Monitoring the acute adverse effects of vector control

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Every year sees an increase in operations to combat the mosquito vectors of arbovirus diseases. In spite of this, in 2023 and 2024, the number of calls to poison control centres about poisoning due to insecticides remained low, and cases were not serious. Vigilance is still called for, however, in view of the increase in the number of arbovirus diseases, and the density and geographical spread of their mosquito vectors in mainland France.

VECTOR CONTROL INTENSIFYING WITH THE GEOGRAPHICAL SPREAD OF THE TIGER MOSQUITO

Vector control (VC) aims to prevent and limit the spread of diseases transmitted by vectors, including arbovirus diseases. These infectious diseases are caused by viruses transmitted by the bite of an infected arthropod vector. These vectors include the tiger mosquito (Aedes albopictus), which can transmit the dengue, chikungunya and Zika viruses.

Since 2020, all départements in mainland France have been considered at risk from the establishment and spread of the tiger mosquito. As of 1 January 2025, it was established in 81 départements, representing 84% of those in mainland France, compared with 51% in 2019.

The tiger mosquito's range is expanding towards the west and north of mainland France. This spread is facilitated by the movement of goods and people and by rising temperatures, which lengthen the season favourable to mosquitoes (shorter winters). Not all mosquitoes are carriers of arboviruses, but they can become so if they bite an infected person, even one who is asymptomatic.

The number of outbreaks of arbovirus disease transmission and of indigenous cases[1] in mainland France confirms the increase in risk observed since 2022, with 66 indigenous cases of dengue fever in 2022 [1], 45 in 2023 [2] and 83 in 2024 [3] (Table 1).

In France, VC is coordinated by the regional health agencies (ARSs) and their specialist mosquito eradication operators, who cover the entire country. Because dengue fever, chikungunya and Zika are notifiable diseases, as soon as a case of arbovirus disease is identified, the ARS mobilises its operator to search for tiger mosquitoes in the places frequented by the patient.

If the presence of the tiger mosquito is confirmed, VC measures are put in place, including the mechanical removal of breeding sites (destruction of eggs and elimination of the water in which the female mosquito lays its eggs) and, if necessary, a deltamethrin-based biocidal treatment to kill adult mosquitoes and reduce the risk of transmission of the arboviruses dengue, chikungunya and Zika.

[1] A person infected with the virus in mainland France who has not recently travelled to an area where the virus is circulating, indicating virus transmission by mosquito vectors found locally.

	2022	2023	2024
Imported cases			
Dengue	378	2524	4683
Chikungunya	23	44	34
Zika	6	11	8
Indigenous cases			
Dengue	66	45	83
Chikungunya	0	0	1
Zika	0	0	0

Table 1 - Number of imported[2] and indigenous cases of dengue, Zika and Chikungunya in mainland France between 2022 and 2024 (Source: Santé publique France).

This biocidal treatment is carried out within a defined perimeter, generally 150 metres, around places frequented by the patient and while complying with regulations concerning water points or water courses (application of a buffer zone). The aim is to eliminate any adult mosquitoes that may have bitten the patient and could then transmit the virus to other people in the surrounding area. Taking place at night during the mosquito's resting period, it is applied to vegetation to limit the population's exposure to the sprayed product and the impact on non-target fauna biodiversity (pollinating insects, in particular). In the days leading up to the operation, leaflets posted through letterboxes give the date of the operation and advise people to avoid exposure to the spray mist, stay home, close their doors and windows during spraying, turn off any ventilation, keep animals and their food bowls away or indoors, protect aquatic and cold-blooded animals, cover ponds, pools and sand pits, and move or protect beehives. They are also advised to bring washing indoors and put away garden furniture and outdoor toys.

	Information requests	Exposure cases	Total
2022	19	5	24
2023	34	19	53
2024	19	9	28
TOTAL	77	33	105

Table 2 - Breakdown of calls to poison control centres relating to vector control between 2022 and 2024.

Exposure to deltamethrin during VC is mainly via the respiratory route, following inhalation of a low-concentration aerosol dispersed in an unconfined environment, or via the dermal route, through contact with treated surfaces. Its low concentration in the formulations used limits the risk to the exposed population. The symptoms observed are generally mild and irritative: moderate difficulty breathing with coughing, slight eye irritation, redness of the skin, tingling. The co-formulants, in particular the solvents in the products used, may also play a role in symptoms. An exceptional form of bronchospasm remains possible in at-risk individuals, particularly asthmatics.

FEW REPORTS OF ADVERSE EFFECTS IN 2023 AND 2024

An initial assessment of calls to poison control centres (PCCs) in connection with VC during 2022 was carried out [4]. Of the 24 dossiers analysed, 19 people had called a PCC to ask for details of the vector control procedures (date and time), the products used and the potential effects on human or animal health. The other five people thought they had been exposed, but none exhibited any symptoms.

Over the period from 2023–2024, 81 calls about VC were recorded by the PCCs. However, as in 2022, they mainly concerned requests for information (n=53) from people who had been informed that a VC operation was going to take place near their home (Table 2).

The majority of these calls were made between June and October, coinciding with the period of activity of the tiger mosquito (May to November) and with the VC treatments around detected cases (Figure 1).

In total, in 2023 and 2024, 28 people contacted a PCC following direct exposure to a VC treatment. Thirteen of them showed symptoms (9 in 2023 and 4 in 2024). These symptoms were mainly irritative (irritation of the upper airways, coughing, oropharyngeal irritation), neurological (headaches) or digestive (nausea, abdominal pain). All poisonings were of low severity.

These people mainly lived in the Nouvelle-Aquitaine, Occitanie, Auvergne-Rhône-Alpes and Grand-Est regions. These results coincided with the regions in which the most VC treatments were carried out.

Although VC campaigns are being stepped up as a result of the increase in cases of arbovirus diseases, the PCC data show that the number of calls from people who have experienced symptoms following a VC treatment remains low. However, it is likely that not everyone who was affected called a PCC: some may have consulted their doctor or pharmacist, or even gone to the emergency department.

[2] A person who contracted the virus during a stay in an area where it is actively circulating, such as the French Caribbean, French Guiana, French Polynesia or Reunion Island, and who returned to mainland France while contagious.

	2023	2024	Total
Nouvelle-Aquitaine	8	14	22
Occitanie	15	4	19
Auvergne-Rhône-Alpes	13	4	17
Grand-Est	12	2	14
Île-de-France	2	3	5
Provence-Alpes-Côte d'Azur	2	1	3
Bourgogne-Franche-Comté	1	0	1
Total	53	28	81

Table 3 - Regional breakdown of calls to poison control centres about vector control (source: SICAP 2023–2024).

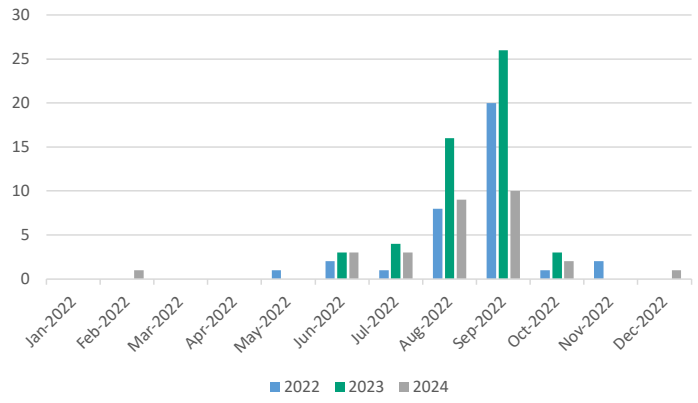

Figure 1 - Monthly breakdown of calls to poison control centres about to VC operations (source: SICAP 2022–2024)

AN UPWARD TREND IN 2025

2025 was a record year for arbovirus diseases in mainland France, with more than 1100 imported cases and 380 indigenous cases of chikungunya.

Calls to PCCs also appear to have increased since the start of the year. By 30 September 2025, 31 people had contacted a PCC following exposure to a VC treatment, 22 of whom were symptomatic. This is more than in 2023 and 2024 combined.

VC in mainland France is a major public health issue requiring an integrated approach: surveillance, prevention, innovation and community mobilisation. The monitoring of calls to PCCs relating to VC operations contributes to this approach by providing a picture of the acute adverse effects associated with these operations.

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FIND OUT MORE

[1] **Calba C, Cochet A, Jourdain F, Grard G, Durand GA, Guinard A, et al.** Arboviruses surveillance in mainland France: significant increase in the number of autochthonous dengue cases in 2022. Bull Épidémiol Hebd. 2023;(14):248-54. https://beh.santepubliquefrance.fr/beh/2023/14/2023_14_1.html

[2] **Fournier L, Calba C, Cochet A, Fournet N, Brottet E, Grard G, et al.** Bilan de la dengue, du Chikungunya et du Zika en France hexagonale en 2023. Bull Épidémiol Hebd. 2024 ;(13):260-266. https://beh.santepubliquefrance.fr/beh/2024/13/2024_13_1.html

[3] https://www.santepubliquefrance.fr/maladies-et-traumatismes/maladies-a-transmission-vectorielle/chikungunya/documents/bulletin-national/chikungunya-dengue-et-zika-en-france-hexagonale.-bilan-2024

[4] **Battefort, F., Bloch, J. 2024**. No adverse effects from vector control: a finding that will need to be confirmed in the coming years. Vigil'Anses 22: 21-23 https://vigilanses.anses.fr/sites/default/files/VigilAnses_N22_Vectorcontrol.pdf