Ongoing Early-Season Multi-Country Transmission of West Nile Virus in Europe, 27 May to 29 July 2026

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Abstract: West Nile virus (WNV) has become an increasingly important mosquito-borne public health threat in Europe, yet the scale and geographic breadth of early-season transmission in 2026 had not been synthesised. We conducted a secondary descriptive analysis of publicly available surveillance reports from 27 May to 29 July 2026, reconstructing weekly case growth, affected countries and administrative areas, country-level burden, clinical severity signals, historical late-July comparisons, and a sensitivity analysis excluding Italy. Locally acquired human cases increased from one to 158 across seven countries and 49 areas; 77 cases (48.7%) were reported in the final weekly interval. Greece reported 37 neuroinvasive cases among 42 cases and four deaths. The 2026 burden exceeded comparable late-July totals in 2023-2025, while excluding Italy still left 64 cases across six countries and 19 areas. These findings demonstrate a regional transmission signal and support coordinated human, animal and mosquito surveillance, timely diagnosis, vector control, blood-safety measures, risk communication, and rapid cross-border data sharing.

Keywords: West Nile Virus; Public Health Surveillance; Disease Outbreaks; Cross-Border Transmission

1. Introduction

West Nile virus (WNV) is a mosquito-borne flavivirus maintained in a bird-mosquito transmission cycle, with humans and horses serving as incidental hosts [1,2]. Most human infections are asymptomatic, although a minority develop West Nile neuroinvasive disease (WNND), including meningitis, encephalitis or acute flaccid paralysis, while viraemic donations may compromise blood safety [3,4]. Locally acquired infection was first reported in Europe on 27 May 2026 [5]. European surveillance subsequently documented rapid expansion, from one case in one country and one affected area on 27 May to 158 cases across seven countries and 49 areas by 29 July. This case burden exceeded comparable late-July totals in 2023-2025.

The continuing emergence of WNV in Europe reflects interactions among viral movement, competent mosquito vectors, avian reservoir hosts, environmental suitability and human exposure. Recent phylogeographic analysis has shown that WNV circulation in Europe involves both local persistence and repeated geographic dispersal [6]. Modelling studies have also linked long-term climatic change with an expansion of ecologically suitable areas for WNV transmission [7]. These findings provide an important background for interpreting the early geographic widening observed in 2026, but surveillance counts alone cannot identify the ecological or virological mechanisms responsible for that expansion.

From a public health perspective, the timing of transmission is as important as the cumulative burden. Early-season activity can extend the period during which clinicians, blood services and vector-control programmes must remain alert. It can also increase the probability that local transmission will be recognised only after severe cases or infected blood donations have already occurred. A concise, comparable snapshot of cases, countries and affected areas therefore has operational value even before final season-end totals are available. The purpose of the present analysis was not to estimate incidence in the underlying population, but to characterise the signal visible in routine surveillance and translate that signal into priorities for preparedness.

Rapid multi-country assessments are nevertheless valuable because they can identify a regional signal before complete season-end datasets become available. Such assessments

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must account for differences in reporting schedules, territorial units, clinical definitions and the likelihood that severe disease is more readily detected than mild or asymptomatic infection. The present study therefore aimed to reconstruct the temporal and spatial progression of locally acquired human WNV cases in Europe between 27 May and 29 July 2026, compare the 2026 late-July burden with recent seasons, describe available clinical severity signals, and determine whether the multi-country pattern persisted after excluding Italy, the country with the largest reported burden.

2. Materials and Methods

2.1 Study Design and Data Sources

We conducted a secondary descriptive surveillance study using publicly available data on human WNV infection in Europe. The core study period extended from 27 May to 29 July 2026 and comprised 10 surveillance cut-offs spanning epidemiological weeks 22-31. Data were compiled from European Centre for Disease Prevention and Control (ECDC) surveillance outputs, World Health Organization (WHO) Regional Office for Europe updates, and national or regional public health reports from Italy, Greece, North Macedonia, Romania, Spain, France and Germany. The ECDC and European Food Safety Authority (EFSA) surveillance report and established European indicator- and event-based surveillance approaches were used to align the interpretation of reported events [5,8]. Recent national and regional outbreak investigations were also considered when defining country-level clinical variables and reporting limitations [9,10].

The primary analytical unit was the surveillance cut-off, represented by cumulative locally acquired human case counts and cumulative numbers of affected countries and administrative areas. Country-level and area-level records were organised by surveillance date. Because the source reports did not provide a fully harmonised territorial level across countries, each administrative area was retained as reported by the relevant public health authority. Areas for which public sources confirmed transmission but did not provide an area-specific case count were retained as affected areas without an assigned case total.

2.2 Inclusion and Exclusion Criteria

We included locally acquired human WNV infections reported within the European surveillance framework by the relevant cut-off date. Imported infections, animal cases and mosquito-positive records were excluded from the human case totals. Records were also excluded from area-specific case mapping when the public report did not identify a geographic unit or did not disaggregate the case count. However, an affected area was retained in the cumulative area total when the source explicitly identified that area as affected. The analysis therefore distinguished between evidence of geographic involvement and the availability of a numeric area-level case count.

2.3 Variables and Measures

2.3.1 Epidemiological Measures

The main epidemiological measures were cumulative reported cases, weekly newly reported cases, affected countries and affected administrative areas. Weekly newly reported cases were calculated as the difference between consecutive cumulative ECDC totals. These increments represent changes between surveillance cut-offs and should not be interpreted as cases with symptom onset during the same interval. Country-level burden was summarised as the number and percentage of all 158 cases, the number of affected areas, and the numbers of new cases and newly affected areas reported between 22 and 29 July 2026.

2.3.2 Clinical Severity Measures

Clinical variables included WNND, mild or febrile illness, asymptomatic blood-donor detection, other symptomatic presentation, unspecified clinical presentation, hospitalisation, discharge and death, where available. National clinical reports nearest to the 29 July cut-off were retained with their original dates, case definitions and denominators. Clinical severity measures were not pooled across countries when reporting dates, denominators or definitions differed. Consequently, country-specific percentages describe the composition of reported cases within each source and not the risk of severe disease among all WNV infections in the population.

2.4 Descriptive and Spatiotemporal Analysis

Temporal progression was described using successive cumulative totals and derived weekly increments. Geographic progression

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was described by the first ECDC appearance of each country, the cumulative number of affected administrative areas and the distribution of available area-specific case counts. Country contributions to the final weekly interval were compared descriptively. Results were reported as counts and percentages; no inferential significance testing was performed because the observations were incomplete surveillance aggregates at fixed reporting cut-offs rather than a probability sample from a defined population.

2.5 Historical Comparison and Sensitivity Analysis

The 2026 burden was compared with the closest available late-July surveillance cut-offs in 2023, 2024 and 2025. We compared cumulative locally acquired human cases and the numbers of affected countries and administrative areas. The affected-area total for 2024 was unavailable and was reported as not reported rather than estimated. To examine whether the regional signal was dominated by Italy, we repeated the aggregation after excluding Italy and calculated the numbers and proportions of cases, affected countries and affected areas remaining. We also summarised new cases and new affected areas outside Italy during 22-29 July.

2.6 Ethical Considerations

All analyses used publicly available, aggregated surveillance data. No identifiable individual-level information was accessed, no participants were recruited and no intervention was performed. Ethics approval and informed consent were therefore not required.

3. Results

3.1 Early-Season Temporal Expansion

European surveillance documented a progressive increase in locally acquired human WNV infections from 27 May to 29 July 2026 (Figure 1). At the 27 May cut-off, one case was reported in one country and one affected area, and the total remained unchanged through 10 June. By 17 June, totals had increased to three cases across two countries and three areas, remaining unchanged on 24 June. They subsequently rose to six cases in three countries and six areas by 1 July and to 12 cases in five countries and 11 areas by 8 July. Cases reached 34 across five countries and 28 areas by 15 July, then 81 across six countries and 35 areas by 22 July. By 29 July, 158 cases were reported across seven countries and 49 areas, including 77 newly reported cases during the final interval. The final interval contributed 48.7% of the cumulative case burden and 14 newly affected areas. The cumulative case count increased by 95.1% between 22 and 29 July, indicating that the expansion was still accelerating at the study cut-off.

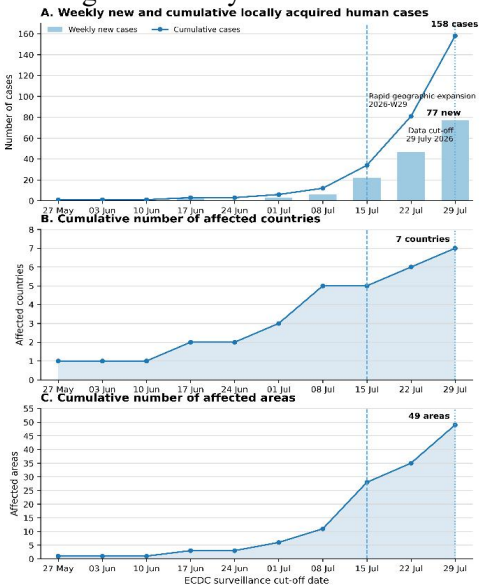


Figure 1. Weekly Growth and Geographic Expansion of Locally Acquired Human West Nile Virus in Europe

Note: Panel A shows weekly newly reported cases and cumulative cases. Panels B and C show cumulative affected countries and administrative areas. Weekly increments are differences between consecutive ECDC reports. Imported infections, animal cases and mosquito-positive records were excluded. The dashed line marks epidemiological week 29, and the dotted line marks the 29 July 2026 cut-off. ECDC, European Centre for Disease Prevention and Control.

3.2 Country-Level and Geographic Distribution

By 29 July 2026, locally acquired human WNV cases had been reported from North Macedonia, Italy, Romania, Greece, Spain, France and Germany (Figure 2). North Macedonia appeared in the surveillance series in the week ending 27 May, followed by Italy on 17 June, Romania on 1 July, Greece and Spain on 8 July, France on 22 July and Germany on 29 July. The largest concentration occurred in Italy, particularly in

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northern and central provinces, with additional affected areas in Greece and more dispersed foci in Romania, North Macedonia, Spain, France and Germany.

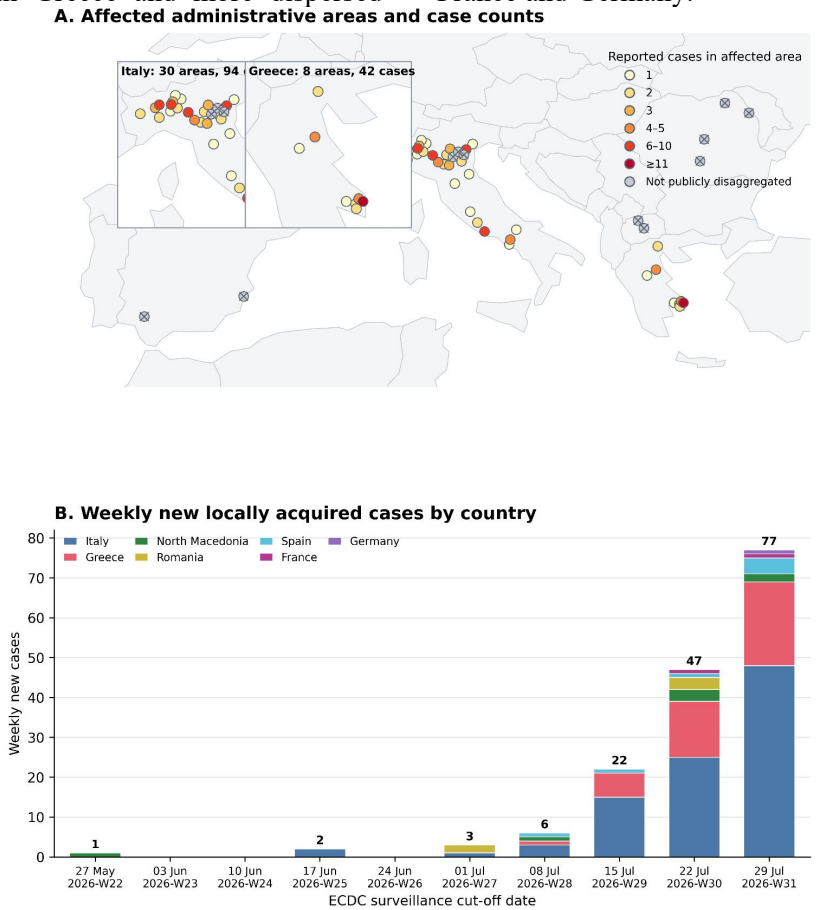


Figure 2. Geographic Distribution and Country-Specific Weekly Burden of Locally Acquired Human West Nile Virus in Europe

Note: Panel A shows affected administrative areas as of 29 July 2026. Marker colour denotes the reported area-level case count; crossed grey markers identify affected areas without publicly disaggregated counts. Insets enlarge Italy and Greece. Panel B shows weekly newly reported locally acquired human cases by country. Imported infections, animal cases and mosquito-positive records were excluded.

Country-level characteristics are presented in Table 1. Italy accounted for 94 cases (59.5%) in 30 areas, followed by Greece with 42 cases (26.6%) in eight areas. Together, Italy and Greece represented 136 cases, or 86.1% of the European total. North Macedonia and Spain each reported seven cases, Romania reported five, France reported two and Germany reported one. During 22-29 July, Italy contributed 48 cases and 10 newly affected areas, while Greece contributed 21 cases and two newly affected areas. The remaining countries contributed eight new cases and two newly affected areas during the same interval.

Table 1. Country-Level Spatiotemporal Characteristics of Locally Acquired Human West Nile Virus in Europe

Country or Geographical Scope	First ECDC Report	Cases, n (% of 158)	Affected Areas, n	New Cases, 22-29 Jul, n	New Areas, 22-29 Jul, n
Italy	17 Jun 2026	94 (59.5)	30	48	10
Greece	08 Jul 2026	42 (26.6)	8	21	2
North Macedonia	27 May 2026	7 (4.4)	2	2	0
Romania	01 Jul 2026	5 (3.2)	4	0	0
Spain	08 Jul 2026	7 (4.4)	2	4	0
France	22 Jul 2026	2 (1.3)	2	1	1
Germany	29 Jul 2026	1 (0.6)	1	1	1

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All Europe	**27 May 2026**	**158 (100.0)**	**49**	**77**	**14**
Europe Excluding Italy	**27 May 2026**	**64 (40.5)**	**19**	**29**	**4**

Note: The core surveillance cut-off was 29 July 2026. Weekly new cases and new areas refer to the interval from 22 to 29 July. ECDC, European Centre for Disease Prevention and Control.

3.3 Historical Comparison

At the closest available late-July surveillance cut-offs, the 2026 season had the highest cumulative burden among the four years compared (Figure 3A). By 29 July 2026, 158 cases had been reported, compared with five by 26 July 2023, 69 by 31 July 2024 and 40 by 23 July 2025. The 2026 count was therefore more than twice the 2024 total and nearly four times the 2025 total, although the comparison dates were not identical.

Seven countries were affected in 2026, compared with eight in 2024 and three in both 2023 and 2025. The number of affected administrative areas was also higher in 2026, with 49 areas compared with five in 2023 and 15 in 2025. The corresponding area total for 2024 was not publicly reported, preventing a complete four-year comparison of geographic extent.

3.4 Clinical Severity Signals

Clinical profiles were described using report-specific denominators (Figure 3B). Greece provided the clearest same-cut-off severity profile: 37 of 42 locally acquired cases (88.1%) were classified as WNND, five (11.9%) were mild or febrile, and four deaths (9.5%) were reported by 29 July. In Italy, the nearest national clinical report recorded 37 neuroinvasive cases among 84 cases (44.0%) and two deaths, although the denominator was not fully harmonised with the ECDC locally acquired case definition.

All eight nationally registered cases in North Macedonia were reported as neuroinvasive and hospitalised, while Romania reported two deaths among eight cases in the nearest national update. The available profiles suggested a substantial burden of severe disease among detected cases, but differences in dates, case definitions and denominators precluded pooled European severity estimates.

3.5 Sensitivity Analysis Excluding Italy

After excluding Italy, 64 cases remained, representing 40.5% of the European total. These cases were distributed across six of the seven affected countries (85.7%) and 19 of the 49 affected areas (38.8%) (Figure 3B). During 22-29 July, countries other than Italy contributed 29 newly reported cases and four newly affected areas. The persistence of cases, countries and affected areas after removing the largest contributor indicates that the observed early-season signal was not attributable to Italy alone.

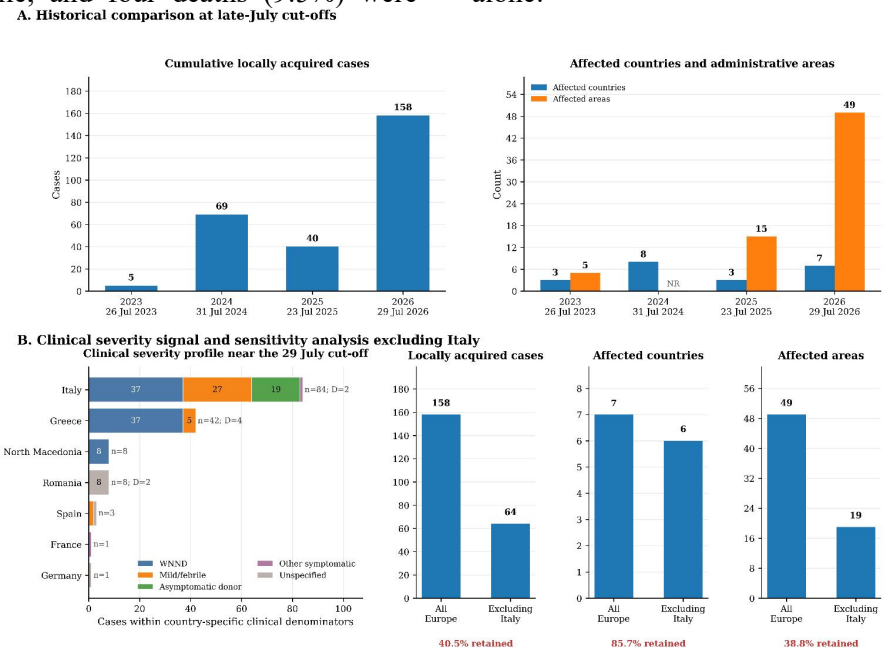


Figure 3. Historical Burden, Clinical Severity, and Italy-Excluded Sensitivity Analysis of West Nile Virus in Europe

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Note: Panel A compares cumulative locally acquired human cases and affected countries and administrative areas at the closest available late-July cut-offs in 2023-2026. The 2024 affected-area count was not reported (NR). Panel B presents country-specific clinical profiles nearest to 29 July 2026 and the sensitivity analysis excluding Italy. WNND, West Nile neuroinvasive disease; n, country-specific clinical denominator; D, reported deaths; NR, not reported.

4. Discussion

4.1 Principal Findings

This study documents sustained early-season, multi-country WNV transmission in Europe during 2026. The surveillance series progressed from one reported case in one country and one affected area on 27 May to 158 cases in seven countries and 49 areas by 29 July. Growth accelerated in July, and almost half of the cumulative cases were reported in the final weekly interval. Although Italy carried the largest national burden, the sensitivity analysis retained 64 cases across six countries and 19 areas, demonstrating that the signal extended beyond a single high-burden country.

The combination of early detection, repeated weekly increases and widening geographic involvement is epidemiologically important even though the data are descriptive. The pattern is consistent with broader evidence that WNV has established complex and recurrent transmission networks in Europe [6]. Recent outbreaks in Italy and increased WNV and Usutu virus activity in Austria further illustrate the capacity for rapid local amplification and geographic spread under favourable conditions [9,10].

4.2 Interpretation in the European Context

Several processes may contribute to early-season and multi-country expansion, including temperature-dependent mosquito development, vector abundance, avian host movement, land use, rainfall patterns and the persistence or repeated introduction of viral lineages. Climate-attribution modelling has shown that long-term warming has increased ecological suitability for WNV circulation across parts of Europe [7], while phylogeographic analysis indicates that viral movement is shaped by both short- and long-distance dispersal [6]. The present analysis did not include meteorological, ecological, entomological or genomic variables, so it cannot attribute the 2026 pattern to any specific driver.

The apparent clinical severity must also be interpreted cautiously. The high proportion of reported WNND in Greece and the severe profiles reported in North Macedonia may partly reflect surveillance systems that preferentially identify hospitalised or neurologically affected patients. A population seroprevalence investigation after the 2010 Greek outbreak showed that infections substantially outnumbered recognised neuroinvasive cases [11]. Therefore, the clinical proportions in this study describe reported case profiles and should not be interpreted as population-level probabilities of neuroinvasive disease or death.

4.3 Public Health Implications

Immediate public health action should combine strengthened human, animal and mosquito surveillance with timely laboratory confirmation in all affected countries. Clinicians should consider WNV infection in patients with fever, meningitis, encephalitis or acute flaccid paralysis, particularly in areas reporting recent transmission, and should promptly notify public health authorities. Communication with clinicians is especially important early in the season, when awareness may lag behind changing transmission conditions.

Blood services should activate risk-based donor screening, temporary deferral or pathogen-reduction measures in affected areas, while transplant programmes should reinforce donor risk assessment for organs, tissues and cells. Vector-control activities should be targeted to locations with evidence of human, animal or mosquito infection and accompanied by public communication on personal protection against mosquito bites. Because reporting systems and administrative units differ between countries, rapid cross-border exchange of harmonised country- and area-level data is essential for recognising regional expansion and coordinating protective measures.

The study also highlights the practical value of transparent weekly data. Area-level reporting makes it possible to identify geographic widening before complete clinical datasets are available, whereas report-specific denominators help prevent inappropriate pooling of severity

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estimates. Integrating indicator-based surveillance with event-based information has previously improved European WNV risk mapping [8]. Wider adoption of consistent machine-readable reporting could further accelerate situational assessment and reduce avoidable discrepancies between national and regional summaries.

The findings also have implications for preparedness planning. A response triggered only by national case totals may underestimate risk when transmission is dispersed across multiple administrative areas or neighbouring countries. Conversely, a sharp increase in reported cases may partly reflect delayed notification rather than a sudden biological change. Decision-makers should therefore consider case counts together with the number of newly affected areas, the timing of reports, evidence from mosquitoes and animals, and the capacity of local health systems to detect mild disease. A tiered approach, in which enhanced surveillance and blood-safety measures are activated when several indicators align, may be more robust than reliance on a single threshold.

4.4 Strengths and Limitations

A major strength of this study is the use of a common core cut-off to reconstruct the progression of a rapidly evolving event across multiple countries. The analysis combined temporal growth, country-level burden, administrative-area expansion, clinical severity signals, historical comparison and an Italy-excluded sensitivity analysis. This multidimensional approach provides a broader assessment than a single-country outbreak description and directly tests whether the European signal depends on the country reporting the largest number of cases.

Several limitations should be considered. First, weekly increments represented newly reported cases rather than infections classified by symptom-onset date and were therefore influenced by reporting delays, retrospective updates and differences in national publication schedules. Second, surveillance sensitivity varied between countries, and mild or asymptomatic infections were probably under-ascertained. Third, the administrative units used to define affected areas were not fully harmonised. Fourth, clinical reports used different denominators and case definitions, preventing pooled severity estimates. Similar concerns about the comparability of preliminary epidemic data have been documented in other European surveillance contexts [12].

Fifth, the historical comparison used the closest available late-July cut-offs rather than identical dates, covered only three preceding years and lacked the 2024 affected-area total. It therefore supports a statement of higher burden within the selected comparison period but cannot establish that 2026 was unprecedented over a longer historical horizon. Finally, the analysis excluded animal, mosquito, meteorological, mobility and genomic data and could not evaluate transmission pathways, causal drivers or individual-level risk factors.

4.5 Future Research

Future analyses should extend through the complete 2026 transmission season and compare the observed trajectory with longer historical baselines. Harmonised human, animal and mosquito surveillance should be linked with temperature, precipitation, land-use, vector abundance, bird-host and human-mobility data. Prospective spatiotemporal models could then evaluate short-term forecasting performance and identify locations where intensified surveillance or vector control may have the greatest value. Previous European modelling demonstrates that spatial and environmental information can improve prediction of WNV risk [13].

Further work should also standardise reporting of symptom-onset date, hospitalisation, neuroinvasive disease, deaths, blood-donor infections and the territorial level used for geographic summaries. Where feasible, serological studies could quantify the gap between detected cases and total infections, while genomic analyses could distinguish local persistence from new introductions. These additions would convert rapid descriptive surveillance into a more complete One Health assessment of regional transmission.

5. Conclusion

By 29 July 2026, Europe was experiencing sustained early-season multi-country transmission of WNV, with 158 locally acquired human cases across seven countries and 49 affected areas. The series progressed from one case on 27 May to 77 newly reported cases in the final weekly interval, demonstrating rapid temporal growth and

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geographic expansion. The late-July burden exceeded comparable observations in 2023-2025, and excluding Italy still left 64 cases across six countries and 19 areas. These findings support coordinated surveillance of humans, animals and mosquitoes, timely clinical recognition and laboratory confirmation, strengthened vector control and risk communication, and prompt blood, organ, tissue and cell safety measures. Rapid cross-border reporting and harmonised data sharing remain essential while transmission continues to expand.

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Authors' Contributions

C.C., an undergraduate student in Class 1 of the 2025 cohort of the Mathematics and Applied Mathematics programme at the School of Mathematics and Statistics, Leshan Normal University, collected, organised and verified the publicly available data, prepared the figures and tables, and contributed to the data analysis and revision of the manuscript. G.L. conceived and designed the study, developed the methodology, performed and supervised the data analysis, interpreted the results, wrote the original draft, and revised the manuscript. Both authors read and approved the final manuscript.

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