The effects of West Nile Virus and their economic factors

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Introduction

Since 2018, West Nile Virus (WNV) outbreaks are reported in Germany in birds, horses and humans (Fig. 1a, b). Currently, there is no information on the impact of WNV in Germany, despite the symptoms in humans and horses (Fig. 1c). Aim of this survey is to identify studies around the world that calculated the impact of WNV on humans and animals.

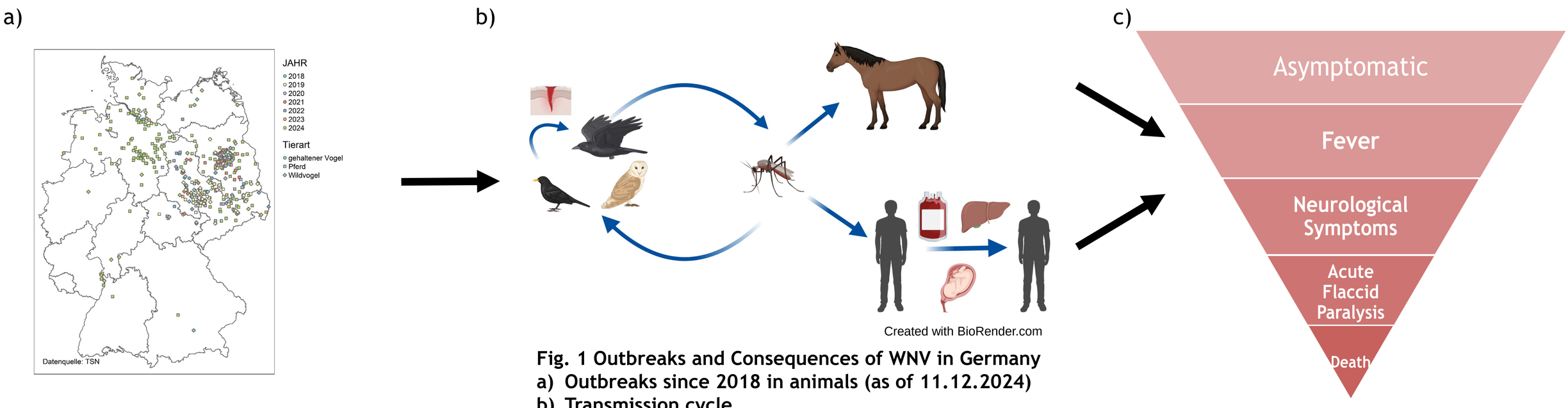


Fig. 1 Outbreaks and Consequences of WNV in Germany
a) Outbreaks since 2018 in animals (as of 11.12.2024)
b) Transmission cycle
c) Clinical implications in horses and humans

Material and Methods

We conducted a literature search in three databases using the terms <West Nile virus> OR <WNV> AND <economic> in the title or abstract and, after removing duplicates and irrelevant papers, included 77 papers in our review (Figure 2). The papers were analysed according to the disease impact as well as costs for control measures.

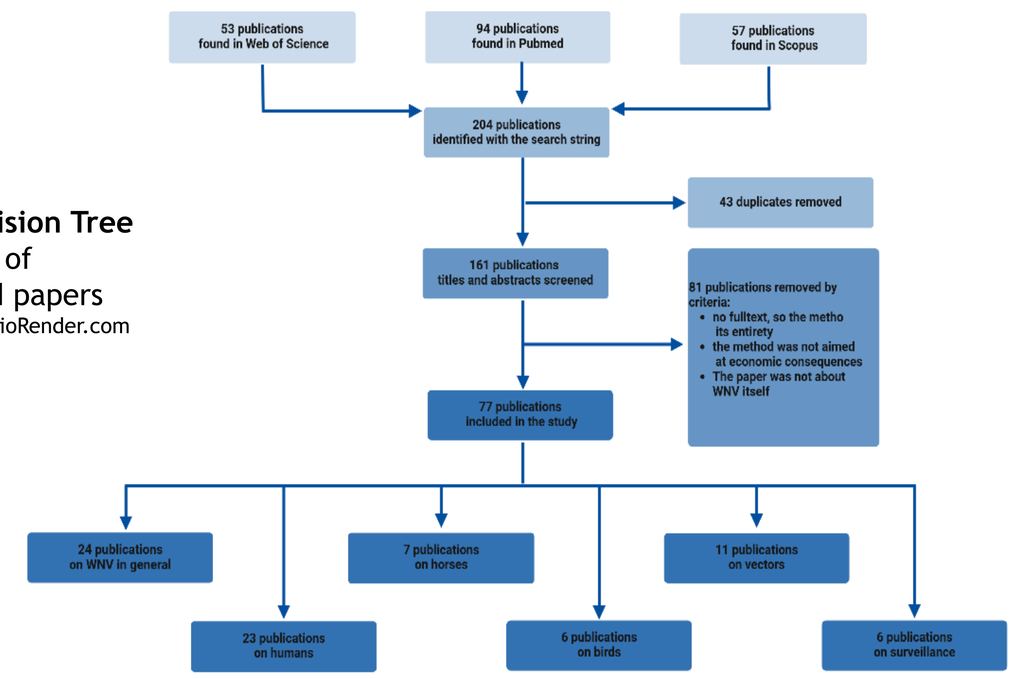
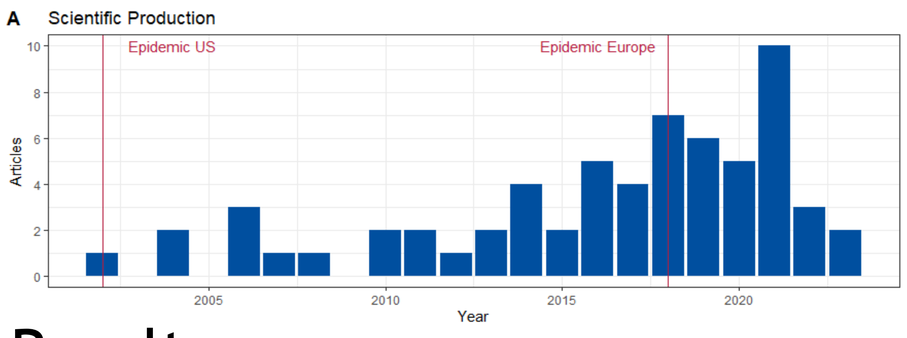


Fig. 2 Decision Tree
And topics of researched papers
Created with BioRender.com

		Costs min		Costs max.	unit[1]	Country
	Vector control	103 k	-	4.012 k	€/year	IT, GR
	Surveillance	15 k	-	596 k	€/year	IT, GR
Treatment	Human	44	-	396 k	€/case	US, IT, BE, GR
	-stationary	702	-	396 k	€/case	US, IT, BE, GR
	-ambulatory	44	-	5.6 k	€/case	US, IT, BE, GR
Treatment	Horse	103	-	6 k	€/case	BE, US
	-stationary	740	-	6 k	€/case	BE, US
	-ambulatory	103	-	256	€/case	BE, US

Tab. 1 Costs in association with WNV
(BE = Belgium, GR = Greece, IT = Italy, US = United States)
[1] US$ are converted into € (1 € = 0.89977 US$)



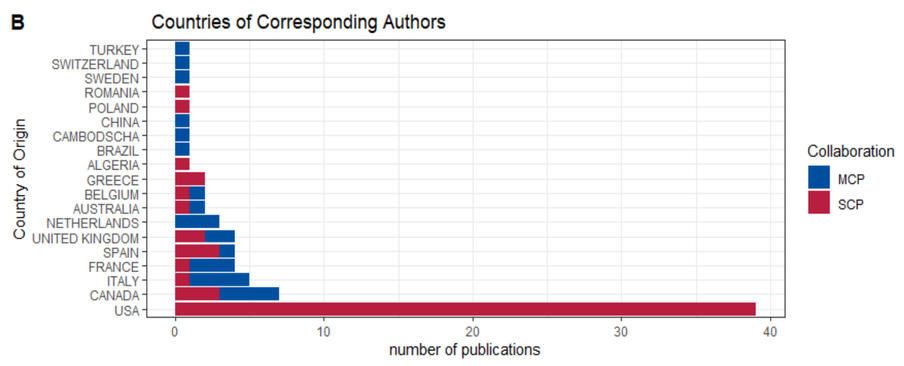


Fig. 3 Bibliometric Analysis
A: Scientific production
With the Epidemic in the US in 2002 and in Europe in 2018
B: Countries of corresponding authors
MCP: multi-country publications
SCP: single-country publications

Results

In general, there are few studies on the impact of WNV compared to other diseases. Although the USA published as many manuscripts (n=31, Figure 3) as any other country, the focus was mainly on clinical and general disease costs in humans. Impact in humans and horses varied widely between studies and countries (Table 1). The costs of treatment were depending on clinical implications and related to time spend in hospital, general period of illness and chronical effects. Treatment could include only diagnostics or hospital costs, loss of productivity and rehabilitation up to 8 years after initial infection.

Conclusion

Despite multiple WNV outbreaks worldwide, studies on the impact of the disease are rare. To develop cost effective control programs, a general disease impact framework should be developed.

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