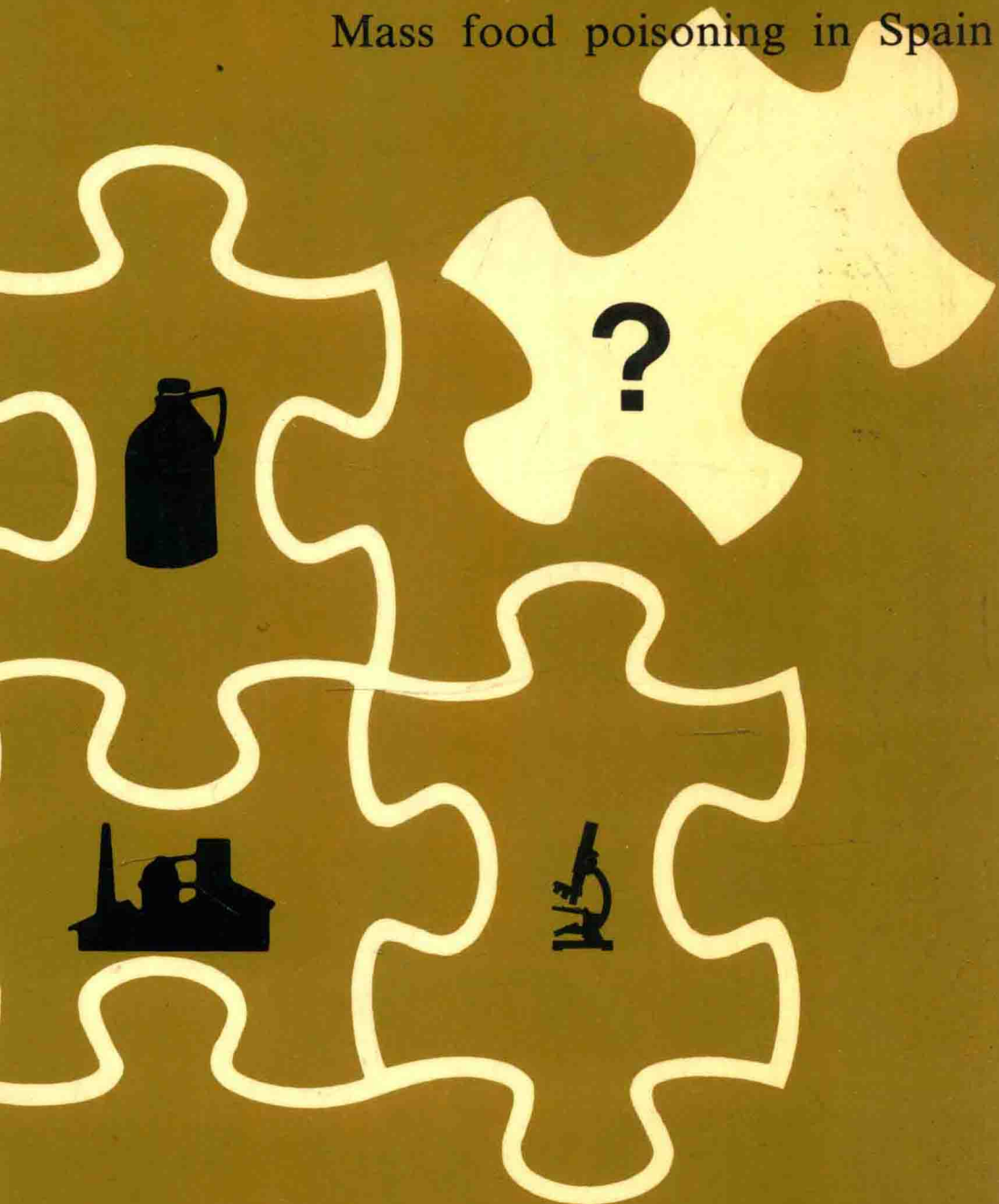




# Toxic oil syndrome

Mass food poisoning in Spain



World Health Organization  
Regional Office for Europe  
Copenhagen



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## Mass food poisoning in Spain

Report on a WHO meeting  
Madrid, 21-25 March 1983

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# **Toxic oil syndrome**

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## Foreword

*On 1 May 1981, the first case of a disease, later to be designated "toxic oil syndrome", was encountered in Spain. Physicians were immediately struck by the disease's unique clinical appearance which separated it from any other known disease condition. Evidence quickly accumulated to indicate that the disease was environmentally induced, but the critical cornerstone on which to base prevention and treatment was still missing: which environmental factor was the cause? Answering this important question rapidly became an acute necessity, as thousands of patients began to overcrowd the hospitals in Madrid and the north-western parts of Spain. Several pieces of evidence pointed towards the ingestion of adulterated edible oil, containing refined denatured rapeseed oil, as being the causal factor. Emergency responses, in particular public warnings and the recall of suspect oil, were then initiated by the public health authorities.*

*Several characteristics of this tragic event relate to food safety and environmental health concerns worldwide. The toxic oil syndrome (TOS) was immediately recognized as a new disease; had this not been the case, many more people might have become ill before its cause was identified, or even suspected. Unlike with many environmentally induced diseases that mimic common syndromes and are not easily related to a specific, preventable cause, the diagnosis of TOS was straightforward. We can only speculate what would have happened if the environmental factor had been less obvious. Since the acute effects occurred within a week or so of exposure to the clandestine oil, problems related to latency period or induction time were of minor importance in the search for a causal factor. The long-term effects have yet to be defined in detail.*

*After the suspect oil had been traced to a specific food oil company, preventive and remedial action was rather clearcut. By contrast, most other environmental exposure occurs through various pathways, at irregular levels or intervals, and in conjunction with other factors that may interfere with the observed effects. Thus, the occurrence of TOS in Spain, though catastrophic, followed a relatively simple chain of events.*

*The lessons to be learned from this type of avoidable tragedy therefore have serious and far-reaching significance for preventive action in environmental health in general. First, the immediate need for stricter and more effective food safety enforcement is imperative. Second, an improved epidemiological*

*programme and a strengthening of toxicological resources are necessary. The training of physicians and other health professionals in these areas must be intensified, and a multidisciplinary approach to preventive environmental medicine needs to be further developed. Finally, plans for emergency response should be reviewed and improved. It should be stressed that although these recommendations relate to a particular incident in one country, they are of great importance and relevance to all countries, owing to the ubiquity of environmental hazards.*

*The early recognition by the Government of Spain that the importance of TOS extended beyond national borders to general considerations of human health led to prompt international involvement and encouraged the scientific community in its efforts to pinpoint the cause of the disease and initiate preventive and rehabilitative measures. At the request of the Spanish authorities, WHO has been involved in TOS since the early phase of the disease. Through WHO, the knowledge and experience of clinicians, epidemiologists and toxicologists have been brought to bear on this important health problem. In addition to the efforts made within Spain, scientific research contributions have been made by groups in other countries, namely: Unilever Research Laboratory, Vlaardingen, Netherlands; Medical Research Council Laboratories, Toxicology Unit, Carshalton, United Kingdom; Centers for Disease Control, Atlanta, Georgia, United States; and National Institute of Environmental Health Sciences/National Toxicology Program, Research Triangle Park, North Carolina, United States. These contributions and the efforts of those who contributed their expertise to the WHO Working Group on the Toxic Oil Syndrome, held in Madrid on 21-25 March 1983, are hereby acknowledged. This publication presents the report of the Working Group, as well as additional scientific reviews of specific aspects of TOS.*

*Many questions concerning TOS are still unanswered. In particular, the specific substance or substances in the oil that caused the disease have not yet been identified. This aspect also deserves international attention and may only be resolved through cooperation among research institutions in several countries.*

J.I. Waddington

*Director, Environmental Health Service  
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# Introduction

In early May 1981 a previously unknown disease syndrome broke out in Spain, primarily in Madrid and in the provinces north-west of Madrid. The epidemic reached a peak by mid-June, when over 600 daily hospital admissions due to the disease were recorded. Once illegally sold denatured rapeseed oil had been identified as the most probable cause, an exchange of the suspect cooking oil with pure olive oil was initiated by the Government. The epidemic then faded away, although chronic cases continued to be discovered. Many cases of the disease were severe and needed intensive care. By March 1983 a total of 340 deaths had occurred, the total number of cases recorded exceeded 20 000, and a small number of patients were still in intensive care. The severity of this epidemic and its associated important medical and toxicological aspects prompted an international collaborative effort to establish precise diagnostic criteria, the mechanisms of pathogenesis, epidemiological characteristics and the identity of the causal agent or agents. In addition, the implications for the prevention of similar incidents needed to be assessed.

The WHO Working Group on the Toxic Oil Syndrome was held at the Ministry of Health and Consumer Affairs in Madrid, from 21 to 25 March 1983. The meeting was opened by Mrs C. Salanueva, Director-General of the National Programme for the Toxic Syndrome, who stressed that the results of the meeting would be of considerable importance to the continued work of the National Programme. Mr J.I. Waddington welcomed the participants on behalf of the WHO Regional Director for Europe, and reviewed the involvement of WHO at the request of the Government of Spain. Several consultation meetings had been arranged, and WHO consultants had visited Spain and made recommendations about continued efforts. The Working Group was planned in close cooperation with the Spanish authorities. On the basis of toxicological, clinical and epidemiological data, it was hoped that specific conclusions would be reached by the participants. In addition, the meeting should note the general lessons learned so that similar tragedies in Spain and other countries could be prevented. Dr S. Tarkowski presented the scope and purpose of the meeting, noting that numerous documents had already been distributed and that a critical assessment of the background information and the current situation would be pertinent. Gaps in knowledge

and priority problems should be identified. Conclusions and recommendations should focus on both practical and theoretical questions and on the wider aspects of future preventive action. The meeting comprised a plenary session to review current information, and three subgroups on epidemiology, clinical observations and pathology, and toxicology.

Mrs C. Salanueva was elected Chairman, Professor R. Goulding and Dr A. Portera Sánchez were elected Vice-Chairmen, and Professor P. Grandjean was elected Rapporteur.

# Review of investigations and findings

## Epidemiology and Etiology

Owing to its relationship to the ingestion of contaminated cooking oil (see Annex 1), the disease was named the toxic oil syndrome (TOS) by the Working Group. Without doubt, this disease is a new entity. The major epidemiological aspects of TOS may be described under five headings: time of occurrence, geographic occurrence, demographic characteristics, association with oil use, and possible causal agents in the oil.

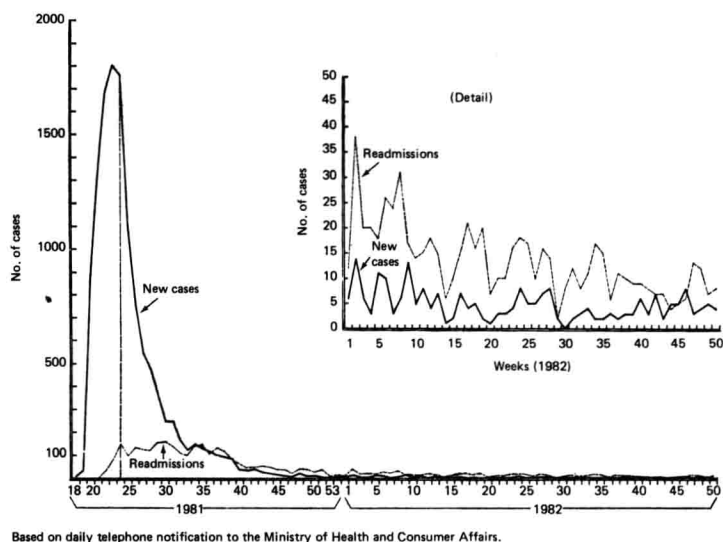
### Time of occurrence

The epidemic was explosive and abrupt. The new disease was first encountered on 1 May 1981 in an 8-year-old boy dying from acute pulmonary insufficiency. He belonged to a Madrid family of eight, six of whom eventually fell ill. The epidemic reached a peak by mid-June when 600 daily hospital admissions due to TOS were recorded. During May and June about 10 000 cases were seen in hospitals (Fig. 1), and 80 deaths occurred in the acute phase of the disease (Fig. 2). Clinical impression suggests that the severity of the disease may have been greater earlier in the epidemic than it was later. Over the next six months only 2600 new cases were discovered, with most reportedly in a chronic phase, and a similar number of TOS patients were readmitted. Coinciding with the sharp decrease in the incidence of acute cases of the disease from late June was the announcement by the Minister of Health and Consumer Affairs on 26 June that pure olive oil would be substituted for suspect toxic oil beginning on 30 June at the latest. Although a causal relationship is not proven by this apparent association, the withdrawal of the oil offers a possible explanation of the sudden disappearance of acute cases, and no other possibility has been substantiated by supporting evidence.

### Geographic occurrence

Cases of TOS appeared first in Madrid and then spread to the provinces largely north-west of the capital (Fig. 3). The epidemic was mainly confined to the 14 provinces indicated in Fig. 4 and 5; fewer than 200 cases were seen in other parts of the country, and most of these originated elsewhere. No

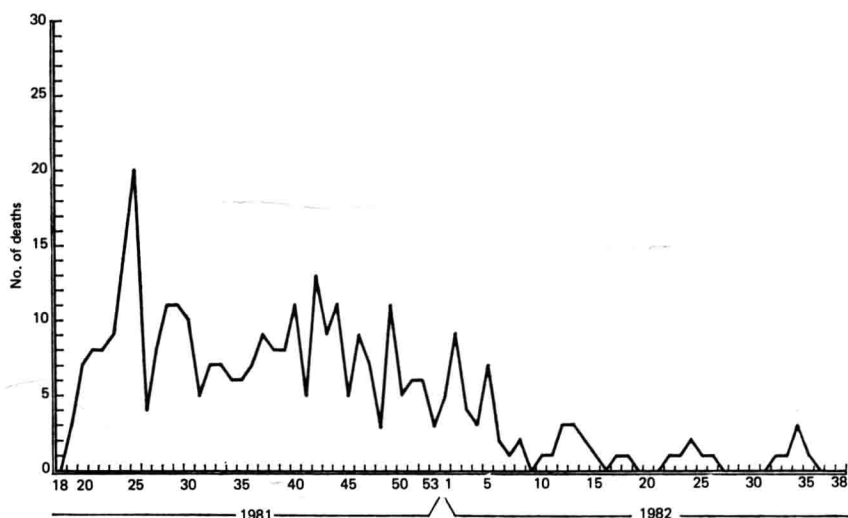
Fig. 1. New cases and readmissions of TOS by week



Based on daily telephone notification to the Ministry of Health and Consumer Affairs.

Source: *Boletín epidemiológico semanal*, **1561**: 273-275 (1983).

Fig. 2. TOS deaths by week



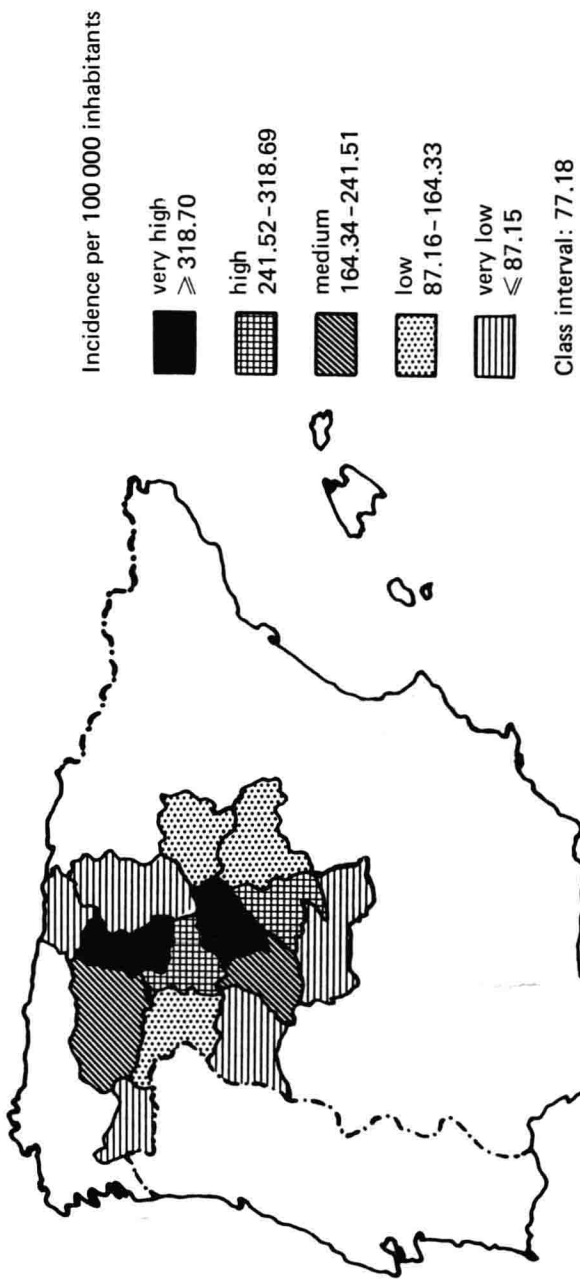
Source: *Boletín epidemiológico semanal*, **1561**: 273-275 (1983).

Fig. 3. Date of first recorded cases of TOS in 14 provinces



Source: *Boletín epidemiológico semanal*, **1482**: 129-131 (1981).

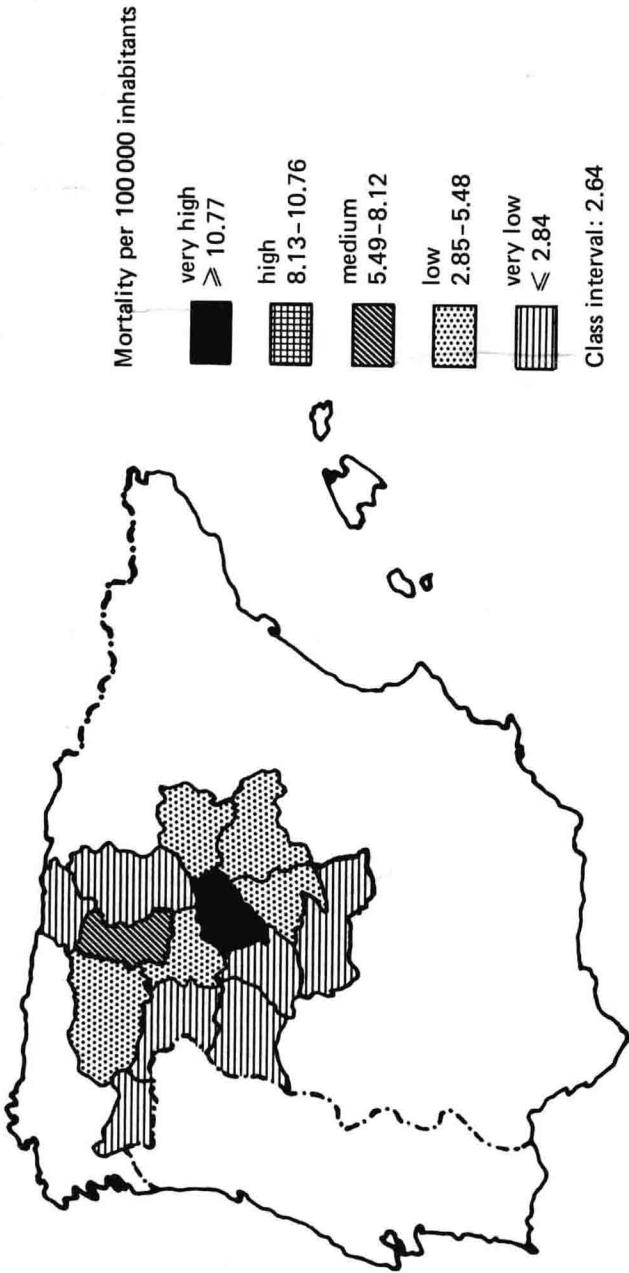
Fig. 4. Total incidence of TOS per 100 000 inhabitants in 14 provinces with more than 12 recorded cases, as of October 1982, when 18 893 cases were recorded in these provinces



Source: *Boletín epidemiológico semanal*, **1565**: 301-303 (1983).



Fig. 5. Mortality from TOS per 100 000 inhabitants in the 14 provinces indicated in Fig. 4, based on 336 deaths



Source: *Boletín epidemiológico semanal*, **1565**: 301–303 (1983).