## National Antimicrobial Resistance Monitoring System For Enteric Bacteria

### Table 1. Population size and number of isolates received and tested, by site, 1999

| Site | Pop. Size* | | Non-Typhi *Salmonella* | | *Salmonella* Typhi | | *Shigella* | | *E. coli* | | *Campylobacter* ** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. | (%) | No. | (%) | No. | (%) | No. | (%) | No. | (%) | No. | (%) |
| California [1] | 2,162,359 | (2) | 54 | (4) | 6 | (4) | 5 | (1) | 6 | (2) | 48 | (15) |
| Colorado | 4,056,133 | (4) | 79 | (5) | 2 | (1) | 18 | (5) | 15 | (5) | | |
| Connecticut | 3,282,031 | (3) | 63 | (4) | 6 | (4) | 7 | (2) | 20 | (7) | 53 | (16) |
| Florida | 15,111,244 | (15) | 100 | (7) | 19 | (11) | 14 | (4) | 13 | (4) | | |
| Georgia | 7,788,240 | (8) | 126 | (8) | 2 | (1) | 19 | (5) | 14 | (5) | 52 | (16) |
| Kansas | 2,654,052 | (3) | 27 | (2) | 1 | (1) | 5 | (1) | 4 | (1) | | |
| Los Angeles [2] | 9,329,989 | (9) | 134 | (9) | 25 | (15) | 19 | (5) | 3 | (1) | | |
| Maryland | 5,171,634 | (5) | 48 | (3) | 3 | (2) | 2 | (1) | 5 | (2) | 22 | (7) |
| Massachusetts | 6,175,169 | (6) | 123 | (8) | 17 | (10) | 80 | (21) | 40 | (14) | | |
| Minnesota | 4,775,508 | (5) | 62 | (4) | 4 | (2) | 19 | (5) | 32 | (11) | 42 | (13) |
| New Jersey | 8,143,412 | (8) | 133 | (9) | 22 | (13) | 34 | (9) | 22 | (8) | | |
| New York City [3] | 7,428,524 | (7) | 174 | (12) | 37 | (22) | 50 | (13) | 1 | (0) | | |
| New York State [4] | 10,768,077 | (10) | 146 | (10) | 10 | (6) | 12 | (3) | 58 | (20) | 54 | (17) |
| Oregon | 3,316,154 | (3) | 44 | (3) | 4 | (2) | 9 | (2) | 12 | (4) | 34 | (11) |
| Tennessee | 5,483,535 | (5) | 70 | (5) | 1 | (1) | 65 | (17) | 12 | (4) | 14 | (4) |
| Washington | 5,756,361 | (6) | 96 | (6) | 7 | (4) | 13 | (4) | 31 | (11) | | |
| West Virginia | 1,806,928 | (2) | 20 | (1) | 0 | (0) | 4 | (1) | 4 | (1) | | |
| **Totals** | 103,209,350 | (100) | 1499 | (100) | 166 | (100) | 375 | (100) | 292 | (100) | 319 | (100) |

* County population 1999, U.S. Census Bureau, post-census estimates
** *Campylobacter* isolates are submitted only from FoodNet sites, population size of FoodNet sites is 25.6 million persons (see http://www.cdc.gov/ncidod/dbmd/foodnet/default.htm)
(1) San Francisco and Alameda Counties
(2) Los Angeles County
(3) Five boroughs of New York City (Bronx, Brooklyn, Manhattan, Queens, Staten Island)
(4) Excluding New York City

## National Antimicrobial Resistance Monitoring System For Enteric Bacteria

### Table 2. Antimicrobial agents used for susceptibility testing for *Salmonella*, *Shigella*, *E. coli* O157, and *Campylobacter* isolates

| Antimicrobial Agent | Antimicrobial Agent Concentration Range (μg/ml) | Breakpoints [R] | [I] | [S] | Code |
|---|---|---|---|---|---|
| Amikacin | 4 - 32 | ≥ 64 | 32 | ≤ 16 | Ak |
| Amoxicillin – Clavulanic Acid | 0.5/0.25 – 32/16 | ≥ 32 | 16 | ≤ 8 | Cv |
| Ampicillin | 2 – 64 | ≥ 32 | 16 | ≤ 8 | A |
| Apramycin** | 2 – 16 | ≥ 32 | 16 | ≤ 8 | Ap |
| Azithromycin* | 0.016 – 256 | ≥ 2 | 0.5-1 | ≤ 0.25 | Az |
| Ceftiofur** | 0.5 – 16 | ≥ 8 | 4 | ≤ 2 | Cf |
| Ceftriaxone | 0.25 – 64 | ≥ 64 | 32 | ≤ 8 | Cx |
| Cephalothin | 1 – 32 | ≥ 32 | 16 | ≤ 8 | Ce |
| Chloramphenicol<br>Chloramphenicol* | 4 – 32<br>0.125 – 256 | ≥ 32<br>≥ 32 | 16<br>16 | ≤ 8<br>≤ 8 | C |
| Ciprofloxacin<br>Ciprofloxacin* | 0.015 – 2<br>0.016 – 32 | ≥ 4<br>≥ 4 | 2<br>2 | ≤ 1<br>≤ 1 | Cp |
| Clindamycin* | 0.032 – 256 | ≥ 4 | 1-2 | ≤ 0.5 | Cl |
| Erythromycin* | 0.047 – 256 | ≥ 8 | 1-4 | ≤ 0.5 | E |
| Florfenicol** | 2-16 | ≥ 16 | | | F |
| Gentamicin<br>Gentamicin* | 0.25 – 16<br>0.025 – 16 | ≥ 16<br>≥ 16 | 8<br>8 | ≤ 4<br>≤ 4 | G |
| Kanamycin | 16 – 64 | ≥ 64 | 32 | ≤ 16 | K |
| Nalidixic Acid<br>Nalidixic Acid* | 4 – 64<br>0.047 - 256 | ≥ 32<br>≥ 32 | | ≤ 16<br>≤ 16 | Na |
| Streptomycin | 32 – 356 | ≥ 64 | | ≤ 32 | S |
| Sulfamethoxazole | 128 – 512 | ≥ 512 | | ≤ 256 | Su |
| Tetracycline<br>Tetracycline* | 4 – 64<br>0.023 – 32 | ≥ 16<br>≥ 16 | 8<br>8 | ≤ 4<br>≤ 4 | T |
| Trimethoprim - Sulfamethoxazole | 0.12/2.4 – 4/76 | ≥ 4/76 | | ≤ 2/38 | Tm |

* Campylobacter antimicrobial agents and concentration ranges used

** No NCCLS interpretive standards for this antimicrobial agent (veterinary use only)

## National Antimicrobial Resistance Monitoring System For Enteric Bacteria

### Table 3. Antimicrobial resistance of *Salmonella, Shigella,* and *E. coli* O157 isolates, 1999

| Antimicrobial Agent | Non-Typhi *Salmonella* (N=1499) | | *Salmonella* Typhi (N=166) | | *Shigella* (N=375) | | *E. coli* O157 (N=292) | |
|---|---|---|---|---|---|---|---|---|
| | **N** | **%** | **N** | **%** | N | % | **N** | **%** |
| Amikacin | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Amoxicillin – Clavulanic Acid | 36 | 2 | 1 | 0.6 | 4 | 1 | 1 | 0.3 |
| Ampicillin | 234 | 16 | 21 | 13 | 291 | 77 | 4 | 1 |
| Apramycin | 5 | 0.3 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ceftiofur | 31 | 2 | 2 | 1 | 0 | 0 | 0 | 0 |
| Ceftriaxone | 6 | 0.4 | 1 | 0.6 | 0 | 0 | 0 | 0 |
| Cephalothin | 55 | 4 | 4 | 2 | 12 | 3 | 2 | 1 |
| Chloramphenicol | 138 | 9 | 20 | 12 | 65 | 17 | 0 | 0 |
| Ciprofloxacin | 1 | 0.1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Florfenicol | 128 | 8 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gentamicin | 34 | 2 | 0 | 0 | 1 | 0.3 | 1 | 0.3 |
| Kanamycin | 66 | 4 | 0 | 0 | 2 | 0.5 | 2 | 1 |
| Nalidixic Acid | 16 | 1 | 31 | 19 | 6 | 2 | 2 | 1 |
| Streptomycin | 254 | 17 | 23 | 14 | 209 | 56 | 8 | 3 |
| Sulfamethoxazole | 272 | 18 | 28 | 17 | 210 | 55 | 24 | 8 |
| Tetracycline | 292 | 19 | 15 | 9 | 215 | 57 | 10 | 3 |
| Trimethoprim - Sulfamethoxazole | 31 | 2 | 21 | 13 | 193 | 51 | 4 | 1 |

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### Table 4a. Non-Typhi *Salmonella* submissions by site and by month of collection, 1999

| Site | Total | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CA | 54 | 2 | 4 | 3 | 4 | 3 | 5 | 7 | 5 | 7 | 4 | 5 | 5 |
| CO | 79 | 4 | 6 | 8 | 7 | 9 | 9 | 7 | 9 | 7 | 3 | 5 | 5 |
| CT | 64 | 3 | 3 | 4 | 3 | 5 | 7 | 9 | 7 | 7 | 7 | 3 | 6 |
| FL | 100 | 2 | 7 | 6 | 4 | 5 | 10 | 8 | 7 | 15 | 13 | 15 | 8 |
| GA | 130 | 9 | 7 | 10 | 7 | 8 | 12 | 17 | 11 | 16 | 14 | 10 | 9 |
| KS | 27 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 4 | 4 | 2 | 2 | 1 |
| LX | 134 | 8 | 5 | 8 | 8 | 8 | 11 | 21 | 18 | 13 | 14 | 11 | 9 |
| MA | 130 | 7 | 5 | 9 | 6 | 11 | 15 | 16 | 15 | 16 | 8 | 12 | 10 |
| MD | 48 | 3 | 0 | 2 | 1 | 3 | 1 | 11 | 7 | 7 | 5 | 4 | 4 |
| MN | 62 | 3 | 4 | 4 | 6 | 4 | 5 | 11 | 8 | 6 | 4 | 4 | 3 |
| NJ | 134 | 9 | 9 | 7 | 8 | 9 | 11 | 14 | 17 | 18 | 10 | 10 | 12 |
| NYC | 176 | 13 | 11 | 10 | 10 | 8 | 16 | 23 | 20 | 21 | 15 | 14 | 15 |
| NYS | 146 | 8 | 5 | 7 | 7 | 14 | 13 | 32 | 16 | 11 | 11 | 11 | 11 |
| OR | 44 | 3 | 4 | 2 | 2 | 3 | 8 | 6 | 4 | 3 | 2 | 3 | 4 |
| TN | 70 | 6 | 2 | 4 | 2 | 7 | 7 | 11 | 11 | 4 | 7 | 5 | 4 |
| WA | 96 | 5 | 7 | 7 | 4 | 5 | 16 | 14 | 10 | 6 | 6 | 6 | 10 |
| WV | 20 | 1 | 2 | 1 | 1 | 1 | 4 | 0 | 3 | 3 | 2 | 1 | 1 |
| **Total** | **1514** | 87 | 82 | 94 | 82 | 105 | 153 | 210 | 172 | 164 | 127 | 121 | 117 |

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### Table 4b. *Salmonella* Typhi submissions by site and by month of collection, 1999

| Site | Total | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CA | 11 | 0 | 3 | 2 | 2 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 |
| CO | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| CT | 8 | 0 | 0 | 1 | 1 | 0 | 2 | 2 | 1 | 0 | 0 | 0 | 1 |
| FL | 20 | 7 | 8 | 0 | 3 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| GA | 3 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 |
| KS | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| LX | 59 | 13 | 14 | 6 | 1 | 3 | 1 | 2 | 1 | 5 | 5 | 1 | 7 |
| MA | 18 | 0 | 3 | 3 | 1 | 0 | 0 | 7 | 0 | 0 | 0 | 3 | 1 |
| MD | 3 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| MN | 4 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| NJ | 36 | 0 | 4 | 4 | 1 | 7 | 1 | 2 | 3 | 9 | 3 | 1 | 1 |
| NYC | 52 | 2 | 6 | 2 | 3 | 1 | 4 | 4 | 12 | 1 | 5 | 6 | 6 |
| NYS | 14 | 2 | 4 | 0 | 0 | 3 | 0 | 0 | 1 | 3 | 1 | 0 | 0 |
| OR | 7 | 0 | 0 | 1 | 1 | 2 | 1 | 2 | 0 | 0 | 0 | 0 | 0 |
| TN | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WA | 10 | 1 | 0 | 4 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 3 | 0 |
| WV | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total** | **249** | 25 | 42 | 24 | 15 | 20 | 12 | 23 | 21 | 20 | 15 | 14 | 18 |

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### Table 4c. *Shigella* submissions by site and by month of collection, 1999

| Site | Total | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CA | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 1 | 1 | 0 |
| CO | 18 | 1 | 1 | 0 | 2 | 0 | 0 | 2 | 2 | 4 | 1 | 3 | 2 |
| CT | 7 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 |
| FL | 14 | 1 | 0 | 3 | 2 | 4 | 1 | 1 | 1 | 0 | 0 | 1 | 0 |
| GA | 19 | 1 | 1 | 1 | 2 | 1 | 1 | 3 | 2 | 1 | 3 | 2 | 1 |
| KS | 5 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 2 | 0 |
| LX | 19 | 3 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 2 |
| MA | 80 | 1 | 3 | 2 | 1 | 1 | 3 | 6 | 20 | 15 | 14 | 10 | 4 |
| MD | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| MN | 19 | 1 | 0 | 1 | 1 | 2 | 4 | 2 | 2 | 1 | 2 | 2 | 1 |
| NJ | 34 | 2 | 3 | 4 | 3 | 2 | 2 | 3 | 3 | 4 | 3 | 3 | 2 |
| NYC | 51 | 4 | 4 | 6 | 3 | 0 | 5 | 6 | 6 | 5 | 4 | 4 | 4 |
| NYS | 12 | 3 | 1 | 1 | 1 | 0 | 0 | 1 | 2 | 2 | 1 | 0 | 0 |
| OR | 9 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 2 | 1 | 1 | 1 | 1 |
| TN | 65 | 10 | 4 | 4 | 2 | 8 | 15 | 2 | 3 | 2 | 3 | 3 | 9 |
| WA | 14 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 |
| WV | 4 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 |
| **Total** | **377** | 29 | 21 | 26 | 20 | 22 | 36 | 30 | 51 | 41 | 37 | 35 | 29 |

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### Table 4d. *E. coli* O157 submissions by site and by month of collection, 1999

| Site | Total | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CA | 6 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 |
| CO | 15 | 1 | 0 | 1 | 0 | 1 | 1 | 4 | 1 | 5 | 0 | 0 | 1 |
| CT | 20 | 2 | 0 | 1 | 1 | 1 | 0 | 6 | 4 | 2 | 2 | 1 | 0 |
| FL | 13 | 1 | 0 | 0 | 1 | 0 | 3 | 2 | 3 | 1 | 1 | 1 | 0 |
| GA | 14 | 1 | 0 | 0 | 2 | 0 | 1 | 2 | 1 | 1 | 1 | 2 | 3 |
| KS | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 |
| LX | 3 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| MA | 40 | 1 | 2 | 1 | 1 | 4 | 2 | 10 | 4 | 8 | 4 | 2 | 1 |
| MD | 5 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 2 | 1 | 0 | 0 |
| MN | 32 | 1 | 1 | 0 | 1 | 1 | 5 | 7 | 6 | 3 | 5 | 1 | 1 |
| NJ | 22 | 0 | 1 | 0 | 1 | 2 | 3 | 3 | 3 | 3 | 2 | 2 | 2 |
| NYC | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| NYS | 61 | 1 | 0 | 0 | 3 | 2 | 9 | 8 | 4 | 26 | 4 | 2 | 2 |
| OR | 12 | 1 | 1 | 0 | 0 | 1 | 1 | 2 | 2 | 3 | 1 | 0 | 0 |
| TN | 12 | 1 | 0 | 0 | 0 | 1 | 2 | 1 | 1 | 2 | 2 | 2 | 0 |
| WA | 31 | 0 | 0 | 1 | 2 | 0 | 2 | 4 | 8 | 6 | 5 | 2 | 1 |
| WV | 5 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2 | 0 | 1 | 0 |
| **Total** | **296** | 12 | 5 | 4 | 13 | 14 | 31 | 54 | 38 | 66 | 30 | 17 | 12 |

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### Table 4e. *Campylobacter* submissions by site and by month of collection, 1999

| Site | Total | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CA | 48 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| CT | 53 | 4 | 6 | 4 | 5 | 5 | 3 | 4 | 4 | 4 | 5 | 3 | 6 |
| GA | 52 | 4 | 5 | 3 | 4 | 4 | 5 | 4 | 0 | 9 | 5 | 4 | 5 |
| MD | 22 | 4 | 0 | 2 | 1 | 2 | 5 | 0 | 0 | 0 | 0 | 6 | 2 |
| MN | 42 | 4 | 4 | 5 | 4 | 0 | 4 | 4 | 5 | 3 | 0 | 5 | 4 |
| NYS | 54 | 5 | 3 | 4 | 2 | 5 | 6 | 7 | 6 | 5 | 5 | 2 | 4 |
| OR | 34 | 3 | 1 | 0 | 3 | 7 | 6 | 4 | 3 | 0 | 1 | 3 | 3 |
| TN | 14 | 2 | 1 | 0 | 0 | 2 | 4 | 0 | 0 | 0 | 2 | 0 | 3 |
| **Total** | **319** | 30 | 24 | 22 | 23 | 29 | 37 | 27 | 22 | 25 | 22 | 27 | 31 |

## National Antimicrobial Resistance Monitoring System For Enteric Bacteria

### Table 5. Frequency of non-Typhi *Salmonella* Serotypes, 1999

| Serotype | N | % |
|---|---|---|
| Typhimurium | 362 | 24.2 |
| Enteritidis | 269 | 17.9 |
| Newport | 97 | 6.5 |
| Heidelberg | 89 | 5.9 |
| Montevideo | 52 | 3.5 |
| Muenchen | 51 | 3.4 |
| Javiana | 42 | 2.8 |
| St. Paul | 35 | 2.3 |
| Agona | 33 | 2.2 |
| Thompson | 32 | 2.1 |
| Braenderup | 24 | 1.6 |
| Oranienburg | 24 | 1.6 |
| Hadar | 21 | 1.4 |
| Infantis | 17 | 1.1 |
| Stanley | 17 | 1.1 |
| Not Serotyped | 17 | 1.1 |
| All Others | 317 | 21.1 |
| Total | 1499 | 100 |

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## Table 6. Frequency of non-Typhi *Salmonella* Serotypes / Frequency of Pansusceptibility* Among Serotypes, 1996-1999

**Selected Salmonella Serotypes: NARMS 1996-1999**

1999

| Serotype | Total Isolates | | Pansusceptible Isolates | |
|---|---|---|---|---|
| | # | % of Salmonella | # | % of Serotype |
| Javiana | 42 | 3.6 | 41 | 97.6 |
| Thompson | 32 | 2.8 | 31 | 96.9 |
| Braenderup | 24 | 2.1 | 23 | 95.8 |
| Oranienburg | 24 | 2.1 | 23 | 95.8 |
| Infantis | 17 | 1.5 | 16 | 94.1 |
| Muenchen | 51 | 4.4 | 47 | 92.2 |
| Montevideo | 52 | 4.5 | 47 | 90.4 |
| Enteritidis | 269 | 23.1 | 225 | 83.6 |
| St. Paul | 35 | 3.0 | 29 | 82.9 |
| Newport | 97 | 8.3 | 74 | 76.3 |
| Stanley | 17 | 1.5 | 12 | 70.6 |
| Heidelberg | 89 | 7.6 | 61 | 68.5 |
| Agona | 33 | 2.8 | 21 | 63.6 |
| Typhimurium | 362 | 31.1 | 183 | 50.6 |
| Hadar | 21 | 1.8 | 0 | 0 |

1998

| Serotype | Total Isolates | | Pansusceptible Isolates | |
|---|---|---|---|---|
| | # | % of Salmonella | # | % of Serotype |
| Braenderup | 23 | 1.6 | 23 | 100 |
| Miami | 10 | 0.7 | 10 | 100 |
| Mississippi | 16 | 1.1 | 16 | 100 |
| Poona | 12 | 0.8 | 12 | 100 |
| Thompson | 24 | 1.7 | 24 | 100 |
| Oranienburg | 33 | 2.3 | 32 | 96.7 |
| Javiana | 54 | 3.7 | 52 | 96.3 |
| Newport | 79 | 5.5 | 73 | 92.4 |
| Montevideo | 33 | 2.3 | 30 | 91.0 |
| Infantis | 22 | 1.5 | 20 | 90.9 |
| Muenchen | 30 | 2.1 | 27 | 90 |
| Enteritidis | 245 | 16.9 | 214 | 87.3 |
| Brandenburg | 10 | 0.7 | 8 | 80 |
| St. Paul | 31 | 2.1 | 24 | 77.4 |
| Stanley | 10 | 0.7 | 6 | 60 |
| Agona | 39 | 2.7 | 23 | 59.0 |
| Heidelberg | 103 | 7.1 | 58 | 56.3 |
| Schwarzengrund | 14 | 1.0 | 7 | 50 |
| Typhimurium | 378 | 26.0 | 176 | 46.6 |
| Hadar | 26 | 1.8 | 0 | 0 |

***Pansusceptible to antimicrobial agents tested all 4 years: amoxicillin-clavulanic acid, ampicillin, apramycin, ceftiofur, ceftriaxone, cephalothin, chloramphenicol, ciprofloxacin, gentamicin, kanamycin, nalidixic acid, streptomycin, sulfamethoxazole, tetracycline, trimethoprim-sulfamethoxazole**

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### Table 6. Frequency of non-Typhi *Salmonella* Serotypes / Frequency of Pansusceptibility* Among Serotypes, 1996-1999 (continued)

1997

| Serotype | Total Isolates | | Pansusceptible isolates | |
|---|---|---|---|---|
| | # | % of Salmonella | # | % of Serotype |
| Javiana | 19 | 1.5 | 19 | 100 |
| Thompson | 32 | 2.5 | 31 | 96.9 |
| Infantis | 29 | 2.3 | 28 | 96.6 |
| Montevideo | 27 | 2.1 | 26 | 96.3 |
| Braenderup | 17 | 1.3 | 16 | 94.1 |
| Oranienburg | 27 | 2.1 | 25 | 92.6 |
| Newport | 48 | 2.7 | 42 | 87.5 |
| Poona | 13 | 1.0 | 11 | 84.6 |
| St. Paul | 19 | 1.5 | 16 | 84.2 |
| Adelaide | 10 | 0.8 | 8 | 80.0 |
| Enteritidis | 301 | 23.5 | 223 | 74.1 |
| Muenchen | 17 | 1.3 | 11 | 64.7 |
| Heidelberg | 75 | 5.9 | 48 | 64.0 |
| Agona | 25 | 2.0 | 13 | 52.0 |
| Typhimurium | 326 | 25.4 | 122 | 37.4 |
| Hadar | 30 | 2.3 | 1 | 3.3 |

1996

| Serotype | Total Isolates | | Pansusceptible isolates | |
|---|---|---|---|---|
| | # | % of Salmonella | # | % of Serotype |
| Braenderup | 22 | 1.7 | 22 | 100 |
| Montevideo | 37 | 2.8 | 33 | 89.2 |
| Javiana | 27 | 2.0 | 24 | 88.9 |
| Oranienburg | 18 | 1.4 | 16 | 88.9 |
| Java | 12 | 0.9 | 10 | 83.3 |
| Muenchen | 17 | 1.3 | 14 | 82.4 |
| Newport | 51 | 3.8 | 42 | 82.4 |
| Anatum | 11 | 0.8 | 9 | 81.8 |
| Thompson | 24 | 1.8 | 19 | 79.2 |
| Paratyphi-B | 11 | 0.8 | 8 | 72.7 |
| Infantis | 18 | 1.4 | 13 | 72.2 |
| Enteritidis | 357 | 26.9 | 247 | 69.2 |
| St. Paul | 17 | 1.3 | 11 | 64.7 |
| Heidelberg | 74 | 5.6 | 38 | 51.4 |
| Agona | 12 | 0.9 | 5 | 41.7 |
| Typhimurium | 305 | 23.0 | 110 | 36.1 |
| Hadar | 38 | 2.9 | 1 | 2.6 |

***Pansusceptible to antimicrobial agents tested all 4 years: amoxicillin-clavulanic acid, ampicillin, apramycin, ceftiofur, ceftriaxone, cephalothin, chloramphenicol, ciprofloxacin, gentamicin, kanamycin,**

**nalidixic acid, streptomycin, sulfamethoxazole, tetracycline, trimethoprim-sulfamethoxazole**

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## Table 7. Frequency of non-Typhi *Salmonella* Serotypes / Frequency of Multiresistance Among Serotypes, 1999

| Serotype | Total | | Number resistant to ≥ 1 antimicrobial | | Number resistant to ≥ 2 antimicrobials | |
|---|---|---|---|---|---|---|
| | N | % | N | % | N | % |
| Typhimurium | 362 | 24.4 | 179 | 49.5 | 166 | 45.9 |
| Enteritidis | 269 | 18.2 | 44 | 16.4 | 26 | 9.7 |
| Newport | 97 | 6.5 | 23 | 23.7 | 17 | 17.5 |
| Heidelberg | 89 | 6.0 | 28 | 31.5 | 25 | 28.1 |
| Montevideo | 52 | 3.5 | 5 | 9.6 | 5 | 9.6 |
| Muenchen | 51 | 3.4 | 4 | 7.8 | 4 | 7.8 |
| Javiana | 42 | 2.8 | 1 | 2.4 | 0 | 0 |
| St. Paul | 35 | 2.4 | 6 | 17.1 | 5 | 14.3 |
| Agona | 33 | 2.2 | 12 | 36.4 | 9 | 27.3 |
| Thompson | 32 | 2.2 | 1 | 3.1 | 1 | 3.1 |
| Braenderup | 24 | 1.6 | 1 | 4.2 | 0 | 0 |
| Oranienburg | 24 | 1.6 | 1 | 4.2 | 0 | 0 |
| Hadar | 21 | 1.4 | 21 | 100 | 18 | 93.3 |
| Infantis | 17 | 1.1 | 1 | 5.9 | 0 | 0 |
| Stanley | 17 | 1.1 | 5 | 29.4 | 5 | 29.4 |

**Table 8. Percentage of *S*. Typhimurium isolates with ACSSuT, ACKSSuT, or AKSSuT resistance patterns, by site, 1999**

| Site | Total # Typhimurium | | | ACSSuT Typhimurium | | ACKSSuT Typhimurium | | AKSSuT Typhimurium | |
|---|---|---|---|---|---|---|---|---|---|
| | N | % | | N | % | N | % | N | % |
| California | 6 | 1.7 | | 3 | 50.0 | 1 | 16.7 | 1 | 16.7 |
| Colorado | 29 | 8.0 | | 4 | 13.8 | 0 | 0 | 1 | 3.4 |
| Connecticut | 20 | 5.5 | | 5 | 25.0 | 1 | 5.0 | 4 | 20.0 |
| Florida | 14 | 3.9 | | 6 | 42.9 | 0 | 0 | 1 | 7.1 |
| Georgia | 24 | 6.6 | | 6 | 25.0 | 0 | 0 | 2 | 8.3 |
| Kansas | 14 | 3.9 | | 3 | 21.4 | 1 | 7.1 | 1 | 7.1 |
| Los Angeles | 18 | 5.0 | | 8 | 44.4 | 0 | 0 | 2 | 11.1 |
| Maryland | 12 | 3.3 | | 2 | 16.7 | 0 | 0 | 1 | 8.3 |
| Massachusetts | 40 | 11.1 | | 6 | 15.0 | 1 | 2.5 | 4 | 10.0 |
| Minnesota | 19 | 5.3 | | 8 | 42.1 | 1 | 5.2 | 1 | 5.2 |
| New Jersey | 29 | 8.0 | | 11 | 37.9 | 1 | 3.4 | 2 | 6.9 |
| New York City | 13 | 3.6 | | 4 | 30.8 | 0 | 0 | 1 | 7.7 |
| New York State | 49 | 13.5 | | 13 | 26.5 | 1 | 2.0 | 5 | 10.2 |
| Oregon | 10 | 2.8 | | 3 | 30.0 | 0 | 0 | 0 | 0 |
| Tennessee | 17 | 4.7 | | 4 | 23.5 | 1 | 5.9 | 3 | 17.6 |
| Washington | 35 | 9.7 | | 13 | 37.1 | 4 | 11.4 | 9 | 25.7 |
| West Virginia | 13 | 3.6 | | 3 | 23.1 | 0 | 0 | 1 | 7.7 |
| **Totals** | **362** | **100** | | **102** | **28.2** | **12** | **3.3** | **39** | **10.8** |

**Table 9. Additional antimicrobial resistance for *S*. Typhimurium isolates with ACSSuT or AKSSuT patterns, 1999**

| Antimicrobial | ACSSuT N | ACSSuT % | AKSSuT N | AKSSuT % |
|---|---|---|---|---|
| *Amox-Clav | 7 | 6.9 | 2 | 5.1 |
| Ceftiofur | 3 | 2.9 | 0 | 0 |
| Ceftriaxone | 1 | 1.0 | 0 | 0 |
| Cephalothin | 9 | 8.8 | 8 | 20.5 |
| Chloramphenicol | -- | | 12 | 30.8 |
| Florfenicol | 98 | 96.0 | 10 | 25.6 |
| Gentamicin | 2 | 2.0 | 2 | 5.1 |
| Kanamycin | 12 | 11.8 | -- | |
| **Trimeth-Sulfa | 7 | 6.9 | 5 | 12.8 |

*Amox-Clav=Amoxicillin-Clavulanic Acid
**Trimeth-Sulfa=Trimethoprim-Sulfamethoxazole

## Table 10. Clinical source of non-Typhi *Salmonella* isolates, 1999

| Isolate | Blood N | Blood % | Stool N | Stool % | Other N | Other % | Unknown N | Unknown % | Total N | Total % |
|---|---|---|---|---|---|---|---|---|---|---|
| *S*. Typhimurium -- ACSSuT | 3 | 2.9 | 91 | 89.2 | 6 | 5.9 | 2 | 2.0 | 102 | 6.8 |
| *S*. Typhimurium -- AKSSuT | 2 | 5.1 | 36 | 92.3 | 1 | 2.6 | 0 | 0 | 39 | 2.6 |
| All other S. Typhimurium | 9 | 4.1 | 199 | 90.0 | 11 | 5.0 | 2 | 0.9 | 221 | 14.7 |
| *S*. Enteritidis | 21 | 7.8 | 231 | 85.9 | 12 | 4.5 | 5 | 1.9 | 269 | 17.9 |
| *S*. Heidelberg | 9 | 10.1 | 71 | 79.8 | 8 | 9.0 | 1 | 1.1 | 89 | 5.9 |
| Other *Salmonella* | 35 | 4.5 | 680 | 87.3 | 50 | 6.4 | 14 | 1.8 | 779 | 52.0 |
| Total | 79 | 5.2 | 1308 | 87.3 | 88 | 5.9 | 24 | 1.6 | 1499 | 100 |

**Table 11. Serotypes of non-Typhi *Salmonella* with reduced susceptibility to ciprofloxacin [MIC ≥ 0.25 mg/ml]**
**1999 (N=15)**

| Serotype | # | (%) | Total received |
|---|---|---|---|
| Enteritidis | 6 | 40 | 269 |
| Berta | 2 | 13 | 10 |
| Typhimurium | 1 | 7 | 362 |
| Choleraesuis | 1 | 7 | 1 |
| Virchow | 1 | 7 | 7 |
| Montevideo | 1 | 7 | 52 |
| Heidelberg | 1 | 7 | 89 |
| Senftenberg* | 1 | 7 | 3 |
| Skansen | 1 | 7 | 1 |

* *S*. Senftenberg was resistant to ciprofloxacin (MIC ≥ 4.00 μg/ml)

**Table 12. Serotypes of non-Typhi *Salmonella* with reduced susceptibility to ceftriaxone [MIC ≥ 16 mg/ml]**
**1999 (N=28)**

| Serotype | # | (%) | Total received |
|---|---|---|---|
| Newport* | 17 | 60 | 97 |
| Typhimurium* | 7 | 25 | 362 |
| Agona | 1 | 4 | 33 |
| Enteritidis | 1 | 4 | 269 |
| Skansen | 1 | 4 | 1 |
| Worthington* | 1 | 4 | 4 |

* Three *S*. Newport, 2 *S*. Typhimurium, and 1 *S*. Worthington isolates were resistant to ceftriaxone (MIC ≥ 64.00 µg/ml)

## Table 13. Frequency of *Shigella* Species, 1999

| Species | N | % |
|---|---|---|
| **sonnei** | 275 | 73.3 |
| **flexneri** | 87 | 23.2 |
| **boydii** | 7 | 1.9 |
| *dysenteriae* | 2 | 0.5 |
| not identified | 4 | 1.1 |
| Total | 375 | 100 |

## Table 14. Antimicrobial Susceptibility of *Shigella* isolates, 1999

| Antibiotic | All *Shigella* (N=375) | | *Shigella sonnei* (N=275) | | *Shigella flexneri* (N=87) | | *Shigella boydii* (N=7) | |
|---|---|---|---|---|---|---|---|---|
| | # Resist | % Resist | # Resist | % Resist | # Resist | % Resist | # Resist | % Resist |
| Amikacin | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Amoxicillin – Clavulanic Acid | 4 | 1 | 1 | 0.4 | 3 | 3 | 0 | 0 |
| Ampicillin | 291 | 77 | 219 | 80 | 67 | 77 | 0 | 0 |
| Apramycin | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ceftiofur | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ceftriaxone | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cephalothin | 12 | 3 | 8 | 3 | 4 | 4 | 0 | 0 |
| Chloramphenicol | 65 | 17 | 5 | 2 | 56 | 64 | 0 | 0 |
| Ciprofloxacin | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Florfenicol | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gentamicin | 1 | 0.3 | 1 | 0.4 | 0 | 0 | 0 | 0 |
| Kanamycin | 2 | 0.5 | 2 | 1 | 0 | 0 | 0 | 0 |
| Nalidixic Acid | 6 | 2 | 4 | 1 | 1 | 1 | 1 | 14 |
| Streptomycin | 209 | 56 | 143 | 52 | 55 | 63 | 6 | 86 |
| Sulfamethoxazole | 210 | 55 | 150 | 54 | 51 | 59 | 6 | 86 |
| Tetracycline | 215 | 57 | 127 | 46 | 80 | 92 | 4 | 57 |
| Trimethoprim - Sulfamethoxazole | 193 | 51 | 146 | 53 | 42 | 48 | 2 | 29 |

## Table 15. Frequency of *Campylobacter* Species, 1999

| Species | N | % |
|---|---|---|
| **Jejuni** | 295 | 92.5 |
| **Coli** | 20 | 6.3 |
| **Fetus** | 2 | 0.6 |
| **Upsaliensis** | 2 | 0.6 |
| Total | 319 | 100 |

## Table 16. Antimicrobial Susceptibility of *Campylobacter* isolates, 1999

| Antibiotic | All *Campylobacter* (N=319) | | *Campylobacter jejuni* (N=295) | | *Campylobacter coli* (N=20) | |
|---|---|---|---|---|---|---|
| | # Resist | % Resist | # Resist | % Resist | # Resist | % Resist |
| Azithromycin | 10 | 3 | 8 | 3 | 2 | 10 |
| Chloramphenicol | 1 | 0.3 | 1 | 0.3 | 0 | 0 |
| Ciprofloxacin | 58 | 18 | 52 | 18 | 6 | 30 |
| Clindamycin | 5 | 1 | 3 | 1 | 2 | 10 |
| Erythromycin | 8 | 2 | 6 | 2 | 2 | 10 |
| Gentamicin | 0 | 0 | 0 | 0 | 0 | 0 |
| Nalidixic Acid | 65 | 21 | 59 | 20 | 6 | 30 |
| Tetracycline | 141 | 44 | 135 | 46 | 6 | 30 |

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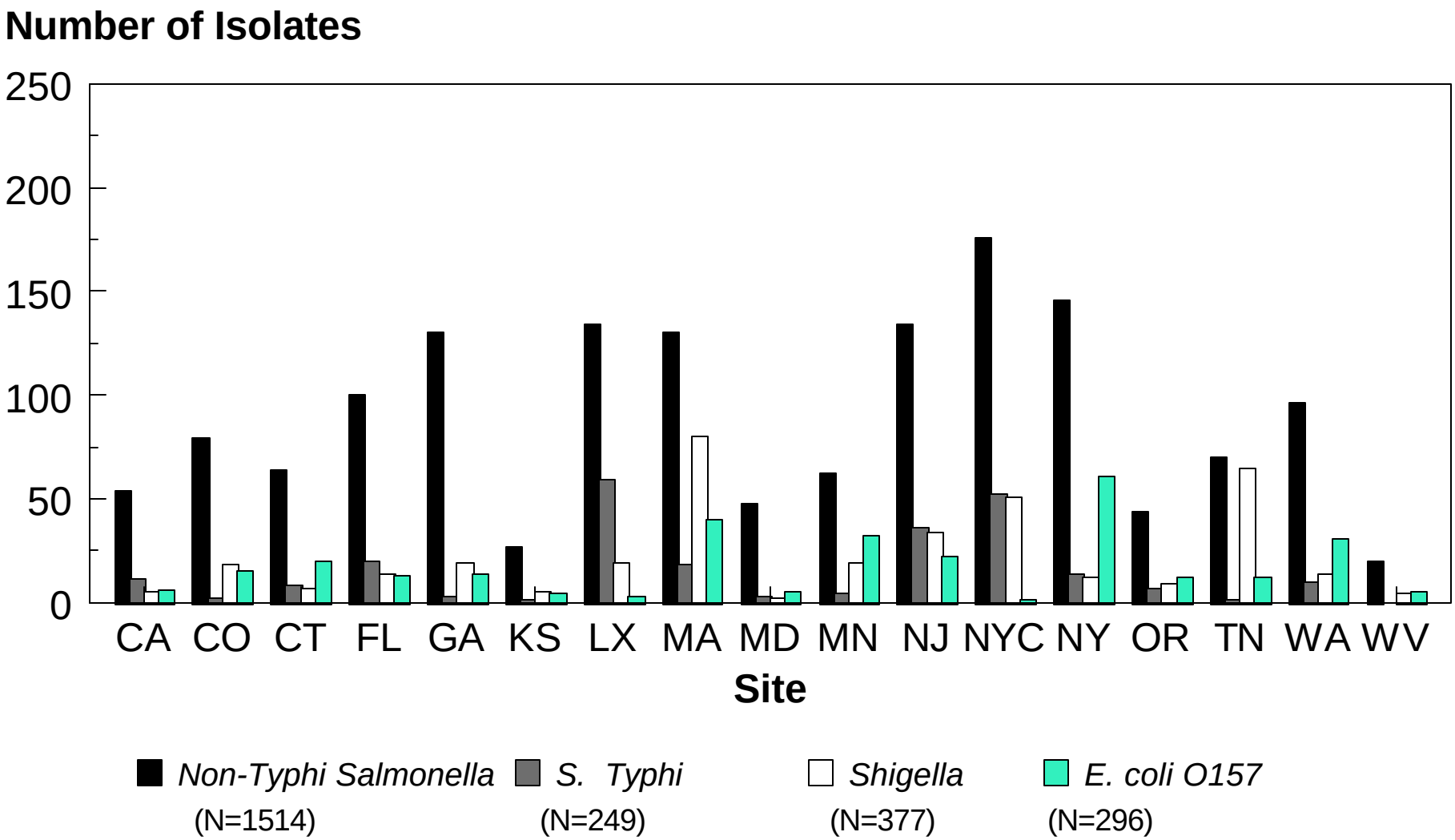
### Figure 1. Number of isolates submitted, by site, 1999




LX=Los Angeles County NYC=New York City

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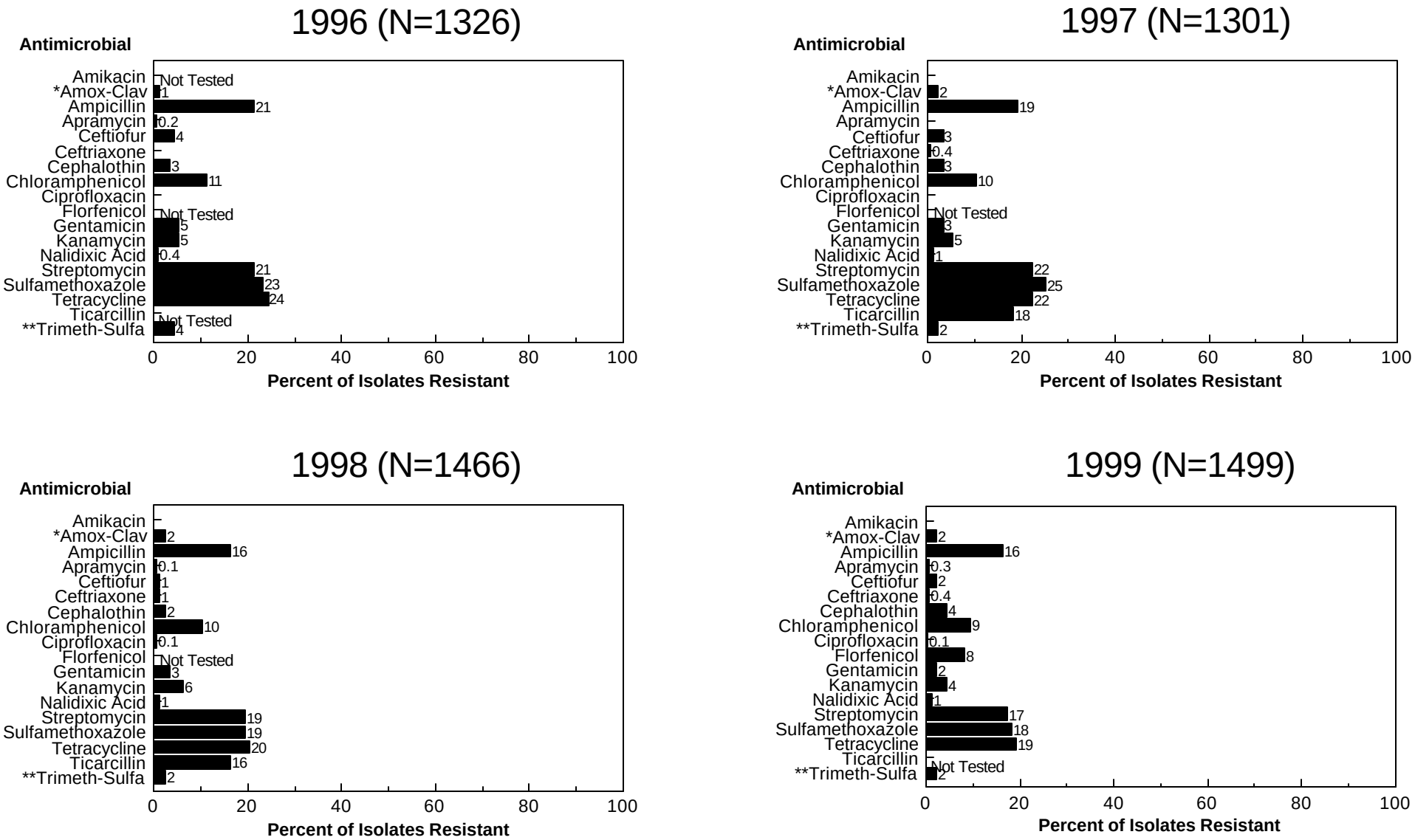
## Figure 2. Resistance among non-Typhi *Salmonella* isolates, 1996-1999



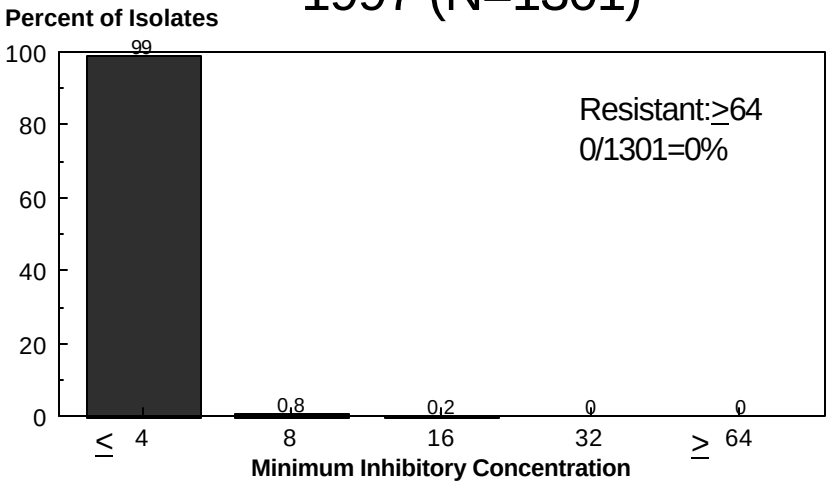

*Amox-Clav=Amoxicillin-Clavulanic Acid **Trimeth-Sulfa=Trimethoprim-Sulfamethoxazole

## National Antimicrobial Resistance Monitoring System For Enteric Bacteria

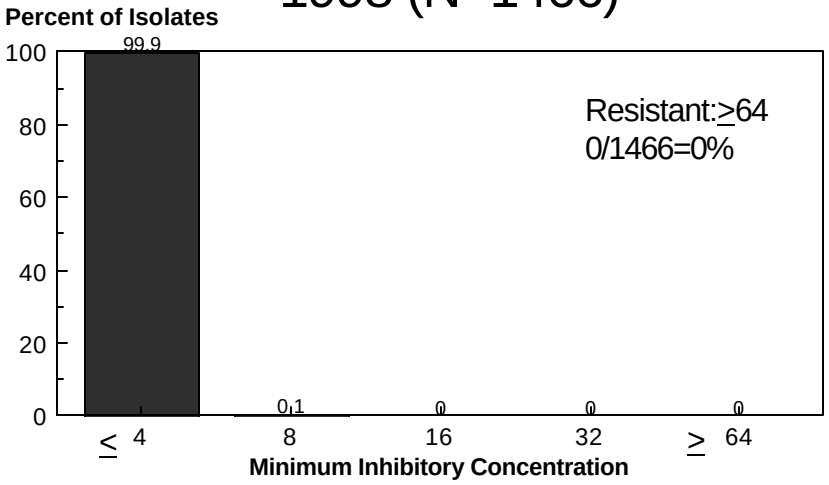
## Figure 3a. MICs for Amikacin among non-Typhi *Salmonella* isolates, 1996 - 1999

Not tested in 1996

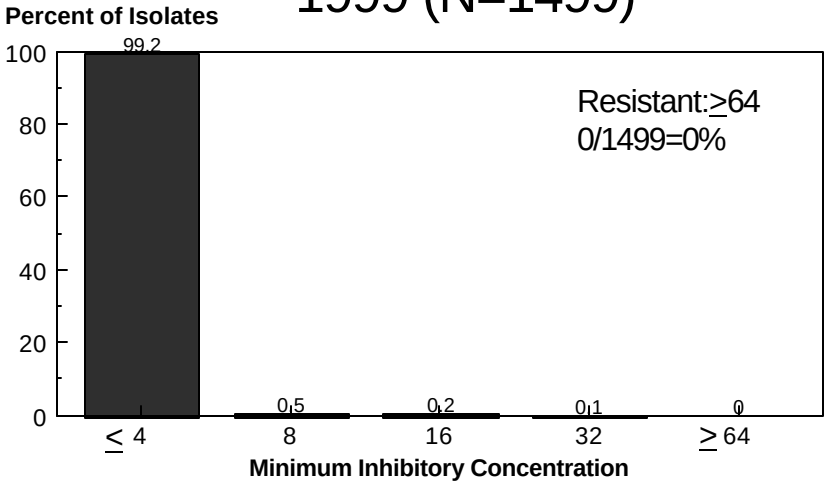
1997 (N=1301)




1998 (N=1466)




1999 (N=1499)



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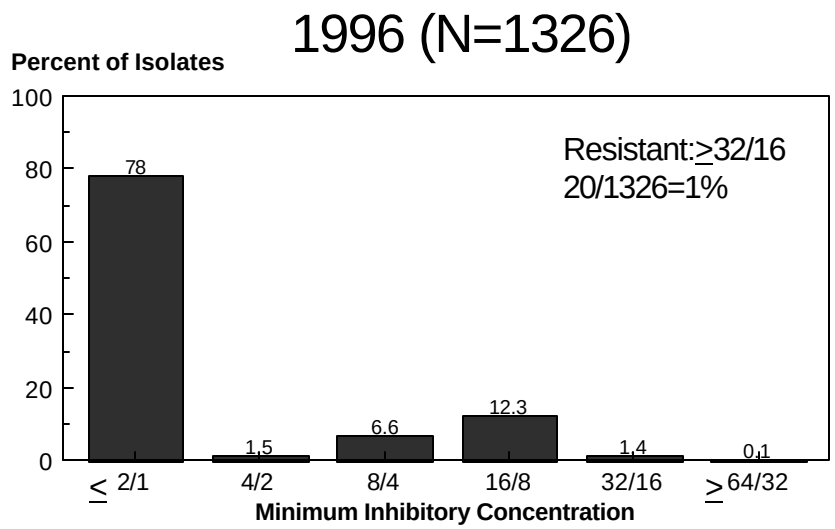
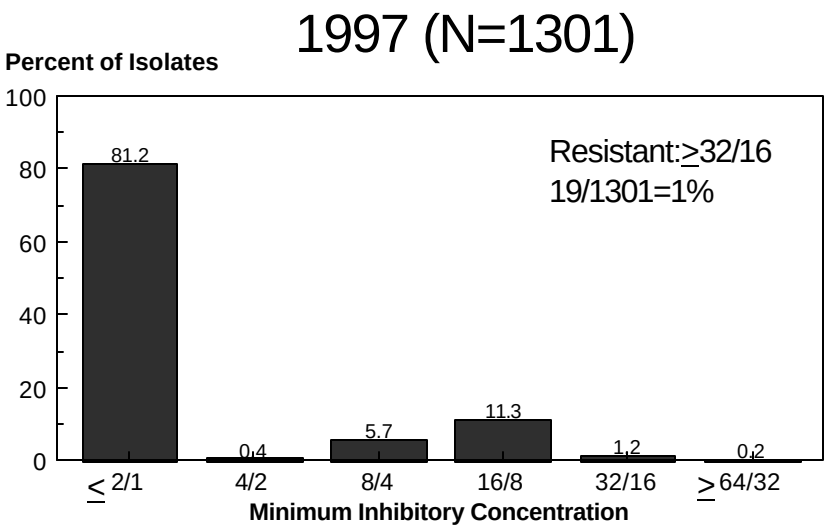
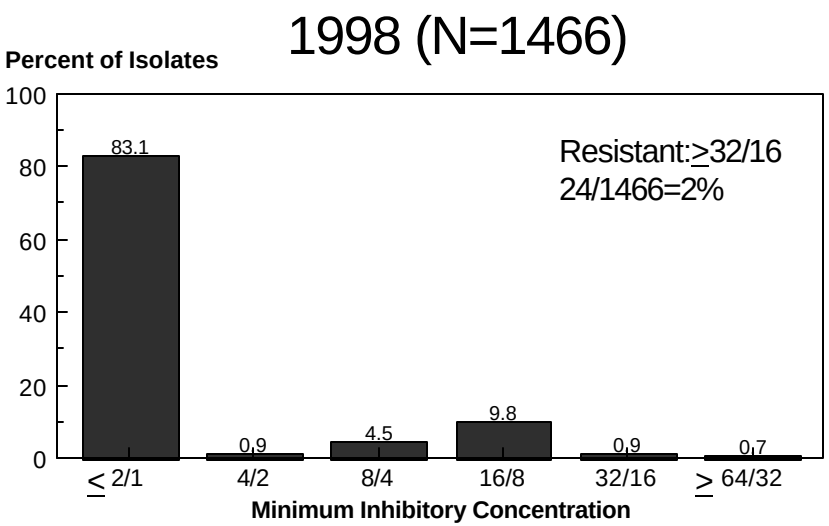
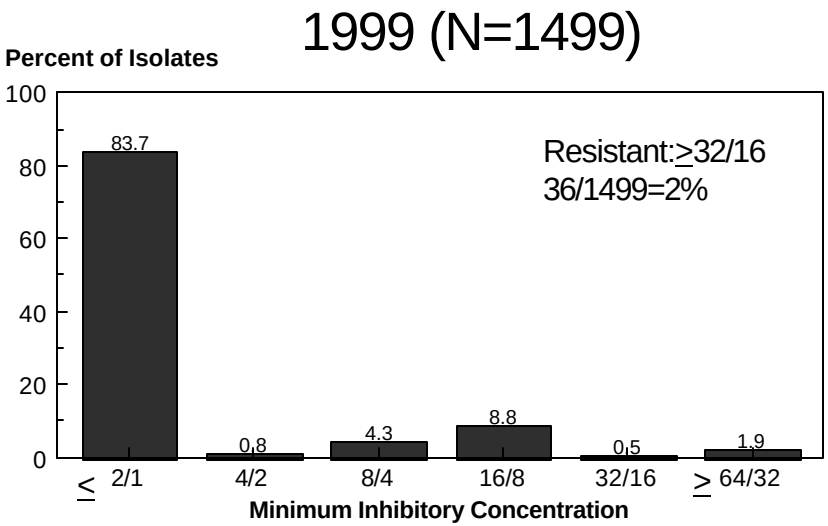
## Figure 3b. MICs for Amoxicillin-Clavulanic Acid among non-Typhi *Salmonella* isolates, 1996 - 1999



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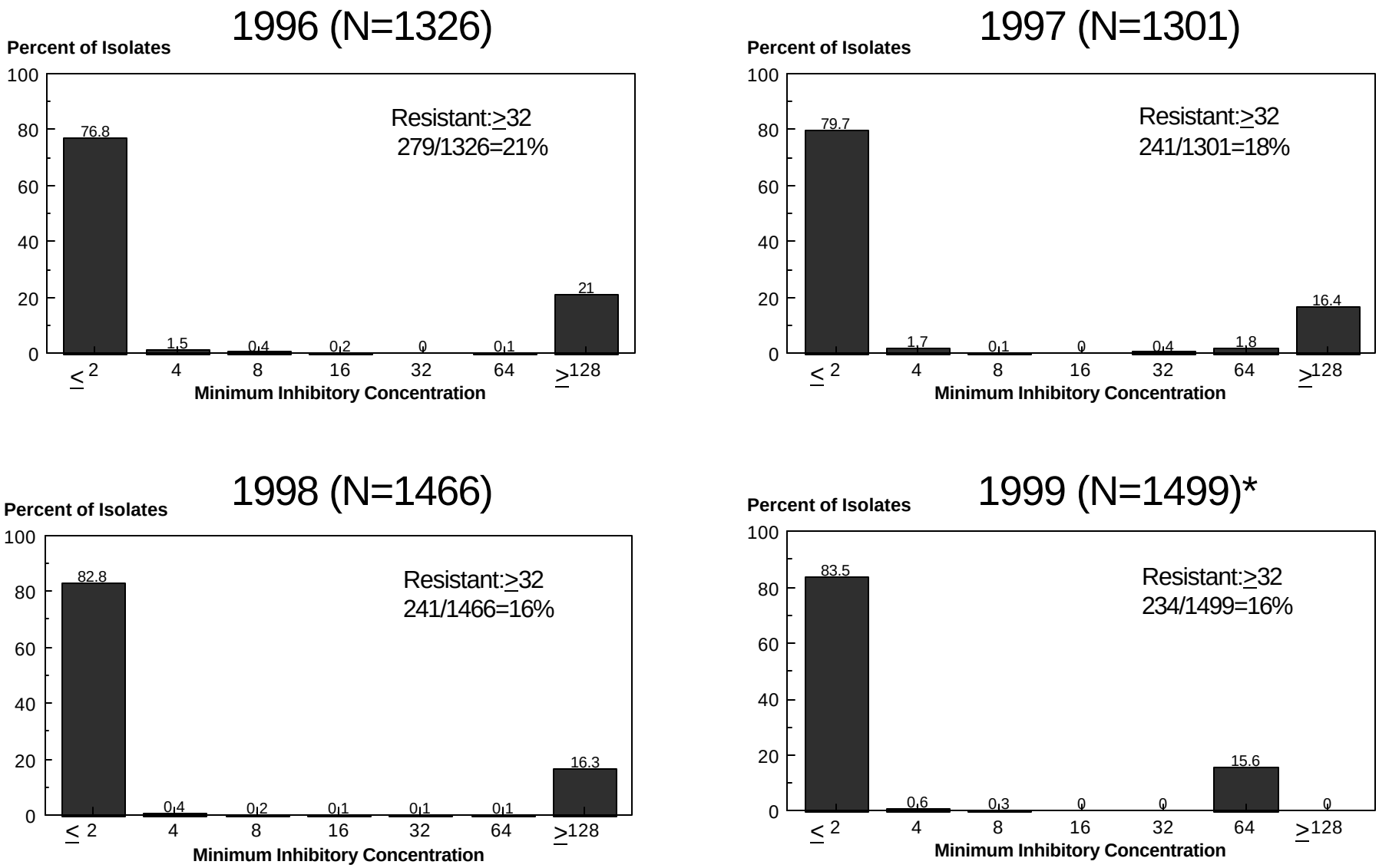
## Figure 3c. MICs for Ampicillin among non-Typhi *Salmonella* isolates, 1996 - 1999




* Maximum MIC dilution for 1999 was 32 ug/ml. All resistant isolates had a MIC >32 ug/ml.

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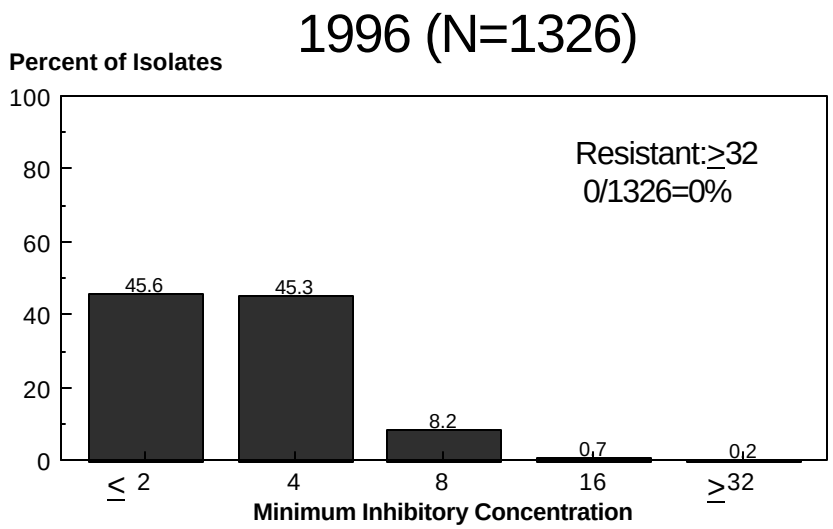
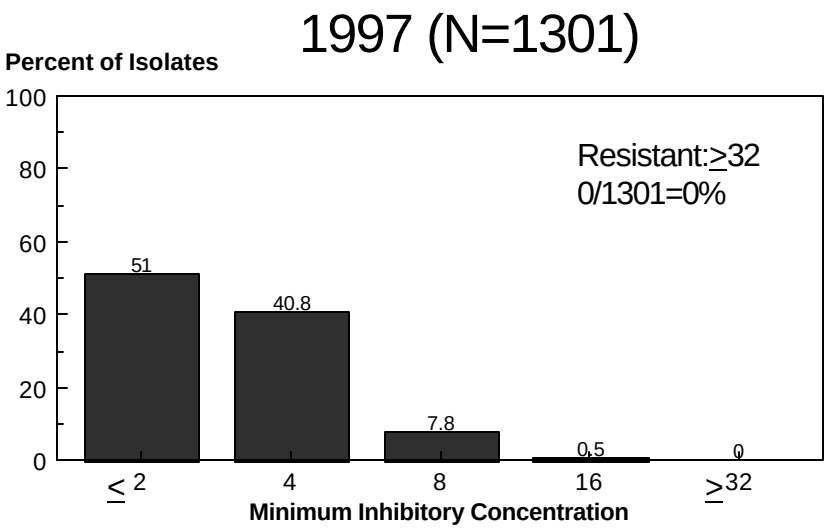
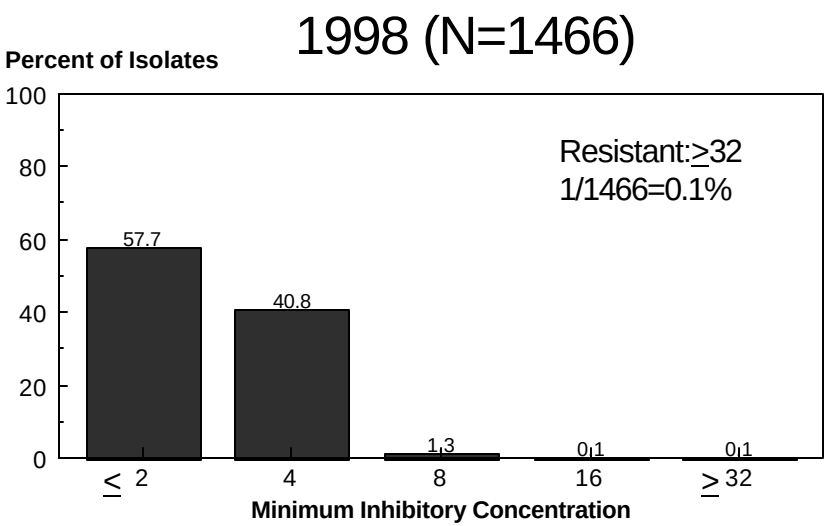
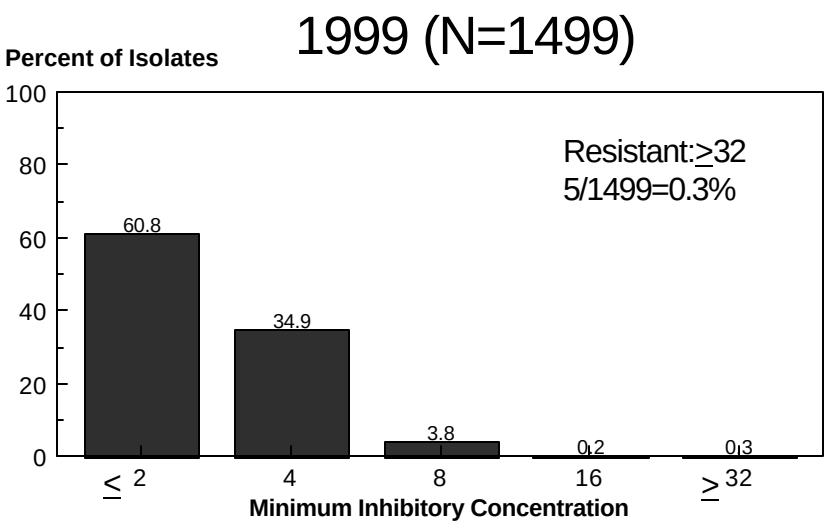
## Figure 3d. MICs for Apramycin among non-Typhi *Salmonella* isolates, 1996 - 1999



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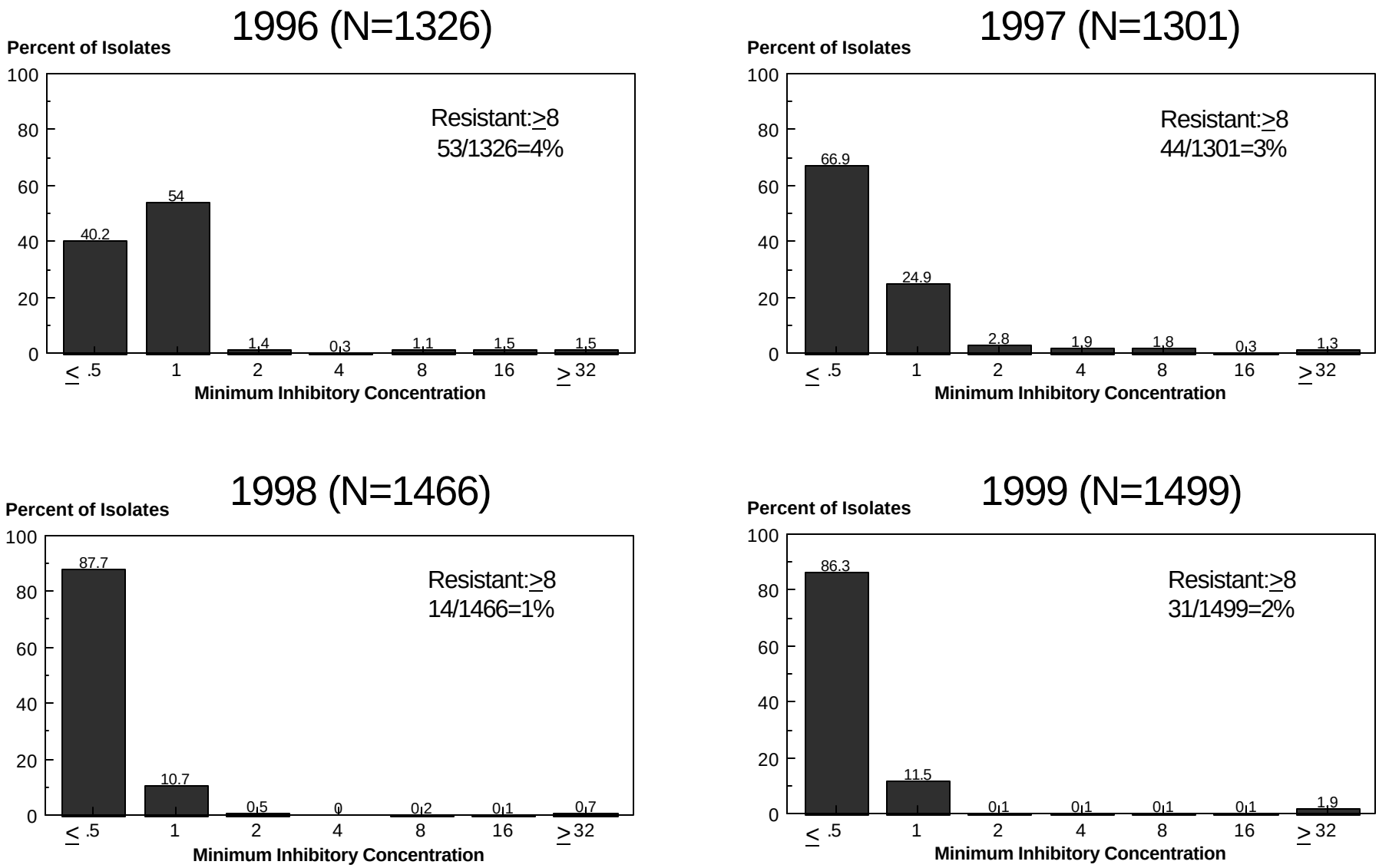
## Figure 3e. MICs for Ceftiofur among non-Typhi *Salmonella* isolates, 1996 - 1999



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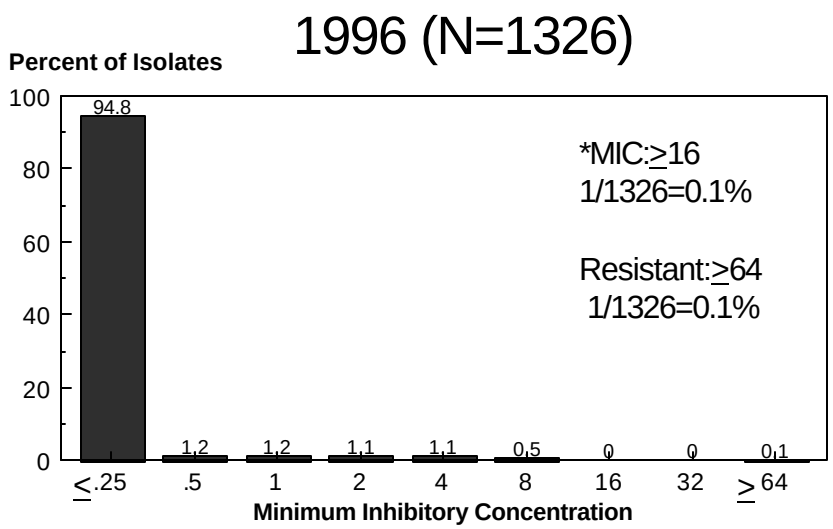
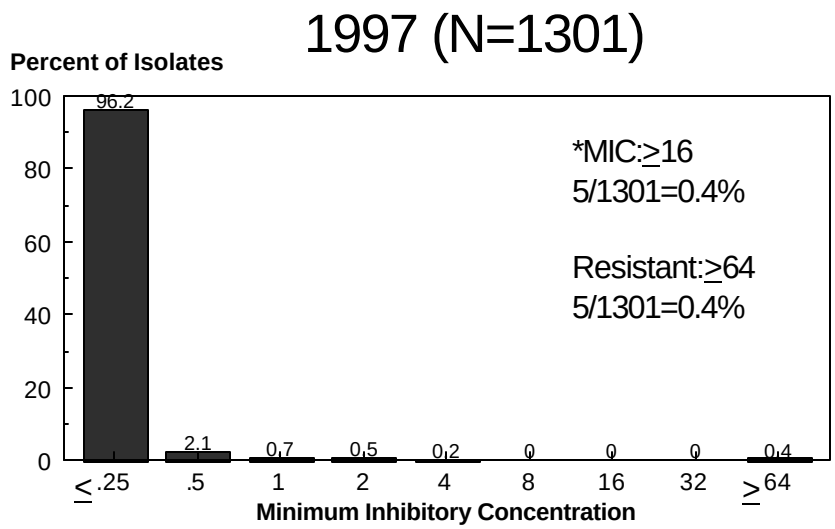
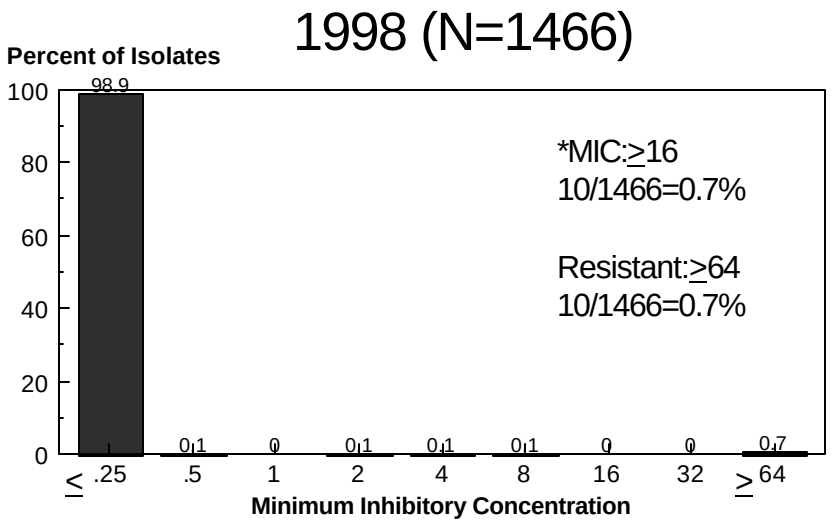
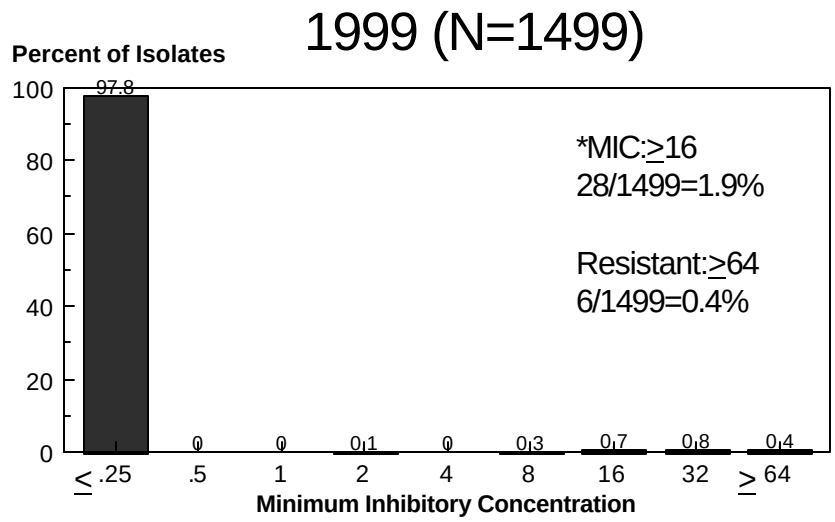
## Figure 3f. MICs for Ceftriaxone among non-Typhi *Salmonella* isolates, 1996 - 1999




*MIC:>16 is decreased susceptibility.

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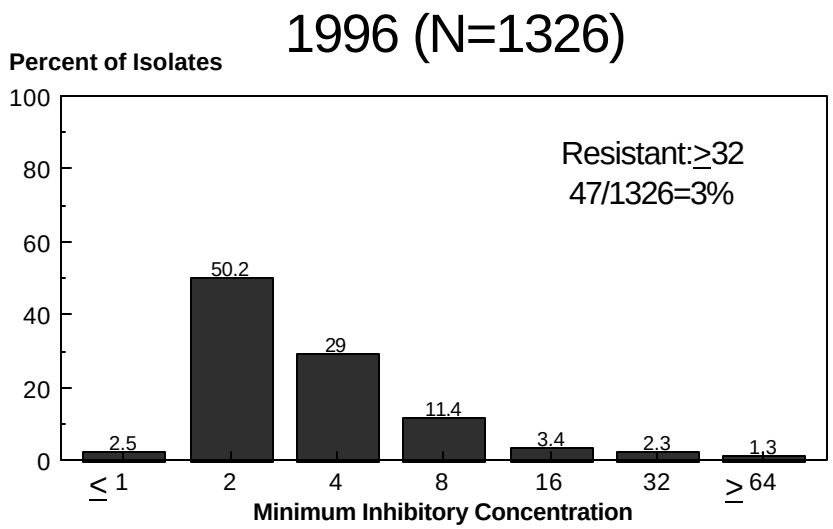
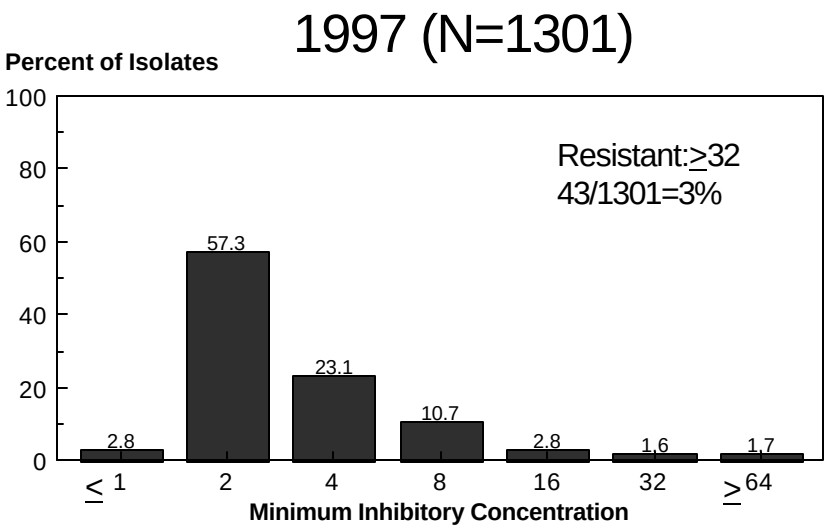
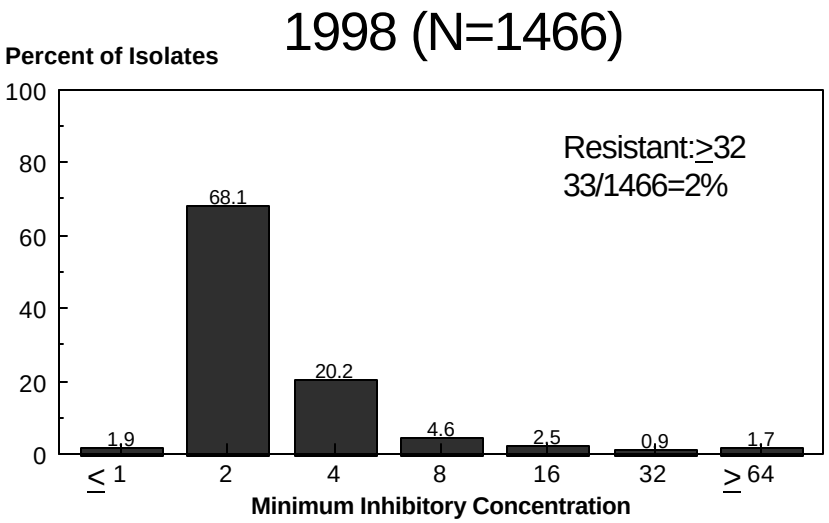
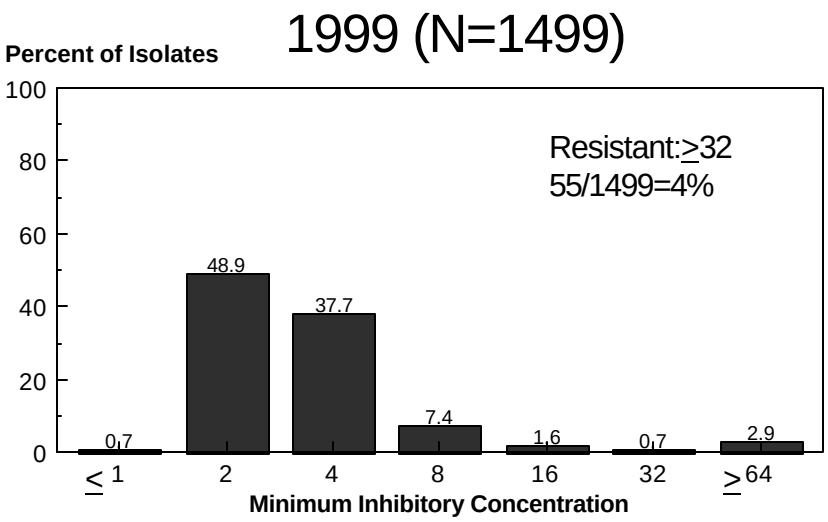
## Figure 3g. MICs for Cephalothin among non-Typhi *Salmonella* isolates, 1996 - 1999



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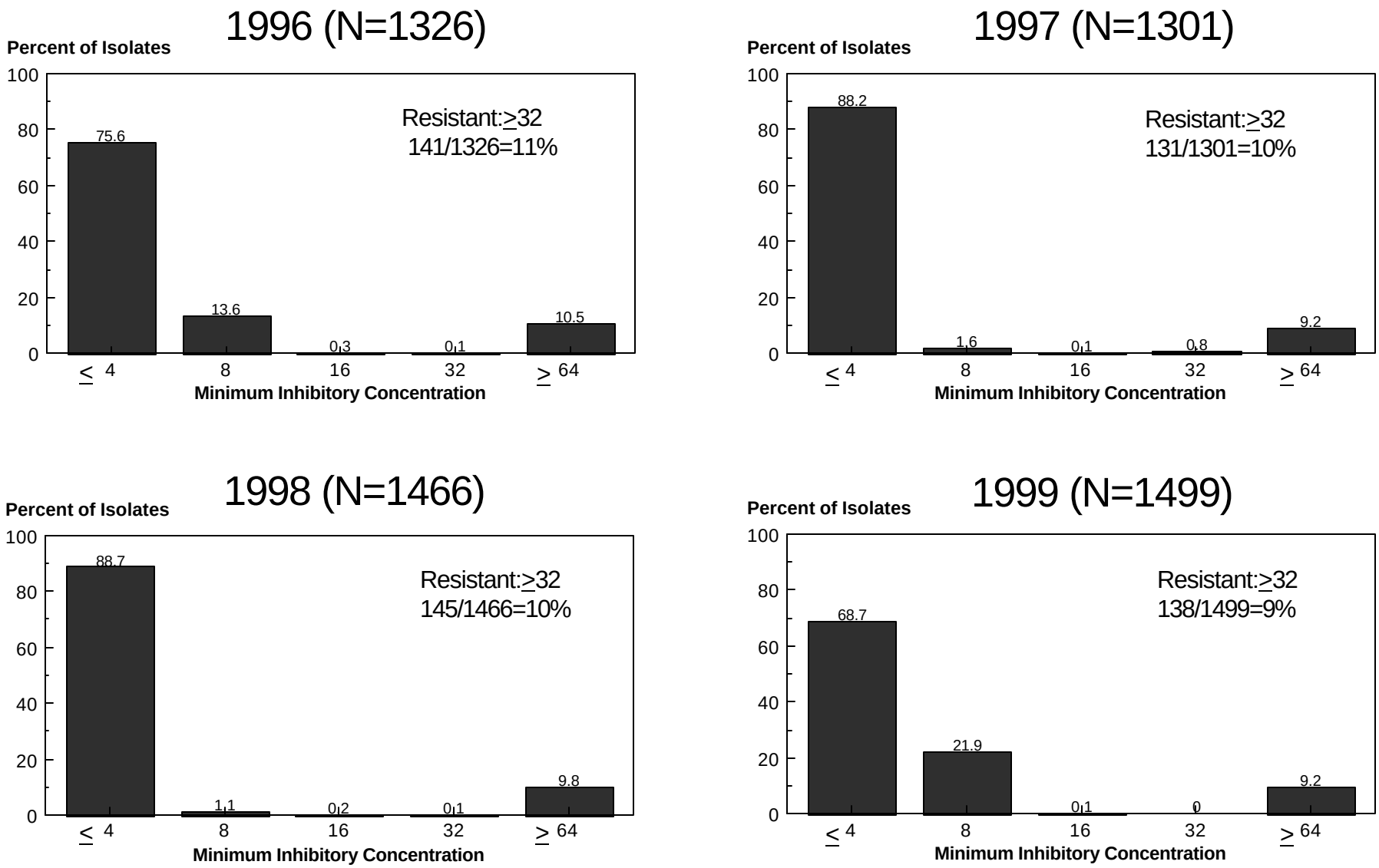
## Figure 3h. MICs for Chloramphenicol among non-Typhi *Salmonella* isolates, 1996 - 1999



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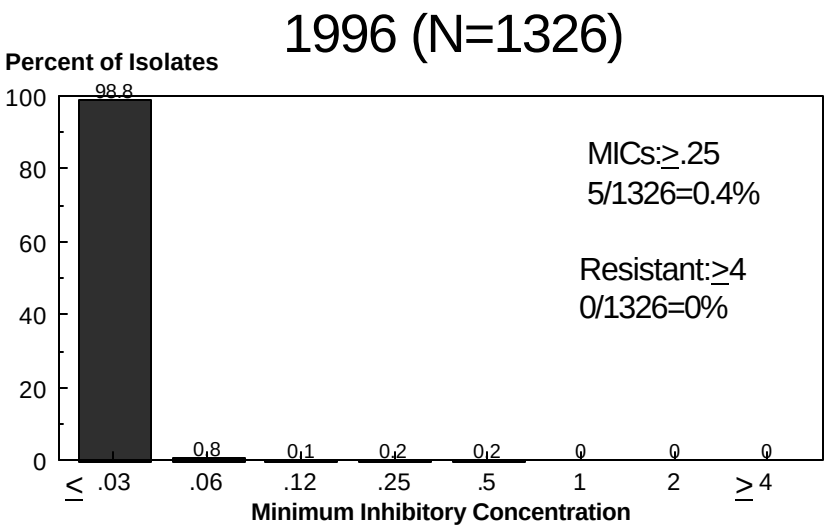
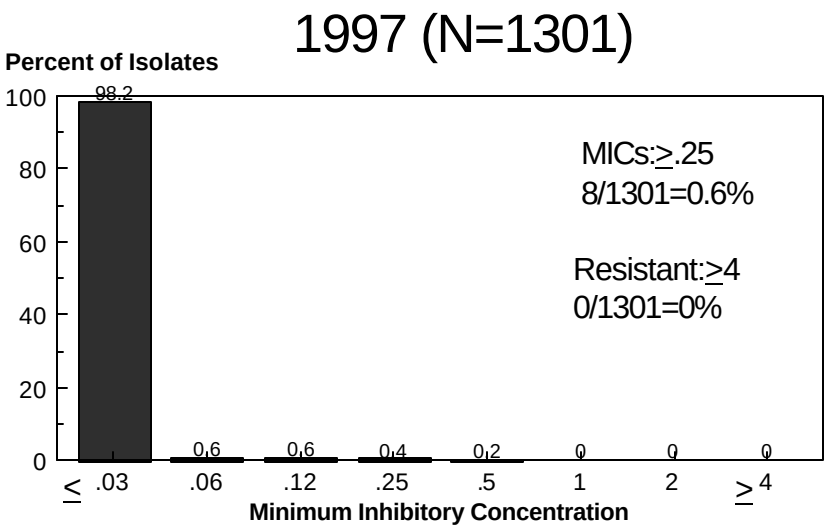
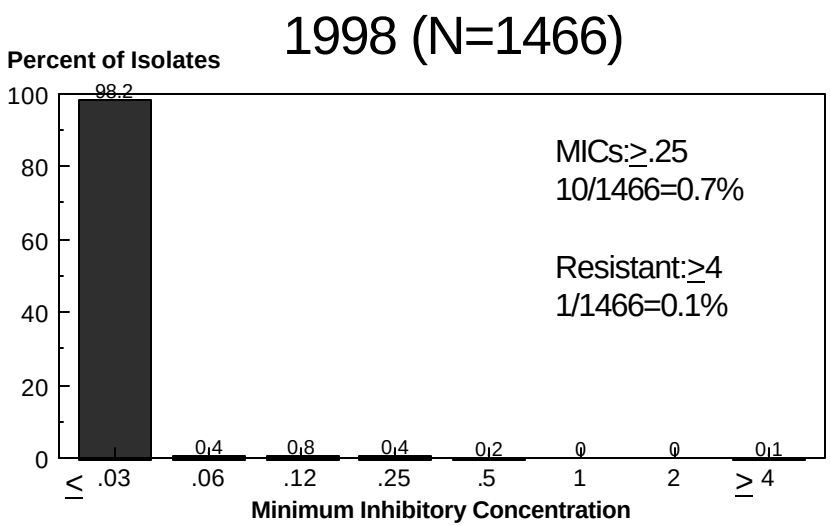
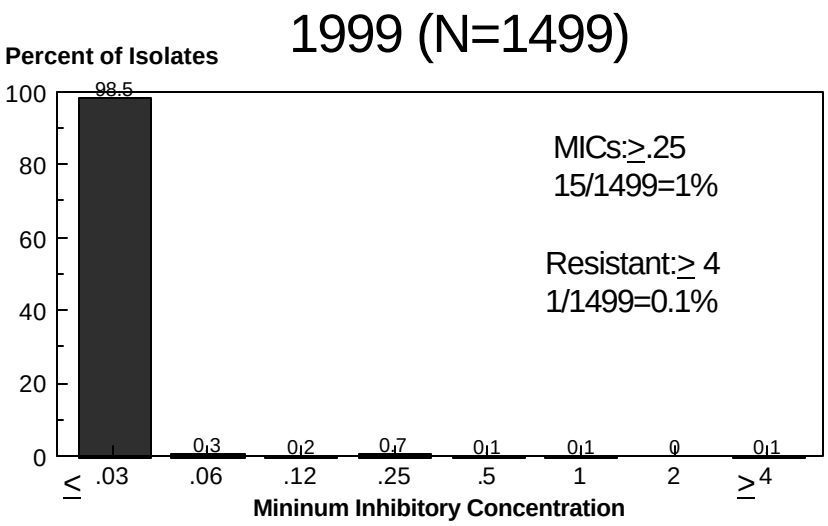
## Figure 3i. MICs for Ciprofloxacin among non-Typhi *Salmonella* isolates, 1996 - 1999



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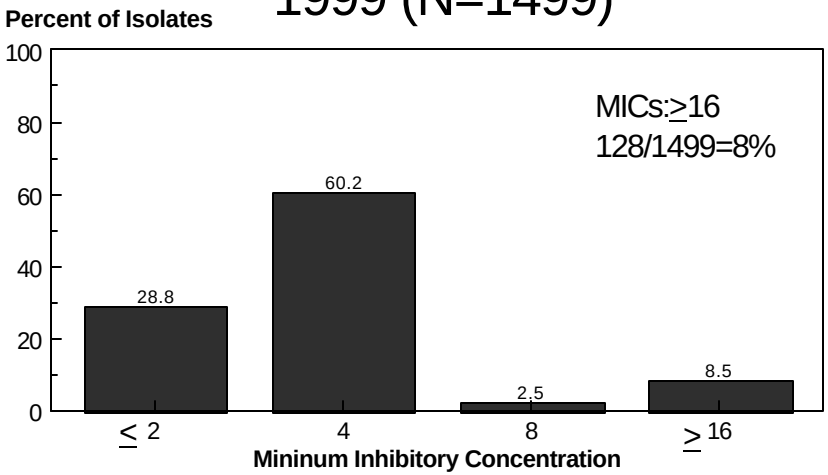
## Figure 3j. MICs for Florfenicol among non-Typhi *Salmonella* isolates, 1996 - 1999

Not tested in 1996

Not tested in 1997

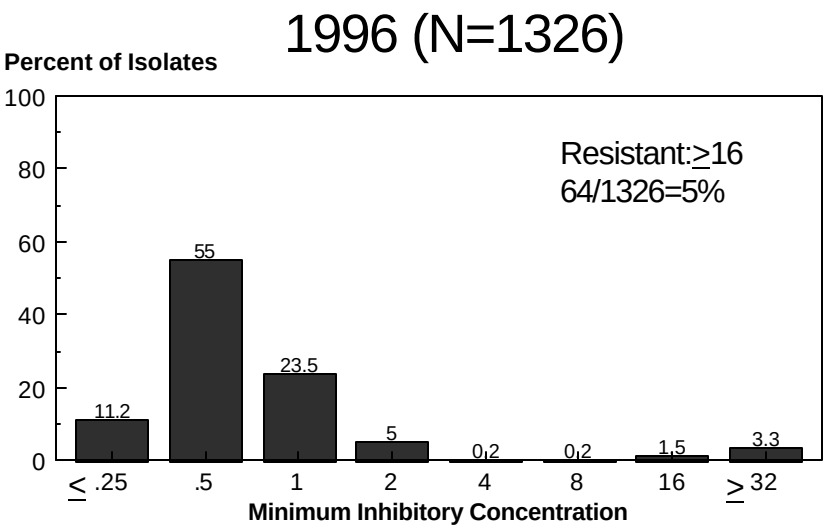
Not tested in 1998

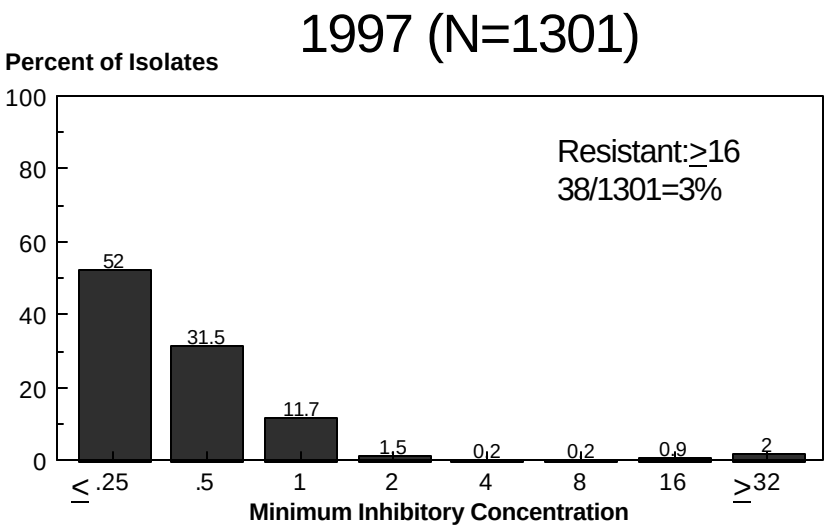
1999 (N=1499)

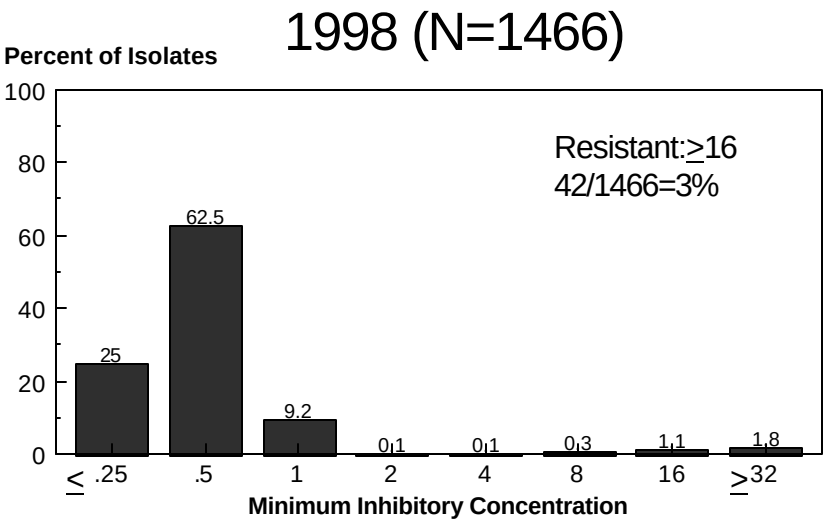


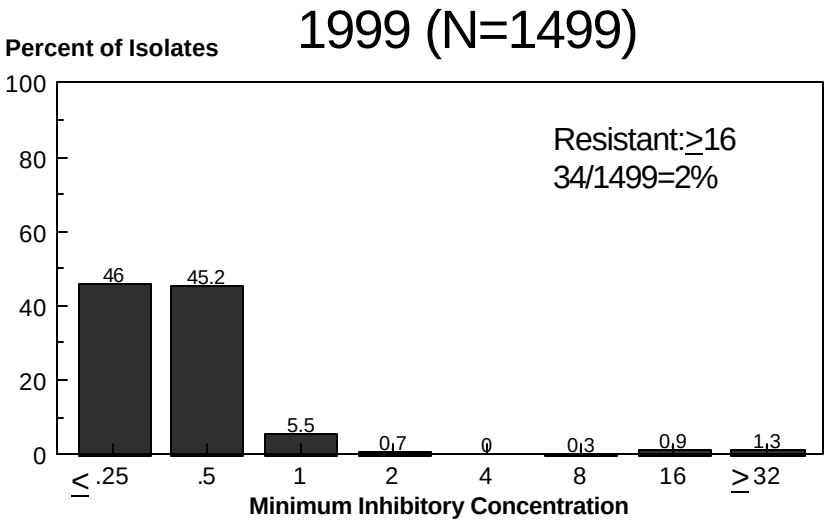
# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 3k. MICs for Gentamicin among non-Typhi *Salmonella* isolates, 1996 - 1999



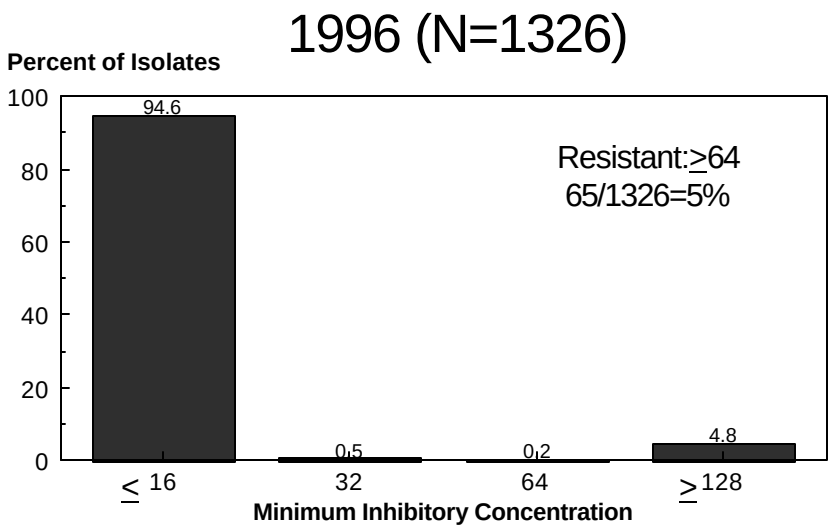



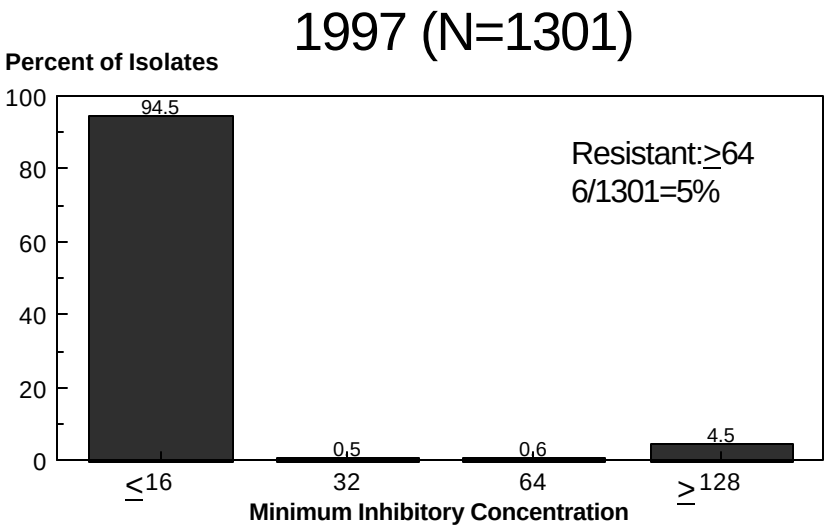



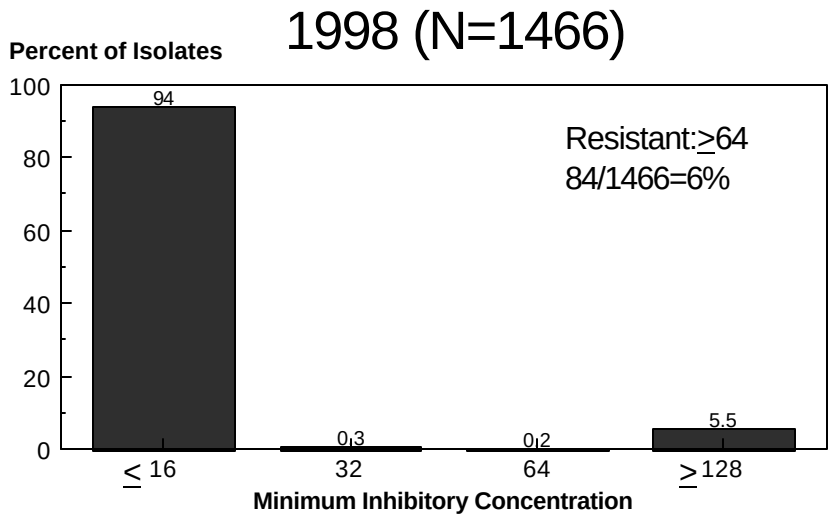



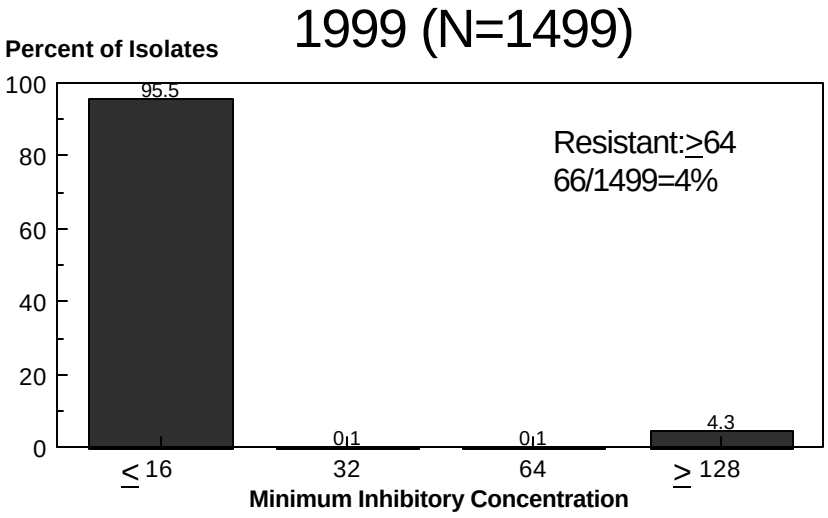
# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 3l. MICs for Kanamycin among non-Typhi *Salmonella* isolates, 1996 - 1999



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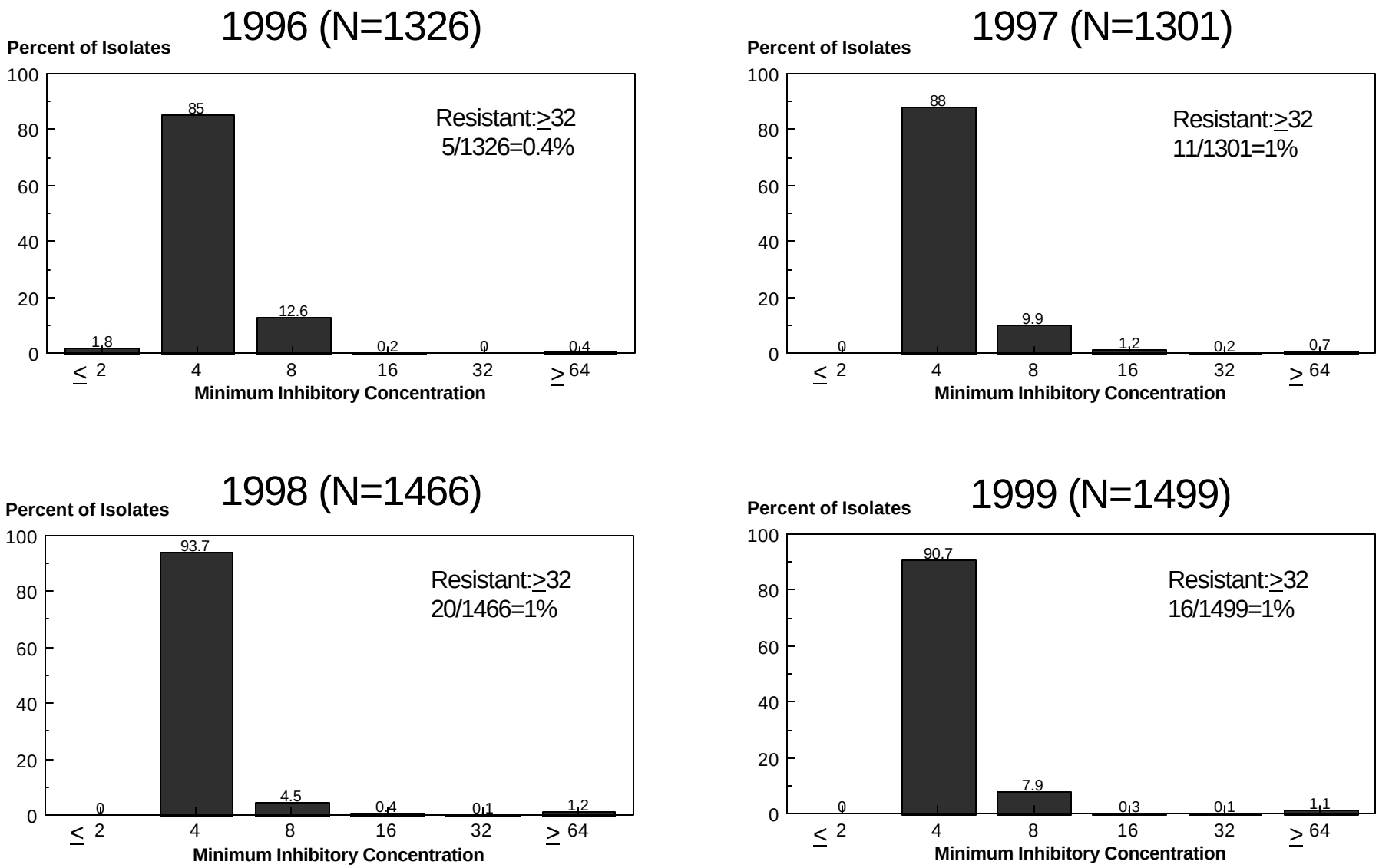
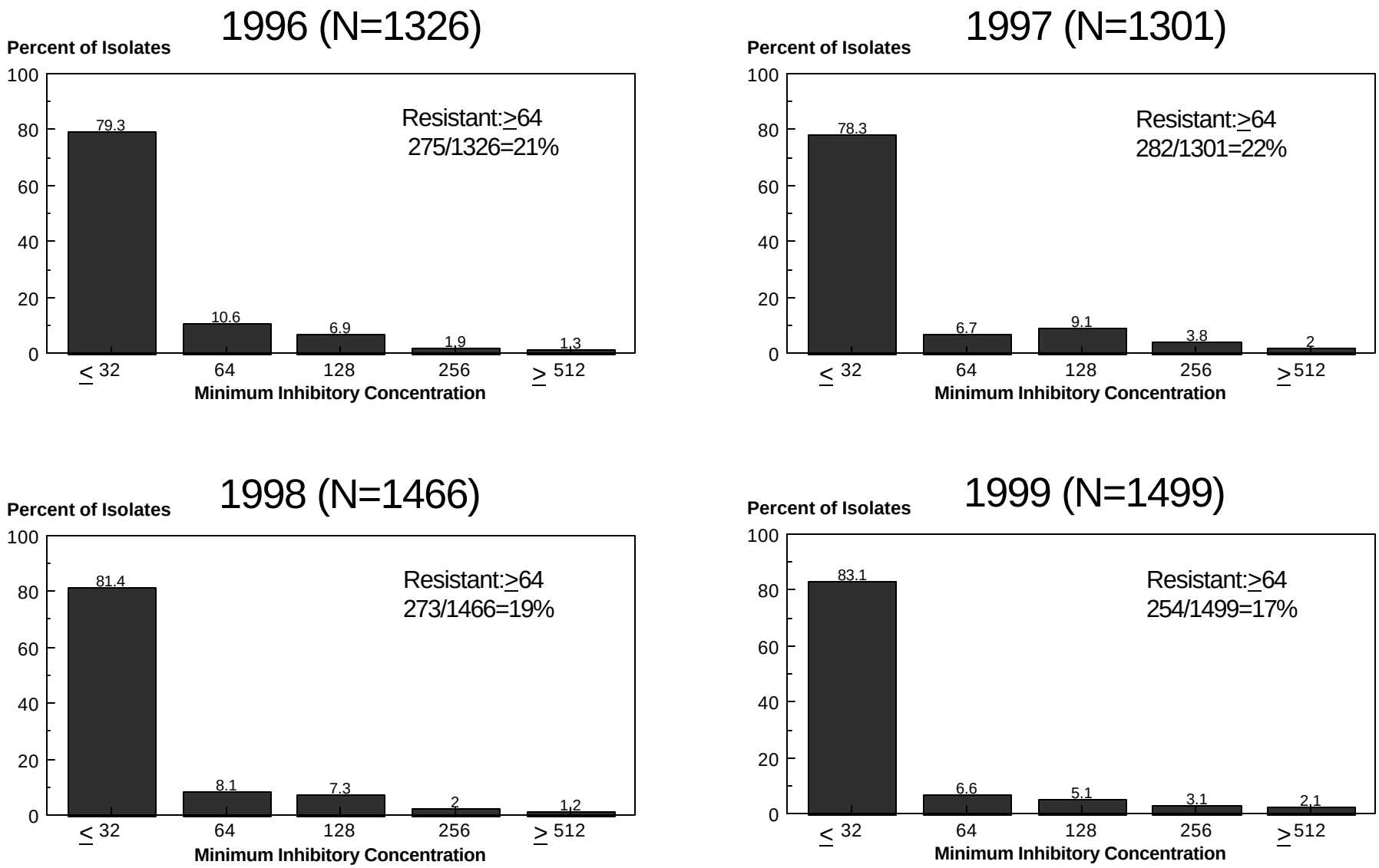
## Figure 3m. MICs for Nalidixic Acid among non-Typhi *Salmonella* isolates, 1996 - 1999



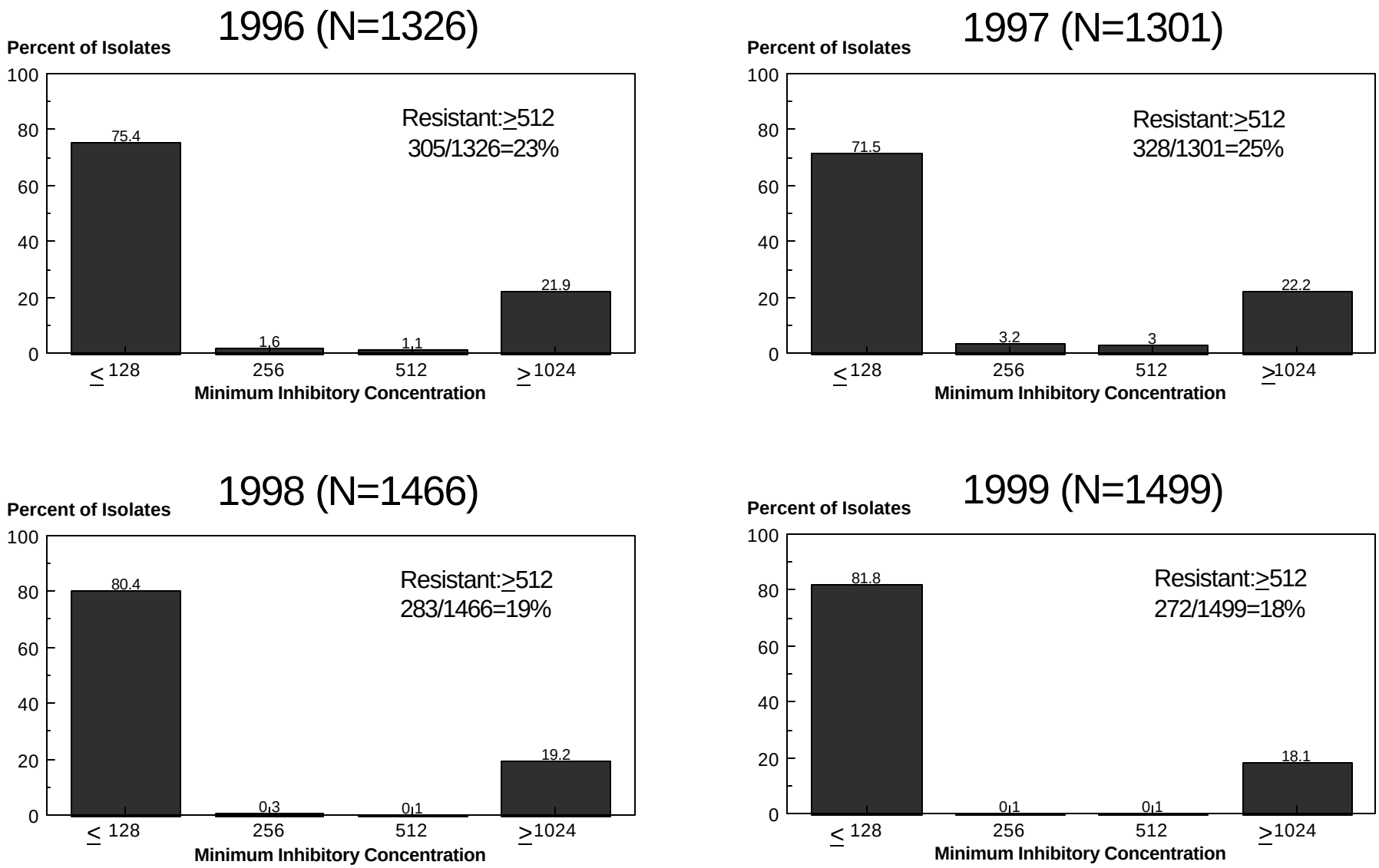
# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 3n. MICs for Streptomycin among non-Typhi *Salmonella* isolates, 1996 - 1999



# National Antimicrobial Resistance Monitoring SystemFor Enteric Bacteria

## Figure 3o. MICs for Sulfamethoxazole among non-Typhi *Salmonella* isolates, 1996 - 1999



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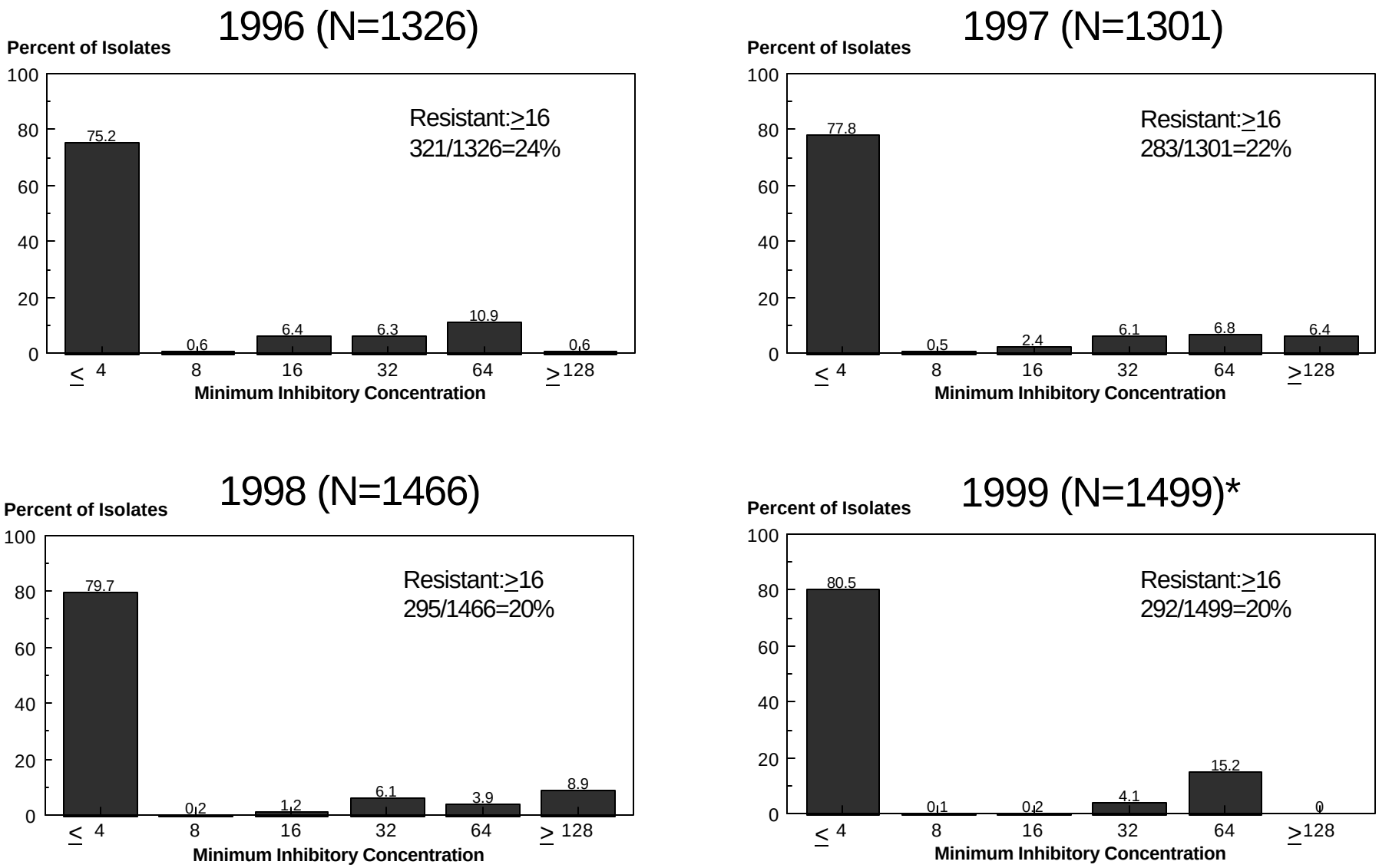
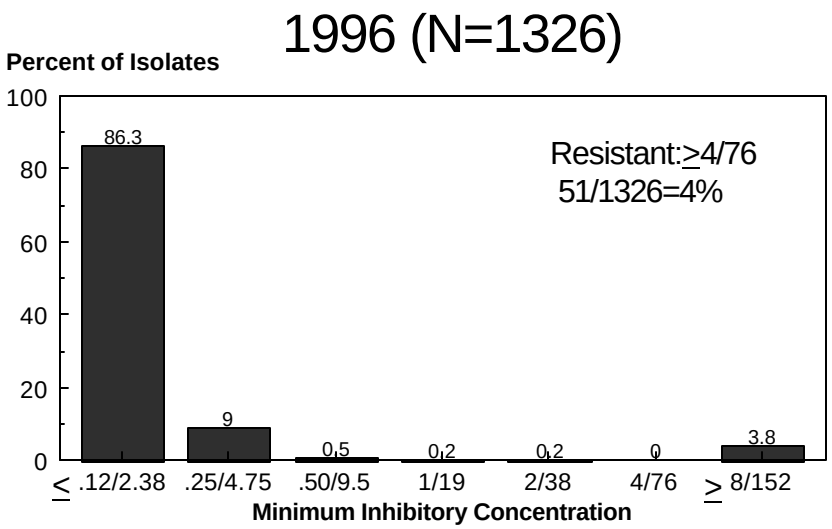
## Figure 3p. MICs for Tetracycline among non-Typhi *Salmonella* isolates, 1996 - 1999

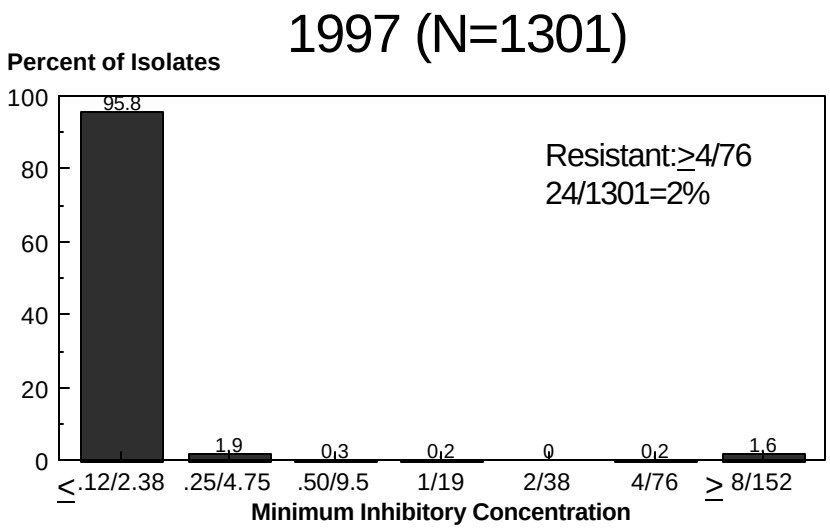


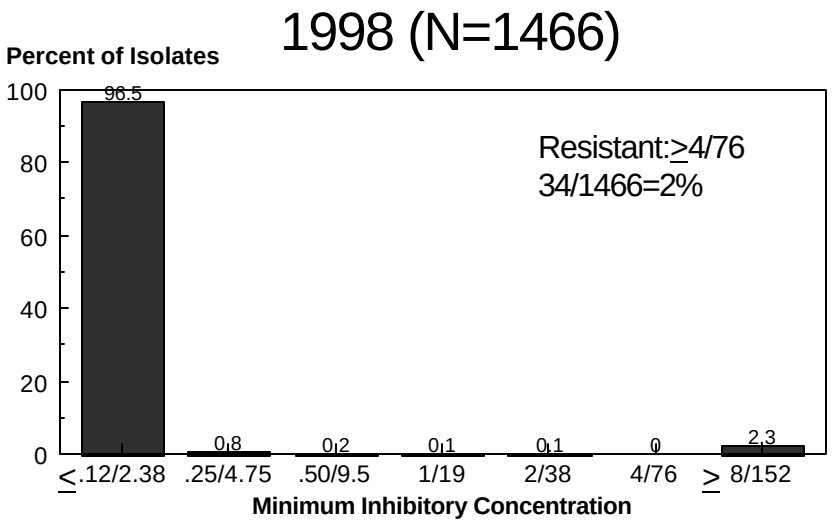

* Maximum MIC dilution for 1999 was 32 ug/ml. All resistant isolates had a MIC >32 ug/ml.

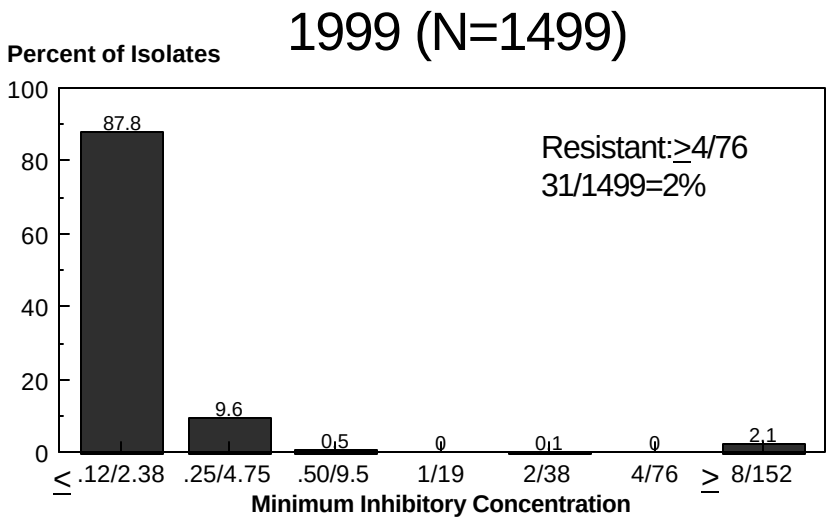
# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 3q. MICs for Trimethoprim-Sulfamethoxazole among non-Typhi *Salmonella* isolates, 1996 - 1999



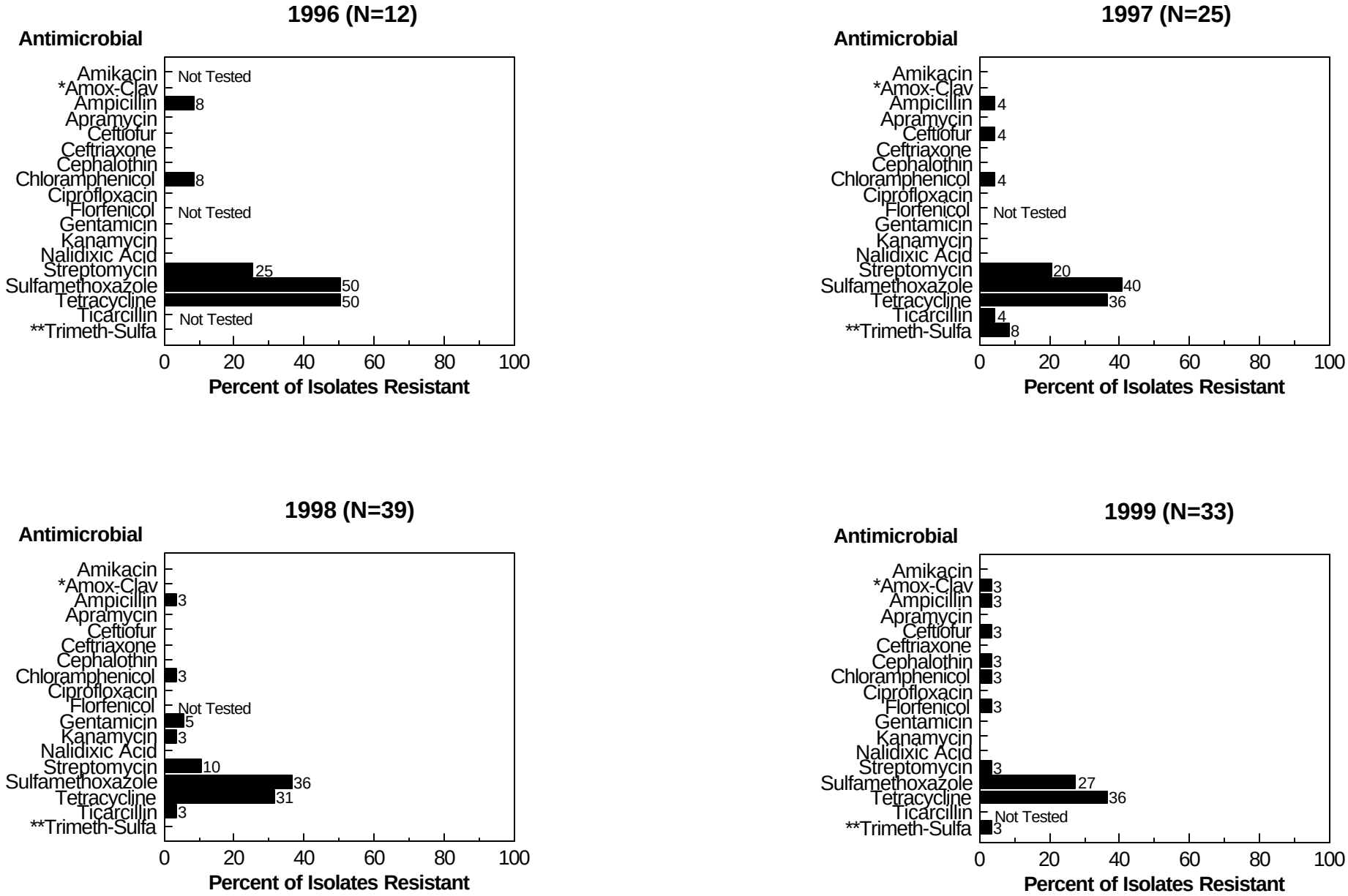



# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 4a. Resistance among *Salmonella* serotype Agona isolates, 1996-1999




*Amox-Clav=Amoxicillin-Clavulanic Acid **Trimeth-Sulfa=Trimethoprim-Sulfamethoxazole

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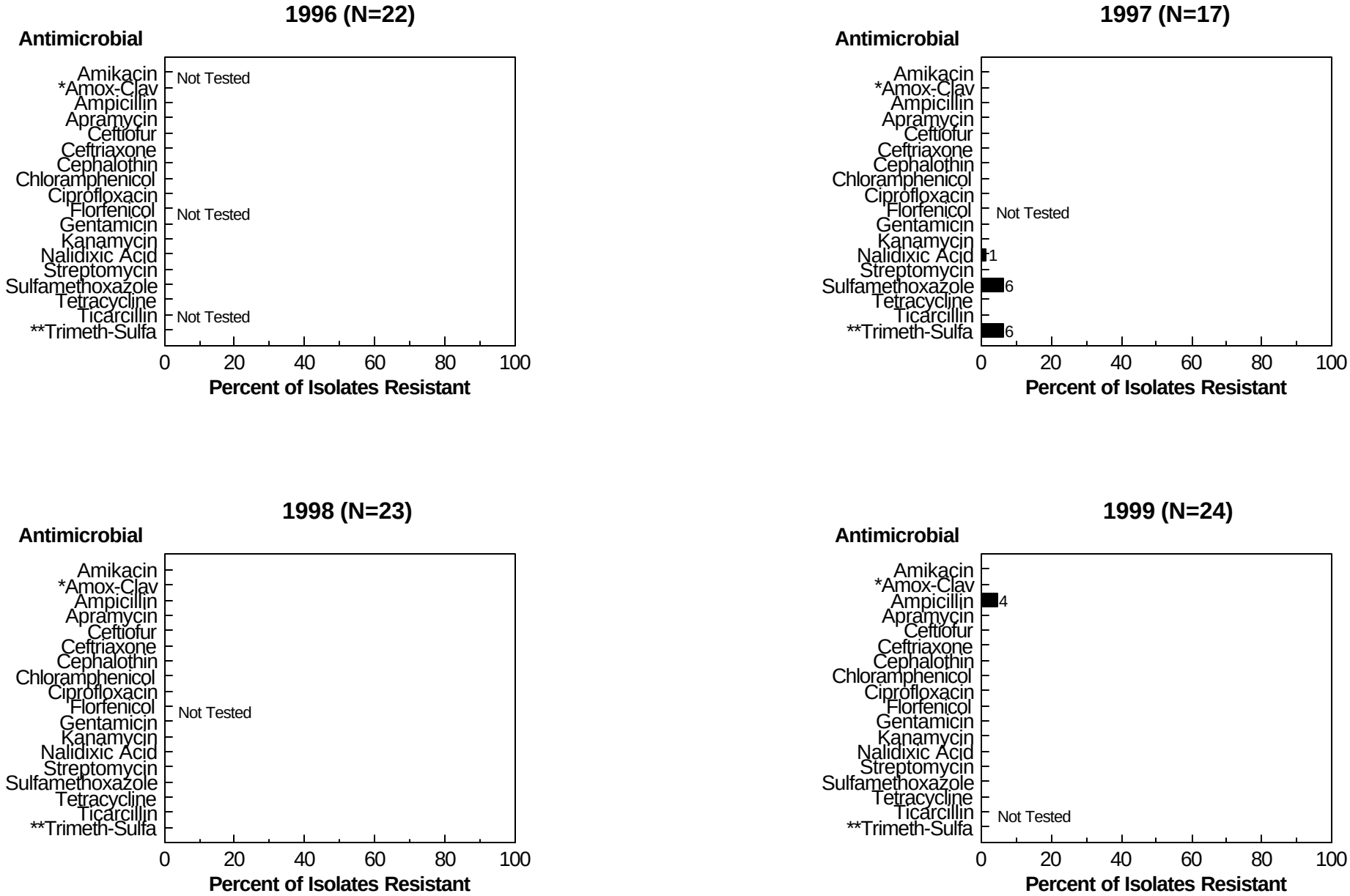
## Figure 4b. Resistance among *Salmonella* serotype Braenderup isolates, 1996-1999




*Amox-Clav=Amoxicillin-Clavulanic Acid **Trimeth-Sulfa=Trimethoprim-Sulfamethoxazole

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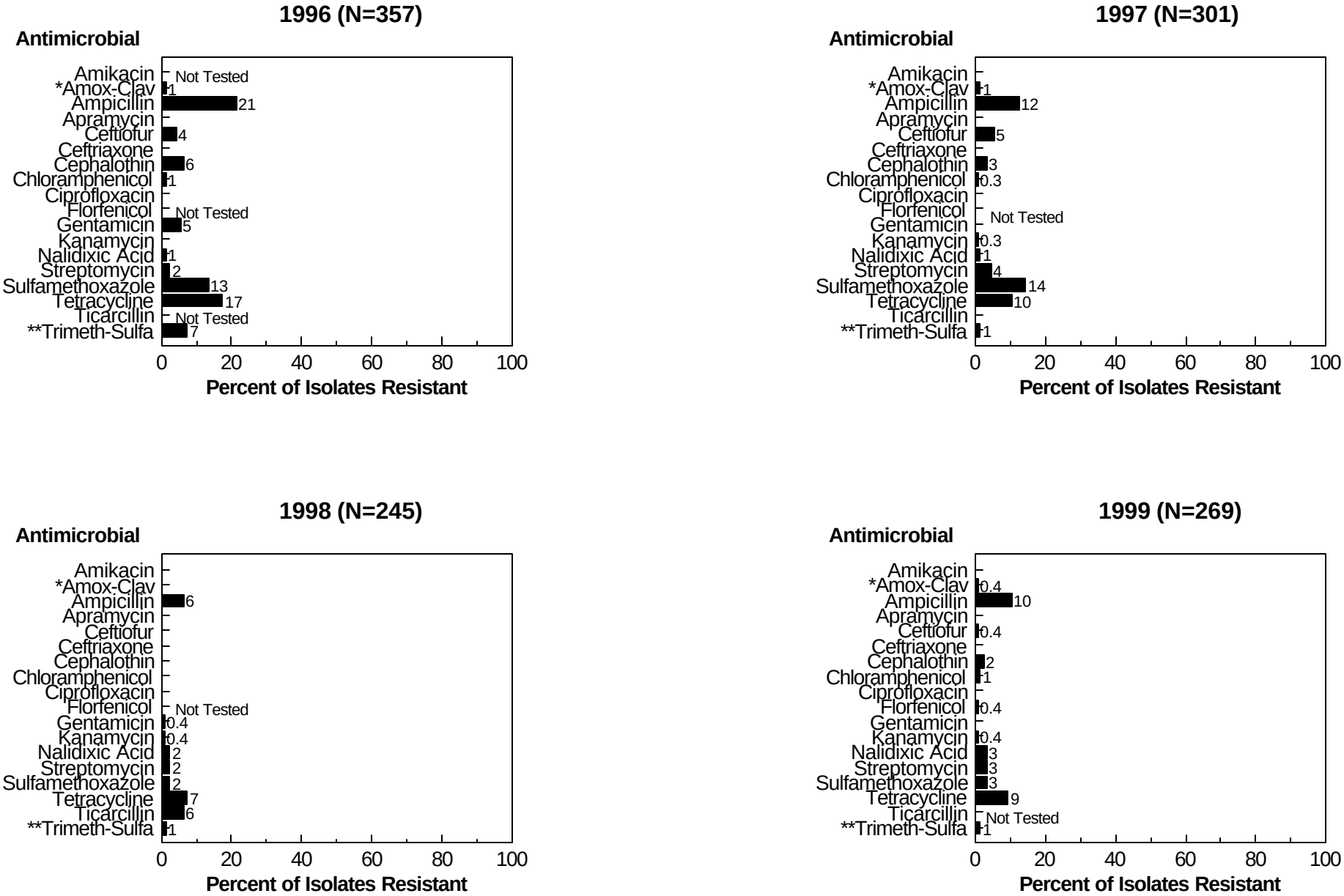
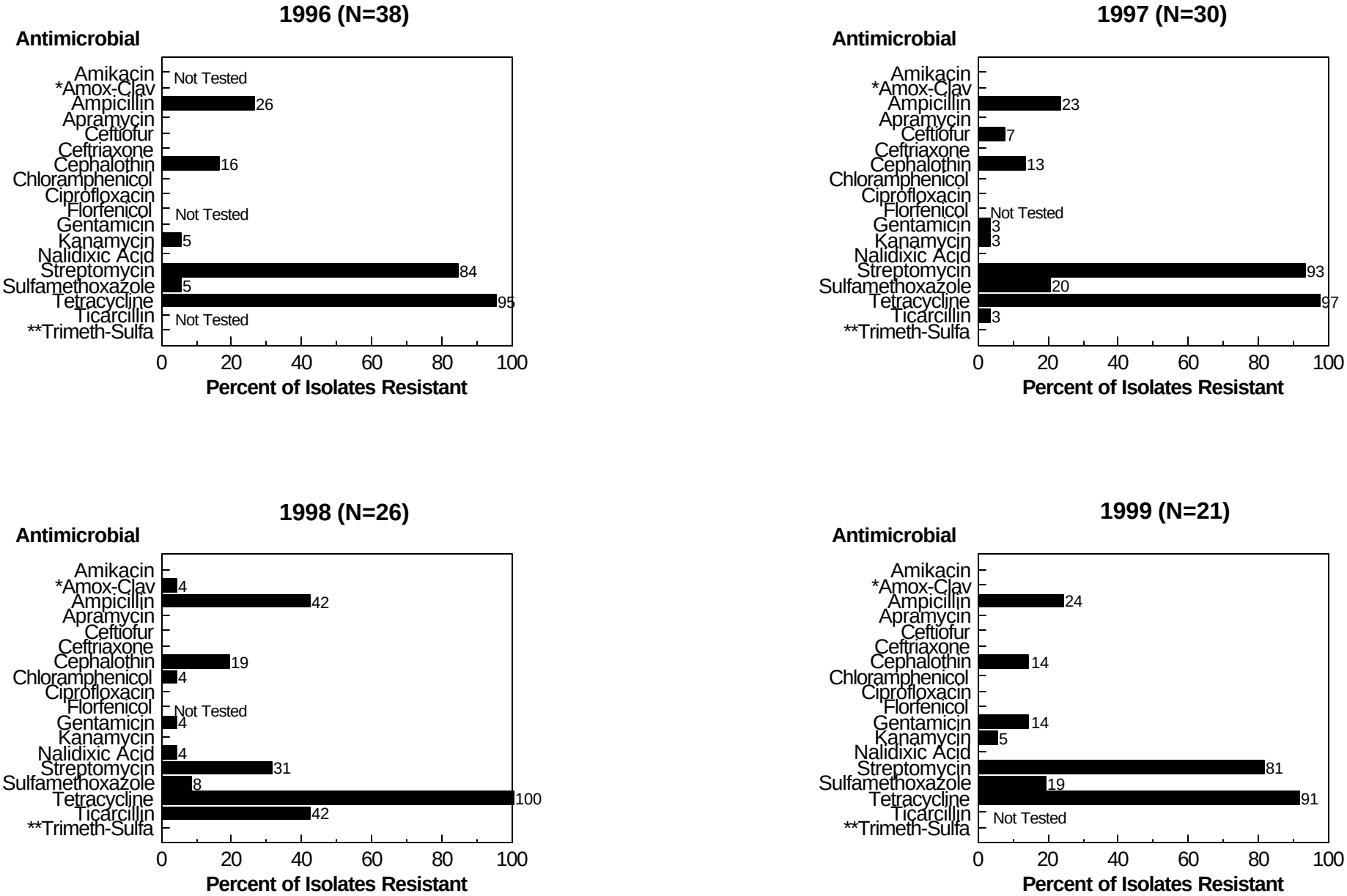
## Figure 4c. Resistance among *Salmonella* serotype Enteritidis isolates, 1996-1999




*Amox-Clav=Amoxicillin-Clavulanic Acid **Trimeth-Sulfa=Trimethoprim-Sulfamethoxazole

# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

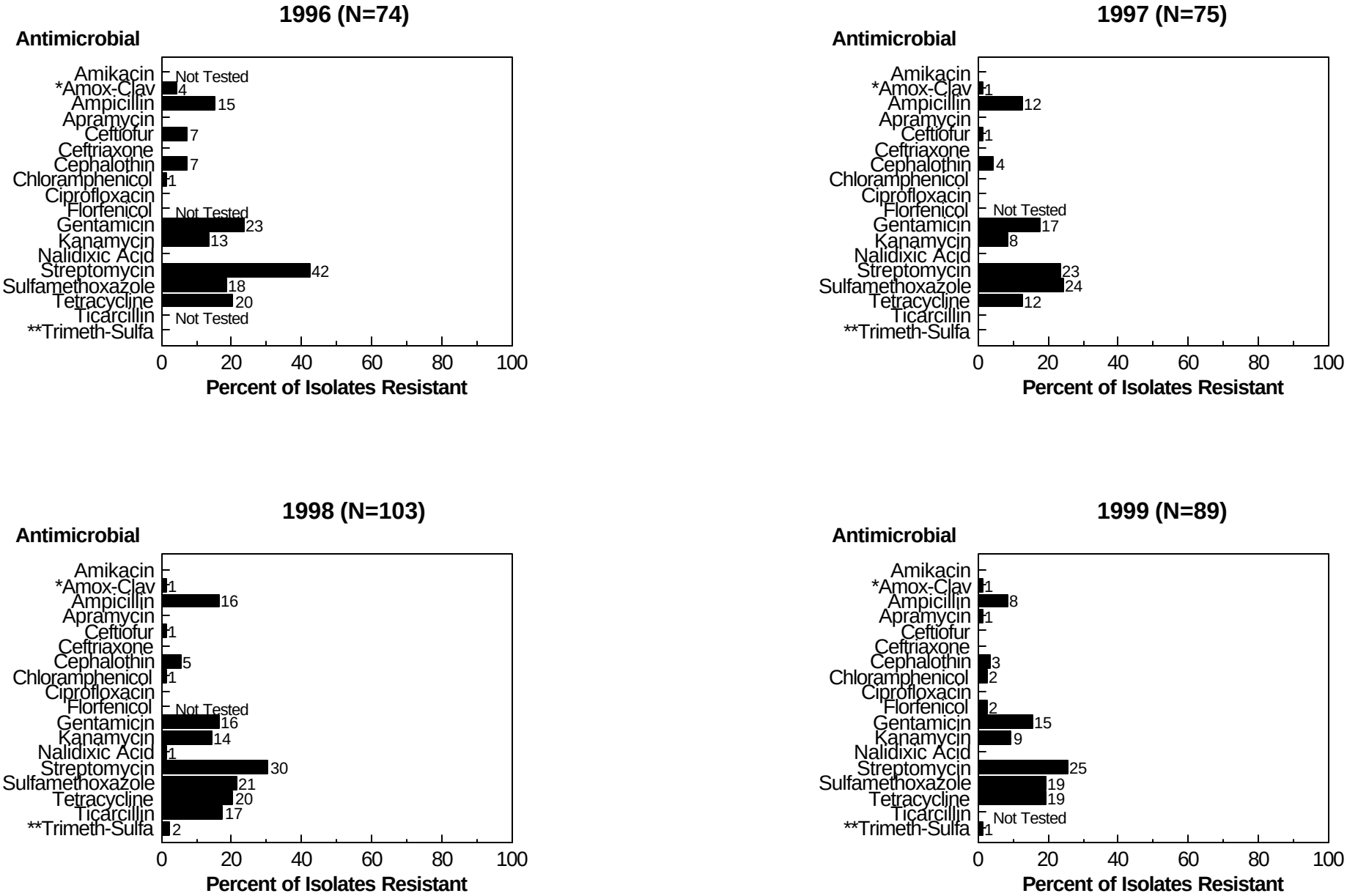
## Figure 4d. Resistance among *Salmonella* serotype Hadar isolates, 1996-1999




*Amox-Clav=Amoxicillin-Clavulanic Acid **Trimeth-Sulfa=Trimethoprim-Sulfamethoxazole

# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

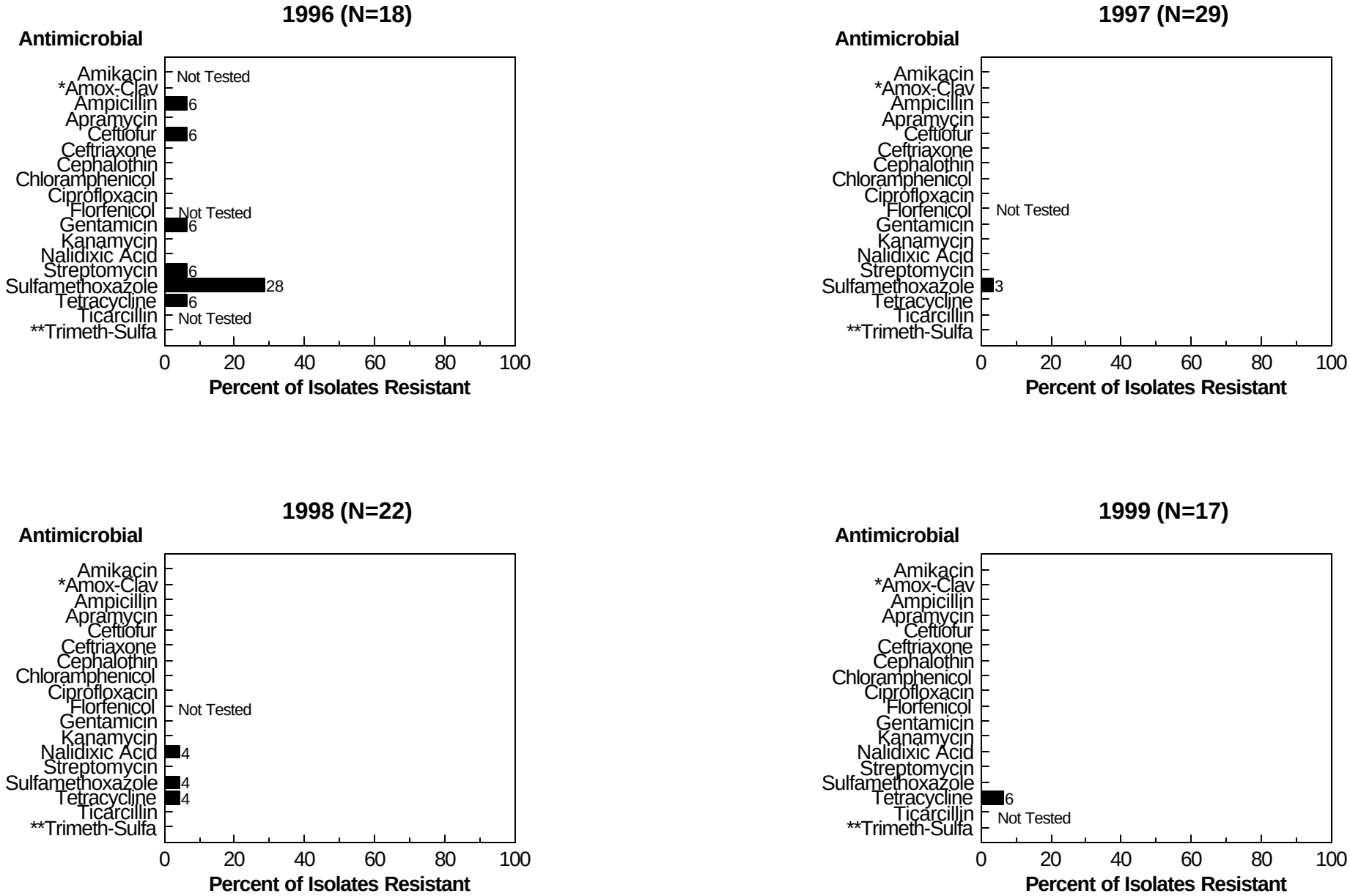
## Figure 4e. Resistance among *Salmonella* serotype Heidelberg isolates, 1996-1999




*Amox-Clav=Amoxicillin-Clavulanic Acid **Trimeth-Sulfa=Trimethoprim-Sulfamethoxazole

# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

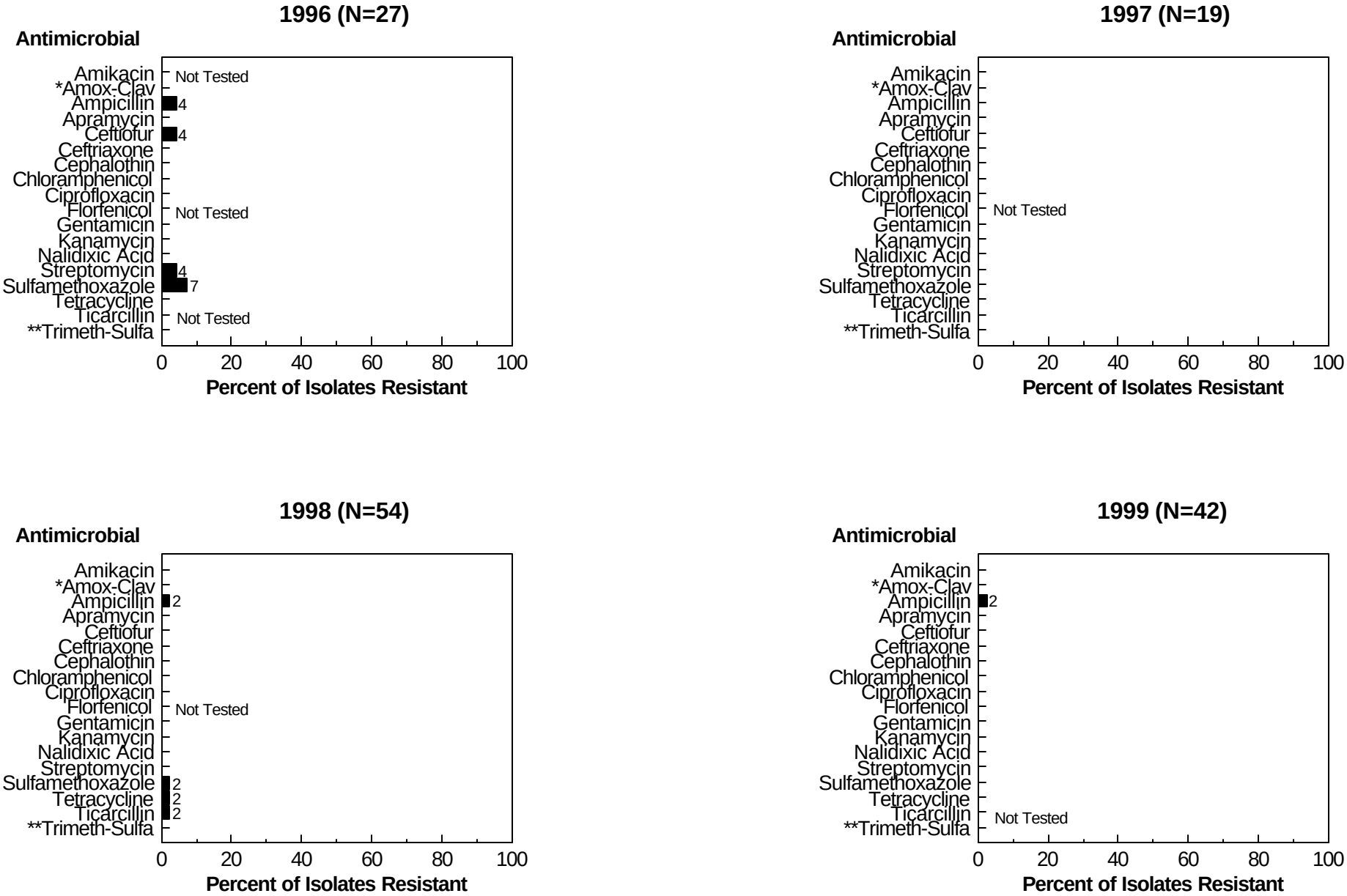
## Figure 4f. Resistance among *Salmonella* serotype Infantis isolates, 1996-1999




*Amox-Clav=Amoxicillin-Clavulanic Acid **Trimeth-Sulfa=Trimethoprim-Sulfamethoxazole

# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

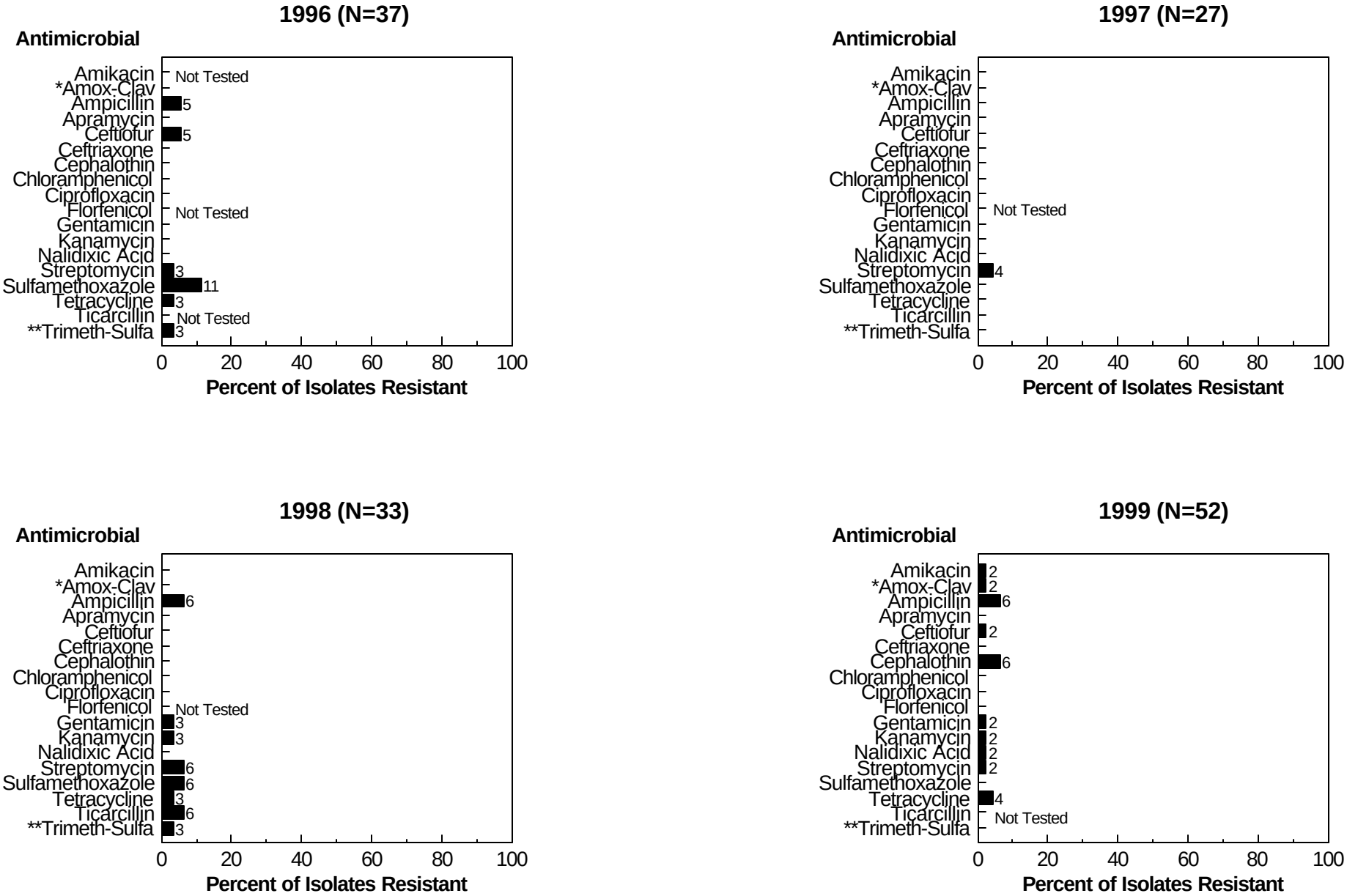
## Figure 4g. Resistance among *Salmonella* serotype Javiana isolates, 1996-1999




*Amox-Clav=Amoxicillin-Clavulanic Acid **Trimeth-Sulfa=Trimethoprim-Sulfamethoxazole

# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

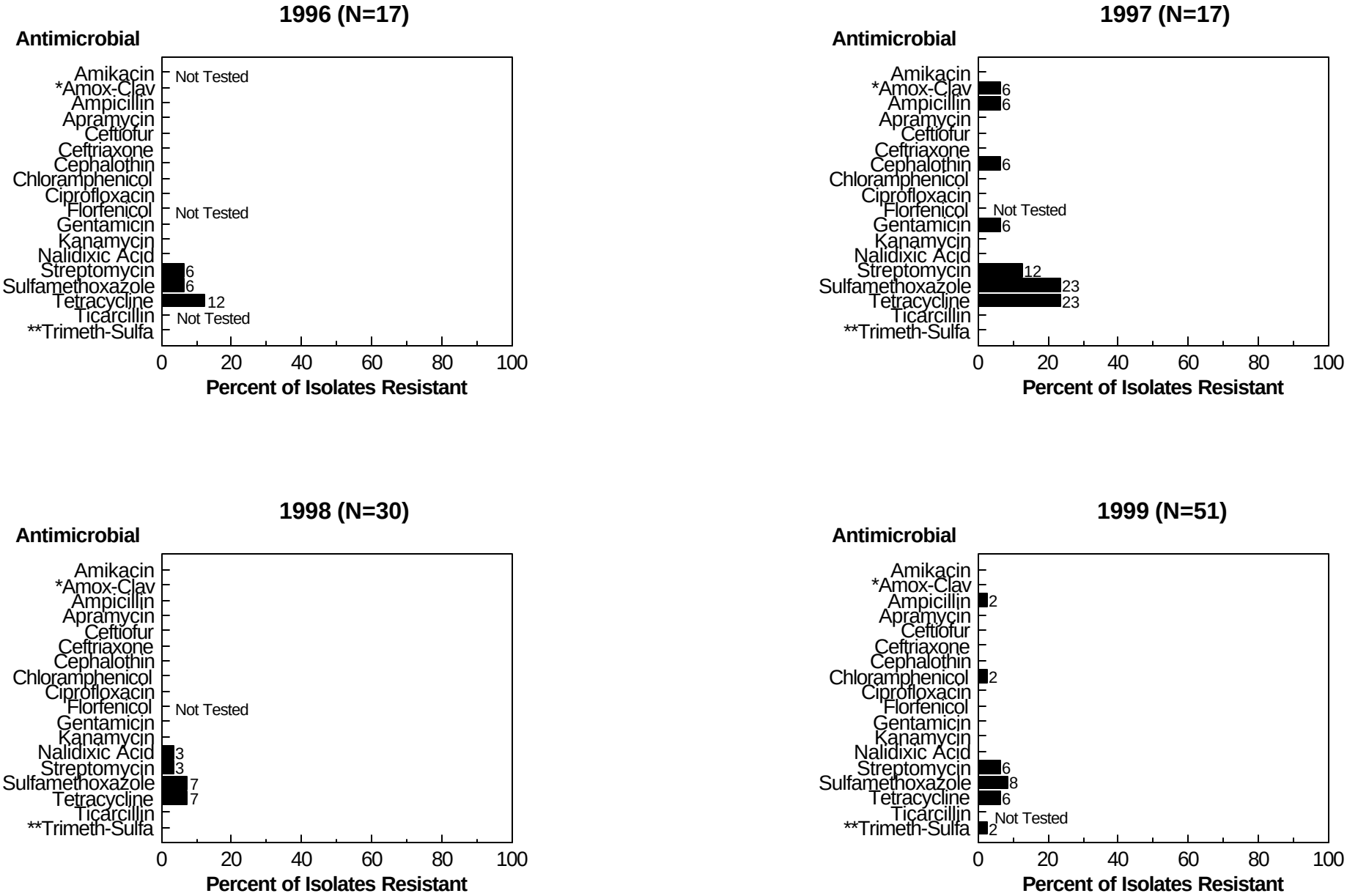
## Figure 4h. Resistance among *Salmonella* serotype Montevideo isolates, 1996-1999




*Amox-Clav=Amoxicillin-Clavulanic Acid **Trimeth-Sulfa=Trimethoprim-Sulfamethoxazole

# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 4i. Resistance among *Salmonella* serotype Muenchen isolates, 1996-1999




*Amox-Clav=Amoxicillin-Clavulanic Acid **Trimeth-Sulfa=Trimethoprim-Sulfamethoxazole

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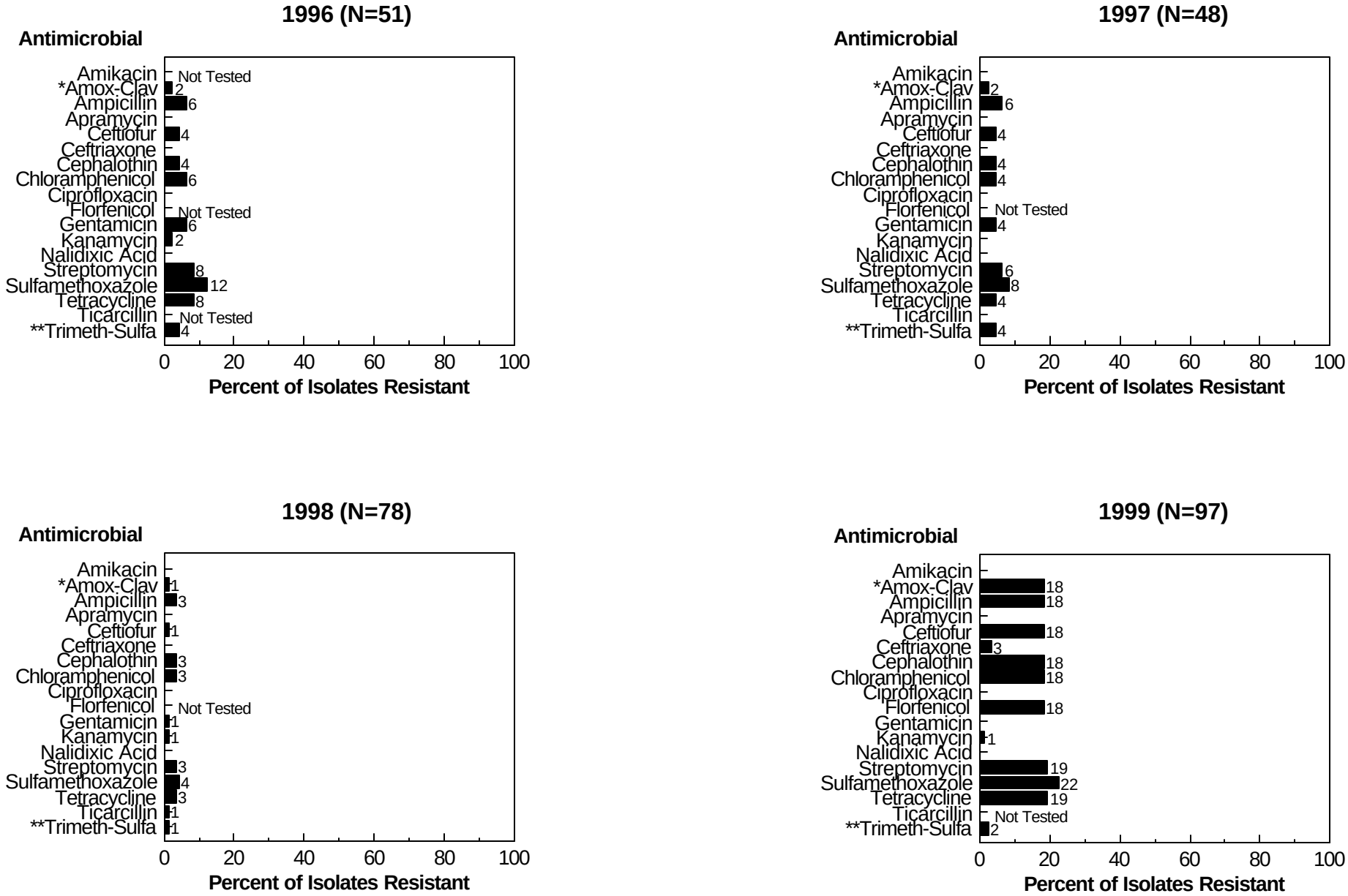
## Figure 4j. Resistance among *Salmonella* serotype Newport isolates, 1996-1999




*Amox-Clav=Amoxicillin-Clavulanic Acid **Trimeth-Sulfa=Trimethoprim-Sulfamethoxazole

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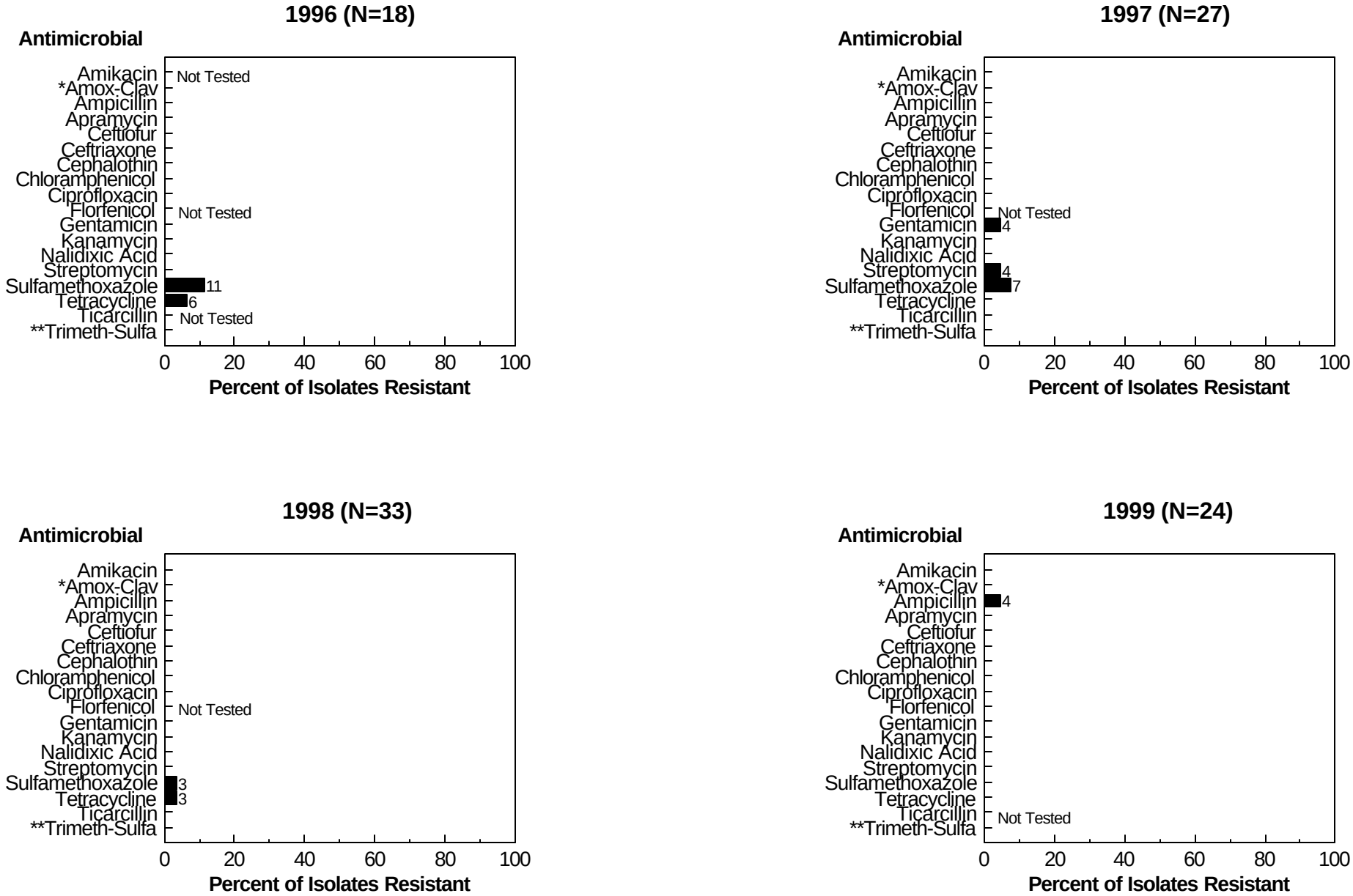
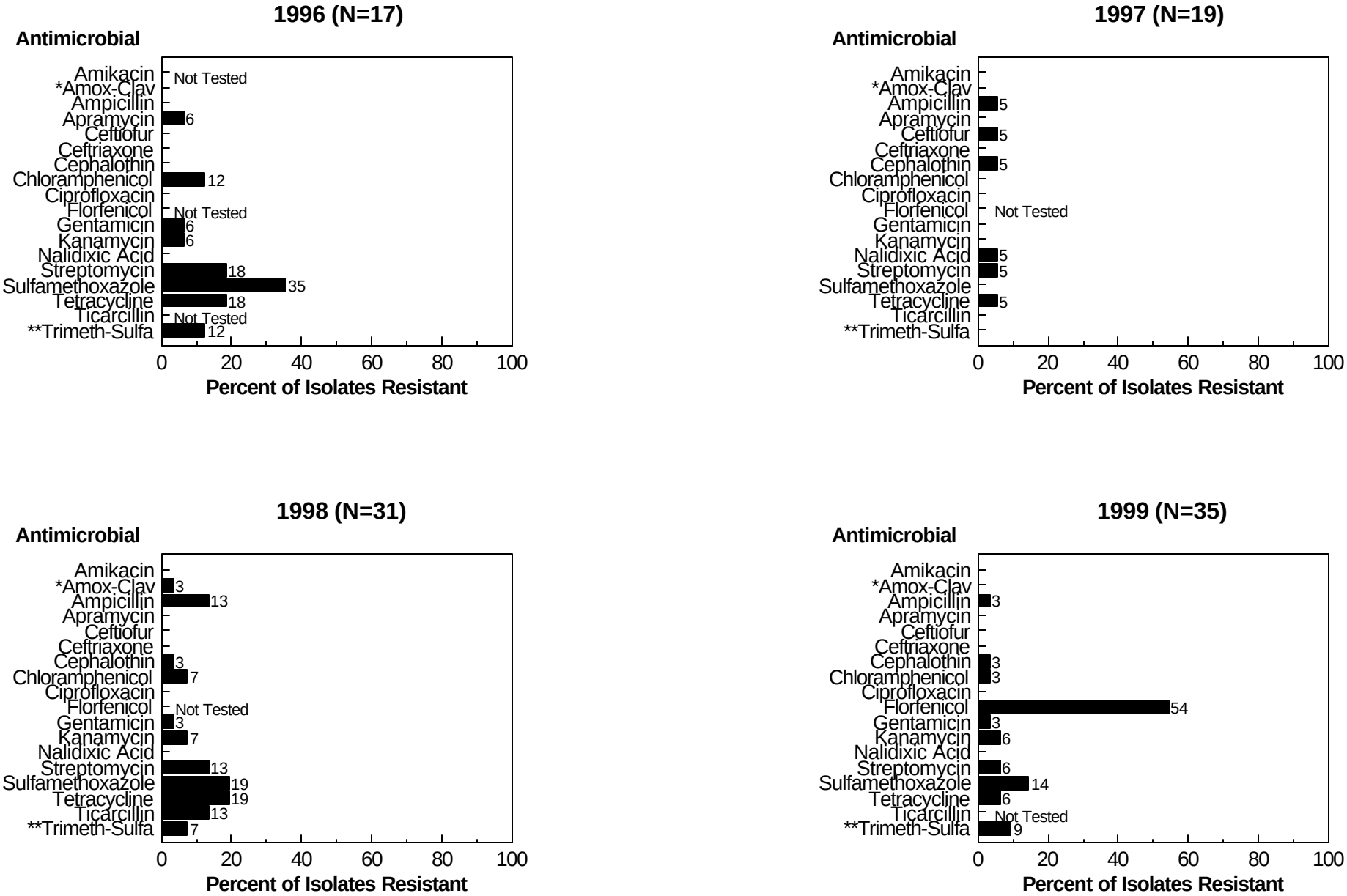
## Figure 4k. Resistance among *Salmonella* serotype Oranienburg isolates, 1996-1999




*Amox-Clav=Amoxicillin-Clavulanic Acid **Trimeth-Sulfa=Trimethoprim-Sulfamethoxazole

# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

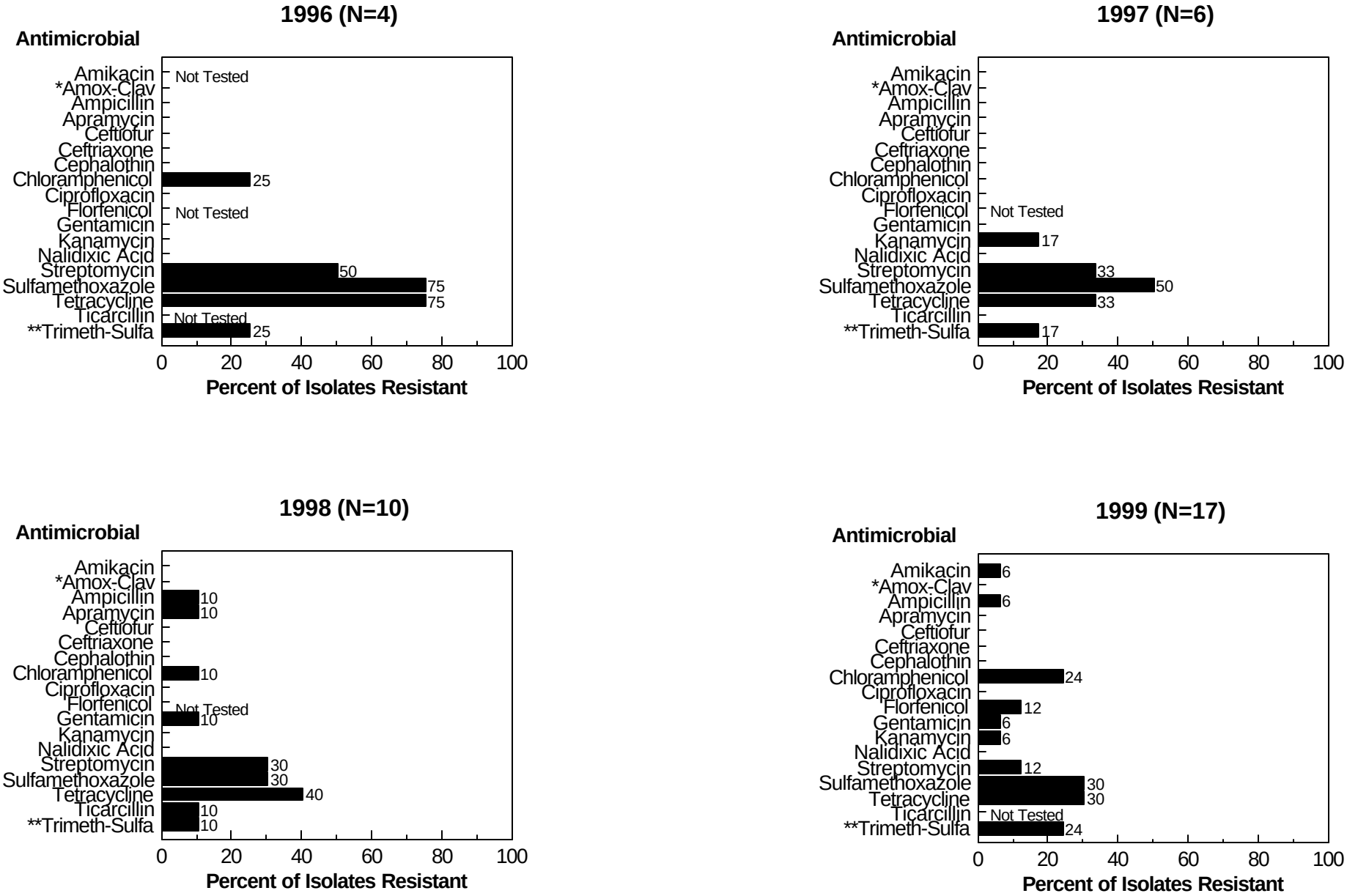
## Figure 4l. Resistance among *Salmonella* serotype Saint Paul isolates, 1996-1999




*Amox-Clav=Amoxicillin-Clavulanic Acid **Trimeth-Sulfa=Trimethoprim-Sulfamethoxazole

# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 4m. Resistance among *Salmonella* serotype Stanley isolates, 1996-1999




*Amox-Clav=Amoxicillin-Clavulanic Acid **Trimeth-Sulfa=Trimethoprim-Sulfamethoxazole

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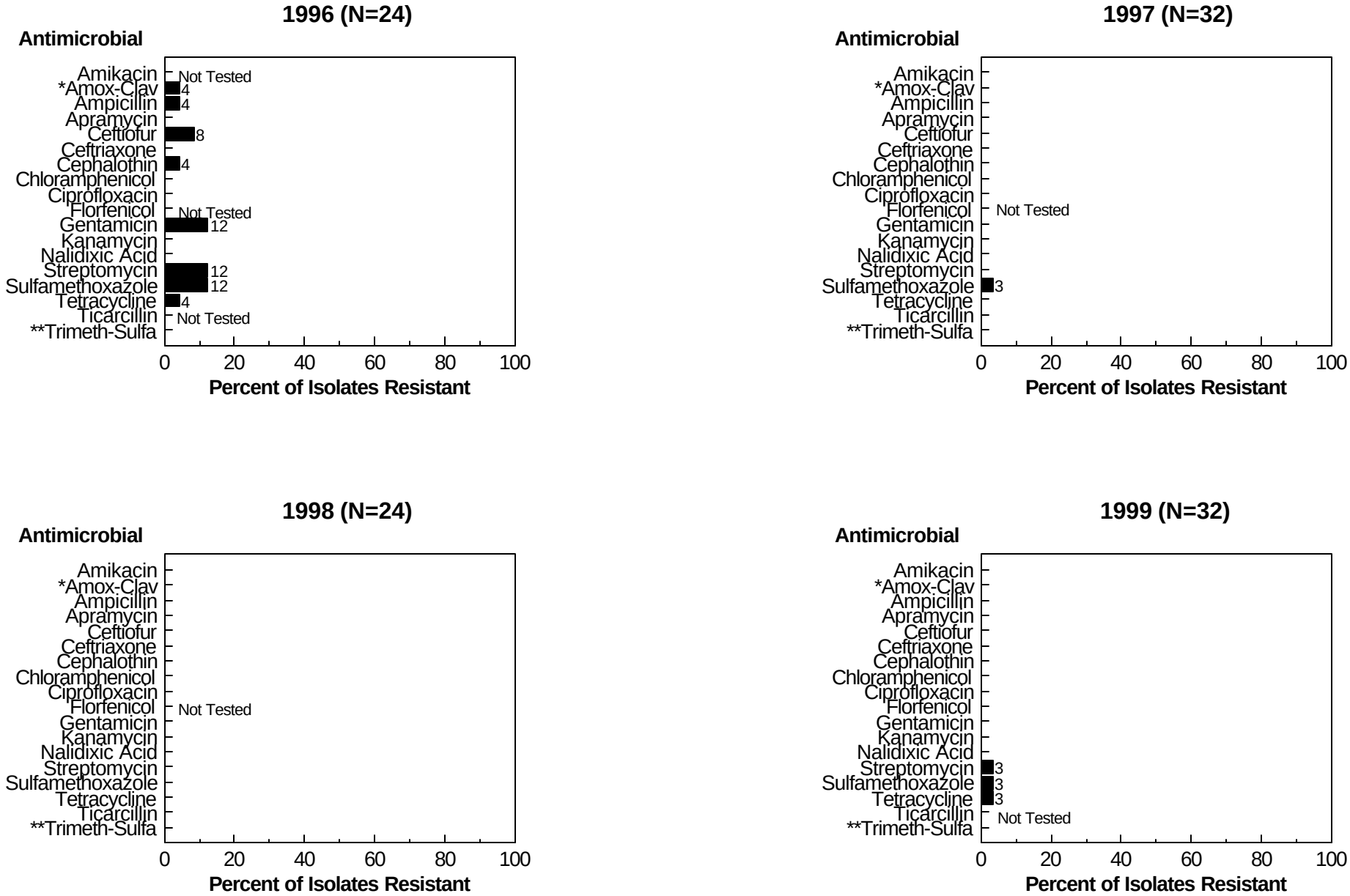
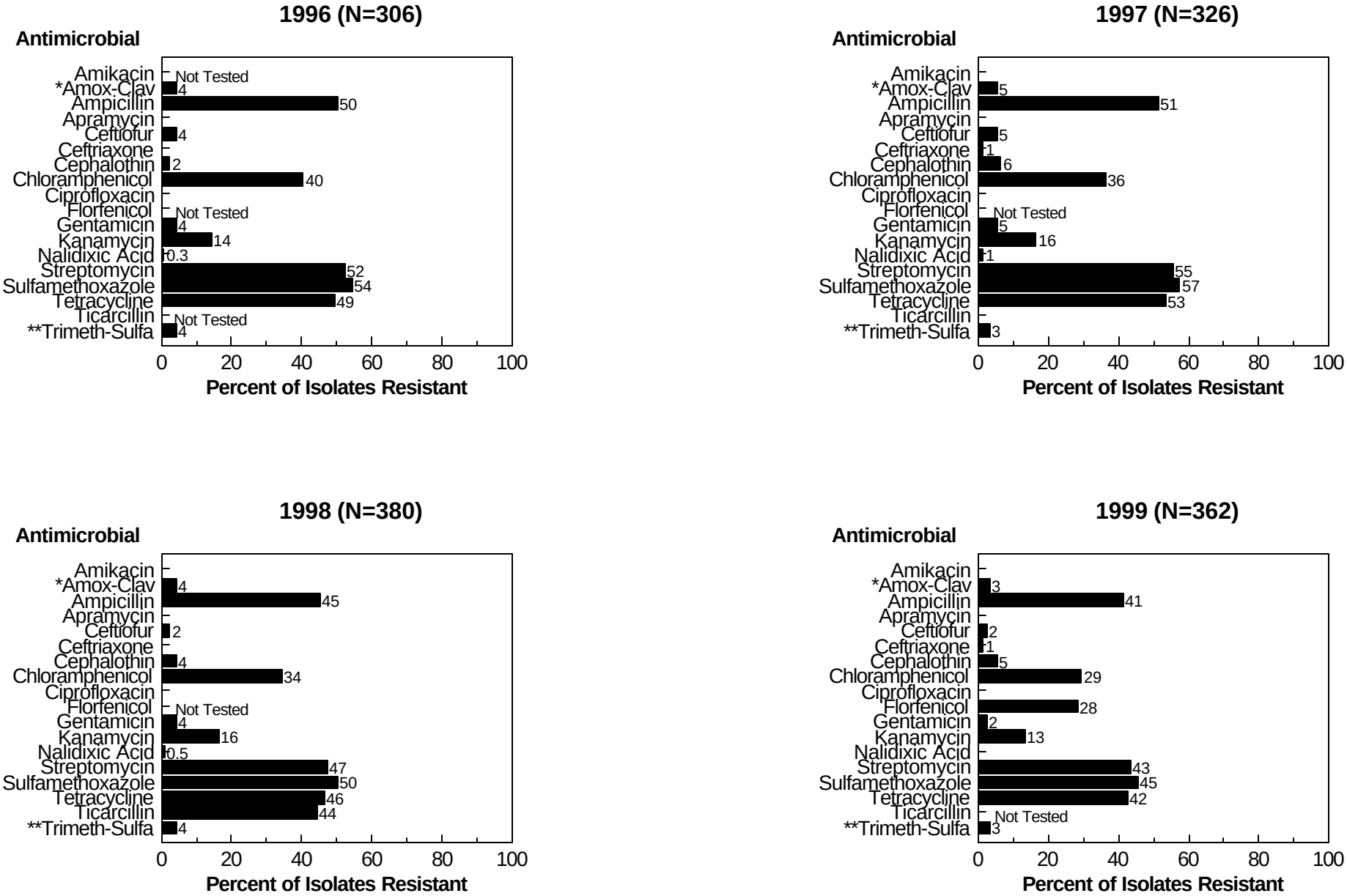
## Figure 4n. Resistance among *Salmonella* serotype Thompson isolates, 1996-1999




*Amox-Clav=Amoxicillin-Clavulanic Acid **Trimeth-Sulfa=Trimethoprim-Sulfamethoxazole

# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

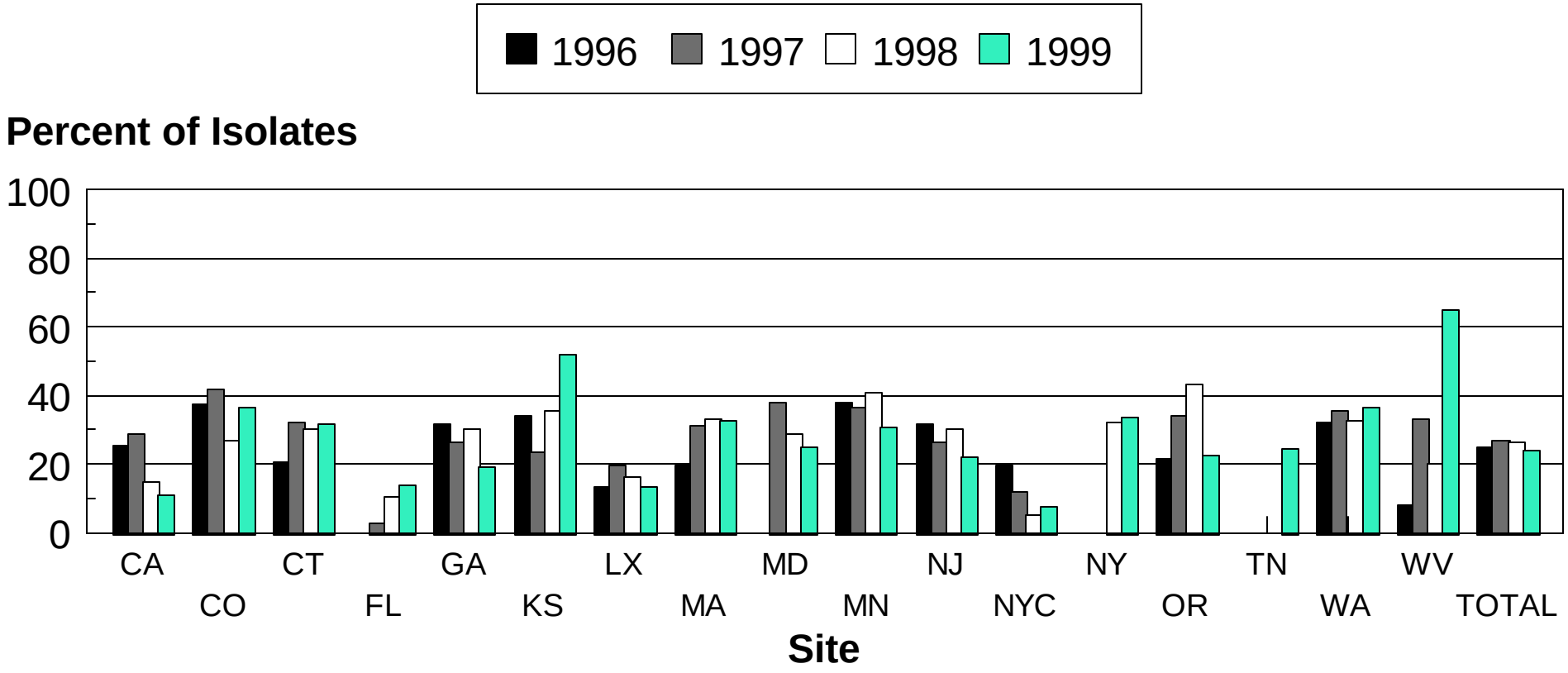
## Figure 4o. Resistance among *Salmonella* serotype Typhimurium isolates, 1996-1999




*Amox-Clav=Amoxicillin-Clavulanic Acid **Trimeth-Sulfa=Trimethoprim-Sulfamethoxazole

## National Antimicrobial Resistance Monitoring SystemFor Enteric Bacteria

## Figure 5. Percent of non-Typhi *Salmonella* isolates that are serotype Typhimurium, by site, 1996 - 1999

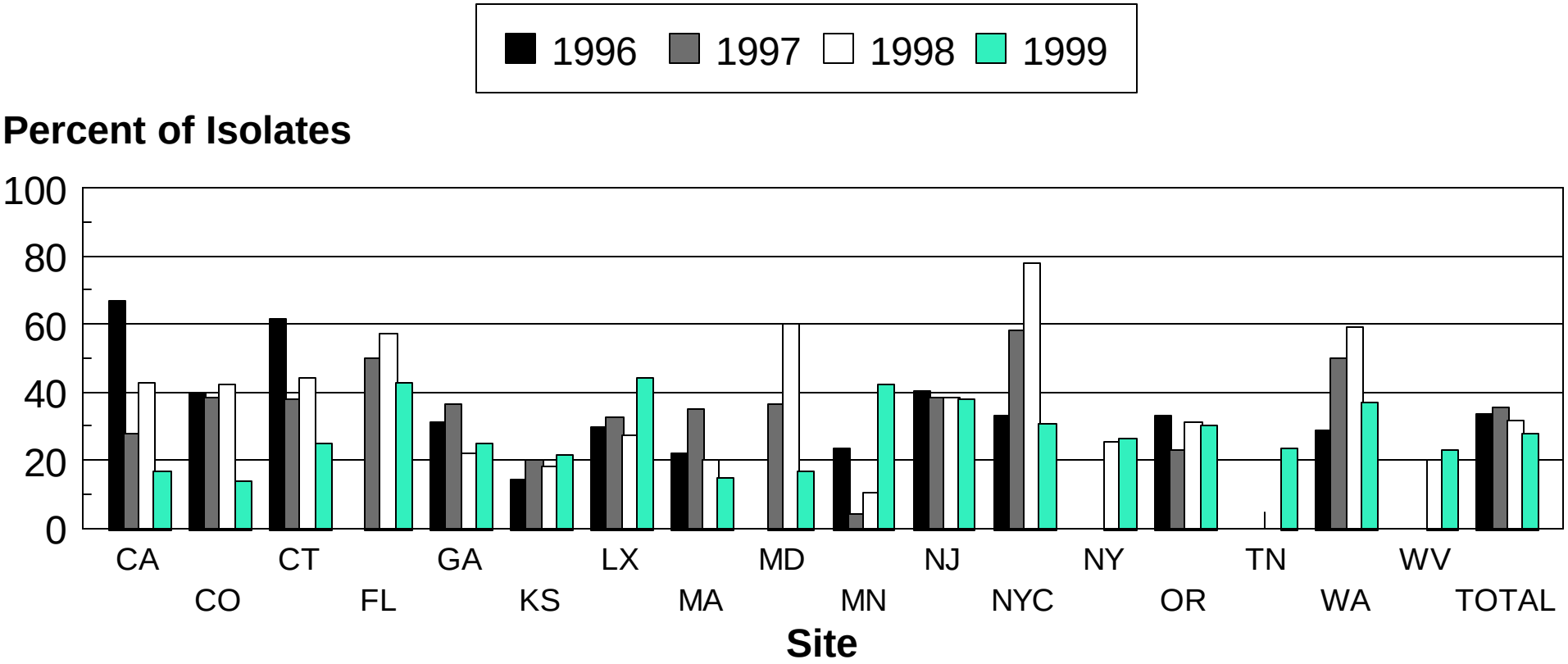



Percent Typhimurium for all sites:
1996 - 306/1326 = 23%  1997 - 326/1301 = 25%
1998 - 380/1466 = 26%  1999 - 362/1499 = 24%

LX=Los Angeles County  NYC=New York City

## National Antimicrobial Resistance Monitoring System For Enteric Bacteria

### Figure 6. Percent of *Salmonella* Typhimurium isolates that are resistant to Ampicillin, Chloramphenicol, Streptomycin, Sulfamethoxazole, and Tetracycline (ACSSuT), by site, 1996-1999

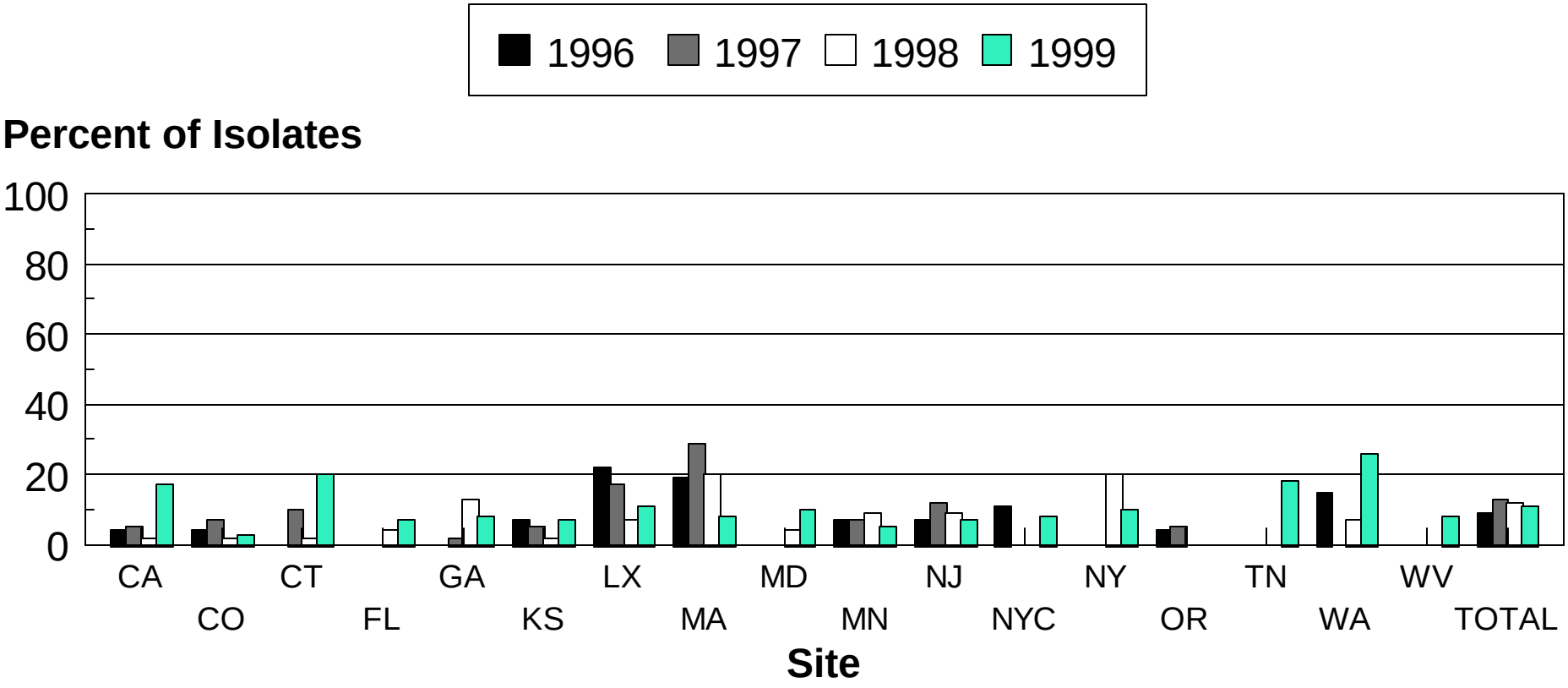



Percent Typhimurium with ACSSuT pattern for all sites:
1996 - 103/306 = 34%  1997 - 115/326 = 35%
1998 - 120/380 = 32%  1999 - 102/362 = 28%

LX=Los Angeles County  NYC=New York City

## National Antimicrobial Resistance Monitoring System For Enteric Bacteria

### Figure 7. Percent of *Salmonella* Typhimurium isolates that are resistant to Ampicillin, Kanamycin, Streptomycin, Sulfamethoxazole, and Tetracycline (AKSSuT), by site, 1996-1999




Percent Typhimurium with AKSSuT pattern for all sites:

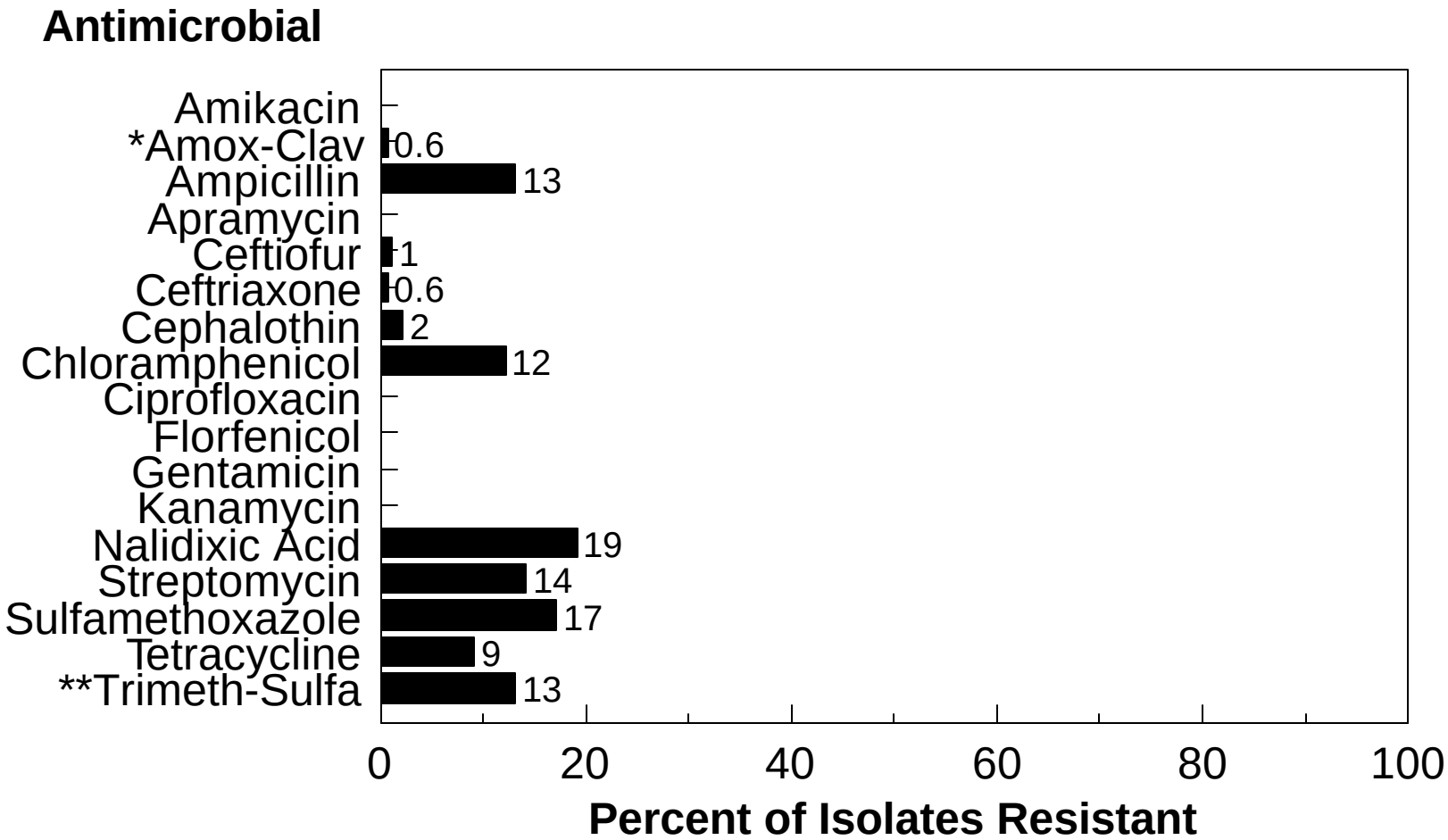
1996 - 27/306 = 9%  1997 - 41/326 = 13%

1998 - 46/374 = 12%  1999 - 39/362 = 11%

LX=Los Angeles County  NYC=New York City

## National Antimicrobial Resistance Monitoring System For Enteric Bacteria

### Figure 8. Resistance among *Salmonella* Typhi isolates, 1999

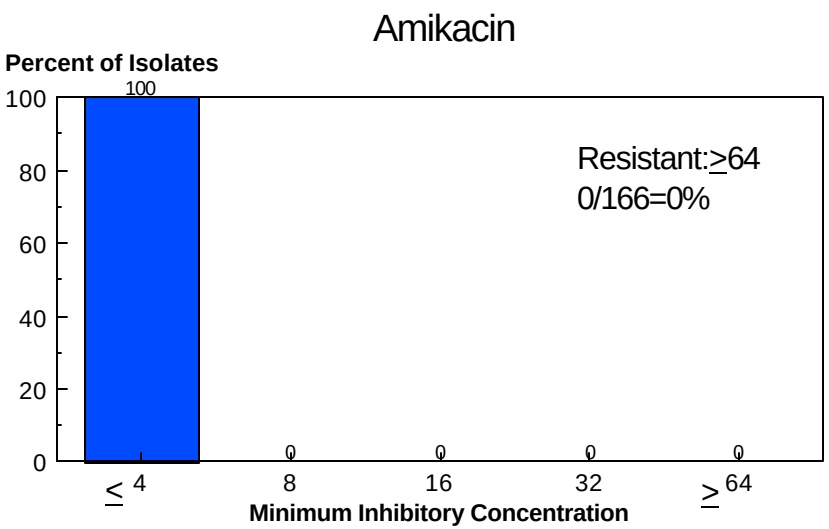


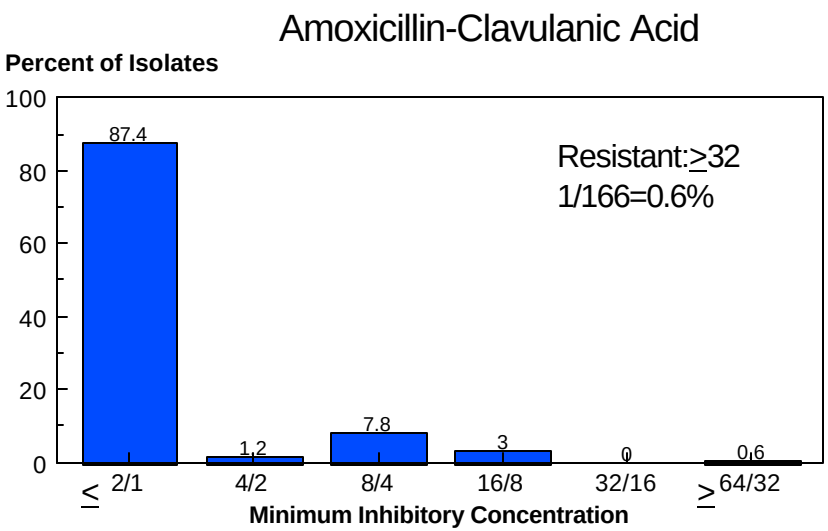

N=166

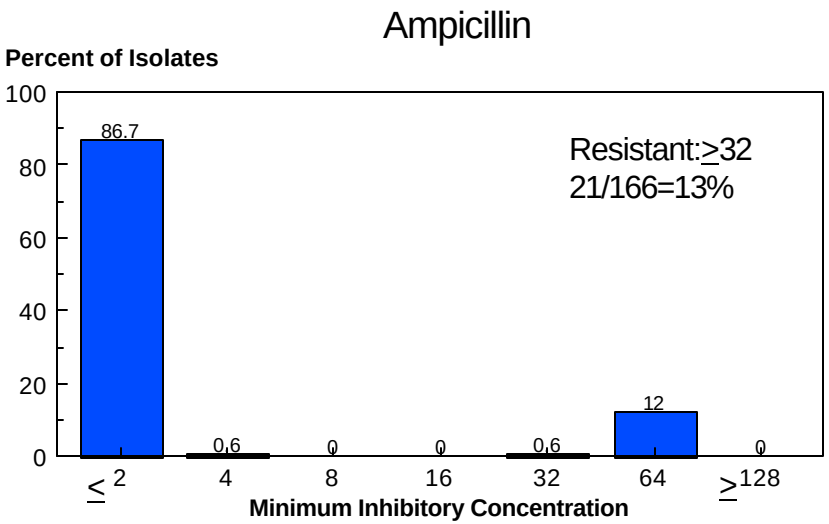
*Amox-Clav=Amoxicillin-Clavulanic Acid **Trimeth-Sulfa=Trimethoprim-Sulfamethoxazole

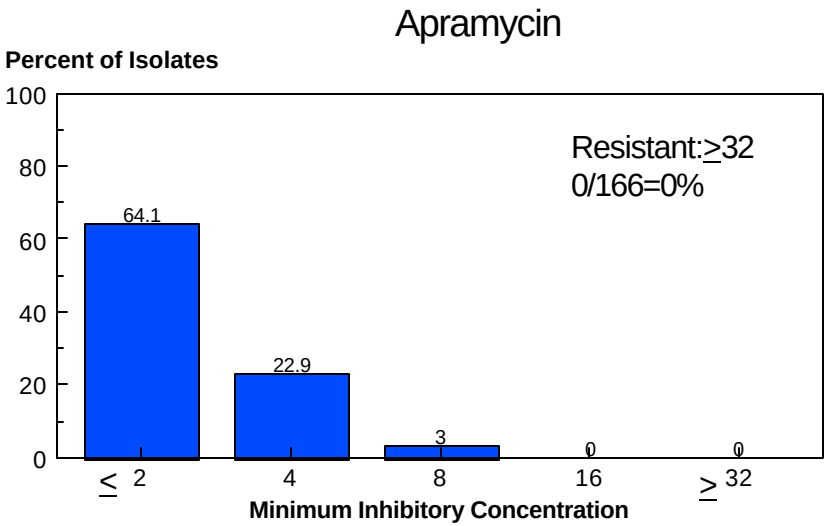
# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 9a. MICs among *Salmonella* Typhi isolates, by antimicrobial agent, 1999



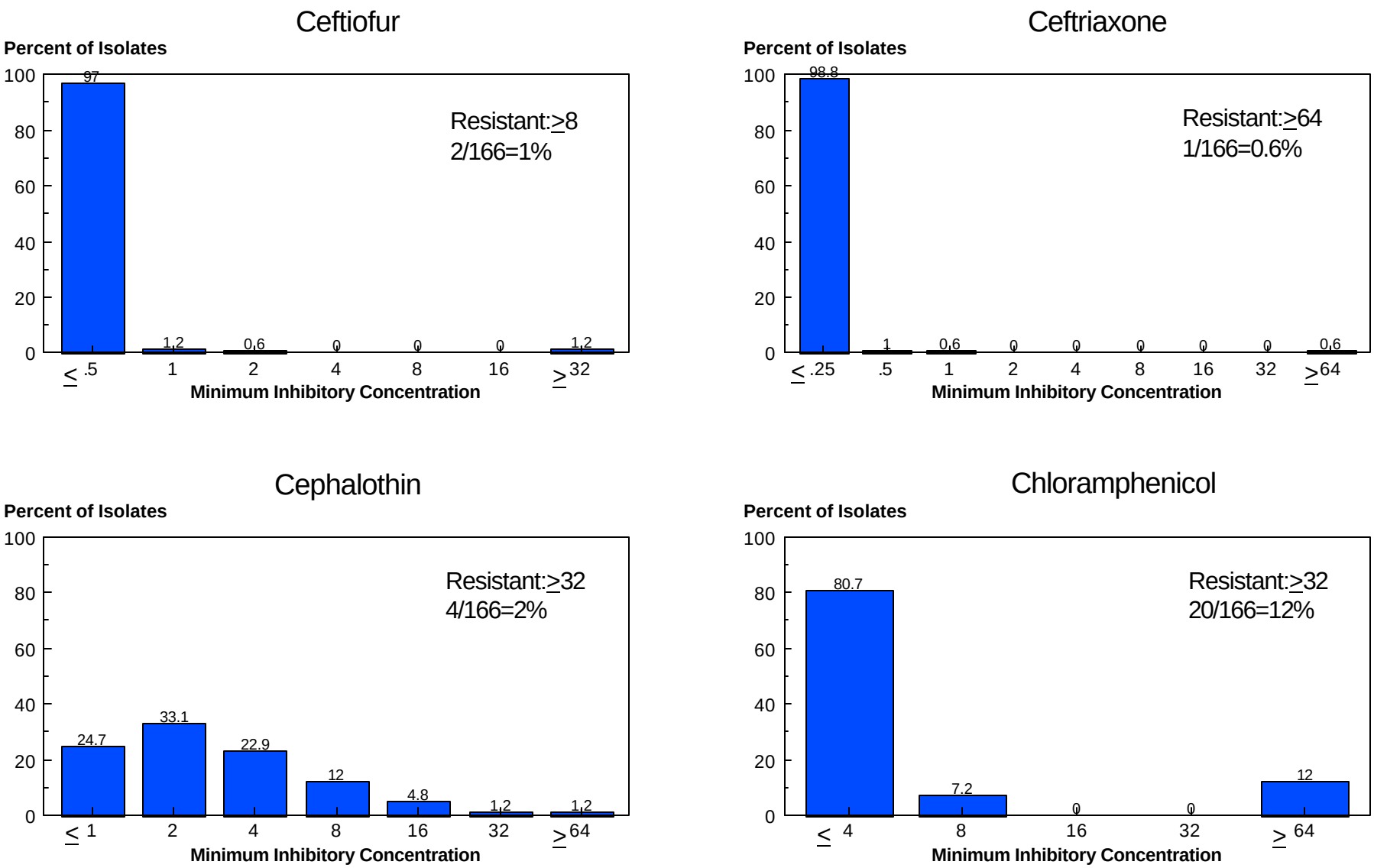



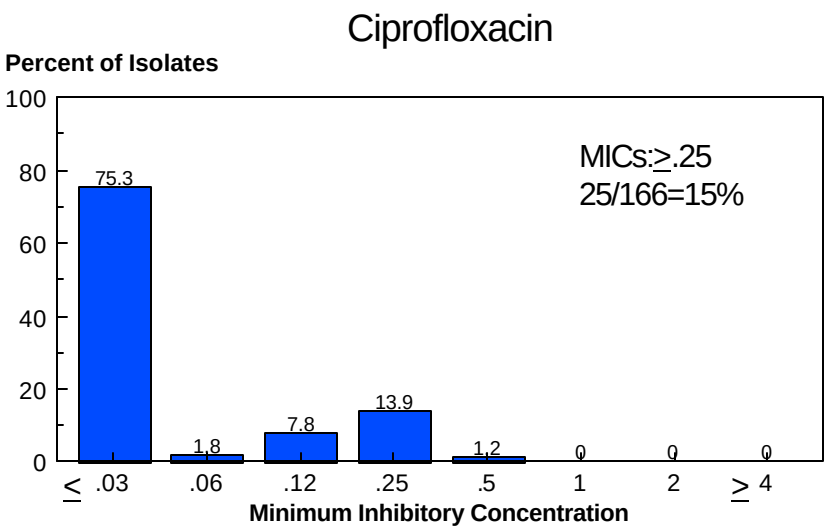
# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

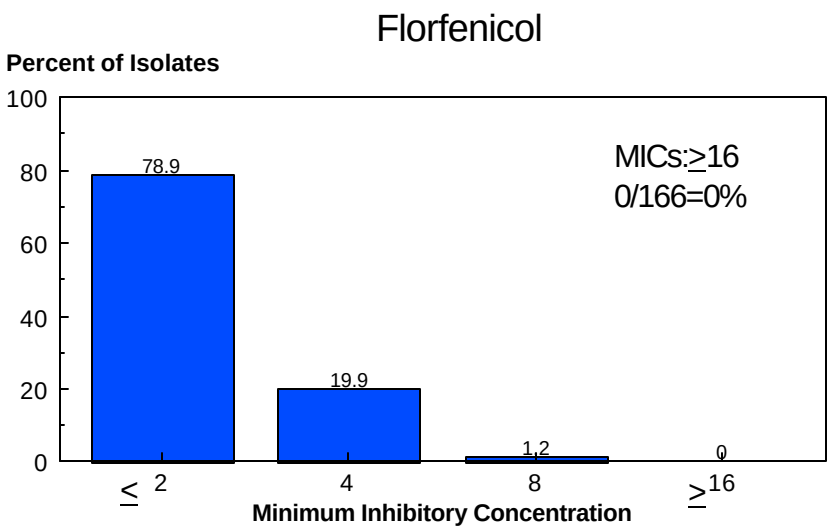
## Figure 9b. MICs among *Salmonella* Typhi isolates, by antimicrobial agent, 1999

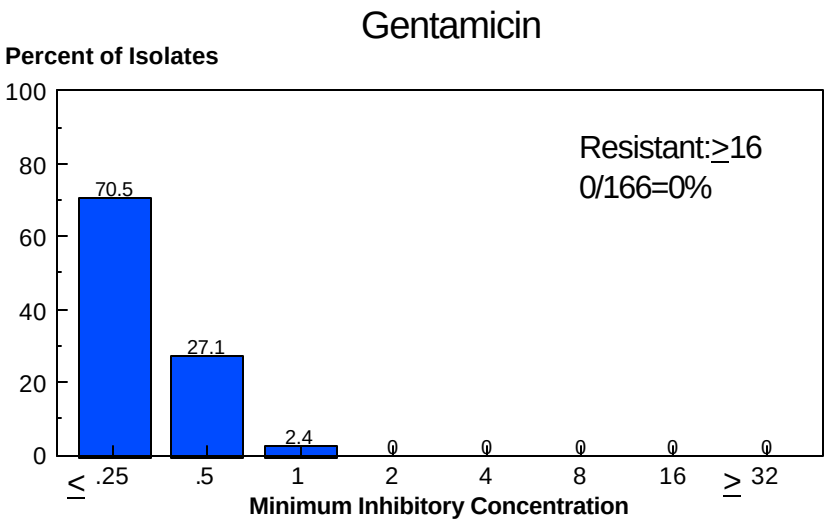


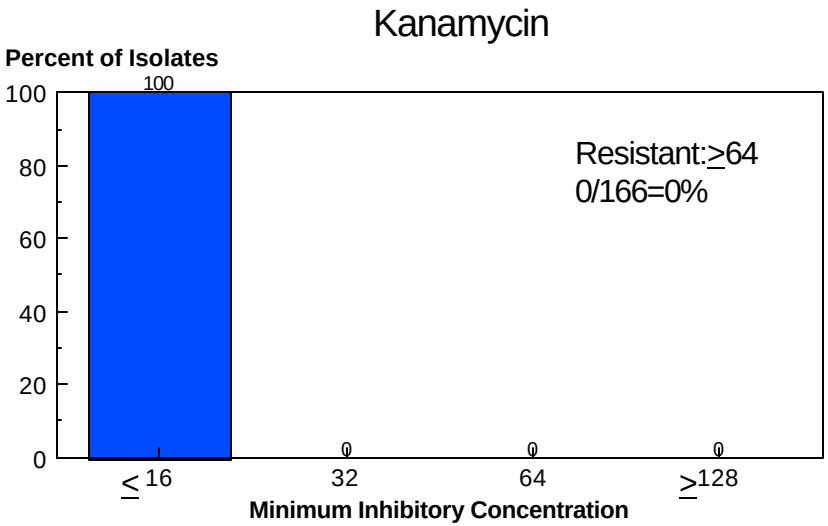
# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 9c. MICs among *Salmonella* Typhi isolates, by antimicrobial agent, 1999



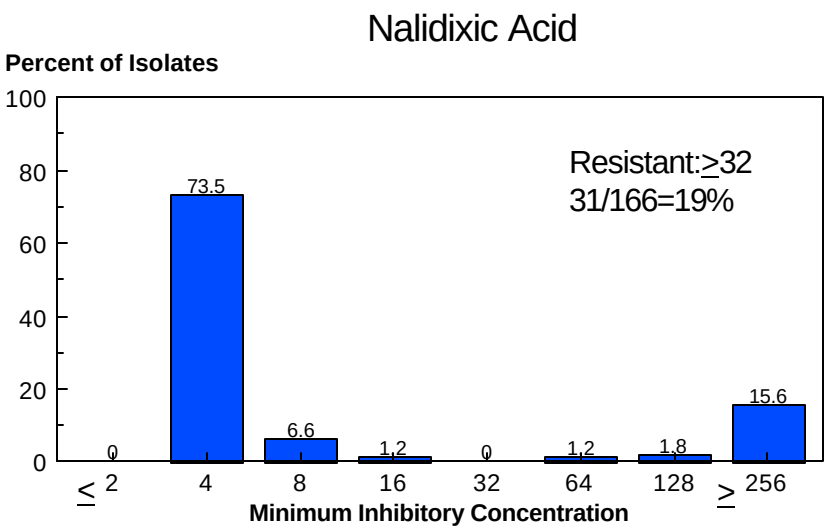



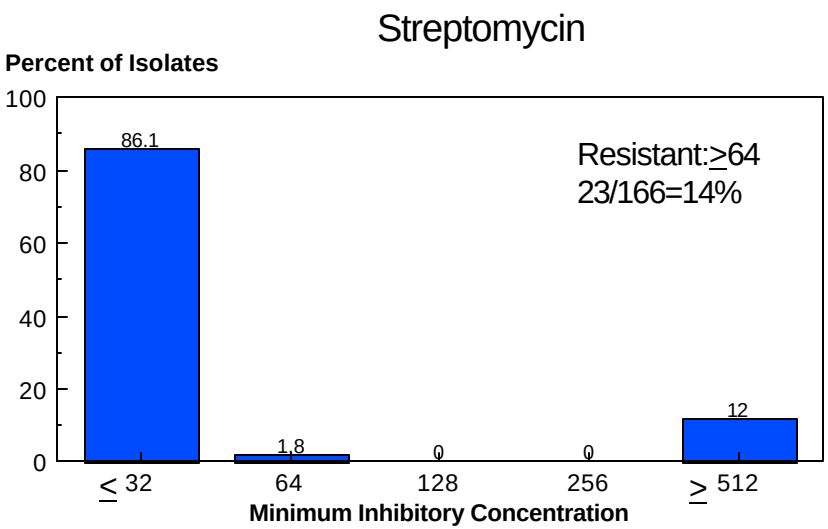



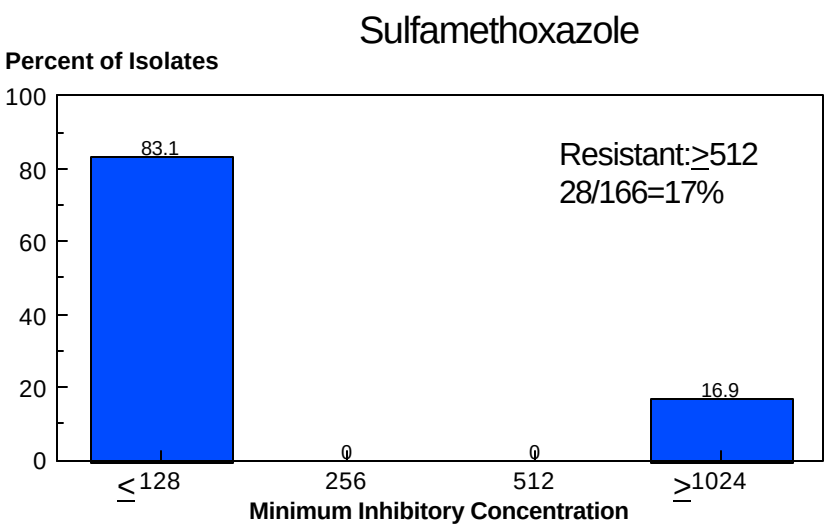



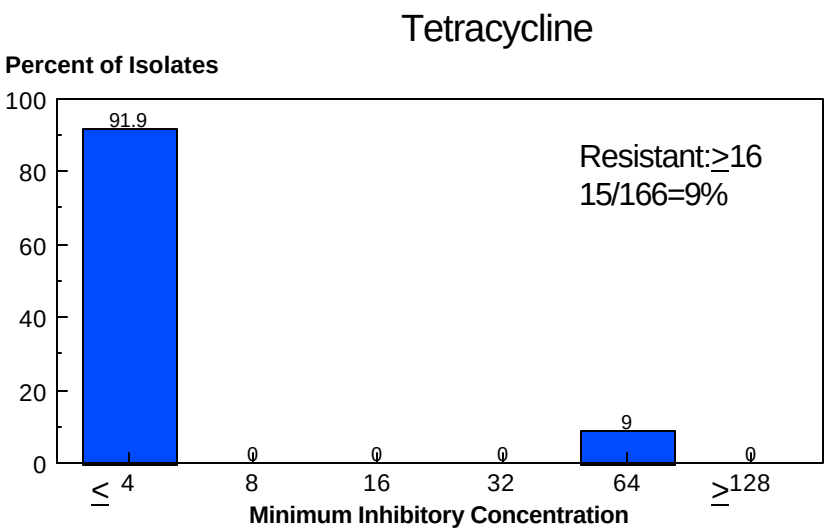
# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 9d. MICs among *Salmonella* Typhi isolates, by antimicrobial agent, 1999



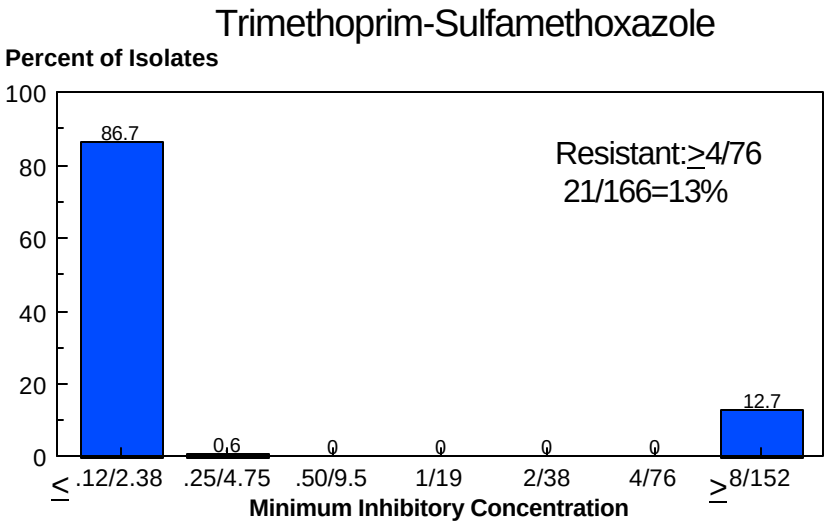



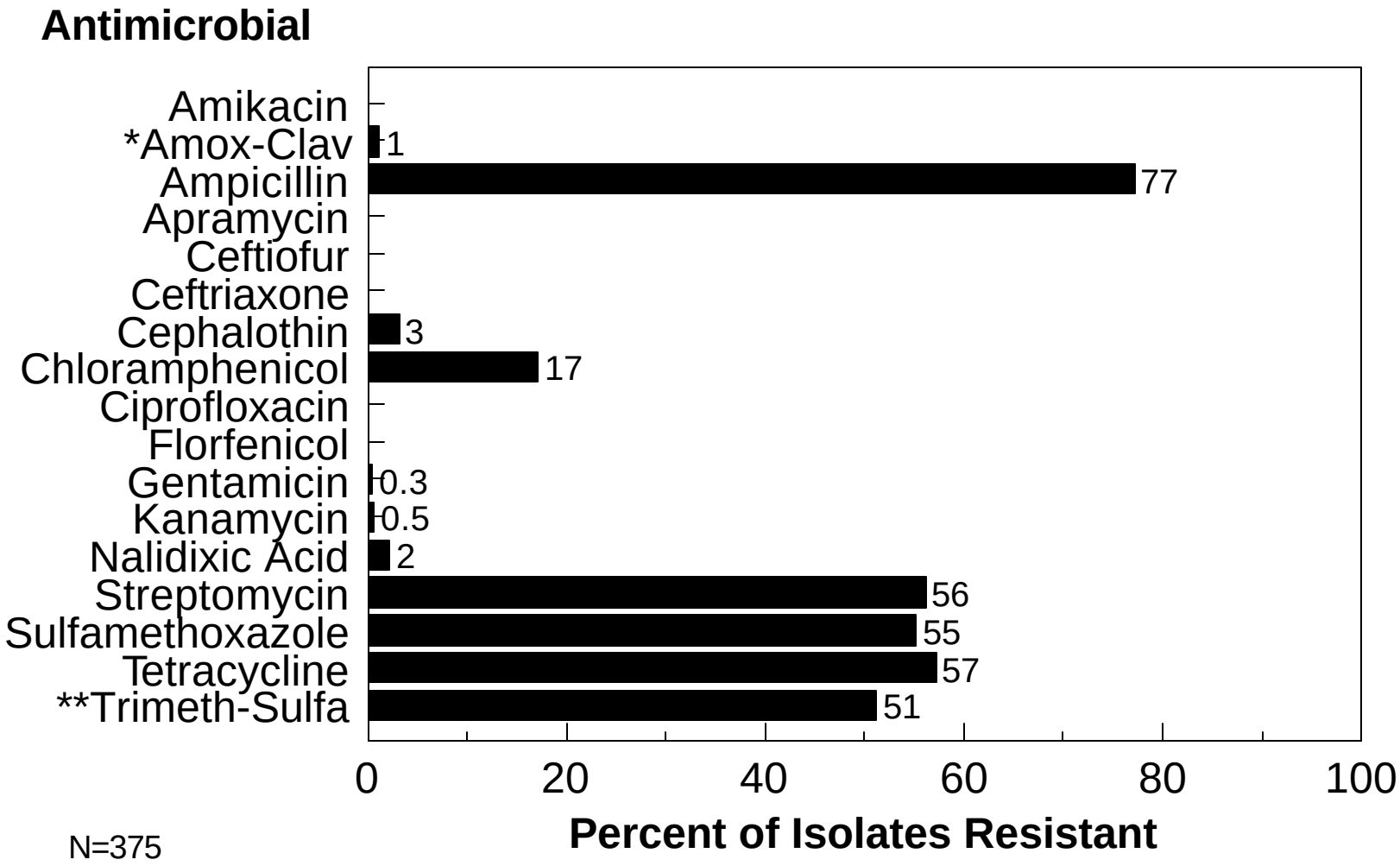
# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 9e. MICs among *Salmonella* Typhi isolates, by antimicrobial agent, 1999



## National Antimicrobial Resistance Monitoring System For Enteric Bacteria

### Figure 10. Resistance among *Shigella* isolates, 1999

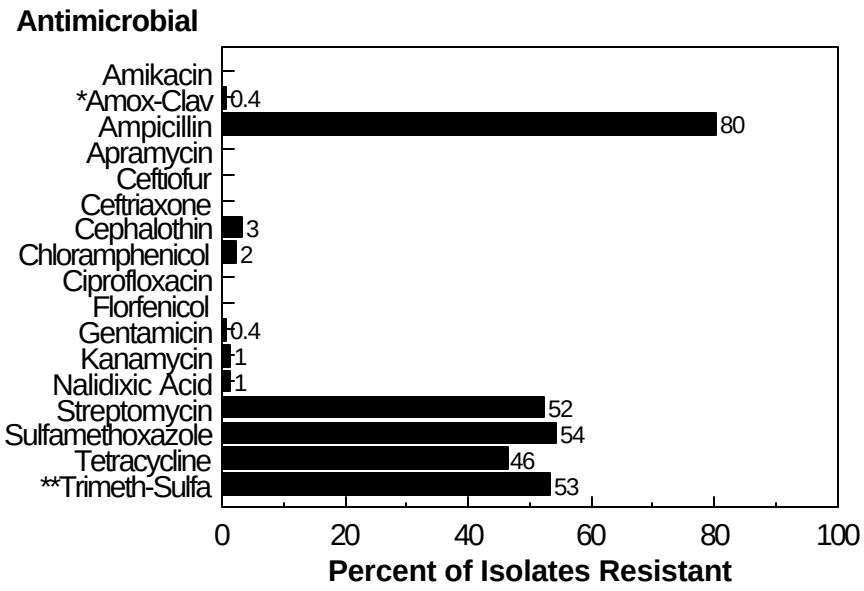



*Amox-Clav=Amoxicillin-Clavulanic Acid **Trimeth-Sulfa=Trimethoprim-Sulfamethoxazole

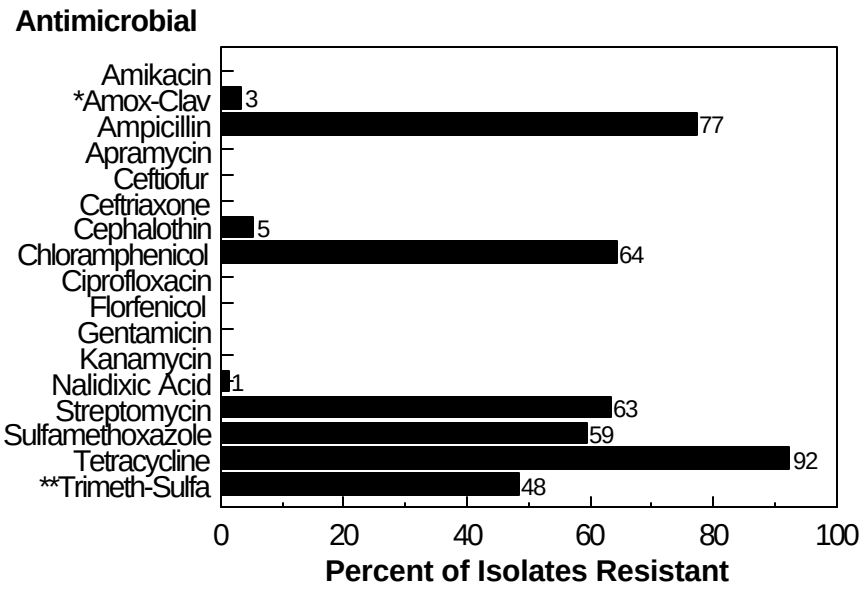
## National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 11. Resistance among *Shigella sonnei* and *Shigella flexneri* isolates, 1999

*Shigella sonnei* (N=275)




*Shigella flexneri* (N=87)

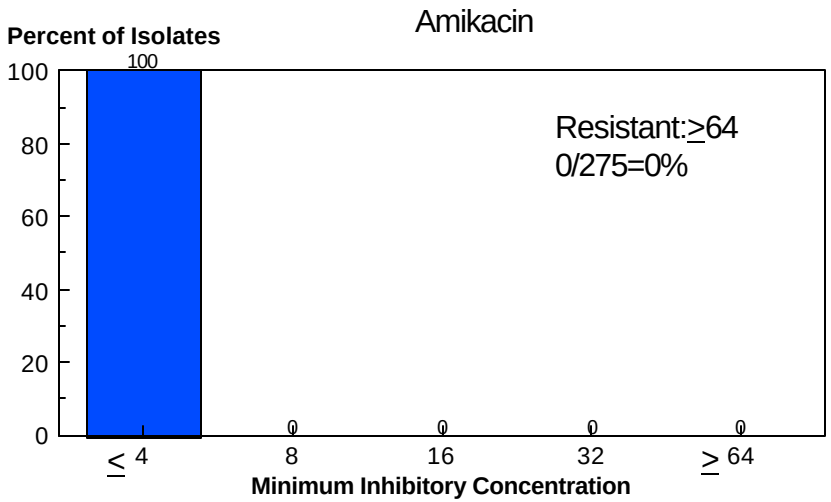


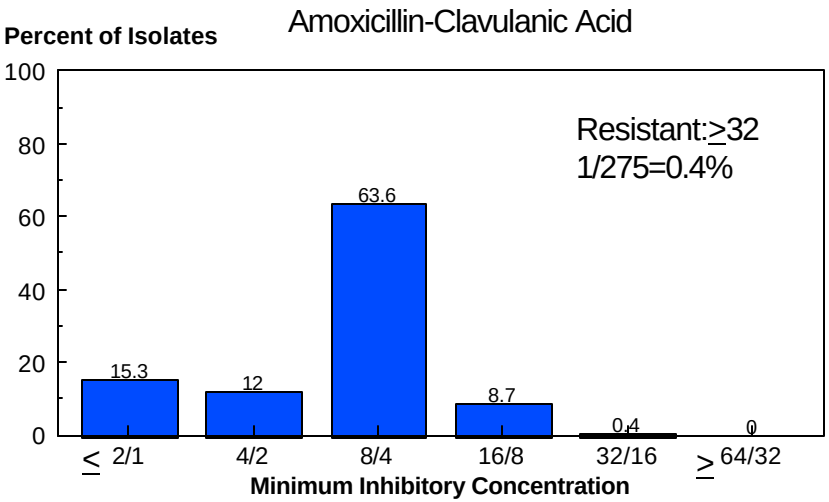

*Amox-Clav=Amoxicillin-Clavulanic Acid

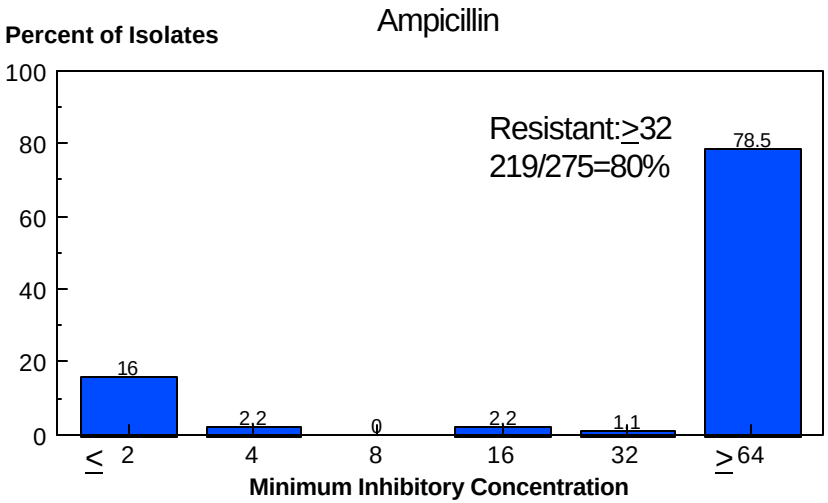
**Trimeth-Sulfa=Trimethoprim-Sulfamethoxazole

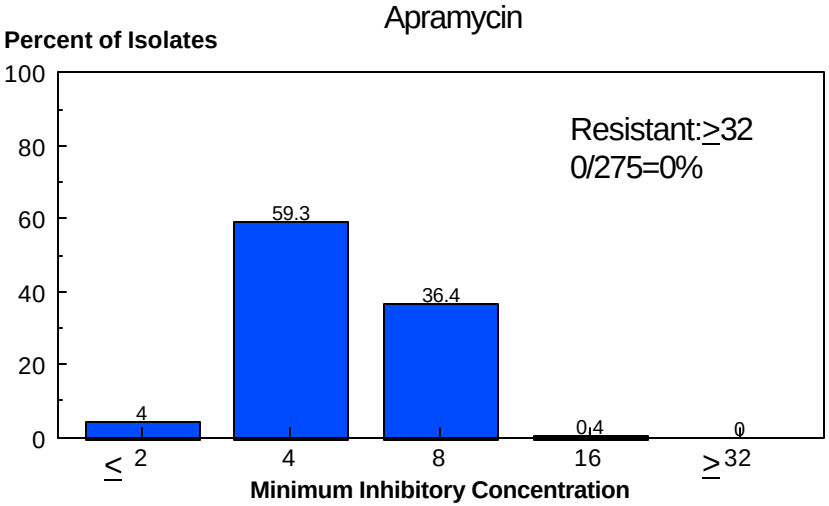
# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 12a. MICs among *Shigella sonnei* isolates, by antimicrobial agent, 1999



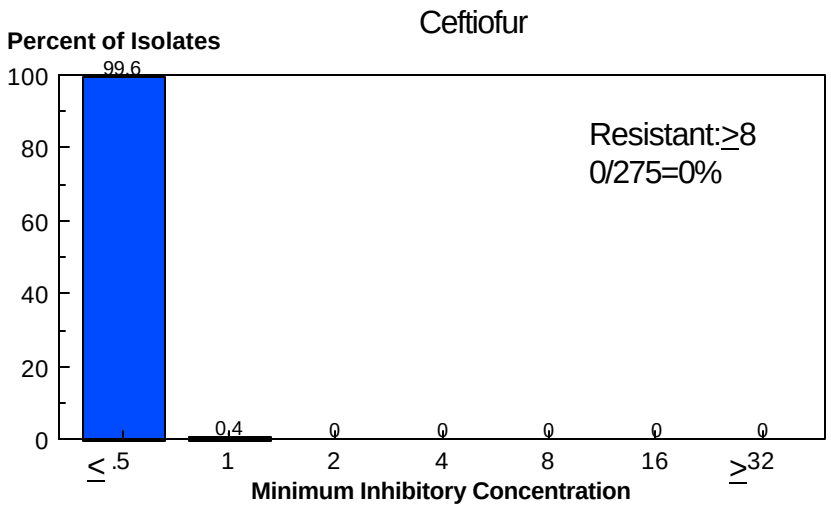



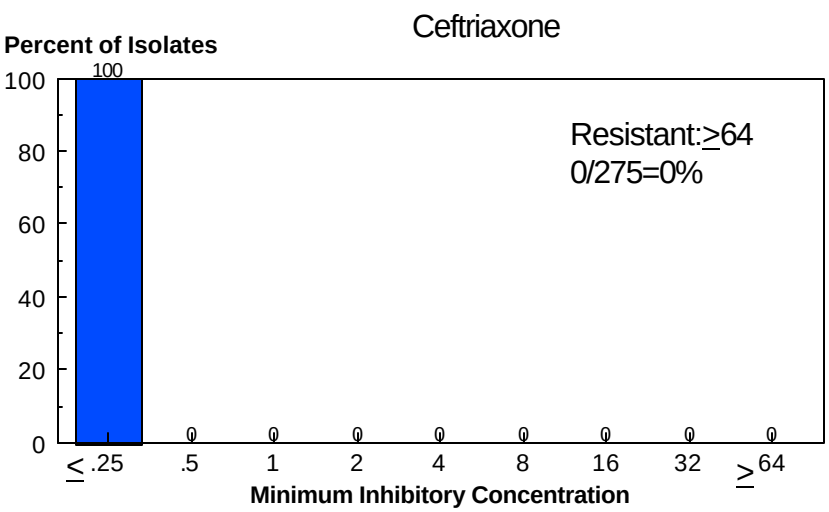



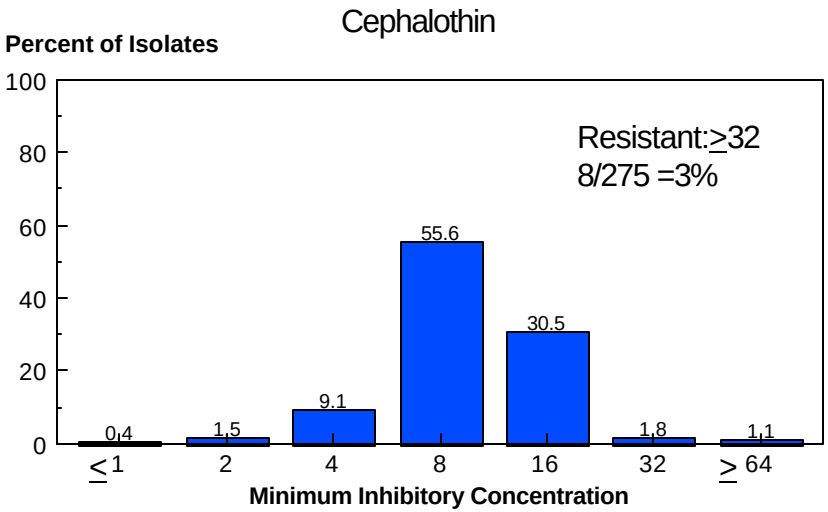



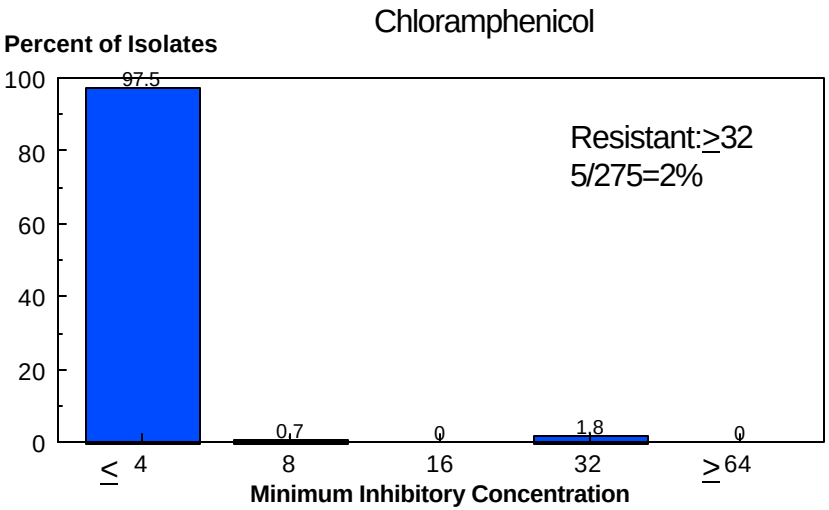
# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 12b. MICs among *Shigella sonnei* isolates, by antimicrobial agent, 1999



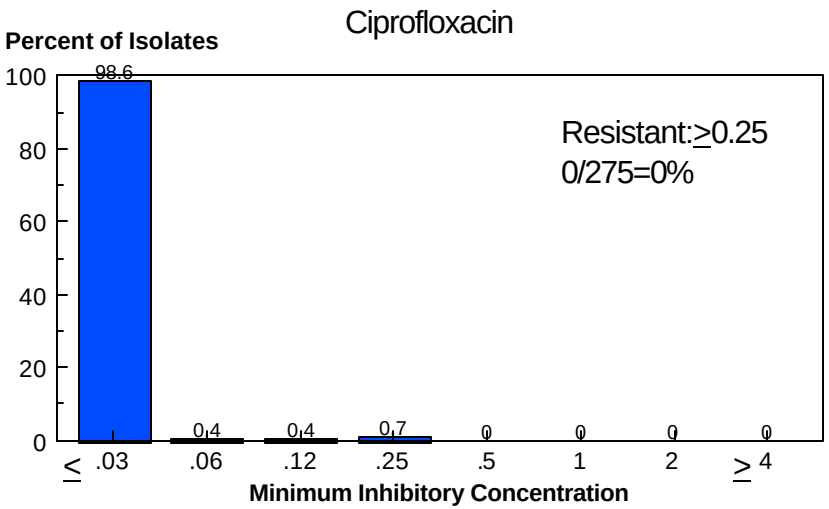



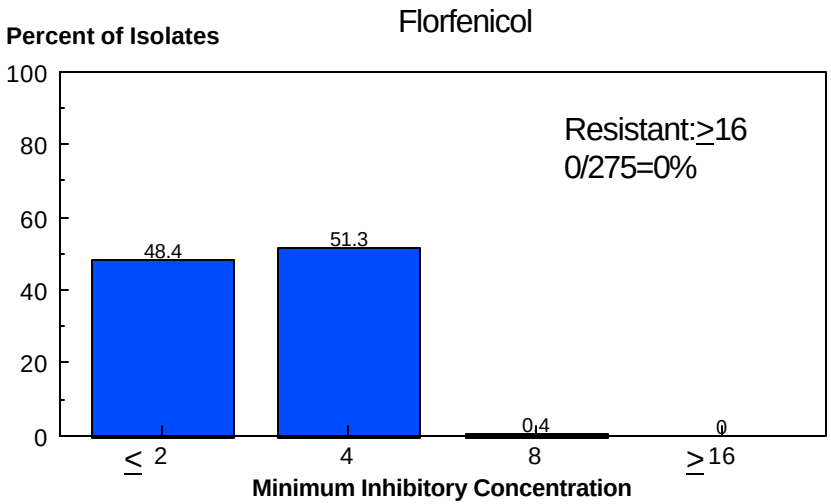



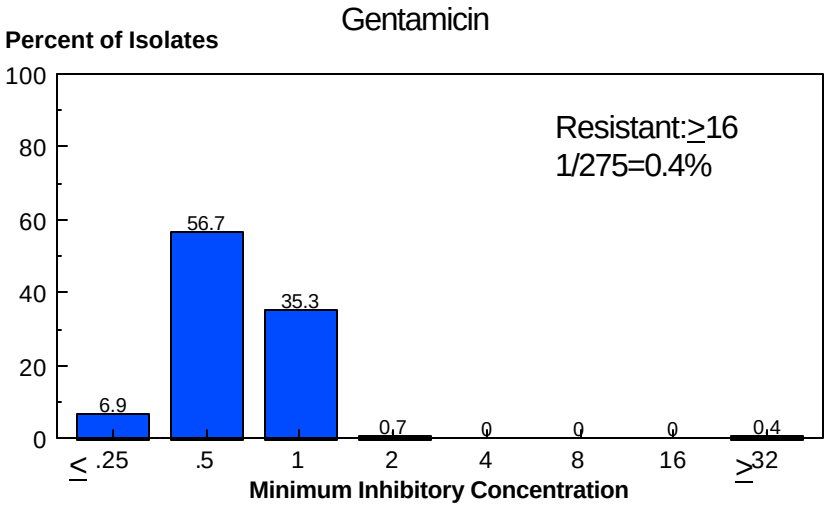



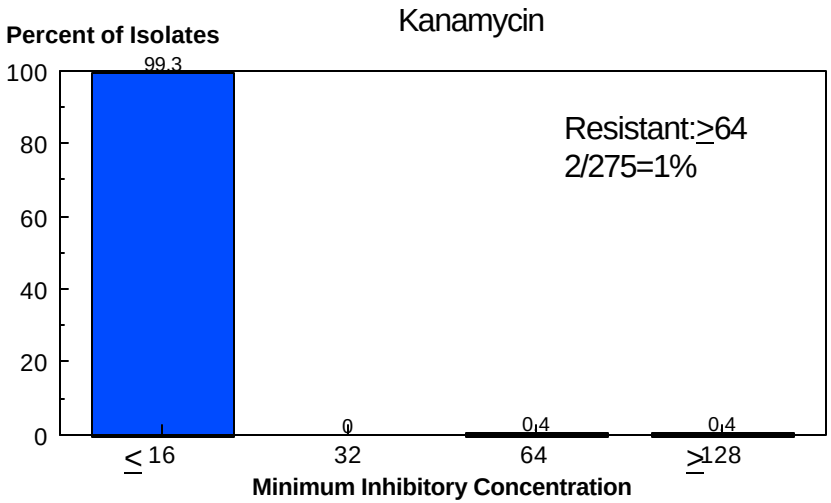
# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 12c. MICs among *Shigella sonnei* isolates, by antimicrobial agent, 1999



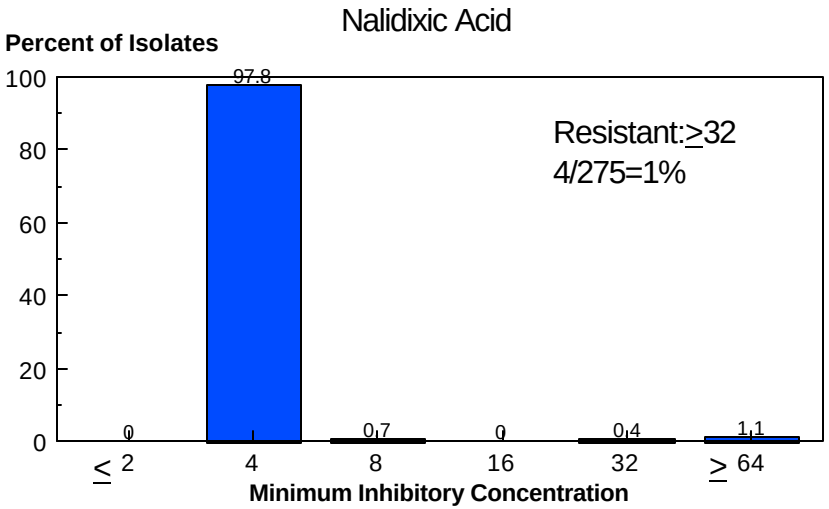



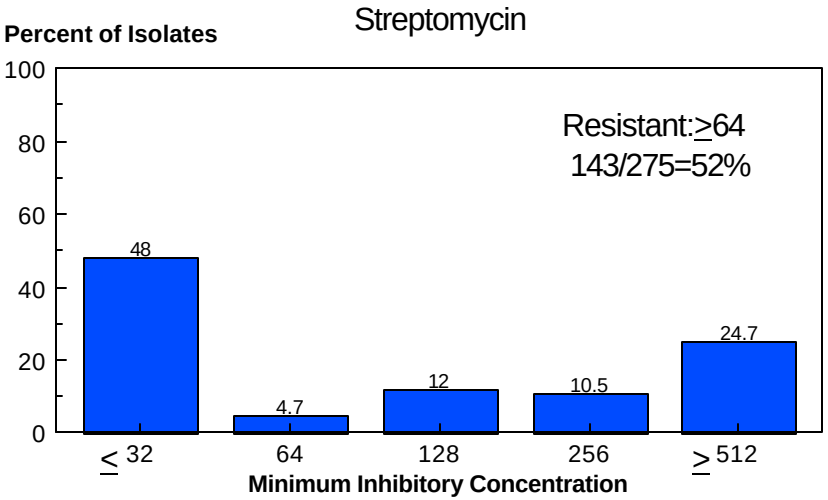



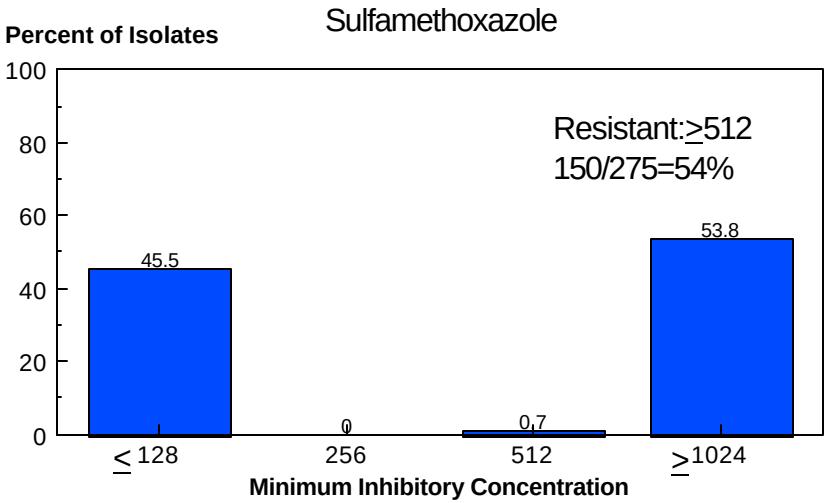



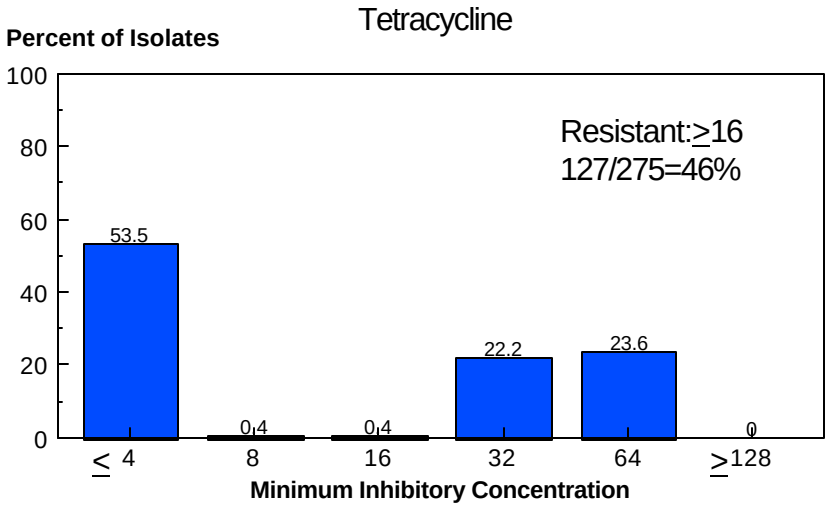
# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 12d. MICs among *Shigella sonnei* isolates, by antimicrobial agent, 1999



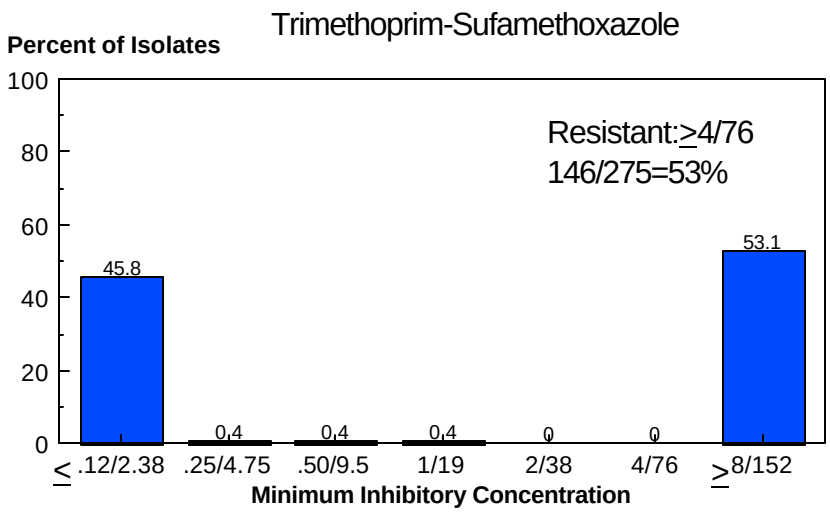



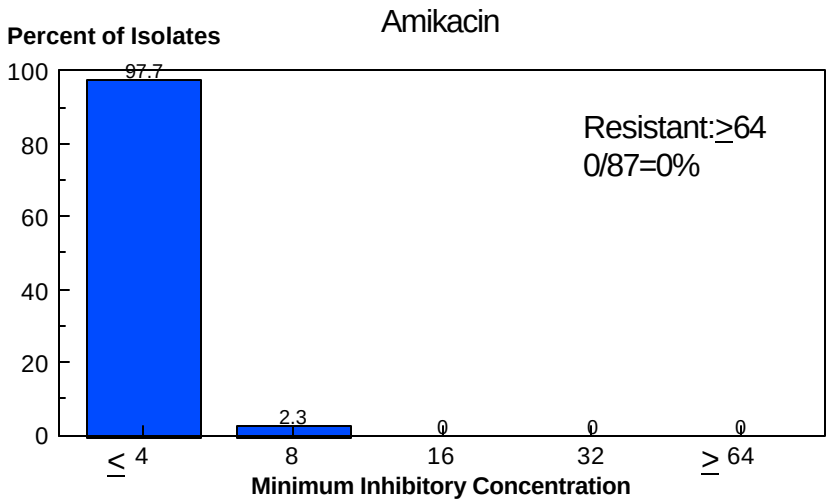
# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

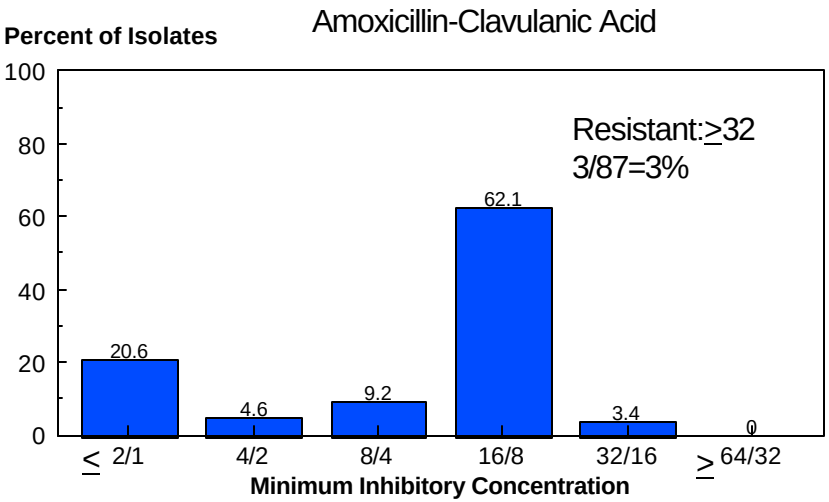
## Figure 12e. MICs among *Shigella sonnei* isolates, by antimicrobial agent, 1999

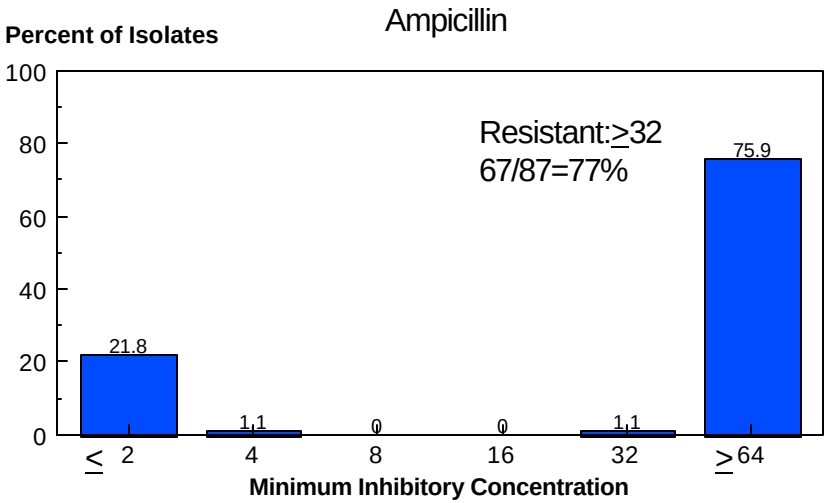


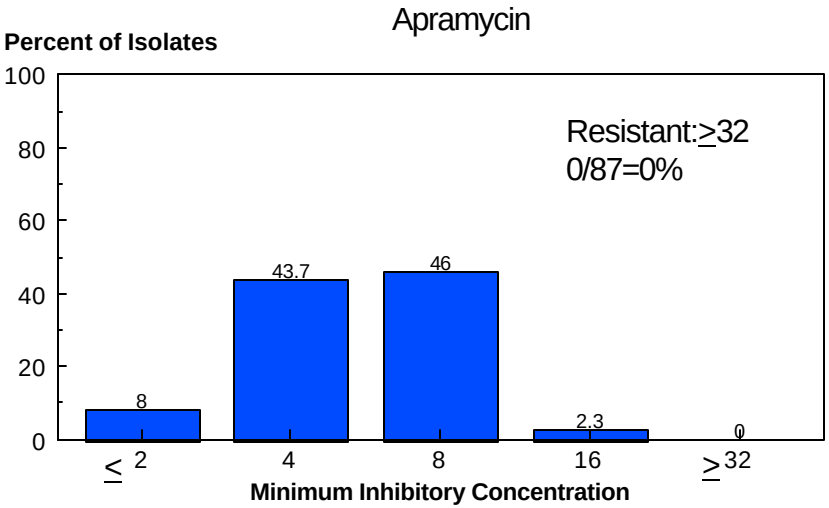
# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 13a. MICs among *Shigella flexneri* isolates, by antimicrobial agent, 1999



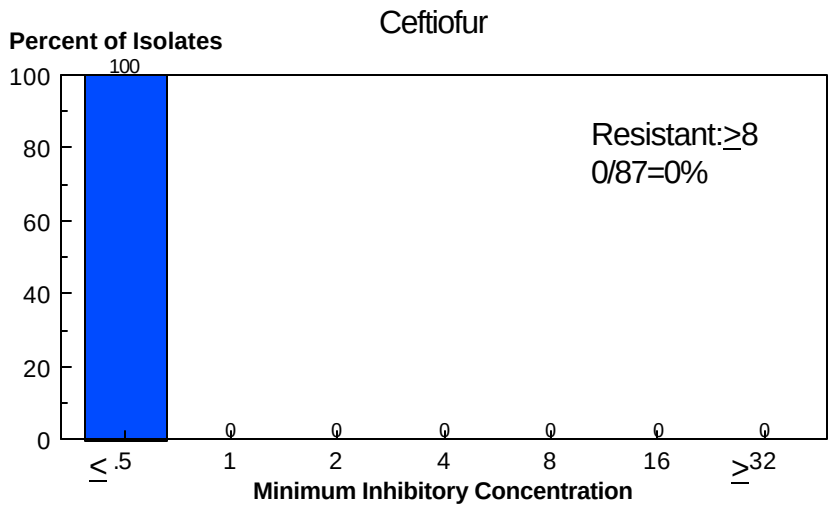



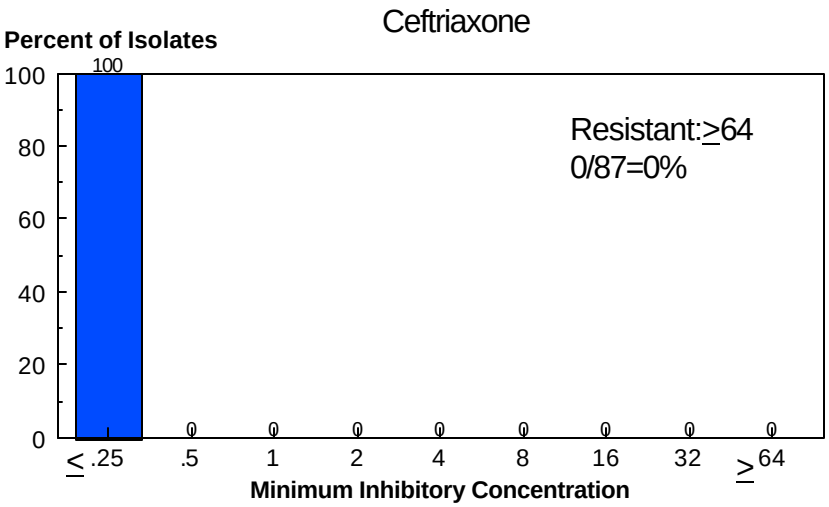



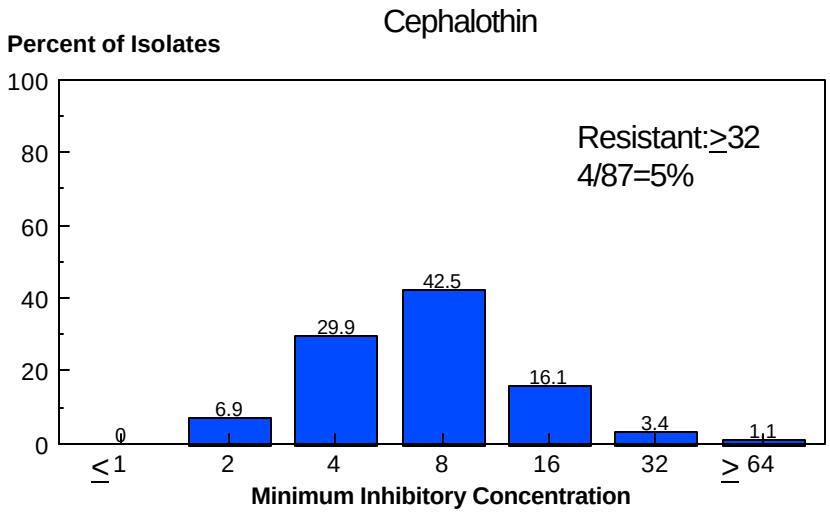



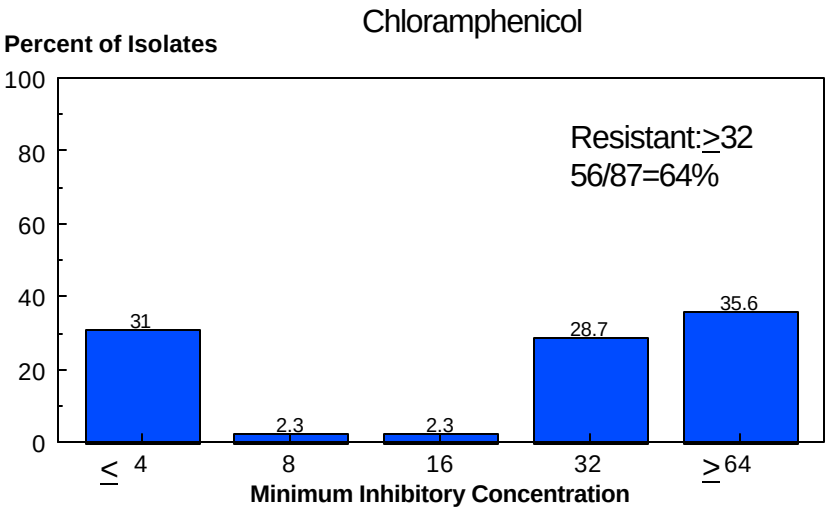
# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 13b. MICs among *Shigella flexneri* isolates, by antimicrobial agent, 1999



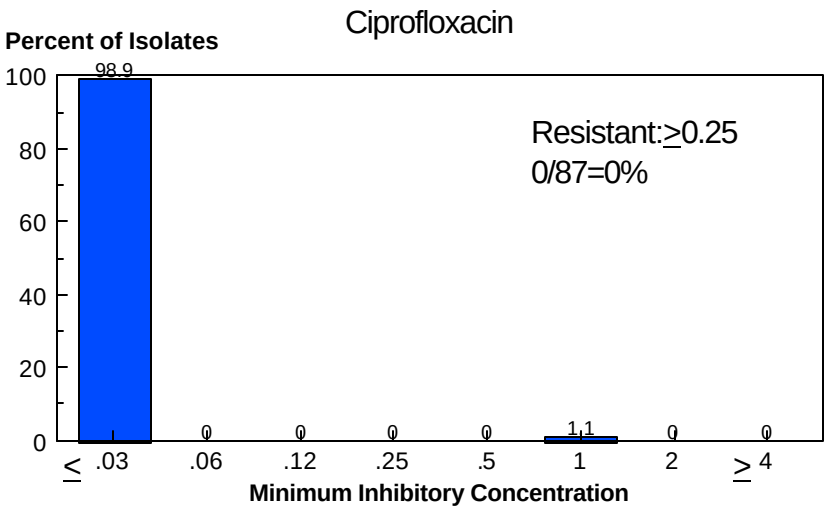



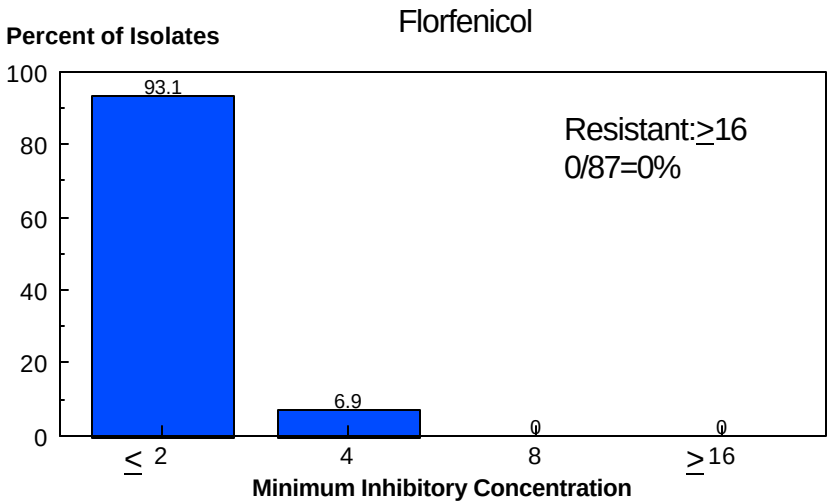



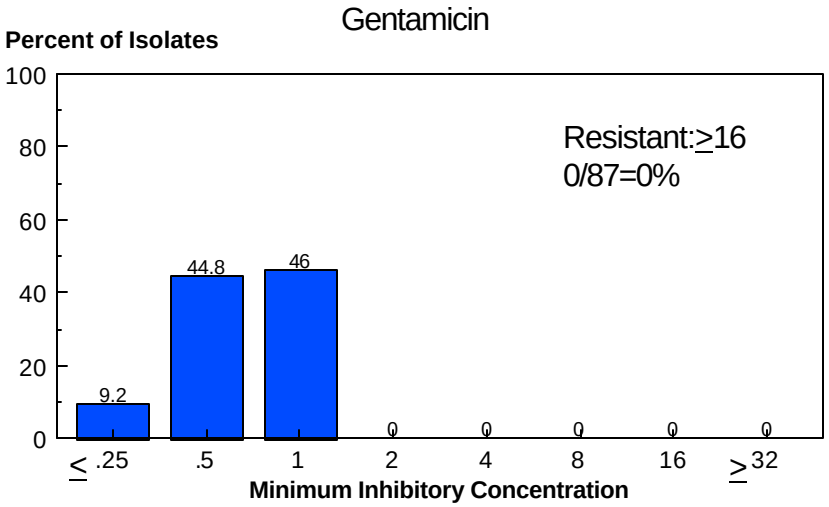



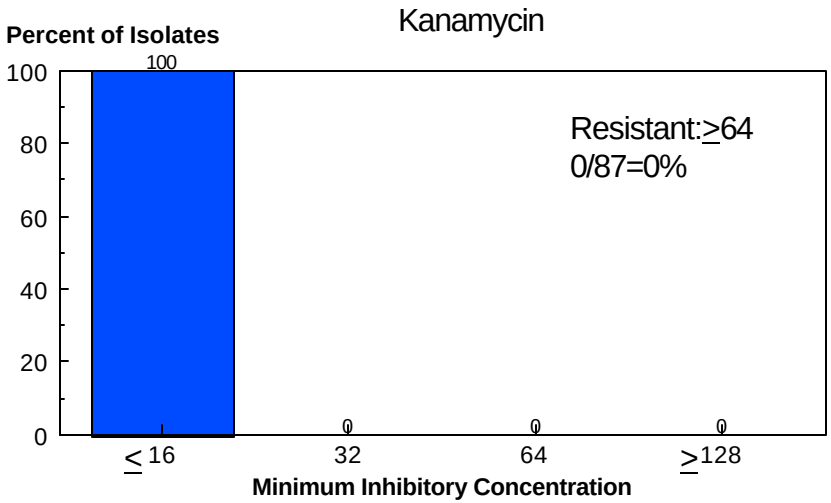
# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 13c. MICs among *Shigella flexneri* isolates, by antimicrobial agent, 1999



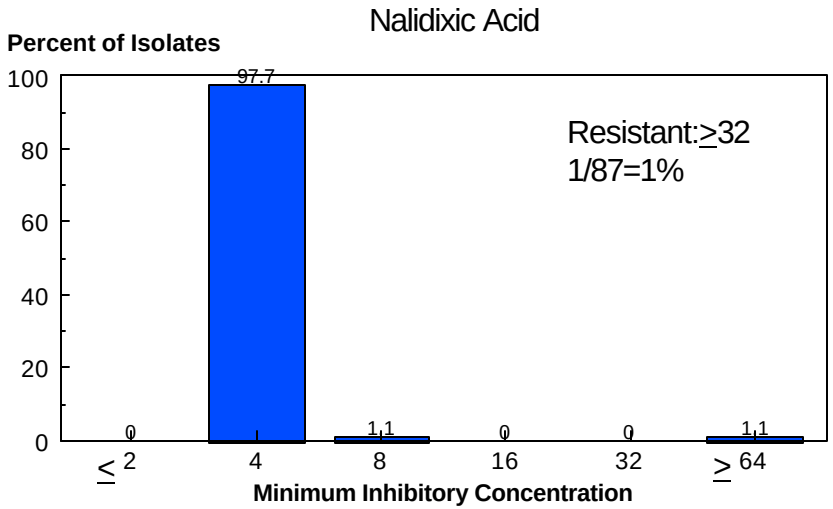



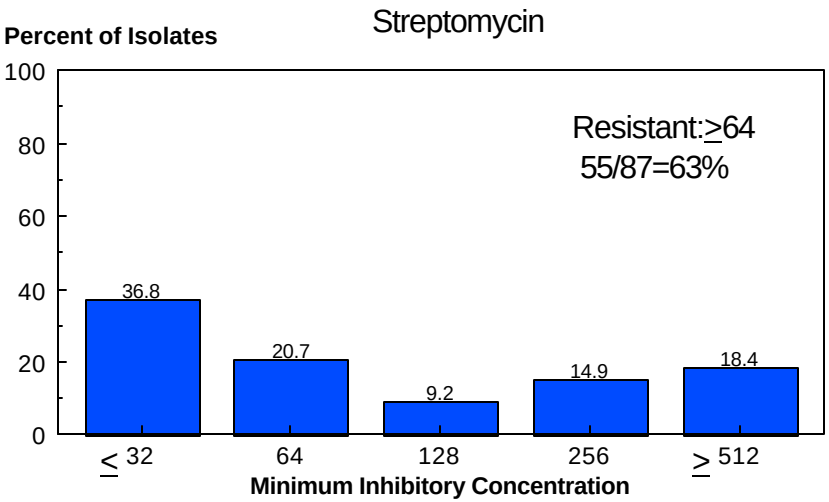



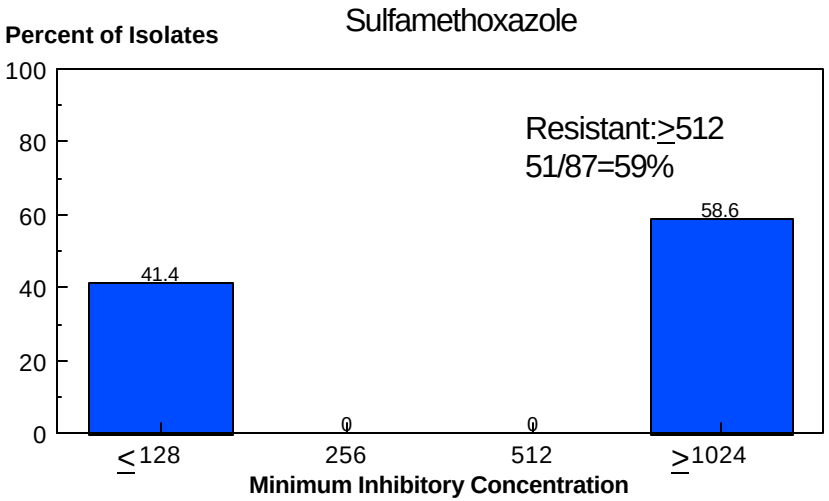



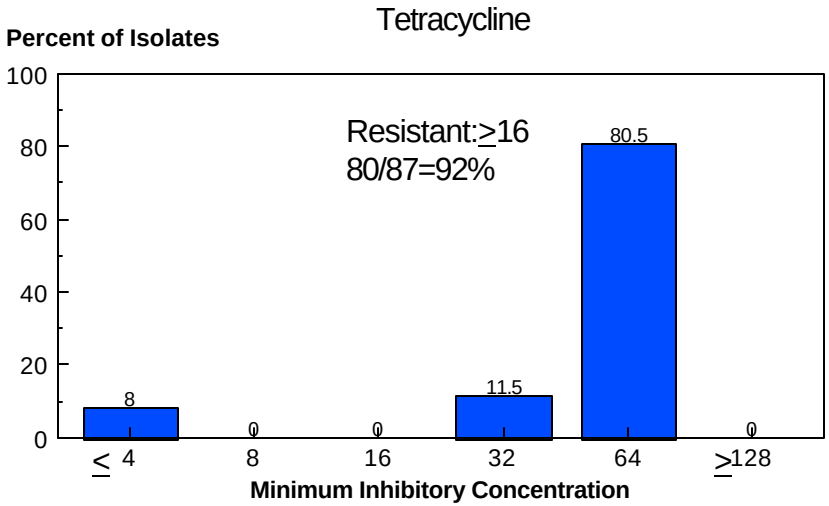
# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 13d. MICs among *Shigella flexneri* isolates, by antimicrobial agent, 1999



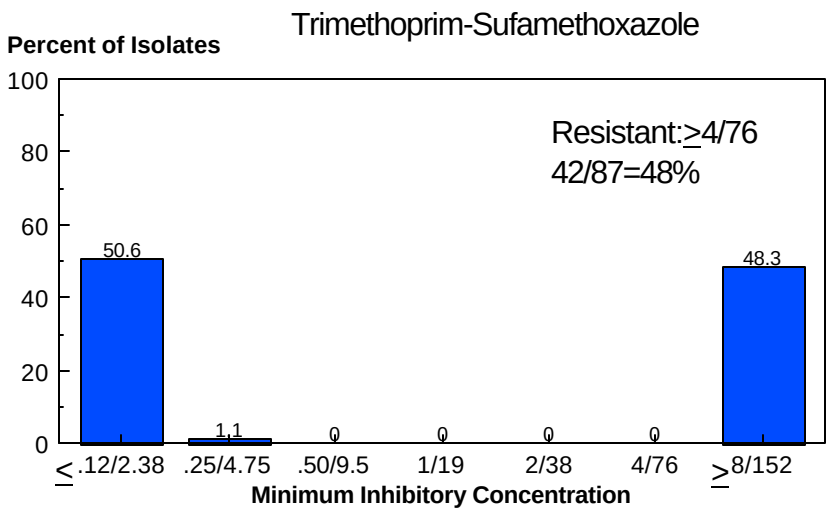



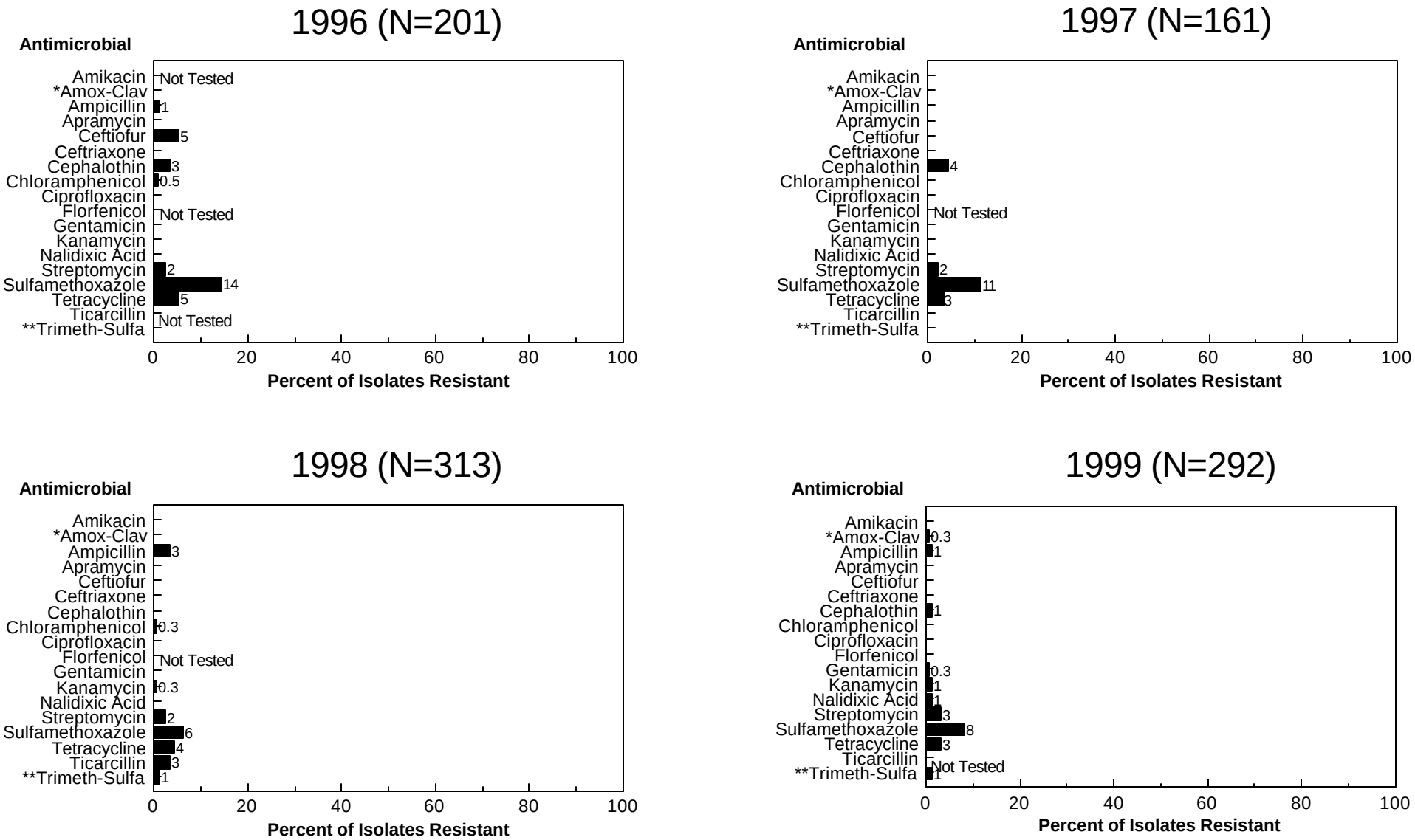
# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 13e. MICs among *Shigella flexneri* isolates, by antimicrobial agent, 1999



# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 14. Resistance among *E. coli* O157 isolates, 1996-1999



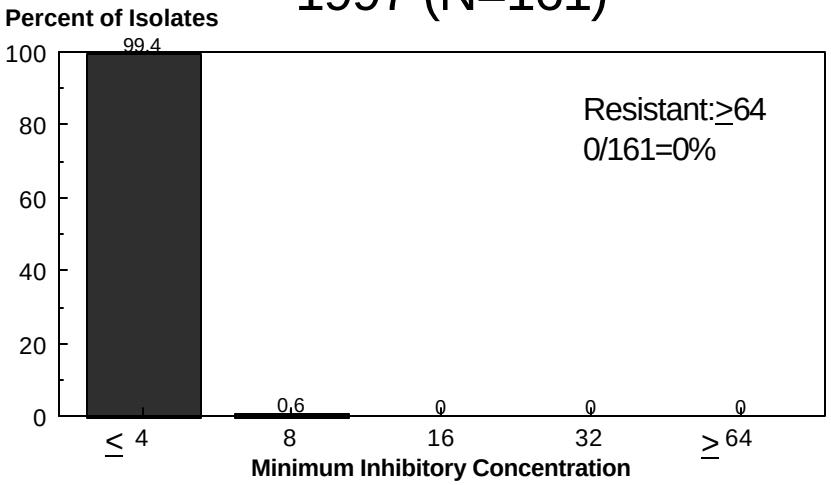

*Amox-Clav=Amoxicillin-Clavulanic Acid **Trimeth-Sulfa=Trimethoprim-Sulfamethoxazole

## National Antimicrobial Resistance Monitoring System For Enteric Bacteria

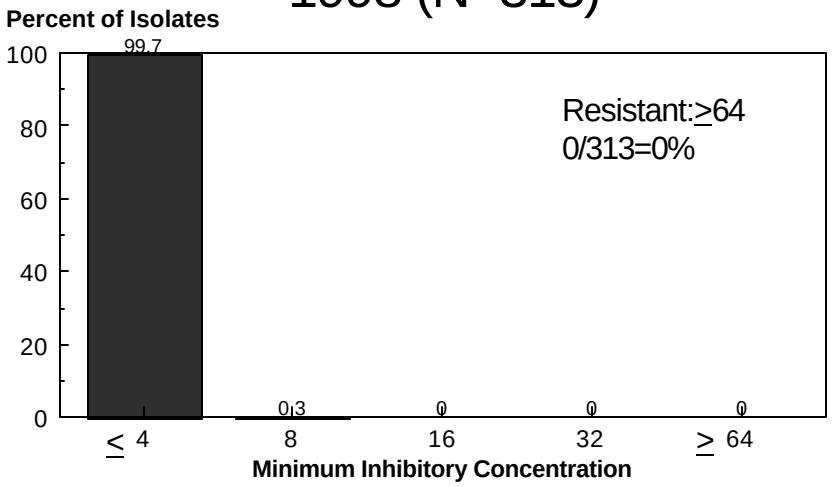
## Figure 15a. MICs for Amikacin among *E. coli* O157 isolates, 1996 - 1999

Not tested in 1996

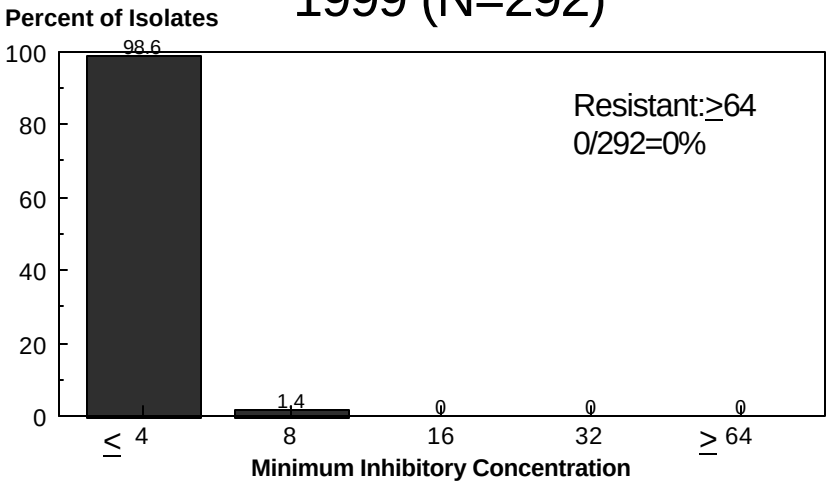
1997 (N=161)




1998 (N=313)

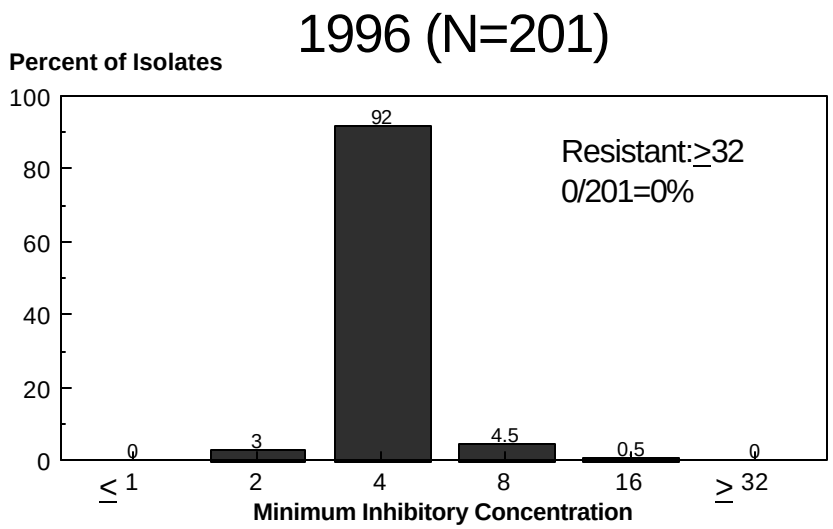


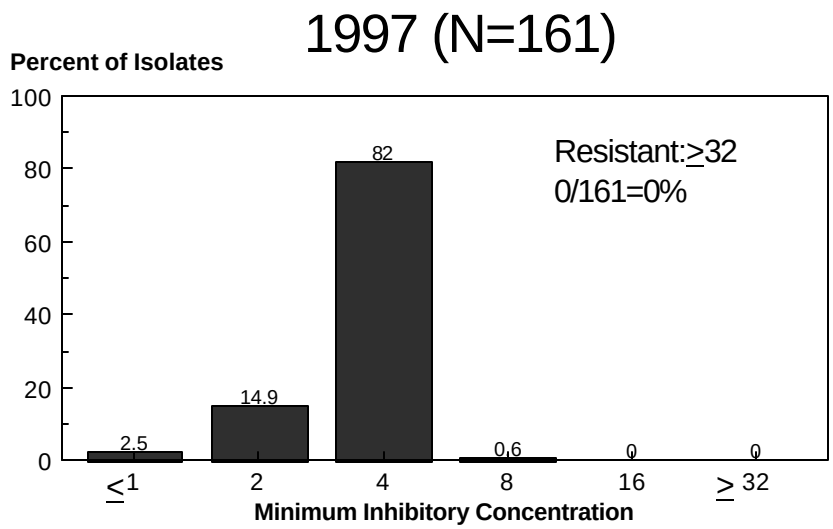

1999 (N=292)

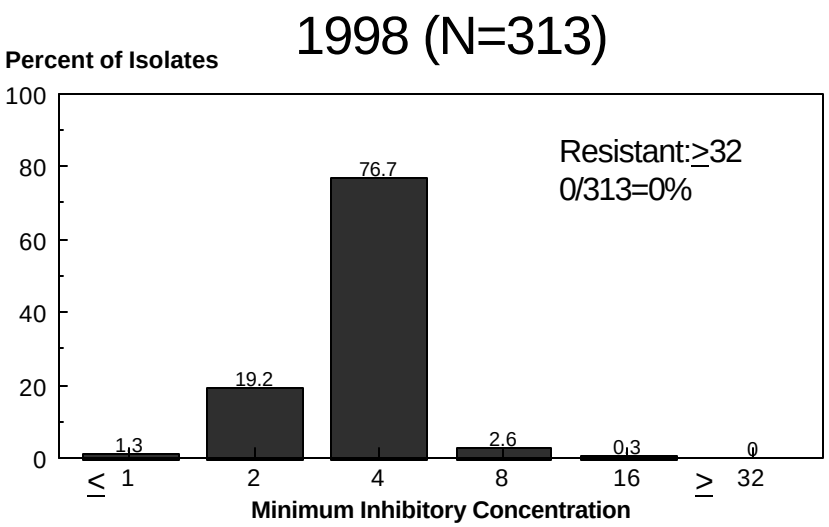


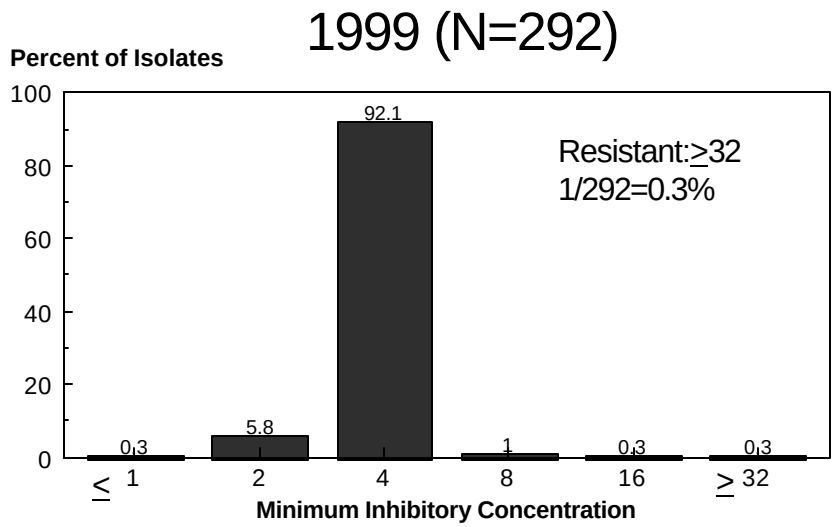
# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 15b. MICs for Amoxicillin-Clavulanic Acid among *E. coli* O157 isolates, 1996 - 1999



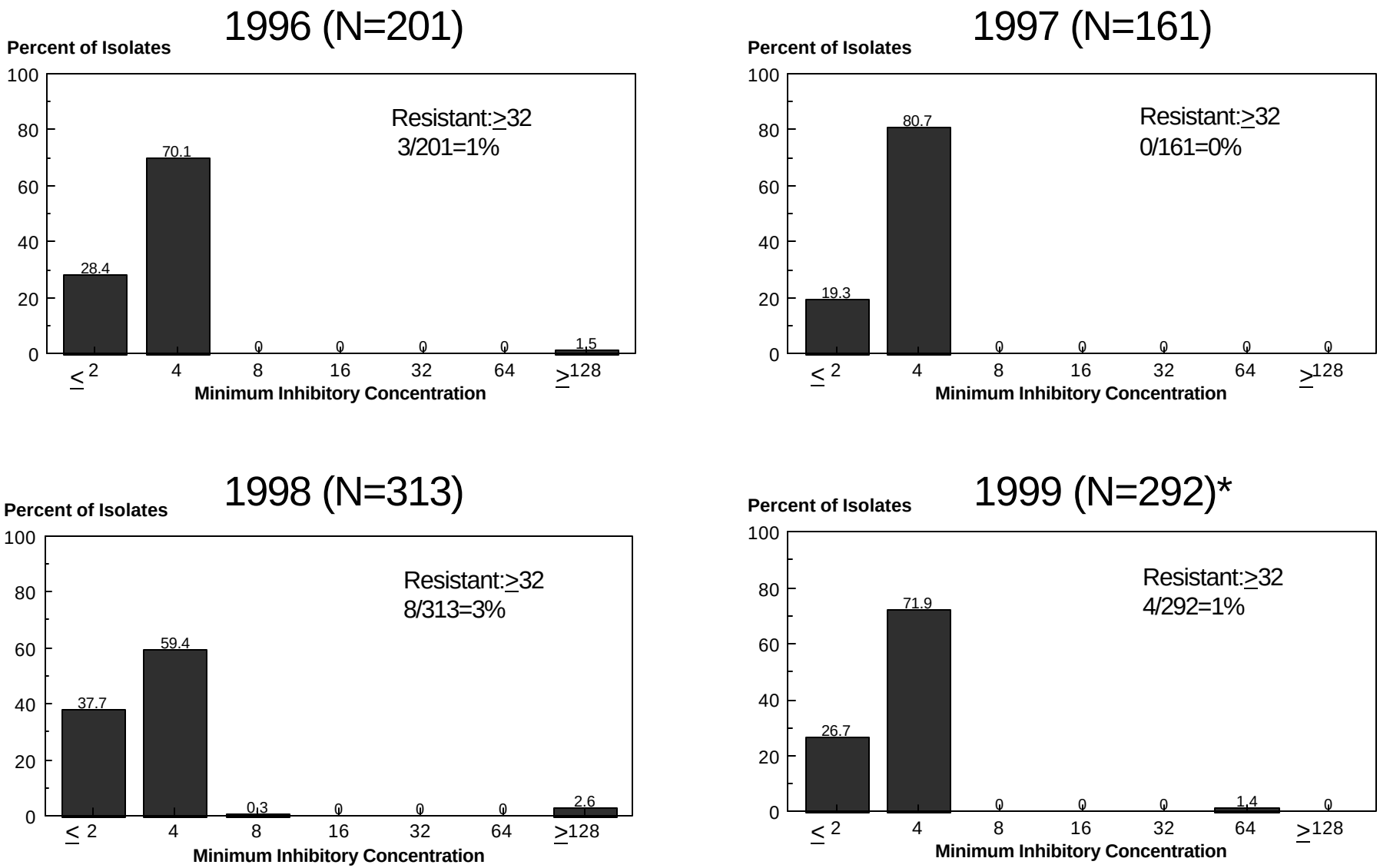



# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

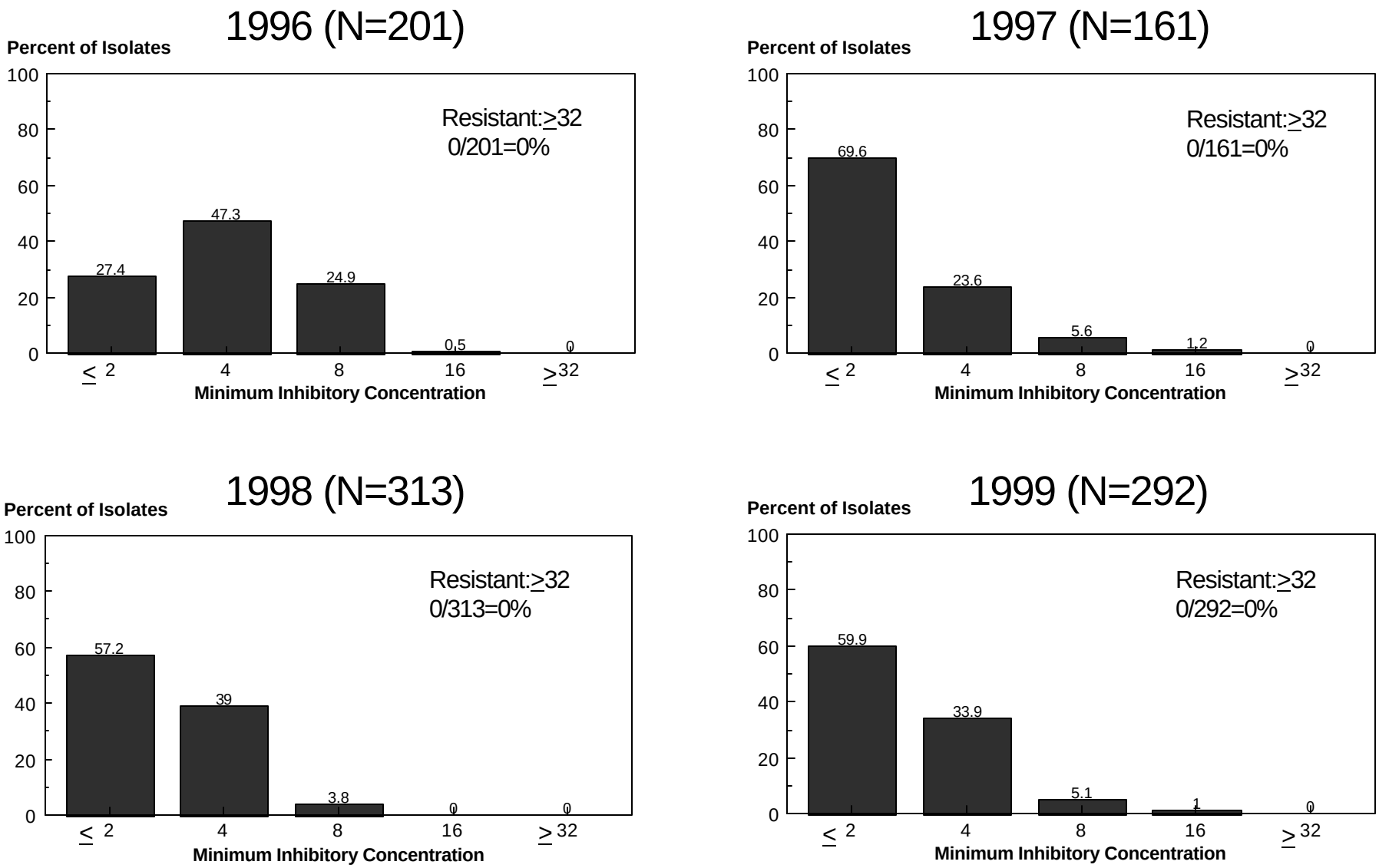
## Figure 15c. MICs for Ampicillin among *E. coli* O157 isolates, 1996 - 1999




* Maximum MIC dilution for 1999 was 32 uq/ml. All resistant isolates had a MIC >32 uq/ml.

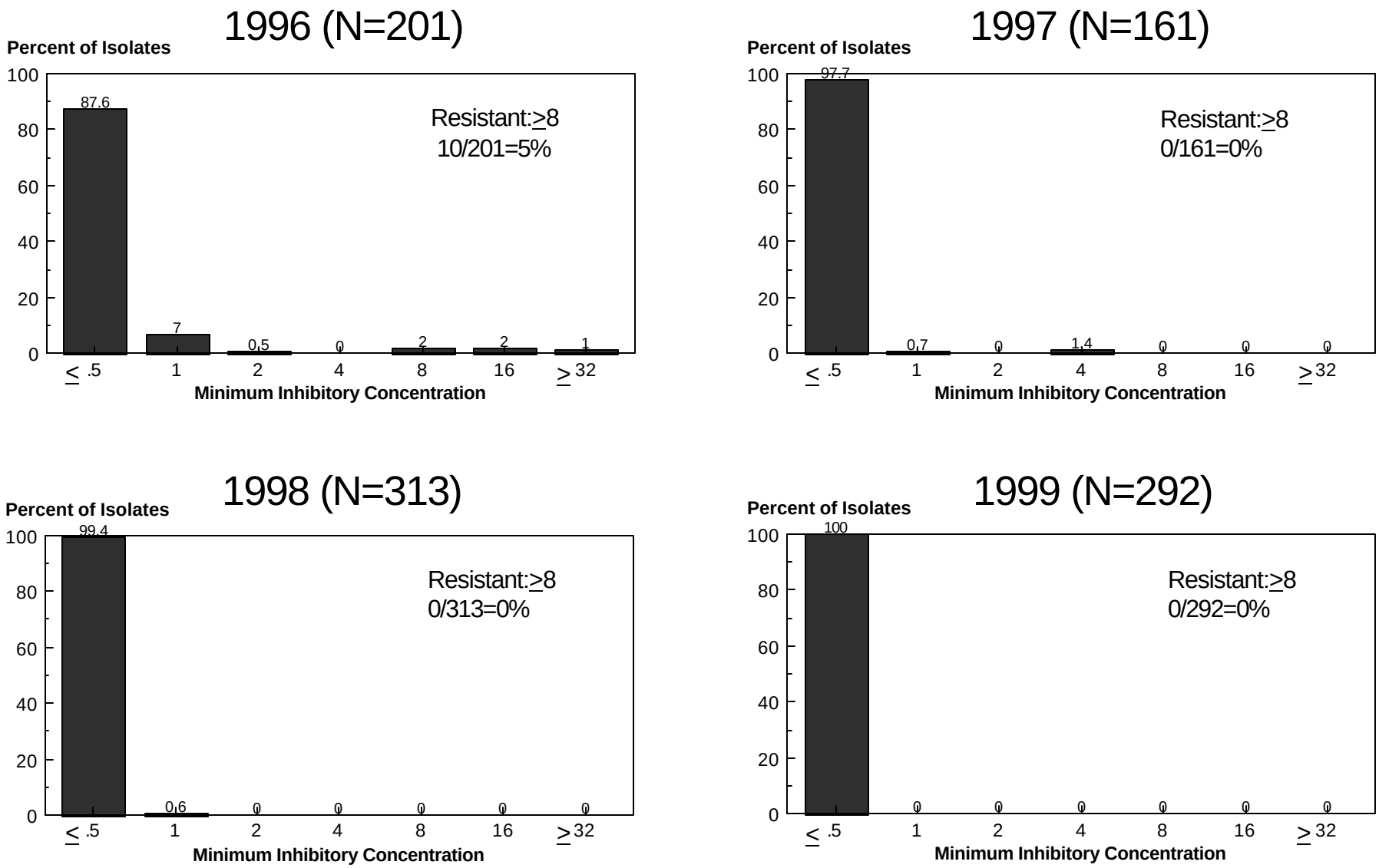
# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 15d. MICs for Apramycin among *E. coli* O157 isolates, 1996 - 1999



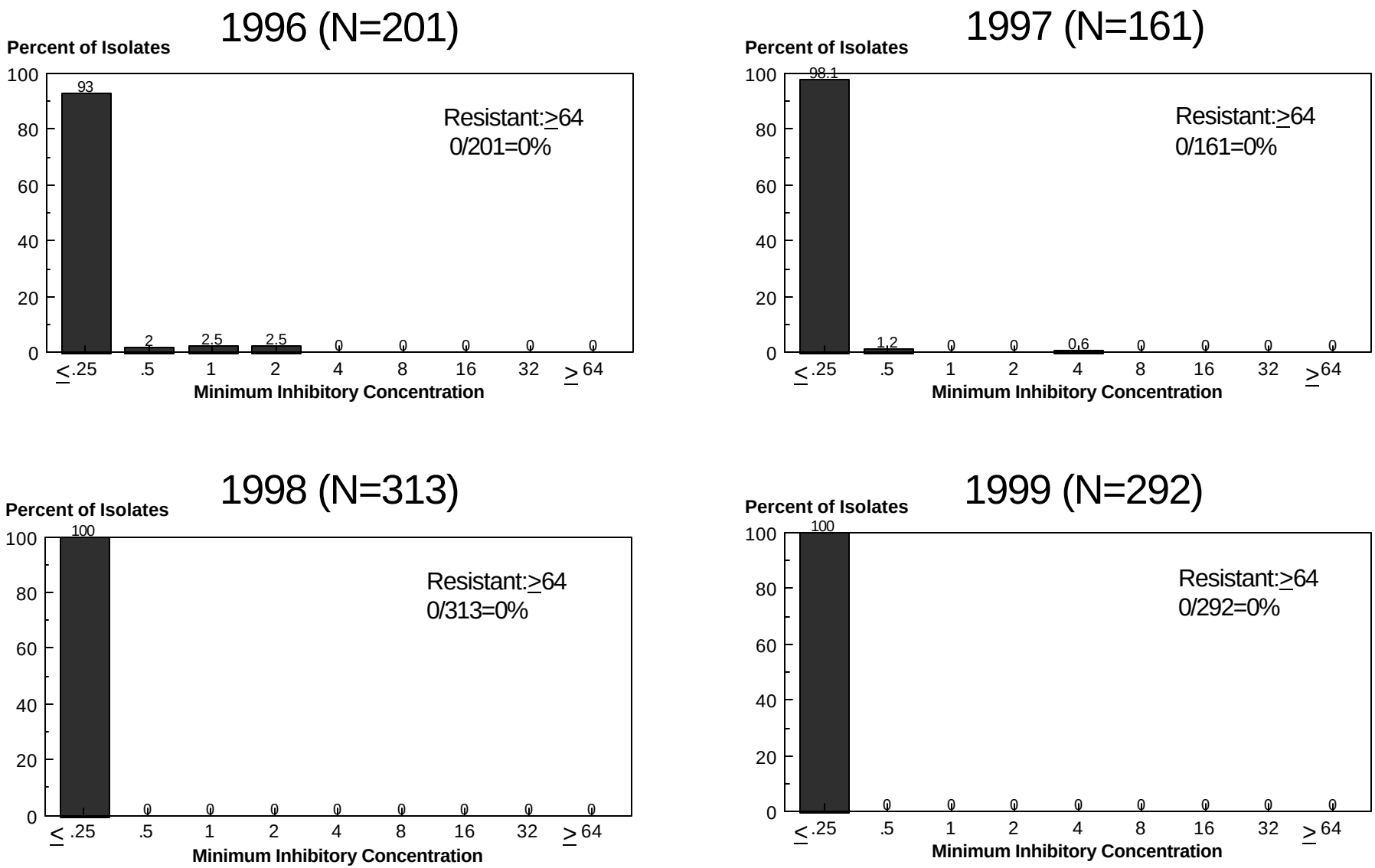
# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 15e. MICs for Ceftiofur among *E. coli* O157 isolates, 1996 - 1999



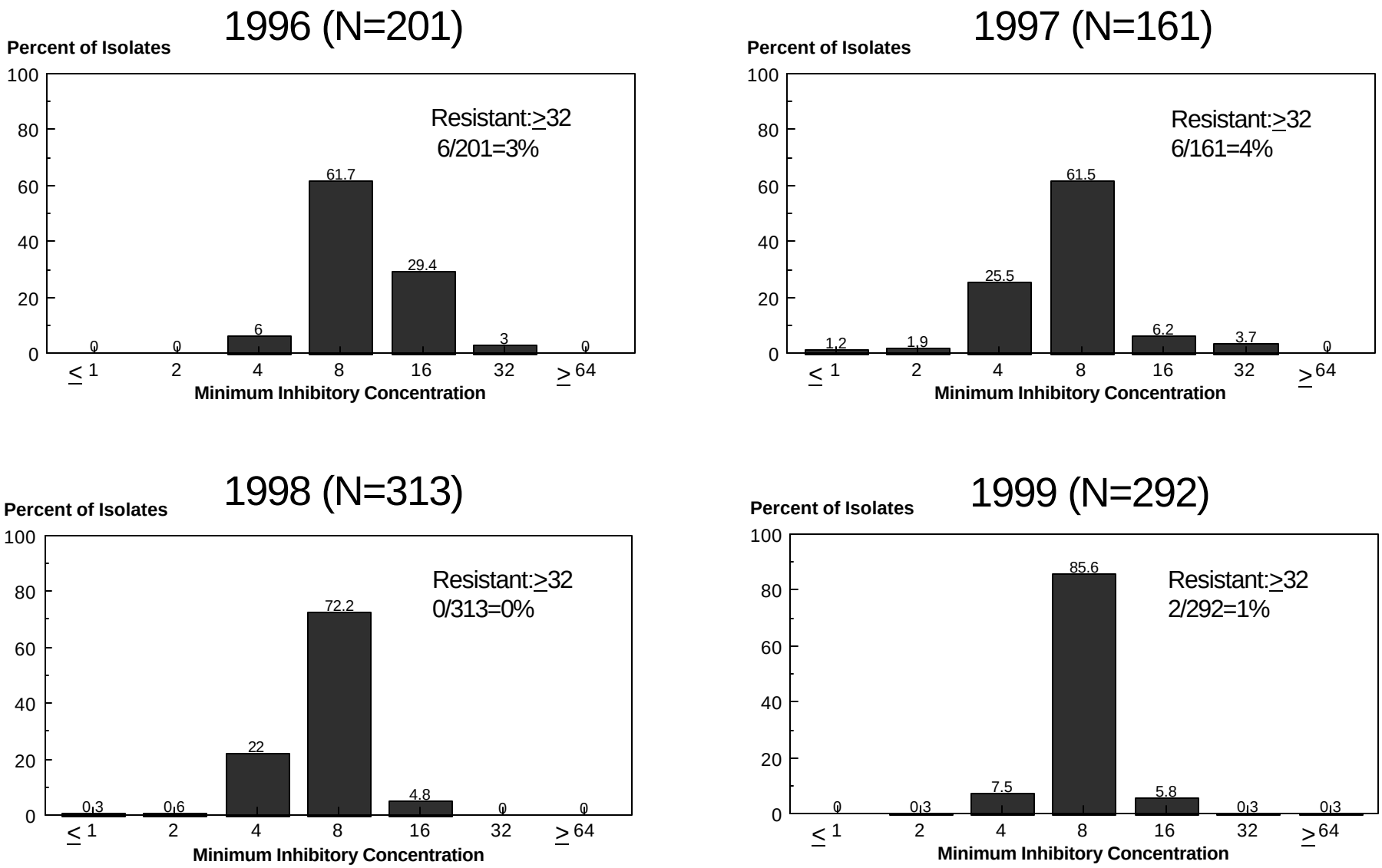
# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 15f. MICs for Ceftriaxone among *E. coli* O157 isolates, 1996 - 1999



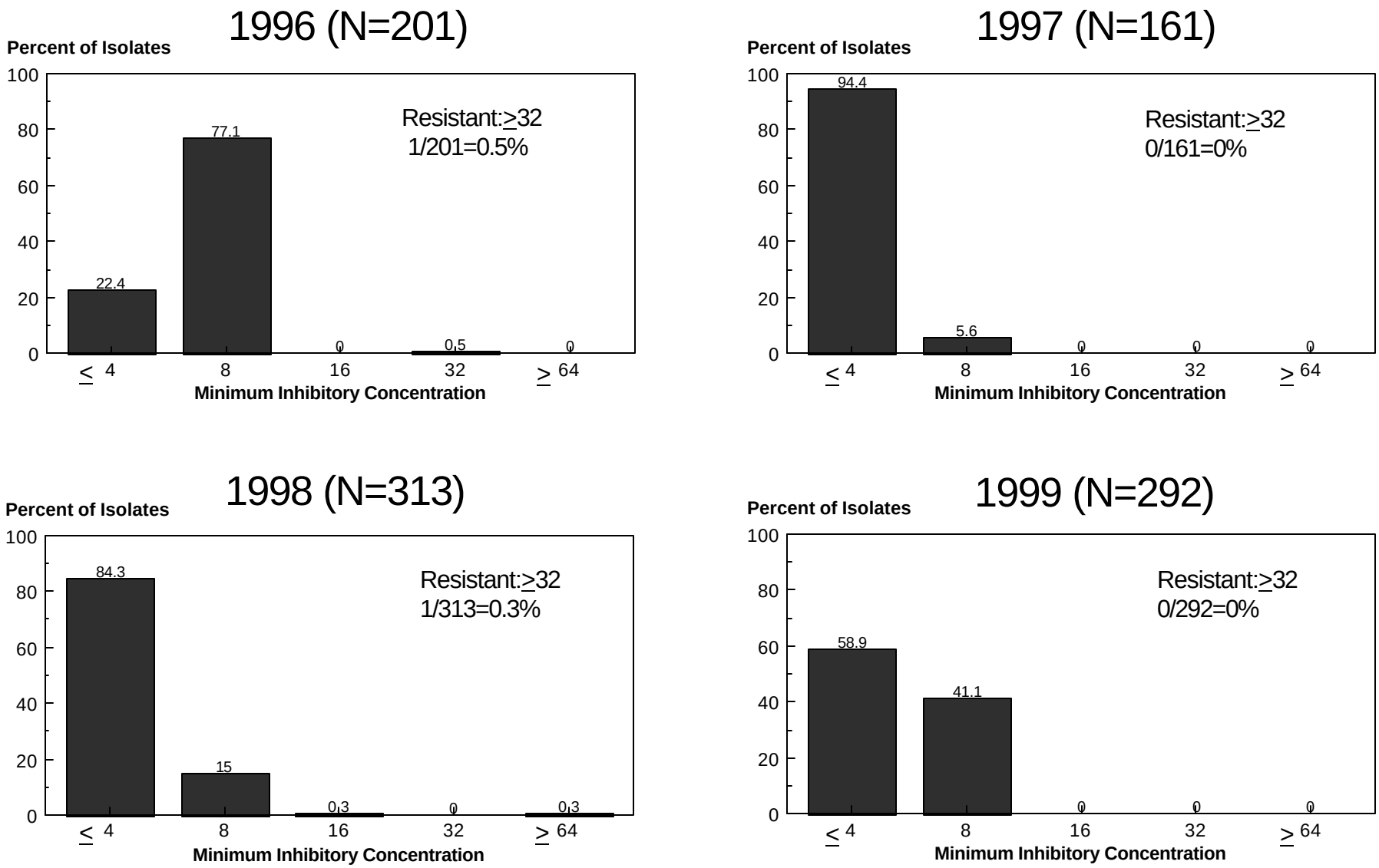
# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 15g. MICs for Cephalothin among *E. coli* O157 isolates, 1996 - 1999



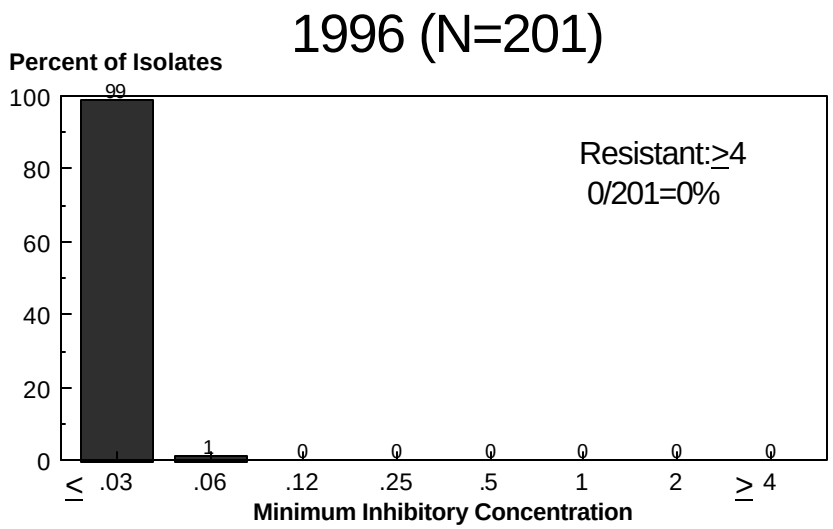
# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

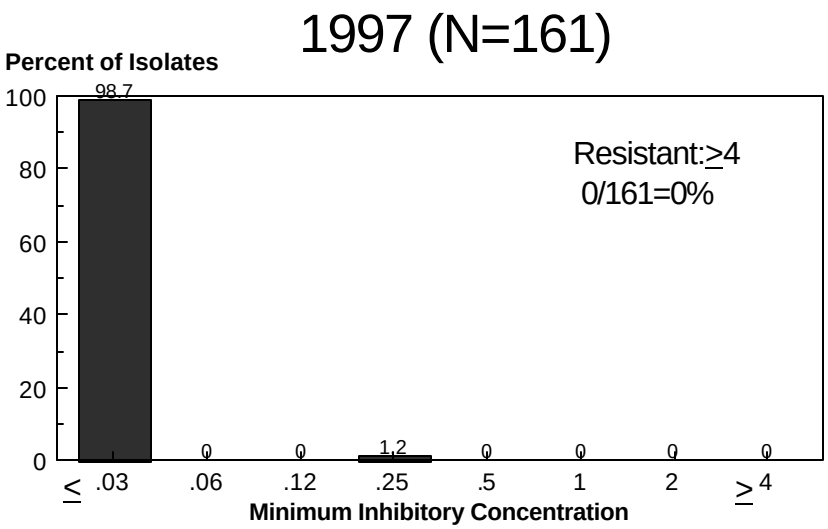
## Figure 15h. MICs for Chloramphenicol among *E. coli* O157 isolates, 1996 - 1999

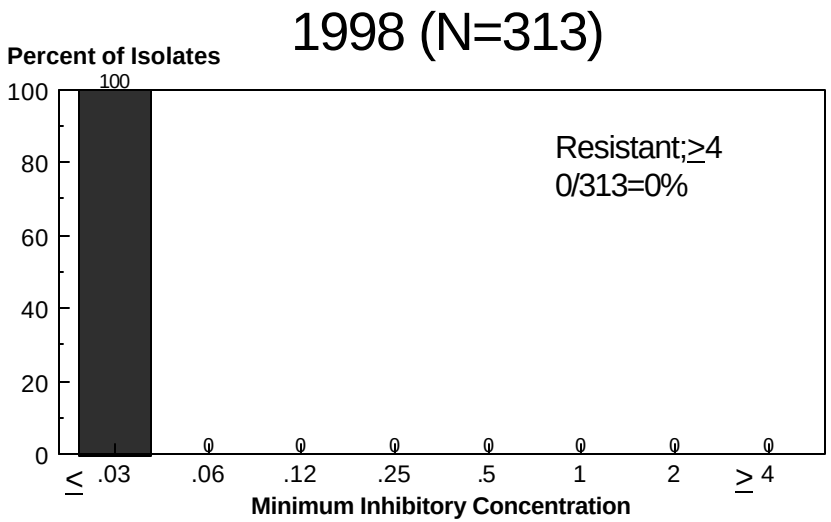


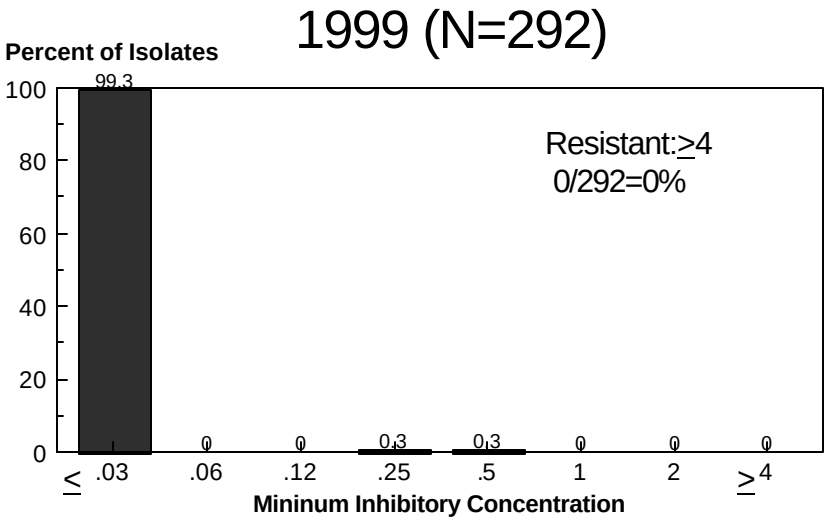
# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 15i. MICs for Ciprofloxacin among *E. coli* O157 isolates, 1996 - 1999



## National Antimicrobial Resistance Monitoring System For Enteric Bacteria

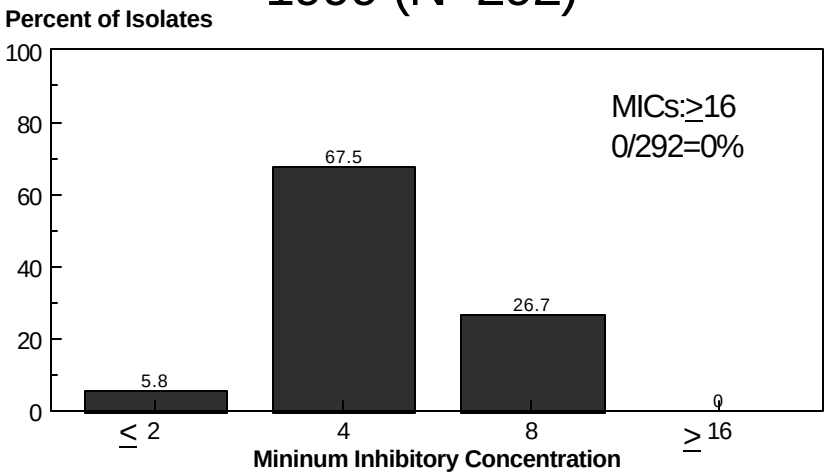
## Figure 15j. MICs for Florfenicol among *E. coli* O157 isolates, 1996 - 1999

Not tested in 1996

Not tested in 1997

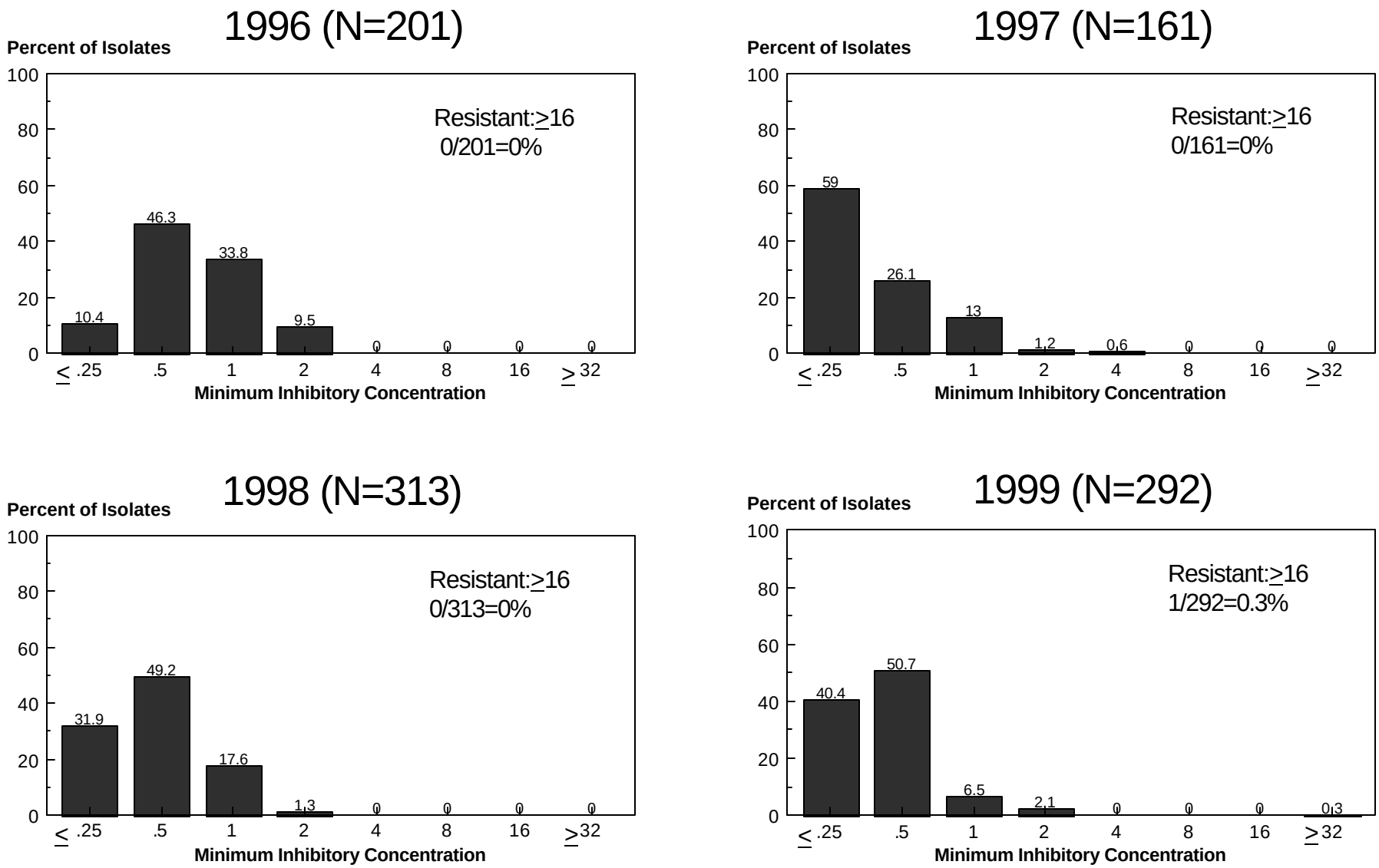
Not tested in 1998

1999 (N=292)



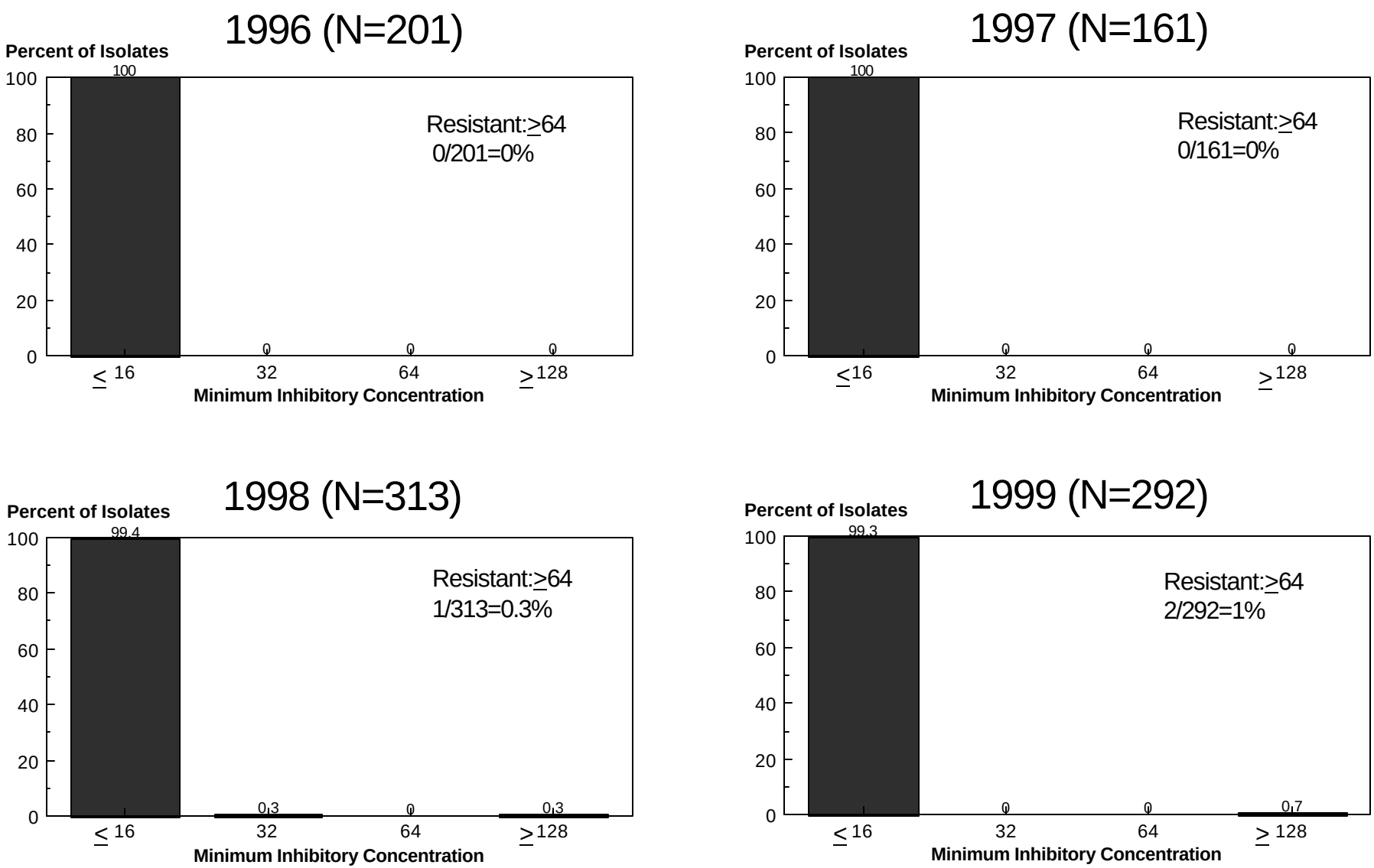
# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 15k. MICs for Gentamicin among *E. coli* O157 isolates, 1996 - 1999



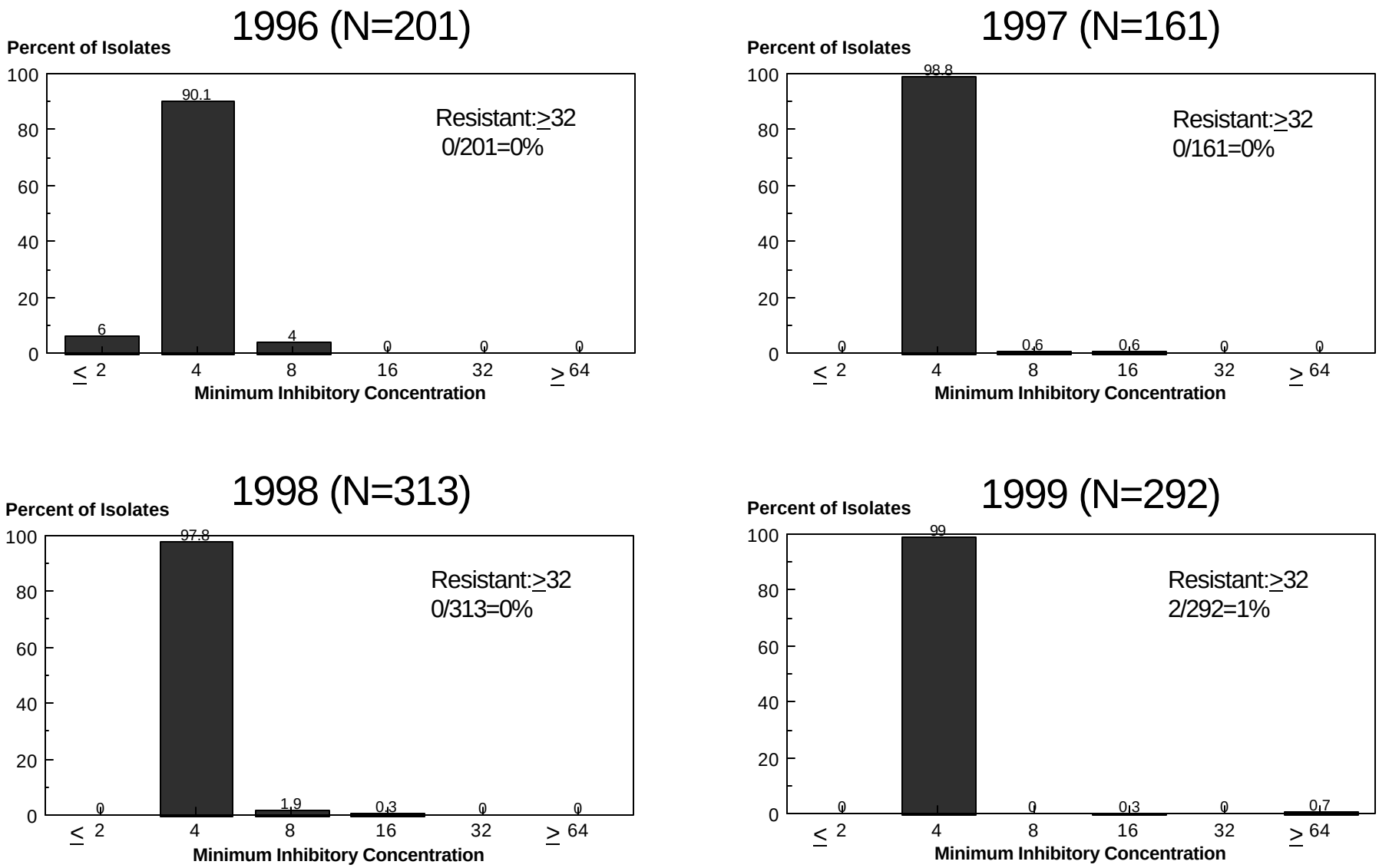
# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 15l. MICs for Kanamycin among *E. coli* O157 isolates, 1996 - 1999



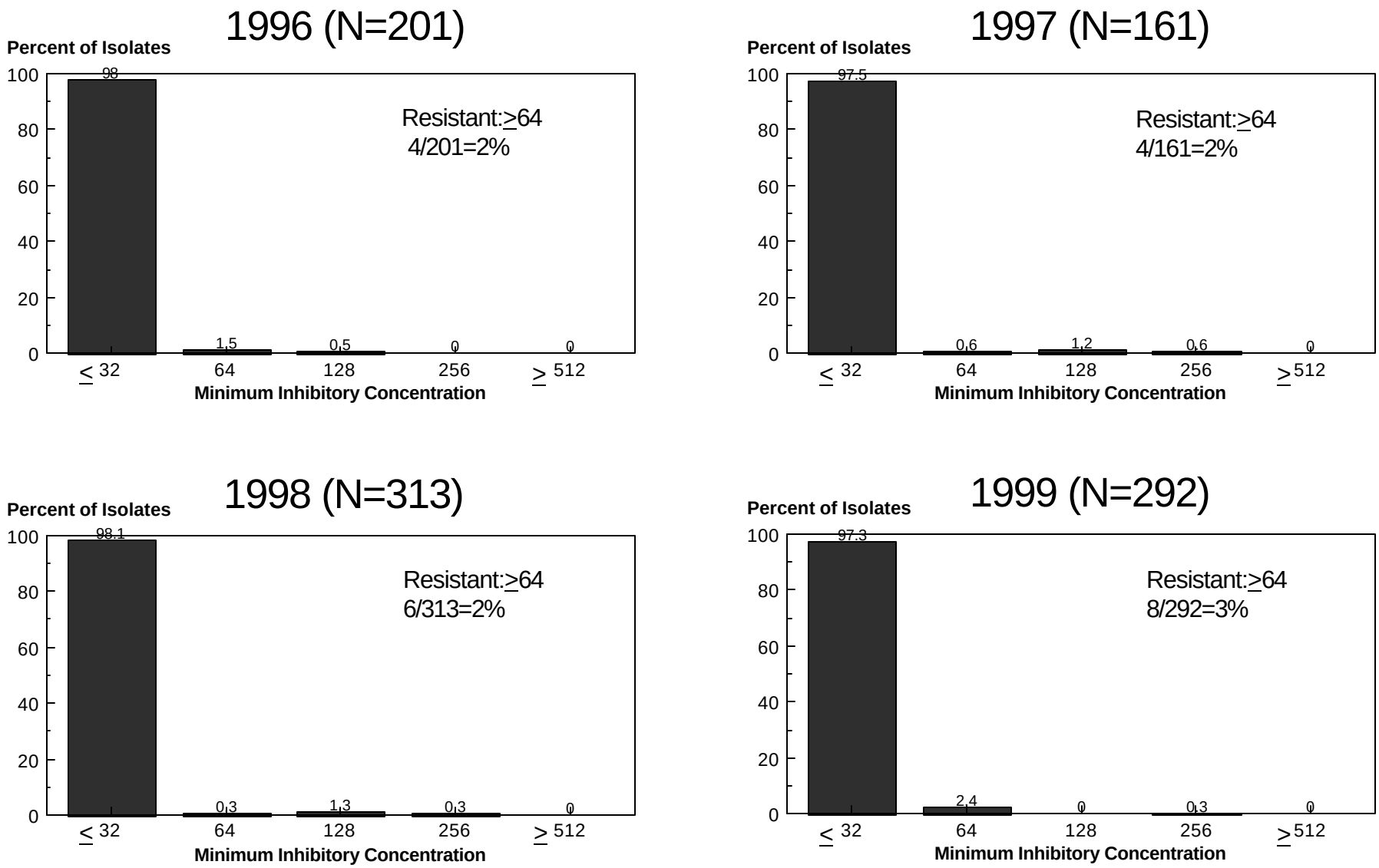
# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 15m. MICs for Nalidixic Acid among *E. coli* O157 isolates, 1996 - 1999



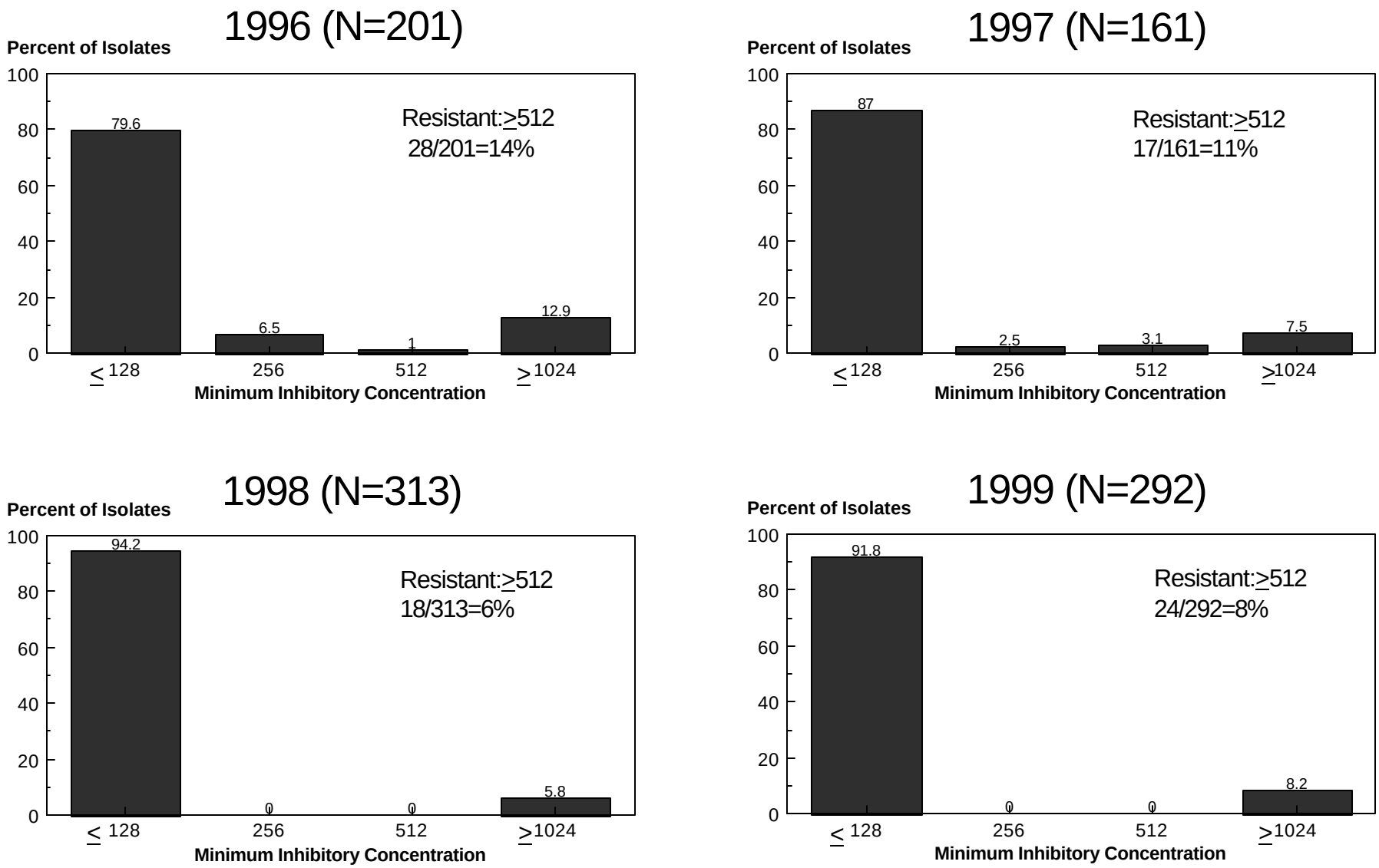
# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 15n. MICs for Streptomycin among *E. coli* O157 isolates, 1996 - 1999



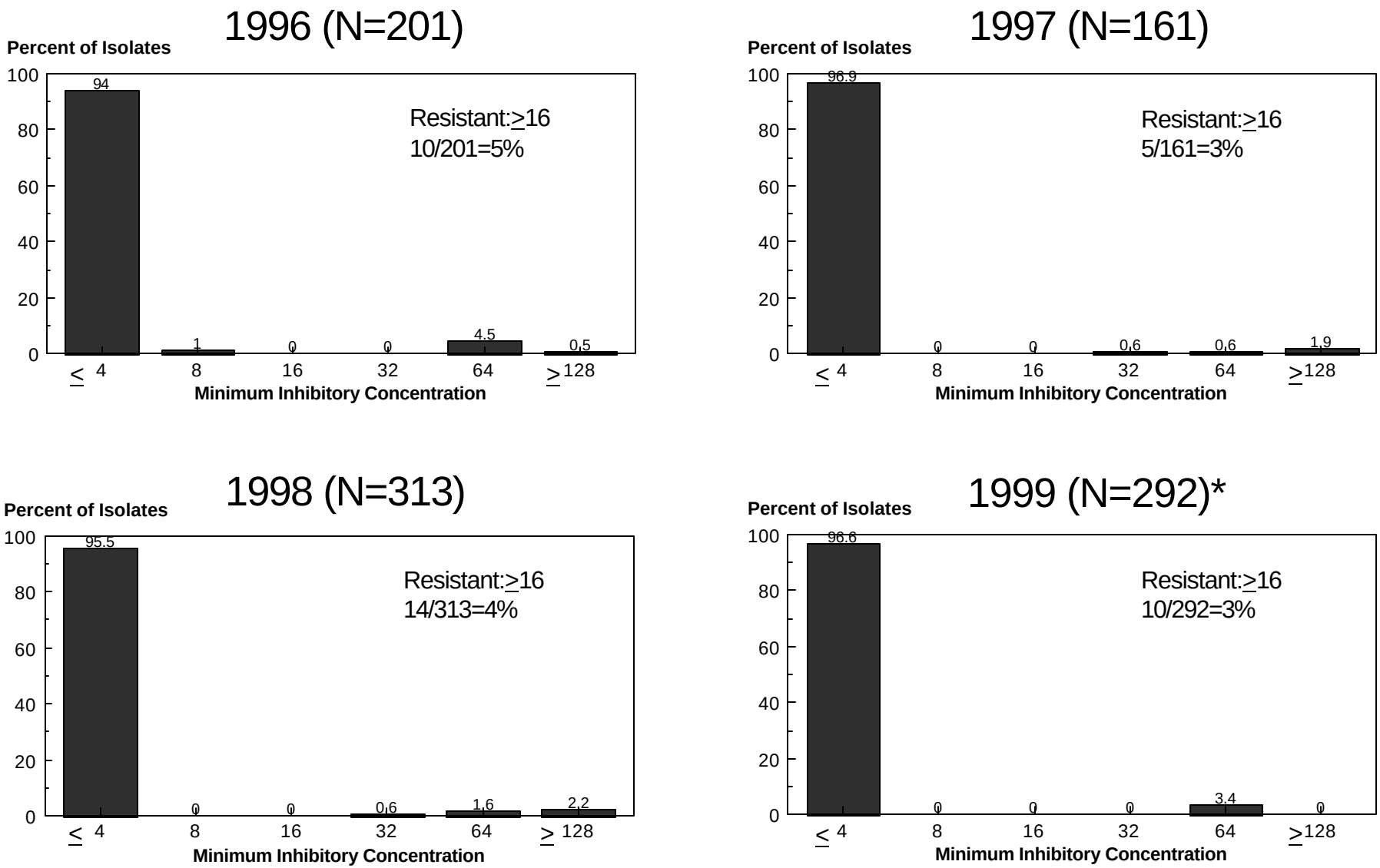
# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 15o. MICs for Sulfamethoxazole among *E. coli* O157 isolates, 1996 - 1999



# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

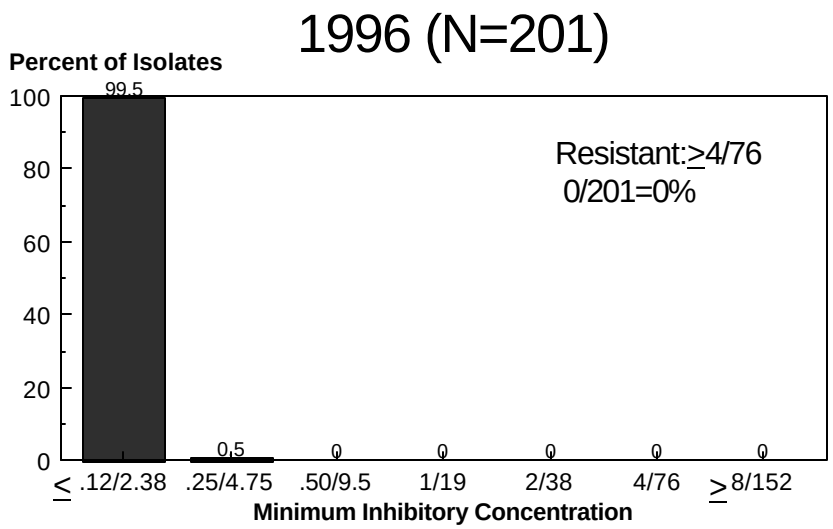
## Figure 15p. MICs for Tetracycline among *E. coli* O157 isolates, 1996 - 1999

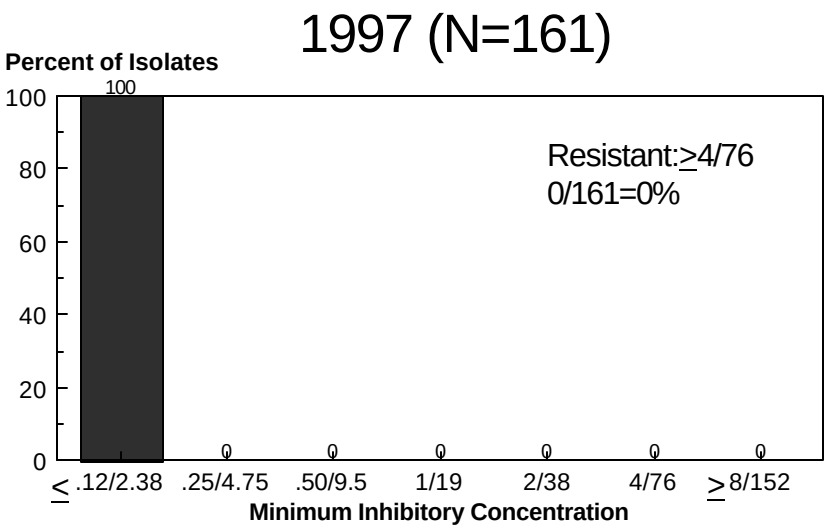


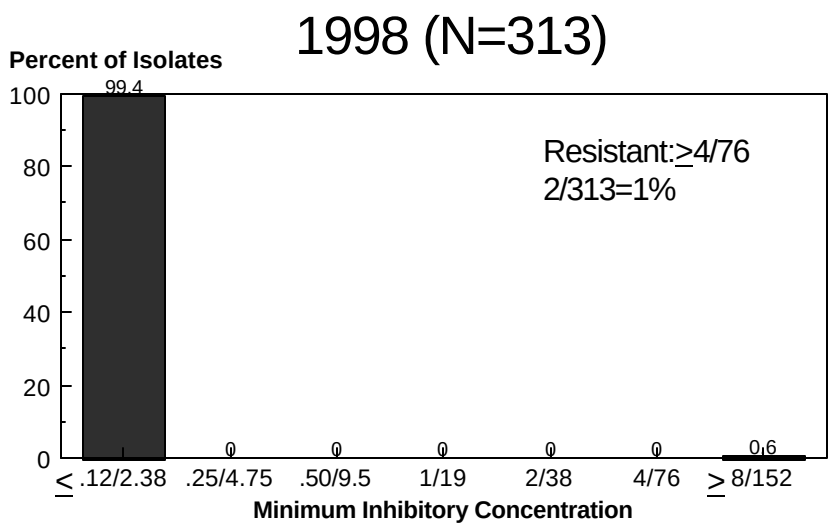

* Maximum MIC dilution for 1999 was 32 uq/ml. All resistant isolates had a MIC >32 uq/ml.

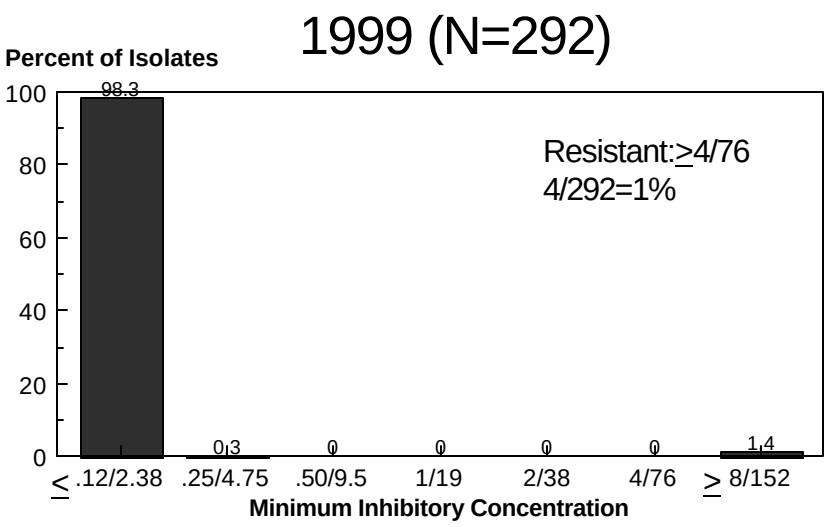
# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 15q. MICs for Trimethoprim-Sulfamethoxazole among *E. coli* O157 isolates, 1996 - 1999



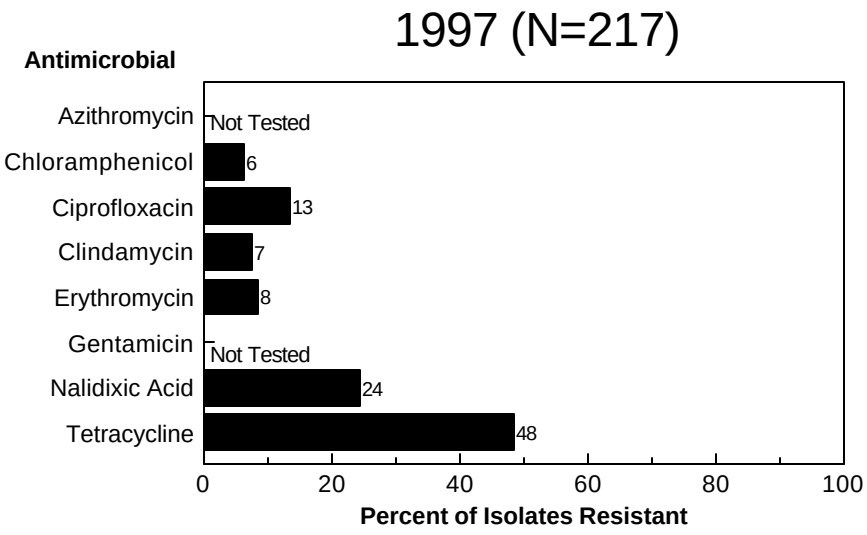



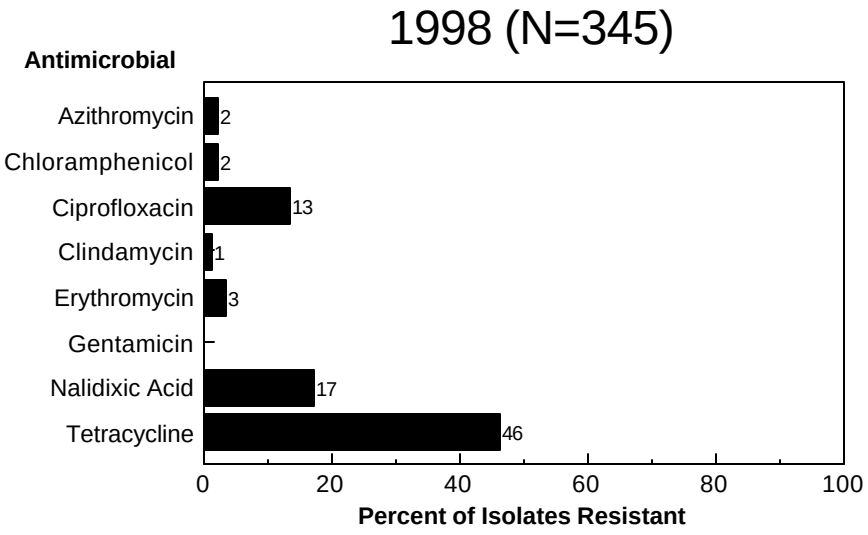



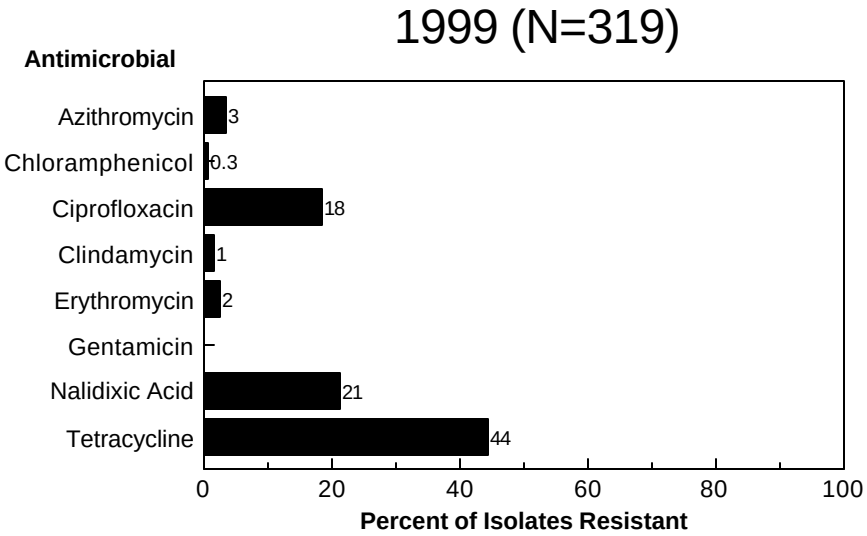



# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 16. Resistance among *Campylobacter* isolates, 1997- 1999

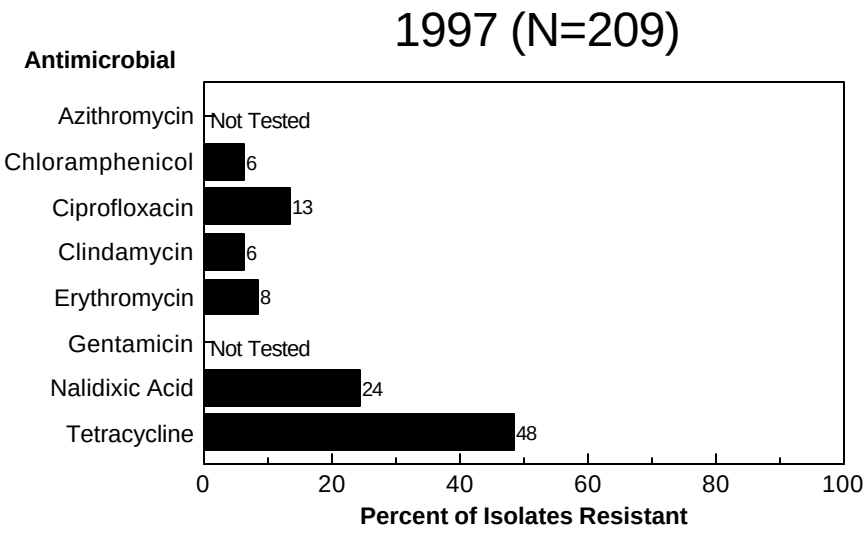


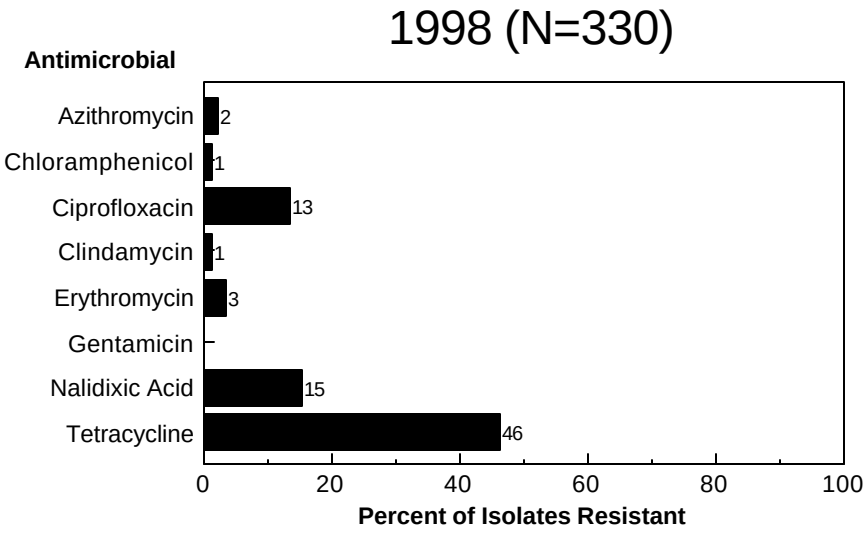



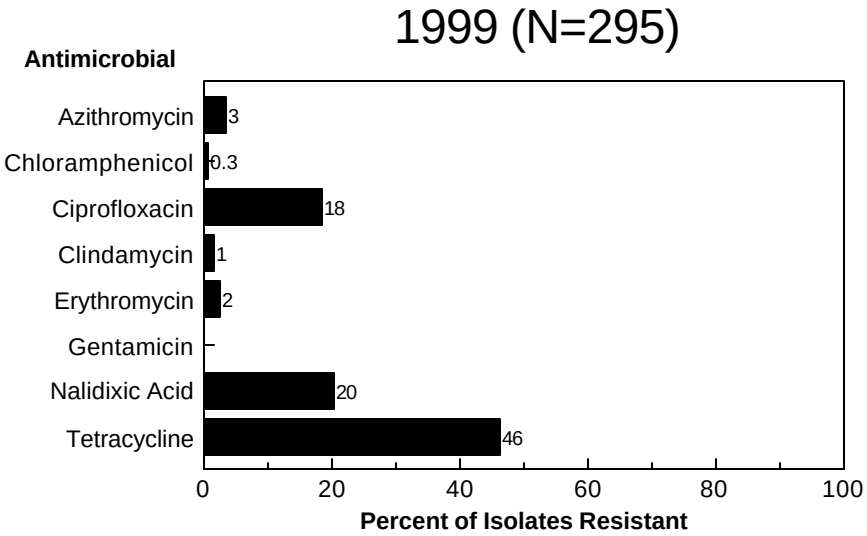



# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 17a. Resistance among *Campylobacter jejuni* isolates, 1997- 1999

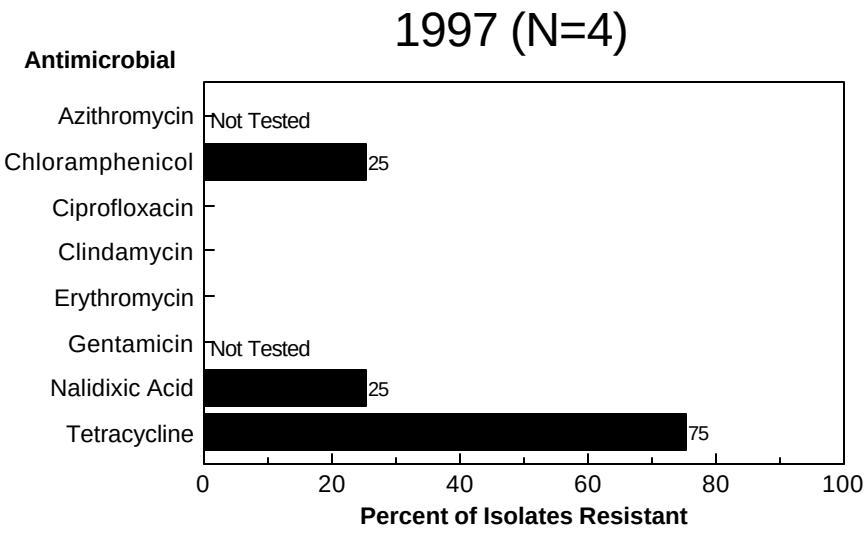


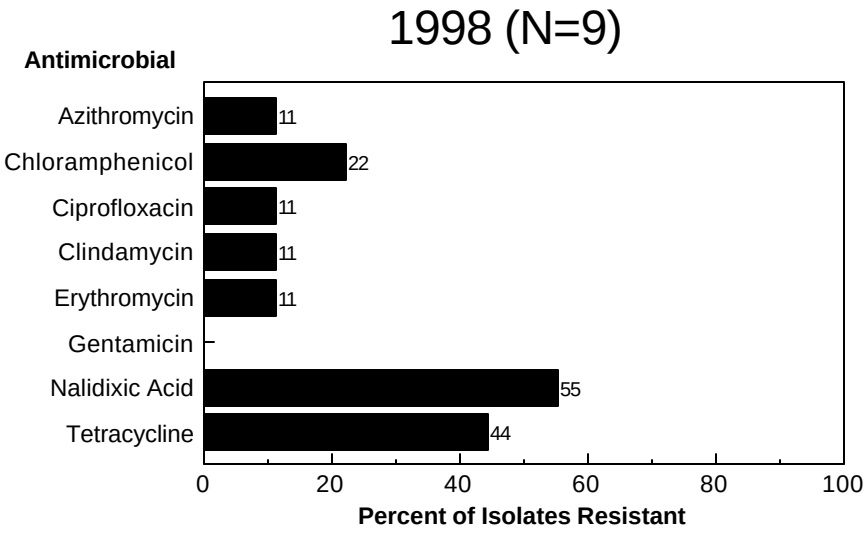



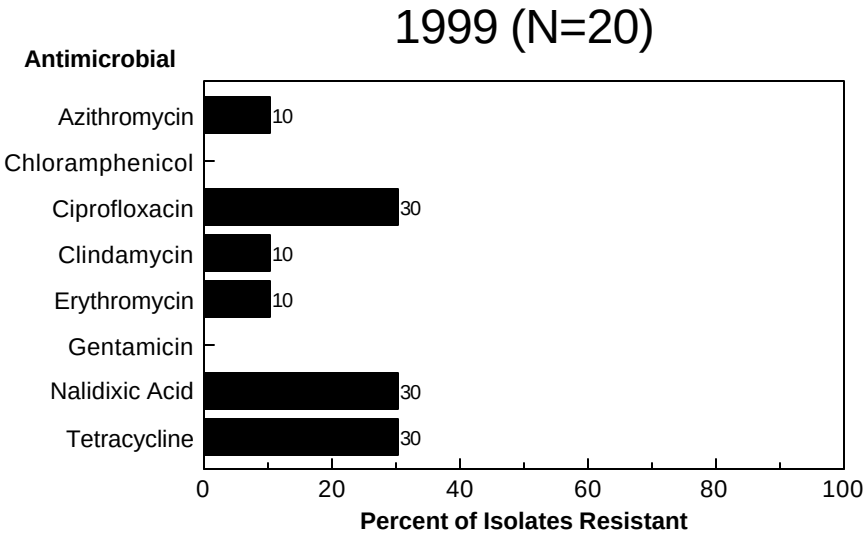



# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 17b. Resistance among *Campylobacter coli* isolates, 1997- 1999



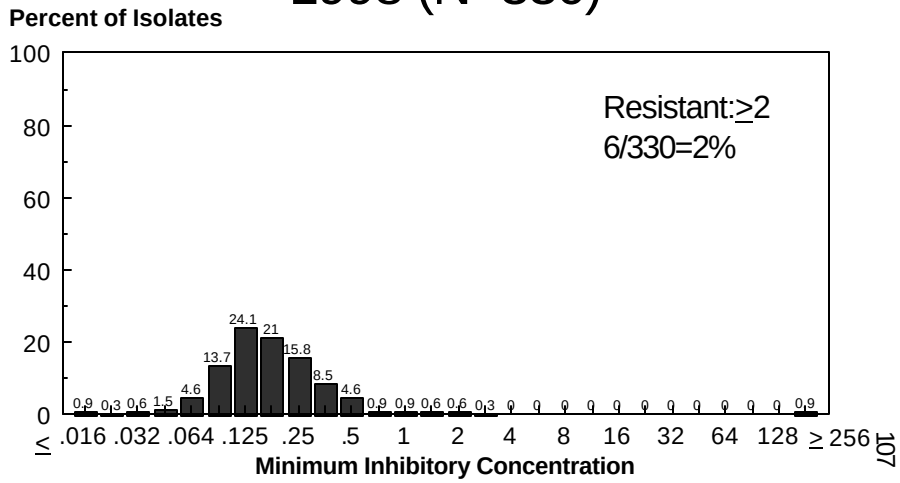



## National Antimicrobial Resistance Monitoring System For Enteric Bacteria

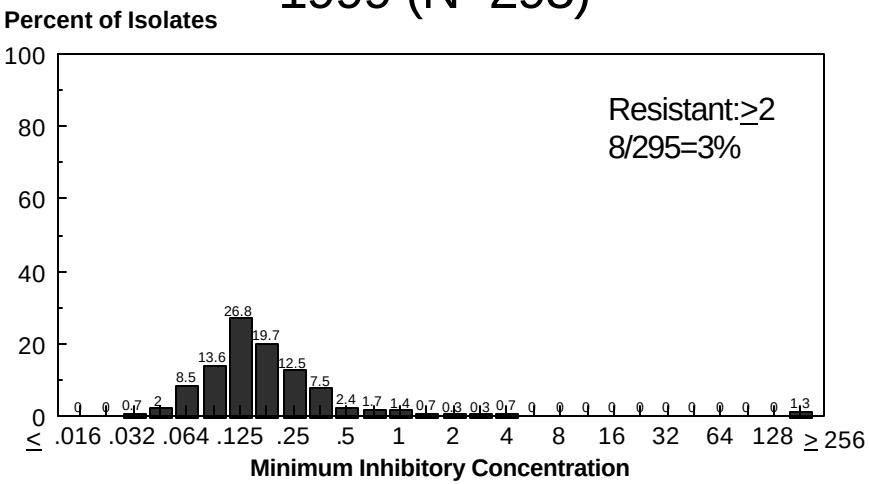
## Figure 18a. MICs for Azithromycin among *Campylobacter jejuni* isolates, 1997 - 1999

Not tested in 1997

1998 (N=330)

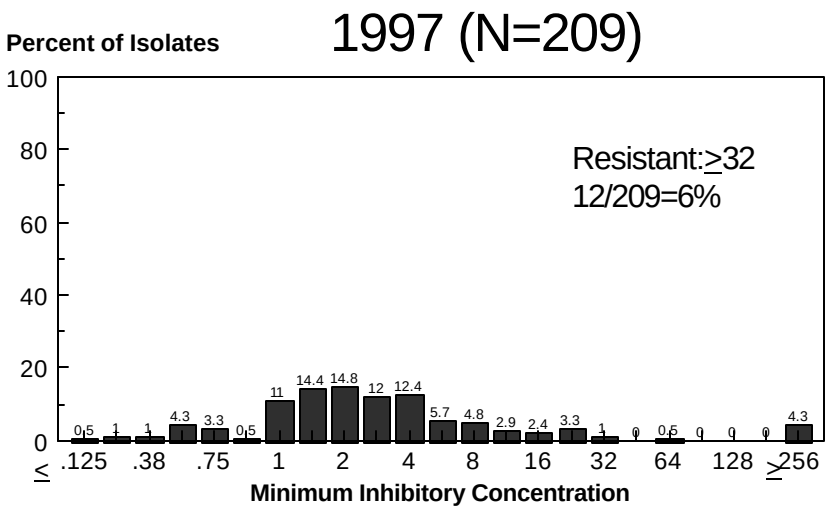


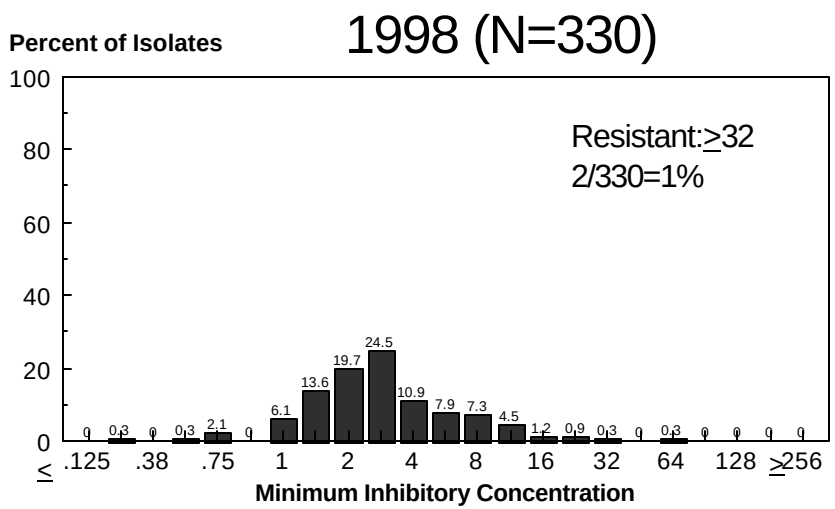

1999 (N=295)

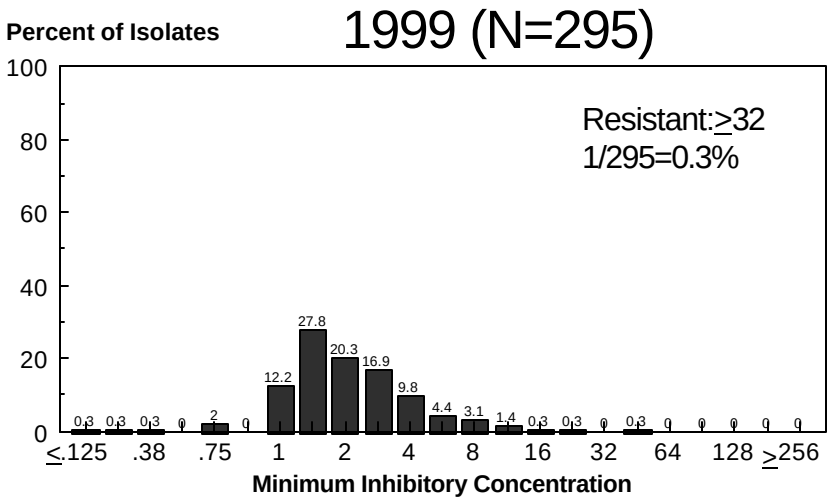


# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 18b. MICs for Chloramphenicol among *Campylobacter jejuni* isolates, 1997 - 1999

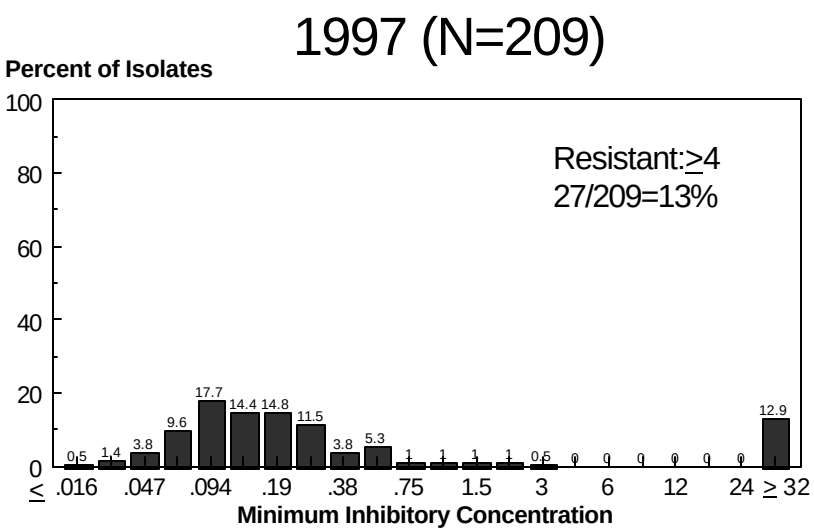


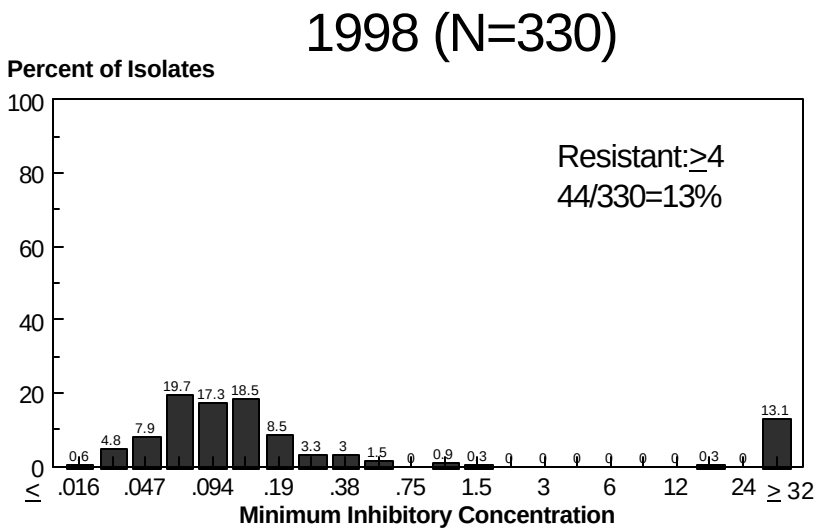



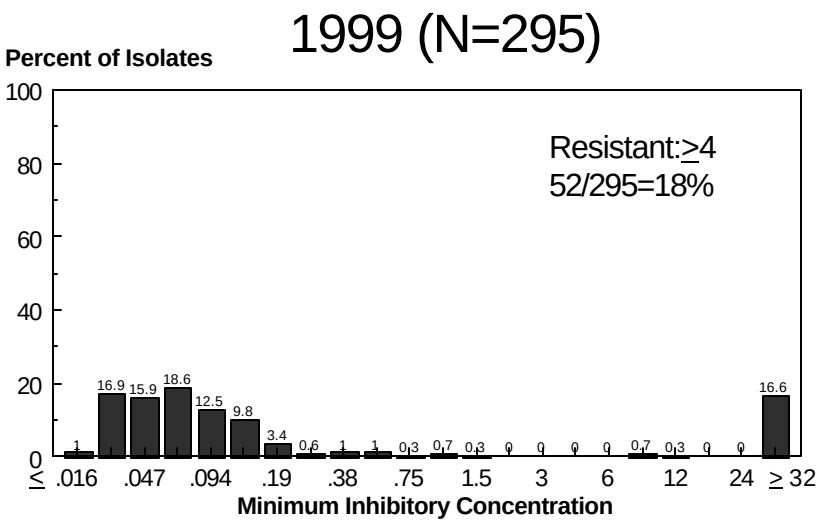



# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 18c. MICs for Ciprofloxacin among *Campylobacter jejuni* isolates, 1997 - 1999

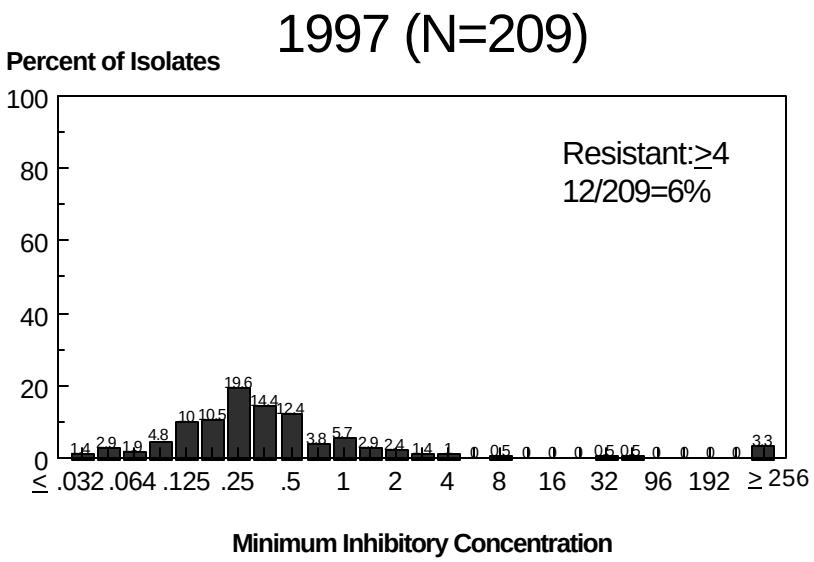


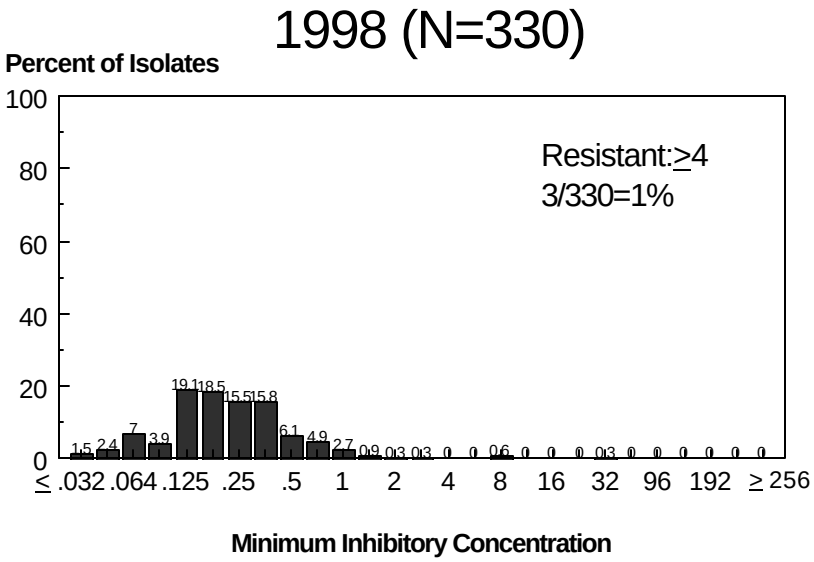



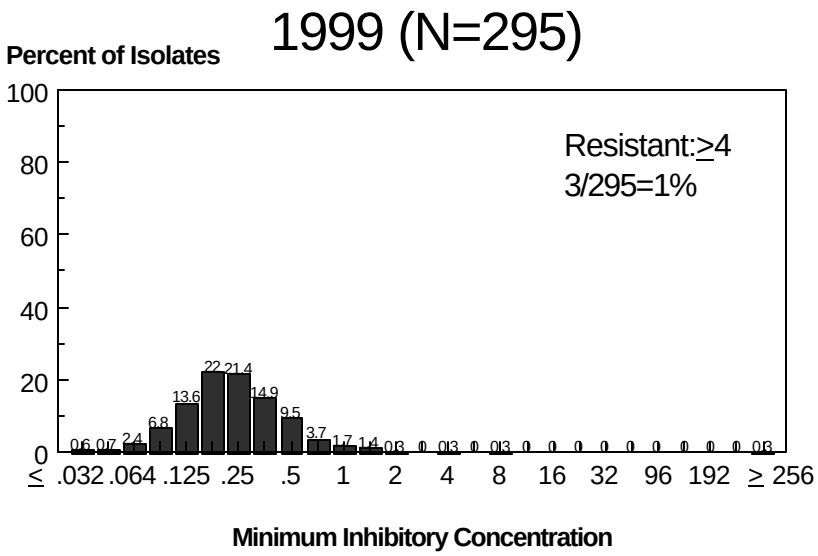



# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 18d. MICs for Clindamycin among *Campylobacter jejuni* isolates, 1997 - 1999

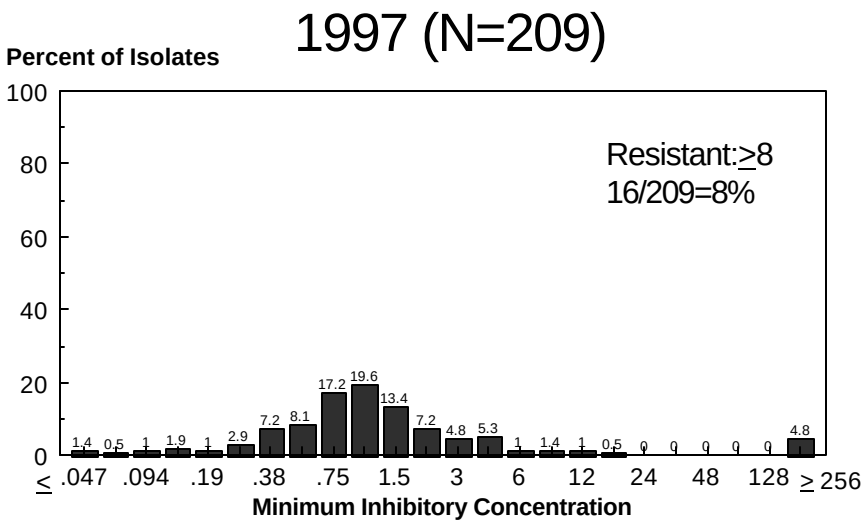


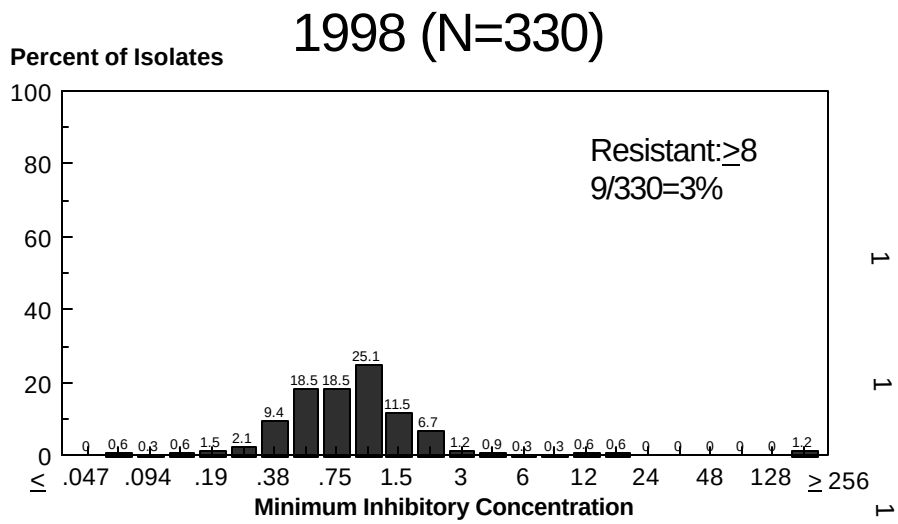



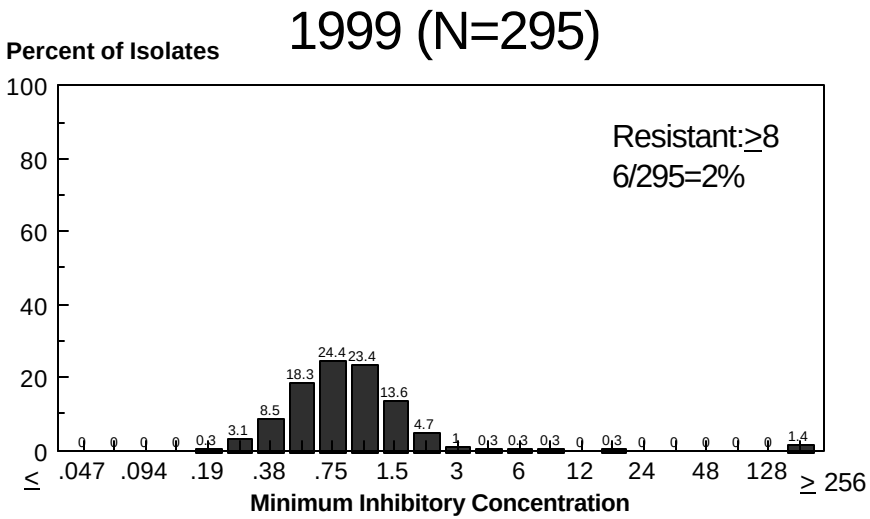



# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 18e. MICs for Erythromycin among *Campylobacter jejuni* isolates, 1997 - 1999



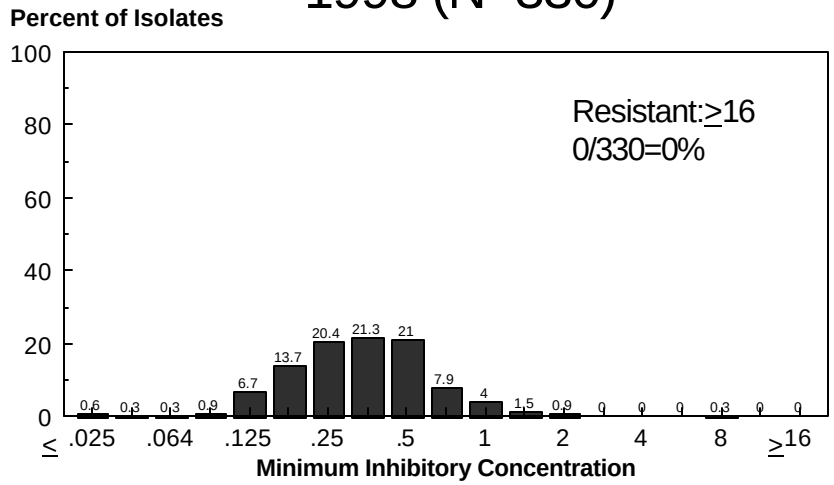



## National Antimicrobial Resistance Monitoring System For Enteric Bacteria

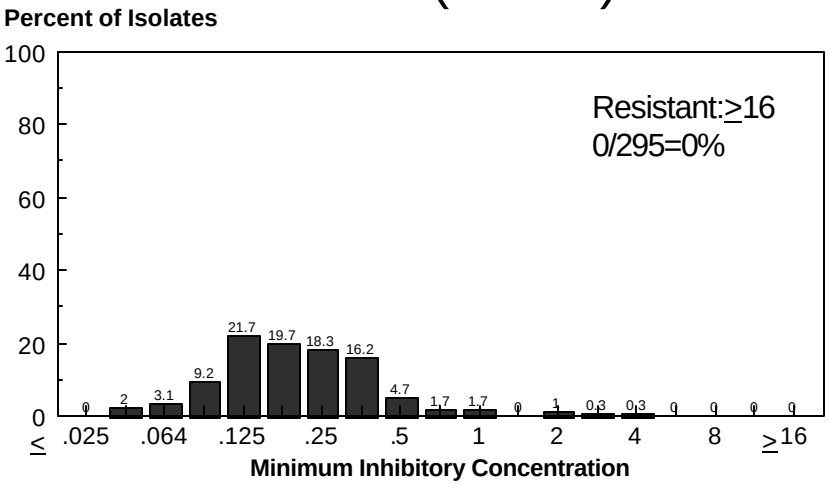
## Figure 18f. MICs for Gentamicin among *Campylobacter jejuni* isolates, 1997 - 1999

Not tested in 1997

1998 (N=330)

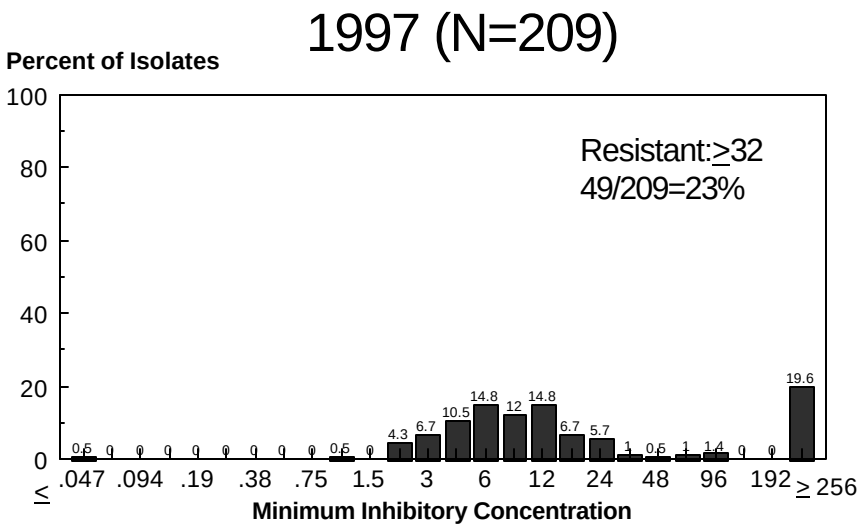


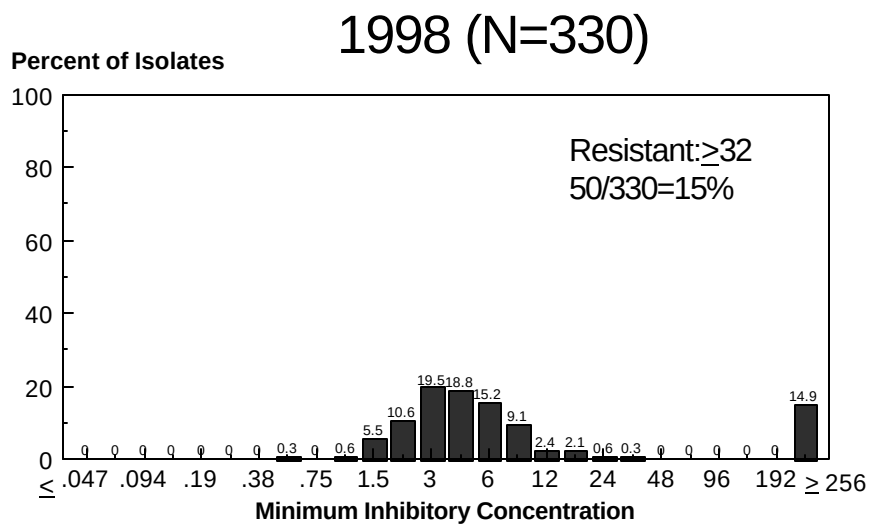

1999 (N=295)

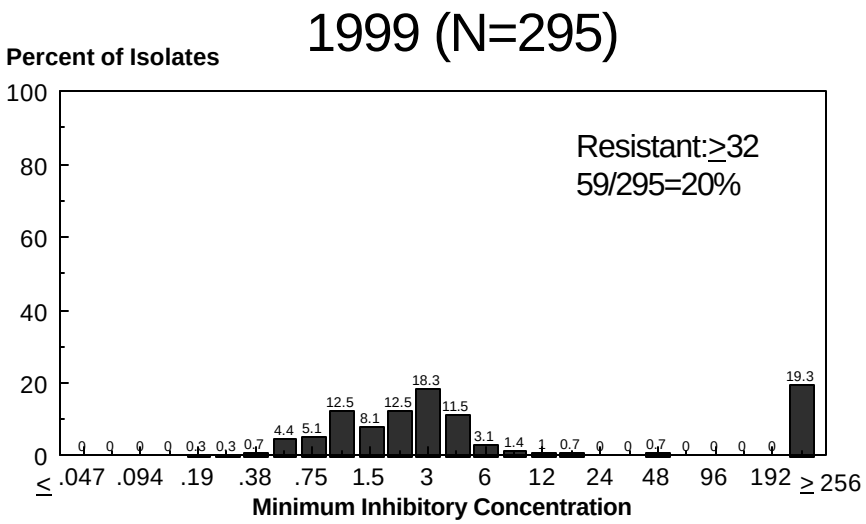


# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 18g. MICs for Nalidixic Acid among *Campylobacter jejuni* isolates, 1997 - 1999

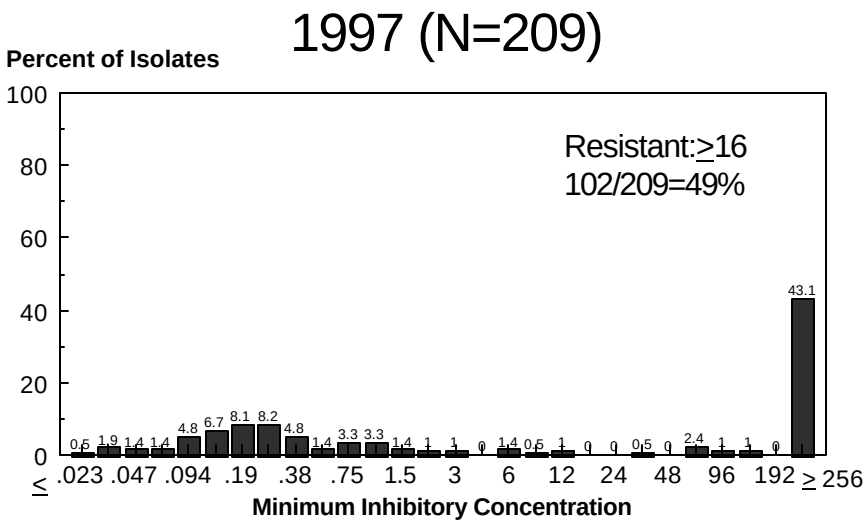


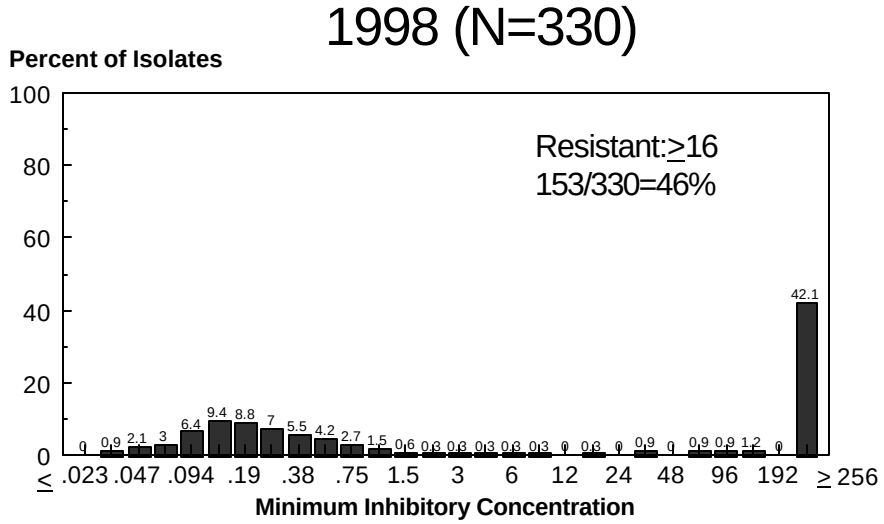



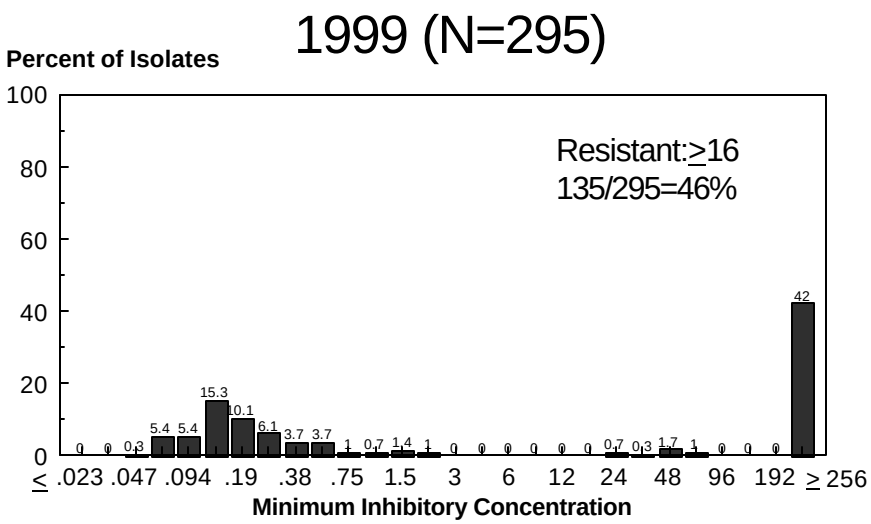



# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 18h. MICs for Tetracycline among *Campylobacter jejuni* isolates, 1997 - 1999



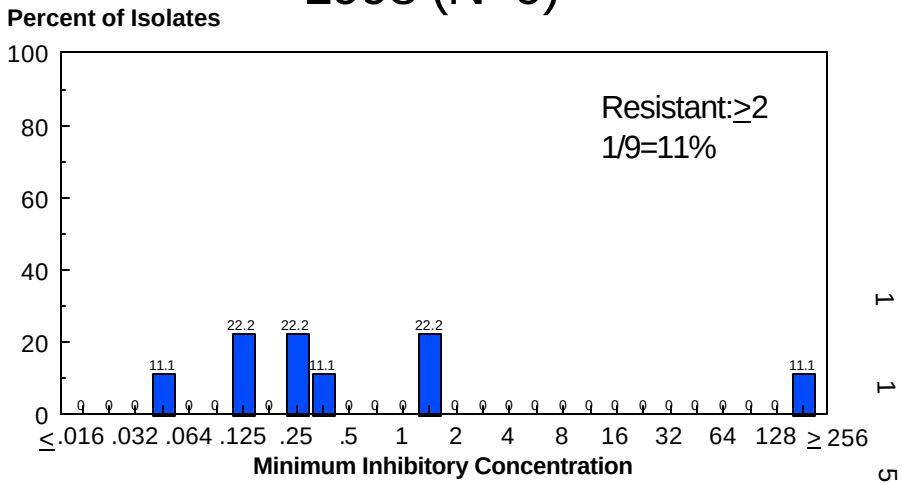



## National Antimicrobial Resistance Monitoring System For Enteric Bacteria

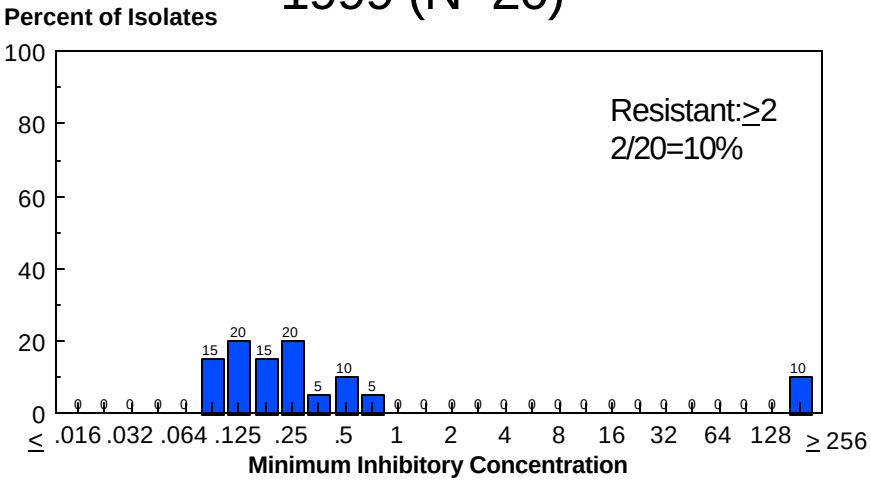
## Figure 19a. MICs for Azithromycin among *Campylobacter coli* isolates, 1997 - 1999

Not tested in 1997

1998 (N=9)

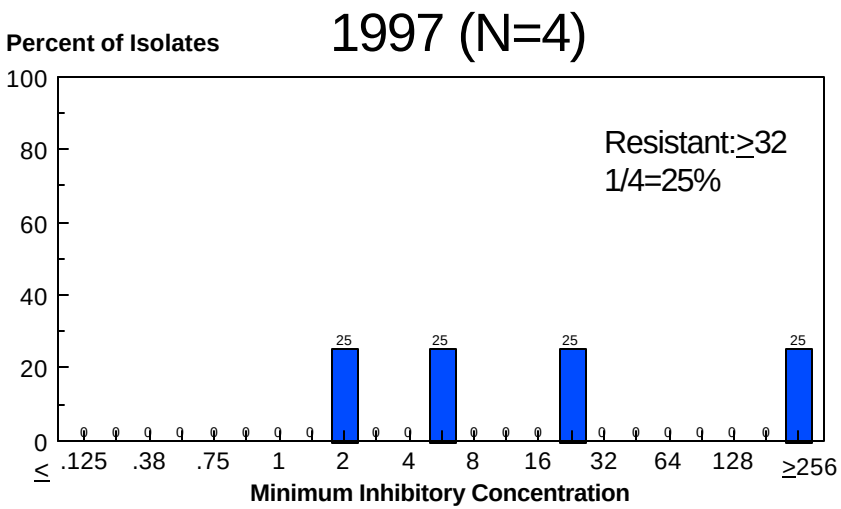


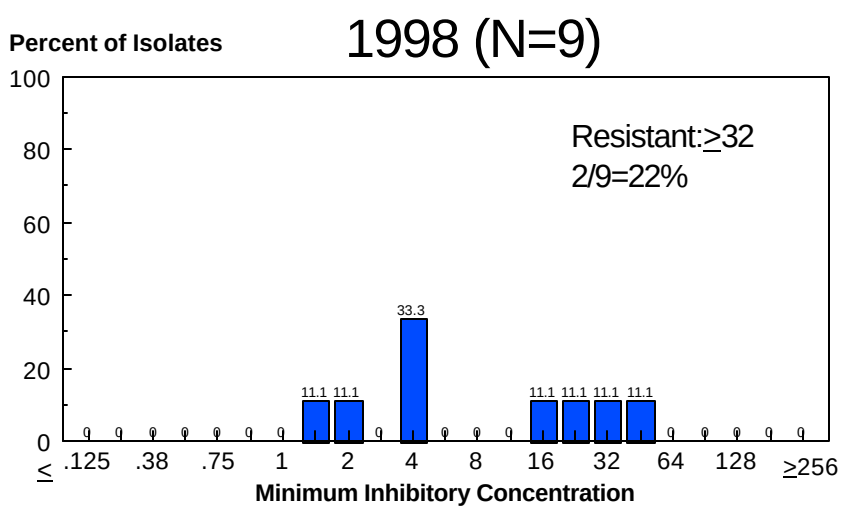

1999 (N=20)

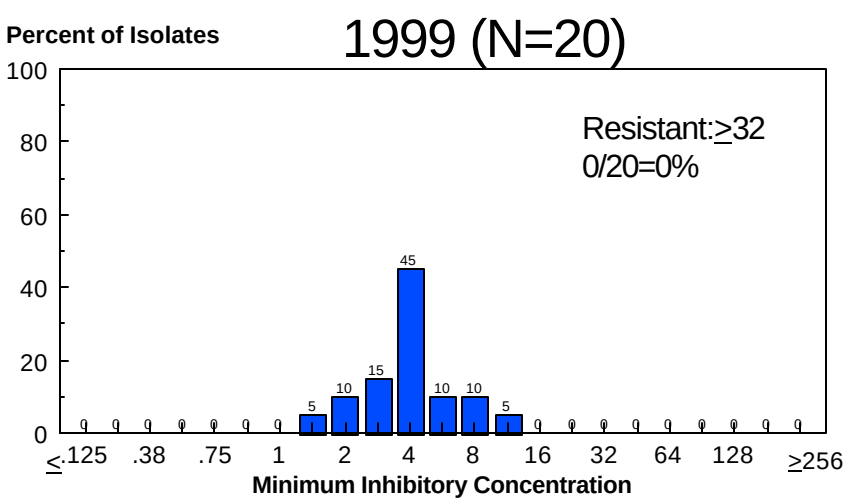


# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 19b. MICs for Chloramphenicol among *Campylobacter coli* isolates, 1997 - 1999

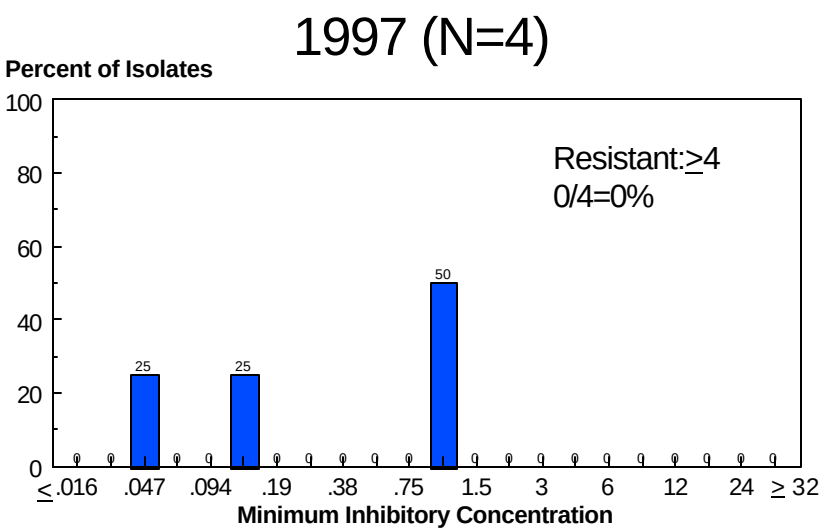


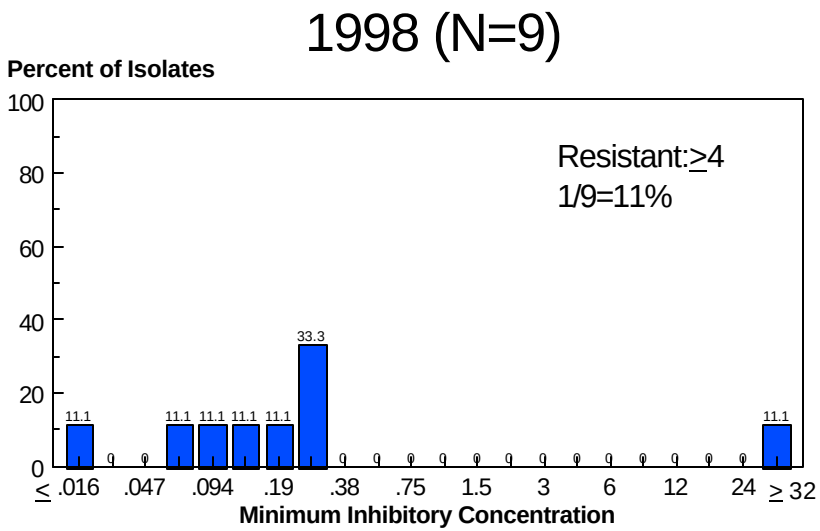



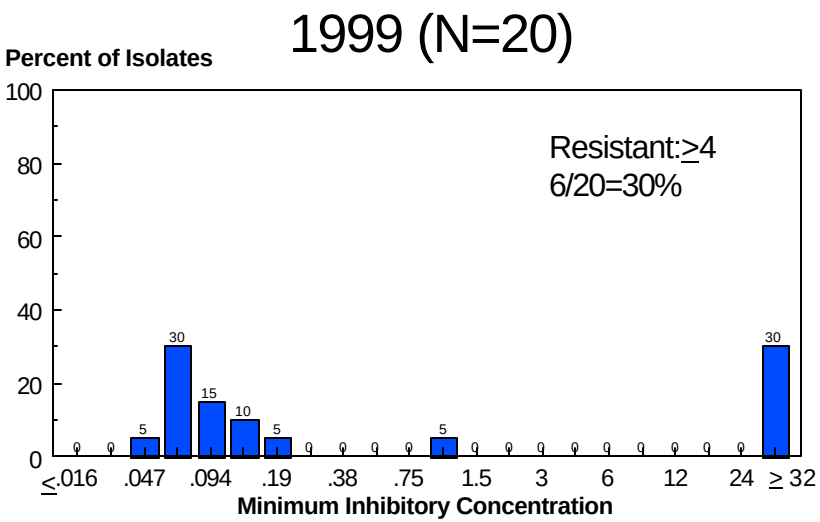



# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 19c. MICs for Ciprofloxacin among *Campylobacter coli* isolates, 1997 - 1999

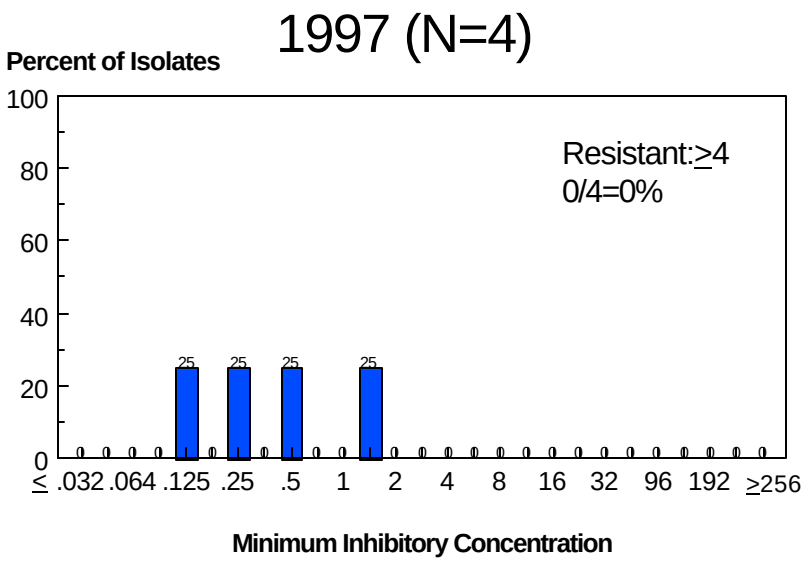


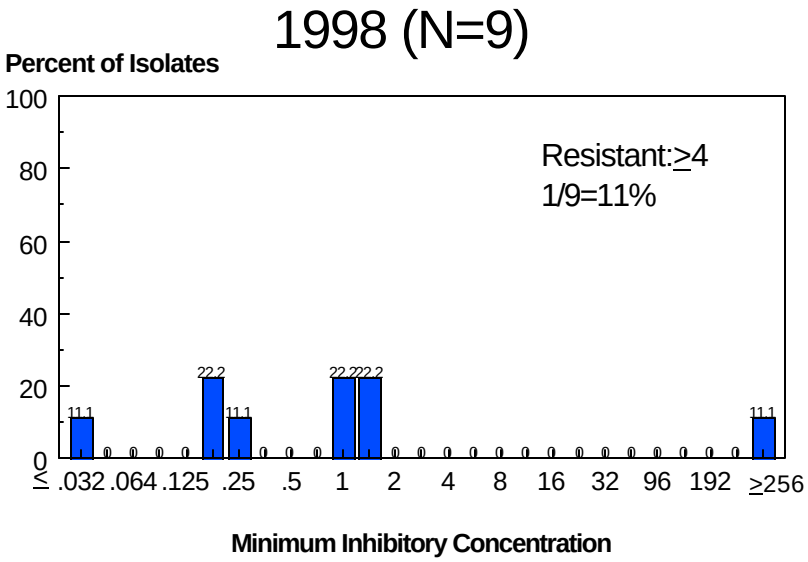



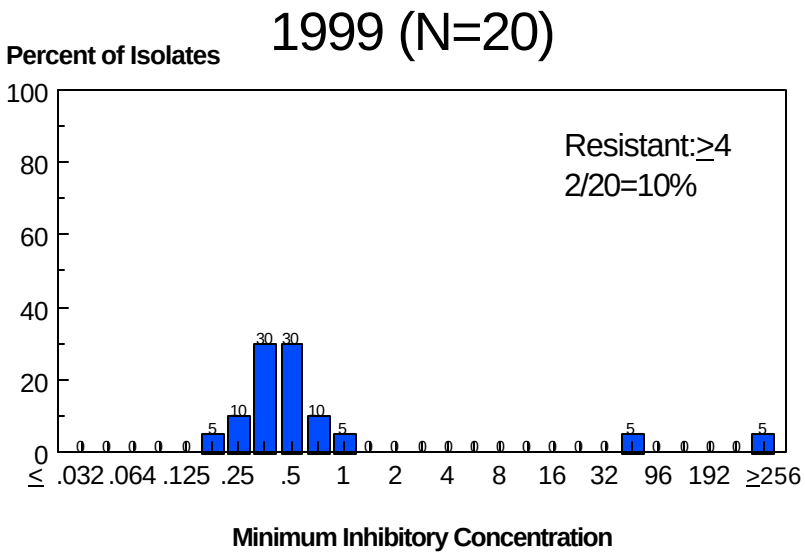



# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 19d. MICs for Clindamycin among *Campylobacter coli* isolates, 1997 - 1999

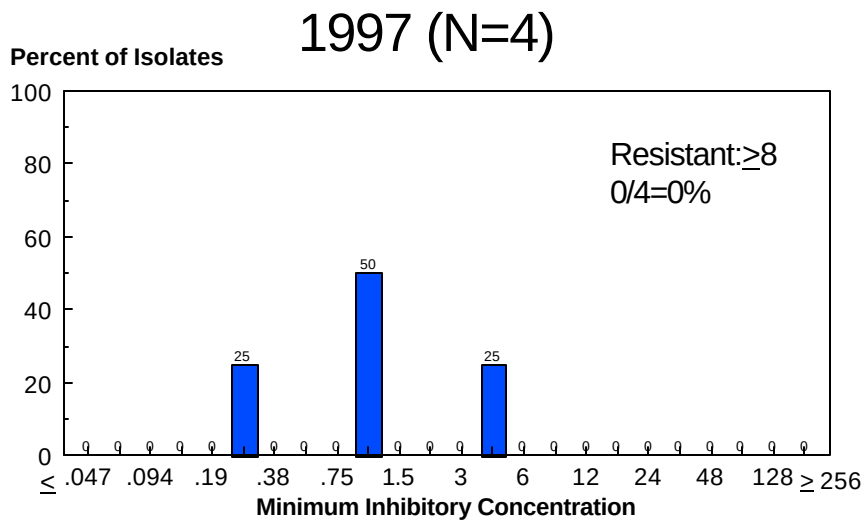


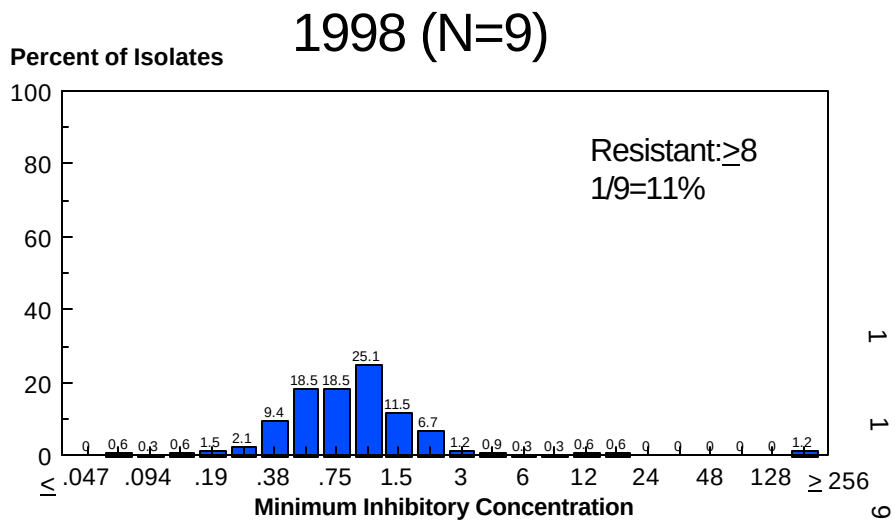



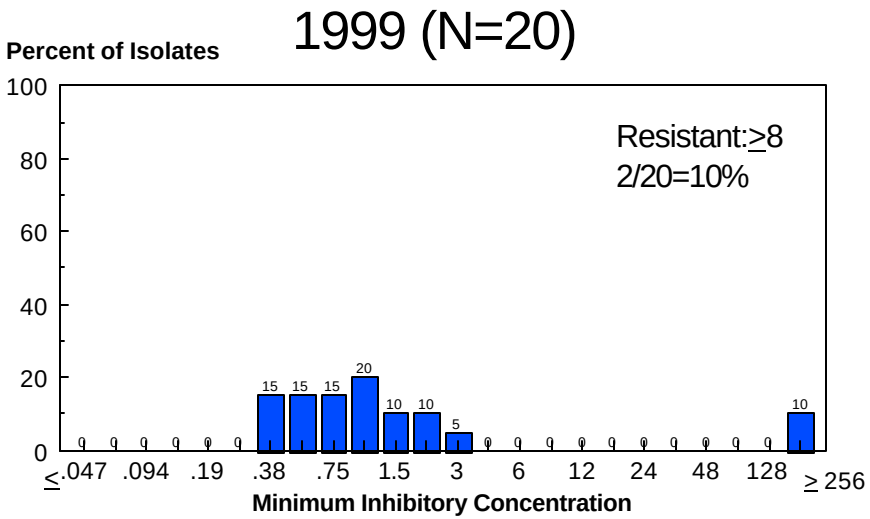



# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 19e. MICs for Erythromycin among *Campylobacter coli* isolates, 1997 - 1999



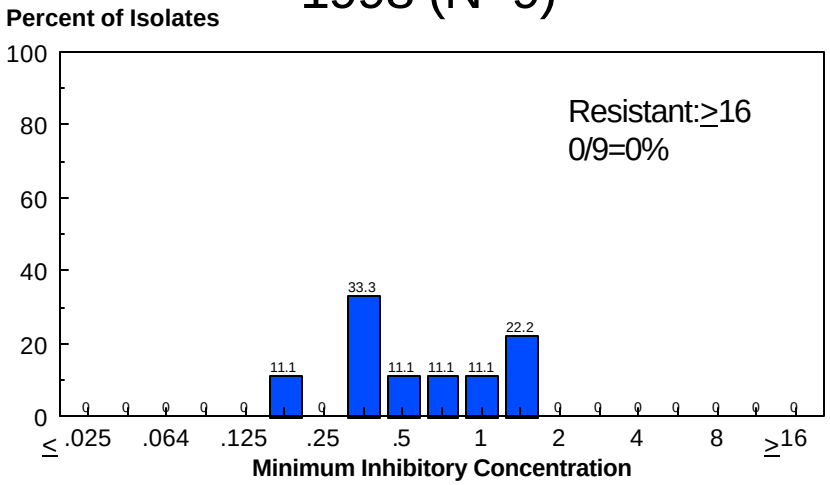



## National Antimicrobial Resistance Monitoring System For Enteric Bacteria

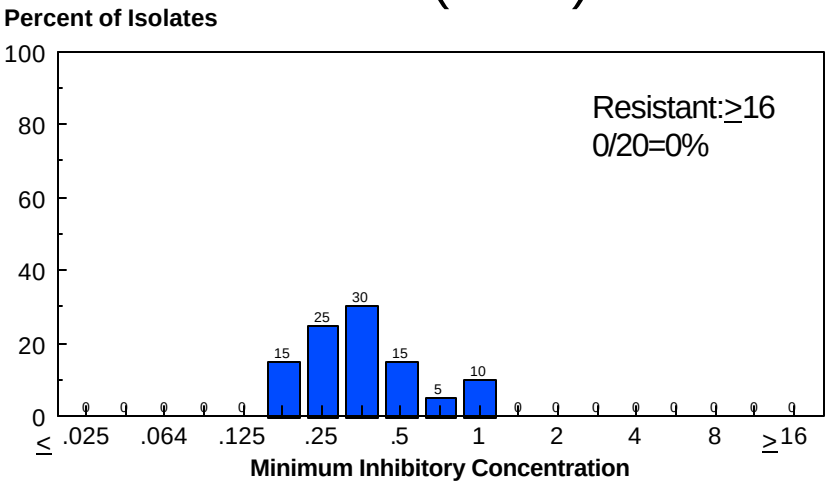
## Figure 19f. MICs for Gentamicin among *Campylobacter coli* isolates, 1997 - 1999

Not tested in 1997

1998 (N=9)

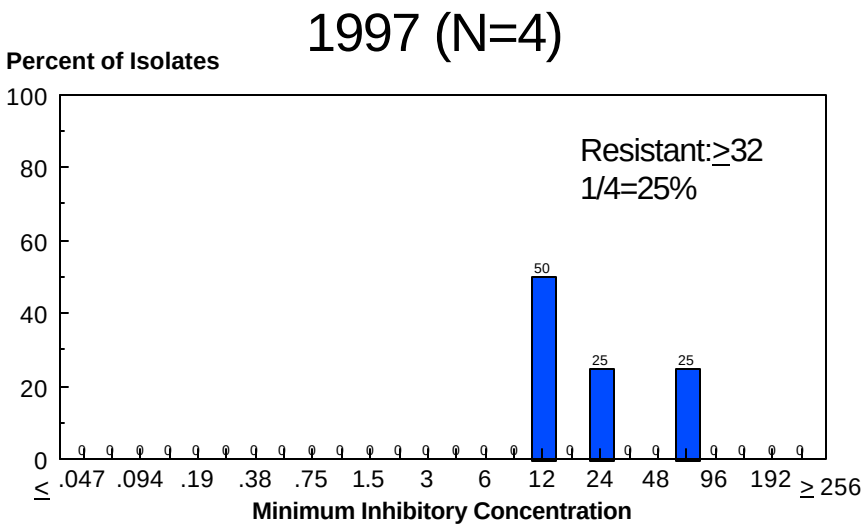


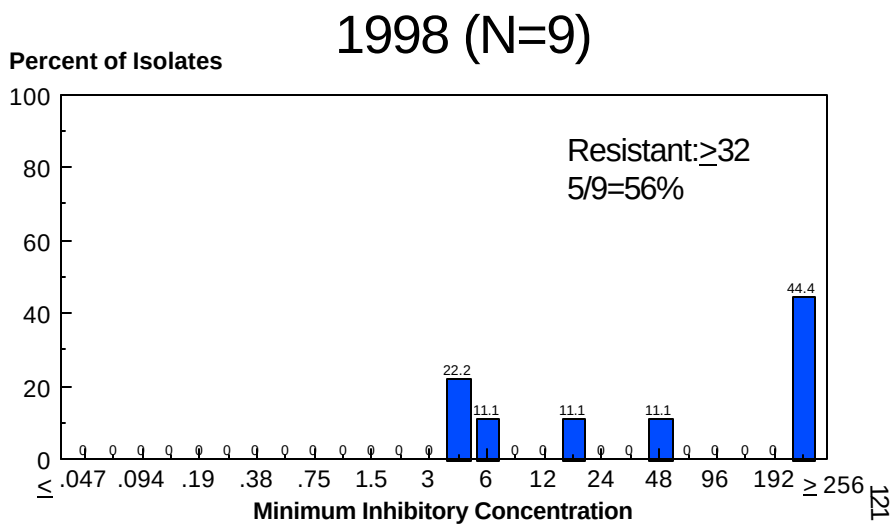

1999 (N=20)

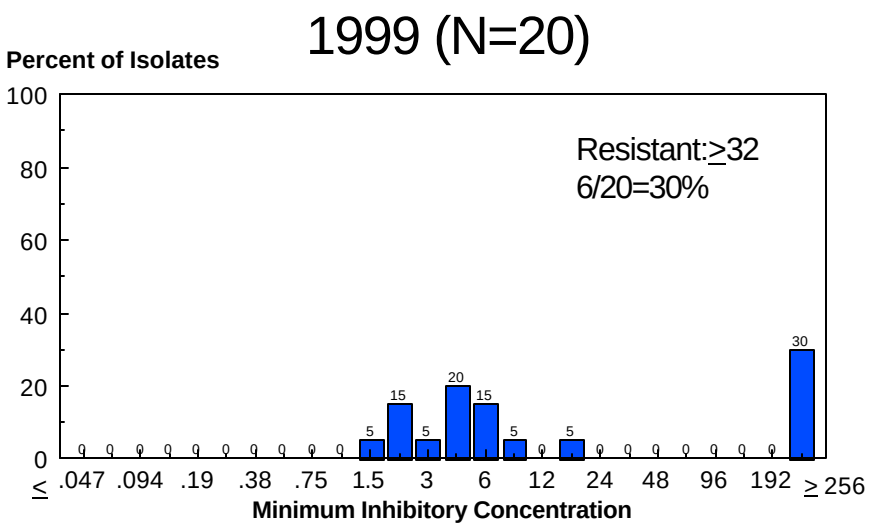


# National Antimicrobial Resistance Monitoring System For Enteric Bacteria

## Figure 19g. MICs for Nalidixic Acid among *Campylobacter coli* isolates, 1997 - 1999



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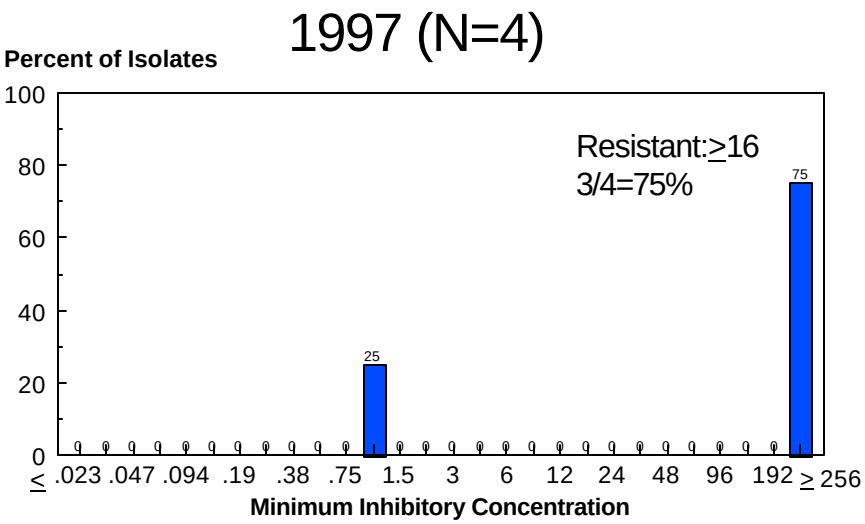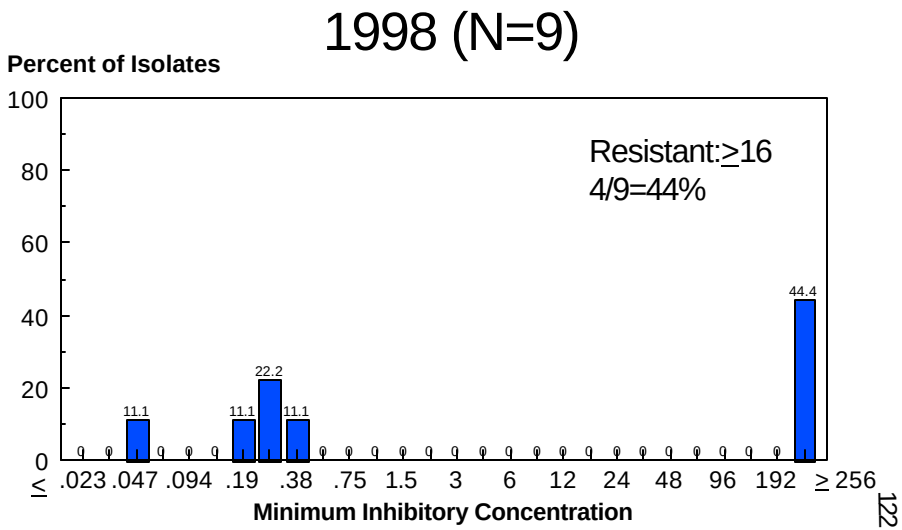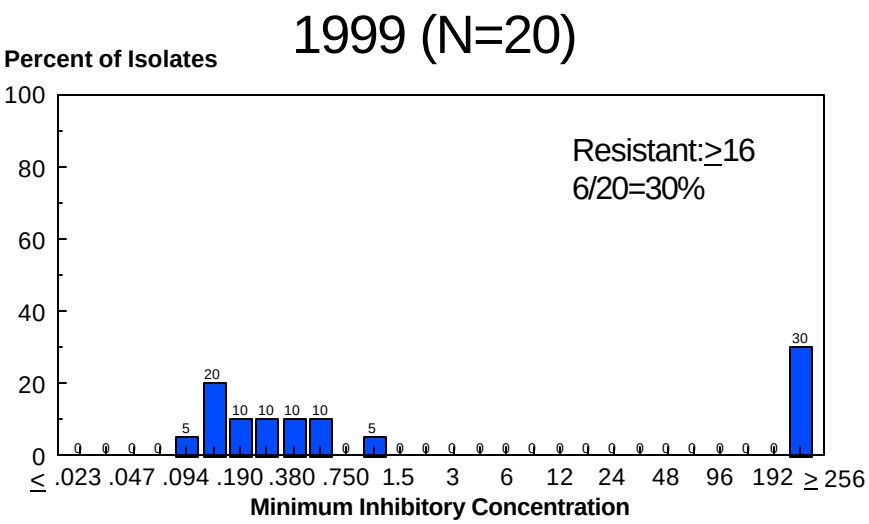
## Figure 19h. MICs for Tetracycline among *Campylobacter coli* isolates, 1997 - 1999