



EUCAST

European Committee
on Antimicrobial
Susceptibility Testing

Corynebacterium diphtheriae and C. ulcerans

Calibration of zone diameter breakpoints to MIC values

Version 2.2
January 2026

C. diphtheriae and *C. ulcerans*

MIC and zone diameter correlates

- The following histograms present inhibition zone diameter distributions from EUCAST antimicrobial susceptibility testing. In most, the different colours of the bars indicate different MIC values. In some, the colours of the bars indicate a resistance gene or a resistance mechanism.
- The distributions include data for wild-type isolates and for isolates with acquired resistance mechanisms. A large number of isolates with MIC values close to the edge of the wild-type distribution and/or close to EUCAST clinical breakpoints were intentionally included. These distributions can not be used to infer resistance rates or the performance of the tests with routine isolates.
- For some agents, isolates were tested on more than one occasion, including parallel tests with disks and media from several manufacturers. When this is the case, data are presented as both the “number of isolates tested” and the “total number of MIC-zone diameter correlates”, including replicate tests and parallel tests with disks and media from different sources.

C. diphtheriae and *C. ulcerans*

MIC and zone diameter correlates

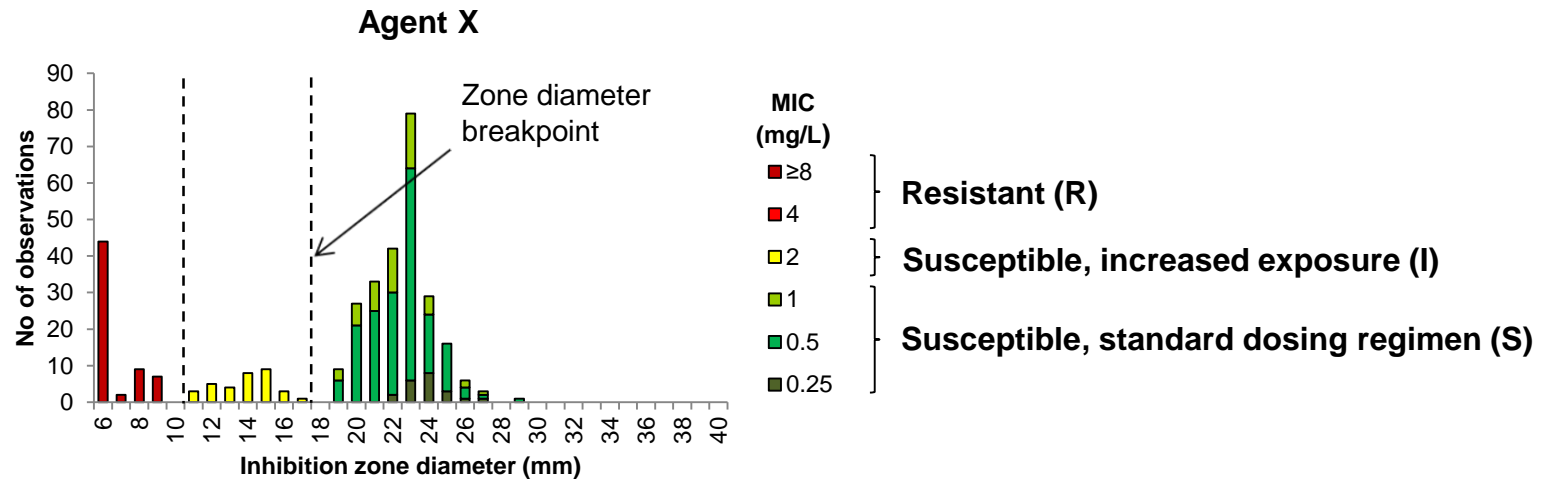
- Antimicrobial susceptibility testing was performed on clinical isolates of *Corynebacterium diphtheriae* (n=200) and *Corynebacterium ulcerans* (n=200). Disk diffusion was performed according to EUCAST methodology and MIC determination was performed with broth microdilution using MH-F broth.
- Note that distributions and breakpoints for *Corynebacterium* spp. other than *C. diphtheriae* and *C. ulcerans* are presented in a separate document.
- The distributions of MIC vs. zone diameter in this presentation are the result of a collaboration between EUCAST, the National Reference Center for Diphtheria, Institut Pasteur, France and the National Consiliary Laboratory for Diphtheria, Bavarian Food and Health Authority (LGL), Germany.
- This presentation is based on EUCAST Clinical Breakpoint Tables v. 16.0.

Changes from previous version (2.1)

Changes
<ul style="list-style-type: none">• No changes. Breakpoints checked against latest version of EUCAST Clinical Breakpoint Tables.

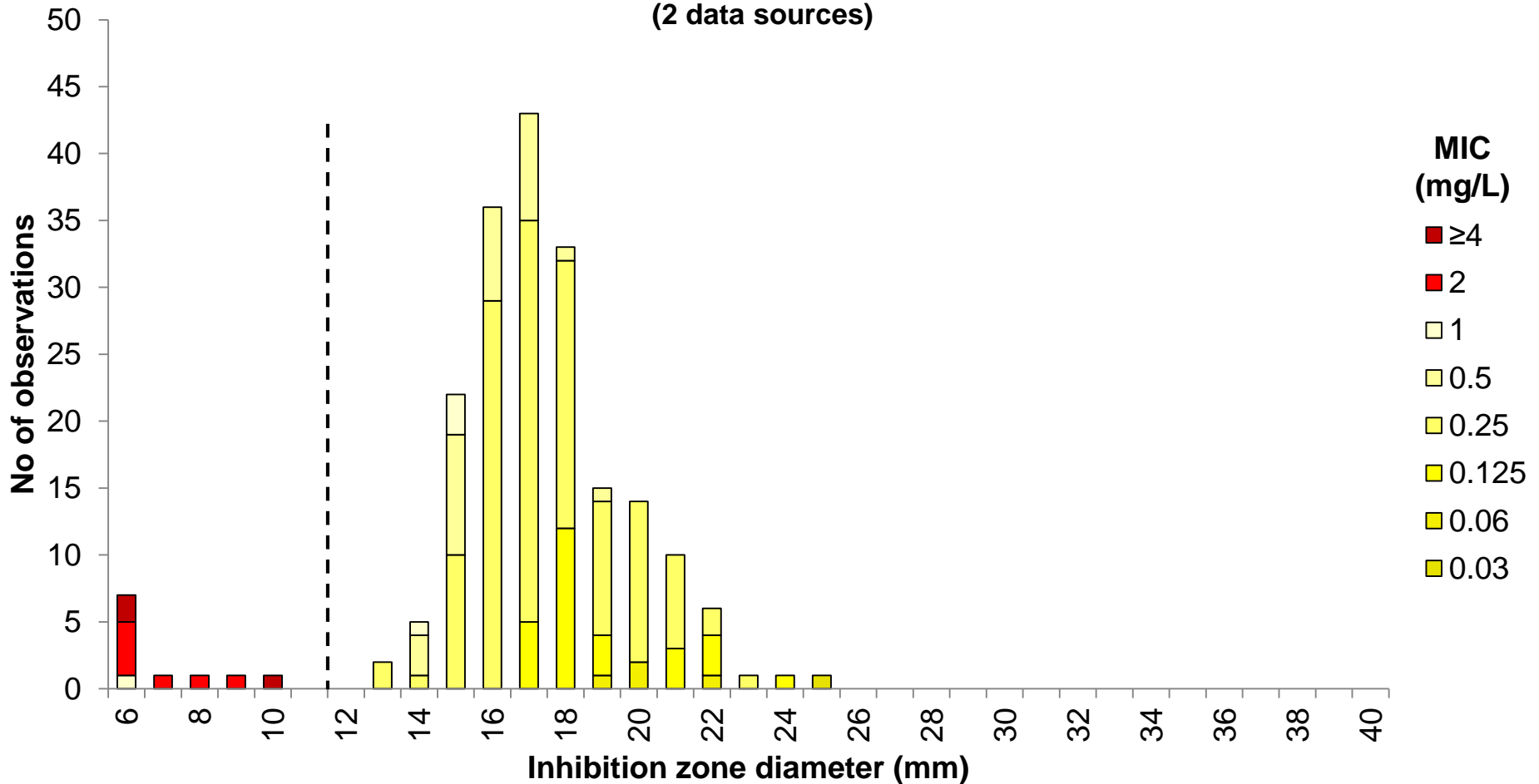
Explanation of graphs:

- These graphs show zone diameter distributions with MIC values or resistance mechanisms as coloured bars. Colours are related to current EUCAST MIC breakpoints.



Benzylpenicillin 1 unit vs. MIC *C. diphtheriae*, 200 isolates

(2 data sources)



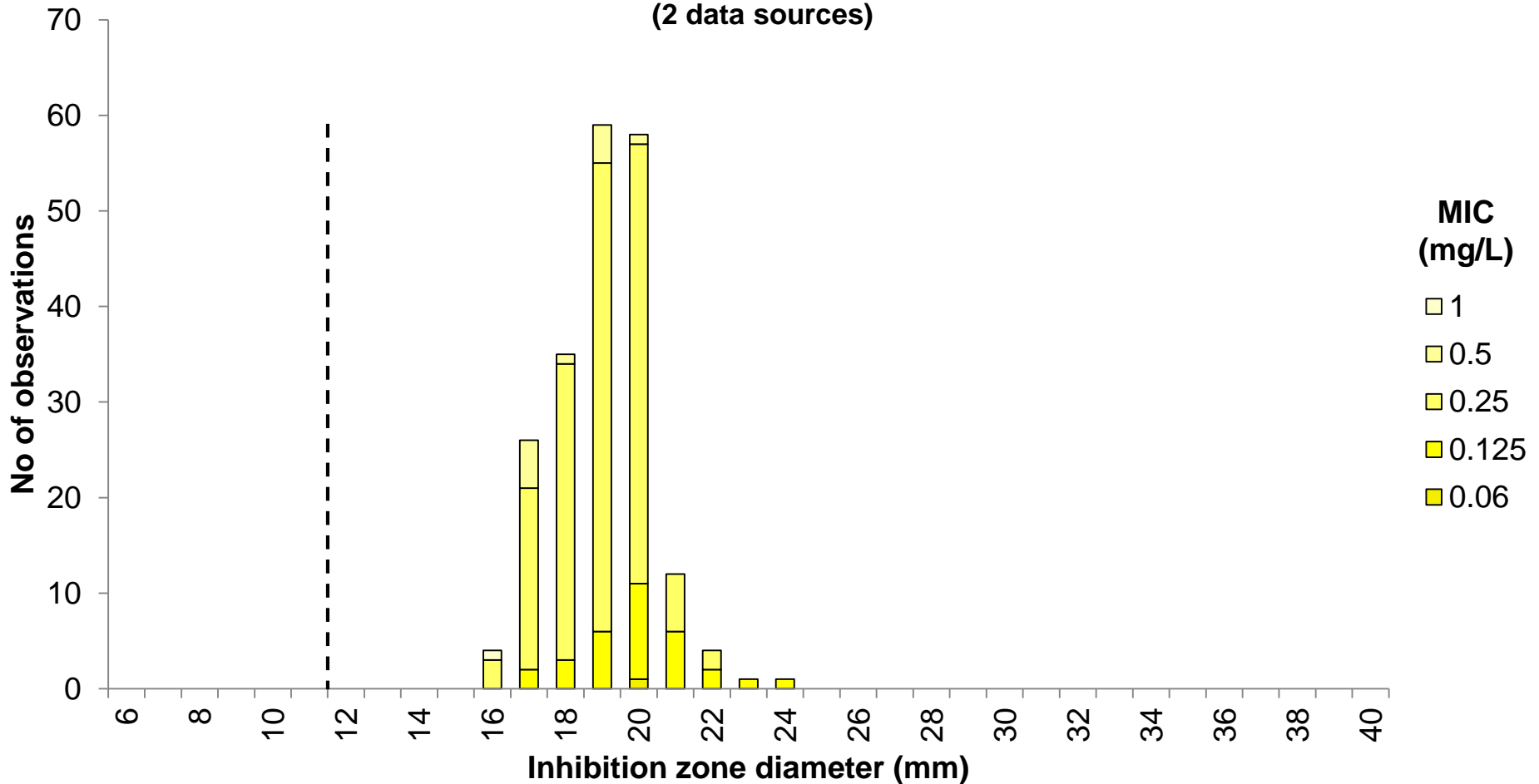
Breakpoints

MIC $S \leq 0.001$, $R > 1$ mg/L

Zone diameter $S \geq 50$, $R < 12$ mm

Benzylpenicillin 1 unit vs. MIC *C. ulcerans*, 200 isolates

(2 data sources)



Breakpoints

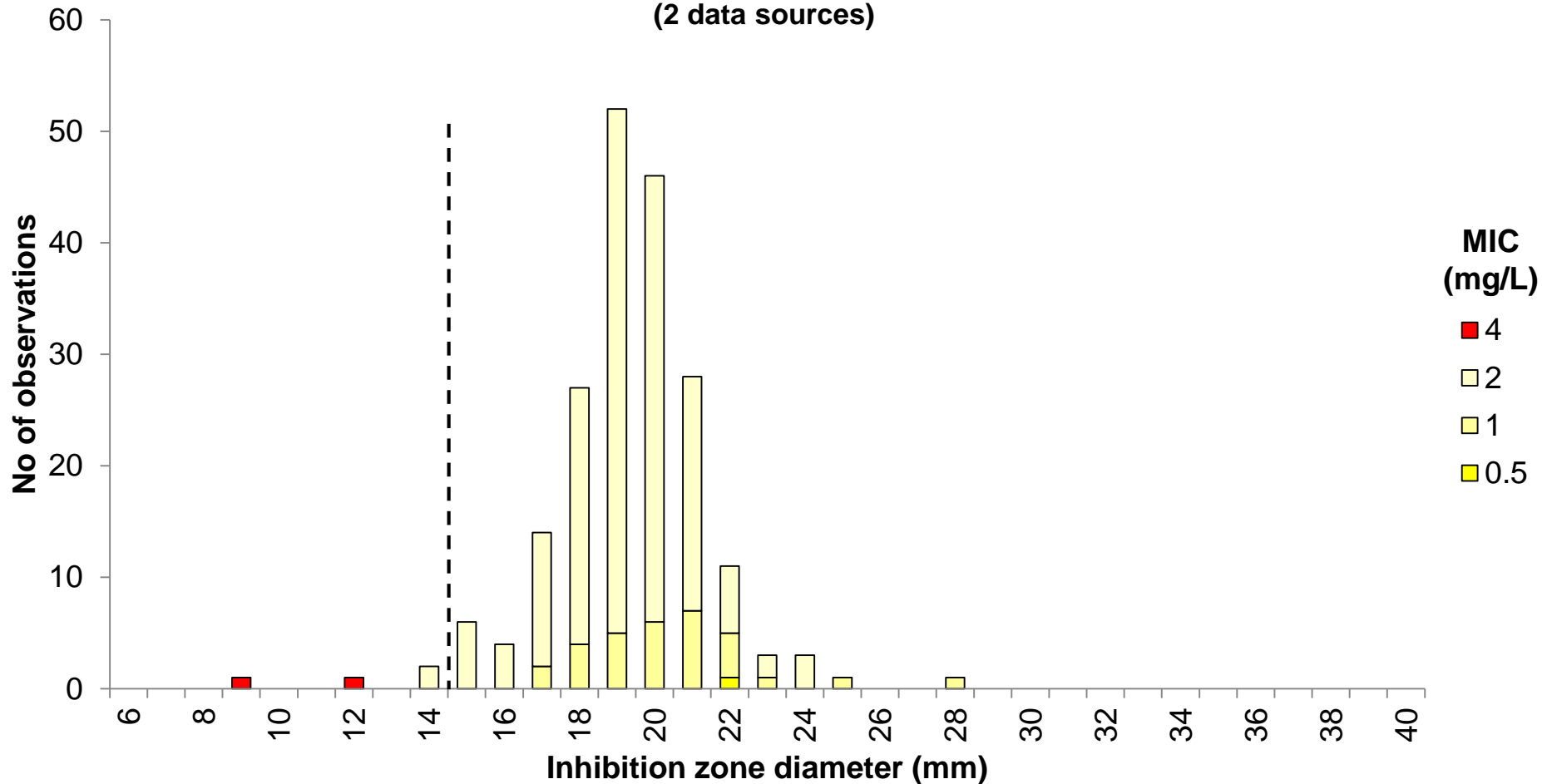
MIC $S \leq 0.001$, $R > 1$ mg/L

Zone diameter $S \geq 50$, $R < 12$ mm

Cefotaxime 5 µg vs. MIC

C. diphtheriae, 200 isolates

(2 data sources)



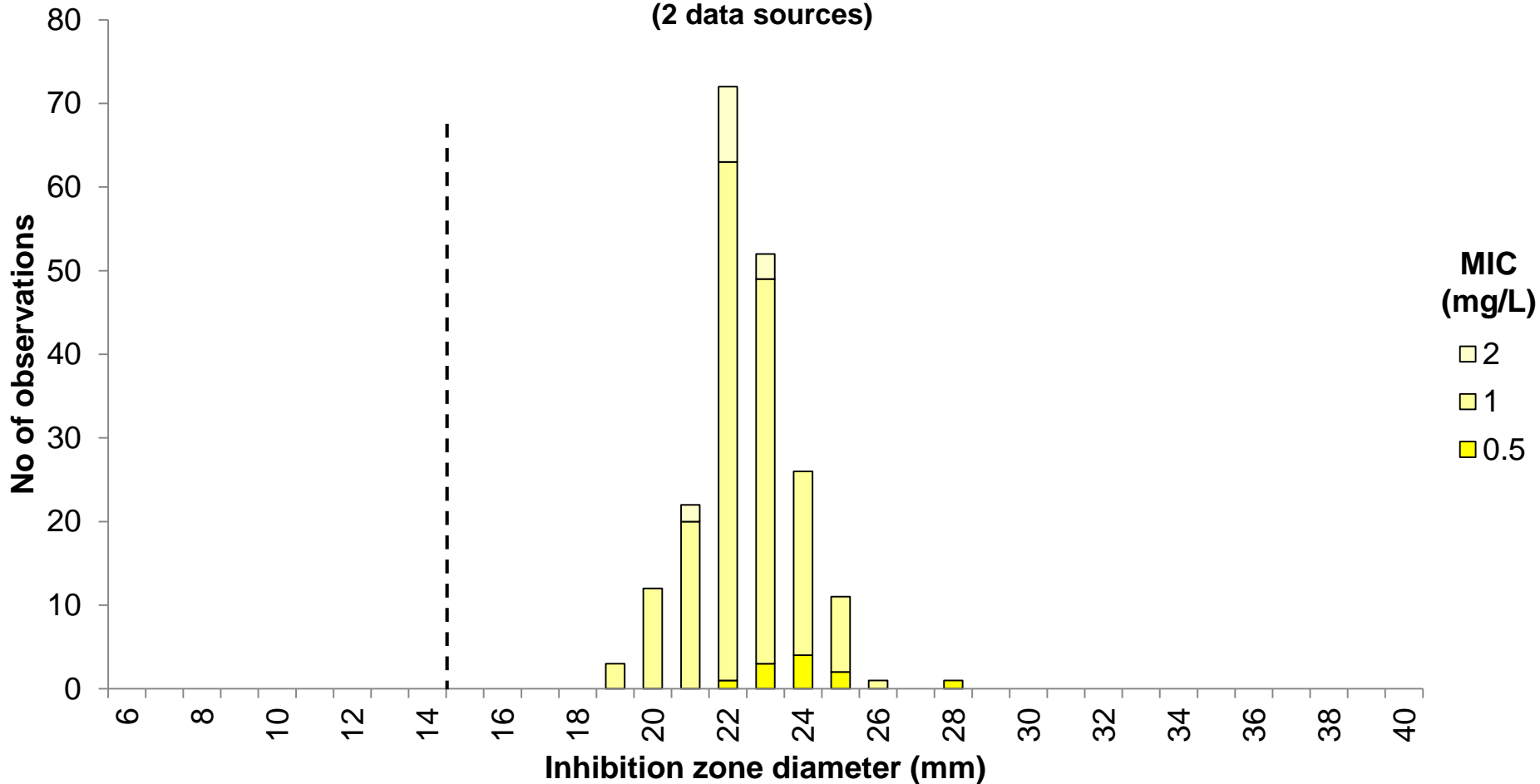
Breakpoints

MIC $S \leq 0.001$, $R > 2$ mg/L

Zone diameter $S \geq 50$, $R < 15$ mm

Cefotaxime 5 µg vs. MIC *C. ulcerans*, 200 isolates

(2 data sources)



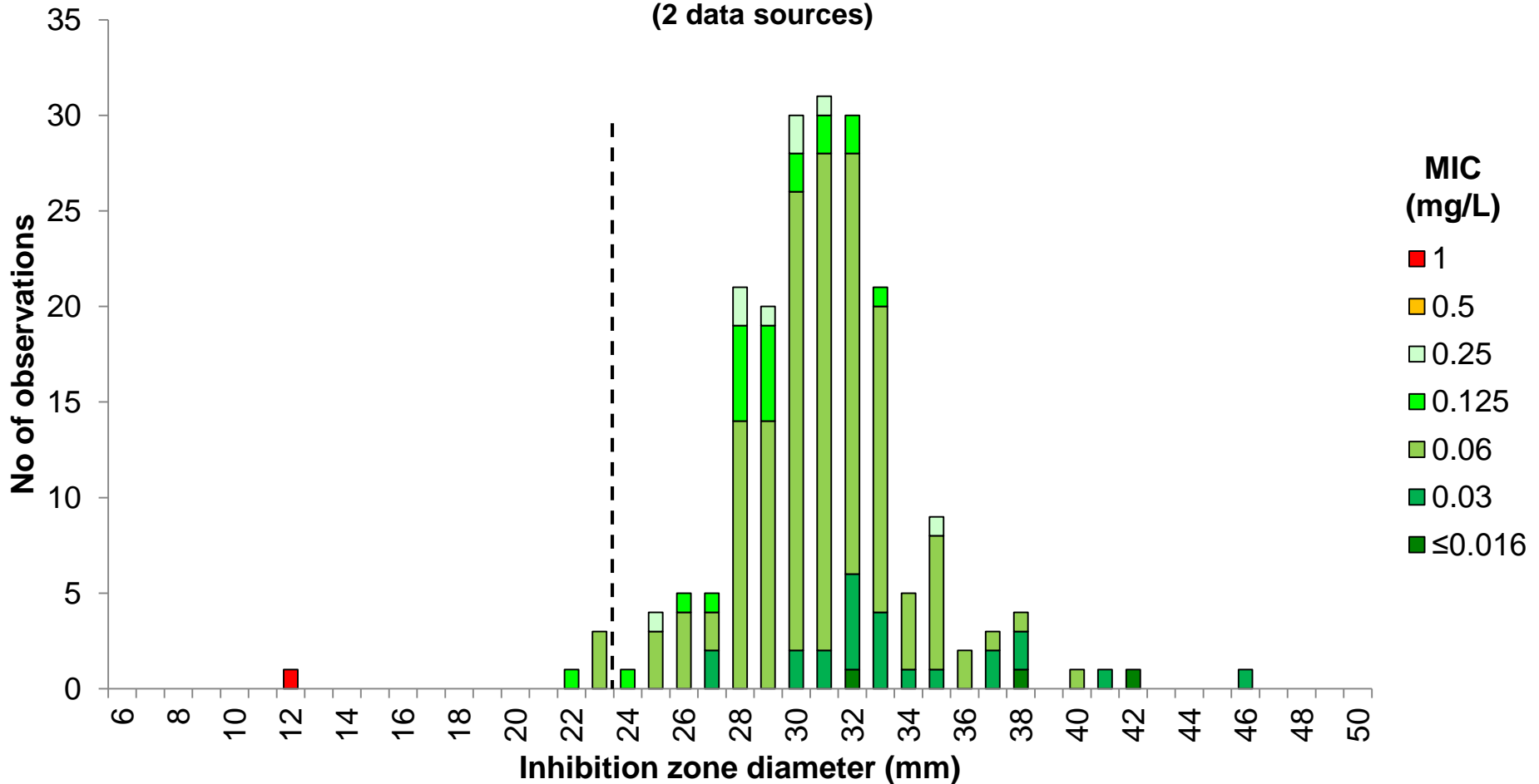
Breakpoints

MIC $S \leq 0.001$, $R > 2$ mg/L

Zone diameter $S \geq 50$, $R < 15$ mm

Meropenem 10 µg vs. MIC *C. diphtheriae*, 200 isolates

(2 data sources)



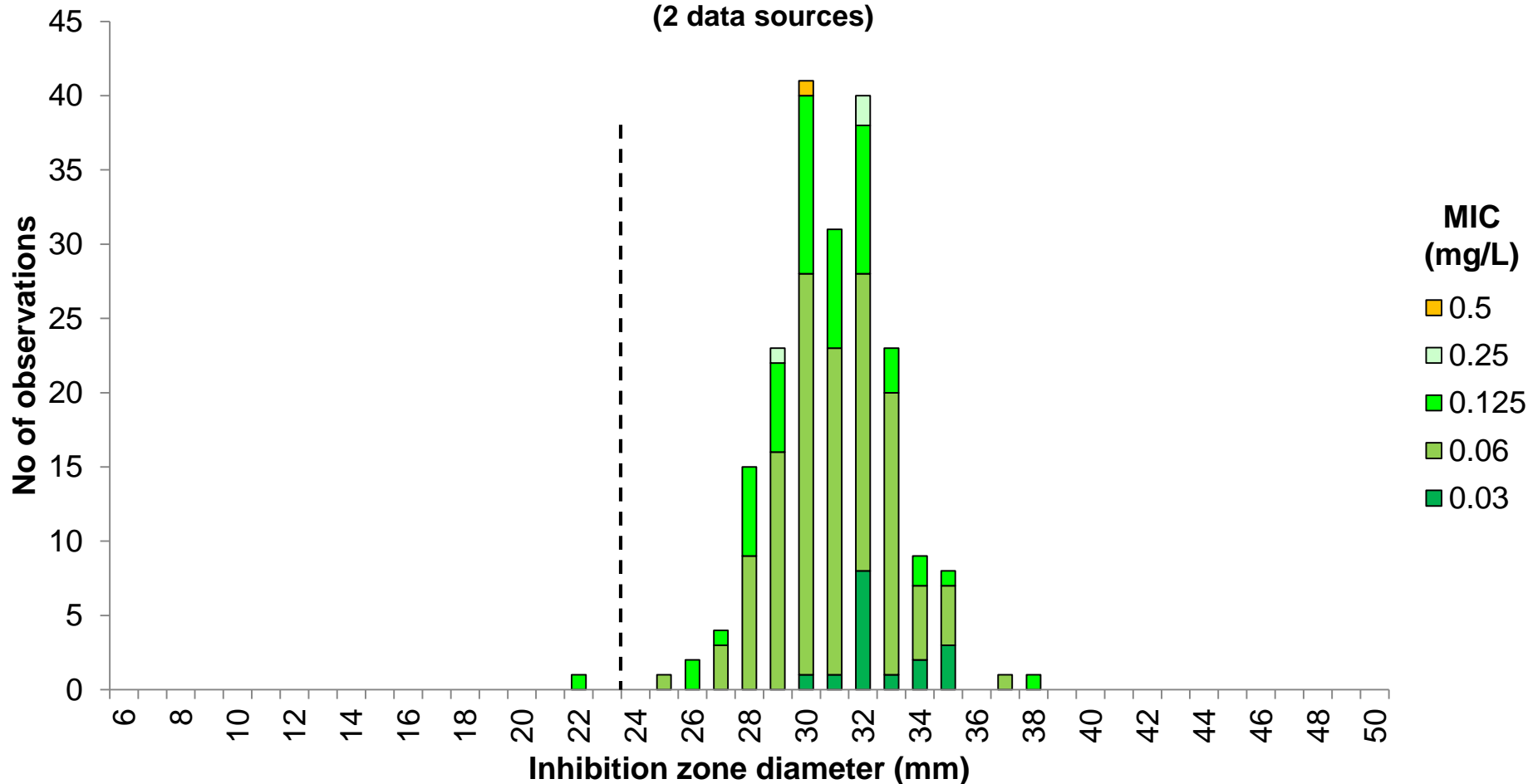
Breakpoints

MIC S ≤ 0.25, R > 0.25 mg/L

Zone diameter S ≥ 24, R < 24 mm

Meropenem 10 µg vs. MIC *C. ulcerans*, 200 isolates

(2 data sources)



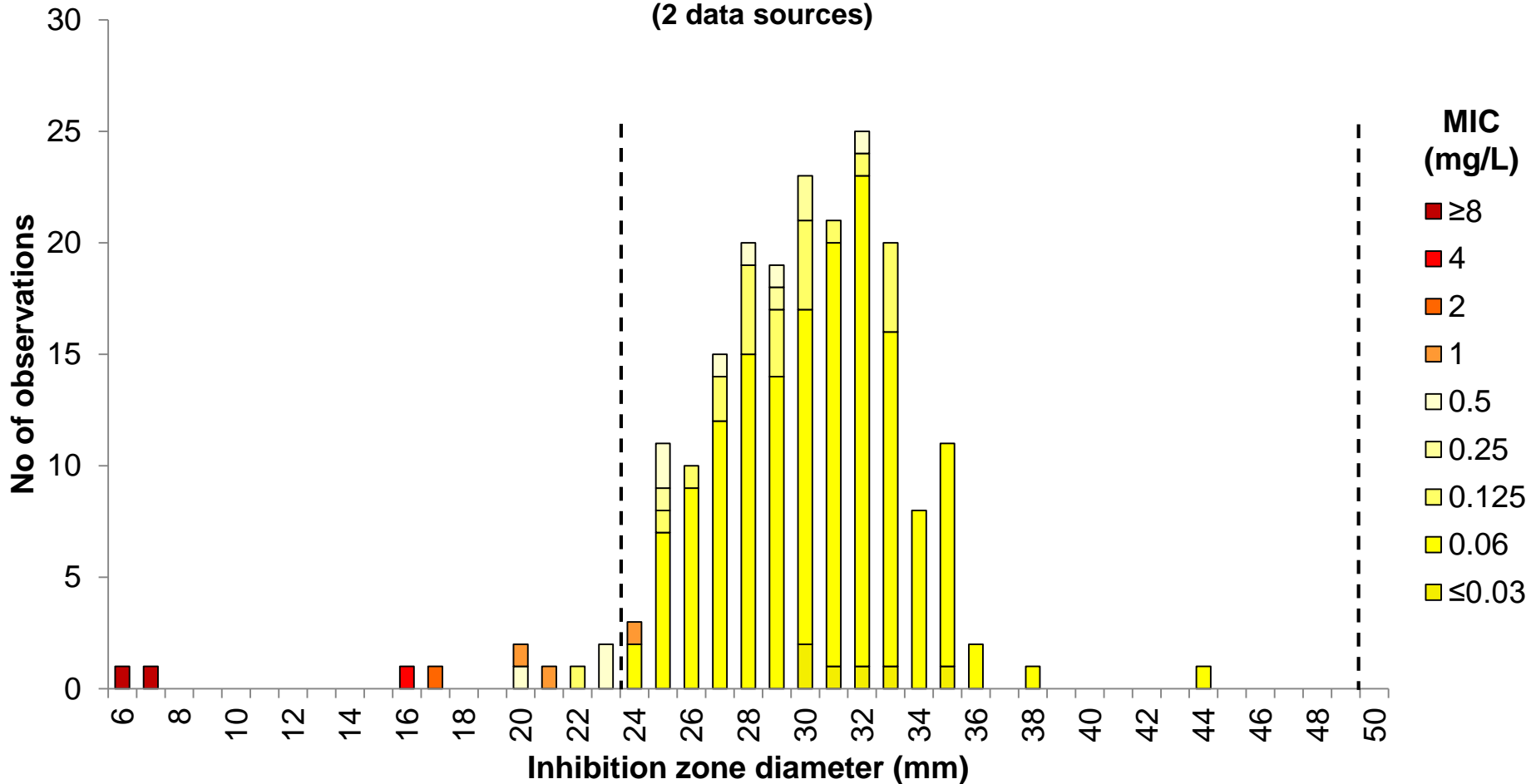
Breakpoints

MIC $S \leq 0.25$, $R > 0.25$ mg/L

Zone diameter $S \geq 24$, $R < 24$ mm

Ciprofloxacin 5 µg vs. MIC *C. diphtheriae*, 200 isolates

(2 data sources)



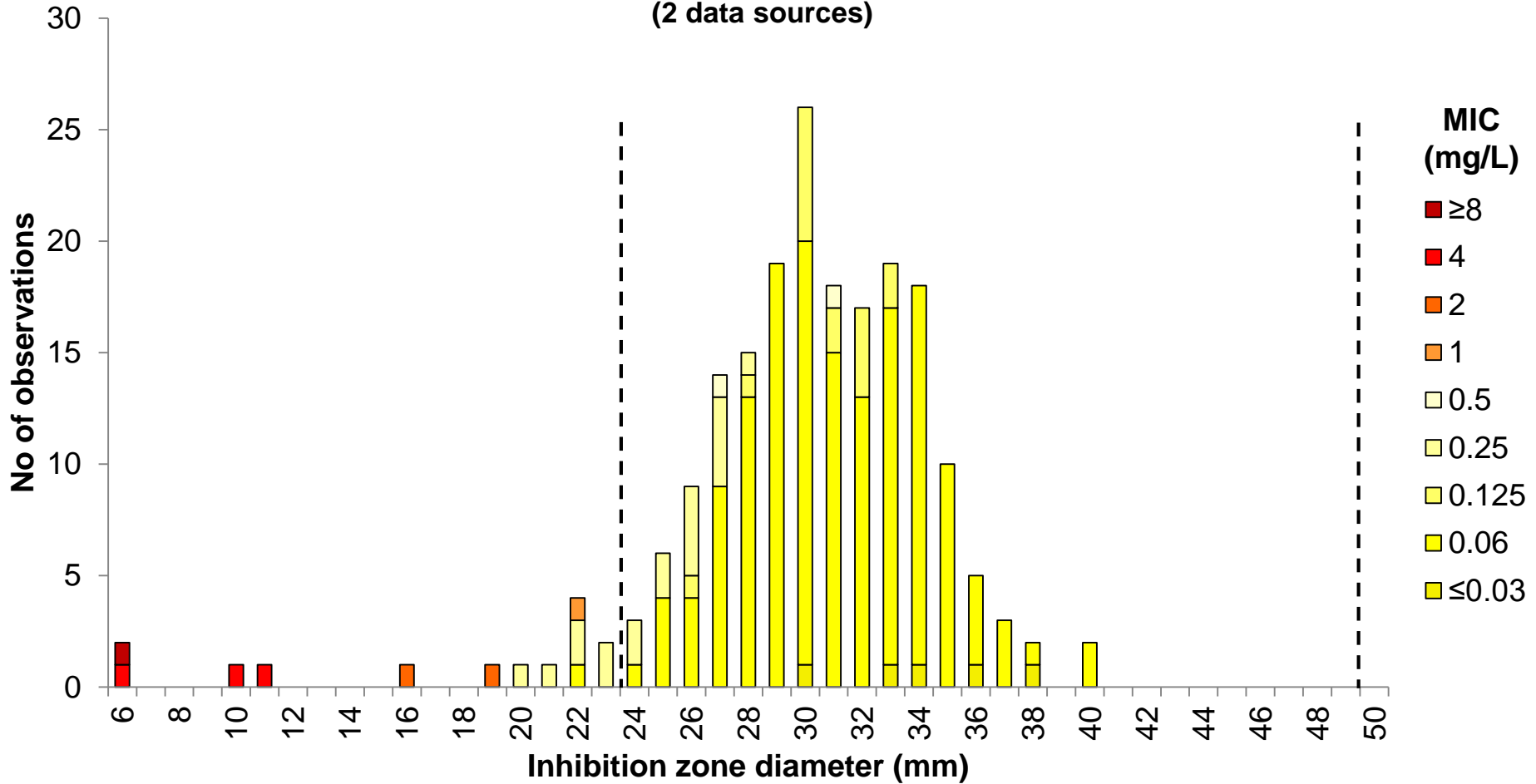
Breakpoints

MIC S ≤ 0.001, R > 0.5 mg/L

Zone diameter S ≥ 50, R < 24 mm

Ciprofloxacin 5 µg vs. MIC *C. ulcerans*, 200 isolates

(2 data sources)



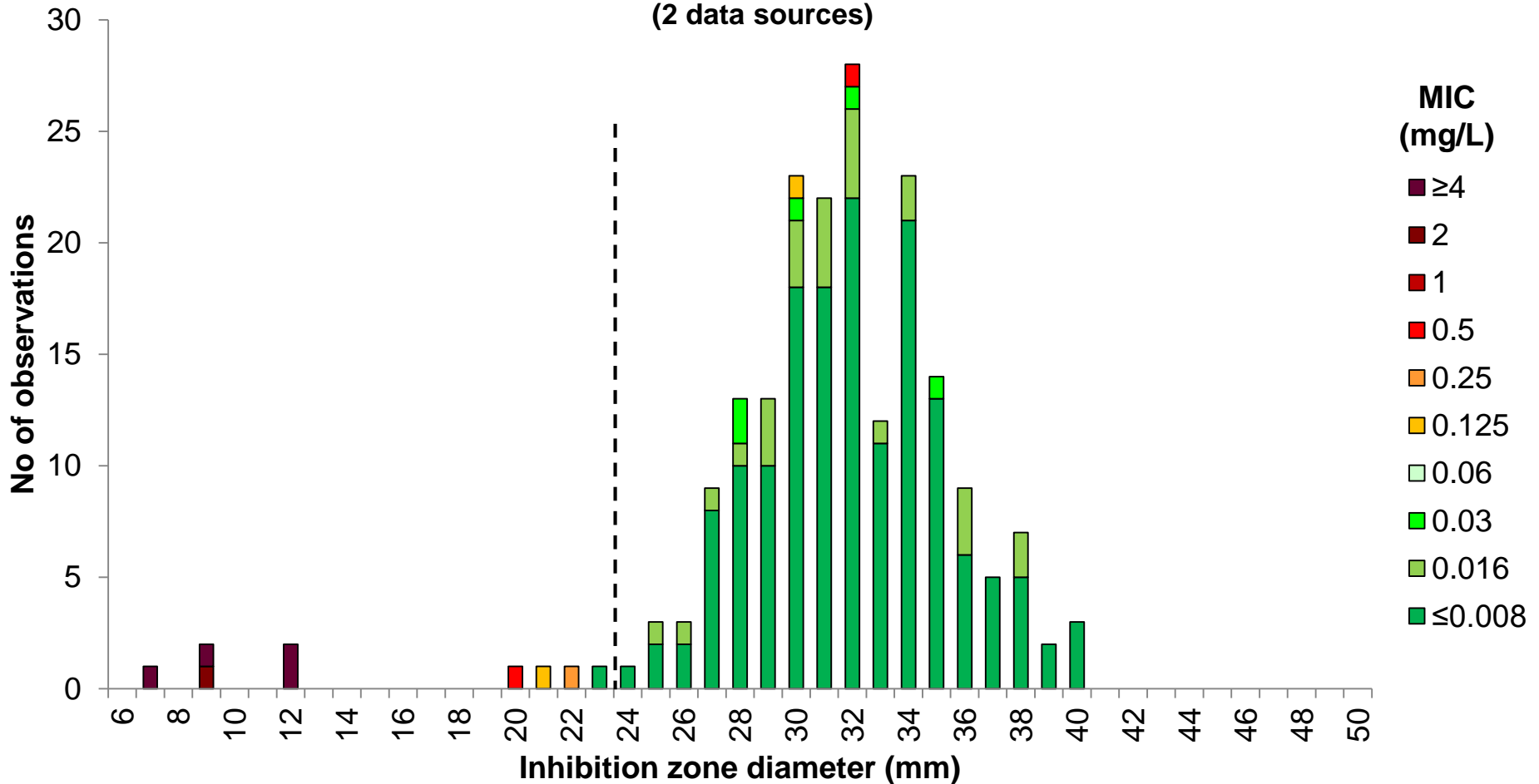
Breakpoints

MIC $S \leq 0.001$, $R > 0.5$ mg/L

Zone diameter $S \geq 50$, $R < 24$ mm

Erythromycin 15 µg vs. MIC *C. diphtheriae*, 199 isolates

(2 data sources)



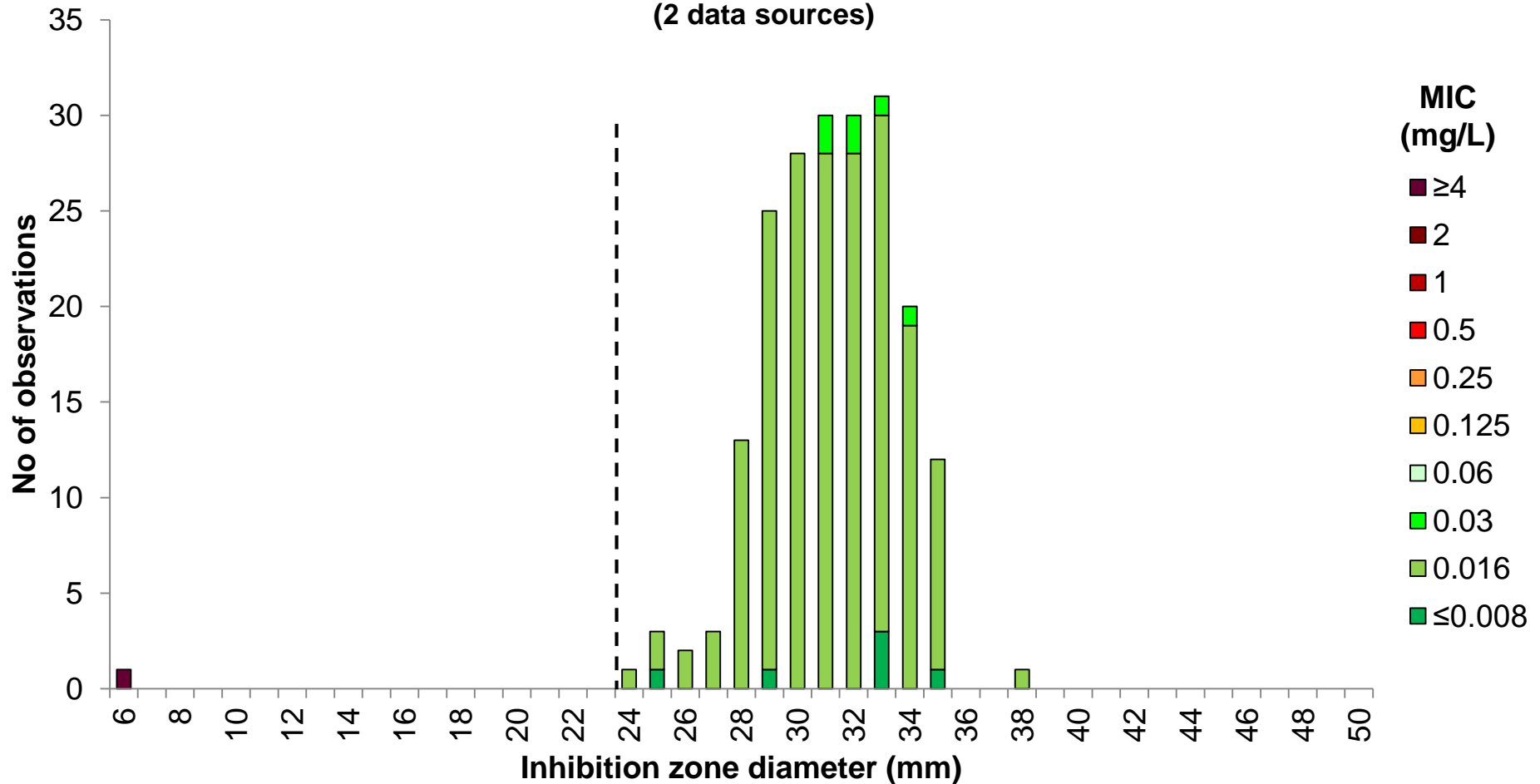
Breakpoints

MIC S ≤ 0.06, R > 0.06 mg/L

Zone diameter S ≥ 24, R < 24 mm

Erythromycin 15 µg vs. MIC *C. ulcerans*, 200 isolates

(2 data sources)



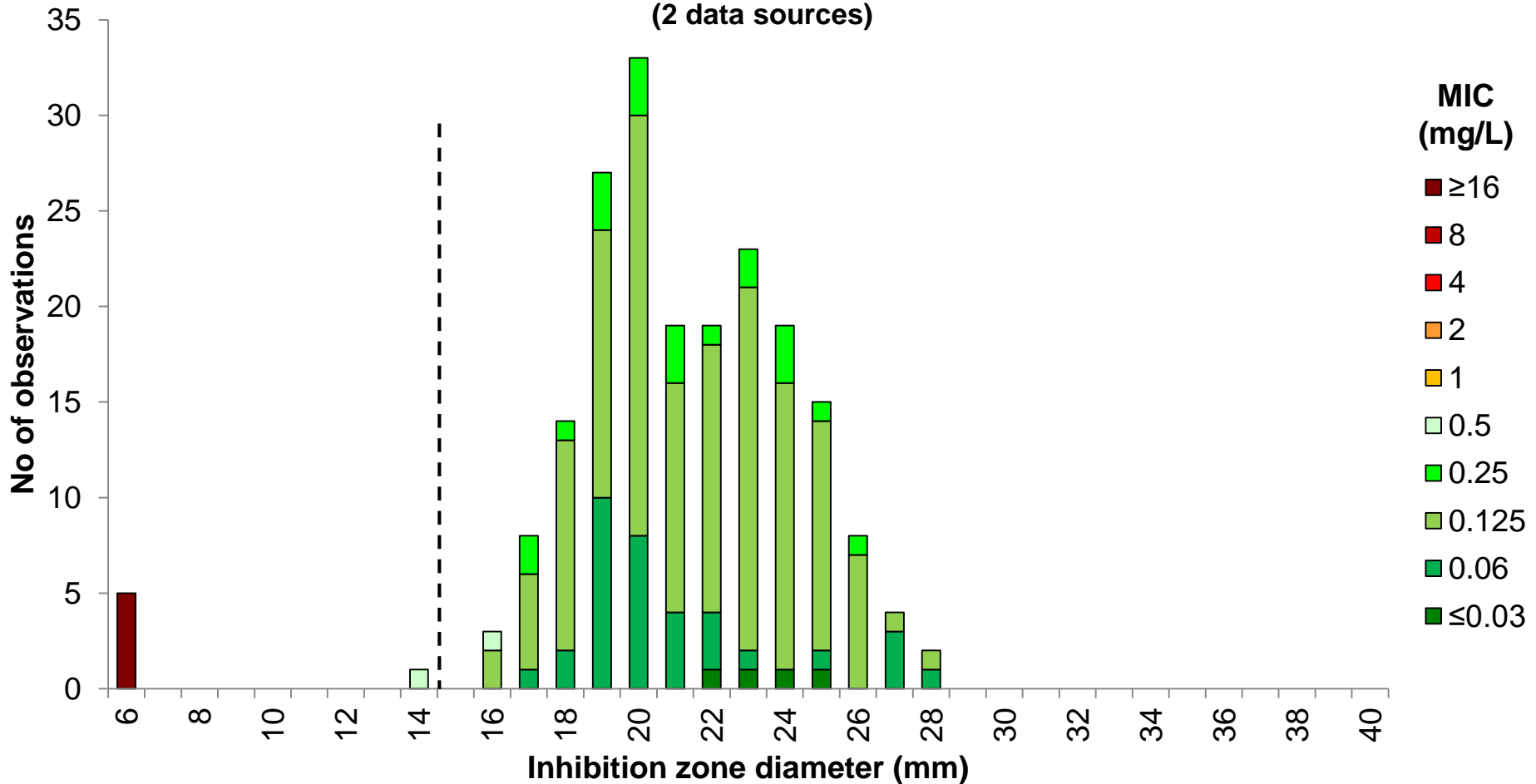
Breakpoints

MIC S ≤ 0.06, R > 0.06 mg/L

Zone diameter S ≥ 24, R < 24 mm

Clindamycin 2 µg vs. MIC *C. diphtheriae*, 200 isolates

(2 data sources)



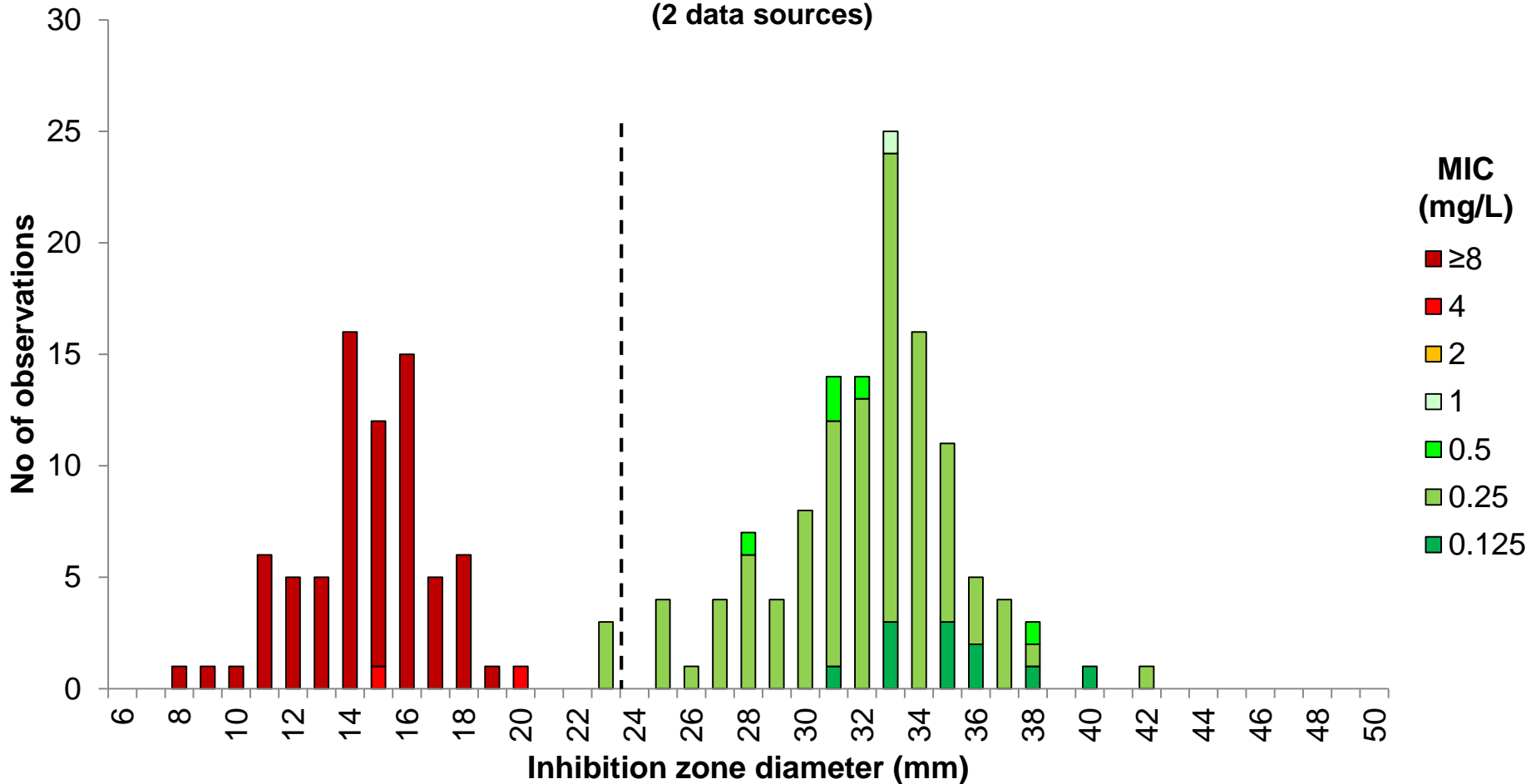
Breakpoints (*C. diphtheriae*)

MIC S ≤ 0.5, R > 0.5 mg/L

Zone diameter S ≥ 15, R < 15 mm

Tetracycline 30 µg vs. MIC *C. diphtheriae*, 200 isolates

(2 data sources)



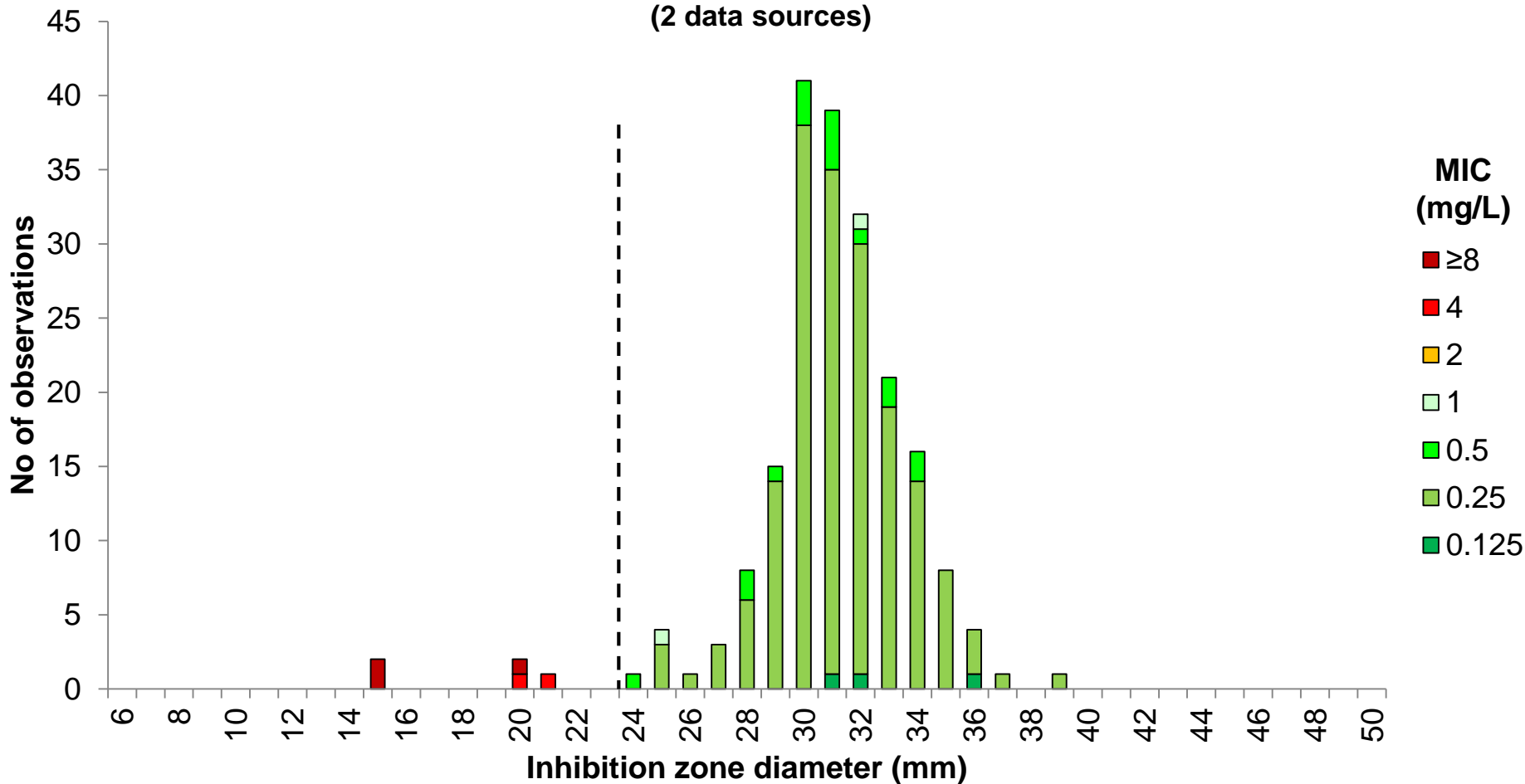
Breakpoints

MIC $S \leq 1$, $R > 1$ mg/L

Zone diameter $S \geq 24$, $R < 24$ mm

Tetracycline 30 µg vs. MIC *C. ulcerans*, 200 isolates

(2 data sources)



Breakpoints

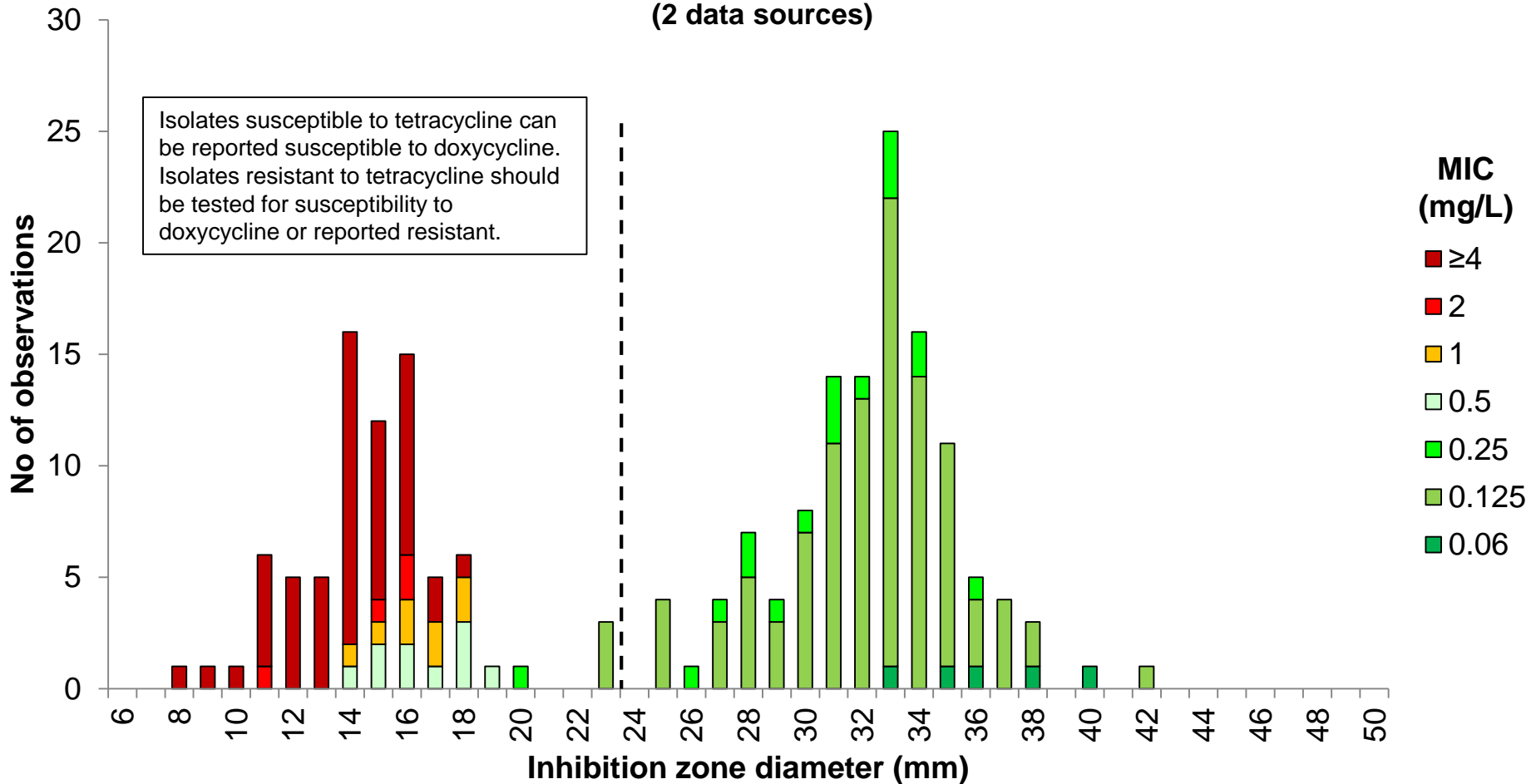
MIC S ≤ 1, R > 1 mg/L

Zone diameter S ≥ 24, R < 24 mm

Tetracycline 30 µg vs. Doxycycline MIC

C. diphtheriae, 200 isolates

(2 data sources)



Breakpoints

Doxycycline MIC

S ≤ 0.5, R > 0.5 mg/L

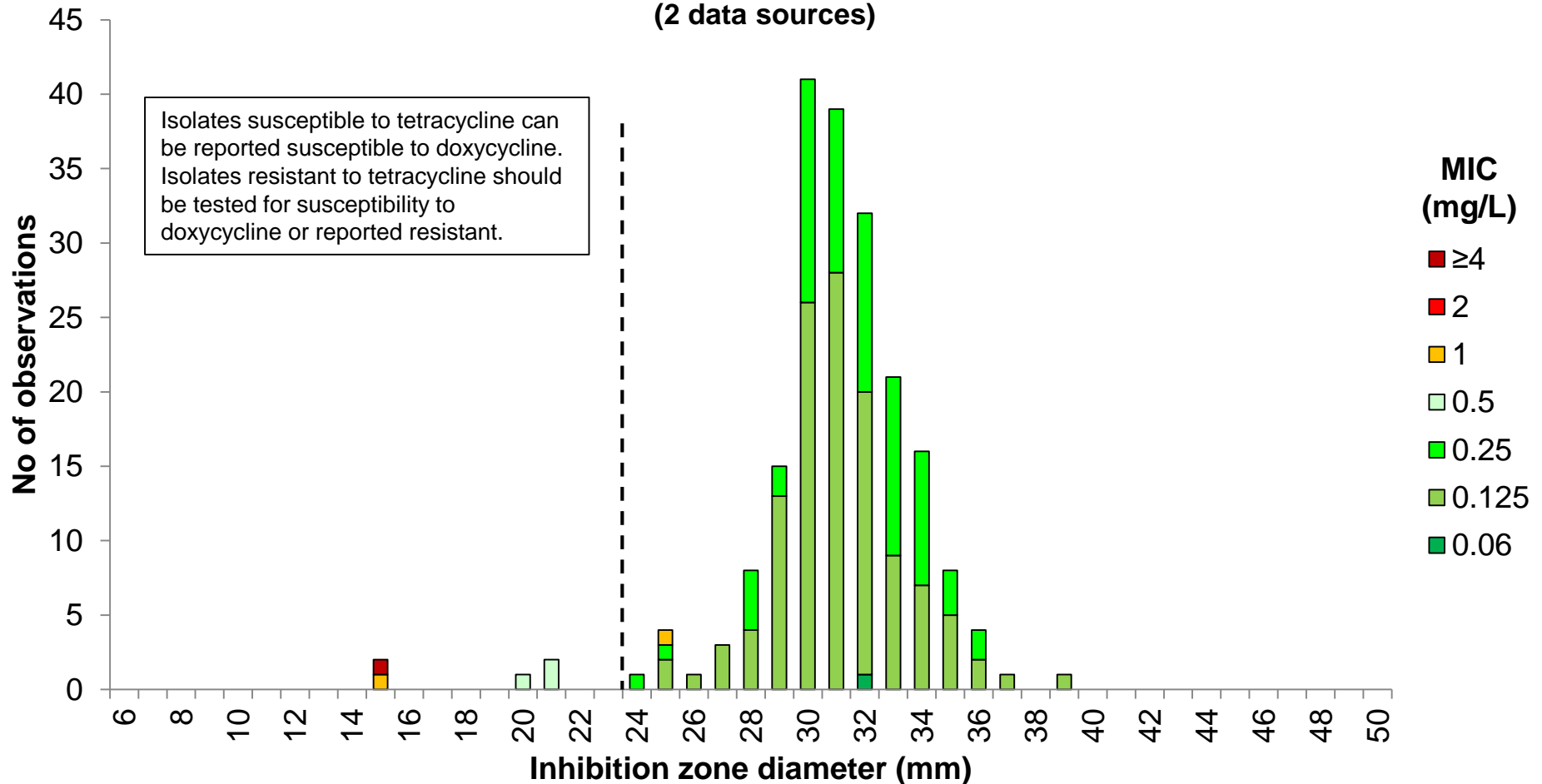
Tetracycline zone diameter

S ≥ 24, R < 24 mm

Tetracycline 30 µg vs. Doxycycline MIC

C. ulcerans, 200 isolates

(2 data sources)



Breakpoints

Doxycycline MIC

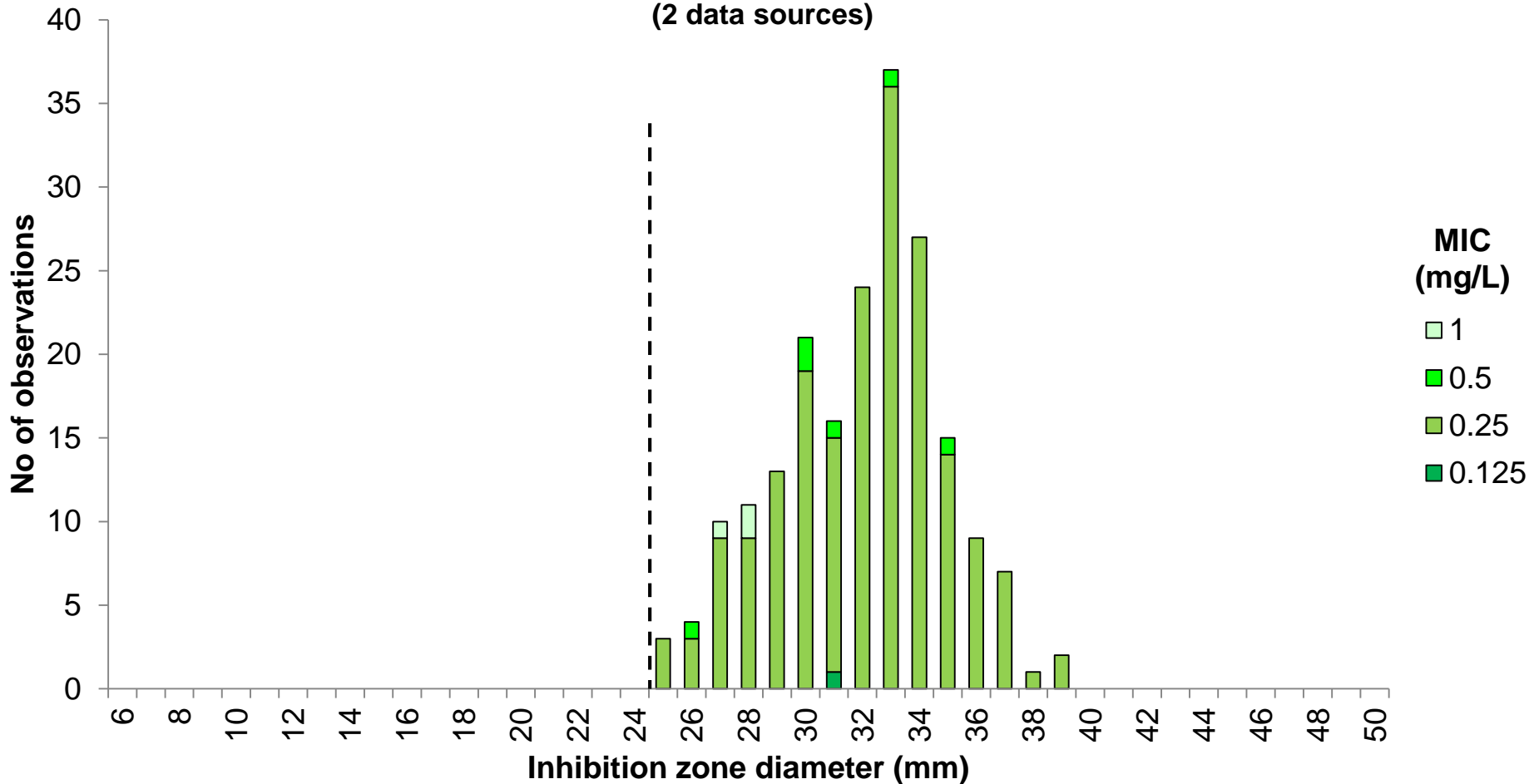
S ≤ 0.5, R > 0.5 mg/L

Tetracycline zone diameter

S ≥ 24, R < 24 mm

Linezolid 10 µg vs. MIC *C. diphtheriae*, 200 isolates

(2 data sources)



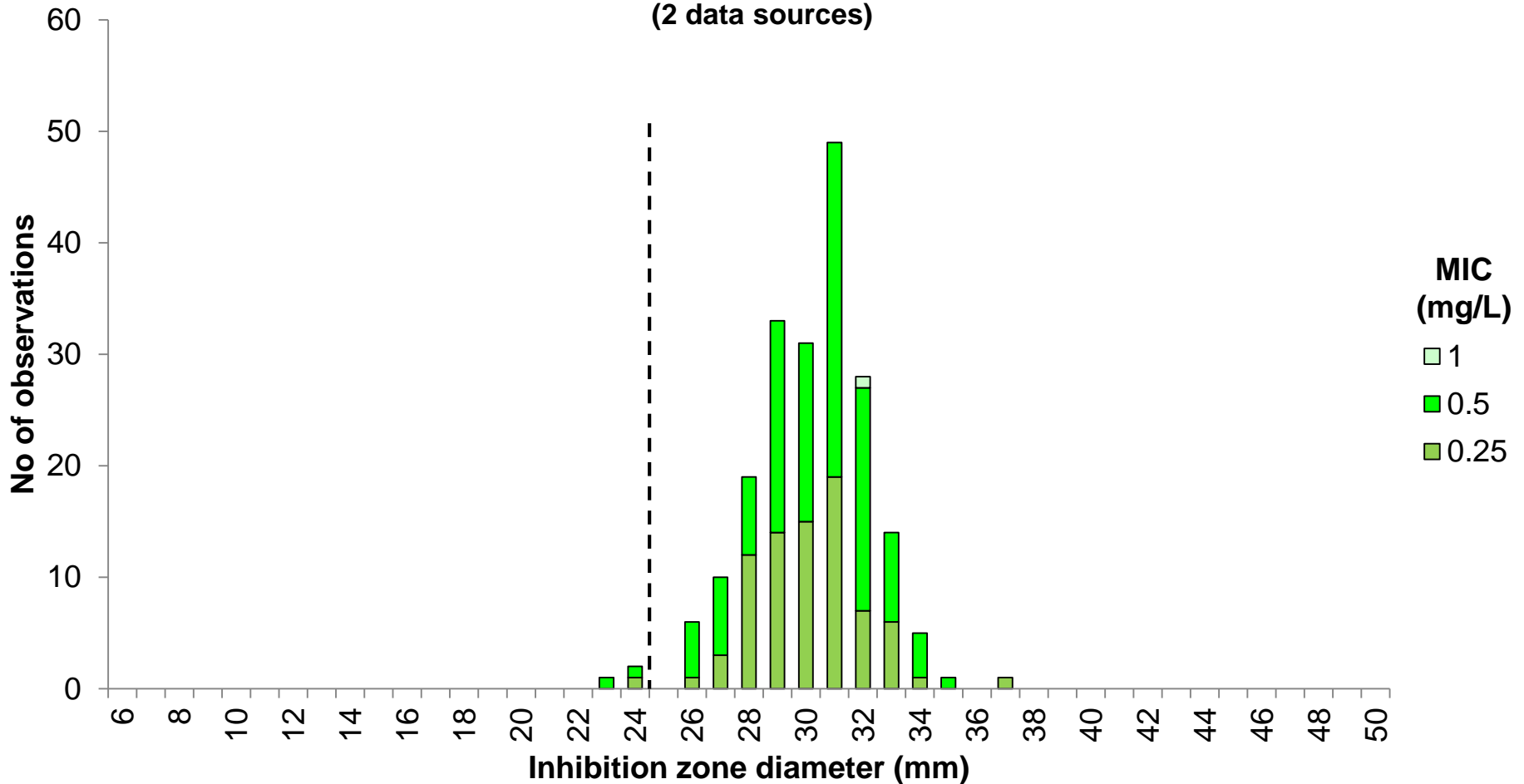
Breakpoints

MIC $S \leq 2$, $R > 2$ mg/L

Zone diameter $S \geq 25$, $R < 25$ mm

Linezolid 10 µg vs. MIC *C. ulcerans*, 200 isolates

(2 data sources)



Breakpoints

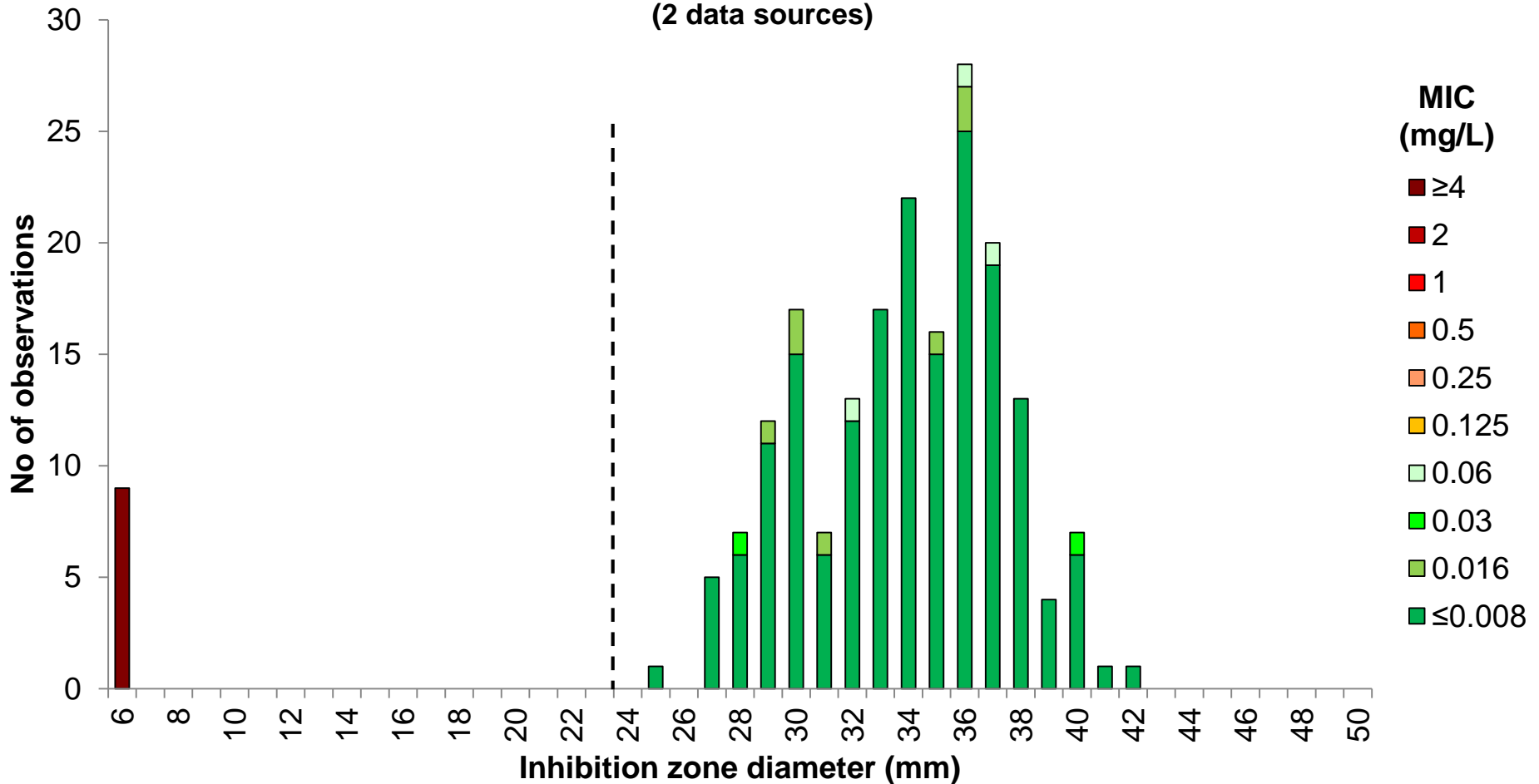
MIC $S \leq 2$, $R > 2$ mg/L

Zone diameter $S \geq 25$, $R < 25$ mm

Rifampicin 5 µg vs. MIC

C. diphtheriae, 200 isolates

(2 data sources)



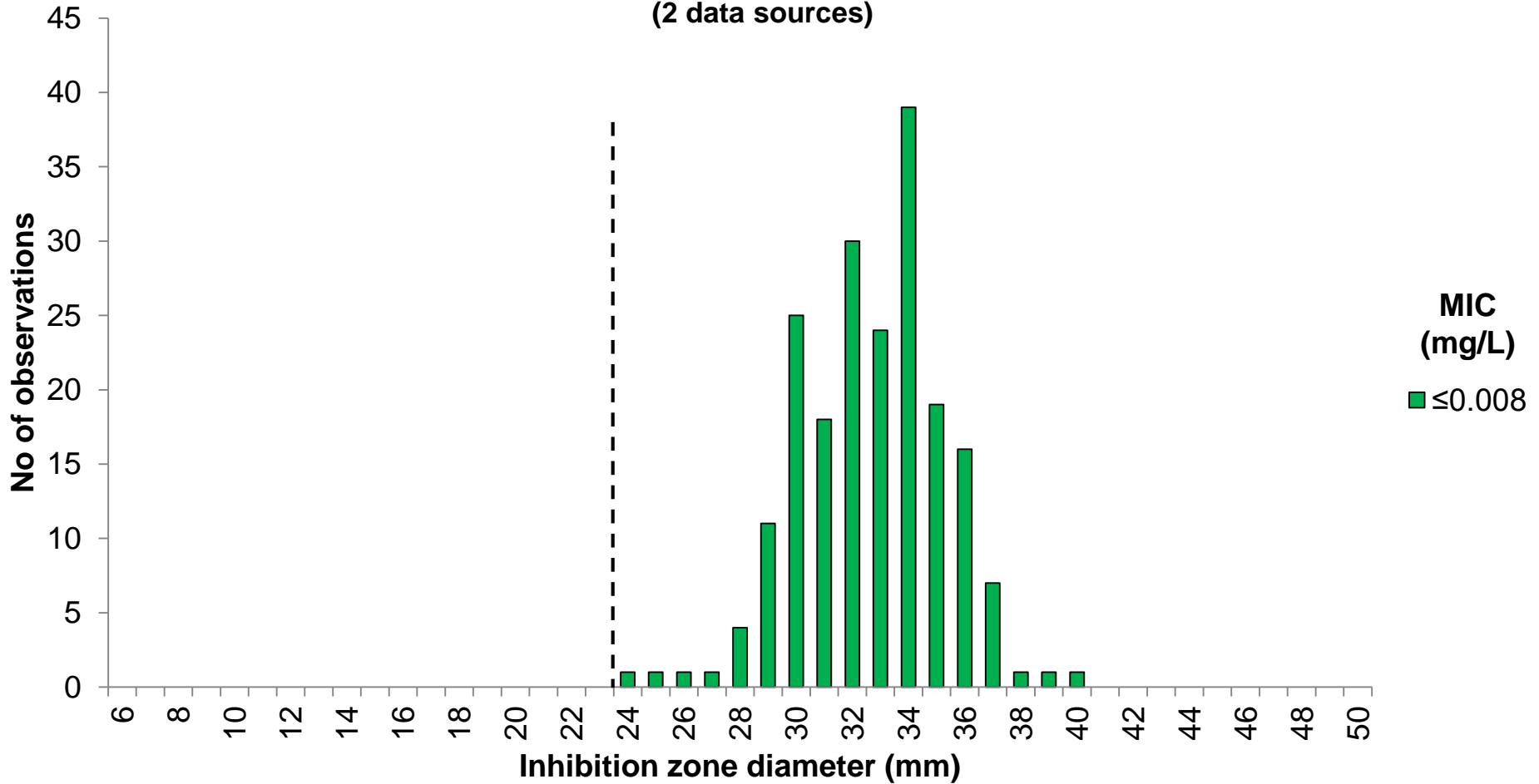
Breakpoints

MIC S ≤ 0.06, R > 0.06 mg/L

Zone diameter S ≥ 24, R < 24 mm

Rifampicin 5 µg vs. MIC *C. ulcerans*, 200 isolates

(2 data sources)



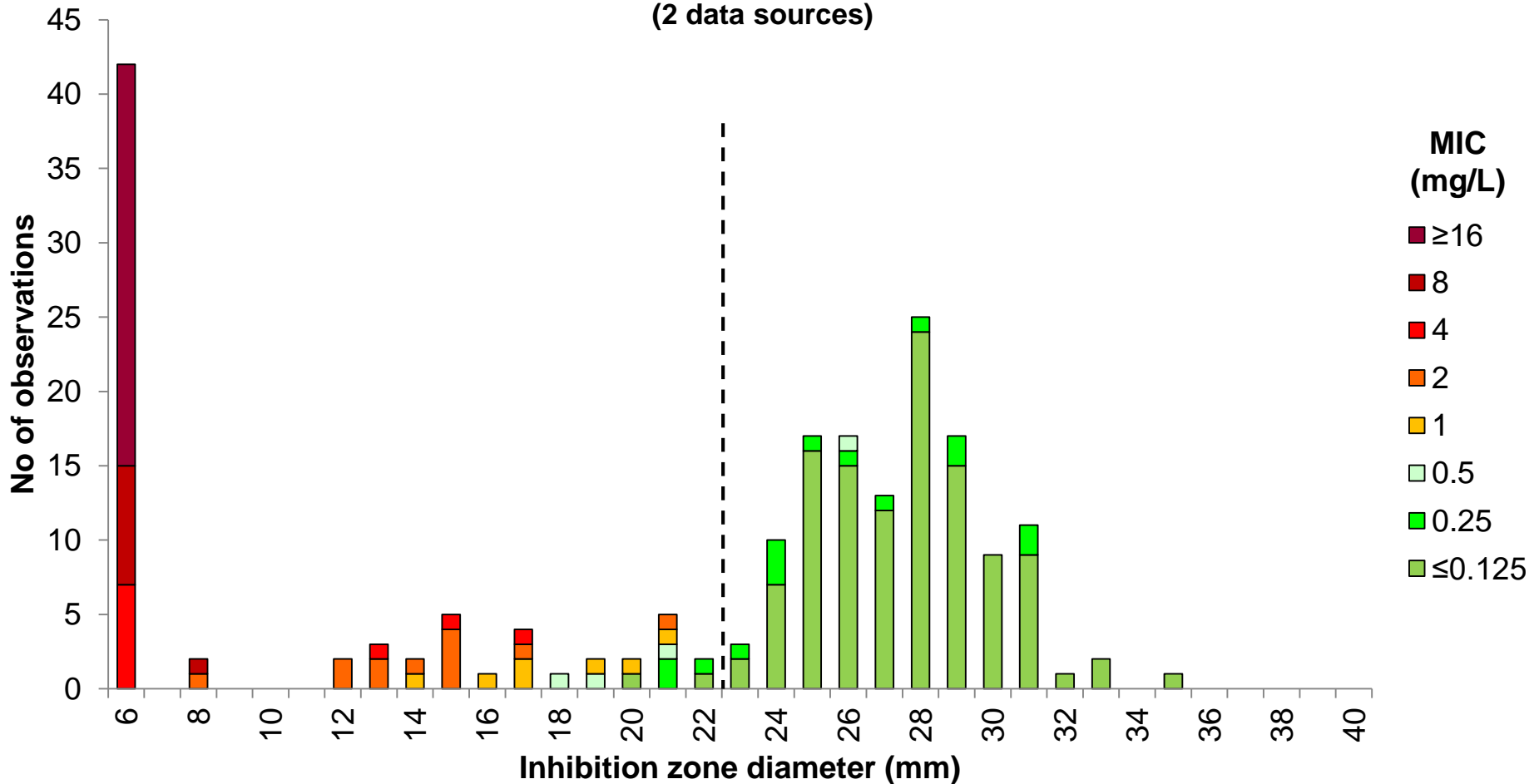
Breakpoints

MIC $S \leq 0.06$, $R > 0.06$ mg/L

Zone diameter $S \geq 24$, $R < 24$ mm

Trimethoprim-sulfamethoxazole 1.25-23.75 μg vs. MIC *C. diphtheriae*, 199 isolates

(2 data sources)



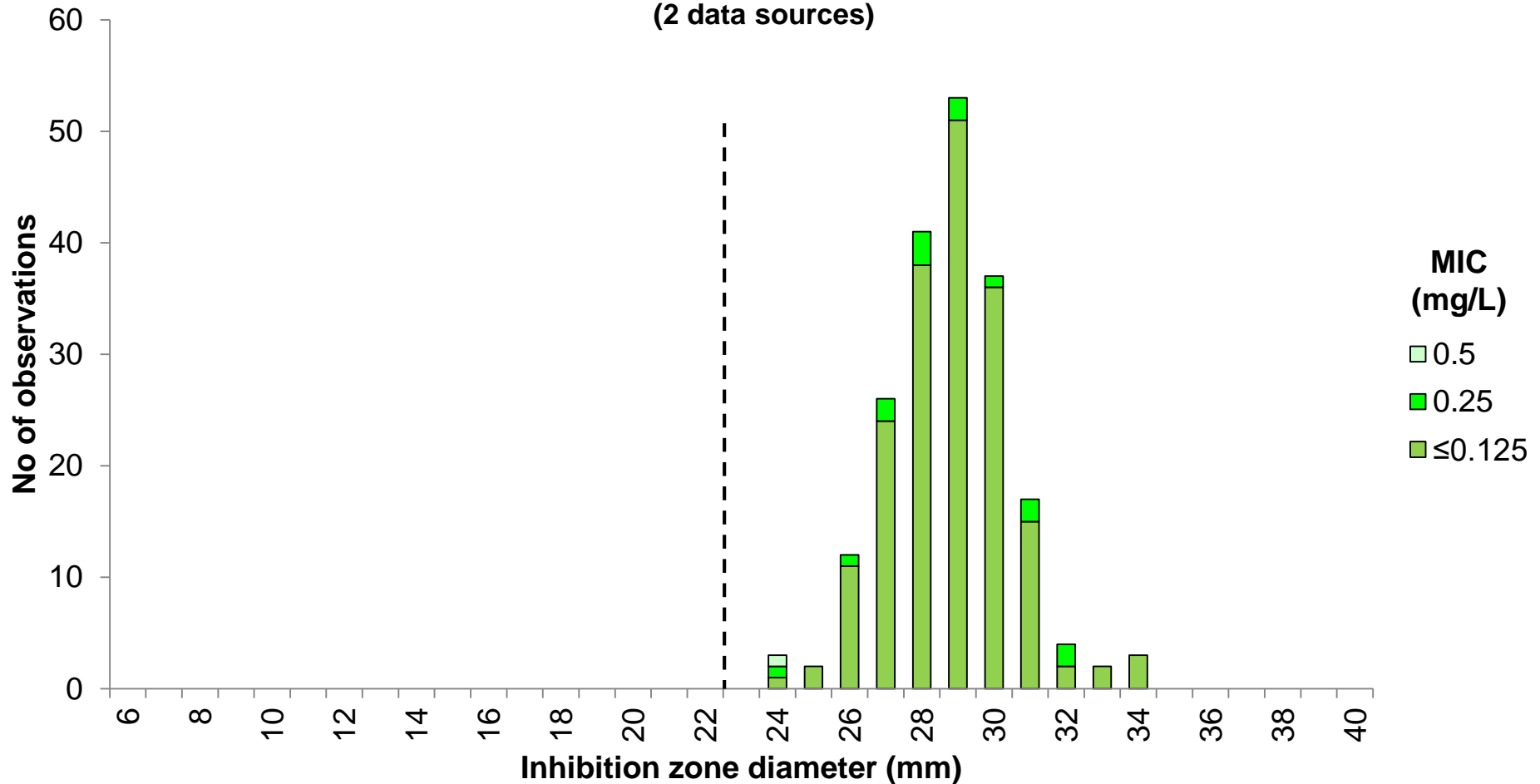
Breakpoints

MIC $S \leq 0.5$, $R > 0.5$ mg/L

Zone diameter $S \geq 23$, $R < 23$ mm

Trimethoprim-sulfamethoxazole 1.25-23.75 μg vs. MIC *C. ulcerans*, 200 isolates

(2 data sources)



Breakpoints

MIC $S \leq 0.5$, $R > 0.5$ mg/L

Zone diameter $S \geq 23$, $R < 23$ mm

Corynebacterium diphtheriae* and *C. ulcerans

Correlation between benzylpenicillin
susceptibility and susceptibility to other
beta-lactam agents

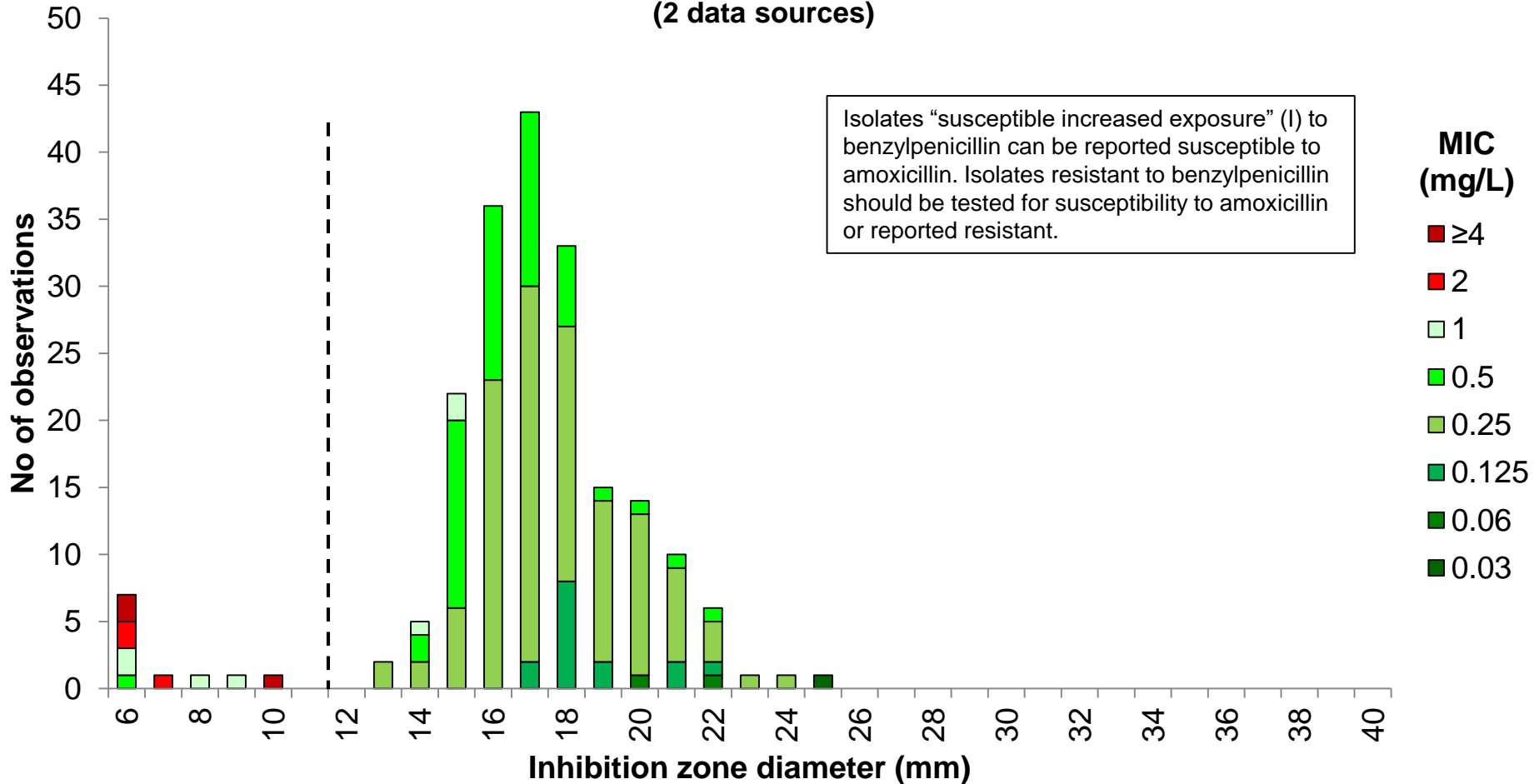
C. diphtheriae and *C. ulcerans*

- Benzylpenicillin (MIC or disk diffusion) susceptibility can predict susceptibility to other beta-lactam agents in *C. diphtheriae* and *C. ulcerans*.
- Isolates “susceptible increased exposure” (I) to benzylpenicillin can be reported susceptible amoxicillin and meropenem and “susceptible increased exposure” (I) to cefotaxime without further testing.
- Isolates resistant to benzylpenicillin should be tested for susceptibility to individual agents or reported resistant.

Benzylpenicillin 1 unit vs. Amoxicillin MIC

C. diphtheriae, 200 isolates

(2 data sources)

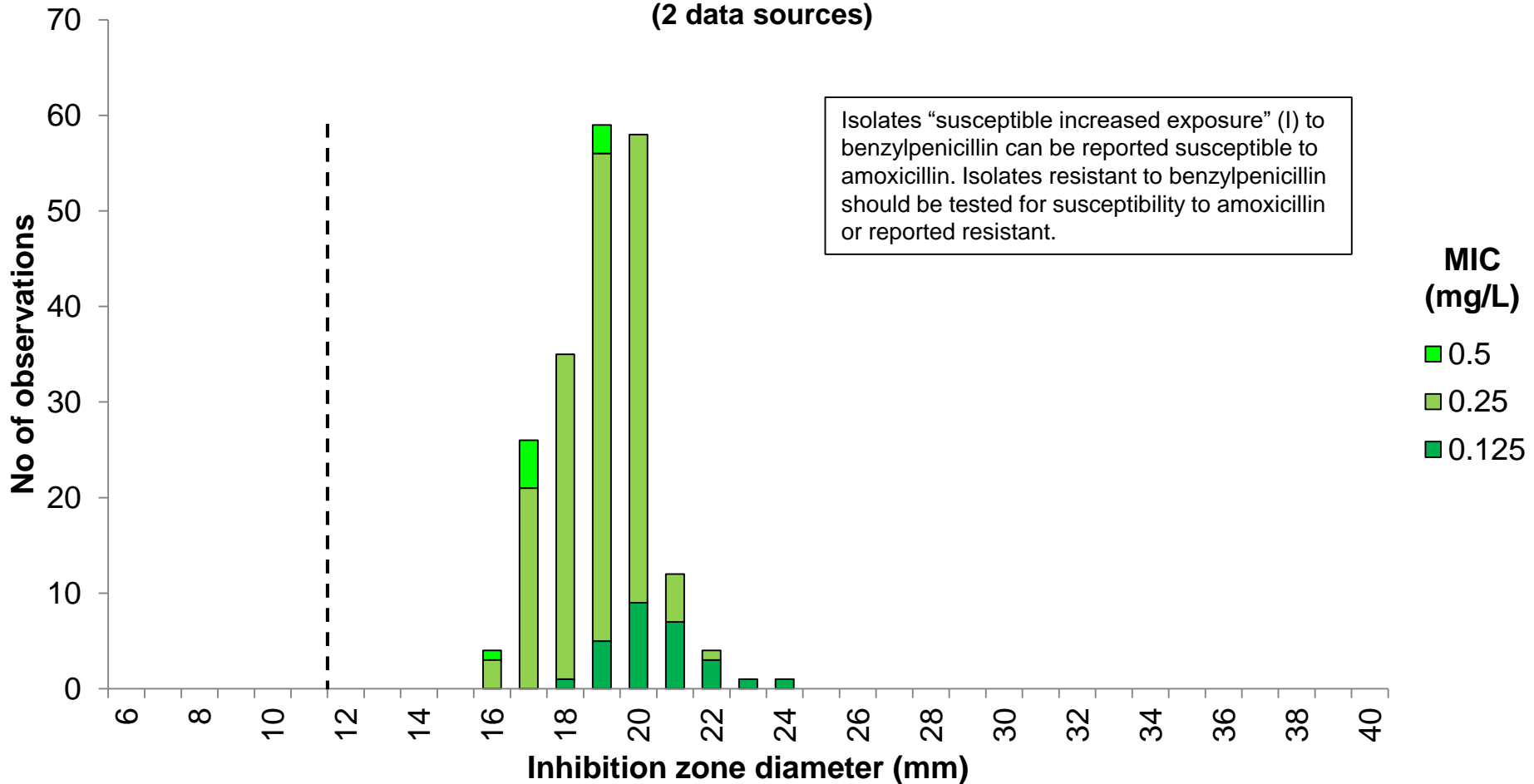


Breakpoints	
Amoxicillin MIC	S ≤ 1, R > 1 mg/L
Benzylpenicillin zone diameter	S ≥ 50, R < 12 mm

Benzylpenicillin 1 unit vs. Amoxicillin MIC

C. ulcerans, 200 isolates

(2 data sources)



Breakpoints

Amoxicillin MIC

$S \leq 1$, $R > 1$ mg/L

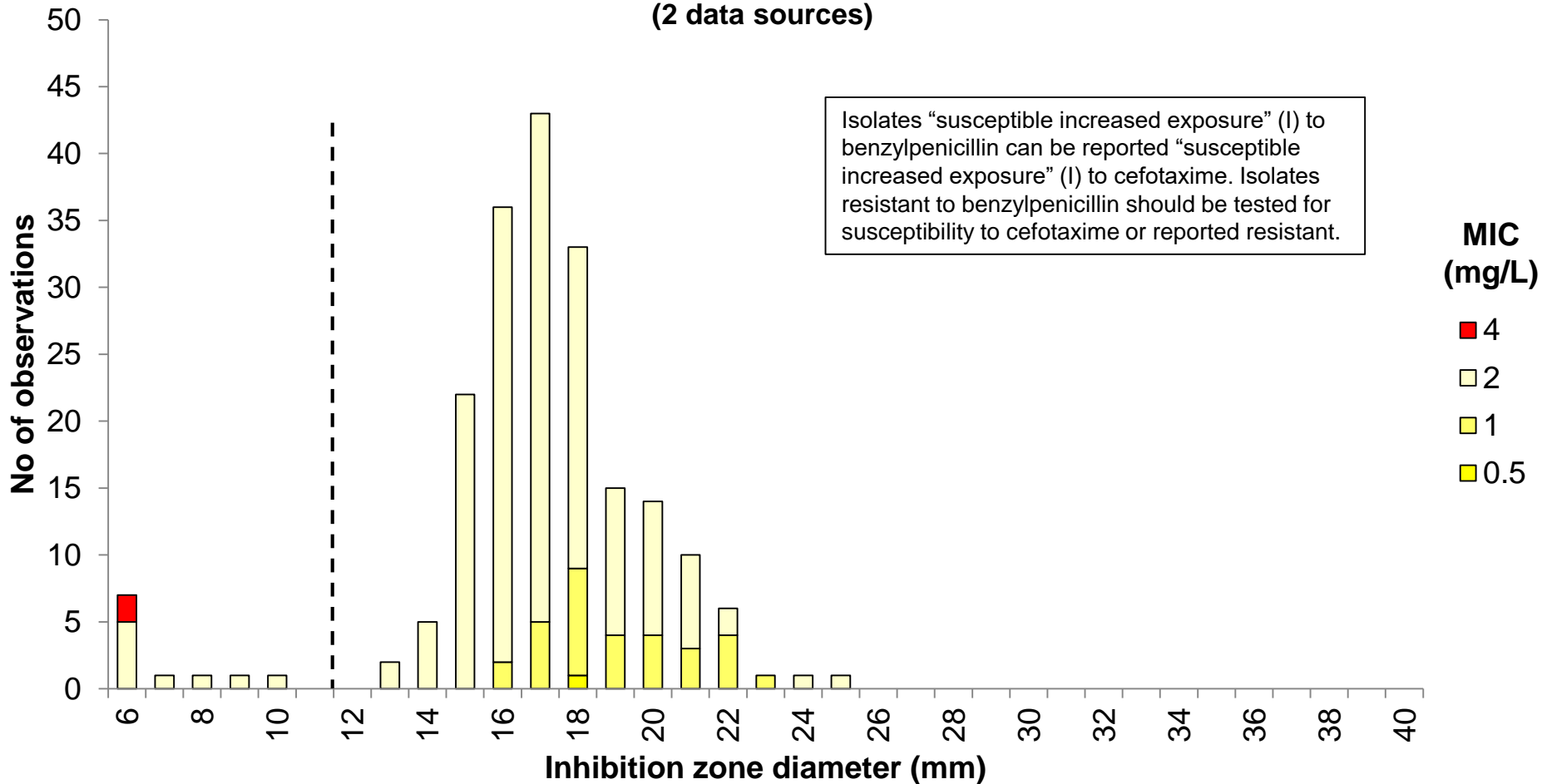
Benzylpenicillin zone diameter

$S \geq 50$, $R < 12$ mm

Benzylpenicillin 1 unit vs. Cefotaxime MIC

C. diphtheriae, 200 isolates

(2 data sources)



Breakpoints

Cefotaxime MIC

$S \leq 0.001$, $R > 2$ mg/L

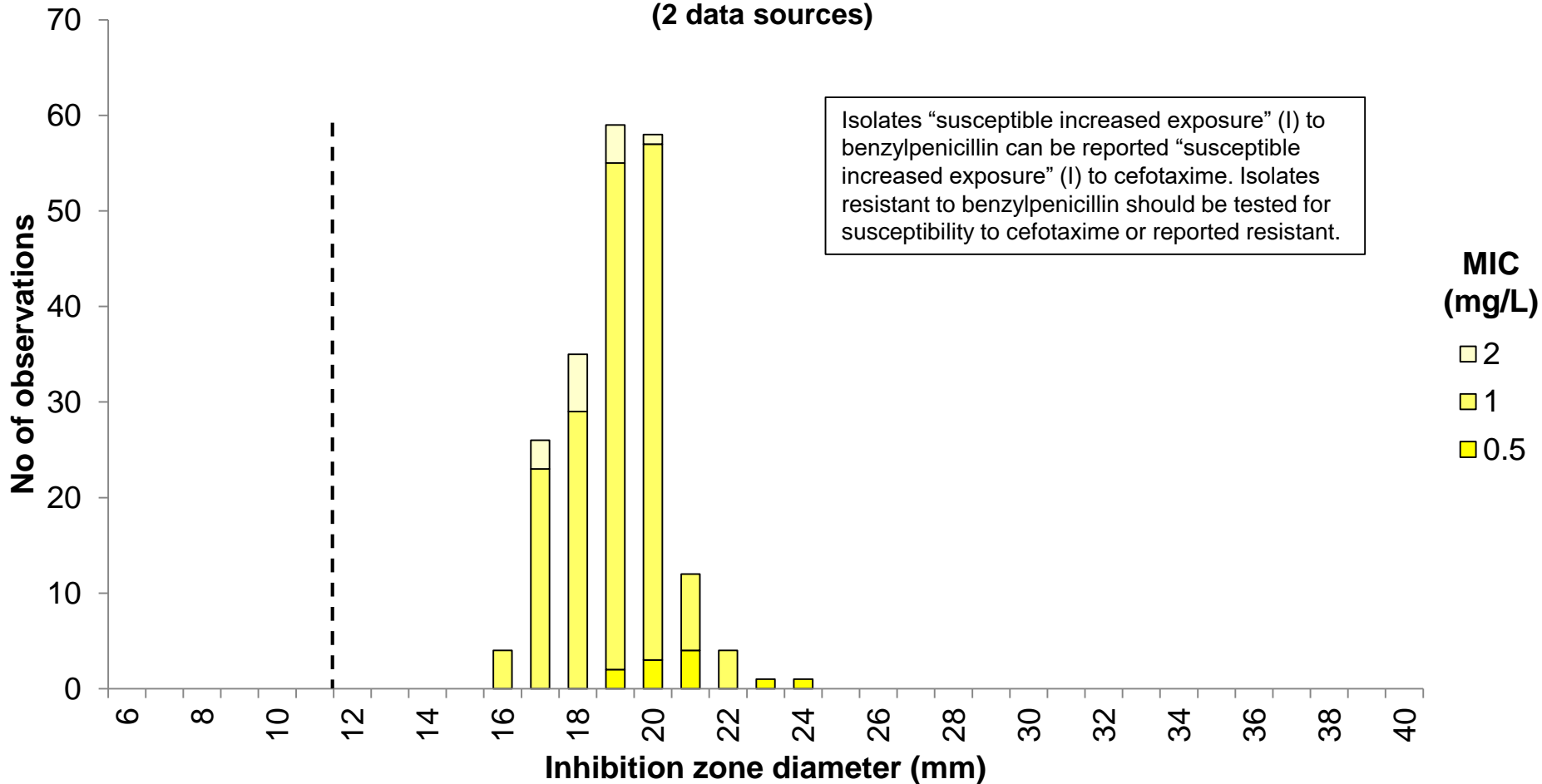
Benzylpenicillin zone diameter

$S \geq 50$, $R < 12$ mm

Benzylpenicillin 1 unit vs. Cefotaxime MIC

C. ulcerans, 200 isolates

(2 data sources)



Breakpoints

Cefotaxime MIC

$S \leq 0.001$, $R > 2$ mg/L

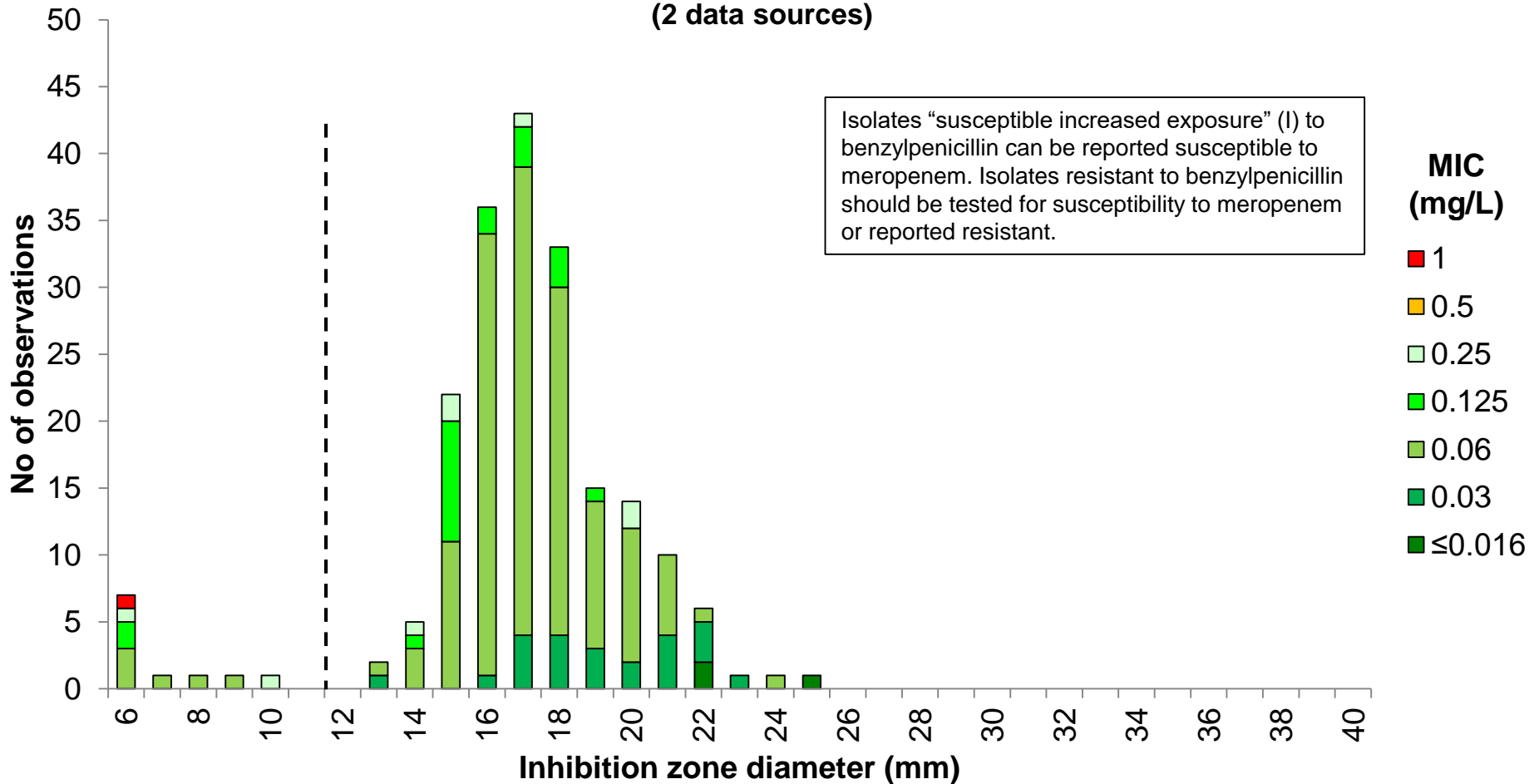
Benzylpenicillin zone diameter

$S \geq 50$, $R < 12$ mm

Benzylpenicillin 1 unit vs. Meropenem MIC

C. diphtheriae, 200 isolates

(2 data sources)



Breakpoints

Meropenem MIC

S ≤ 0.25, R > 0.25 mg/L

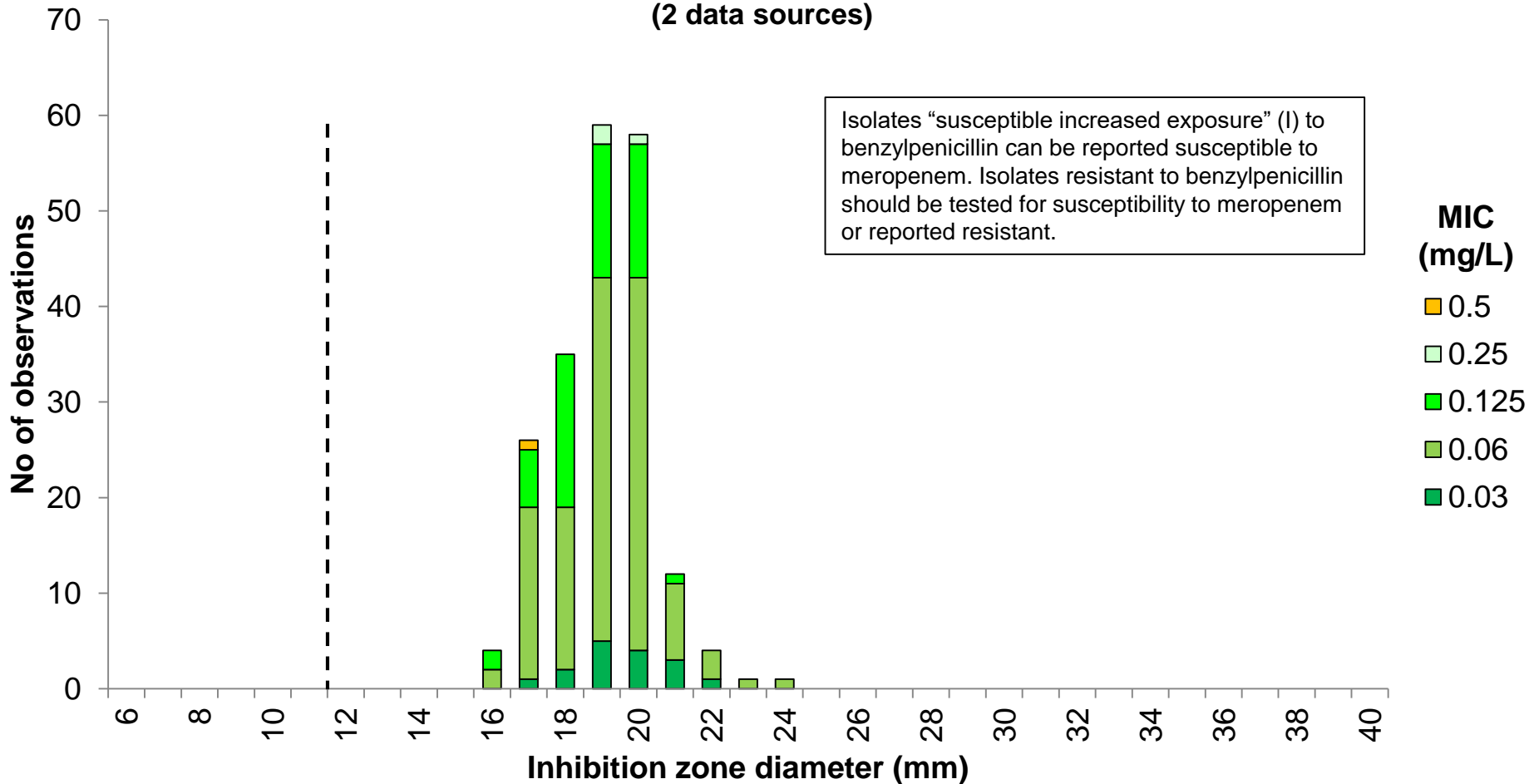
Benzylpenicillin zone diameter

S ≥ 50, R < 12 mm

Benzylpenicillin 1 unit vs. Meropenem MIC

C. ulcerans, 200 isolates

(2 data sources)



Breakpoints

Meropenem MIC

$S \leq 0.25$, $R > 0.25$ mg/L

Benzylpenicillin zone diameter

$S \geq 50$, $R < 12$ mm



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