

# Risk Assessment of Arboviruses in Brazil (Country-wide, States and State Capitals)

2025-08-29

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## 1. Gathering Data

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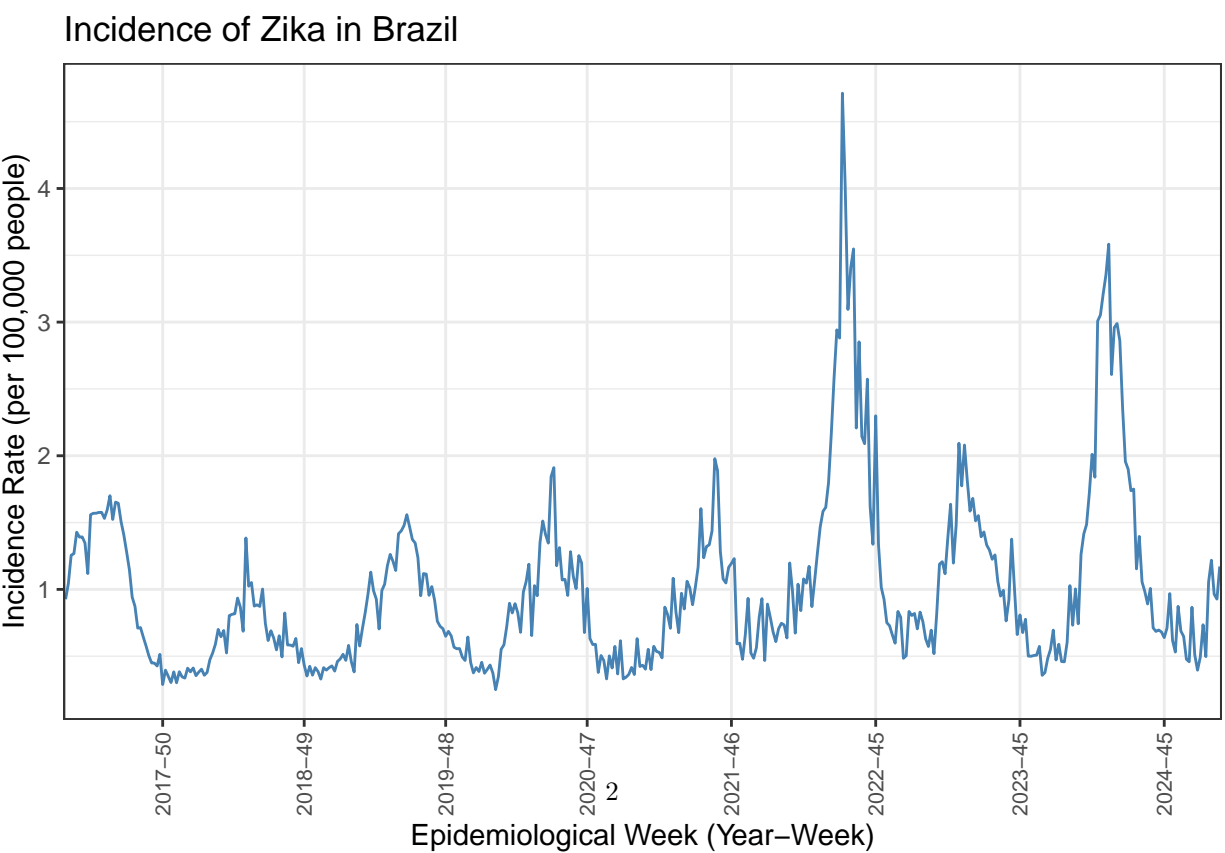
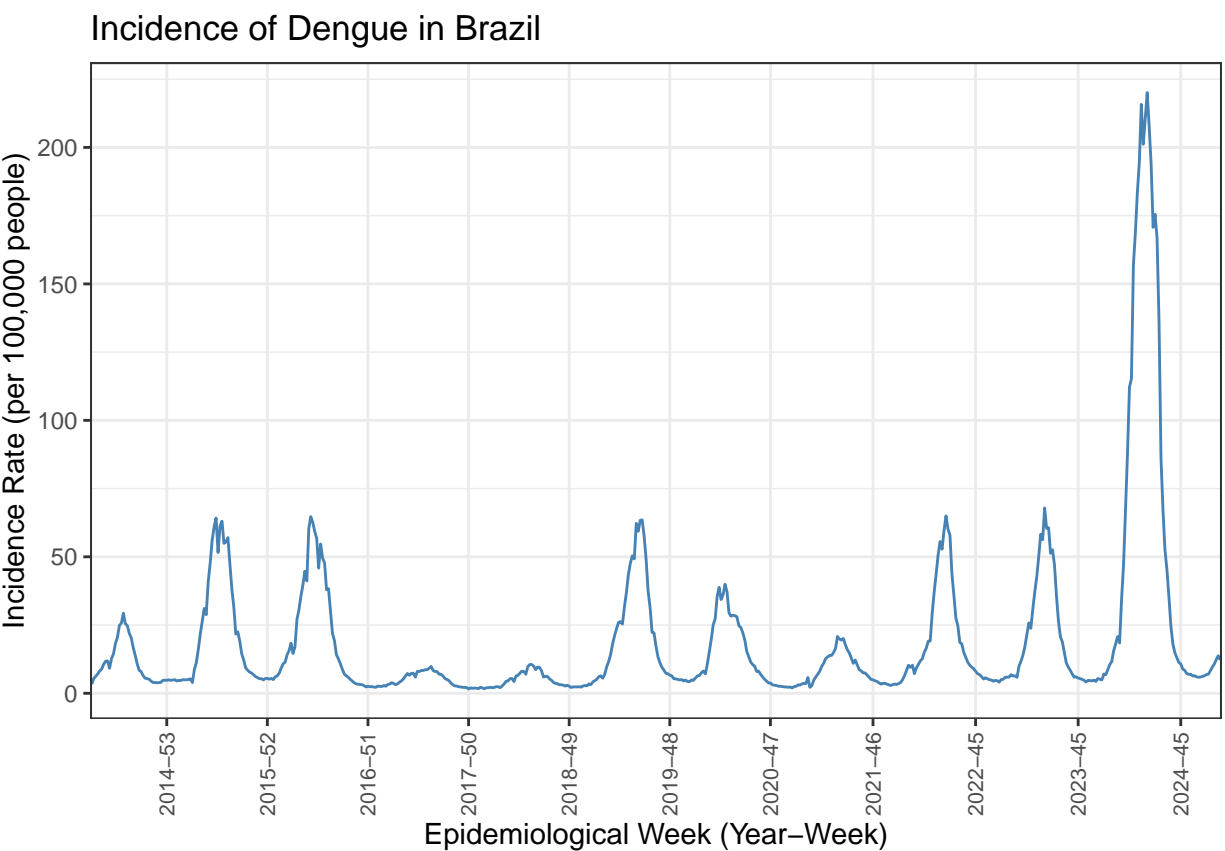
## 2. Preparing Data

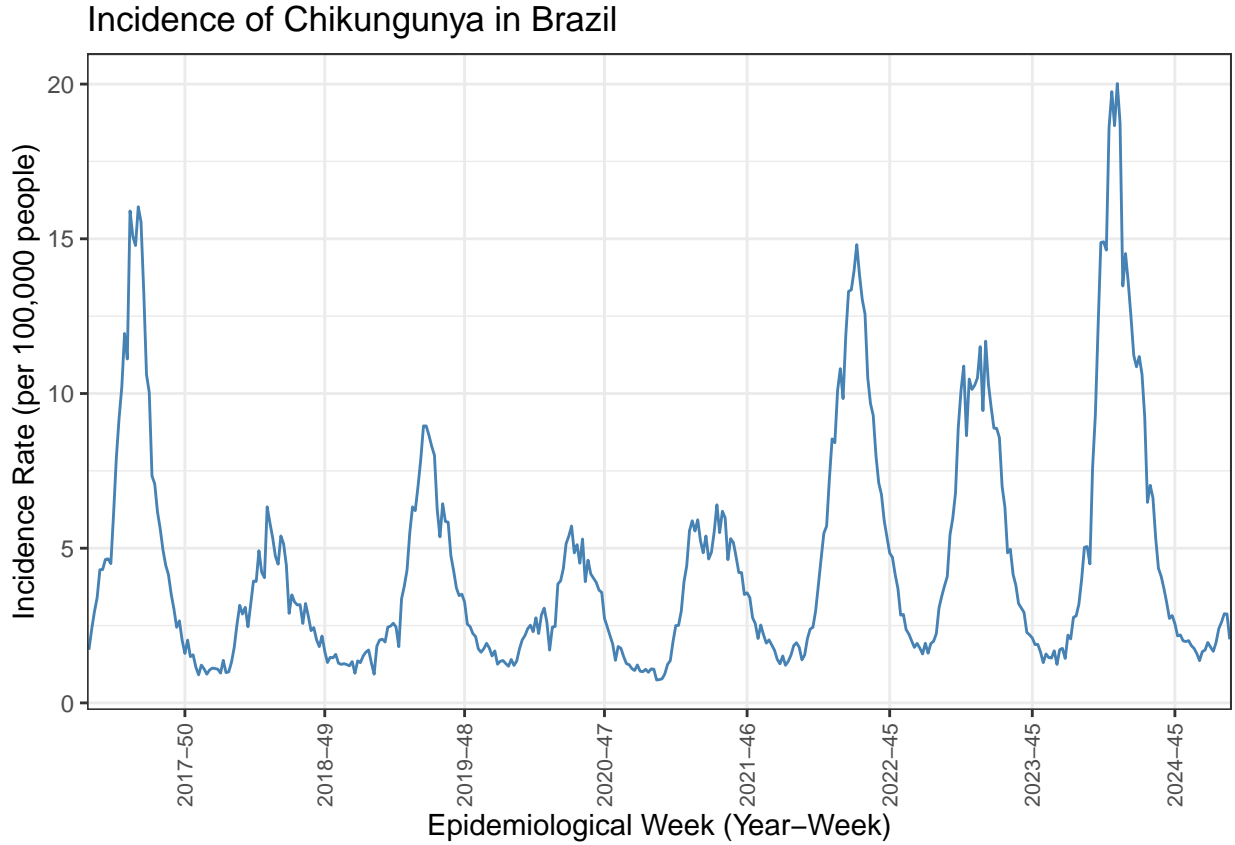
Grouping by Municipality, State, and Country

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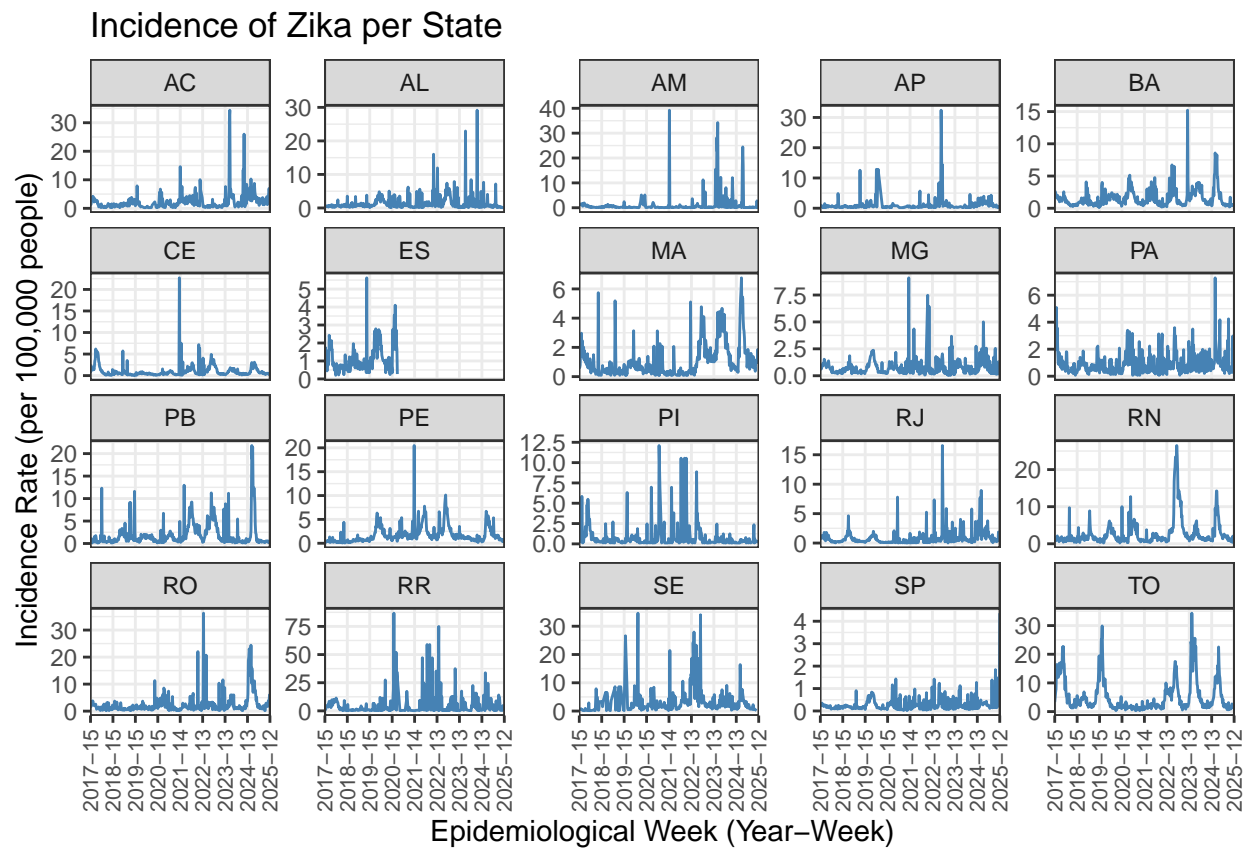
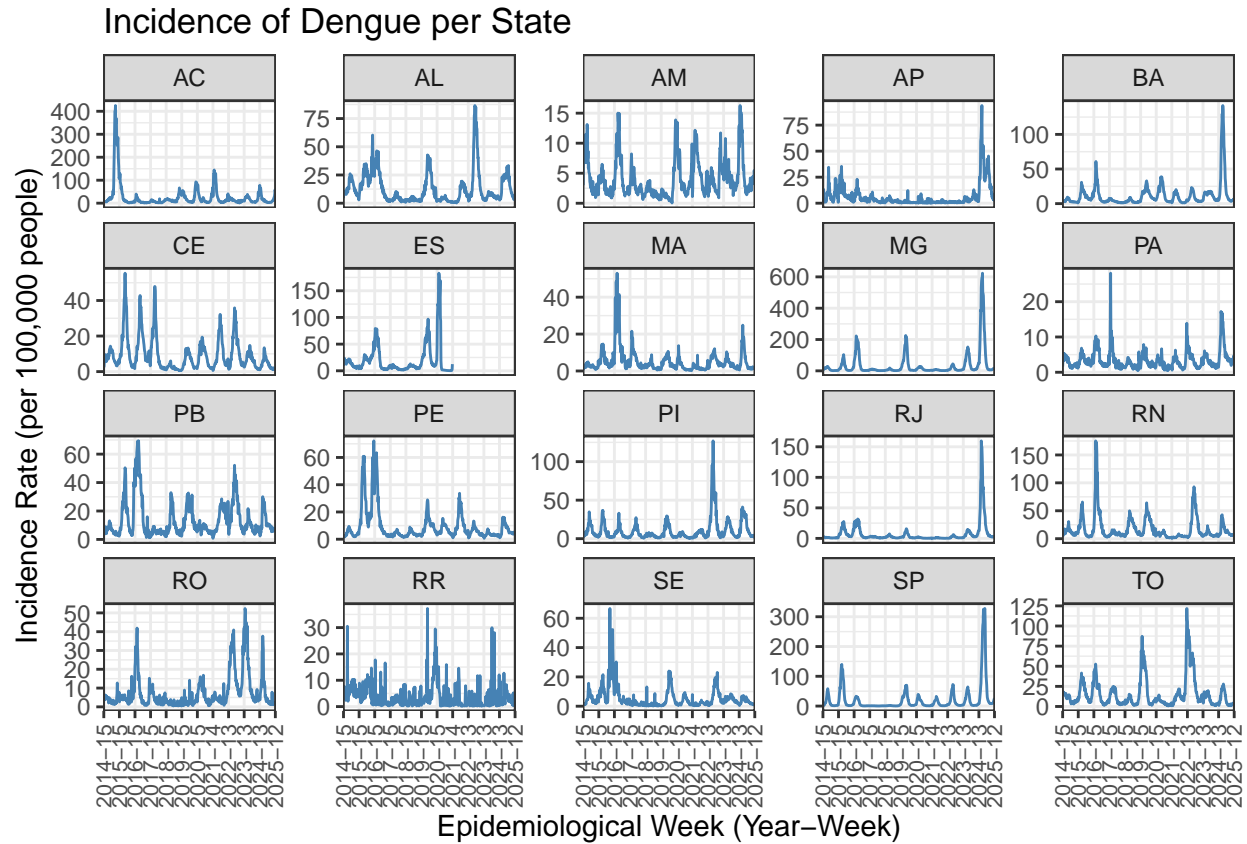
### 3. Descriptive Incidence Graphs

#### 3.1. Country-wide Incidence

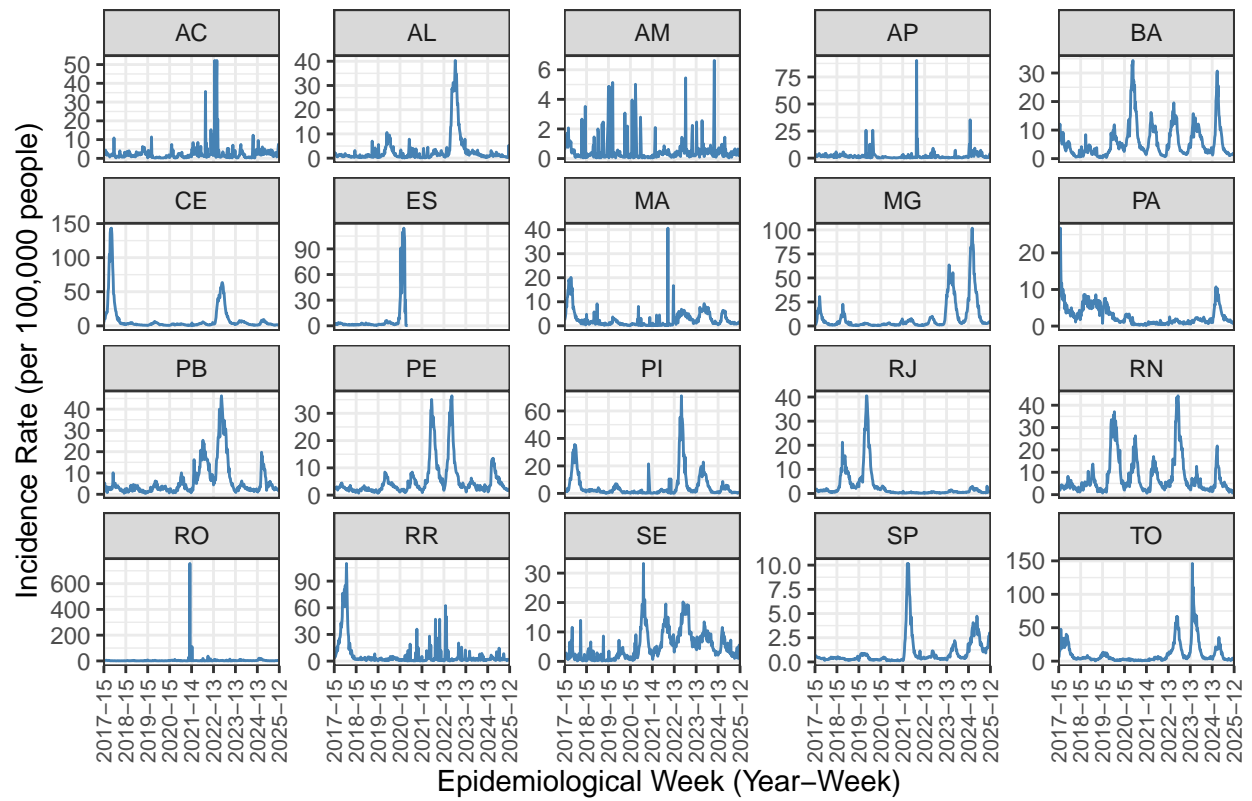




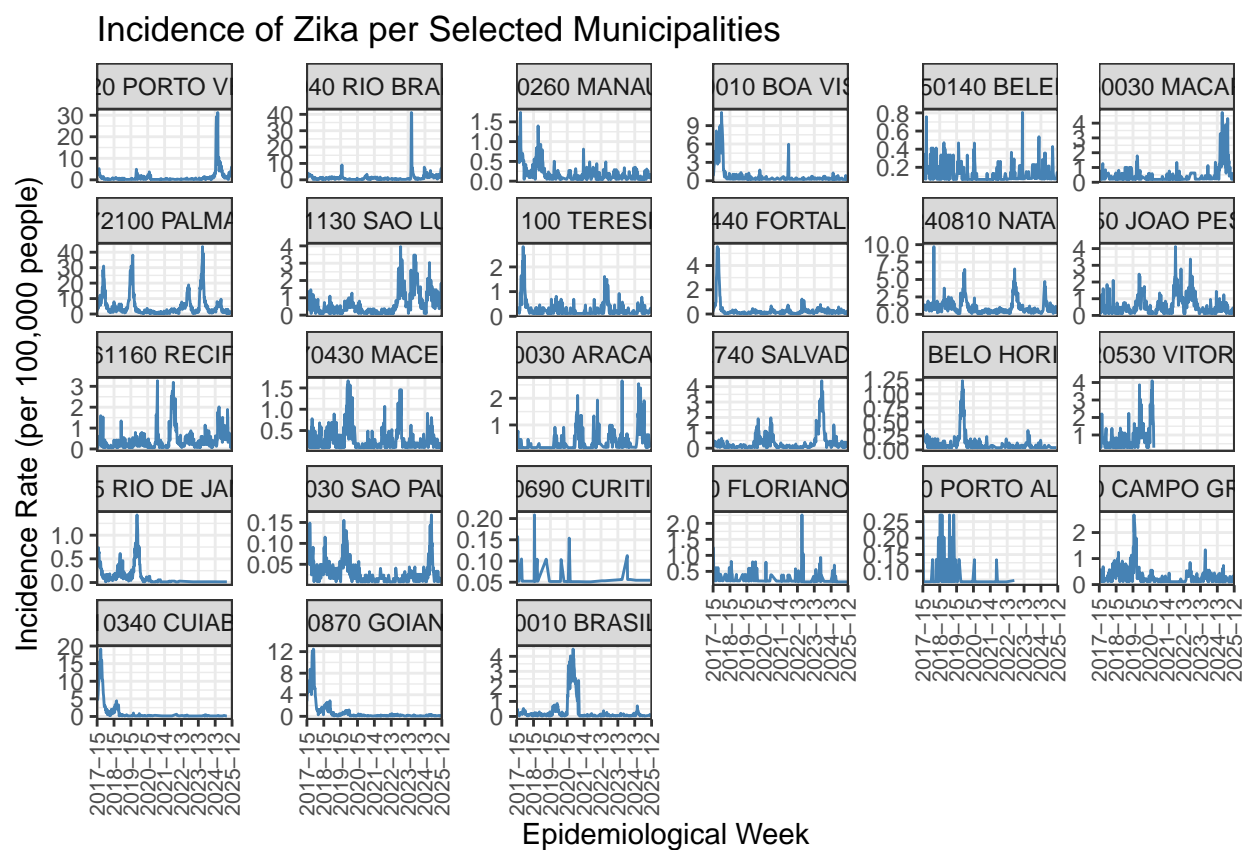
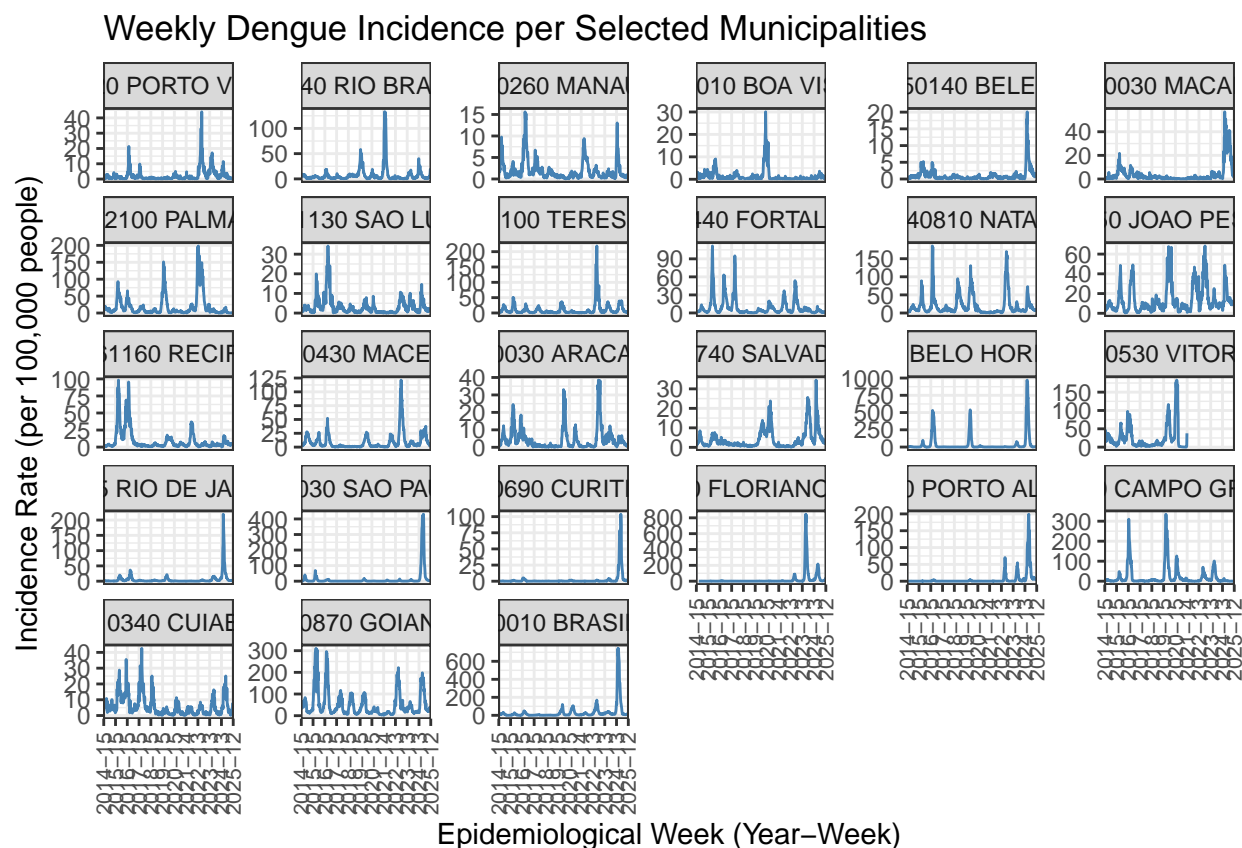
### 3.2. State-level Incidence



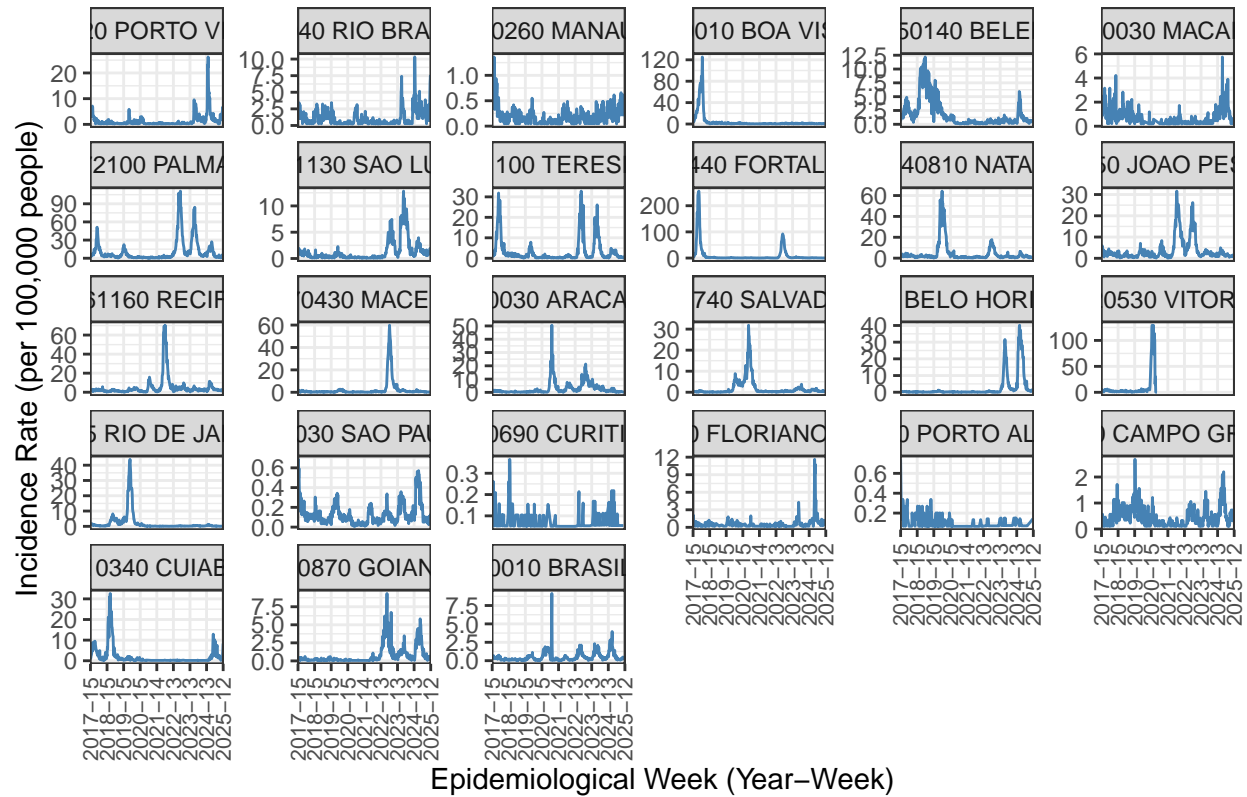
## Incidence of Chikungunya per State



### 3.3. Selected Municipalities Incidence



### Incidence of Chikungunya per Selected Municipalities



## 4. Risk Assessment Function

## 5. Risk Assessment - Country Level

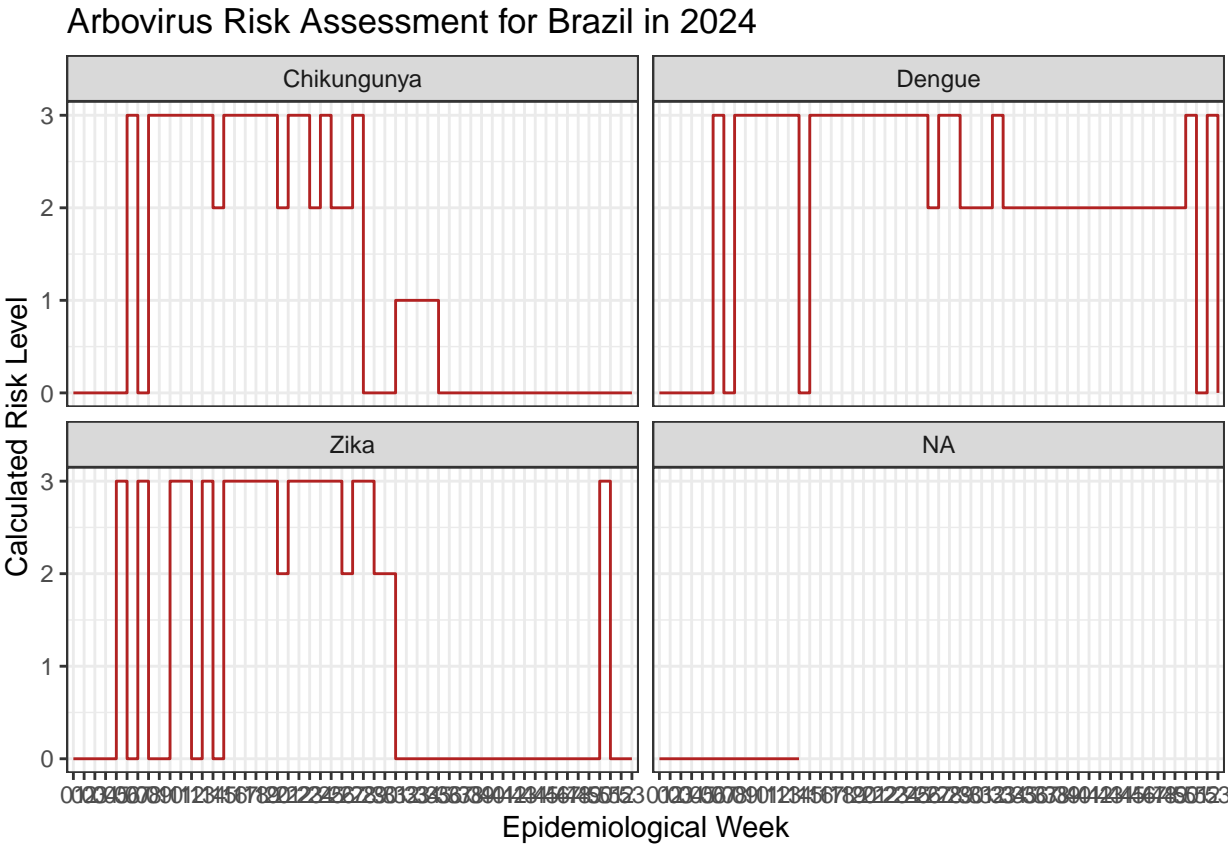
Running risk assessment

Table of epidemic years for Brazil

Tabela 1: Epidemic Years of Arboviruses for Brazil

Country	Virus	Epidemic Years
Brazil	Chikungunya	2023
Brazil	Dengue	2015, 2016, 2019, 2021, 2023
Brazil	Zika	2022, 2023

Plotting Risk Assessment for Brazil in 2024



6. Risk Assessment - State Level

Running risk assessment

Table of epidemic years per state

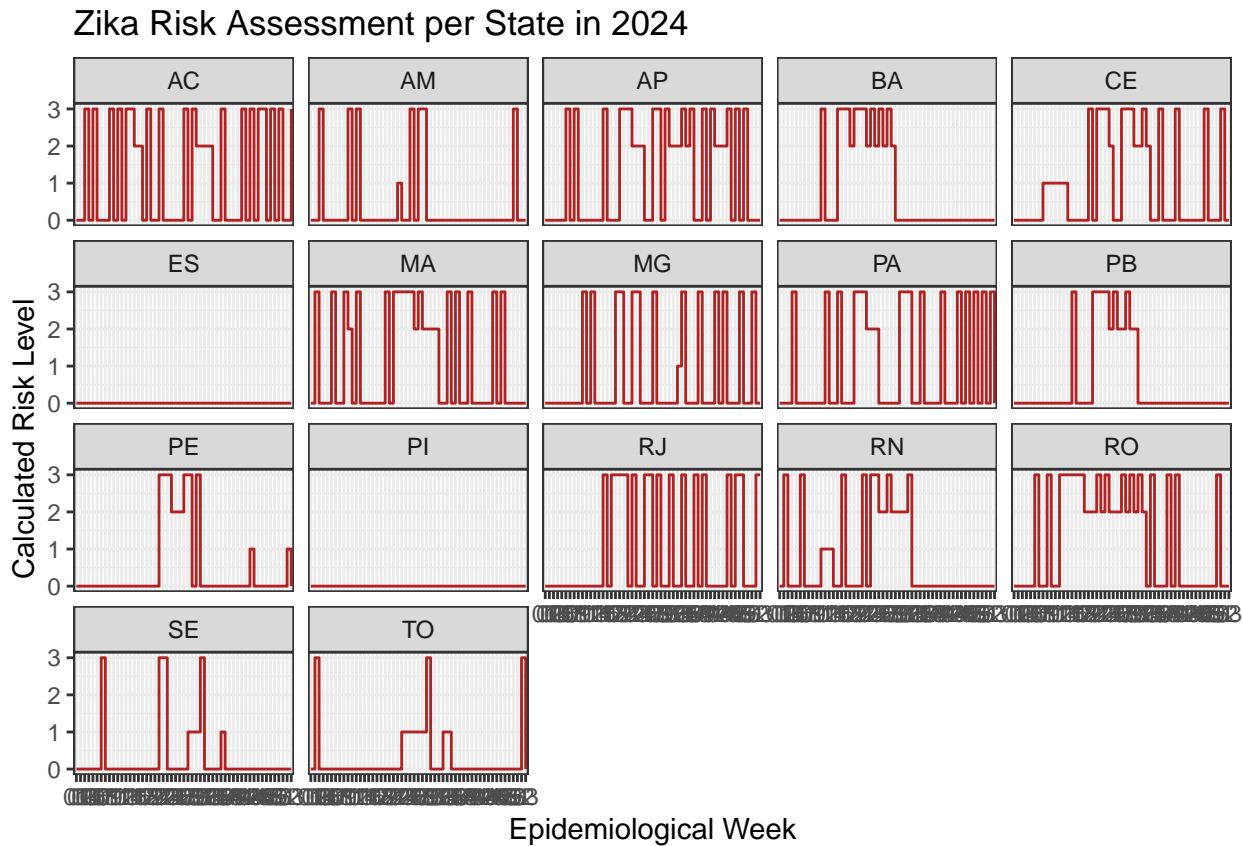
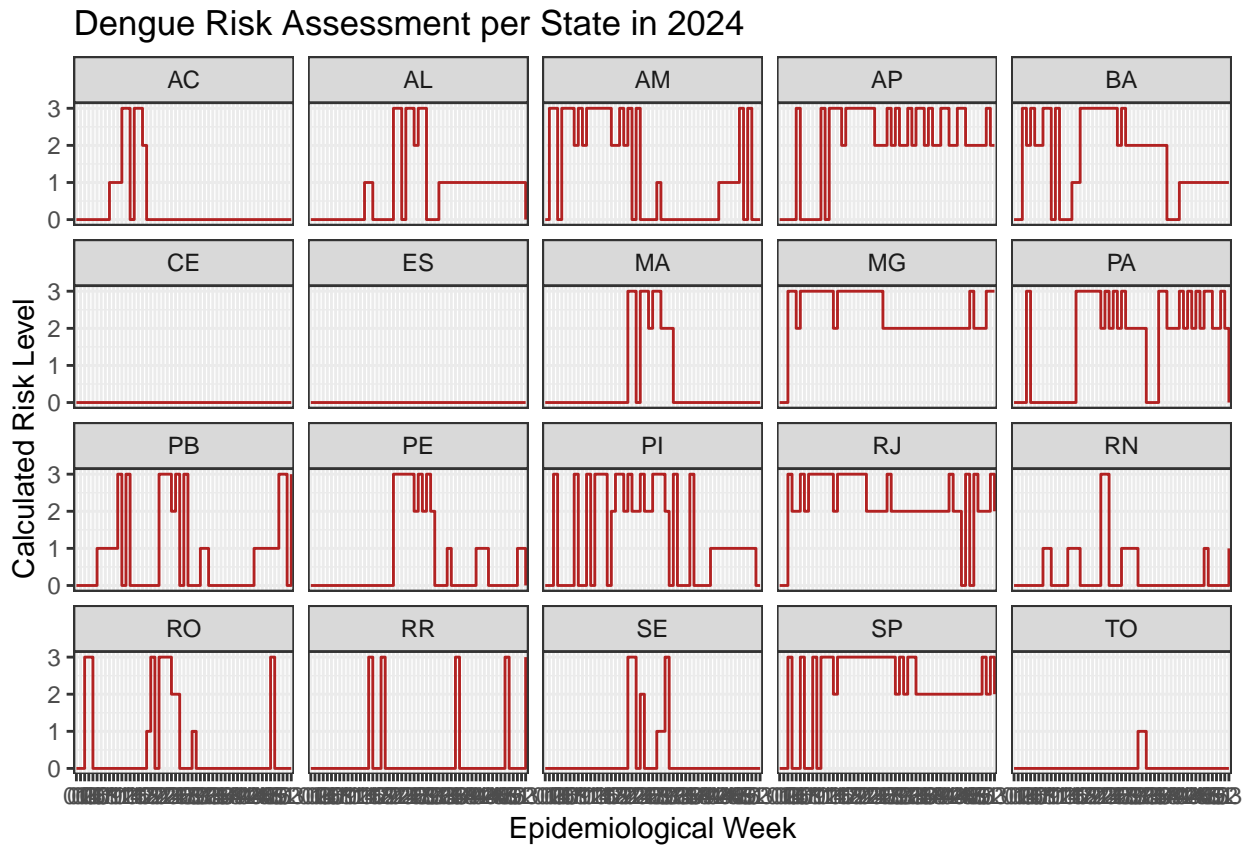
Tabela 2: Epidemic Years of Arboviruses by State

State	Virus	Epidemic Years
AC	Chikungunya	2017, 2019, 2020, 2021, 2022
AC	Dengue	2014, 2015, 2020, 2021
AC	Zika	2021, 2022, 2023
AL	Chikungunya	2022, 2023
AL	Dengue	2016, 2022
AM	Dengue	2016, 2020, 2021, 2022, 2023
AM	Zika	2020, 2021, 2022, 2023
AP	Chikungunya	2017, 2018, 2019, 2021
AP	Dengue	2014, 2015, 2016, 2023

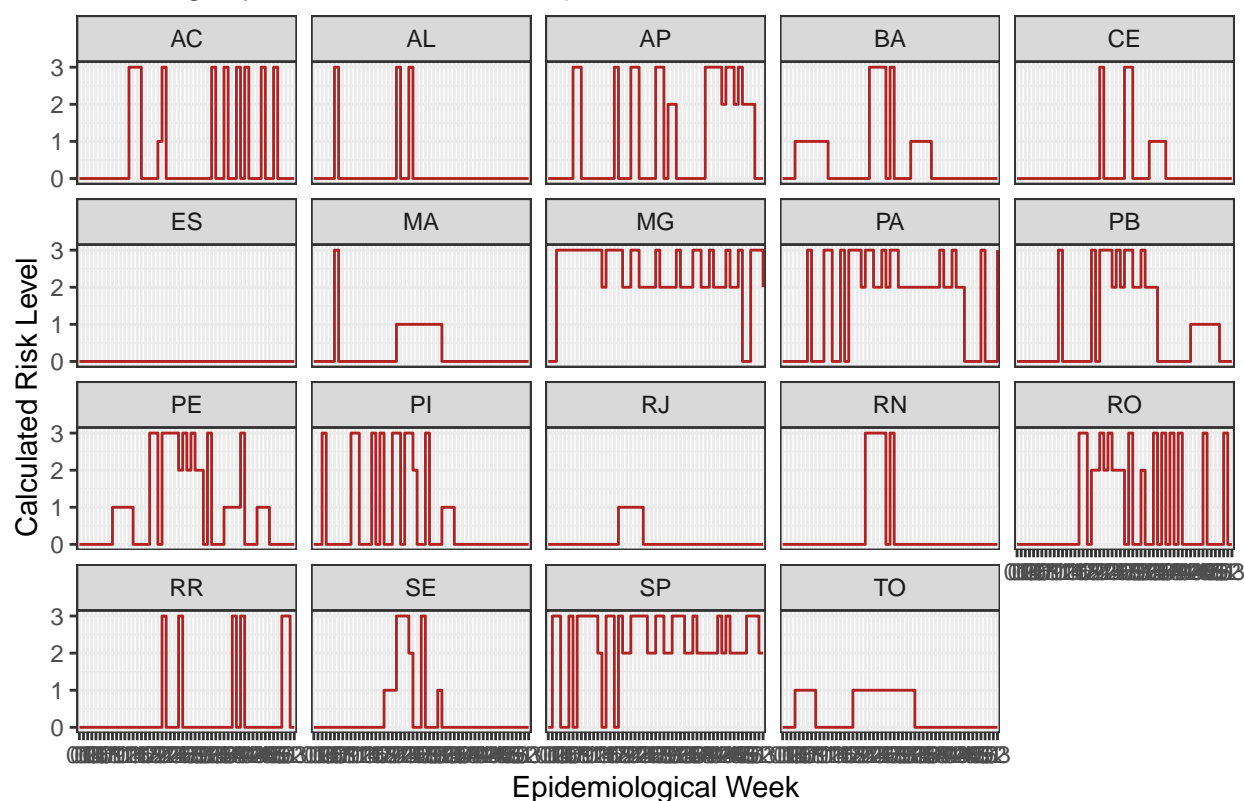


State	Virus	Epidemic Years
AP	Zika	2019, 2022
BA	Chikungunya	2020
BA	Dengue	2016, 2019, 2020
BA	Zika	2017, 2019, 2022, 2023
CE	Chikungunya	2017, 2022
CE	Dengue	2015, 2017
CE	Zika	2017, 2018, 2021, 2022
ES	Dengue	2016, 2019, 2020
MA	Chikungunya	2017, 2021, 2022
MA	Dengue	2015, 2016, 2017
MA	Zika	2017, 2018, 2022, 2023
MG	Chikungunya	2023
MG	Dengue	2016, 2019, 2023
MG	Zika	2019, 2020, 2021
PA	Chikungunya	2017, 2018, 2019
PA	Dengue	2015, 2016, 2017, 2022
PA	Zika	2017, 2020, 2021, 2022, 2023
PB	Chikungunya	2021, 2022
PB	Dengue	2016, 2019, 2021, 2022
PB	Zika	2019, 2020, 2021, 2022, 2023
PE	Chikungunya	2021, 2022
PE	Dengue	2015, 2016, 2021
PE	Zika	2021, 2022
PI	Chikungunya	2017, 2018, 2022, 2023
PI	Dengue	2014, 2015, 2022, 2023
PI	Zika	2017, 2020, 2021, 2022
RJ	Chikungunya	2019
RJ	Dengue	2015, 2016
RJ	Zika	2018, 2020, 2021, 2022, 2023
RN	Chikungunya	2019, 2020, 2022
RN	Dengue	2016, 2019, 2020, 2022
RN	Zika	2017, 2020, 2022, 2023
RO	Chikungunya	2018, 2020, 2021, 2022, 2023
RO	Dengue	2016, 2019, 2021, 2022, 2023
RO	Zika	2020, 2021, 2022, 2023
RR	Chikungunya	2017, 2021, 2022, 2023
RR	Dengue	2014, 2015, 2016, 2019, 2020, 2021, 2023
SE	Chikungunya	2022
SE	Dengue	2015, 2016, 2019, 2022
SE	Zika	2019, 2022
SP	Chikungunya	2021, 2022
SP	Dengue	2015, 2016, 2019
TO	Chikungunya	2023
TO	Dengue	2021, 2022
TO	Zika	2017, 2019

Plotting Risk Assessment per State in 2024



## Chikungunya Risk Assessment per State in 2024



## 7. Risk Assessment - Municipality Level

### Running risk assessment

### Table of epidemic years per municipality

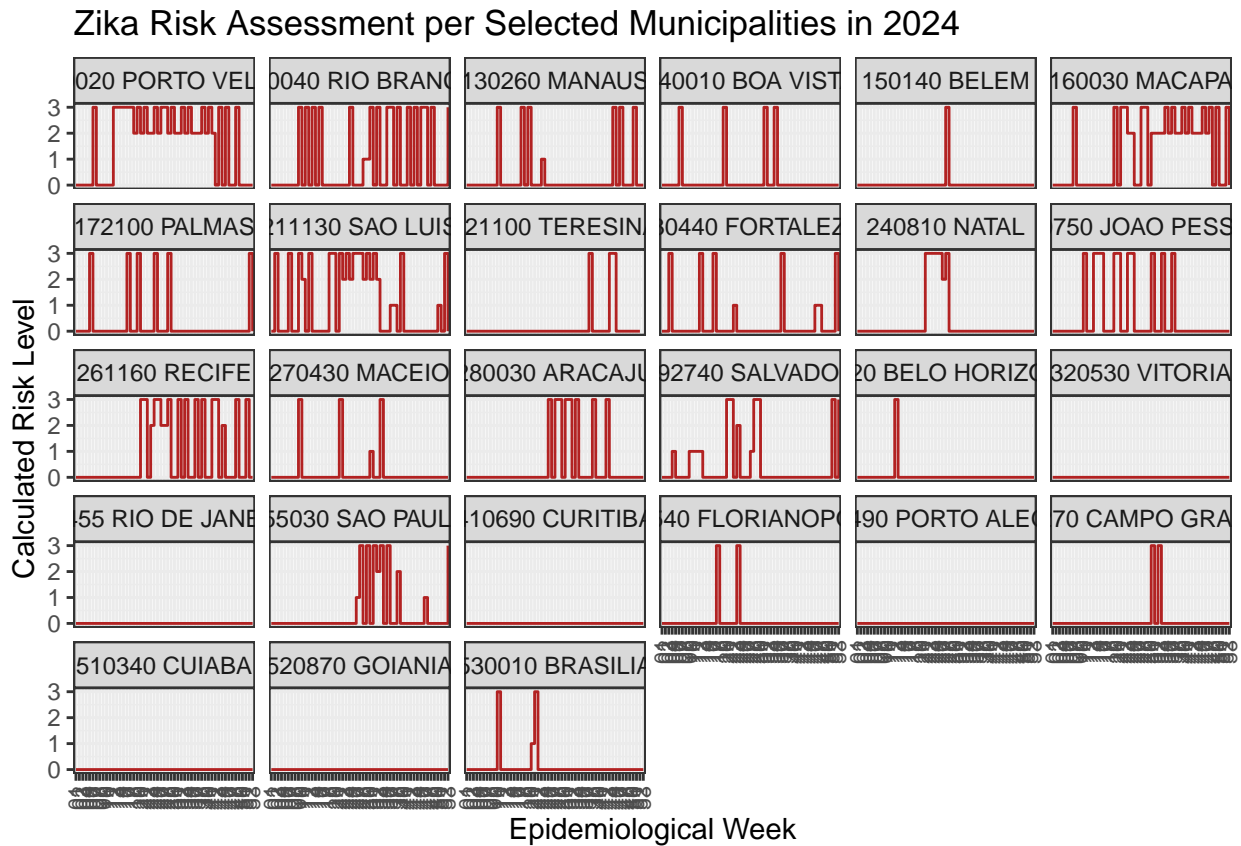
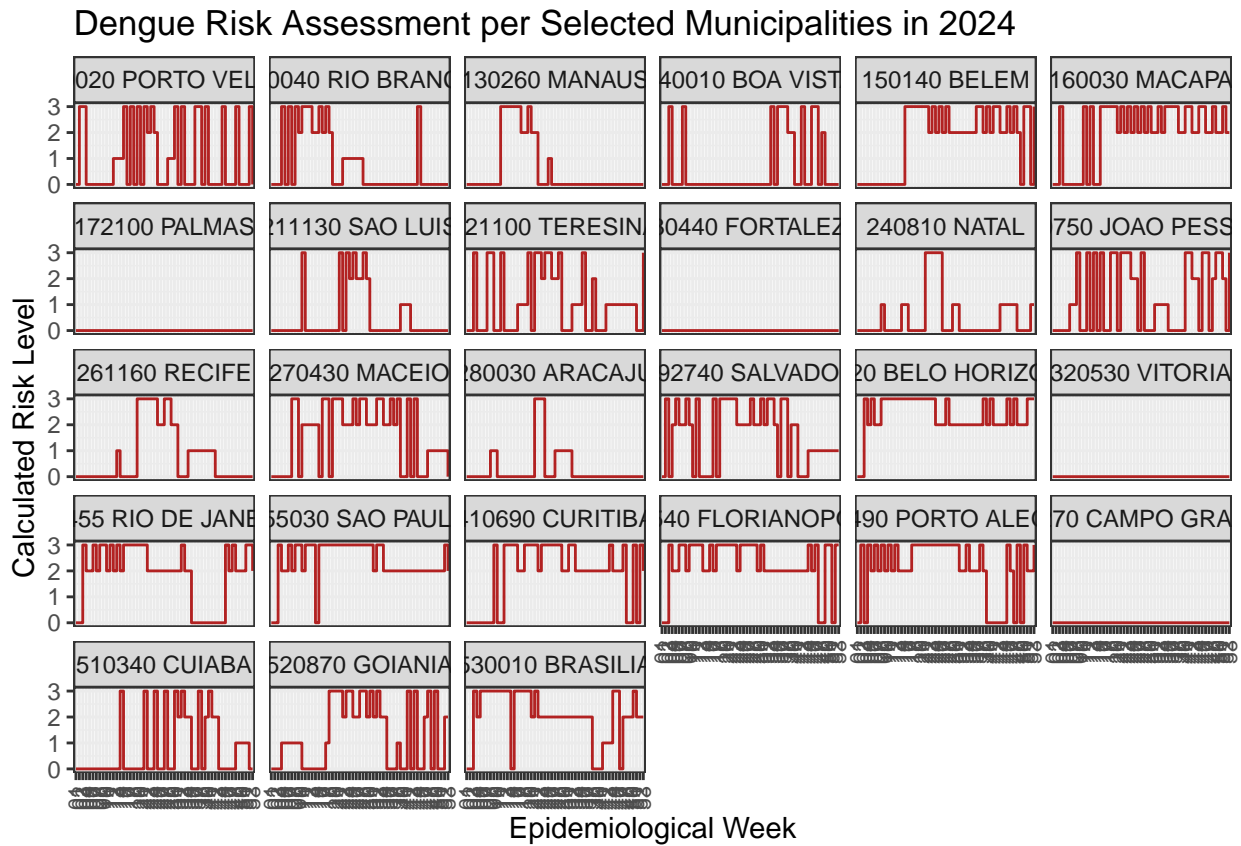
Tabela 3: Epidemic Years of Arboviruses by Municipality

Municipality	Virus	Epidemic Years
110020 PORTO VELHO	Chikungunya	2023
110020 PORTO VELHO	Dengue	2015, 2016, 2022, 2023
110020 PORTO VELHO	Zika	2017, 2019
120040 RIO BRANCO	Chikungunya	2018, 2019, 2020, 2023
120040 RIO BRANCO	Dengue	2018, 2019, 2021
120040 RIO BRANCO	Zika	2023
130260 MANAUS	Chikungunya	2017, 2021, 2023
130260 MANAUS	Dengue	2016, 2017
130260 MANAUS	Zika	2017, 2018
140010 BOA VISTA	Chikungunya	2017, 2018
140010 BOA VISTA	Dengue	2015, 2017, 2019, 2020

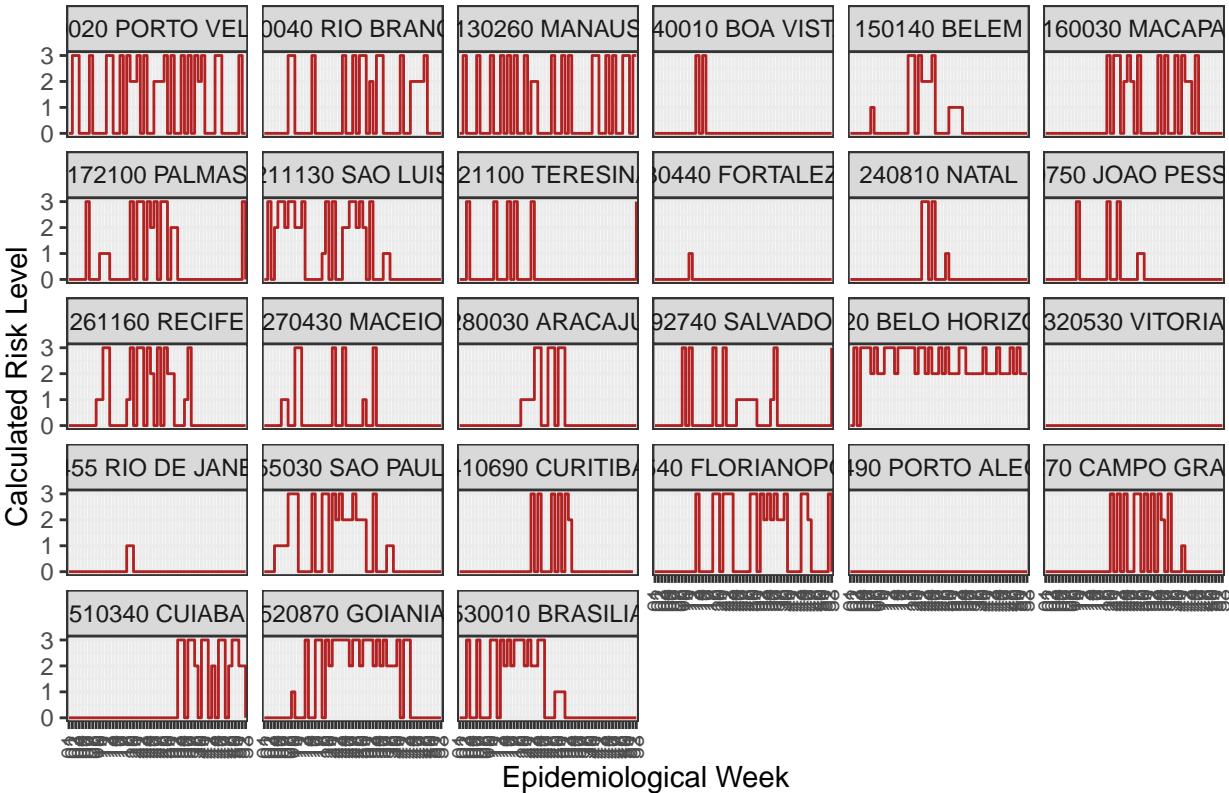
Municipality	Virus	Epidemic Years
140010 BOA VISTA	Zika	2017
150140 BELEM	Chikungunya	2018, 2019
150140 BELEM	Dengue	2015, 2016, 2018, 2021, 2023
160030 MACAPA	Chikungunya	2017
160030 MACAPA	Dengue	2015, 2016, 2017, 2018, 2023
172100 PALMAS	Chikungunya	2022, 2023
172100 PALMAS	Dengue	2015, 2019, 2021, 2022
172100 PALMAS	Zika	2017, 2019, 2023
211130 SAO LUIS	Chikungunya	2023
211130 SAO LUIS	Dengue	2015, 2016, 2022, 2023
211130 SAO LUIS	Zika	2017, 2023
221100 TERESINA	Chikungunya	2017, 2018, 2023
221100 TERESINA	Dengue	2014, 2015, 2018, 2022, 2023
221100 TERESINA	Zika	2017, 2022
230440 FORTALEZA	Chikungunya	2017, 2018
230440 FORTALEZA	Dengue	2015, 2016, 2017
230440 FORTALEZA	Zika	2017
240810 NATAL	Chikungunya	2019, 2020
240810 NATAL	Dengue	2016, 2019, 2020, 2022
240810 NATAL	Zika	2017, 2020, 2022
250750 JOAO PESSOA	Chikungunya	2021, 2022
250750 JOAO PESSOA	Dengue	2016, 2018, 2019, 2020, 2021, 2022
250750 JOAO PESSOA	Zika	2019, 2021, 2022
261160 RECIFE	Chikungunya	2021, 2022
261160 RECIFE	Dengue	2015, 2016, 2021
261160 RECIFE	Zika	2017, 2020, 2021, 2022
270430 MACEIO	Chikungunya	2022, 2023
270430 MACEIO	Dengue	2015, 2016, 2022
270430 MACEIO	Zika	2019, 2023
280030 ARACAJU	Chikungunya	2020, 2022, 2023
280030 ARACAJU	Dengue	2015, 2016, 2019, 2022
292740 SALVADOR	Chikungunya	2019, 2020
292740 SALVADOR	Dengue	2019, 2020, 2023
292740 SALVADOR	Zika	2019, 2023
310620 BELO HORIZONTE	Chikungunya	2023
310620 BELO HORIZONTE	Dengue	2015, 2016, 2019, 2023
310620 BELO HORIZONTE	Zika	2019
320530 VITORIA	Dengue	2016, 2019, 2020
330455 RIO DE JANEIRO	Chikungunya	2019
330455 RIO DE JANEIRO	Dengue	2015, 2016, 2023
355030 SAO PAULO	Chikungunya	2017
355030 SAO PAULO	Dengue	2014, 2015, 2016, 2023
355030 SAO PAULO	Zika	2019
410690 CURITIBA	Dengue	2016, 2023
420540 FLORIANOPOLIS	Chikungunya	2018, 2019, 2023
420540 FLORIANOPOLIS	Dengue	2023
431490 PORTO ALEGRE	Dengue	2016, 2022, 2023
500270 CAMPO GRANDE	Chikungunya	2019
500270 CAMPO GRANDE	Dengue	2016, 2019, 2022
500270 CAMPO GRANDE	Zika	2018, 2019
510340 CUIABA	Chikungunya	2018
510340 CUIABA	Dengue	2015, 2016, 2017

Municipality	Virus	Epidemic Years
520870 GOIANIA	Chikungunya	2022
520870 GOIANIA	Dengue	2015, 2016, 2022
520870 GOIANIA	Zika	2017
530010 BRASILIA	Chikungunya	2020
530010 BRASILIA	Dengue	2019, 2022, 2023
530010 BRASILIA	Zika	2020

Plotting Risk Assessment per Selected Municipalities in 2024

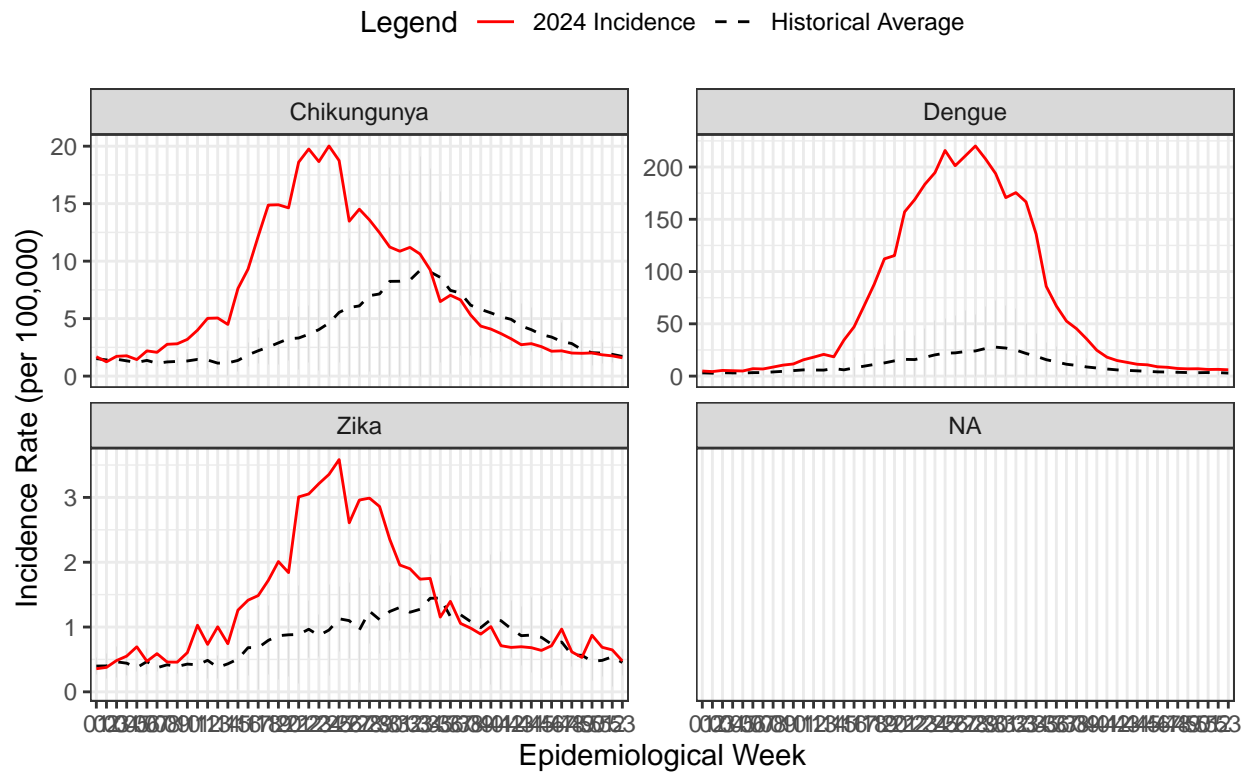


Chikungunya Risk Assessment per Selected Municipalities in 2024



## 8. Control Diagrams - Country Level

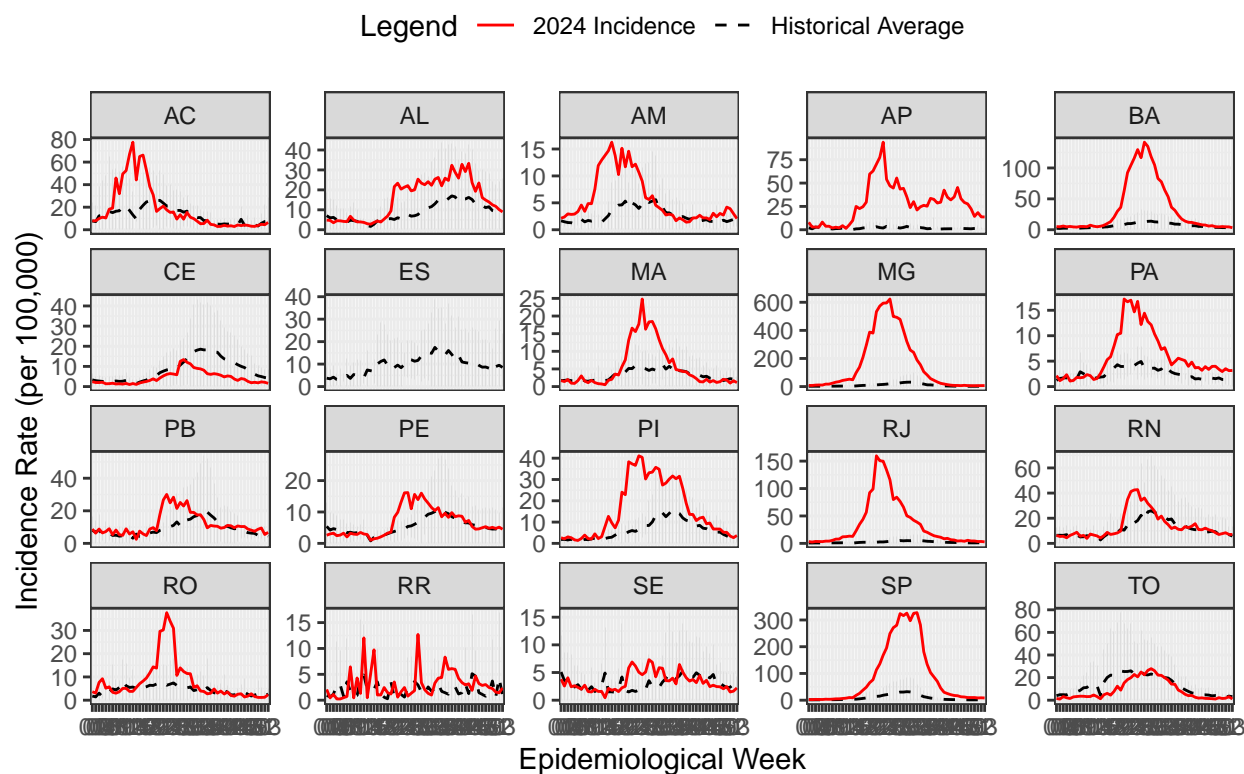
### Control Diagrams for Arbovirus Incidence in Brazil (2024)



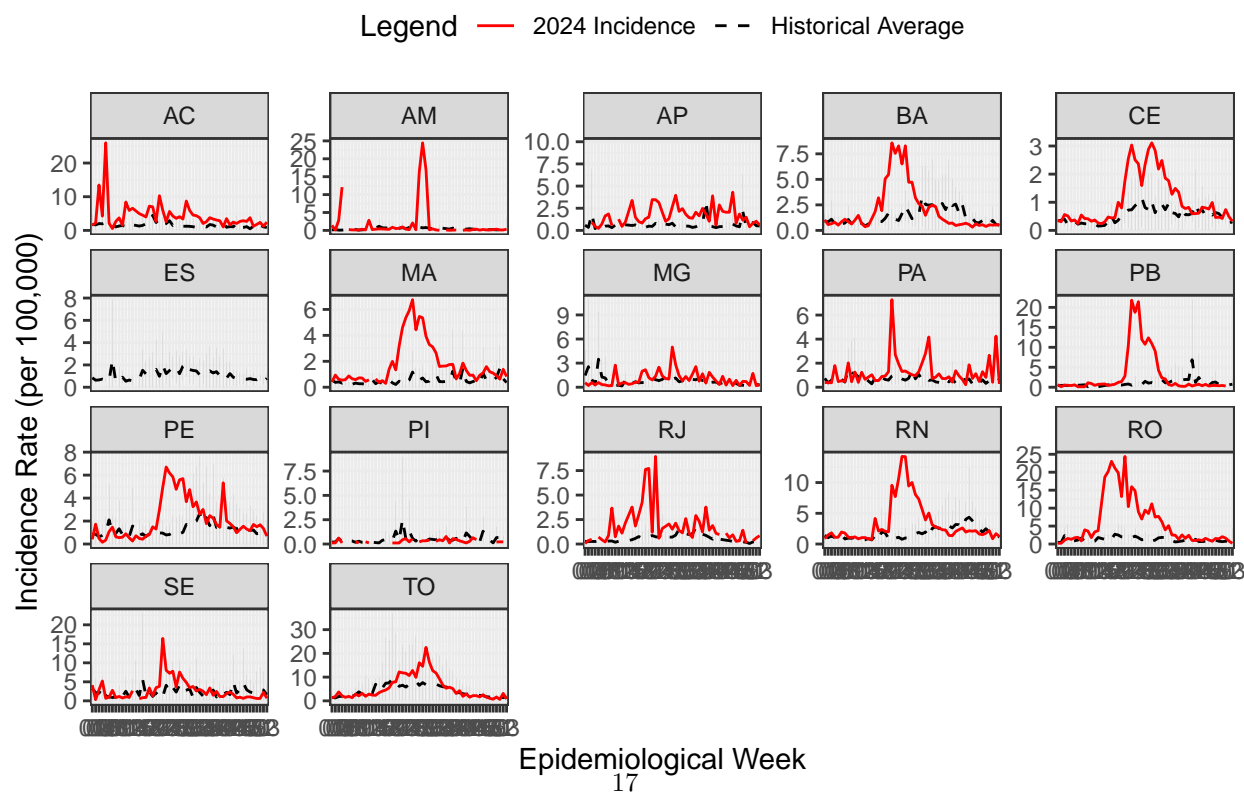


## 9. Control Diagrams - State Level

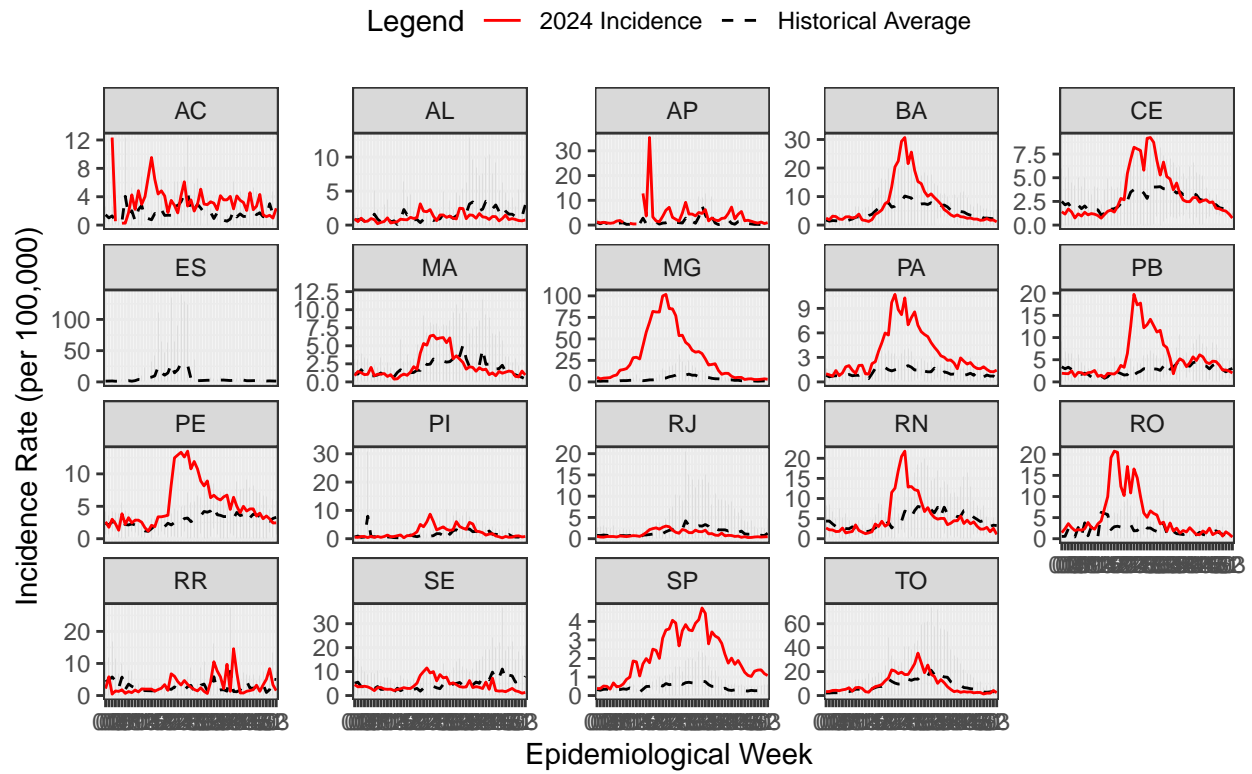
Control Diagrams for Dengue Incidence per State (2024)



Control Diagrams for Zika Incidence per State (2024)

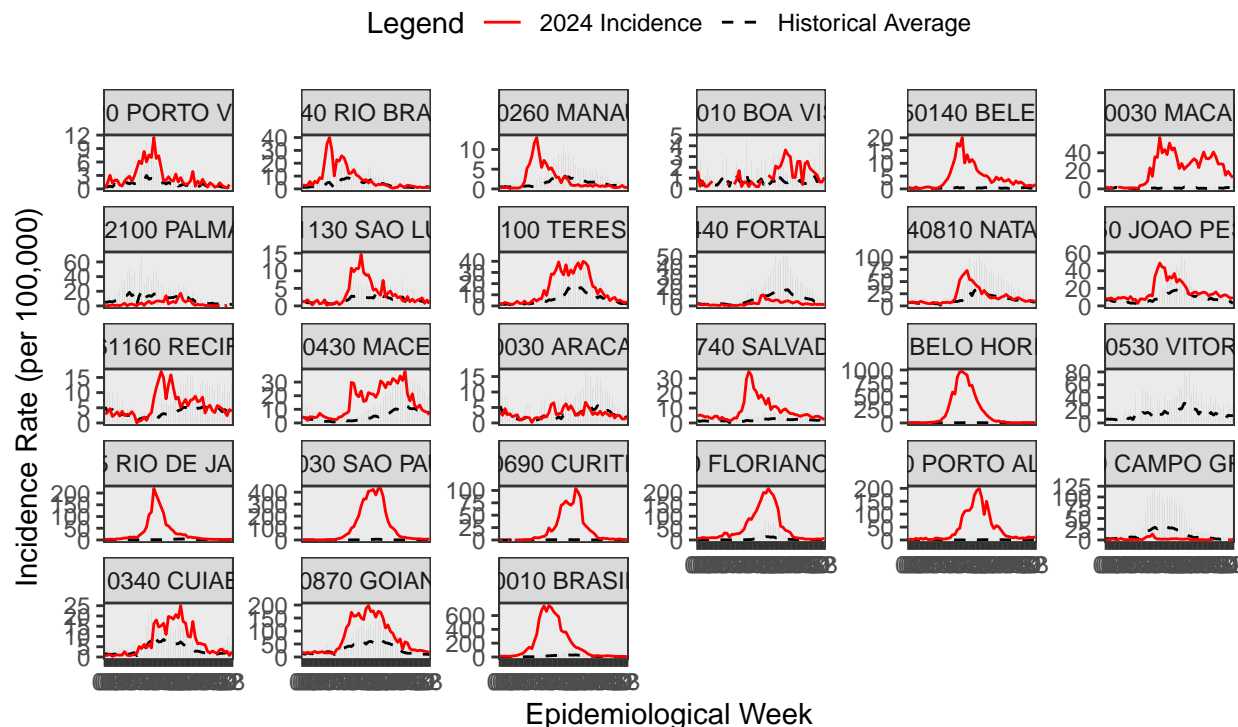


## Control Diagrams for Chikungunya Incidence per State (2024)

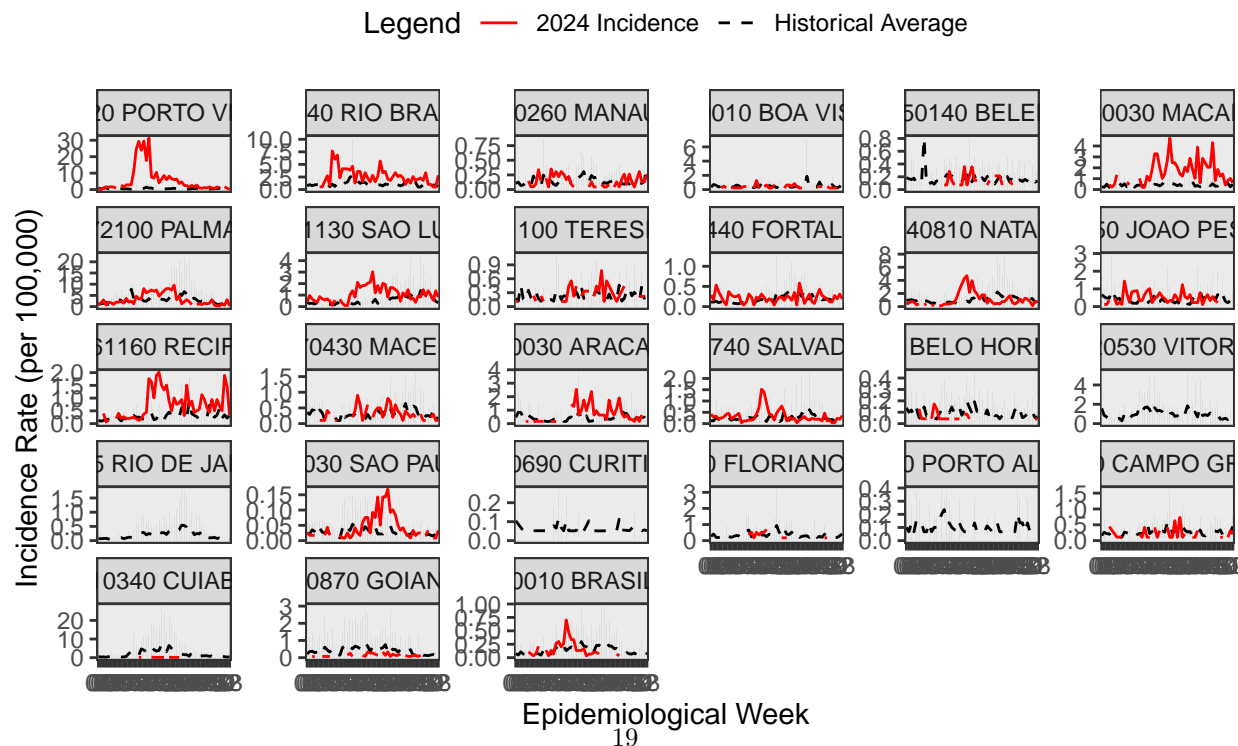


## 10. Control Diagrams - Municipality Level

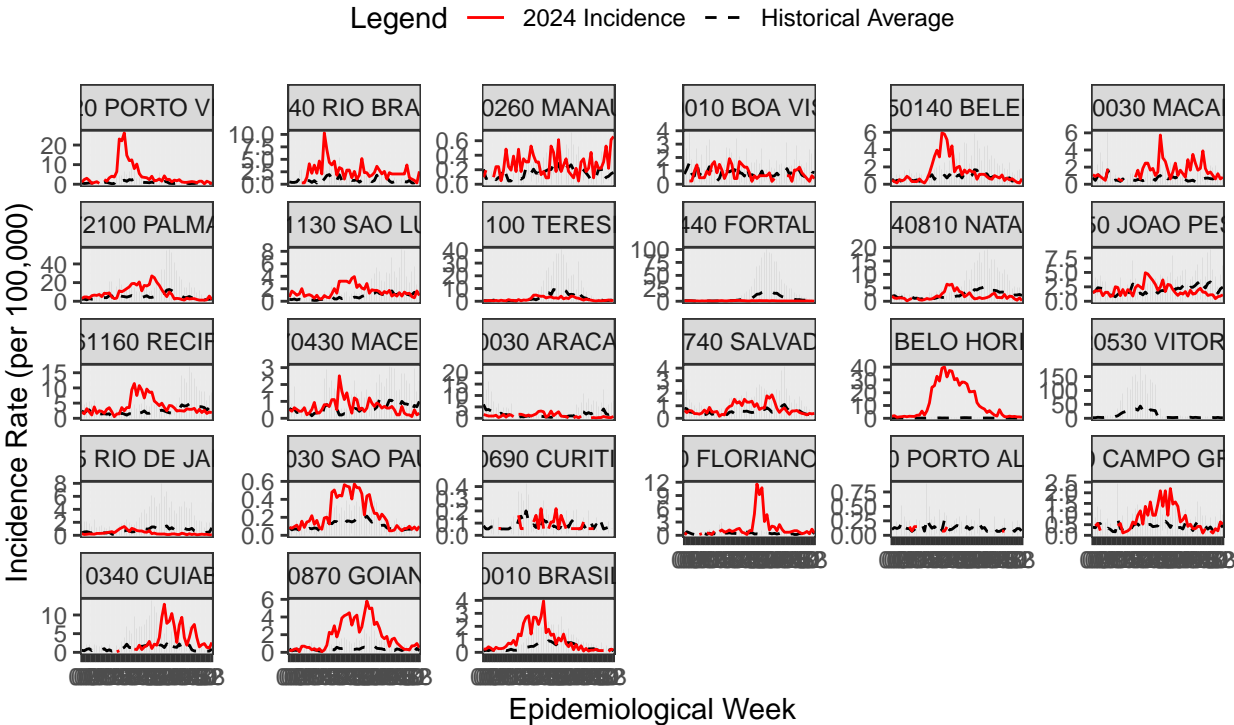
### Control Diagrams for Dengue Incidence per Selected Municipalities (2024) 2024 Incidence vs. Non-Epidemic Historical Average



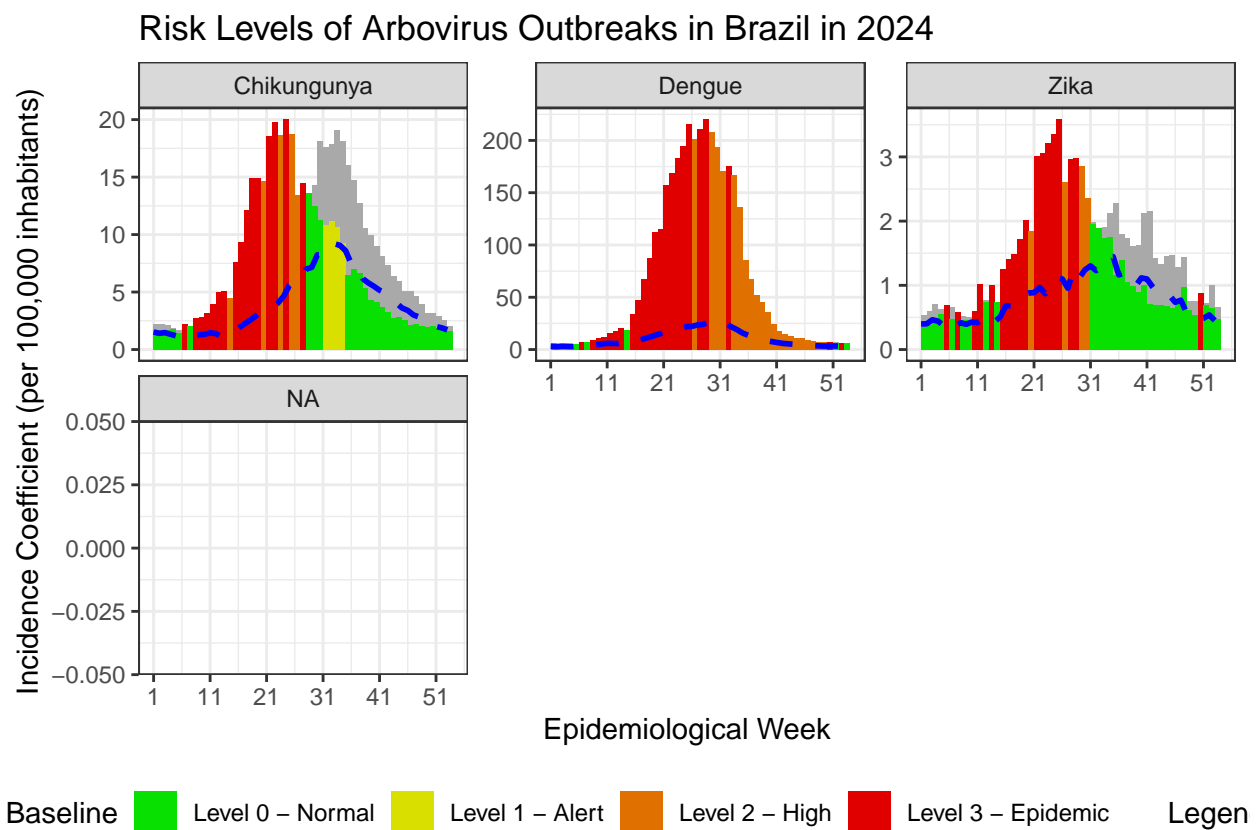
### Control Diagrams for Zika Incidence per Selected Municipalities (2024) 2024 Incidence vs. Non-Epidemic Historical Average



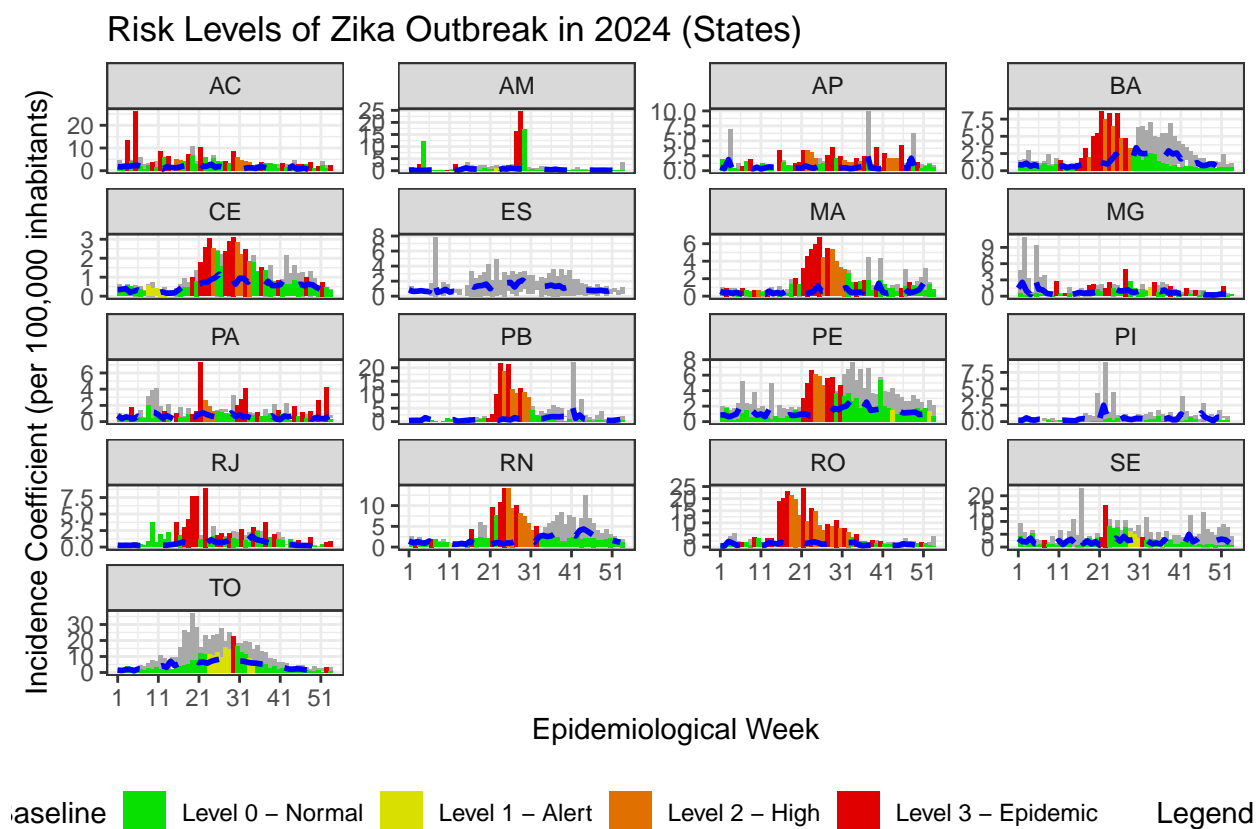
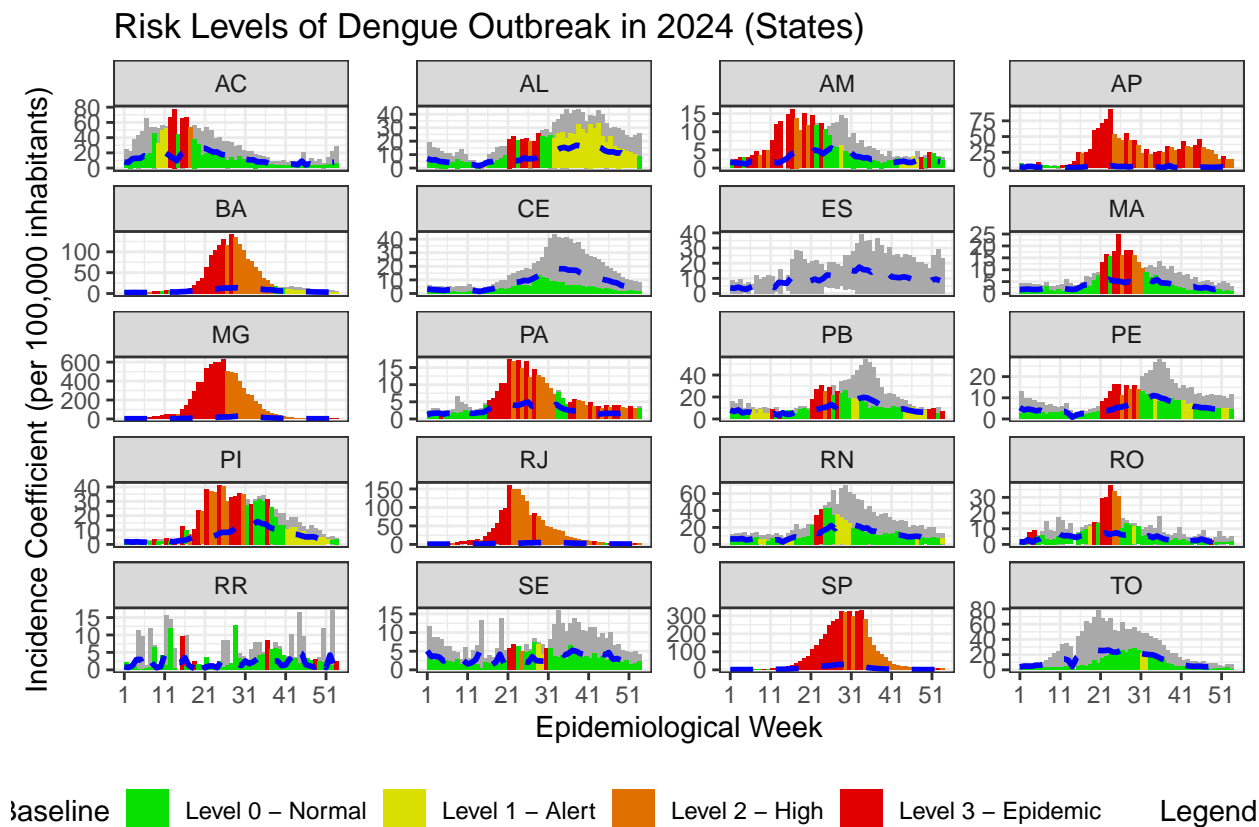
# Control Diagrams for Chikungunya Incidence per Selected Municipalities (2024 Incidence vs. Non-Epidemic Historical Average)



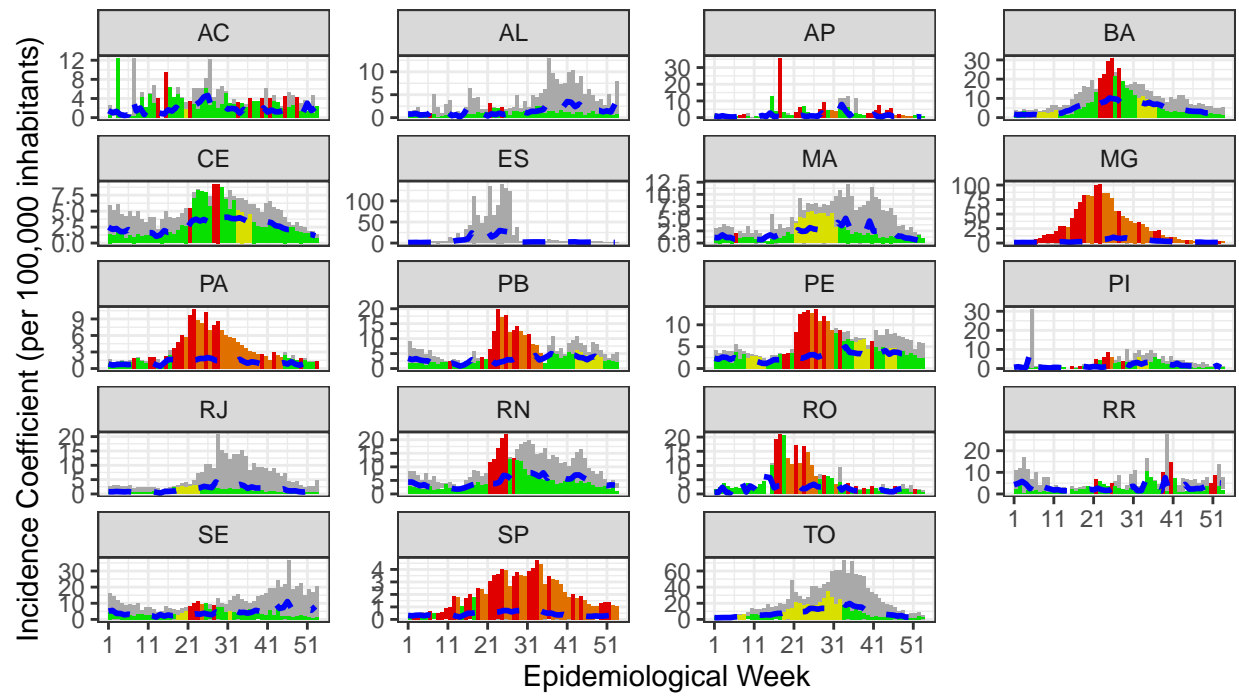
## 11. Risk Levels in 2024 - Country Level



## 12. Risk Levels in 2024 - State Level



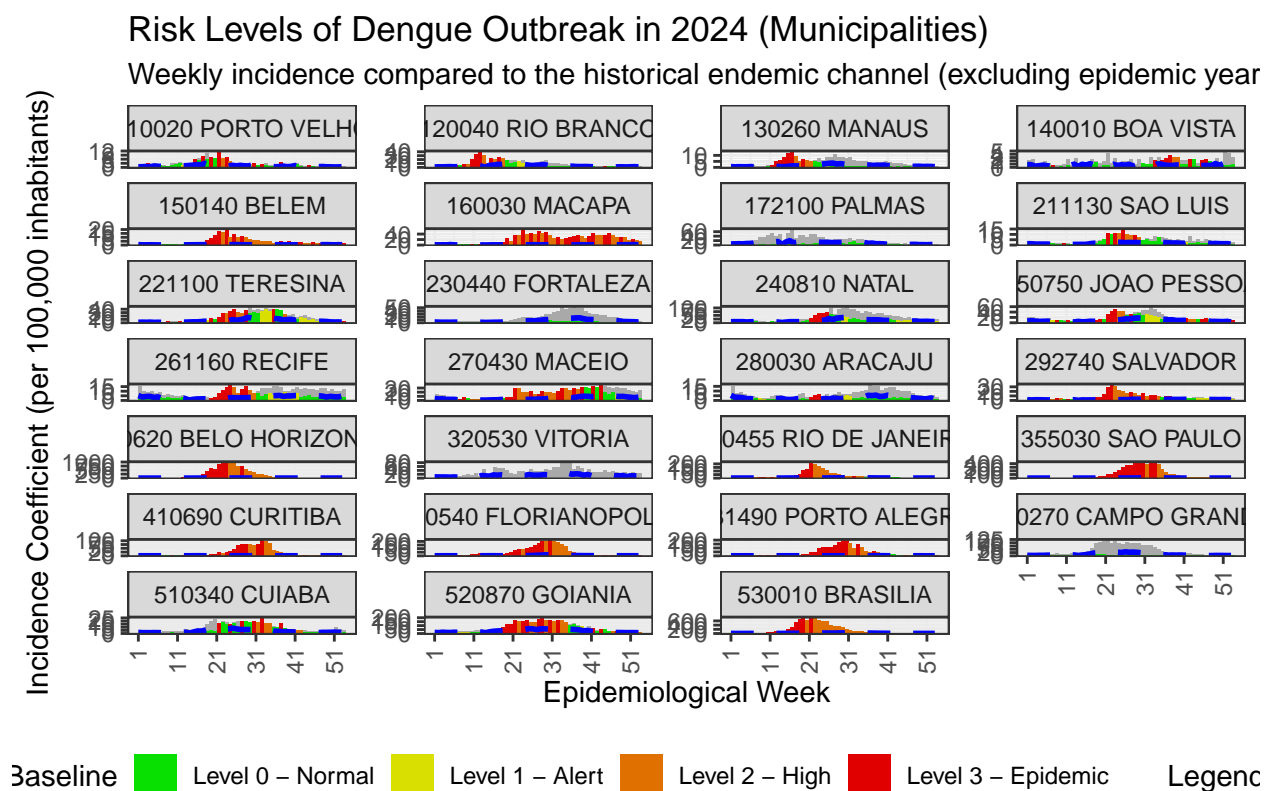
## Risk Levels of Chikungunya Outbreak in 2024 (States)



Baseline    Level 0 – Normal    Level 1 – Alert    Level 2 – High    Level 3 – Epidemic    Legend

## 13. Risk Levels in 2024 - Municipality Level

### Dengue



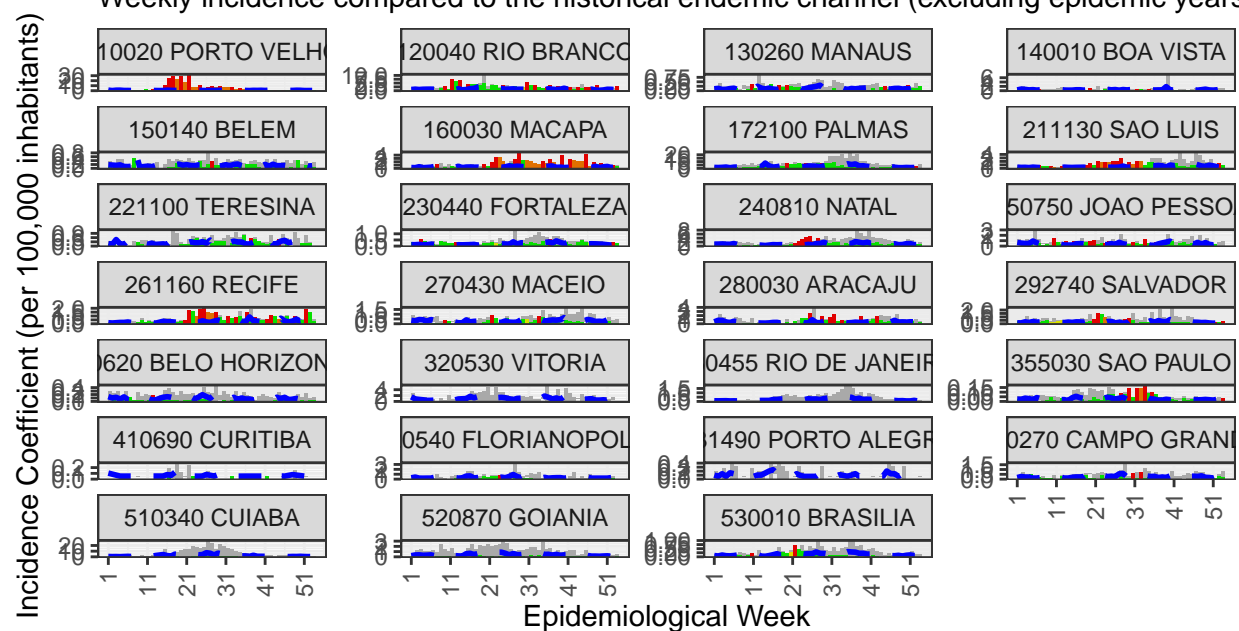
Data from: DATASUS. Analysis and Visualization by the authors



## Zika

### Risk Levels of Zika Outbreak in 2024 (Municipalities)

Weekly incidence compared to the historical endemic channel (excluding epidemic years)



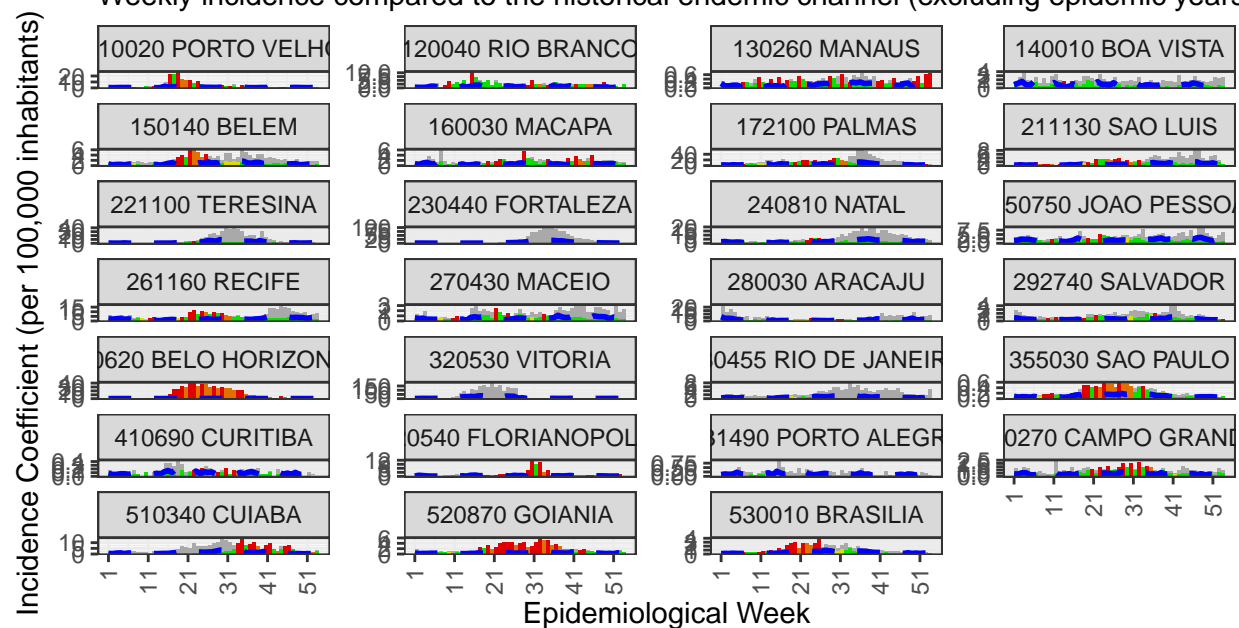
Baseline Level 0 – Normal Level 1 – Alert Level 2 – High Level 3 – Epidemic Legend

Data from: DATASUS. Analysis and Visualization by the authors

## Chikungunya

### Risk Levels of Chikungunya Outbreak in 2024 (Municipalities)

Weekly incidence compared to the historical endemic channel (excluding epidemic years)



Baseline Level 0 – Normal Level 1 – Alert Level 2 – High Level 3 – Epidemic Legend

Data from: DATASUS. Analysis and Visualization by the authors