

Banned rodenticides: a danger to young children in French Guiana



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A study conducted by the toxicovigilance scheme in French Guiana between 2010 and 2024 identified 208 cases of paediatric exposure to rodenticides¹, with numbers increasing sharply since 2023.

Most of this exposure occurred in the home, where the child had ingested bait consisting of one of these products (generally in liquid form) mixed with food. More than half of the products originated from China and had been imported illegally from Suriname. The most serious cases were caused by neurotoxic rodenticides such as sodium fluoroacetate. To address this situation, a prevention campaign was launched in late 2024 targeting a highly toxic Chinese rodenticide called "Hai Zhen Wei", whose use is increasingly being reported. Three courses of action were proposed: strengthening checks, raising public awareness and improving data collection.

In French Guiana, the proximity of inhabited areas to natural spaces attracts rodents, especially in unfavourable socio-economic conditions: substandard housing, poor waste management and stagnant water. Infestations in both urban and rural areas are controlled by rodenticides, raising the risk of accidental exposure, particularly of children.

Unfortunately, local rodent control efforts often rely on rodenticides that have been illegally imported from neighbouring countries. These products are not subject to European standards and may contain substances that have been banned in Europe at high concentrations, and be poorly labelled or sold in unauthorised forms. Moreover, the labelling is sometimes written in Chinese without any translation into French or English, making it difficult to identify the ingredients and provide appropriate treatment in the event of poisoning.

Baits are usually placed on the ground so that rodents can access them, but this also means that they are within reach of young children.

Following several serious cases of poisoning among children, the French Guiana toxicovigilance scheme (DTV) conducted a descriptive study² of cases of rodenticide exposure among minors in French Guiana between 2010 and 2024, based on data from poison control centres³, in order to identify possible actions and preventive measures.

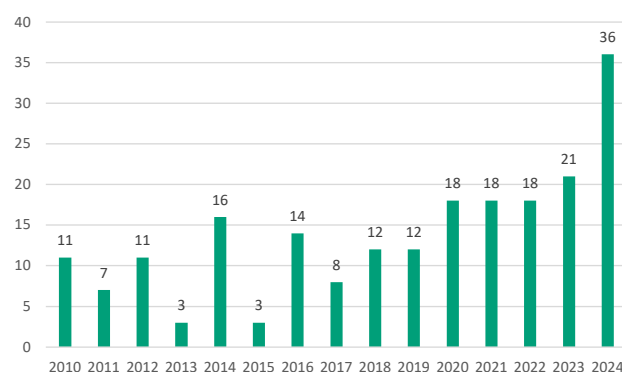


Figure 1 – Annual breakdown of paediatric rodenticide exposures recorded by poison control centres between 1 January 2010 and 31 December 2024. (Source: SICAP)

1. Rodenticides are biocidal products used to control mice, rats and other rodents.

2. <https://www.sciencedirect.com/science/article/pii/S2352007825002434>

3. Toxicovigilance schemes collect information on poisoning cases from various sources of health data (French programme for the medicalisation of information systems, emergency department visits, etc.). The Paris poison control centre operates the emergency telephone hotline for French Guiana; these calls are analysed here.

GROWING INCIDENCE OF EXPOSURE INVOLVING VERY YOUNG CHILDREN

Between 1 January 2010 and 31 December 2024, 208 calls concerning children exposed to rodenticides were recorded by the poison control centres. Whereas between 2010 and 2023, 10 to 18 cases had been reported each year, from 2023 onwards the number rose, reaching 36 cases in 2024.

Exposure was mostly accidental (n=192, 92.3%) and had occurred in the home (n=203, 97.6%). Children under the age of two accounted for 65% of cases (n=134). In addition, 15 cases of deliberate poisoning (suicidal behaviour) were recorded among adolescents aged 11 years and over.

One young girl had also taken the product in an attempt to induce an abortion.

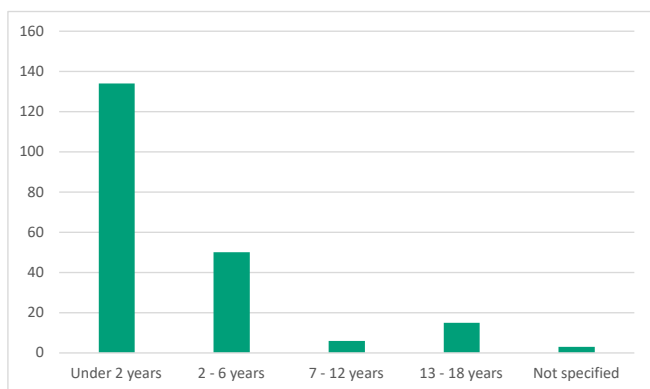


Figure 2 – Breakdown of cases of paediatric rodenticide exposure recorded by poison control centres between 1 January 2010 and 31 December 2024, by age group, in French Guiana. (Source: SICAP)

Of the 208 reported cases, 56 experienced symptoms. Fifteen cases of poisoning were of moderate severity, nine were severe, and one death occurred.

Digestive disorders such as diarrhoea and vomiting were observed in 52% of the moderate to severe poisonings, coagulation disorders in 32% (generally coagulation abnormalities without bleeding), while 40% of these cases experienced neurological symptoms (generalised convulsions, coma, status epilepticus).

All the serious poisoning cases were characterised by convulsions, accompanied by kidney failure (in one case) or heart problems (in three cases). One patient experienced temporary blindness and deafness.

The deceased patient died as a result of convulsions associated with multiple organ failure.

ILLEGAL PRODUCTS IMPORTED FROM NEIGHBOURING COUNTRIES

Rodenticides are broadly classified into two main classes of compounds based on their mode of action: anticoagulants (vitamin K antagonists, or VKAs) and non-anticoagulant rodenticides (neurotoxic agents). In France, products containing VKAs in concentrated liquid form are restricted to professional use and their sale to the general public is prohibited. Bromadiolone-based products intended for public use are exclusively in the form of solid baits containing a maximum of 25 ppm of active substance, i.e. a concentration of 25 mg/kg, combined with a bittering agent⁴.

The different types of neurotoxic rodenticides are subject to strict European regulations, as they can cause severe accidental poisoning in children and adults, even if only small amounts are ingested. Only baits containing alpha-chloralose and a bittering agent are permitted to be sold to the general public.

In this study, more than half of the exposure cases (n=118) involved VKAs. Details of the compounds are shown in Table 2.

Liquid rodenticides were involved in 35% of cases reported to poison control centres (n=73). This form is mixed with food and used without a secure bait station⁵.

Compounds	Number of exposure cases	%
VKAs	118	56.7
<i>Brodifacoum</i>	14	6.7
<i>Bromadiolone</i>	39	18.8
<i>Difenacoum</i>	27	13.0
<i>Difethialone</i>	12	5.8
<i>Flocoumafen</i>	2	1.0
<i>Undetermined VKA</i>	24	11.5
Neurotoxic agents	16	7.7
<i>Chloralose</i>	5	2.4
<i>Sodium fluoroacetate</i>	1	0,5
<i>Undetermined neurotoxic agent</i>	10	4.8
Unknown	74	37,5
Total	208	100.0

Table 2 – Classes and compounds implicated in cases of rodenticide exposure reported to poison control centres between 1 January 2010 and 31 December 2024 in French Guiana.

4. Bittering agents are substances added to a product to give it a bitter taste and prevent accidental or intentional ingestion of rodenticides by children, adults or non-target animals.

5. A container designed to hold bait, fitted with a child-resistant closure and designed to prevent access to the bait by non-target organisms

In nearly a quarter of cases (n=51), the product had been mixed with food: mainly rice (45%) or bread (16%). Mixtures containing wheat, cakes or chicken fat were also reported. The other forms responsible for accidental exposure were pellets (n=41, 19.7%), blocks (n=23, 11.1%), pastes (n=24, 11.5%) and powders (n=8, 3.8%).

There is a clear correlation between the rise in the number of cases and the increased use of liquid forms: 26% of rodenticide exposure cases involved liquid formulations prior to 2022, compared with 75% thereafter.

The liquid form was associated with higher severity (21%) than the other forms (5%). Neurotoxic rodenticides were implicated in 63% of serious cases, compared with 11% for VKAs (Table 3).

Where information was available (n=169), it was found that two-thirds of the implicated products (n=112, 66%) were not authorised in France. A significant proportion of exposure followed the use of rodenticides manufactured in China (n=75, 36%), some of which were purchased in neighbouring Suriname (n=51, 24% of products). These products were then imported illegally into French Guiana from Suriname; the crossing of the Maroni River takes about ten minutes by canoe, with no customs checks or searches between the two countries. They are supplied in packaging labelled solely in Chinese, with no clear indication of the active substance or its concentration.

PROHIBITED AND SOMETIMES HIDDEN NEUROTOXIC SUBSTANCES

This study revealed that certain products marketed as containing only VKA anticoagulants at low doses, mainly 0.05% bromadiolone, had in fact been adulterated⁶ with sodium fluoroacetate, a substance

that is lethal in the event of inhalation, skin contact or ingestion, and that has been banned in France and the European Union. It was rarely possible to identify the specific compound responsible, but the presence of sodium fluoroacetate was confirmed in one case and suspected in three others with neurological symptoms.

This adulteration complicates the management of poisoning cases because doctors assume they are dealing with poisoning from a substance "listed" on the label, for which the treatment may be different. Several cases of neurological toxicity have thus been observed with substances indicated as low-dose bromadiolone, which is not neurotoxic. It is difficult to predict the clinical consequences without knowing the exact composition of the product. In such cases, symptoms remain the best indicator for guiding treatment.

The product "Hai Zhen Wei", which may contain sodium fluoroacetate, was reported in 31 cases, i.e. around 15% of the total. Since 2021, when the first call about this product was made to a poison control centre, the number of cases has been rising steadily: six cases in 2022, nine in 2023 and 15 in 2024. It is a rodenticide of Chinese origin sold in liquid form, sometimes requiring dilution. This product, which has a reputation in the field for being effective and good value for money, is exported from China to a number of countries, mainly in South-East Asia and Africa. In 2021, two children died after ingesting a rat poison containing sodium fluoroacetate, which had been purchased in Suriname and brought back to mainland France following a trip to French Guiana⁷.

Variable	Types	Mild cases (zero or low severity)	Moderate or high severity cases	Total
Presentation*	Other	91 (95%)	5 (5%)	96
	Liquid	58 (79%)	15 (21%)	73
	Total	149 (88%)	20 (12%)	169
Compound classes**	Neurotoxiques	6 (37%)	10 (73%)	16
	AVK	105 (89%)	13 (11%)	118
	Total	111 (83%)	23 (17%)	134

*p < 0,002, **p < 0,01

Table 3 – Severity of rodenticide poisoning by dosage form and compound class
(source: SICAP, cases reported between 1 January 2010 and 31 December 2024 in French Guiana)

6. Products containing an active substance not listed in their ingredients.

7. https://vigilanses.anses.fr/sites/default/files/VigilAnsesN15_Novembre2021_Ratpoison.pdf

COMBATING FRAUD AND RAISING AWARENESS TO PREVENT RISKS

Better surveillance of the market (imports and distribution) would help reduce the risk of serious poisoning from liquid rodenticides by preventing them from being brought into French Guiana. In addition, information campaigns, particularly at supermarket checkouts and local grocery shops, should reiterate the risks associated with these products, especially for children.

Young children are particularly vulnerable because of their low body weight (they reach the toxic doses more easily, even after ingesting just a small amount), their inability to perceive risk, and their propensity to explore their surroundings and put everything in their mouths, due to their natural curiosity.

This is why it is essential to prevent them from gaining access to toxic products: rodenticides and insecticides, as well as household products, detergent tablets, etc. Preventive measures and raising public awareness – in schools, pharmacies, GP surgeries and public places – about the use of rat poison, and more generally the rules for the proper use of household products (not removing them from their original packaging and storing them safely) should have a major positive impact on population health.



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