry, to access the environmental impact of the mass use of antivector products. But the questions raised by chikungunya also extend to the social sciences: sociology, behavioural psychology, economics, and communications.

The entire 20th century propelled the organization and specialization of the sciences. But a turning point occurred in the 1980s, with an increase in social demand. It took place first around the AIDS epidemic, and then around other major health crises, such as bovine spongiform encephalitis, or "mad cow disease". For the first time, civil society has questioned the scientific community, seeking global responses. Society is addressing research in general and not this or that discipline, expressing its need for answers that, by definition, cannot come from a single discipline. The chikungunya episode shows that scientists themselves now seek this cross-sectional approach.

They see clearly what it can provide, as we have long observed at IRD, a naturally multidisciplinary institution. This is an important advance, even though it will take time before mentalities and work habits adapt.

You are president of the CRVOI, created in 2007 after the epidemic. What will it provide that's new?

The creation of this centre seems to me very interesting for 3 reasons. First, it is located in Reunion, in an intertropical area with a strongly mobile population and very exposed to emerging diseases. Second, it is an interface between research and scientific surveillance, on the one hand, and health surveillance, on the other. Finally, based on lessons drawn from the chikungunya epidemic, it was created from the beginning in a cross-sectional and multidisciplinary perspective, although not as any sort of loose cannon. We have concluded partnerships with the Reunion university hospital centre and the University of Reunion. We are also developing agreements with other countries of the Indian Ocean — first the islands and then the countries of east Africa.

Extension of the epidemic: CRVOI

The Indian Ocean Regional Centre for Health Surveillance and Research (CRVOI) was created in January 2007. This scientific interest group located in Sainte-Clotilde (Reunion) brings together 2 ministries (Health and Research), 8 health research and action institutions (AFSSA, CIRAD, CNRS, INRA, INSERM, the Pasteur Institute, InVS, and IRD) and local participants: the regional and district councils of Reunion, the University of Reunion, the regional hospital centre, and the regional union of private practitioners. The IRD has been designated by the group members as its agent.

CRVOI has four principal tasks:

- set up research programmes on infectious diseases relevant to the Indian Ocean region;
- reinforce the training of masters and doctoral students and of young researchers in its selected research programmes;
- organize the science and technical watch, targeting infectious diseases;
- promote strengthened regional cooperation in research on these diseases.

Specific and nonspecific surveillance: two foundations for a continuous state of alert

In 2007, InVS dealt with 74 health alerts. Some concerned diseases that are well known and highly monitored (eg, infectious diseases). Other alerts were associated with environmental or occupational exposures that are still little known and rarely studied. Specific surveillances of known diseases and nonspecific surveillance are the 2 pillars that allow a permanent and effective state of alert. In the face of the emergence of new health threats and the onset of events unpredictable in their extent and their consequences (eg, the 2003 heat wave), early detection of health signals, even of low intensity, is essential in public health. InVS is developing tools to respond to this need.

Since the creation in 1992 of the national public health network, which became InVS in 1998, epidemiologic surveillance activities have been reinforced regularly. The best example is the creation in 1994 of the interregional epidemiology units (CIRE). InVS saw its essential tasks of "health surveillance, vigilance, and providing alerts" reaffirmed by the Public Health Policy Act (L. 2004-806 dated 9 August 2004). This act also assigned to InVS the task of contributing to crisis management.

This reinforcement has been matched at the European level, with the creation in 1998 of a European network of

epidemiologic surveillance and communicable disease control and in 2004, of the European Centre for Disease Prevention and Control (ECDC), based in Stockholm.

InVS's primary objective is to be able to cope with new health threats that may not necessarily be detected by alert systems targeting known risks (eg, mandatory reporting). It presumes that the traditional health alert procedures — which remain essential — should be rounded out by a broad prospective monitoring programme to identify unknown phenomena that may present a public health threat — of infectious, environmental, or other origin.

The SURSAUD system: health surveillance of emergency departments and deaths

Since 2004, InVS has experimented with the implementation of a health surveillance system based on nonspecific data, also called syndromic surveillance. It is based on the combination of 4 data sources centralized by InVS and managed by the Alert Coordinating Committee (CCA):

- data transmitted by hospital emergency departments in the OSCOUR network (coordinated emergency department surveillance organization);
- data transmitted by SOS Médecins associations — private services providing emergency general medical care, that is, generally, emergency house calls, not life-threatening situations;
- mortality data centralized by INSEE (National Institute of Statistics and Economic Studies), from vital status registries, and from INSERM, based on electronic death certificates;
- INSERM data on causes of death, based on electronic death certificates.

The combination of these 4 sources of information comprises the SURSAUD system.

To improve this syndromic surveillance, in 2007 InVS organized 2 working groups, made up of members of the different InVS departments, the CCA, and the CIRE.

The first considered the contributions and limitations of these surveillance systems, as well as of a strategy for their development and implementation. This work should lead to the production of a strategic orientation document.

The second group sought to enumerate and select statistical methods permitting the detection, within the SURSAUD information system, of variations in the data transmitted that could result from a health event. This group reviewed the literature and is currently in the process of assessing the methods selected.



The OSCOUR network: organization of coordinated surveillance of emergency departments

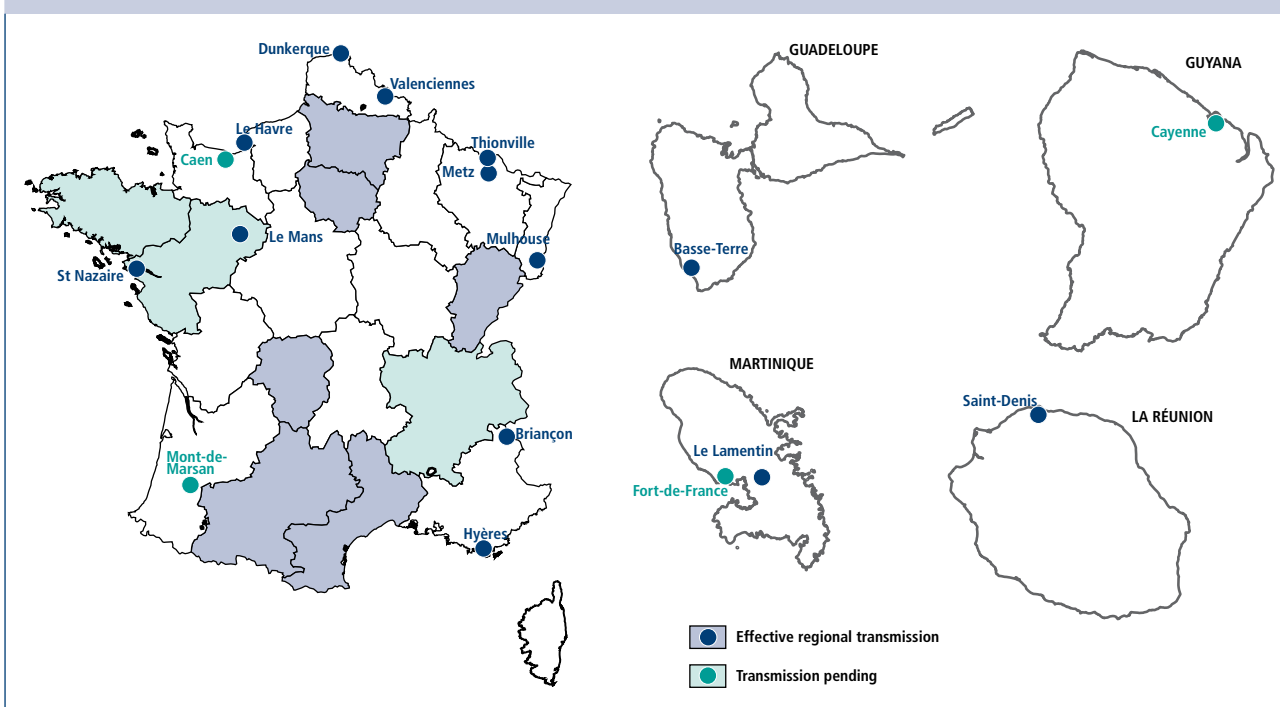
Established in early summer 2004, the OSCOUR network continued its development in 2007. It relies on the continuous transmission by volunteer hospital emergency departments of specific data on patients visiting the emergency departments: age, sex, severity, medical diagnosis, and short-term outcome (admission, transfer, or discharge). These data are totally anonymized before their transmission to InVS, and the diagnoses are coded according to the 10th revision of the WHO International Classification of Diseases (ICD). The information is sent to InVS either directly by the establishment, or via a regional structure that centralizes the data for participants in the region. A scientific committee monitors the system and ensures good cooperation with the emergency specialists.

Emergency department visits are a reliable and reactive indicator of health problems in the population. A sudden sharp augmentation in their number may be a manifestation of the onset of a health problem and should be investigated.

The OSCOUR network grew strongly in 2007. By the end of the year, 98 hospitals were participating: 34 in Île-de-France, 5 in Picardy, 10 in Limousin, 22 in Languedoc-Roussillon, 8 in Midi-Pyrénées, 8 in Franche-Comté, 9 distributed through other regions of metropolitan France, 1 in Reunion, and 1 in Guadeloupe. Each day, this network reports between 8,000 and 9,000 visits by adults and nearly 2000 by children. This number is high, but the quality of the data can still be improved in some of the participating departments.

The analysis of the information collected by OSCOUR may apply either a quantitative approach (volume of ED visits) or a qualitative approach, taking diseases and age groups into account. These data also complete those collected in the specific surveillance of several diseases (including influenza, gastroenteritis, and carbon monoxide poisoning). They can also be used on an ad hoc basis, as for the surveillance of viral meningitis epidemics in the Paris region in the springs of 2005 and 2006, or to monitor the impact of the heat wave in 2006.

THE OSCOUR NETWORK IN FRANCE IN 2007



Source: Surveillance of emergency departments - OSCOUR Network - National Results 2004/2007. December 2007.

The SOS Médecins network

The SOS Médecins network, set up in July 2006, is the counterpart to OSCOUR for private practice medicine. The various SOS Médecins groups transmit information to InVS by computerized telephone switchboards. The data for each call received include sex, age, postal code of residence, reason for call (diseases or symptoms mentioned by caller), source (individual or the

emergency call centre that coordinates prehospital emergency medical services, which may choose to refer a physician from the association rather than its own intensive care ambulances) and, whenever possible, the physician's diagnosis and the short-term outcome (referral to a hospital, etc.).

Of the 59 French associations of SOS Médecins, 37 (62%) were transmitting data to InVS by the end of 2007. This represents approximately 4000 calls daily that are followed by medical care. The CCA analyzes these data, currently on a weekly basis. This analysis considers the reason for the calls because the terminology used for diagnoses remains very heterogeneous between associations. Bulletins of feedback information devoted to summer or winter diseases — depending on the time of year — are distributed to SOS Médecins France, the CIRE, and the relevant InVS departments.

A scientific committee, established in January 2007, with members from both InVS and SOS Médecins France, defines the orientations of this surveillance system. The topics covered in 2007 concern the development of relevant surveillance indicators, the development of appropriate feedback, improvement in the quality and recording of diagnoses, and the harmonization of the terminology used by the associations.

Syndromic surveillance in Languedoc-Roussillon

As part of the "Information system for emergency departments" project, the summaries of emergency department visits in the healthcare facilities of Languedoc-Roussillon, centralized by the regional hospital agency, are transmitted to InVS daily. The system has been consolidated over time, as the number of participating departments able to automate and transfer their data increases. At the regional level, the Languedoc-Roussillon interregional epidemiology group (CIRE) analyzes these data, both to detect unusual events and to have information available to assess the situation should a health event be identified. This information has, for example, been used for the heat wave alert or during the surveillance set up for the rugby World Cup in September 2007.

These data reinforce the national representativeness of the OSCOUR network, which initially comprised mainly facilities in the Île-de-France (Parisian metropolitan region). In Languedoc-Roussillon, SOS Médecins in Perpignan and in Nîmes have signed agreements with InVS. They transmit daily the database of their physicians' house calls. These data are then transmitted to the CIRE, which analyzes the reasons for the call, since the diagnosis is, for now, rarely coded in the data that are transmitted. This information rounds out the data transmitted by healthcare facilities and provides useful indications about some of the activity of physicians in private practice.

Mortality data

Mortality data furnish the third and fourth components of the SURSAUD system. Experiments with the transmission of mortality data, based on vital registry data, took place in 2 phases.

The first was set up with INSEE in June 2004 and made it possible to validate the usefulness of these data. Each participating municipality transmits daily individual data related to the recorded deaths: sex, year of birth, and date of death. Since 2005, this network covers all of the computerized municipal vital registries in metropolitan France and in the overseas districts,

that is, 1042 municipalities. They account for nearly 70% of the deaths in France, approximately 1000 deaths a day.

The second phase began in December 2006, when INSERM (CepiDc, the centre for the epidemiology of causes of death) began deployment of electronic death certificates, which it forwards to InVS. This new procedure provides InVS with rapid access — within several hours — to causes of death.

The data sent daily to InVS as part of SURSAUD are also made available to the regional epidemiology units in real time by a specific secure website.

Surveillance of mandatory-reporting diseases

In addition to this syndromic surveillance aimed at new health threats that might not be detected by the classic alert systems, InVS relies on specific surveillance procedures. The primary one is the surveillance of 30 mandatory-reporting diseases, that physicians are required to report.

Mandatory reporting is based on the transmission of individual data to health authorities. It provides an exhaustive collection of data that permit a precise analysis of the situation and trends of the 30 mandatory-reporting diseases in France, to enable preventive activities and programmes appropriate to public health needs. Mandatory reporting is only one of the modes of surveillance of these 30 diseases.

Example of an alert: hepatitis A in Côtes-d'Armor

Between 13-16 August 2007, doctors filed mandatory reports for 4 cases of hepatitis with the Côtes-d'Armor DDASS. On 21 August, DDASS referred the onset of 9 cases in the district to the West interregional epidemiology unit. A retrospective and prospective description of the cases was set up and led to the identification of 111 cases of hepatitis overall in people who lived or had lived in Côtes-d'Armor.

The questionnaire survey showed that the documented cases had all eaten shellfish, 81% of them only oysters, and 87% various shellfish likely to be eaten raw (oysters and many kinds of clams). Moreover, 26 cases in the district from 7 to 22 July had all eaten oysters. The shellfish could be traced for 20: 19 had eaten oysters from the same company, and the 20th had eaten only oysters fished near that company's farm.

An environmental survey was then conducted on the Paimpol loop, where the company is located. The search for hepatitis A virus in the shellfish, waters, and mud was negative.

These investigations made it possible to describe the epidemic, with a case cluster larger than any yet observed since national hepatitis surveillance began. The results underline the interest of mandatory reporting for early detection of case clusters at

the district level. The epidemic in Côtes-d'Armor may have been due to the discharge of wastewater from collective or individual treatment facilities, or even from rain outlets. This confirms the need to limit human and manmade effluent (and to circulate information about these releases in real time, to pursue efforts to improve water quality, and to promote good practices by shellfish producers.



The 30 diseases subject to mandatory reporting

- Acute hepatitis A
- Acute symptomatic hepatitis B infection
- African hemorrhagic fevers
- Anthrax
- Autochthonous malaria
- Botulism
- Brucellosis
- Bubonic plague
- Chikungunya
- Cholera
- Dengue
- Diphtheria
- Exanthematous typhus
- Grouped or clustered food poisoning
- HIV infection, regardless of stage
- Imported malaria in the overseas districts
- Invasive meningococcal disease
- Lead poisoning in children
- Legionellosis
- Listeriosis
- Measles
- Orthopoxviroses including smallpox
- Poliomyelitis
- Rabies
- Suspected Creutzfeldt-Jakob disease and other subacute spongiform encephalopathies transmissible to humans
- Tetanus
- Tuberculosis
- Tularemia
- Typhoid fever and paratyphoid fevers
- Yellow fever

Occupational health: identifying exposures and assessing risks

Associations between health and the workplace are increasingly a public health preoccupation. Despite extensive research, we still know little about the role of occupational risks in the social inequalities in health observed in France. InVS has been heavily involved in the epidemiologic surveillance of occupational risks since its creation. This surveillance is based on the implementation of specific tools, such as job-exposure matrices, and on large-scale population studies. In 2007, several of these projects reached their conclusion or at least an important stage in their development.

Epidemiologic surveillance of occupational risks must make it possible to measure the impact of work on the population's health and to identify the industries, jobs, occupational statuses, and working conditions associated with high risks. The objective here is to assess the risks and thus be able to guide policies of both prevention and compensation. The development of relevant indicators has also made it possible to monitor the changes in occupational disease at the scale of the entire population and to facilitate the identification of emerging phenomena.

Occupational risks have several characteristics that complicate these investigations:

- the cause of the harm is often multifactorial and may combine numerous occupational and nonoccupational factors;

- the clinical and pathophysiologic characteristics of diseases induced by occupational factors do not generally differ from those with other causes;

- the effects are often delayed, and the latency periods between exposure to the risk and disease onset may be long.

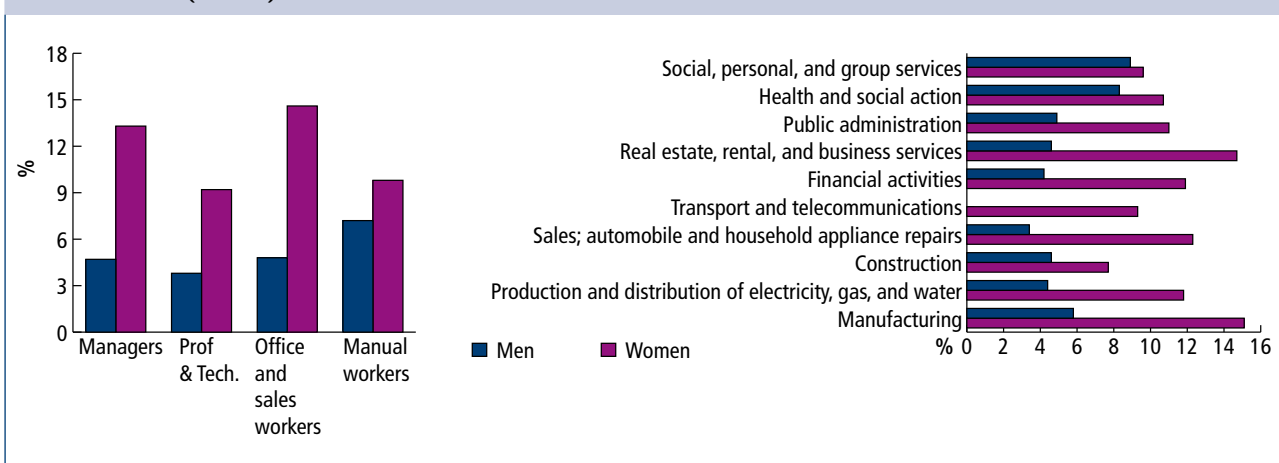
These elements require both the diversification and combination of epidemiologic methods. Moreover, the variety of occupational statuses (ie, private sector workers, the self-employed, farmers, and civil servants) requires the observation of populations with different characteristics. Several studies conducted or begun by InVS in 2007 illustrate different aspects of the epidemiologic surveillance of occupational risks.

SAMOTRACE: mental health at work

Begun in 2006, the SAMOTRACE programme (workplace mental health observatory for Rhône-Alpes and Centre) is an early version of a permanent national system of epidemiologic surveillance of work-related mental health. Its objective is to determine the frequency of mental disorders according to the type of job and their course over time and to identify exposures to recognized or presumed risk factors. The pilot phase covered the Centre region, since joined by the Pays-de-la-Loire and Poitou-Charentes, as well as 2 districts in the Rhône-Alpes (Rhône and Isère). Besides InVS,

which together with the Institute of Occupational Medicine and the University of Tours defined the programme, SAMOTRACE brings together the regional departments of labor, volunteer occupational physicians (for the industrial epidemiology portion of the project), and medical advisors of health insurance programmes (for the medical-administrative portion). Some results are already available from the industrial epidemiology portion in the regions initially included in the programme (Centre, Pays-de-la-Loire, and Poitou-Charentes).

CONSUMPTION OF PSYCHOTROPIC DRUGS ACCORDING TO INSEE SOCIO-OCCUPATIONAL CATEGORY (LEFT) AND INDUSTRY (RIGHT)



Source: SAMOTRACE - "Industrial epidemiology" - Results at one year - Centre, Pays de la Loire and Poitou-Charentes regions. May 2007.

3000 subjects in the industrial epidemiology study at its midpoint in the Centre region

In mid-2007, one year after the programme began in the Centre, Pays-de-la-Loire, and Poitou-Charentes regions, 3000 people randomly selected during mandatory visits to their occupational physician were included in the sample and responded to a detailed questionnaire about their work activity, its psychosocial constraints, and their health status. Provisional early results reveal some interesting findings. For example, 43% of the workers in the sample considered that their training does not correspond to the job they do, 10% of the men and 3% of the women reported that their usual work hours do not allow them to sleep at night, and 7% report "piece work". Significantly, 16% of the employees reported that they had been intimidated, threatened, or humiliated at work at least once during the past 12 months, while 12% indicated that they had been required to violate their conscience at work at least once during the same period. Similarly, in some industries (production of electricity, gas, and water, sales for men, and real estate for women), a

high proportion of workers (more than 60%) reported they were exposed to strong psychological demand. This increased with social status (higher pressure on managers), as did decision latitude — low in workers and higher in managers.

Perceived health was fairly good (mean score of 7 on a scale of 0-9). Nonetheless, 24% of the men and 37% of the women had psychological distress, as measured by the standardized GHQ-28 (General Health Questionnaire). Moreover, 8% of workers reported using psychotropic drugs (12% of women and 5% of men), while 9.6% of the men and 2.2% of the women either drank too much or were dependent on alcohol, as measured by the CAGE questionnaire.

These initial analyses show results consistent with the epidemiologic literature, as well as satisfactory completion rates. They suggest that it will eventually be possible to identify the industries or jobs most particularly at risk for mental health problems. It nonetheless appears necessary to await the end of data collection before reaching any final conclusions.

Continuing follow-up of the effects of the AZF factory explosion in Toulouse

Following up on the various studies conducted in the immediate aftermath of the explosion of the AZF factory in Toulouse on 21 September 2001, InVS set up an intermediate-term study of the health consequences of the explosion among a population of workers in the metropolitan area. This study of a cohort of 3000 volunteers is one of the first in France to assess the health, social, and occupational consequences of an industrial disaster several years afterwards in a population of workers. One of the principal strengths of the cohort is its use of 2 distinct data sets from 2 independent sources. A first assessment took place in 2007, 4 years after it was set up.

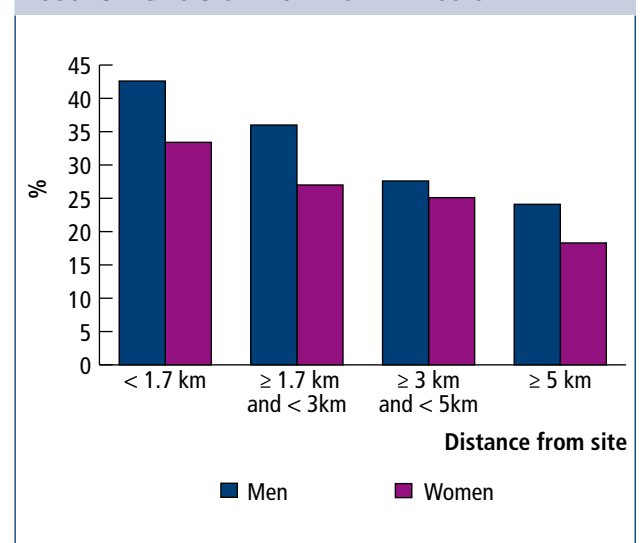
Although the cohort sample was not representative of the Toulouse population and the results are preliminary, they show that the disaster had a strong impact on mental health, with a particularly high prevalence of psychological distress, as assessed by the GHQ-28 (60% in women and 40% in men). For men, this psychological distress was most frequent in subjects with a history of depressive symptoms, or with psychological symptoms in the immediate aftermath of the explosion, or who had the impression of having inhaled toxic air or had taken a sick-leave. Tradespeople and shopkeepers were most frequently affected. Women with a history of depressive symptoms and those with a close friend or family member hurt during the disaster were more likely to show psychological distress. Data on psychological distress after industrial disasters are too rare for comparisons with other populations.

As part of the longitudinal follow-up, a detailed mental health work-up with a structured diagnostic interview (*Mini International Neuropsychiatric Interview*) by a healthcare professional will be offered to those whose GHQ-28 scores reveal distress; this should help to refine the results.

The ear, nose, and throat symptoms most frequently observed were sensorineural hearing loss and tinnitus, especially when the person was close to the explosion. Audiograms showed that the frequency of persistent auditory deficiencies increased with closeness to the explosion.

These results are an important contribution to the body of knowledge about the epidemiology of disasters. They appear consistent with those of the international literature in the fields of both mental health and hearing disorders.

FREQUENCY OF SENSORINEURAL HEARING LOSS ACCORDING TO DISTANCE FROM EXPLOSION



Source: Inclusion phase of the cohort of Toulouse metropolitan area workers (AZF health cohort). June 2007.

InVS analysis of INSEE's 2003 decennial health survey

The analysis by InVS of data from large national surveys conducted by other institutions also helps to add to our knowledge in the field of workplace health. This was the case, for example, in 2007 with studies of mental health and work from data collected by INSEE during its 2003 decennial health survey. This survey, which involved a face-to-face interview and a self-administered questionnaire, studied a national sample of 16 848 households including 40 865 people. Its analysis by InVS from files provided by INSEE makes it possible to describe with precision exposure to some work constraints in a general population of working people, thus supplementing the results already available. The study showed occupational

inequalities in the frequency of depressive disorders (measured by the CES-D scale), as well as associations with some work constraints (varying according to social category). It reports a high prevalence of these mental health disorders among working people, especially elevated in some categories of salaried and hourly workers, as well as in some sectors, such as services, agriculture, sales (for men), and financial activities (for women). This morbidity has major consequences on the quality of life of the individuals and their families, but also on their work and their lost work time. It is therefore essential to attempt to minimize the occurrence of such disorders, especially by interventions in the organization of work.

ESPrI: asbestos exposure of tradespeople

Launched in September 2005, in partnership with the self-employed workers social insurance fund (RSI), the programme for epidemiologic surveillance of the self-employed (ESPrI) is intended to identify tradespeople exposed to asbestos during their working lives. The originality of this project lies in its double objective. On the one hand, it is a public health action aimed at identifying these tradespeople, to offer them an exposure assessment and medical follow-up. On the other hand, this epidemiologic surveillance will follow this population, describe their past exposures, measure the long-term health effects, and assess the impact of the project in terms of health benefits and damages from the compensation fund for asbestos victims.

The pilot phase of ESPrI was conducted among 2334 tradespeople — 88% of them men — who retired in 2004. They lived in the regions of Aquitaine, Limousin, and Poitou-Charentes. The pilot population represented approximately 15% of the eligible population nationwide. A self-administered mail questionnaire allowed experts to determine the probability of occupational asbestos exposure for each participating retiree; a free medical work-up was then offered to those considered likely to have been exposed.

A first assessment in 2007

In June 2007 an intermediate assessment looked at the ESPrI programme. It appears largely positive, with a 67% response rate to the questionnaire. The respondents had a mean age of 61 years and a working life of 43 years. After expert assessment of their careers, three-quarters of the respondents — considered as possibly exposed at an "intermediate" or "high" level — were offered health examinations. At the halfway point, nearly half the respondents were undergoing this work-up, most often by a general practitioner. The first estimates from the pilot phase show that approximately half of all retired tradespeople were exposed to asbestos during their career, for an average of 25 years. The presence of an abnormality or disease that might be associated with asbestos exposure was detected in a quarter of those for whom complete work-ups are already available.

The results of the pilot phase led InVS to recommend that the ESPrI programme be extended to all newly retired tradespeople covered by RSI, that is, approximately 17 000 people a year. This progressive extension nonetheless requires several modifications: adaptation of the procedures and tools used, awareness campaigns for healthcare professionals and especially general practitioners, continuous training of the staff of the participating organizations, consolidation of the partnership between InVS and RSI, and the establishment of an *ad hoc* organization. Moreover, we should take into account the guidelines of the High Health Authority related to post-retirement follow-up associated with asbestos exposure, and these should be updated from the conclusions of the 1999 consensus conference.

The extension of the ESPrI programme will begin in 2008, in 4 new regions: Upper and Lower Normandy, Nord-Pas-de-Calais, and Picardy.



MATGÉNÉ and job-exposure matrices

Schematically, a job-exposure matrix is a table that shows the correspondence between job titles, industries and activity sectors, and exposure to one or several hazards. The design of these matrices makes it possible to determine automatically the risks to which individuals are likely to be exposed according to their job title. The matrices can then be used in a variety of ways: to estimate the prevalence of occupational exposure within a population, to study variations of this prevalence as a function of different elements (sex, age, region, occupation, activity sector, or period considered) to assess occupational exposure of subjects in epidemiologic studies, or to help in identifying exposures for prevention or for medical and social management.

In view of the interest of this approach, InVS set up and coordinated the MATGÉNÉ programme to design and validate job-exposure matrices adapted to the general French population. Each matrix developed in this programme is specific to a substance or a group of substances. It includes, however, all of the occupations, industries, and other economic sectors likely to expose workers to the substance, so that the matrix can be used as broadly as possible. Crossing these matrices with a sample of job histories representative of the French population makes it possible to describe the exposure history of the population and to assess cumulative exposures for entire careers.

Matrices that are operational or in preparation

At the beginning of 2007, some matrices were already operational. They cover:

- dusts — both organic (flours, cereals, leather) and mineral (cement);
- petroleum-based solvents, subdivided into 5 groups: gasoline, special boiling-point solvents and naphtha solvents, kerosene/fuels/diesel oil, white spirits, and benzene;
- man-made mineral fibers: mineral wools and refractory ceramic fibers.

During the year, InVS worked on completing matrices for:

- oxygenated solvents (eg, ketones and glycol ethers);
- chlorinated solvents (eg, trichloroethylene);
- free crystalline silica;
- pest control products: a particular aspect of the MATGÉNÉ programme — called Matphyto — involves the design of a series of matrices for agricultural settings, concerning the use of pest control products (expressed as large chemical families and as active ingredients), by type and growing period.

Moreover, 2 earlier matrices (asbestos and wood dust, version ISCO/ISIC) have been adapted to the MATGÉNÉ format.

MATGÉNÉ: example of fuels and solvents

The matrices developed for the 5 categories of fuels and solvents (see opposite) combine several elements. First they distinguish exposure periods (which differ according to the product), determined as a function of changes in regulations and work techniques. They then integrate 3 exposure indicators, which when combined make it possible to assess respiratory and cutaneous exposure to fuels and petroleum-based solvents between 1947 and 2005: the probability of exposure (proportion of workers exposed to the product in the specific job), intensity of exposure (with values specific for each product), and frequency of exposure (proportion of work time during which exposure may occur).

The results show, for example, that in 1999, 10.2% of men and 1.3% of women in the French working population were exposed at least once to fuels or petroleum solvents. This proportion of exposure at least once to fuels or solvents rises to 22.3% in blue-collar men. It approaches 15% in tradespeople (principally because of the use of white spirits) and reaches 10% in farmers and farm workers.

In terms of occupational fields, the highest prevalence of exposure was observed in the fields of automobile sales and repair, of publishing, printing and copying, of land transport, and of fishing and aquaculture.

When we calculate over a lifetime, the matrices show that the proportion of subjects exposed at least once in their life to a fuel or petroleum solvent is 36.8% for men and 8.4% for women.



Health and environment: scientific response to population concerns

The influence of the environment on health has become a major preoccupation of our fellow citizens, although it remains difficult to assess precisely. InVS monitors and assesses the consequences to human health of environmental modifications — either accidental or chronic, due to either natural or human causes. InVS conducted several studies in this domain in 2007. It also helped to prepare the launch of a very ambitious large-scale longitudinal study, the ELFE cohort.

The national environmental health plan (PNSE), adopted in 2004, clearly sets forth the stakes involved. It reminds us that among the many factors that determine human health and disease development, environmental quality (air, water, and soil), as well as environmental change (eg, climate changes and biodiversity), plays a fundamental role. The quality of the environment is itself determined by the contaminants (biological, chemical, or physical) and nuisances (noise and

insalubrity) that it conveys. The PNSE thus points out that "deepening our knowledge of the role of the environment on health is a major scientific issue".

InVS, which participated actively in the work of the Grenelle Environment Forum that began in July 2007, has thus been heavily involved in the field of environmental health since its creation.

Alerts and toxicity monitoring

Action number 39 of the PNSE consists of developing alert systems and strengthening the national network of toxicity monitoring. The Ministry of Health has assigned to InVS the leadership of this network based upon 13 poison and toxicity monitoring centres (CAPTV). The system also includes a toxicity monitoring coordinating committee (CCTV), with one operations unit and a number of working groups. The committee, led by InVS, brings together the CAPTV, the Directorate-General of Health (DGS), the agricultural workers' insurance fund, and other health agencies: the French Food Safety Agency (AFSSA), the French Health Products Safety Agency (AFSSAPS), and the French Agency for Environmental and Occupational Health Safety (AFSSET).

The year 2007 was especially rich in this field. In particular, the direction of the network and of the working group meetings (36 sessions during the year) consolidated the leadership of the CCTV. The working groups dealt with 27 referrals and received 22 new requests. The harmonization of the CAPTV information system was nearly completed this year, which makes it possible to analyze exposures at a national level now (excluding data from the Lille poison centre). Harmonization of coding practices is also being finalized. Accordingly, for the first time since the

end of the 1990s, it was possible to draw up a national synthesis of exposures reported to CAPTV in 2006. This recapitulation was presented at the first session on toxicity monitoring at the InVS Science Meetings, on 29 and 30 November 2007, together with other communications describing the committee's organization and activities. Specific funding was also provided to organize toxicity monitoring in Reunion.

Also in 2007, an independent consulting firm conducted an expert assessment of emergency toxicological response, and the Inspector-General for social services conducted an audit of toxicity monitoring, recommending reinforcement of InVS oversight of this system. Both reports also recommend that the CCTV organize a more efficient response to alerts and referrals, which should include the promotion of regional networks of poison and toxicity monitoring centres, to be developed with help from the regional epidemiology units. Finally, they recommend pursuing the search for data sources in addition to the CAPTV, for cases of acute poisoning (such as registries of serious accidents and analysis of deaths reported as "toxic, suspicious", or occurring in a public place or before receiving care). Several new measures should implement these recommendations in 2008.

Surveillance of carbon monoxide poisoning

The Public Health Policy Act of 2004 set as an objective the reduction of deaths due to carbon monoxide poisoning by 30% in 2008. Carbon monoxide (CO) is the leading cause of acute poisoning deaths in France. Each year this colorless,

odorless gas kills more than 300 people (accidental poisoning at home or work, fumes from fires or motor vehicles, and suicides). Half of these deaths followed accidental poisoning at home.

Assessing compliance with the objectives set by the Public Health Policy Act of 2004 and included in the PNSE requires reliable mortality data but also a surveillance system, measurements, and action. The Ministry of Health assigned InVS to monitor this national surveillance system. It is relatively complex, based on the coordination of a network of 350 regional and local partners — regional and interdistrict health and social bureaus, the CAPTV, municipal hygiene and health departments, and others — that work with the regional epidemiology units in regional and local working groups.

In 2007, the procedures for reporting suspected cases of CO poisoning and for data collection were simplified. A service provider was selected to work with the North (Lille) regional epidemiology group to develop specifications for a new computer application that would be more effective and more appropriate for the different users, especially the regions, and that focuses principally on the medical characteristics of the cases. Also undergoing change are the environmental data collected at the poisoning site, due to the development by the DGS of a specific application for home risk management. It should be linked with the new application to be developed under the aegis of InVS at the beginning of 2008.

ELFE: a study from birth to adulthood

The ELFE (French longitudinal study starting in childhood) cohort project is being developed by a scientific interest group including the Ministries of Health and of Education, InVS, INED (National Institute of Demographic Studies), INSERM, INSEE, and the national family allowance fund.

The objective of this multidisciplinary project is to follow a national cohort of 20 000 children, born in 2010, from birth through adulthood, to analyze their pathway through their physical, chemical, and biological environment but also their family and school life and their socioeconomic status.



The studies conducted as part of ELFE will cover 3 principal themes: child health, relations between environment and health, and social and demographic aspects.

The specific objective of the health and environment theme is to study the effects of the environment on the child's health and development. This project will enable us to learn more about the diseases likely to be associated with the environment and to identify the children most sensitive to them. The ELFE cohort will also make it possible to describe exposure to the principal environmental pollutants and its change over time, by using and

comparing different methods: direct methods involving assays of exposure biomarkers, indirect methods of estimation by questionnaires about lifestyles and habits, and the estimation of contamination levels of different environments people live in. Finally it will improve our knowledge of the relations between exposure to these different pollutants and health status, with other determinants taken into account.

The study may also contribute to defining future biosurveillance strategies by furnishing information useful for choosing toxic substances to measure, methods for their measurement, and the critical ages at which they should be measured. The cohort may also provide a baseline for biosurveillance of other cross-sectional samples in the years to come, to measure changes in pollutant burdens at specific ages.

Two pilot studies in 2007

Given the scale and pioneering nature of the ELFE cohort, an important test phase must precede its implementation. Its first objective is to measure the acceptability, feasibility, and pertinence of the study. To do this, we constituted a sample to test the follow-up at 6-8 weeks and at one year and then we conducted a descriptive analysis of the data collected.

The first pilot study included all the children born in the 36 maternity units in the region of Burgundy on 2, 3, and 4 April 2007. It was expected to cover approximately 350 births. The midwife-investigators recruited by the ELFE team collected data in the form of a questionnaire and a medical file covering the pregnancy, the perinatal period, and the health status of mother and child at delivery (but without biological samples in this pilot study). Also included were a contact form (address and telephone numbers of the parents agreeing to participate) and a self-administered questionnaire completed by the mother, about her dietary habits, use of cosmetics and household products, and leisure activities and hobbies during pregnancy. This first phase was followed by a second collection of data at 2 months: An INSEE investigator administered a questionnaire at home and placed radon dosimeters and dust traps. This phase also included a telephone interview of the father and a self-administered questionnaire on postnatal depression to be completed by the mother.

The overall acceptance rate for participation was 58%—198 births. This first pilot phase allowed us to test the acceptability of the study and the feasibility of radon measurement.

A second pilot study took place in Seine-Saint-Denis and in 4 districts of the Rhône-Alpes region: Ardèche, Isère, Loire, and Savoie. It covered a predicted 550 births from 1-4 October 2007 in 38 maternity units. This second pilot study used the same methodological approach as the first, but added to it the collection of biological samples: cord blood and the mother's urine, hair, and milk (in the maternity ward and then at home during the first month).

The ELFE acceptance rate was 53%, for 301 births, and 269 women provided at least one sample. This second pilot study also tested the acceptability of biological sampling and its logistic feasibility: collection of samples by maternity unit personnel, quantities collected, and coordination with the French Blood Agency for transportation, material, sample division, and storage.

Early results of the 2 ELFE pilot studies

Beyond testing the feasibility of a large-scale study, the 2 ELFE pilot surveys in 2007 also produced some interesting results.

In the first, 16% of the mothers had cesarean deliveries, 17% induction of labor, and 10% pelvimetry measurements. Ten percent of the women had CMV (cytomegalovirus) tests, and half of those who were CMV-negative were not given advice on preventing infection. Six percent of the babies were preterm (born before 37 weeks of gestation), and 55% were breast-fed (at least in part). Overall, 20% of the children had health problems after discharge (17% respiratory and 15% digestive) and 8% had been hospitalized.

At the second phase, at 6-8 weeks, 32% were breast-fed, 53% received formula, and 14% had both.

Other results concern household conditions: 12% of the homes had molds, 5% exposure to smoking, 41% used additional heating devices (direct-fired for 30%), and 72% used a gas cooktop.

The pilot study also shows relatively little use of pesticides overall, but with some frequent users (approximately 30% of the sample) or conditions that led to exposure of the children.

Of the laboratory tests for the second pilot study, only blood lead level and CMV were analyzed, since the primary objective was to test the feasibility of taking, collecting, and using samples.

Exposure to chlordecone in the West Indies

Bananas are the leading agricultural product and principal export of the West Indies, and parasites that proliferate in the tropical climate attack them ferociously. Producers thus used large quantities of pesticides, with intensive application of organochlorine insecticides and nematicides. Organochlorine insecticides, chlordecone in particular, are chemically very stable and persist in the soil for decades, continuously contaminating other environmental compartments as well as the food chain.

This persistence and the demonstrated toxicity of organochlorine compounds on all living creatures (fish, rodents, and humans) led to restrictions on its use as early as 1969. Several products have thus been successively banned or withdrawn from the market in France between 1972 and 1998. Chlordecone sales were first suspended and then permanently banned on 1 February 1990.

In 1979 and 1980, 2 cyclones in the West Indies severely damaged and weakened the banana plantations, exposing them to attacks by banana weevils (*Cosmopolites sordidus*). In 1981, the Ministry of Agriculture therefore accorded marketing authorization to a commercial product containing 5% chlordecone. Even after it was banned in metropolitan France, massive use continued in the West Indies, with the issuance of several successive exemptions. It was permanently banned in September 1993. During this period, some banana plantations were treated several times a year, at a quantity of 3 kg of active ingredient per hectare per application, that is, overall nearly 300 tons of active ingredient (for 6000 tons of product sold), according to the commercial data from that period.



A health risk assessment

In 2002 and 2003, regulations were enacted to forbid the sale of any food product with traces of chlordecone. They also mandated a procedure to test soil contamination before sowing began. At the same time, the Ministries of Agriculture, Health, and Consumer Affairs referred to AFSSA the question of the chlordecone risks related to food, asking the agency to assess them and recommend how best to manage them. A quantitative health risk assessment began. To understand the dietary and food supply habits of the local population and estimate the levels of contamination in food required several studies. They were assigned to the West Indies-Guyana CIRE and to InVS (see below). At the same time, an epidemiologic research programme was set up to characterize the health risks associated with chronic chlordecone exposure. INSERM conducted several studies to improve our knowledge of how organochlorine exposure is associated with cancer risk (especially of the prostate) and with subfertility, fetal development, pregnancy outcome, and neurological development of newborns. Human contamination was estimated from biological samples in all of these studies.

Three complementary studies

The West Indies-Guyana regional epidemiology team and InVS conducted 3 studies to respond to the questions of the national, regional, and local authorities.

A survey of health and dietary behaviour (ESCAL) included a sample of 1504 people older than 16 years and 461 children aged 3-15 years throughout Martinique. It was stratified by residence in the potentially contaminated area, so that those living there would be included at a higher rate. This stratification relied on a multicriterion map by the office of geological and mining research.

In Guadeloupe, the survey on dietary behaviour in Basse-Terre (CALBAS) included only the populations living in the 9 municipalities of southern Basse-Terre that were potentially contaminated. It included 536 people aged 16 years or older and 148 children aged 3 to 15 years and used a questionnaire identical to that in the ESCAL survey. It asked about the frequency of consumption of a specific list of foods and for a description of what the subject had eaten in the past 24 hours.

These 2 surveys made it possible to calculate population exposure, assuming that the food eaten was contaminated at the levels shown by the surveillance and control plans implemented by the relevant government departments. Nonetheless, these plans did not allow a real estimation of the level of contamination of the food really eaten by the population: above all they were

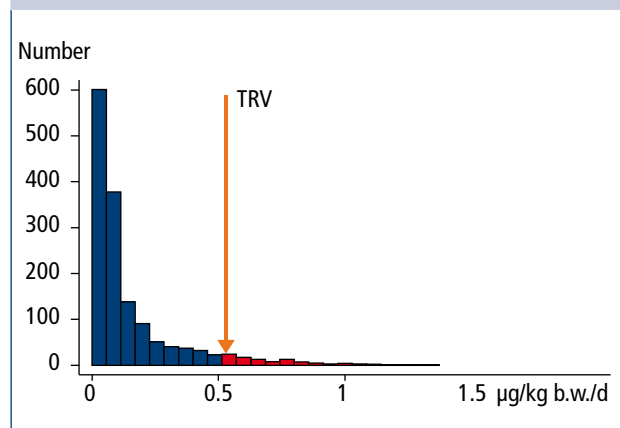
aimed at detecting the worst-case situations. This procedure nonetheless helped to advance in managing the problem: AFSSA was able to define a provisional maximum limit and the populations at risk could be characterized.

To specify the levels of contamination of food in more detail, a survey (RESO, on organochlorine residues in food) was later conducted, in Martinique between October 2005 and July 2006, and in Guadeloupe between July 2006 and January 2007. In each district, approximately 850 dietary samples were taken in places representative of the population's supply sources, as seen in the ESCAL and CALBAS surveys. A network of laboratories coordinated and monitored by AFSSA conducted the analyses. The results showed that the use of the data in the surveillance and control plans resulted in overestimating contamination in the most contaminated food but that the diversity of contaminated food was much larger than originally thought.

By the end of 2007, the different surveys conducted by AFSSA, InVS, and the CIRE since 2004 made it possible to recommend to the relevant ministries maximum chlordecone limits in food on the basis of the most relevant data; determination of these limits has facilitated the management of this problem for farmers and consumers.

The surveys conducted also allowed us to quantify and characterize the populations at high risk of exposure. This information makes it possible today for the health and social development bureaus of Martinique and Guadeloupe (the overseas equivalent of the DDASS) to prepare plans to reduce exposure (such as the JAJA programme for the users of family gardens).

DISTRIBUTION OF THE POTENTIAL EXPOSURE DOSE IN THE ESCAL STUDY SAMPLE



Source: Basag n°5. July 2006.

Population involvement in expert assessments

Public opinion is especially sensitive on environmental health topics, especially when the investigations involve children.

In August 2007, for example, AFSSET conducted a campaign to measure pesticides in the air of 3 schools in Chenôve (Côte-d'Or). In one of the schools, they revealed concentrations of organochlorine pesticide residues (lindane and HCH alpha) substantially larger than in the other establishments, leading to the closing of the entire school complex (nursery and

elementary school), thus worrying the children's parents and indeed the general population. At the request of the health authorities, a scientific and technical committee (CST) and a local orientation and information committee (CLOI) were established. The CST was made up of independent experts, designated jointly by AFSSET, InVS, and representatives of the 3 populations directly concerned: teachers, municipal technical staff, and children (represented by their parents), as well as

the school physician. The CLOI brought together the prefect, the mayor, the DGS, DDASS, representatives of the Ministry of Education, parents, teachers, municipal technical staff, and a general practitioner. The CST was in particular responsible for launching and monitoring the risk assessment. It conducted a campaign of complementary measurements in the environment to quantify exposure, determine toxicity reference values, and identify risk management recommendations. It met 4 times. There were also several meetings of the technical subgroups. The CLOI met 3 times.

This system of interaction with the different participants has so far been very productive. It involved the exposed population and local policy-makers, by sharing important information with all of them. This sharing occurred without interfering with the production of scientific information or with the decision-making processes of the health authorities. It is nonetheless appropriate to remain prudent and to await the end of the scientific expertise process and the crisis management to draw final conclusions about this practice.

The study at Aulnay-sous-Bois also illustrates the importance of involving the exposed populations and local leaders in the studies conducted.

Le Comptoir des Minéraux et Matières Premières, a company specializing in mineral grinding, asbestos in particular, first began operations in 1938, in Aulnay-sous-Bois (Seine-Saint-Denis), in the Paris suburbs. Its grinding activity produced noise and intense dust and led to multiple neighbourhood complaints. In 1997, a neighbouring family filed a lawsuit against the company after a family member died of mesothelioma, which they attributed to the environmental exposure generated by the company.

The aim of this study was to verify the existence of at least one case of an asbestos-related disease in the vicinity for which the only exposure was environmental and to estimate the extent of the past exposure to asbestos fibers around the factory when it was operating.

It was possible to review the clinical files and reconstruct the exposure of 21 neighbours with asbestos-related diseases. Eleven of them had a confirmed disease (mesothelioma or pleural plaque) associated with strictly environmental exposure or associated with a minor extracurricular exposure, thus validating the signal.

Consultation with the different participants (former workers and their families, neighbours, public authorities, the employer, and advocacy associations) preceded the performance of this study.

Interviews with former employees and neighbours provided a history of the plant and the neighbourhood, the lives of the workers and their families, their working conditions and health, and the quality of life and health of neighbours during the years the plant operated. It also helped to understand the birth of the citizen movement. Archival research completed this recovery of the company's history to make it possible to characterize the source of pollution as precisely as possible and to reconstruct the exposure history of the relevant people.

Subsequently, the epidemiologic portion of the study took place, aided by victim advocacy groups, who helped to set up the climate of confidence essential for the participation of those concerned. The relationships thus established between the different parties helped the study to progress smoothly, contributing to the quality of the dialogue. This involvement of civil society — and especially associations and advocacy groups — also facilitated access to medical files.

The report concluded, by the way, that it was necessary to inform the former workers and their families of their rights to compensation and to medical follow-up. It also stressed the need for a collective analysis involving the neighbours before deciding on the information actions to implement and the possible medical follow-up of the population exposed in the past.

Sick building syndrome or mass psychogenic illness: difficult differential diagnoses

Although first described at the end of the 18th century, advances in psychiatry have made mass psychogenic illnesses, sometimes also known as sick building syndromes, better known and better recognized. Their clinical and epidemiologic aspects raise particular difficulties, for they are frequently misunderstood by the people concerned and by public opinion, which often feels that “there must be an objective cause and they are hiding something from us”. In 2007, InVS investigated several situations of this type and undertook, in a special issue of BEH, to draw conclusions from the accumulated experience.

Mass psychogenic illnesses, sometimes called sick building syndrome, are epidemics of unexplained malaise that affect people presenting the same somatic symptoms but without an apparent organic cause and which are transmitted by emotional suggestion from one person to another in a single place. While not in principle a health hazard, these phenomena can have serious (and expensive, because of the cost of environmental investigations) consequences for the authorities concerned. They also disrupt the operations of the schools, establishments, and companies affected.

The information drawn from the different cases investigated by InVS, as well as from the literature on the topic, allows a rather precise classification of these phenomena. They are manifested by specific symptoms, including headaches, nausea, abdominal pain, sensation of malaise, vertigo, hyperventilation, trembling, or syncope. These symptoms do not suggest any particular cause, are not serious, and disappear within a few hours. The number of people affected varies greatly and may range from several individuals to several dozen, or even several hundred. The most common episodes are short (2-4 days), although some epidemics are reported to have lasted more than 30 days. The belief that a particular event or environmental exposure is responsible for the phenomenon nonetheless persists.

The episodes are transmitted by viewing and word of mouth. Someone is thus at higher risk of being affected if she has

seen, in her own group, someone affected. Similarly, it is not rare to observe transmission that begins from a leader or an individual with a strong influence on the group. Transmission is easiest between people with close contacts. The existence of an “index case”, the first from whom the “disease” is then propagated, is typical of these epidemics. In some situations, the index case is not explicitly identified at the outset and must be systematically sought during the investigation.

The sometimes disproportionate response of emergency departments (eg, firefighters and mobile emergency medical services, SAMU/SMUR) as well as the resources invested in environmental investigation may amplify the epidemic, as may extensive media coverage.

Mass psychogenic illness is observed preferentially among women and adolescents, in school settings or the workplace. In school settings, when the disorder affects students, the staff is generally not touched. In the workplace, it is not rare to find underlying conflicts, poor working conditions, poor relations between supervisors and supervisees, and poor management.

In most cases, an anxiety-inducing trigger is mentioned, most often an environmental factor, such as the presence or perception of an odor (gas especially) or smoke. Generally, the affected subjects agree about the cause of their symptoms.

Skin irritation in a middle school in the Oise

On 12 February 2007, a 6th grade student (at the Betz Middle School in the Oise) came to the infirmary, with red blotches and itching on her face, which she attributed to cosmetic treatment she’d had the day before. The symptoms extended to 3 other students in the same class and then, after lunch, to 9 other classes and some adults. In all, there were 66 cases (62 students and 4 adults). The school was closed that night.

The interregional epidemiology group (CIRE) and the district health and welfare bureau (DDASS) began investigations. The National Institute of Industrial Environment and Risks (INERIS) and the Laboratory for Inhaled Particle Studies conducted an initial campaign of environmental analyses at the request of the district council. It identified a substantial quantity of dust near the rooms where the first cases appeared. The initial conclusion

was thus that the cutaneous irritation was provoked by dust from the ongoing school renovation.

The district council then arranged for the school to be aired and cleaned, and for the construction area to be contained. It also organized an informational meeting with the parents. The Ministry of Education planned for a school nurse onsite as well as a school physician for the reopening, planned for 22 February, and the DDASS designated a coordinating dermatologist.

On 22 February, the phenomenon recurred, with 52 cases (50 students and 2 adults). The school was again closed, this time until the end of vacation (12 March), and a new set of environmental measurements were taken.

The epidemiologic investigation

The epidemiologic and clinical investigations were based on a descriptive census of the cases, together with a clinical description of the students treated by private physicians. They showed several important points:

- cases were highly concentrated in two 6th grade classes;
- attack rates were very heterogeneous in the other classes;
- more than 90% of the students reported having seen another student scratch him- or herself before developing their own symptoms;
- there were equal numbers of girls and boys among the cases;
- in every room where cases appeared, other classes took place without any student developing symptoms.

At the same time, clinical assessments of the itching showed no papules, no plaque, no urticaria, and no allergies (all atypical lesions were due to scratching).

The environmental investigations did not identify any significant anomalies, except for the elevated concentration of dust on the upper floors (due to the construction work).

A group phenomenon

In the interval, local media covered the story heavily, and an advocacy group blamed mobile telephone antennas. This aroused strong worries as the second reopening approached. On 12 March 2007, 19 students reported a new episode. The hospital staff dermatologist present that day immediately diagnosed benign cutaneous irritation and mass psychogenic pruritus. That same day, 2 students were punished for bringing itching powder into the school.

The next day, 5 or 6 students reported itching, but it was not severe. No new case has been reported since then.



Operational feedback

A similar mass episode took place between 5 December 2006 and 25 January 2007, in the Pierre de la Ramée de Saint-Quentin High School (Aisne). Afterwards, InVS, working with a sociologist, organized an operational feedback procedure. The participants made several general recommendations for dealing with this type of event:

- set up a multidisciplinary expert assessment as rapidly as possible, coordinated by the emergency response team;
- rely on a coordinating physician to provide unquestionable clinical expertise;
- include the school health department in the investigations, analysis, and communication of results;
- take only those environmental measurements consistent with the results of the clinical and epidemiologic investigations

and especially do not keep taking more measurements without justification;

- keep to a single consistent line of communication by all participants, communicate the results of investigations as often as possible, in small groups, at workshops and open debates, rather than in large public meetings;
- draft guidelines for managing these situations, to increase the awareness of school health departments and emergency medical services.

A national working group directed by InVS and the DGS is being set up to define the most appropriate intervention strategies for managing these mass psychogenic illnesses and to produce a booklet on these intervention as guidance for those in the field (school health services, occupational physicians, SAMU/SMUR).

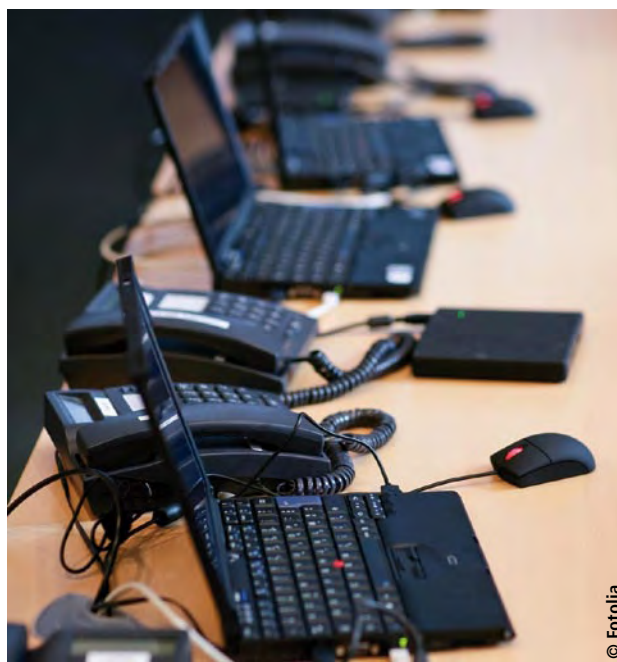
The Labège call centre

This 2007 InVS epidemiologic investigation took place in a workplace — at a call centre located in Labège (Haute-Garonne). The district health and welfare bureau sought the Institute's intervention after a case cluster of incidents of malaise in this company in late June and early July 2007. The incidents received widespread media attention at the time.

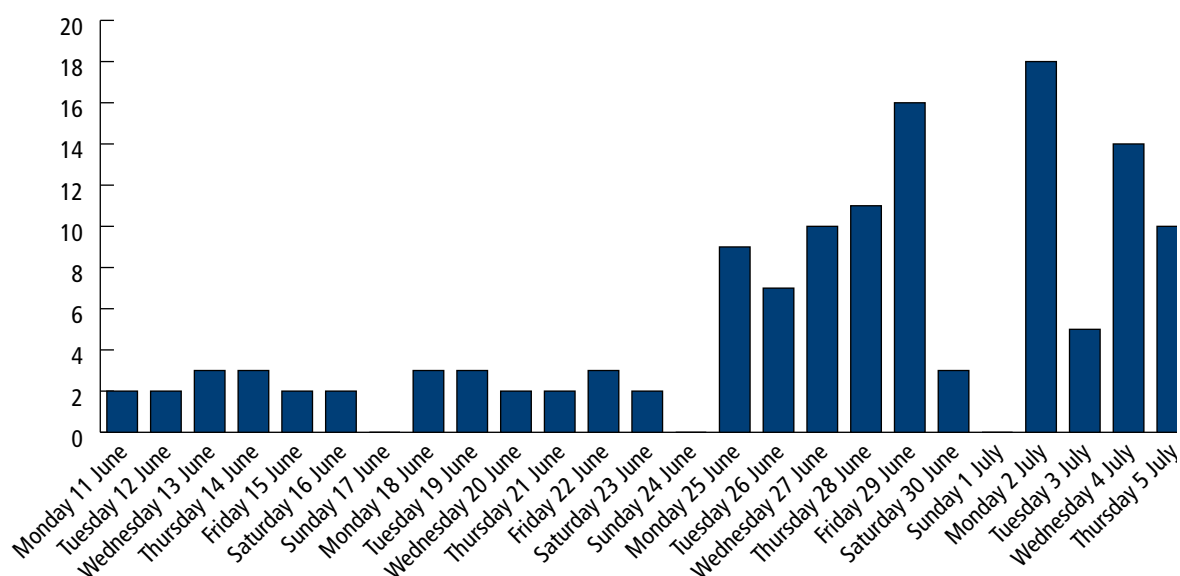
During the first week, 2 or 3 cases appeared each day. The company first changed the filters on its HVAC (heating, ventilation, and air conditioning) system and disinfected it

with a bactericide. Next it hired a consultant (Véritas) to test the ventilation and cleanliness of the premises and to analyze the air in various parts of the building. As cases continued to appear, the occupational physician and the site director decided to turn off the HVAC system, maximize natural ventilation, and have 2 independent companies take biological samples at the water distribution points and food vending machines, as well as from the air.

On 2 July when new cases appeared, it was decided to evacuate the site, and 13 people were taken to local hospitals for suspected carbon monoxide poisoning. New analyses, conducted by the fire and rescue department, did not detect any significant presence of the different compounds sought (including sulfur dioxide, hydrogen sulfides, hydrogen cyanide, volatile organic compounds, and carbon monoxide). An exceptional meeting of the company's Safety, Hygiene, and Working Conditions Committee decided on a series of measures on 3 July: keeping the centre apparently at the origin of the incidents closed, resuming minimal activity at the rest of the site, transferring some employees to other sites or sending them for training, turning off the HVAC and controlled mechanical ventilation, providing substantial natural ventilation and ventilator systems in every room, removing the coffee machines, water fountains, and food distribution points, proposing individual water bottles, and suspending the use of all cleaning products. Despite these measures, 4 new cases appeared on 4 and 5 July. The management then decided to shut the entire establishment down temporarily. When it reopened the following week, no new cases were reported.



DISTRIBUTION OF EVENTS ACCORDING TO DATE OF ONSET OF SYMPTOMS, TÉLÉPERFORMANCE, LABÈGE (31), JUNE-JULY 2007



Source: Epidemic of unexplained symptoms among the staff at the Téléperformance call centre at Labège (31). 2007.

Reconstruction of the events

InVS conducted a retrospective cohort study to help to understand these events. Its aim was to reconstruct the history of the events from 11 June through 5 July and to estimate and compare the incidence of these events according to different possible risk factors. The data were collected onsite with a self-administered questionnaire designed by the Midi-Pyrénées CIRE and organized in 2 parts: an individual questionnaire for each person (demographic variables, medical history, perceived health status, and work environment) and a questionnaire that reviewed, for each event, the symptoms and their environmental circumstances: each person completed a questionnaire for each event they reported.

The study did not begin until after the situation has returned to normal in the company, and the overall participation rate was only 19%. This may be explained by the substantial staff turnover, their workload (initially, they were allowed to participate in the study only during their break time), by the less than propitious study period (late July), and by the staff's reduced motivation, since the crisis atmosphere had ended. The epidemic attack rate could not be calculated precisely, but a minimum rate of 13% can nonetheless be estimated, if all those who had perceived symptoms were interviewed during the study.

The results of the epidemiologic study support the hypothesis of mass psychogenic hyperreactivity for at least a part of the events

reported. Accordingly, 92% of the cases who had symptoms had seen a sick person before becoming ill, and seeing someone sick was significantly associated with symptoms the same day.

The results of the simultaneous environmental survey also suggest a defect in the HVAC system. This track is consistent with the epidemiologic results since 44% of those with symptoms had perceived odors, and the perception of odors on a given day was significantly associated with the onset of symptoms the same day in the sample surveyed.

Several elements of the situation, seen in the literature and in earlier surveys conducted by InVS, are characteristic of mass psychogenic illness: presence of a precipitating anxiety-inducing factor (often environmental), existence of an index case from whom the epidemic propagates "by viewing and by word of mouth", sex-ratio (predominance of women), and nonspecific symptoms, which were not suggestive of a particular cause and were neither serious nor long-lasting (they disappeared rapidly within several hours). The identification of an environmental risk factor is not inconsistent with the diagnosis of mass psychogenic illness. These epidemics have multifactorial origins: an environmental factor can provoke reactions in the first cases and these reactions can then be amplified to colleagues by emotional contagion.

Episodes such as those investigated at the Labège call centre are often summed up under the term of sick building syndrome.

Difficulties of this study

The investigation confirmed the pertinence of the measures taken and the key role of the occupational physician's intervention: improvement of ventilation during the events, transparent information to employees about the measures taken, and vigilance about new cases occurring after these

steps were taken. Relapses are often described in these epidemics. More broadly, the investigations by InVS showed the importance of rapid and energetic management of the problem and strong involvement by the occupational physician. The study at this facility calls attention to some of the difficulties and limitations and suggests that an epidemiologic investigation may not always be feasible in this type of situation:

- insufficient acceptability of the questionnaire (2 related questionnaires with a very large number of variables), which turned out to be tedious for people who reported several events during the study period;
- the definition of health events: the concept of a health event might be perceived differently by different subjects, especially when symptoms occurred several days in a row and it was not possible to say whether or not they stopped from one day to another;
- the low response rate, compared with the population possibly present during the study period: the global participation rate was on the order of 19%, and still lower for the call centre agents (approximately 14%). The epidemiologic study was thus conducted among an unrepresentative sample and was probably biased. It was therefore difficult to go further than a descriptive analysis of the cases, which could provide only some suggestions about the potential causes of these unusual symptoms;
- the lateness of the epidemiologic study relative to the events and their media coverage (data collection began more than a week after the symptoms disappeared);
- the separation of the environmental and epidemiologic studies.

These different factors should be considered in subsequent studies.

Emergence of mass psychogenic illness in Martinique

In 2007, Martinique was the setting for several different mass psychogenic illnesses in schools and in the workplace (both public and private). The frequency of these illnesses appears to be rising.

Although different, these events most often shared the perception of odors as a precipitating factor. The odors were not linked to any well-identified substance and were either the consequence of the proximity of defective sewer draining or of poor ventilation by the office HVAC system, resulting in stale office air.

The resulting clinical events, very similar from one episode to the next, were expressed as cutaneomucosal irritation.

The constant in these events was their amplification from one person to the next or from several index cases. That is, although these situations were not serious from a health point of view, the speed of their amplification testified to the very anxiogenic character of this situation. This is due both to the nature of the events and the deployment, most often disproportionate, of rescue services.

In some cases, simple recommendations for maintenance of the HVAC systems and ventilation of the premises rapidly resolved the problem. In others, temporary closing of the premises, or even moving out, were the only solutions for a return to normal. These situations always involved a request for ambient air measures.

These phenomena thus bring together the characteristics that qualify them as mass psychogenic illnesses (or sick building syndromes in the workplace). The West Indies-Guyana CIRE handled 2 illustrative examples in 2007.

The Trianon school in François

On 26 May 2007, the Martinique health and social bureau was informed that some students of this middle school were reporting nonspecific benign symptoms, including headaches, tingling in the nose and eyes, or abdominal pain. These symptoms always followed the perception of odors (solvents, urine, or sewage) by the children as well as by teachers. Similar episodes recurred in the days that followed. These characteristics were suggestive of a mass psychogenic illness within the school.

The different investigators also noted these odors, however, sometimes accompanied by signs of nasal and eye irritation. Because these odors were perceived beyond the school boundaries, in particular near a neighbouring printing plant, there was a question about chronic low-dose exposure to environmental substances. Nonetheless, measurements taken continuously for a week within the school boundaries during the symptomatic episodes did not show any important concentrations of the substances measured (volatile organic compounds). It might, nonetheless, have involved exposure to discontinuous emission peaks. The environmental survey explored the hypothesis of exposure to substances used by neighbouring companies and also showed defects in the sewer network connected to the school. The CIRE asked the local industry and research office for an enumeration of the companies' activities and a description of the processes and products used. These advances in the investigations were presented at 3 public meetings while the report of the investigation was made available to parents and teachers.

Companies in the Jambette au Lamentin zone

From 21 September through 3 October 2007, this industrial and commercial area experienced several episodes of malaise involving several companies, although no one was hospitalized. The environmental investigations identified ammonia fumes coming from a pipe network as the cause of the first episode. It seems to have triggered a "psychological contagion" in the company involved and then in other companies in the same area.

Several factors may explain this extension:

- the poor working conditions described by some employees of companies where the malaise occurred;
- recurrent interventions in the area by fully-equipped firefighters (helmets, masks and oxygen tanks) and SMUR teams, thus contributing to suggest the situation was serious;
- the perception of gas odors in the area over several months.

Chronic diseases and injuries: population-based surveys

InVS's surveillance responsibilities include chronic diseases (such as cancer, cardiovascular diseases, diabetes, and rare diseases) as well as injuries. Because of their permanent or recurrent nature and their scale, these require specific epidemiologic approaches. Most especially, they involve cross-sectional population-based surveys with large samples. Several large InVS surveys reached important milestones in 2007.

The epidemiologic approach to chronic diseases and to injuries can cover a more or less broad field. It can thus focus on a behavioural issue, one that precedes diseases but influences their onset. This is the case, for example, of the national nutritional health study (ENNS) by InVS, which is linked to the implementation and follow-up of the National Nutritional-Health Programme, PNNS) and of surveys of more targeted populations, such as ABENA, which studied the diet and nutritional status of food aid recipients, and NUTRIMAY, which did the same for the general population of Mayotte.

Other studies focus on a known public health issue, but cover a vast area. The permanent survey of home and leisure accidents (EPAC) thus studies injuries. InVS also focuses more particularly on the description and incidence of sports accidents.

Finally, some studies target a particular chronic disease that is a major public health issue. This is the case for the large ENTRED 2007-2010 study on diabetes and for the more specific epidemiologic investigations of the progression of childhood diabetes and of its medical management. INSERM and InVS are conducting these investigations jointly.

The national nutritional health study: a complete panorama of nutrition in France

It is now well established that diet plays an important role in the onset of a number of chronic diseases, including cardiovascular diseases, some cancers, diabetes, and osteoporosis. This observation led the public authorities to launch the PNNS in 2001. This programme set specific dietary aims, in terms of food, nutritional intake, markers of nutritional status, and physical activity. The ENNS study is one of the tools intended to follow up on and evaluate the PNNS. It is conducted by USEN (the nutritional epidemiology and surveillance unit), a mixed unit in which InVS, University of Paris 13, and the National Conservatory of Arts and Sciences all collaborate. Evaluation of the PNNS also involves AFSSA and the National Institute for Health Education and Prevention (INPES).

The ENNS had several objectives:

- to describe the nutritional situation and practices 5 years after the PNNS began. The study thus furnishes descriptive data about diet, markers of nutritional status, and physical activity of a national sample of the population living in metropolitan France in 2006 (3115 adults aged 18 to 74 years and 1675 children aged 3 to 17 years, with a single participant for each household included in the sample);
- to supply a series of indicators for monitoring achievement of some of the objectives set by the Public Health Policy Act of 2004;
- to contribute, together with other programmes of epidemiologic surveillance set up by InVS, to the surveillance of diabetes (see page 36) and of cardiovascular diseases, as well as to the description of their nutritional management;
- to describe the population burden of a number of environmental contaminants absorbed at least in part through food: lead, mercury, cadmium, arsenic, and pesticides.

A large-scale survey

Inclusion took place from February 2006 through March 2007 to take the seasonality of diet into account. The study combined several methodological approaches: a dietary survey, laboratory assessment of nutritional and environmental markers, and the collection of complementary information.

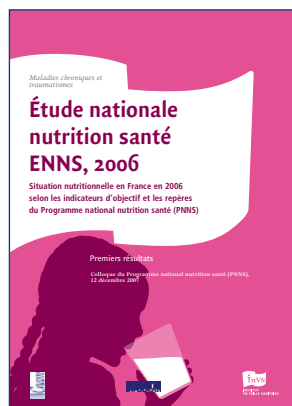
The dietary survey consisted of 3 short interviews for each subject, randomly distributed over a period of 15 days. The objective of these interviews, conducted by dietitians hired and trained by InVS, was to describe as precisely as possible all of the food and drink consumed the day before. Besides the list of products, each interview also specified the nature, components, and quantity of everything; a notebook with photographs of portions aided in this determination. A separate questionnaire collected information about added fat and salt intake.

For the children, the laboratory, nutritional, and environmental tests consisted of a measurement of height and weight as well as a hair sample to assess mercury exposure. For the adults, the work-up included weight, height, waist, and hips, blood pressure, biomarkers (including total cholesterol, HDL and LDL, triglycerides, hemoglobin, ferritin, blood glucose, glycosylated hemoglobin, creatinine, urine iodine, folates, and vitamin D) and environment contaminants (lead, mercury, cadmium, arsenic, and pesticides) from samples of blood, urine, and hair.

Information on physical activity came from 3 separate questionnaires, appropriate for 3 different age groups: a specific questionnaire developed by USEN for children aged 3 to 10 years, a French adaptation of the American questionnaire used for the Youth Risk Behaviour Surveillance System for adolescents 11 to 14 years, and the International Physical Activity Questionnaire for those aged 15 years or older.

To this information were added social and demographic data and information related to particular dietary regimens, drug use, smoking and alcohol consumption, previous diagnoses of diabetes, hypercholesterolemia, or hypertension, and environmental exposures.

Dietary Practices in France



ENNS is a large-scale study and its complete analysis will take place in the years to come. Initial results were nonetheless presented on 12 December 2007, at a conference organized by the Directorate-General of Health. They make it possible to compare the data collected with the objectives set by the PNNS. This first analysis of the study has already provided some major information about nutritional practices in France:

- in fruit and vegetable consumption, the percentage of adults meeting the PNNS goal (at least 5 portions of fruits or vegetables a day) seems fairly encouraging, even though more than half did not meet the goal. The situation for children and young adults, on the other hand, was not as good;
- overall, adults are not at risk of not meeting their daily needs for calcium and dairy products, but again the situation was less good especially among young girls older than 11 years and generally among young women younger than 30;
- added fat intake seems adequate, but total lipid intake (especially saturated fatty acids) is too high;
- the calories from total carbohydrates and from complex carbohydrates do not meet the guidelines, nor does fiber intake (in adults or children);
- half the population eats meat, poultry, fish, and eggs in the amounts recommended in the PNNS. This consumption, like that of fruits and vegetables, will be analyzed according to the respondents' socioeconomic characteristics;

- the levels of salt (8.5 g per day in adults and 6.9 g in children) lean on average towards the PNNS guidelines (8 g), but there are important disparities, with elevated consumption in men;
- one adult in 5 does not drink alcohol. Among those who do drink, most women drink daily quantities corresponding to the guidelines but a quarter of the men exceed them;
- finally, water intake can be considered insufficient in children and, to a lesser extent, in young adults, while they frequently drink sweetened beverages.

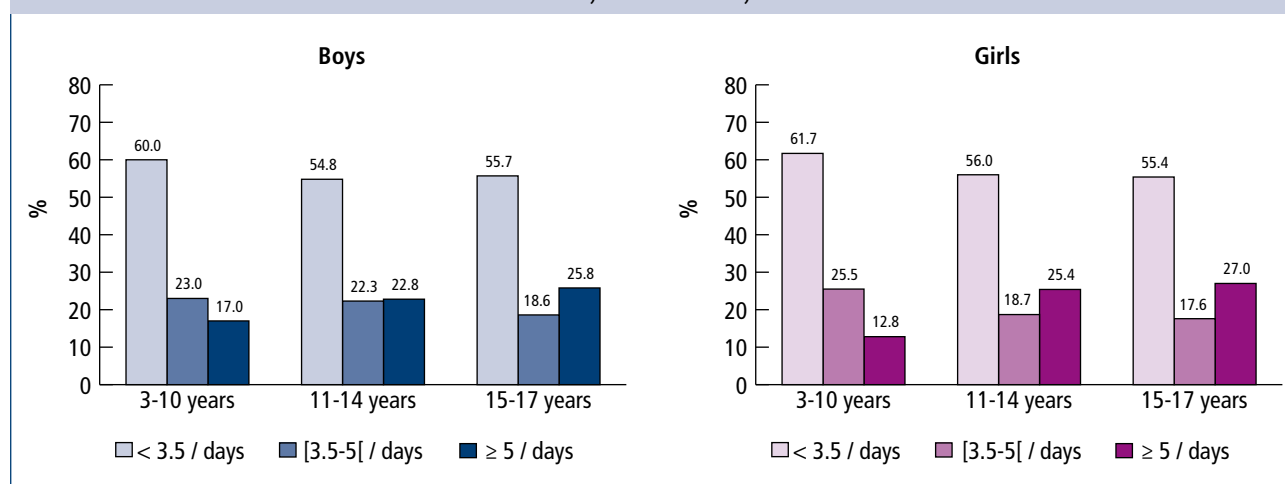
A first assessment of nutritional status

The early results of the health examinations conducted as part of the ENNS study were also presented in late 2007. They include several findings important to public health:

- the prevalence of overweight (57% of men and 41% of women) and obesity (17%) is elevated in adults, but also in children (18% overweight and 3.5% obese). Among the latter, these prevalences are similar to those observed in other studies at the beginning of this decade;
- a third of adults have high blood pressure or take antihypertension treatment;
- less than 5% of adults are vitamin D-deficient;
- iron reserves — important for women of childbearing age — are too frequently insufficient, especially among women younger than 30. Nonetheless, the PNNS objective for iron-deficiency anemia was reached: it affects only 3% of women of childbearing age.

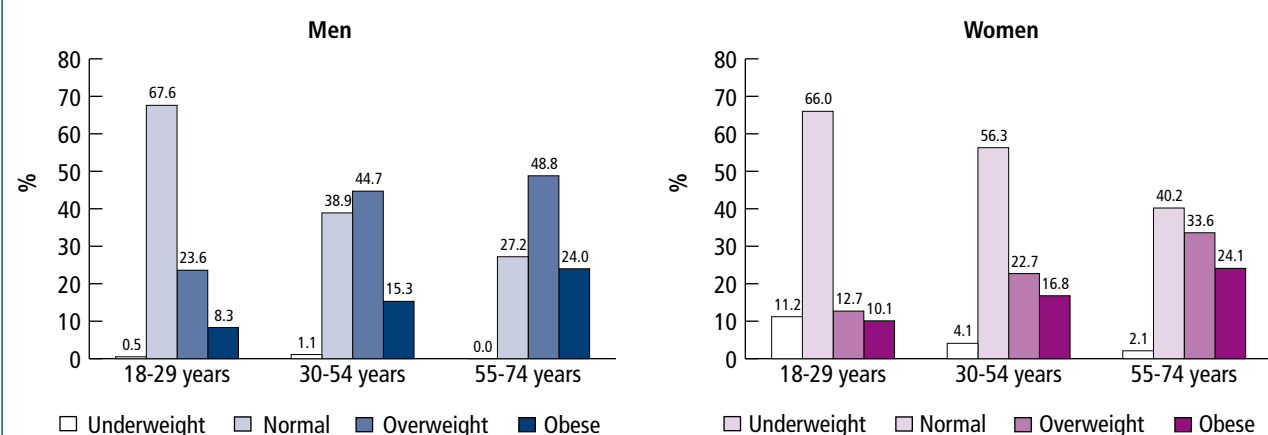
In terms of physical activity, two-thirds of adults and 70% of adolescents meet the PNNS objectives (daily activity equivalent to at least a half-hour of fast walking). These indicators are of the same order for the adolescents 11 to 14 years (60%, but lower in girls than boys). But physical inactivity remains important, especially because of the time spent in front of television, computer, or video game screens: 3 hours or more for 53% of adults and 39% for the children aged 3 to 17 years.

DISTRIBUTION OF BOYS AND GIRLS AGED 3-17 YEARS ACCORDING TO MEAN DAILY FREQUENCY OF FRUIT AND VEGETABLE CONSUMPTION AND ACCORDING TO AGE, ENNS STUDY, 2006



Source: National nutritional health study - ENNS, 2006. December 2007.

DISTRIBUTION OF MEN AND WOMEN AGED 18-74 YEARS ACCORDING TO BMI (BODY MASS INDEX, WHO REFERENCES) AND ACCORDING TO AGE, ENNS STUDY, 2006



Source: National nutritional health study - ENNS, 2006. December 2007.

Nutritional specificities in Mayotte: the NUTRIMAY study

The NUTRIMAY study of diet and nutritional status in the Mayotte general population is a cross-sectional descriptive study conducted in 2006 by USEN and the CIRE for Reunion-Mayotte, in a sample of 993 persons. Its objective was to describe the diet, nutritional status, and physical activity of the population of this French territory in the Indian Ocean.

The results suggest that Mayotte is in a phase of nutritional transition, characterized by the coexistence of nutritional deficiencies in children and overweight and obesity in adults, especially women. Accordingly, in children younger than 5 years, the study shows a prevalence of short stature (height

for age) of 6.7% and a prevalence of underweight (weight for height) of 8.1%. Inversely, 28.1% of women are overweight and 27.4% obese, while 56.3% do not have adequate physical activity according to the criteria of the *International Physical Activity Questionnaire*. In men, the prevalence of overweight is 24.8% and that of obesity 7.6%. Moreover, hypertension appears to affect 15.6% of the women and 18.8% of the men. These results will be completed by detailed analyses of diet in Mayotte, information that is necessary for public health actions there.

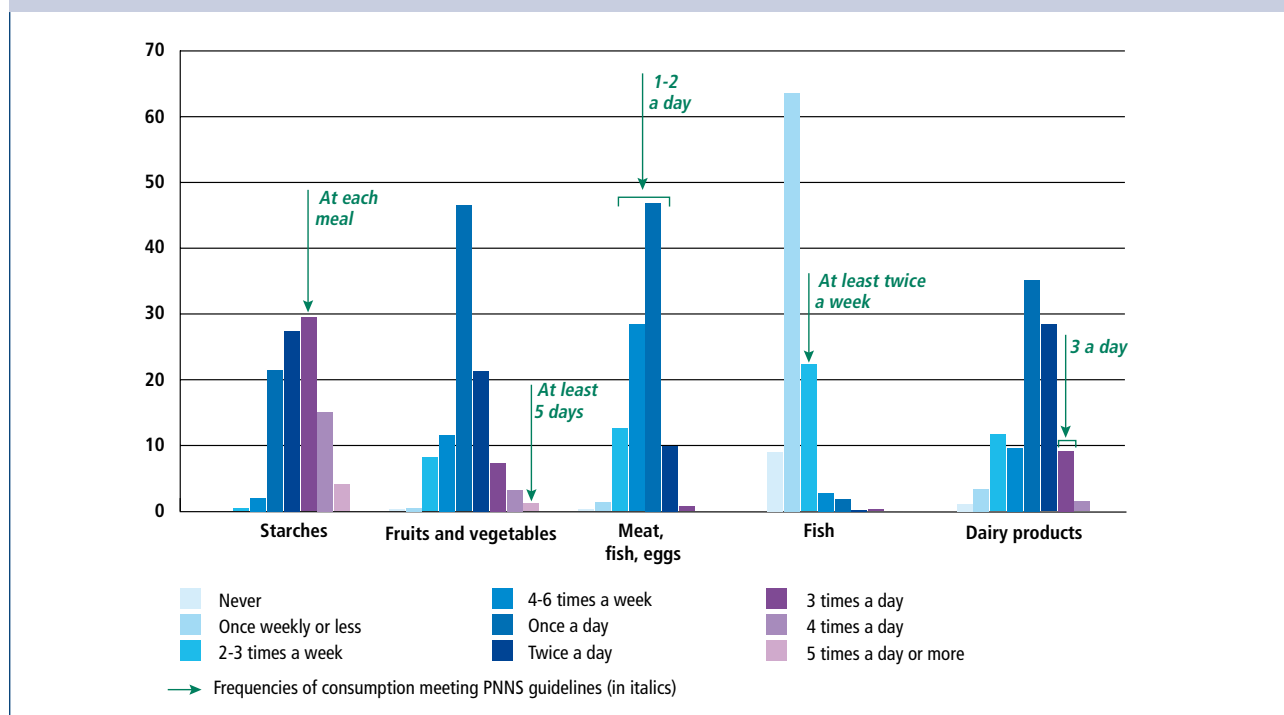
Disadvantaged populations: the ABENA study

Launched in 2004-2005 and conducted by USEN, the ABENA study of food aid recipients included a sample of people receiving food aid in 4 urban areas (Paris, Seine-Saint-Denis, Dijon, and Marseille). This study made possible a first inventory of the nutritional situation of these very disadvantaged people: 64.7% live alone, approximately 50% live in temporary or precarious conditions, 58.5% report an educational level of primary school or lower, and only 5.5% report having a job.

These results show nutritional practices very distant from the PNNS guidelines. Accordingly, 94.5% eat fewer than 3.5 fruits

and vegetables a day (compared with the goal of 5), 89.4% fewer than 3 dairy products a day, and 72.7% eat fish less than twice a week. The health examinations conducted of part of the sample showed that 30.7% of the women and 12.1% of the men were obese, while among those older than 40 years, 31.6% of women and 27.1% of men had a blood pressure above the guidelines. Finally, 29.8% of the women younger than 40 years had anemia. The results of the ABENA study have served to guide the activity of the public authorities and that of associations distributing food aid.

DISTRIBUTION OF SUBJECTS (%) ACCORDING TO THEIR FREQUENCIES OF CONSUMPTION OF DIFFERENT FOOD GROUPS



Source: ABENA study 2004-2005. November 2007.

Childhood diabetes

European epidemiologic data show an augmentation in the incidence of type 1 diabetes 1 (DT1) in children, especially in toddlers. This is a chronic disease that has a major impact on the child — in terms of health, but also socialization and schooling — and on the family, as well as on healthcare professionals. It can lead to substantial morbidity, even death, although that is both rare and avoidable. Glycemic control in these children is insufficient and does not protect them from serious complications of diabetes, which appear only in adulthood but are closely linked to inadequate glycemic control during childhood.

Between 1988 and 1997, the incidence of childhood DT1 — measured by a registry covering 15% of the French population younger than 20 years — increased from 7.4 per 100 000 children younger than 15 years to 9.5 per 100 000. This increase on the order of 3.5% a year seems to be continuing. A hospital-based study in 2004 calculated this incidence rate at 13.5% in Aquitaine. The trend is accompanied by an ever-earlier age of onset, especially among children younger than 5 years, for whom the disease can be severe or associated with an elevated risk of complications, or both.

The trends observed in France by INSERM are found in other European countries as well, with a mean increase in incidence of 3.2% per year during the 1990s, and a still more pronounced rise in children younger than 4 years (+4.8% per year). These average results nonetheless cover variations by a factor of 1 to 8 according to country.

This recent, rapid increase in incidence does not appear to be associated with any changes that occurred during this period (no new disease definition or improved diagnostic or

screening practices) and cannot be associated with changes in the population's genetic background. These trends therefore suggest environmental involvement. Diet, enterovirus infections, and the increased prevalence of obesity have all been suggested. Nonetheless, no one factor explains this rapid increase in very young children, and no prevention has yet been shown effective.

The management of an increasing number of very young children with DT1 raises the question of how best to treat them. They require very specialized hospital-based care, which consumes large amounts of health-care staff time.

From diabetes type 1 to type 2

Since the end of the 1990s, we have also observed a rise in the prevalence of type 2 diabetes (DT2), until recently considered a disease of middle age. This increase is directly linked to the rising prevalence of overweight and obesity. It concerns mainly adolescents who are overweight or obese at puberty and who have a family history of diabetes. The frequency of DT2 will therefore continue to rise among children in the years to come, especially among adolescents.

Although there are not currently any national data on the incidence of DT2 in children, hospital data show that it accounts for an increasing proportion of paediatric diabetes cases.

The seriousness of complications — especially cardiovascular — and the speed of their onset make this trend an emerging public health issue. Its importance is heightened by the complexity and difficulty of diagnosis and classification of diabetes type in adolescents. Similarly, there are currently no specific guidelines for treatment of DT2 in children.

The report presented jointly by INSERM and InVS on International Diabetes Day, 14 November 2007, recommends that surveillance of all types of diabetes in children be reinforced. This requires

increasing awareness by physicians, epidemiologic surveys (see sidebar page 37), and perhaps the establishment of a national registry of childhood diabetes.

ENTRED 2007-2010

The ENTRED 2007 study (national representative sample of people with diabetes) was set up by InVS, the national health insurance funds, the High Health Authority, INPES, and the



French Diabetes Association. Its first wave — ENTRED 2001-2003 — inventoried the health of people with diabetes, their living conditions, and their medical management.

ENTRED 2007-2010 aims to broaden these results and describe their health status, their pathway through the health care system, the quality of the care they received, the educational services provided,

the patients' needs and experiences in terms of information and education, their quality of life, their socioeconomic characteristics, and the cost of their diabetes. The study is based on a national sample of nearly 9000 people, with the participation of their general practitioners and their diabetes specialists. It is composed of 3 sub-studies, with the same objectives but each covering a specific population: ENTRED metropolitan France (adults with diabetes living in metropolitan France), ENTRED 2007-2010 DOM (adults with diabetes in the 4 overseas districts), and ENTRED Ado (adolescents in metropolitan France aged 12-17 years with diabetes), which will be conducted by INSERM, in partnership with InVS and 2 associations (Aide aux jeunes diabétiques and Association française des diabétiques).

The early results of ENTRED 2007 are already available on the website www.invs.sante.fr/entred

EPAC: home and leisure accidents

EPAC — the permanent survey of home and leisure accidents (HLA) — is an epidemiologic study by InVS focused on HLA that lead to emergency medical care. These accidents are one component of injuries, alongside intentional injuries, traffic accidents, and workplace accidents. In practice, EPAC covers mainly household accidents and those related to sports and other leisure activities.

Launched in 1986 as part of a European project, the EPAC survey is the French portion of the European Injury Data Base, developed as part of the European Injury Prevention Network. It is based on the collection of data (about the accident and its consequences) for every person seeking care for an accident at the emergency department of a national sample of hospitals. Besides the social and occupational information, the data collected include the injury and the part of the body affected, the circumstances of the accident, products, or factors involved, and type of management and follow-up.

The EPAC study thus provides a detailed inventory of HLA. This survey indicates that half of all HLA occur in the home, ahead of sports areas (19%), schools and other public places (12%), transport areas (11%), and other places (8%). Among the activities at the origin of the accident, play and leisure activities predominate (38%), ahead of walking (23%), sports and exercise (22%), domestic work (7%), vital activities (6%), and do-it-yourself work (4%).

The mechanisms identified are falls (60% of all HLA), blows (18%), crushing, cutting, and piercing (11%), overexertion (4%), other mechanisms (4%), and foreign bodies (3%). The



body parts damaged by HLA are the upper extremities (36%), lower extremities (30%), head (26%), and thorax (7%).

The incidence of HLA is highest early in life. It peaks during adolescence and then decreases, rising again after the age of 70 years. The rate of hospitalization after HLA increases strongly with age: from 4-7% for children and adolescents, it rises to 37% in those aged 75 years or more. Mean duration of hospitalization also increases with age.

HLA are a public health issue in their own right. It is estimated that there are nearly 5 million emergency department visits for HLA each year in France, and several hundreds of thousands of hospital admissions. Each year, approximately 19 000 people die after HLA (3.6% of all causes of death). This number has been falling since the beginning of the 1980s, probably because of the information and prevention campaigns against accidents

conducted for more than 2 decades now, but it remains high compared with other European Union countries. For those who survive, sequelae and handicaps often follow HLA. Besides their human cost, HLA also have an important monetary cost: the several international studies available indicate that nearly 10% of healthcare costs are associated with the management of these accident victims.

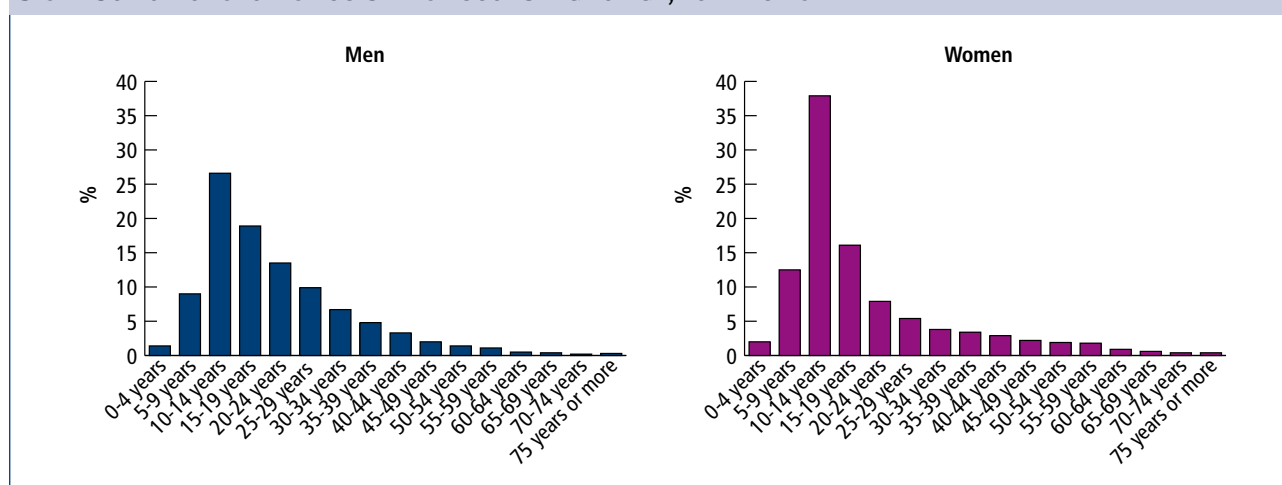
Sports accidents

Sports accidents account for almost one-fifth of HLA, approximately 900 000 emergency department visits each year. Because little information is available about them, InVS and the sports office of the Ministry of Health have reached an agreement to develop the epidemiologic surveillance of sports accidents.

Several activities are underway. A review of the epidemiologic literature of sports accidents was undertaken, as well as an analysis of the databases available, including the EPAC

survey and the INPES Health Barometer. In collaboration with the regional youth and sports office and the regional health observatory, the Centre-East CIRE will launch a geographically-based epidemiologic survey in 2008 in the district of Côte-d'Or. It will provide detailed results of the most serious sports accidents, those requiring hospitalization. InVS organized and is supervising a scientific assessment of the national observation system for winter sports. The final report should be available in 2008.

DISTRIBUTION OF SPORTS ACCIDENTS ACCORDING TO AGE, FOR EACH SEX



Source: Description and incidence of sports accidents - EPAC (permanent survey of home and leisure accidents) 2004-2005. December 2007.

Surveillance of infectious diseases: a major preoccupation

InVS plays a pivotal role in the surveillance of infectious diseases (eg, HIV and HCV infections, STDs, nosocomial infections, and invasive meningococcal diseases). In addition to its missions of surveillance and alert, it contributes to the expertise necessary in this field within the Ministry of Health, the High Council of Public Health (specifically, its advisory committees on vaccinations and on nosocomial infections), and the other health and safety agencies (the French Food Safety Agency and the French Health Products Safety Agency). InVS also leads and provides coordination for the national reference centres (CNRs) and is the French partner for European surveillance within the European surveillance network coordinated by the ECDC.

Ten years of HIV/AIDS and STD surveillance

In 2007, InVS published an important retrospective report about a decade of surveillance of HIV/AIDS and other sexually transmitted diseases (STD). Covering the period 1996-2005, it retraces the course of the disease in its different aspects.

The incidence of HIV infection accelerated from the early 1980s through 1995, when it reached nearly 6000 new AIDS cases. That year, however, saw the introduction of the first antiretroviral (ARV) combination treatments that made it possible to delay the onset of AIDS in people with HIV infection. These combinations, to which antiproteases, yet another ARV class, were added shortly thereafter, led to a very significant reduction in the number of new cases (4000 in 1996 and 1200 in 2005).

The number of people with HIV infection in 2005 was assessed at 135 000 (with a plausibility interval ranging between 100 000 and 170 000), and approximately 27 000 had developed AIDS. In 2005, more than 6000 persons discovered they were HIV-positive; this number has been stable since 2003.

Despite the decline of the disease, there remain difficulties in access to screening. In 2005, more than one-tenth of newly discovered cases of HIV infection were not diagnosed until the patient had AIDS (and could therefore not benefit from the advances in ARV treatment).

Sexual transmission remained predominant, but some interesting trends developed during the decade between 1996 and 2005:

- an increase in at-risk sexual practices among men having sex with men: The "Presse gay" surveys by InVS in 1997, 2000, and 2004 demonstrate this trend, even though this population is theoretically better informed of the risks and modes of protection. Between 1997 and 2004, the proportion of unprotected anal penetration went from 26% to 49% among seropositive homosexuals and from 15% to 27% in seronegative homosexuals. Since 2000, this risk-taking has been associated with the emergence of some STDs (eg, syphilis and venereal lymphogranulomatosis of the rectum)

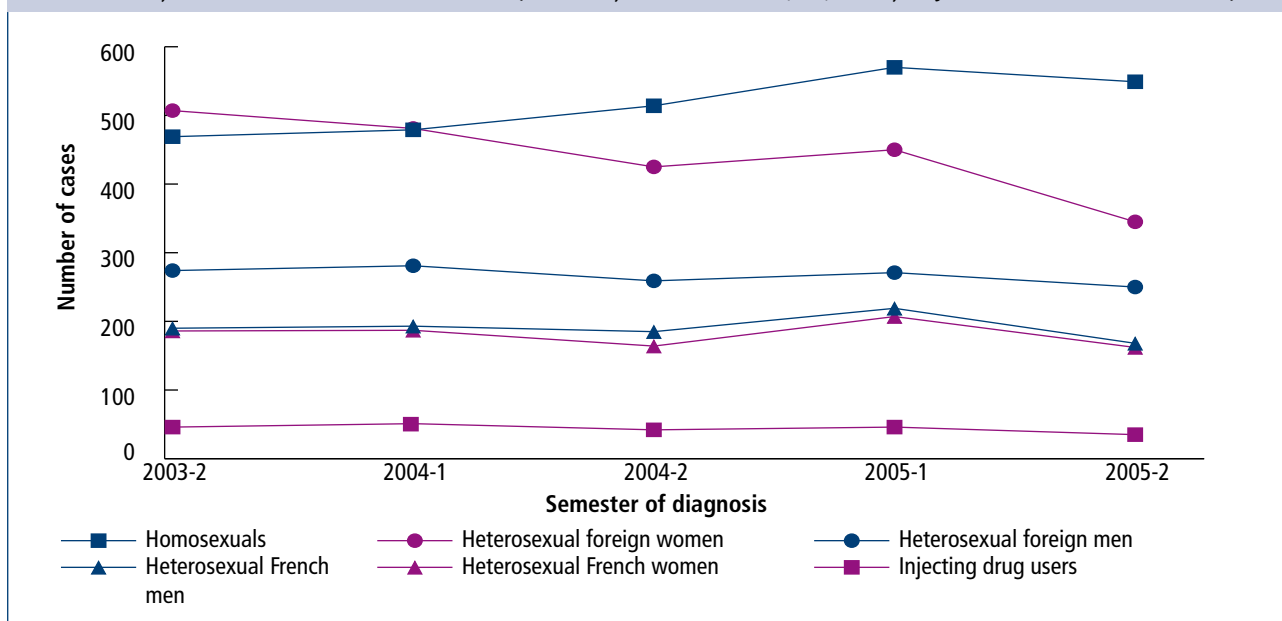
and since 2003 by an increase in the number of new cases of HIV infection in this population. Nearly half of newly seropositive men having sex with men were infected in the 6 months preceding the discovery;

- a reduction in the number of injecting drug users (IDUs) infected by HIV: This decline took place nearly continuously over the 1996-2005 period and is explained especially by their adhesion to policies of risk reduction. IDUs now account for a very low proportion of newly discovered HIV infections. On the other hand, the prevalence of HCV remains high among drug users as a whole;
- an increase in the number of people from sub-Saharan Africa infected by HIV: Between 1996 and 2005, the proportion of foreigners among the cases of AIDS reported in France grew markedly, a change explained in part by the decline in the number of French patients. In absolute values, nonetheless, the number of AIDS cases in people from sub-Saharan Africa increased strongly from 1998 through 2002, and their screening was often late. A trend visible since 2003 shows a diminution of the number of AIDS cases and newly discovered seropositivity, due to recent improvement in screening. But the risk of treatment failure remains higher in this population, which is strongly affected by the precarity that complicates treatment follow-up;
- slow feminization of the epidemic: The proportion of women among the new AIDS cases has increased regularly. From 1986 through 2005, it rose from 21% to 33%. This trend is associated in part with the distribution of the virus in the heterosexual population, especially among women of foreign nationality and still more especially those originally from sub-Saharan Africa.

The trends observed in France over this period are found in other western European countries.

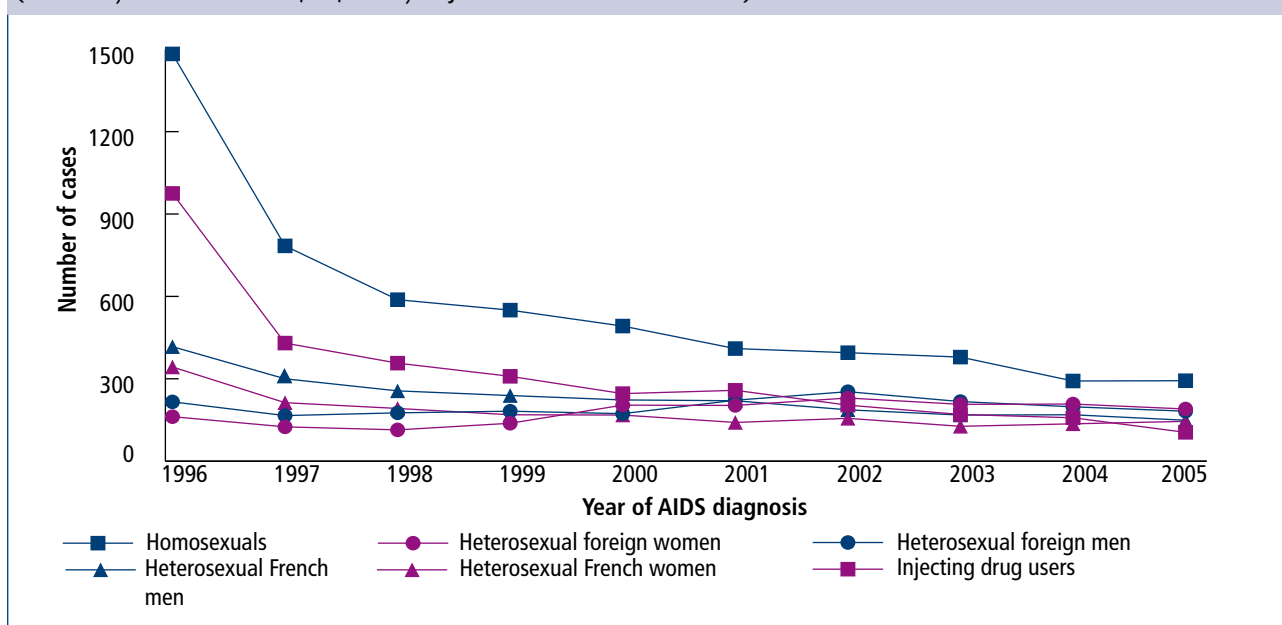
These 10 years have also been marked by increased epidemiologic surveillance and by reinforced prevention, both of which explain these results in part.

NUMBER OF NEWLY DISCOVERED CASES OF HIV SEROPOSITIVITY ACCORDING TO MODE OF TRANSMISSION, SEX, NATIONALITY, AND SEMESTER OF DIAGNOSIS (FRANCE, DATA AS OF 31/03/2006, ADJUSTED FOR LATE REPORTS)



Source: HIV/AIDS and sexually transmitted diseases in France - 10 years of surveillance, 1996-2005. March 2007.

NUMBER OF CASES OF AIDS BY MODE OF TRANSMISSION AND YEAR OF DIAGNOSIS (FRANCE, DATA DATED 31/03/2006, ADJUSTED FOR LATE REPORTS)



Source: HIV/AIDS and sexually transmitted diseases in France - 10 years of surveillance, 1996-2005. March 2007.

Nosocomial infections

In 2007 InVS presented the results of the national survey of nosocomial infection prevalence conducted in 2006 with the nosocomial infection control coordination centres (CCLIN). This survey was established as part of the 2005-2008 national programme against nosocomial infections. Its objective was to describe these infections in healthcare facilities on a given day. The study covered 2337 establishments (83.3% of the total in France and 93.6% of all hospital beds) and 358 353 patients. It is thus the largest survey of this type so far conducted.

The day of the survey, 17 817 patients had one or more active nosocomial infections, for a prevalence of infected patients (PIP) of 4.97%, and 19 294 nosocomial infections were enumerated, for a nosocomial infection prevalence of 5.38%. The PIP nonetheless varied according to the size of the facility, its type (from 1.84% in psychiatric hospitals to 9.34% in cancer centres), and according to department (from 0.89% in obstetrics to 22.4% in intensive care). PIP also differed according to sex, age, and immune status. It was higher in patients who had a fatal disease that caused them to die within 5 years, in those

with a surgical intervention within the past 30 days that caused them to die within one year, and in those with a vascular or urinary catheter or intubation/tracheotomy tube.

The variations observed in regional prevalences (figure) are due mainly to the variation in the types of facilities, departments, and patients included in each region.

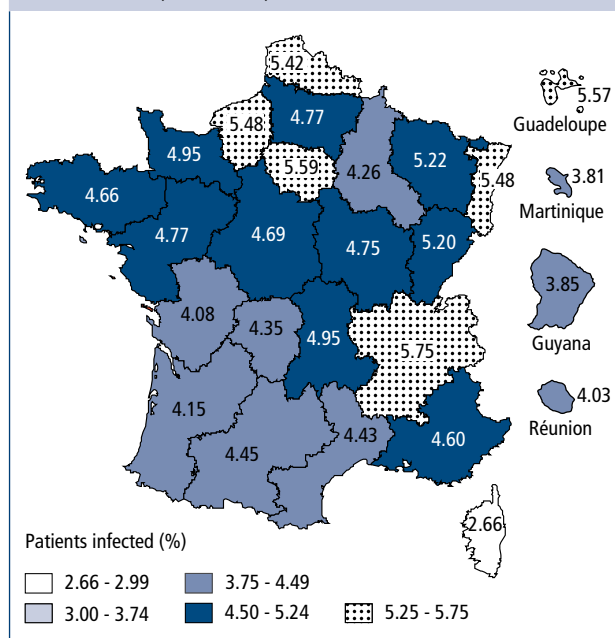
Three sites account for nearly 60% of all documented infectious sites: urinary tract infections (30.3%), lung diseases (14.7%), and surgical site infections (14.2%).

At least one microorganism was identified in 13 504 of the nosocomial infections (70%), and 3 microorganisms accounted for more than half (53.5%) of the 15 800 organisms isolated: *Escherichia coli* (24.7%), *Staphylococcus aureus* (18.9%, 52% of which were resistant to methicillin (MRSA), and *Pseudomonas aeruginosa* (10.0%).

Compared with the 2001 national prevalence survey, the prevalence of infected patients fell slightly, from 4.61% in 2001 to 4.25% in 2006. This decline was seen in all categories of facilities, except army hospitals and hospitals with fewer than 300 beds. It increased in intensive care departments, remained stable in medical and surgical departments, and fell in all others. The reduction in MRSA infections was greater, with the PIP falling from 0.49% in 2001 to 0.29% in 2006. The prevalences observed in this French study are within the lower limits of prevalence measured during similar European surveys since 2000.

These decreasing trends are encouraging, but we must nonetheless recall that in 2006 nosocomial infections still involved one in 20 hospitalized patients. This justifies the pursuit of efforts to reduce them.

PREVALENCE OF INFECTED PATIENTS BY REGION, NATIONAL SURVEY OF NOSOCOMIAL INFECTION PREVALENCE, FRANCE, 2006



An epidemic of glycopeptide-resistant enterococci in Lorraine

In January 2007, a hospital in Lorraine reported an epidemic of infections and colonizations by glycopeptide-resistant enterococci (GRE). In April, an increase in the reports of GRE infection and colonization from other health facilities in Lorraine suggested a regional extension of the epidemic. The CIRE and local nosocomial infection control committee began a prevalence study in June 2007.

A rectal swab was requested of all patients present on the day of the study in the departments at risk (hemodialysis, cancer and blood diseases, surgery, intensive care, and geriatrics) of 26 facilities that had accepted infected or colonized patients from the first facility as transfers.

Of the 2718 patients included, 48 (1.8%) carried GRE, including 31 (65%) unknown before this survey. The prevalence ranged from 0 to 11.5% according to facility. The survey allowed 10 facilities to identify one or more (up to 13) new GRE carriers, all with the same epidemic clone.

This survey provided guidance for the control measures recommended by the CCLIN and implemented by the healthcare

facilities concerned. The regional prevalence of GRE, higher than the results of a national survey in 2006 (0.3%), confirms the diffusion of GRE in Lorraine and underlines the interest of a regional policy for the control of these emerging multidrug-resistant bacteria.



Meningococcal infections and vaccination in Seine-Maritime

Since 2003, the Seine-Maritime district has been home to a large number of patients with invasive meningococcal disease (IMD). The incidence ranges from 2.5 to 4 cases per 100 000 inhabitants, that is, 2-3 times greater than the national incidence. Geographic analysis of the cases shows a hyperendemic area (with an incidence since 2003 varying from 12 to 17 cases per 100 000 inhabitants). The area includes 75 municipalities around the city of Dieppe, with a total population of 84 000 inhabitants.

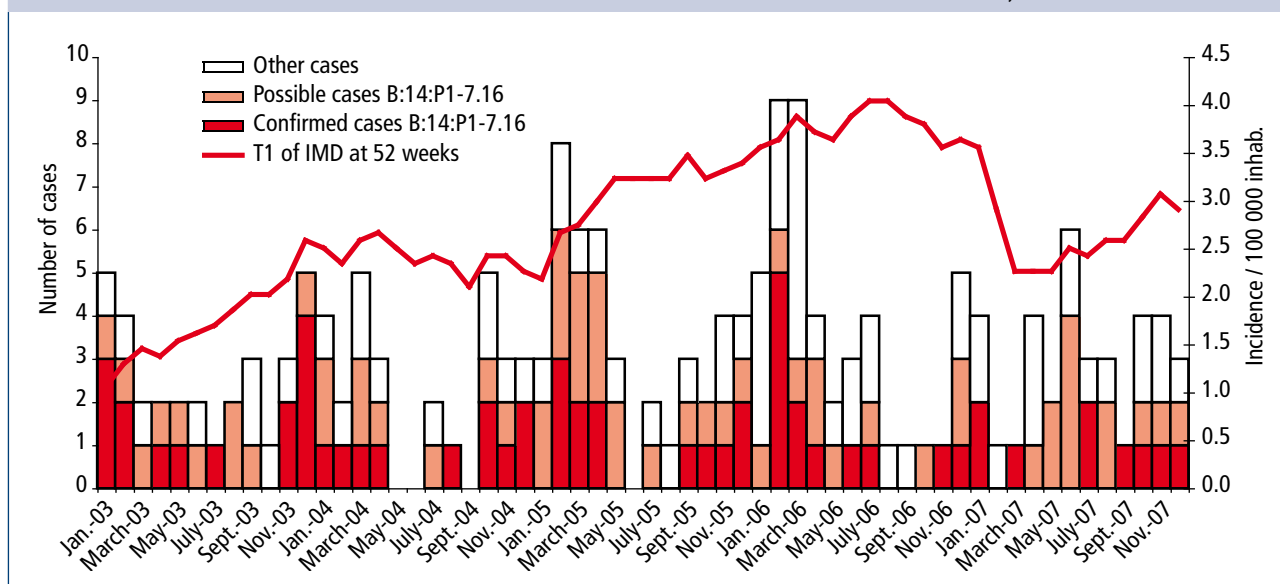
In view of the persistence of this hyperendemic and on the advice of public health bodies, the health authorities decided in mid-2006 to implement a vaccination campaign for the children aged 1 to 19 years living in Seine-Maritime. The vaccine used is MenBvac®, developed by the Norwegian Public Health Institute, which has demonstrated its efficacy *in vitro* against the Normandy strain B:14:P1.7.16. But this vaccine nonetheless presents several constraints:

- it has not been approved for marketing and is therefore used according to a particular authorization procedure with vaccination campaigns organized under the supervision of the State;
- the regimen recommended by the manufacturer consists in 4 injections (3 injections 6 weeks apart and a booster 12 months later);
- the manufacturer's production capacity is limited, and the campaign is thus taking place in several phases; the vaccinations are performed as the vaccine doses are delivered.

This has required the definition of priority populations, specifically those of the 6 cantons of Dieppe and its immediate environs, where more than 50% of the confirmed B:14:P1.7.16 cases were identified. The epidemiologic investigations by the Upper Normandy CIRE and InVS led to the selection as the highest priority group among the 21 500 young people in the area the population of preschool children (1-5 years). The announcement in July 2007 of the arrival of a new batch of vaccines nonetheless led the CIRE and InVS to develop a new priority definition, now focused on the 10-14 and 15-19 year-old age groups. The recommendation therefore is to complete the vaccination of the children 1-5 years old in the 3 cantons remaining (this age group was vaccinated in the first 3 cantons in summer 2006 with the first doses), then to vaccinate, in order, the high school students (15-19), middle school students (11-14), and finally, the primary school children (6-10). The vaccination campaign started again in December 2007.

The epidemiologic follow-up established by the CIRE and InVS for the Dieppe area should make it possible to assess the efficacy of the MenBvac® vaccination campaign. Analysis of Seine-Maritime as a whole will allow us to measure the impact of these vaccinations on the circulation of this strain and, where appropriate, identify other priority sectors where vaccinations should be continued.

COURSE OF THE INCIDENCE OF INVASIVE MENINGOCOCCAL DISEASE IN SEINE-MARITIME, 2003-2007



Source: InVS.

A vaccination campaign in Barcelonnette

In a 10-day period in January 2007, 4 cases of massive IMD (3 serogroup C) were reported among children and adolescents of the Barcelonnette valley (Alpes-de-Haute-Provence). The incidence of 107 cases per 100 000 inhabitants exceeded the epidemic threshold, and a vaccination campaign began in Barcelonnette and 7 neighbouring villages, targeting those younger than 21 years. But in February, 3 new cases occurred, 2 in patients aged 23 and 26 years. This led to a second campaign expanded to include 21-29 year-olds and to 5 new villages.

The South CIRE then assessed vaccination coverage at the end of these 2 campaigns. The target population of 3165 people was determined from the files of the health insurance funds for the residents of the municipalities concerned and from school and daycare centre lists for nonresidents. The number of people vaccinated was obtained through

vaccination registries. The overall vaccination coverage reached 67%: 75.5% for the first campaign (younger than 21 years) and 48.8% for the second (expanded to 21-29 year-olds). Coverage varied greatly according to age group: 81% of those aged 1-5 years, 77% of those 6-16 years, and only 47% of those 21-29 years. Moreover, the epidemic took place during the high season for skiing. Only 63 nonresident seasonal workers aged 21-29 years were vaccinated, and it was not possible to determine the rate of vaccination coverage rate for this population.

Thus, the results of the first campaign were appreciably better, because of the invitation by individualized mail and the organization of sessions at school. The second was performed under very short deadlines and with a target difficult to reach — seasonal workers in tourism-related jobs.

Vaccination coverage of children and adolescents

In 2007, InVS, in collaboration with the Ministries of Health and Education, published the results of several surveys of vaccination coverage of children and adolescents in France. They are part of a triennial cycle of surveys in schools, first established in 2000 and intended to monitor the health status of children through a variety of indicators, including vaccination coverage rates. The published article reports the results of surveys conducted in 2001-2002 in the 5th grade classes (10-11 year-olds), in 2002-2003 in kindergartens (5-6 year-olds), and in 2003-2004 among 9th graders (14-15 year-olds). The samples were set up by 2-stage sampling: first public and private schools were chosen, and then students randomly selected.

The results showed that vaccination coverage is generally high up to adolescence, especially for the diphtheria, tetanus, and polio vaccine (DTPolio) (80% to 96%). For whooping cough,



coverage before the age of 6 is satisfactory. The second booster, however, is erroneously offered at 6 years, at the same time as the second DTPolio booster (35% of the 10-year-olds received a fifth dose before 10 years). Thus, not enough teenagers had had 5 doses of vaccine at adolescence (57.4% at 15 years in 2003-2004), and only 17.4% of them had received the fifth dose after the age of 11 years. BCG vaccination coverage against tuberculosis is excellent (99%, regardless of age). For the measles-mumps-rubella (MMR) vaccination, coverage at 6 years for the first dose seems satisfactory (95%), but that for the second dose is still very insufficient (24%-61%). Vaccination against hepatitis B remains much more of a problem, with very low coverage (33%-42%).

These results clearly show the priorities required to improve vaccination coverage of children and adolescents:

- children should be vaccinated against hepatitis before the age of 13, and preferably in infancy;
- boosters against whooping cough should be administered at 11-13 years;
- second doses of MMR should be administered more often (principally in the South and Centre-East of France);
- the first MMR dose should be administered earlier.

Impact of vaccination against rotavirus

In 2007, InVS, in partnership with the University of Lille department of infectious diseases and travelers, the Lille laboratory of economic and social research (CNRS), and INSERM, published the results of a study of the impact and cost-efficiency ratio of vaccination against rotavirus in France.

Rotavirus is the principal cause of acute severe diarrhoea in children, and a vaccine against it was added in 1998 to the vaccination schedule of infants in the United States. Acute intestinal intussusception turned out to be associated with this vaccine, however, and it was withdrawn from the market in 1999. In 2006, 2 new vaccines (one monovalent and one pentavalent) — that do not appear to present this adverse effect — were approved in Europe.

A medicoeconomic study was conducted to provide decision aid about the possible inclusion of this vaccination in the vaccination schedule. It followed 2 virtual cohorts of children from birth to 3 years, one vaccinated and the other not. The onset of rotavirus infection in these 2 cohorts was modeled in a decision tree. The study made it possible to measure the impact of vaccination from several points of view: the number of cases and of hospital admissions avoided, number of years of life gained, direct medical costs, cost of avoided hospitalization, cost per year of life gained, and cost per year of quality-adjusted life gained.

It showed, in particular, that vaccination could prevent 89 000 cases of acute diarrhoea each year in children younger than 3 years (of the 182 000 episodes for which rotavirus is responsible), 10 500 hospitalizations (of 18 000) and 8 deaths (of 13). At €150 for a complete vaccination series (2 or 3 doses, depending on the vaccine), the vaccine programme would represent an additional cost of €68 million. The cost-efficiency of vaccination was estimated at €299 000 per year of life gained, €138 000 per year of quality-adjusted life gained, and €6500 per hospitalization avoided. The sensitivity analysis — which takes into account the uncertainty surrounding some of the model indicators — varied the cost-efficiency ratio from €64 000 to €212 000 a year of quality-adjusted life.

The onset of a vaccination programme of these new vaccines would have an important impact on the severe morbidity associated with rotavirus, but it would not be "cost-effective" relative to the thresholds generally accepted unless the price of the vaccine falls considerably.

Taking this study — among other elements — into account, the High Council of Public Health decided to delay the recommendation of routine antirotavirus vaccination for infants younger than 6 months and then reassess the situation in 2 years, after implementation of a set of measures intended to improve management of these infections.

Surveillance of acute respiratory infections

Influenza, and more generally winter epidemics of acute respiratory infections (ARI) have a major health impact each year, especially among elderly groups. ARI are thus the leading cause of infectious mortality in institutions for the elderly and specifically in nursing homes (EHPAD). In 2003-2004, InVS drafted a guide for the investigation of ARI case clusters, for use by district health and welfare bureaus. This guide has since been integrated into the recommendations of the High Council for Public Health in France, distributed in the November 2006 circular about management of acute lower respiratory infections in the elderly. In 2007, InVS published an issue of its weekly epidemiologic bulletin entirely devoted to flu surveillance and ARI outbreaks. It presented the results of

a study of ARI outbreaks in residences for the elderly in France in 2006-2007.

This study focused on the ARI outbreaks between August 2006 and July 2007, reported by the facilities to their local DDASS, CCLIN, or CIRE, which subsequently reported them to InVS. Since January 2007, an Internet application has made it possible for the DDASS, CIRE, and InVS to exchange epidemiologic information about these episodes in real time.

During this period, 64 outbreaks of ARI in residences for the elderly were reported to InVS: 41 in nursing homes, 10 in independent or assisted living facilities, 9 in long-term hospitals, and 4 in other hospital departments. The epidemiologic investigations of these case clusters identified an influenza

virus in more than 30% of the episodes. The mean attack rates were 22% for residents and 7% for staff. The mean lethality rate for residents was 4%. Mean influenza vaccination coverage in these episodes was 91% for residents and 38% for staff. Staff members became ill in 51% of the episodes. In at least 4 of the 64 outbreaks reported, staff members became ill before the residents. The mean duration of the episodes was 13 days. Control measures were put into place an average of 7 days after the episode began and in 36% of the cases, after the episode was reported. In the episodes where control measures were instituted late, the mean duration of the epidemic was longer and residents had a higher risk of becoming ill.

The results of this study show that flu vaccination coverage in the staff at residences for the elderly is insufficient, even though staff frequently become ill and can contribute to the introduction and dissemination of the epidemic. Similarly, while control measures (such as wearing masks) are recommended once the first ARI case is identified, it appears that their implementation takes time. Finally, the advice and expertise provided during reporting help in the management of these episodes and thus reinforce their epidemiologic interest.

From the general to the particular

In addition to this nationwide study, InVS also intervened in 2007 in more local episodes. In Vendée, for example, the Pays-de-la-Loire CIRE conducted an epidemiologic survey of 26 ARI case clusters in one retirement home, including 2 deaths.

This study identified the cases concerned and determined the cause. It led to the formulation of recommendations, concerning especially the need for rapid alert, for staff to be vaccinated (4 cases of influenza among the personnel) and to take sick-leave when ill or at least wear a mask while caring for patients.



InVS also intervened in a nursing home in Tarn. The cohort study conducted on this occasion by the Midi-Pyrénées CIRE, together with rapid influenza tests, produced a descriptive analysis of the epidemic and identified factors associated with its onset. The study showed the impact of inadequate vaccination coverage — only 65% in residents and 0% in staff. Attack rates during the episode were 48% in the residents and 26% in the staff. The study also confirmed the importance of early alerts.

Case clusters of acute respiratory infections in the Landes

On 24 May 2007, the Landes district health and welfare bureau reported to the Aquitaine CIRE a suspected epidemic of atypical lung disease in children at 3 schools in Saint-Martin-de-Seignanx, in the southern end of the district. A cross-sectional survey collected retrospective and prospective data once the epidemic was reported. A case was defined as confirmed if the PCR (polymerase chain reaction) test was positive, probable if it was identified by radiology, and possible if there was a clinical picture of lung disease associated with a recent contact with a previously identified case.

The epidemiologic survey identified 99 cases of lung disease in all — 4 confirmed, 93 probable and 2 possible — with a median age of 6.1 years (range: 1.2 to 45.1 years). None of the cases required hospitalization.

In addition to the main cluster (84 children in 2 elementary schools and one nursery school in the municipality), 2 secondary clusters (4 and 5 cases) were identified in schools in neighbouring municipalities. In the principal epidemic outbreak, the attack rate was 9.9% in those younger than 5 years and 18.9% in children 5-9.

The investigations confirmed the epidemic character of the episode and identified the etiological agent responsible (*Mycoplasma pneumoniae*). The early reporting thus made it possible to optimize medical management.

European and international cooperation

Cooperation between InVS and its homologues abroad was a highlight of 2007. InVS activities in association with the European Centre for Disease Prevention and Control (ECDC) continue to develop, and ECDC is now a major partner for InVS. InVS also participates in several collaborative projects cofinanced by the European Commission. These programmes are intended to establish closer relations with the Netherlands, set up a bilateral programme with Quebec, and launch EpiSouth, a new Euro-Mediterranean project that involves the Balkans, North Africa, and the Middle East.



InVS, partner of ECDC

Relations between InVS and the ECDC, with its headquarters in Stockholm, continued to expand this year. Created in 2004, this European agency is responsible for surveillance, alerts, preparedness, and scientific advice related to the risks of communicable diseases and emerging phenomena. InVS contributes increasingly to ECDC activities, both in its governing bodies (management board and advisory forum) and in our various fields of national competence: surveillance, alerts, investigation, expertise, and training. In spring 2007, the ECDC management board created a steering committee to oversee the exterior evaluation of the ECDC. The executive director of InVS sits on this committee. The evaluation will concern the Centre's activity since its creation, its work practices, and the possible need to extend its mission to other domains of EC activity in public health, in particular, health surveillance.

EuroHIV and EuroTB join ECDC

After 23 years managing the EuroHIV programme for AIDS surveillance within the WHO/Europe region and 12 years managing tuberculosis surveillance in the EuroTB programme, in 2007 InVS prepared to transfer the direction of these 2 European programmes to ECDC. This transfer will be effective in 2008.

As part of this process, ECDC has had these 2 surveillance programmes evaluated by an independent European team. InVS, through the EuroTB team, collaborated on this evaluation in May 2007. InVS has thus coordinated tuberculosis surveillance in the 53 countries of the WHO/Europe region since 1996. It has also managed HIV surveillance since its creation, but the network existed long before InVS was created. France has coordinated this network since 1985, first under the aegis of

the European centre for the epidemiologic surveillance of AIDS, then that of InVS since 1999. For the period 2005-2007, InVS funded 30% of the operating costs of the EuroTB network and 40% of those for EuroHIV.

What's new for *Eurosurveillance*?

In March 2007, after 11 years of collaboration between InVS and its British homologue, the Health Protection Agency, the *Eurosurveillance* journal was also transferred to ECDC. This

transfer marked the culmination of a project that InVS has supported and partially funded since its origins and which is a key element in the European system for infectious disease control. InVS continues to participate in this information dissemination project, especially through the presence of three representatives on the editorial committee (that is, three associate editors) and one person on the editorial board. *Eurosurveillance* is now becoming the principal medium of scientific communication between ECDC and the European networks it coordinates.

EpiSouth in the Mediterranean

The EpiSouth project, cofinanced by the European Commission and the Italian Ministry of Health, began officially in December 2006. Its objective is to create a framework for collaboration in the domain of epidemiology, to reinforce the surveillance of communicable diseases in the Mediterranean basin, and improve expertise, training, and communication in this region. InVS participates in the direction of the project and coordinates one of its 8 work programmes, the one devoted to international surveillance and cross-border alerts. In March 2007, representatives of 22 countries of southern Europe, the Balkans, North Africa, and the Middle East met for the first

time with representatives of the ECDC and WHO (regional offices for Europe and the Mediterranean) to design their future partnership. Today, of the 27 countries participating in the network, 26 have confirmed their willingness to collaborate actively in this ambitious proposal. EpiSouth also took concrete steps forward in 2007: creation of a secure collaborative space, launching a pilot epidemiologic bulletin, a first training session, and evaluation of needs in terms of emerging zoonoses, vaccination, and international surveillance. In 2008 a secure electronic platform for exchanges of international alerts for health events will be set up.

Three European projects: ANAMORT, ENHIS 2, and ESBIO

The ANAMORT project on the modalities of analysis of injury mortality in the European Union was concluded in early 2008. It is based on collaboration between experts in mortality and injuries from 36 European countries and Eurostat.

The objectives of this project were:

- to report injury mortality in Europe with pertinent indicators by validated analyses of the available data;
- to produce results allowing rigorous comparisons of the conditions of mortality from injuries according to country, an element essential in guiding the implementation of prevention policies.

ANAMORT developed 200 guidelines to improve the comparability of future data and the interpretation of past differences in the domain of injury mortality. Its participation in this programme has reinforced the role of InVS at the European level, in relation to injuries and to the International Classification of Diseases.

Two environmental health projects were completed in 2007.

At the national level, InVS conducted several studies of biomonitoring, which is one of the priority activities of the

European Commission 2004-2010 Action Plan in the domain of environmental health. To share our experience at the European level, InVS joined the European expert network ESBIO (Expert Team to Support Biomonitoring). The objective of ESBIO was not only to establish a network of European experts in biomonitoring, but also to develop a technical guide to prepare for a European pilot study of biomonitoring to be implemented before 2009.

Finally, the ENHIS 2 project (European Environment and Health Information System), coordinated by WHO-Europe, ended in October 2007. It worked to implement the ministerial declaration in June 2004 that foresaw the development of a health-environment information system to support public policy-making. For 3 years, the Department of Environmental Health at InVS has coordinated the work on the feasibility of health impact assessments of different environmental factors, focusing especially on children. InVS also contributed to the construction of environmental health indicators, as well as to the definition of the information requirements of public policy-makers in this domain. The results were presented by WHO-Europe at an intergovernmental conference on health and the environment in Vienna in June 2007 and are now accessible to the public by internet.

Completion of the SARSControl project

Launched in 2005 for a 3-year period, the operational research project SARSControl ended in April 2008. Its aim was to improve how European countries detect, prevent, and control emerging infectious risks such as severe acute respiratory syndrome (SARS) or the influenza pandemic. The particularity of this programme lies first in its international dimensions. It brought together European and international partners (China, Singapore, Taiwan, and Hong Kong). Its other originality was the multidisciplinary approach it implemented. The participants approached this issue from different perspectives: mathematical modeling of the introduction and dissemination of SARS or influenza in Europe, risk perception and behaviour, communication strategies, and the political and economic impact of the strategies proposed. InVS has participated in two of the project's eight work programmes.

InVS first developed a mathematical model to estimate the risk that international travelers would introduce SARS into Europe. Its innovation lies in its individualist approach, which furnishes policy-makers with an expected number of imported SARS cases each day as a function of the epidemic trends in the country of origin, the frequency of international travel, and the occupational category of travelers (hypothesizing that healthcare professionals are most exposed to infection). This model also shows that the number of imported cases does not

change if border control is established on arrival. Finally, InVS is currently using the same approach in a newer ECDC project on the risk of imported chikungunya in Europe.

InVS has synthesized the work of different partners to draft guidelines for preparedness of European countries for the influenza pandemic risk. Its key points are the following: in terms of planning, European countries must improve their capacity for detecting emerging phenomena on their territory; the national plans for influenza pandemic control are not sufficiently operational, and the triage of patients raises ethical questions that must be considered soon. The different models show that the reduction of international travel and frontier controls have a very limited impact on epidemic progression. The utility of storing antivirals effective against a pandemic strain has been confirmed, but the teams underline the need to develop, in advance and in collaboration, common protocols for clinical research and studies of treatment resistance. Communication strategies must be adapted to the immigrant populations that conserve social associations with their country of origin (where the epidemic may be developing). Finally, health economists are recommending innovative approaches for analyzing the health crises associated with emerging infectious phenomena. All these guidelines, shared by the different partners, are currently being summarized by InVS as an article.

Towards a collaboration with the RIVM

InVS has analyzed and reconsidered its regular interchanges with its homologues in the different countries of Europe. A first series of exchanges began with the Dutch National Institute for Public Health and the Environment (RIVM) in September 2007.

Several themes were selected for possible collaboration: environmental health, nutrition and health, and comparison of the organization of clinical laboratories in the two countries. These interchanges will continue in 2008.

Multilateral and bilateral cooperation programmes

Since its creation, InVS has collaborated with the World Health Organization (WHO) for epidemic emergencies, especially through the establishment of the Global Alert and Response Network (GOARN). The Institute is a member of its steering committee and can deploy field staff in epidemics. In 2006, an InVS epidemiologist was seconded to the WHO office in Lyon for 2 years; this secondment was renewed in 2008. His task is to coordinate the strengthening of the health alert capacity of the Member-States. This collaboration is part of the implementation of the international health regulations.

Since 2005, the Department of International and Tropical Diseases (DIT) of InVS has also contributed to the surveillance network in southeastern Europe, as part of the Balkans

stability pact, with the support of WHO Europe and of France. In 2007, a DIT epidemiologist presented the theory and tools of international surveillance at the 7th annual conference of this network, organized in Zagreb.

InVS also continues its bilateral cooperation activities, developing long-term partnerships with its corresponding institutions in a number of countries that are special partners of France: the states of the Mediterranean basin (especially North Africa), those of central and eastern Europe (especially the Stability Pact countries), as well as the countries in the regions of the overseas districts and territories (Caribbean Sea and the Indian and Pacific Oceans).

There were thus several missions of technical aid and support in 2007:

- as part of the French-Chinese cooperation agreement for communicable disease control, the DIT participated in a scientific conference organized at the Collège de France on the topic of emerging diseases;
- at the request of the French embassy in China, the DIT also participated, with other French institutions involved in avian influenza control and influenza pandemic preparedness, at a day of scientific meetings organized on this subject in Beijing;
- as part of French aid after the December 2004 tsunami, the DIT made several presentations and participated in several training workshops in Sri Lanka, in collaboration with the Pasteur Institute, to help strengthen the national public health laboratory;
- at the request of the health authorities of Madagascar, a joint DIT-CIRE Reunion-Mayotte mission went to Madagascar in June 2007 to study the organization of health services and make suggestions to integrate the health surveillance department recently created into these services;
- at the request of the Tunisian health authorities, a joint DIT-DCDT (Department of Chronic Diseases and Injuries) mission visited in December 2007 to assess the operation of 3 Tunisian cancer registries. This mission is part of a programme launched in 2004 on cancer surveillance, improvement in cause-of-death collection, and surveillance of emerging infectious diseases.

Several international delegations, from Georgia, Korea, and China (4 delegations), were also received during 2007.

Cooperation between France and Quebec

On the occasion of the 61st session of the Permanent Commission of Cooperation between France and Quebec, InVS and the Quebec national institute of public health (INSPQ) decided to intensify their collaboration in the field of nosocomial infection and chronic disease surveillance. The objective is to share our experience, methodology, and tools for surveillance. InVS thus benefits from the experience of its Quebec homologue, especially in relation to surveillance of *Clostridium difficile* infections, to improve the follow-up of these infections. Moreover, InVS will provide its know-how to help its partner to develop surveillance system for alerts and unusual situations related to the onset of infectious diseases in healthcare facilities. A joint workshop on nosocomial infections took place in France in November 2007, on the occasion of the Science Meetings organized by InVS. The cooperation on chronic diseases will begin next year: the work will be conducted on both sides of the Atlantic, and a seminar will be held in Quebec in 2008.

Beyond this programme, another meeting helped to identify possible collaborations between the two partners in the field of environmental health. These concern information exchange, contribution to scientific work and expert assessments, research and development activities, communication, and training.

The French Institute for Public Health Surveillance (InVS), a public agency reporting to the Ministry of Health, is responsible for surveillance, vigilance, and alerts in all areas of public health. InVS was created by L.98-535 dated 1 July 1998 to reinforce health surveillance and the safety of products intended for human use. Its missions were expanded and reinforced by the Public Health Policy Act of 2004 (L. 2004-806 dated 9 August 2004) to meet the new challenges uncovered by recent health crises, as well as emerging risks.

Missions

The missions assigned to InVS cover:

- **surveillance and permanent observation of the population's health status**

InVS participates in the collection and processing of population health status data for epidemiologic purposes, relying on the public and private correspondents that constitute the national public health network;

- **health watch and vigilance**

InVS is responsible for assembling, analyzing, and keeping up-to-date knowledge of health risks, their causes, and their trends, for the prospective detection of risk factors likely to modify or impair the health of the population or some groups within it, either suddenly or slowly, and for the study and identification of the most fragile or threatened populations for each type of risk;

- **health alerts**

InVS must inform the Minister of Health without delay of any threat to the health of the population or of some groups within it, regardless of origin, and must recommend appropriate measures or actions to prevent the occurrence of the threat or to attenuate its impact;

- **contribution to the management of health emergencies.**

InVS proposes all necessary measures or actions to the public authorities.

As part of its missions, InVS participates in the European and international activities of France, especially in international public health networks aimed at health surveillance and alerts.

Field of action

The tasks of InVS involve all domains of public health:

- **infectious diseases:** infection by HIV, hepatitis viruses B and C, sexually transmitted diseases, tuberculosis, foodborne infectious risks, zoonoses, vaccine-preventable diseases, nosocomial infections and antibiotic resistance, respiratory infections, seasonal and avian influenza, arboviruses, and tropical diseases and the risks of importing them;

- **effects of the environment on health:** risks related to air pollution or exposure to chemical pollutants or ionizing radiation, waterborne risks, physical hazards, and risks related to climate variations;

- **occupational risks:** occupational cancers, effects of asbestos and the fibers used as substitutes for it, musculoskeletal diseases, and morbidity associated with occupational exposure;

- **chronic diseases and injuries:** cancer, cardiovascular diseases, diabetes, nutrition, accidents and injuries, respiratory diseases, mental health, and rare diseases;

- **international and tropical risks:** infectious diseases affecting other countries but likely to reach French residents there or to be imported (eg, avian influenza, Ebola, yellow fever, and arboviruses), diseases and threats affecting the overseas districts (eg, dengue, Chagas disease, and pesticide and mercury pollution).

Partners

All healthcare professionals participate in this mission of health surveillance.

It cannot be conducted by a single agency or group, but requires a complete set of partners, organized into a process that — depending on the topic — collects, validates, and analyzes morbidity and mortality data, and when necessary conducts quantitative risk assessments. InVS must mobilize, coordinate, and support the different public health teams working to establish a national public health network.

National networks

InVS leads the health surveillance functions of the national networks on which it relies for monitoring the population's health status: the national reference centres (CNRs), morbidity registries, networks of nosocomial infection control (CCLINs), and hospital-based and private healthcare professionals (mandatory reporting of some diseases).

It calls on a variety of surveillance systems and care networks: hospital departments (emergency and other specialist departments), hospital and private laboratories (surveillance networks for gonorrhea and for IMD), general practitioners (Sentinelle network), and occupational physicians (for specific topics in workplace health issues).

It also coordinates its activities with organisms that can furnish a wide range of public health and surveillance data: the national health insurance fund for salaried workers and the other health insurance funds, INSERM, the research and evaluation department within the Ministry of Health, and others.

Finally, it coordinates its activity with the other agencies of the French surveillance and health security system, especially the French Food Safety Agency, the French Health Products Safety Agency, the French Agency for Environmental and Occupational Safety, the High Health Authority, the Institute of Radioprotection and Nuclear Safety, the French Blood Agency, the Biomedecine Agency, and the National Institute of Prevention and Health Education.

European and international networks

InVS maintains a close collaboration with the European Centre for Disease Prevention and Control (ECDC). It contributes to surveillance and control of transmissible and environmental diseases in Europe and throughout the world: surveillance of HIV/AIDS, tuberculosis, listeriosis, and the health effects of air pollution. It also participates in other programmes coordinated by other Member States. InVS participates in the European network for surveillance, alert, and control of infectious diseases, which connects the health ministries and health surveillance agencies of the Member States. The alert system, based on a secure transmission network between the states, enables the rapid exchange of epidemiologic information about infectious risks that may affect several of them and the early identification of emerging infectious risks in Europe.

Its work within international health surveillance networks takes place at three levels: participation in the World Health Organization (WHO) Lyons office, its participation in GOARN, the global epidemic alert and response network, and collaboration with the WHO regional office for Europe. Working with the Ministry of Foreign Affairs, InVS also provides technical support to other countries in this domain.

Organization

InVS is directed by an executive director, Dr Françoise Weber, assisted by an associate director. It includes:

- a **Directorate-General** comprised of a strategy and planning office, which coordinates work in European development,

regional development, and external training, the Alert Coordinating Committee, the editorial promotion committee, and management control;

- **5 scientific departments:**

- Department of Infectious Diseases,
- Department of Environmental Health,
- Department of Occupational Health,
- Department of Chronic Diseases and Injuries, and
- Department of International and Tropical Diseases;

- **five agency-wide service departments:**

- Communications department,
- Documentation department,
- Information systems department,
- Finance, logistics, and economics department, and
- Human resources department.

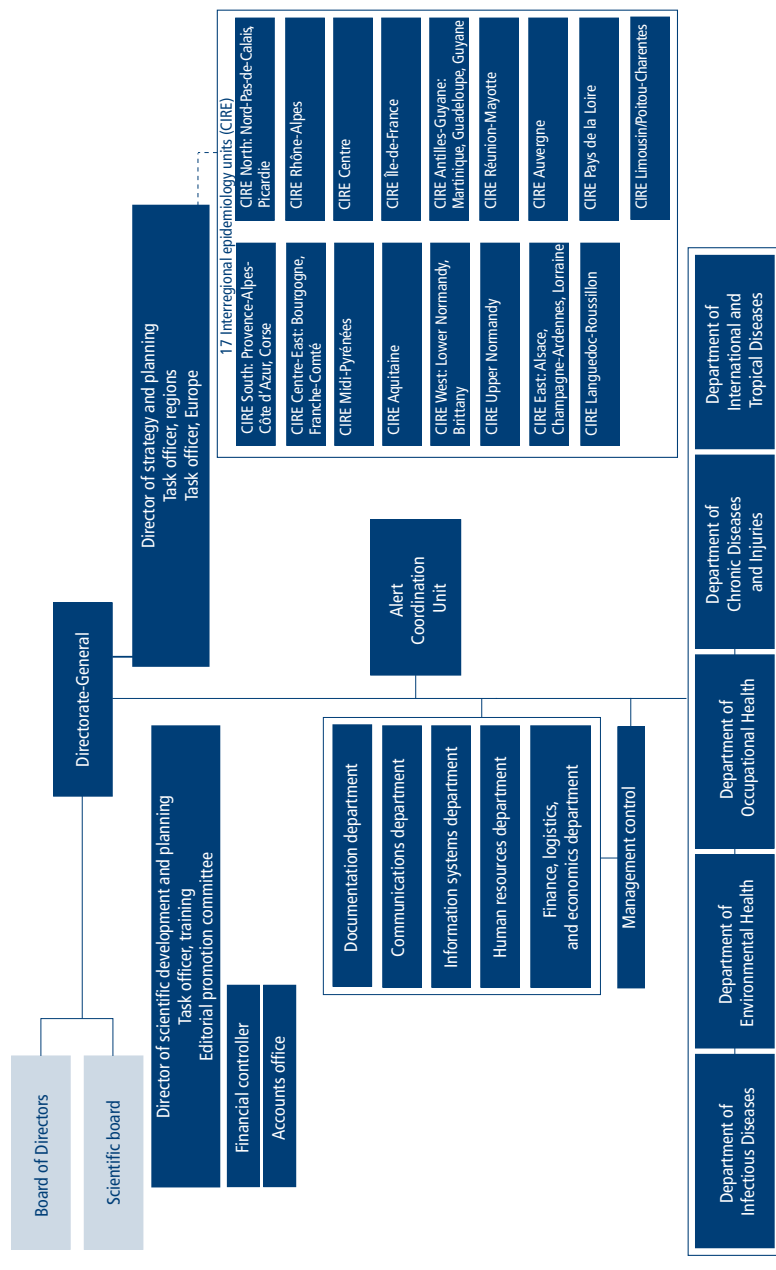
InVS has regional branches, the regional and interregional epidemiology groups (CIRE), capable of applying its know-how on a local level and of relaying its activity. The CIRE are located within the regional health and welfare bureaus (DRASS), as close as possible to the health authorities. The CIRE furnish methodological support, expertise, and an analysis of health alert signals to these decentralized departments. They conduct health surveillance in the regions, on behalf of InVS.

The system currently includes 17 CIRE, 15 metropolitan and 2 overseas. Nine CIRE are interregional, 8 cover a single region.

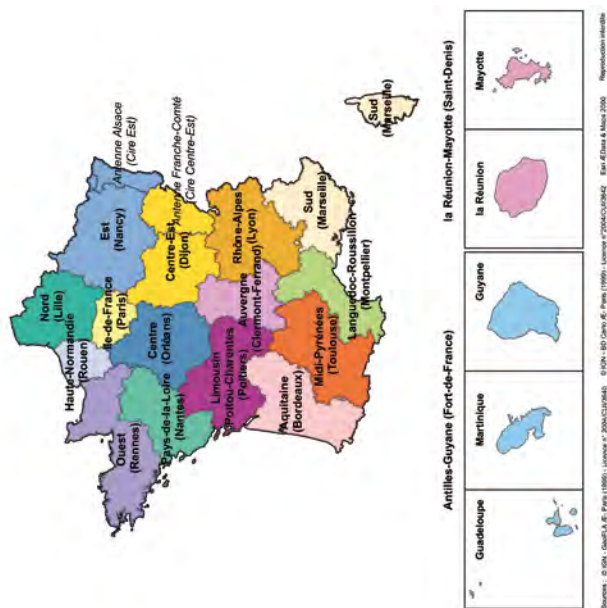
InVS has a Board of Trustees with 23 members (11 representatives of the government) responsible for approving the institution's major strategic directions, its activity programmes, and the human and financial resources necessary for the accomplishment of these missions. It also has a scientific council, with 17 members responsible for monitoring the consistency of the Institute's scientific policies.

In 2007, InVS had a budget of €59.8 million, with 387 employees, principally epidemiologists, trained in a variety of health or information sciences.

CHART



REGIONAL EPIDEMIOLOGY UNITS (CIRE)



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InVS, key figures

InVS activities

- Number of alerts covered in the daily alert bulletins in 2007: 74
- Number of European programmes: 21
- Cooperation activities conducted abroad: 28
- Reports published: 93
- Weekly epidemiologic bulletins (*BEH*) published: 131 articles and 19 editorials
- Weekly international bulletins published: 52 issues
- Influenza surveillance bulletins published: 28 issues
- Posters for conferences: 120
- Press releases issued: 22
- InVS website (www.invs.sante.fr): 1074 562 individual visitors daily (3859 384 pages viewed)

InVS human resources

- Staff (full-time equivalents on December 31, 2007): 381
- Distribution by occupation:
 - epidemiologists: 190.7
 - other scientists: 34.6 (study monitors and technicians)
 - managers: 45
 - administrative and personal support: 110.7

InVS financial resources

- InVS operating budget in 2007: €51 561 739.79
- InVS investment budget in 2007: €11 508 73.37
- Increase in operating budget 2007/2006: 103.66%
- Increase in investment budget 2007/2006: 22%

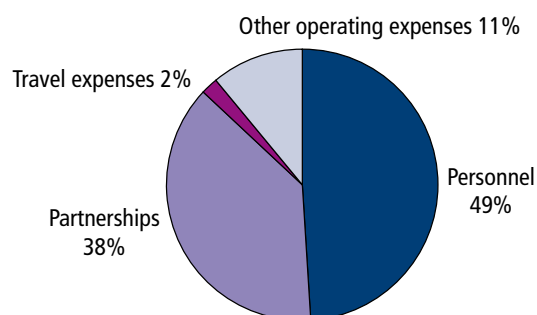
Networks and partners

- Number of national reference centres: 46 (31 associated laboratories)
- Budgetary resources allocated to CNRs (in million €): 9
- Number of morbidity registries: 41
- Budgetary resources allocated to all registries (in million €): 3.85
- Number of emergency departments participating in the OSCOUR network: 102
- Number of SOS Médecins associations in the SOS network: 40
- Number of collaboration agreements and Memoranda of Understanding reached with partners: 207

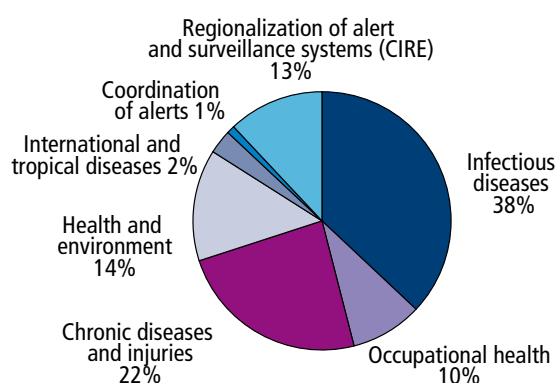
EXPENSES PER ITEM

Expense categories	Total budget (in €)
Personnel	25 535 922.91
Partnerships	19 367 606.79
Travel expenses	861 340.95
Other operating expenses	5 796 869.14
Total expenses 2007	51 561 739.79
Personnel	Remuneration, taxes on remuneration, social charges
Partnerships contracts	Subsidies to partners, financial support of registries, financial support of CNR, subcontracting services associated with scientific projects
Travel expenses	Transportation, expenses, conference registration fees
Other operating expenses	Printing and distribution of reports, expenses for organization of conferences, rent, maintenance of buildings and vehicles, telecommunications, staff training, recruitment costs, supplies, documentation

**DISTRIBUTION OF INVS EXPENSES
BY TYPE OF EXPENSE / FISCAL YEAR 2007**



**EXPENSES 2007
BY SURVEILLANCE PROGRAMME**



EXPENSES BY SURVEILLANCE TOPIC, INCLUDING OVERSIGHT AND SUPPORT

Topics	Total expenses (in €)
Infectious diseases	19 198 342.34
Workplace health	5 381 358.82
Chronic diseases and injuries	11 533 164.50
Health and environment	7 062 718.70
International and tropical diseases	1 242 807.55
Coordination of alerts	646 754.80
Regionalization of alert and surveillance systems (CIRE)	6 496 593.08

SCIENTIFIC REPORTS AND LEAFLETS

JANUARY 2007

- Étude sur les brucelloses humaines en France métropolitaine, 2002-2004
- Hospitalisations pour asthme en France métropolitaine, 1998-2002 – Évaluation à partir des données du PMSI
- Données épidémiologiques sur le cancer du col de l'utérus – État des connaissances
- Enquête sur la survenue et la gestion des épisodes d'infections respiratoires aiguës dans les maisons de retraite de Lorraine – Saison hivernale 2005-2006

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- État d'avancement des actions dans le domaine des zoonoses non alimentaires après la démarche de définition des priorités de 2001, 2001-2006

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- Exposition environnementale à l'amiante chez les personnes riveraines d'anciens sites industriels et d'affleurements naturels. Choix méthodologiques, analyse des données disponibles, modalités de recueil
- Surveillance of tuberculosis in Europe – Euro TB – Report on tuberculosis cases notified in 2005
- Lutte contre le VIH/sida et les infections sexuellement transmissibles en France – 10 ans de surveillance 1996-2005 (rapport et synthèse)
- Surveillance épidémiologique des maladies infectieuses et parasitaires à La Réunion – Détermination et hiérarchisation des priorités par les professionnels de santé – Avril-juillet 2004
- Investigation des cas de légionellose déclarés dans les Alpes-Maritimes au cours des mois d'octobre, novembre et décembre 2005
- Estimation de l'impact du dépistage organisé sur la mortalité par cancer du sein – Contexte, méthodologie et faisabilité
- Prévalence des hépatites B et C en France en 2004
- Émergence de la maladie de Chagas en Guyane française – Évaluation en 2005 et perspectives
- Évaluation épidémiologique du dépistage du cancer du côlon et du rectum – Première campagne du programme pilote français

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- Surveillance des infections à *Campylobacter* en France : bilan de la surveillance du réseau de laboratoires de ville et hospitaliers, 2004-2005
- Réseau Sentasm – Information : surveillance de l'asthme d'origine professionnelle

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- Investigation d'un signalement de pathologies cancéreuses et thyroïdiennes parmi le personnel du complexe scolaire Joliot Curie à Aubervilliers (Seine-Saint-Denis) – Rapport d'investigation
- Dépistage du cancer du sein – Rapport d'évaluation du suivi épidémiologique – Données 2004
- Réseau expérimental de surveillance épidémiologique des troubles musculo-squelettiques dans les Pays-de-la-Loire – Protocole de la surveillance dans les entreprises (2002-2004)
- Samotrace – Volet "Épidémiologie en entreprise" – Résultats intermédiaires à un an (3 000 questionnaires) – Régions Centre, Pays-de-la-Loire et Poitou-Charentes
- Évaluation des risques sanitaires des sous-produits de chloration de l'eau potable – Partie 2 : estimation de l'exposition, caractérisation du risque et faisabilité d'une surveillance épidémiologique des pathologies liées à la surchloration dans la population générale
- Infection à chikungunya – Étude descriptive des cas importés en France métropolitaine, 2005-2006

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- Guide de référence pour le recueil des données de l'enquête permanente sur les accidents de la vie courante – Réseau Epac
- Rapport veille sanitaire et sciences sociales – Interventions aux journées de veille sanitaire du 30 novembre 2005
- Matrice emplois-expositions aux poussières alvéolaires de ciment – Groupe de travail Matgéné
- Matrice emplois-expositions aux poussières alvéolaires de ciment – Groupe de travail Matgéné – Éléments techniques sur l'exposition professionnelle aux poussières de ciment
- Enquête défenestrations 2006 – Synthèse des résultats
- Impact sanitaire de la vague de chaleur de juillet 2006 en Languedoc-Roussillon
- Surveillance de la maladie de Lyme – Département de l'Ain, de la Loire et de la Haute-Savoie – Bulletin d'information n° 2 – Période de surveillance du 1er avril 2006 au 31 janvier 2007

- Conséquences sanitaires de l'explosion survenue à l'usine "AZF" le 21 septembre 2001 – Rapport final sur les conséquences à un an dans la population des travailleurs et des sauveteurs de l'agglomération toulousaine
- Conséquences sanitaires de l'explosion survenue à l'usine "AZF" le 21 septembre 2001 – Rapport sur la phase d'inclusion de la cohorte des travailleurs de l'agglomération toulousaine (cohorte santé "AZF")
- Dépistage organisé du cancer du col de l'utérus – Évaluation épidémiologique des quatre départements pilotes
- Facteurs d'adhésion au dépistage organisé du cancer du sein : étude FADO-sein
- Enquête Presse Gay 2004 (rapport et synthèse)
- Vous allez voyager en zone tropicale – Évitez le paludisme et les arboviroses (Chikungunya, dengue, West Nile...)

JULY 2007

- Exposition professionnelle au formaldéhyde et effets sur la santé
- MDO InfosRégions Auvergne – La tuberculose en Auvergne
- Surveillance des accidents avec exposition au sang dans les établissements de santé français en 2005
- Intoxications au monoxyde de carbone dans la région Île-de-France en 2005 – Bilan épidémiologique de la 1^{re} année du nouveau dispositif national de surveillance
- Présence de plomb et d'arsenic sur le littoral sud de Marseille : une étude de santé (juillet 2005)
- Les facteurs de risque de survenue des légionelloses sporadiques communautaires en France
- The fight against HIV/AIDS and sexually transmitted diseases in France – 10 years of surveillance, 1996-2005 – Executive summary
- Chikungunya et autres arboviroses émergentes en milieu tropical, Saint-Pierre, La Réunion

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- Surveillance active des formes émergentes hospitalières de chikungunya, La Réunion, avril 2005-mars 2006 – Rapport détaillé
- Surveillance épidémiologique des asthmes d'origine professionnelle : étude pilote avec l'Observatoire national des asthmes professionnels
- Samotrace – Volet médico-administratif / Région Centre – Résultats intermédiaires à un an
- MDO InfosRégions Antilles-Guyane – Situation dans les DFA au 31 décembre 2005
- Cas groupés de coqueluche dans une maison de retraite de Gironde, juillet 2006 (rapport et plaquette)

- Caractérisation des groupes de population à risque d'exposition élevée vis-à-vis du chlordécone via l'alimentation, Martinique, août 2006

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- Évaluation de l'incidence du cancer de la thyroïde en Corse à partir des données hospitalières, de l'Assurance maladie et des laboratoires d'anatomopathologie – Période 1998-2001
- Surveillance active des formes émergentes hospitalières de chikungunya, La Réunion, avril 2005-mars 2006 – Rapport de synthèse
- Investigation suite à la survenue de malaises au bloc opératoire central de l'Hôpital Nord de Marseille en août 2005
- Prévalence des troubles de santé mentale et conséquences sur l'activité professionnelle en France dans l'enquête "Santé mentale en population générale : images et réalités"
- La toxoplasmose en France chez la femme enceinte en 2003 : séroprévalence et facteurs associés
- Évaluation de l'impact sanitaire de la pollution atmosphérique urbaine – Agglomérations de Cannes et de Nice – Impact à court et long terme
- SUMEX 2 – Réalisation d'une matrice emplois-expositions à partir des données de l'enquête Sumer 2003
- Faisabilité d'une évaluation de l'impact sanitaire de la pollution atmosphérique urbaine – Agglomération de Chalon-sur-Saône
- Investigation et prise en charge d'une épidémie de gale dans une maison de retraite, Pyrénées-Atlantiques, novembre 2005
- Évaluation de l'impact sanitaire de la pollution atmosphérique urbaine – Agglomération de Dijon – Impact à court et long terme
- Tuberculose dans les maisons d'arrêt en Île-de-France – Enquête prospective, 1^{er} juillet 2005-30 juin 2006
- HIV/AIDS Surveillance in Europe – Mid-year Report 2006, n°74

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- Conditions de travail selon l'activité professionnelle dans l'enquête décennale santé 2003 de l'Insee
- Couverture vaccinale des enfants et adolescents en France : résultats des enquêtes menées en milieu scolaire – 2001-2004
- Santé mentale et activité professionnelle dans l'enquête décennale 2003 de l'Insee
- État de santé des salariés de la filière viande du régime agricole en Bretagne – Relations avec leurs contraintes de travail physiques, organisationnelles et psychosociales

- Estimation quantitative du risque de contamination d'un don de sang par des agents infectieux (rapport et synthèse)
- Enquête de perception du risque monoxyde de carbone en population générale, Lot-et-Garonne, septembre 2006

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- Réseau Sentasm – Bulletin d'information n° 1 Aquitaine (surveillance de l'asthme d'origine professionnelle)
- Réseau Sentasm – Bulletin d'information n° 1 Midi-Pyrénées (surveillance de l'asthme d'origine professionnelle)
- Surveillance épidémiologique du diabète de l'enfant
- MDO InfosRégions Réunion-Mayotte – Épidémiologie des maladies à déclaration obligatoire à La Réunion (1996-2005)
- Étude Entred 2007-2010 – Deuxième enquête nationale sur le diabète
- Les chutes accidentelles de grande hauteur d'enfants en Île-de-France, Nord-Pas-de-Calais et Provence-Alpes-Côte d'Azur – 15 mars-15 octobre 2006
- Alimentation et état nutritionnel des bénéficiaires de l'aide alimentaire, étude Abena 2004-2005 – Rapport de l'étude épidémiologique
- EuroHIV 2006 survey on HIV and AIDS surveillance in the WHO European Region
- MDO InfosRégions Auvergne
- Les infections respiratoires aiguës en établissement d'hébergement pour personnes âgées
- Épidémie de grippe dans un établissement d'hébergement pour personnes âgées dépendantes du Tarn, janvier-février 2007
- Cas groupés de légionellose, Paris Austerlitz, juillet-septembre 2006 – Rapport d'investigation

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- Enquête sur les infections congénitales à cytomégalo virus détectées pendant la grossesse ou à la naissance en France métropolitaine
- HIV/AIDS Surveillance in Europe, end-year report 2006, n°75
- Réseau Sentasm – Bulletin d'information n° 2 Aquitaine (surveillance de l'asthme d'origine professionnelle)
- Réseau Sentasm – Bulletin d'information n° 2 Midi-Pyrénées (surveillance de l'asthme d'origine professionnelle)
- Étude nationale nutrition santé ENNS, 2006 – Situation nutritionnelle en France en 2006 selon les indicateurs d'objectif et les repères du Programme national nutrition santé (PNNS)
- Étude de santé publique autour d'une ancienne usine de broyage d'amiante, le Comptoir des minéraux et matières premières à Aulnay-sous-Bois (Seine-Saint-Denis) –

Pollution environnementale entre 1938 et 1975 : impacts sanitaires et recommandations (rapport et synthèse)

- Surveillance des urgences – Réseau Oscour (organisation de la surveillance coordonnées des urgences) – Résultats nationaux 2004/2007
- Surveillance des infections nosocomiales en réanimation adulte – Réseau REA-Raisin – Résultats 2006
- Surveillance des infections du site opératoire en France de 1999 à 2005 – Réseau ISO-Raisin – Résultats
- Détection et investigation des épidémies d'infection liées à l'ingestion d'eau de distribution – Approche intégrée environnementale et sanitaire
- Comportements alimentaires et situations de pauvreté – Aspects socio-anthropologiques de l'alimentation des personnes recourant à l'aide alimentaire en France

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- Characteristics of hypothermia among the homeless in Paris, France, 2004
- Management of abnormal smears intraepithelial neoplasia and associated treatment costs in France

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- Editorial - Reducing the health inequalities is the key for social cohesion
- Scope, trends and reasons for social inequalities in health and mortality in Europe: a review of comparative studies
- Disabling low back pain and social status, results from a national study in France
- Impact of socioeconomic factors on the participation of women living in Nord-Pas-de-Calais to cancer screening: results of the National Health Survey, France, 2002
- Social inequality in children's overweight in Alsace: data of the medical examination before admission to elementary school, 2001-2002
- Impact of health status on part-time jobs of French population, approach through chronic diseases, France, 2002-2003
- Disabilities and social inequalities in France, 1999

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- Health outcomes in teenagers, Val-de-Marne – France, in 2005: overweight (obesity included), dental caries and risk of depression

- Overweight (obesity included) in high school teenagers, Val-de-Marne – France, in 1998 and 2005 according to social and economic characteristics

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- Evolution of pneumococcal invasive disease incidence, France, 2005
- Antibiotic consumption at the Assistance publique-Hopitaux de Paris (AP-HP): trends over 15 years, France, 1990-2004
- Pneumocystosis: Survey in 14 Hospitals from Assistance publique-Hôpitaux de Paris (AP-HP), France, 2003-2005

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- Vaccination coverage of children and adolescents in France: results of school-based surveys, 2001-2004
- Follow-up of 208 tuberculosis patients treated in 2004 with the TB-info® computer programme
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- Editorial - Toward a pooled expertise process
- Institutional expertise faces the real actors
- Cluster of childhood cancers in Vincennes, France, and role of the Scientific Committee from 2001 to 2006: experts face social expectations
- Perception du dossier et de son déroulement par le Collectif Vigilance Franklin
- A cluster of childhood cancers in Vincennes, France: epidemiological investigations
- Risk assessment studies in Vincennes, France, 2001-2004: Approach used to estimate the health risks related to the environment of an urban area considering its industrial past

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- Survival of cancer patients in France: the population-based “Francim Study”
- Geographical variations of death by screen detectable cancers in French metropolitan regions, 1998-2002
- Cancer incidence and survival among adolescents in France, 1988-1997
- Incidence and survival of patients with haematological malignancies: focus on elderly patients, France, 1989-1997

- Survey on the distribution of “uterus cancer, cervix corpus cancer and not otherwise specified cancer” among death certificates for cervix cancer and corpus uteri cancer

- Strengthening of the national cancer surveillance system in France: the setting up of the multi-source cancer system (SMSC)

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- Tuberculosis cases notified in France in 2005
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- Surveillance of surgical-site infections: results of the RAISIN 1999-2004 national database
- Perception of nosocomial risk among the French population, 2005-2006
- French nosocomial infection control indicators for public reporting
- Patients and health professionals’ perception of a score concerning organization and activities against nosocomial infections (ICALIN): A survey carried out in Haute-Normandie, 2005, France
- Annual repeated prevalence studies of nosocomial infections in South-western France, 1993-2004
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- Incidence and survival in children cancer in Auvergne-Limousin, France, 1986-2003
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- Outbreaks of unexplained physical symptoms: how to diagnose a mass psychogenic illness
- Outbreak of unexplained acute discomforts among the staff of a surgery suite in Marseilles Hôpital Nord, France, 2005

- Cluster of illness occurring in the secondary school of Carignan, France, in October 2004: poisoning or mass psychogenic illness?
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- Unexplained outbreak among the staff of the Villejuif City Hall, France, 2004-2005: the benefits of investigation as a management tool

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- Investigation of exposure to active pulmonary tuberculosis in a health care worker, Lyons, France, 2004-2005
- Evolution of incidence rates for vascular cerebral accidents in Dijon, France, 1985-2004
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- Tobacco smoking in French upper secondary schools from 2002 to 2006
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Maladies infectieuses

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Systèmes de surveillance, investigations épidémiologiques

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Maladies chroniques

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Santé de l'enfant

Systèmes de surveillance, investigations épidémiologiques

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