RR_OR_RD_goat

April 15, 2023

[ ]:
```python
import math
from scipy.stats import norm

def calculate_statistics(a, b, c, d, alpha=0.05):
    # Calculate the risk ratio
    RR = (a / (a + b)) / (c / (c + d))

    # Calculate the odds ratio
    OR = (a * d) / (b * c)

    # Calculate the risk difference
    RD = (a / (a + b)) - (c / (c + d))

    # Calculate the standard errors for RR and OR
    SE_RR = math.sqrt(1/a + 1/b + 1/c + 1/d)
    SE_OR = math.sqrt((1/a) + (1/b) + (1/c) + (1/d))

    # Calculate the confidence intervals for RR and OR
    z = abs(norm.ppf(alpha/2))
    CI_RR = (math.exp(math.log(RR) - z*SE_RR), math.exp(math.log(RR) + z*SE_RR))
    CI_OR = (math.exp(math.log(OR) - z*SE_OR), math.exp(math.log(OR) + z*SE_OR))

    # Calculate the p-values for RR and OR using the two-tailed z-test
    z_RR = (math.log(RR) - 0) / SE_RR
    p_RR = 2 * (1 - norm.cdf(abs(z_RR)))

    z_OR = (math.log(OR) - 0) / SE_OR
    p_OR = 2 * (1 - norm.cdf(abs(z_OR)))

    # Create a dictionary to store the results
    results = {
        'Risk Ratio': RR,
        'Odds Ratio': OR,
        'Risk Difference': RD,
        '95% CI for Risk Ratio': CI_RR,
        '95% CI for Odds Ratio': CI_OR,
        'p-value for Risk Ratio': p_RR,
```

```
        'p-value for Odds Ratio': p_OR
    }

    return results
```

[ ]:
```
#age
results = calculate_statistics(48, 15, 129, 288)
results
```

[ ]:
```
{'Risk Ratio': 2.4629014396456252,
 'Odds Ratio': 7.144186046511628,
 'Risk Difference': 0.45255224391915033,
 '95% CI for Risk Ratio': (1.3304424520150415, 4.55929791793799),
 '95% CI for Odds Ratio': (3.859240263686797, 13.225244032464733),
 'p-value for Risk Ratio': 0.004122327933019809,
 'p-value for Odds Ratio': 3.8986480710434535e-10}
```

[ ]:
```
#sex
results = calculate_statistics(10, 53, 111, 306)
results
```

[ ]:
```
{'Risk Ratio': 0.5963105963105962,
 'Odds Ratio': 0.5201427842937277,
 'Risk Difference': -0.10745689162955352,
 '95% CI for Risk Ratio': (0.29323712631688786, 1.2126238302036594),
 '95% CI for Odds Ratio': (0.25578142713619134, 1.0577332337299739),
 'p-value for Risk Ratio': 0.15340425640926392,
 'p-value for Odds Ratio': 0.07107883179550667}
```

[ ]:
```
#Presence of Cat
results = calculate_statistics(59, 4, 91, 326)
results
```

[ ]:
```
{'Risk Ratio': 4.291470434327577,
 'Odds Ratio': 52.84065934065934,
 'Risk Difference': 0.718282516843668,
 '95% CI for Risk Ratio': (1.5183939941013869, 12.129077538670767),
 '95% CI for Odds Ratio': (18.695908783485777, 149.3447209167987),
 'p-value for Risk Ratio': 0.005998914194461413,
 'p-value for Odds Ratio': 7.216449660063518e-14}
```

[ ]:
```
#Cat Contact with Goat
results = calculate_statistics(59, 4, 54, 363)
results
```

[ ]:
```
{'Risk Ratio': 7.231922398589066,
 'Odds Ratio': 99.15277777777777,
 'Risk Difference': 0.8070115336302387,
```

```
 '95% CI for Risk Ratio': (2.5250771895766104, 20.712515955990913),
 '95% CI for Odds Ratio': (34.61989823047211, 283.97753441100474),
 'p-value for Risk Ratio': 0.00022843076497069958,
 'p-value for Odds Ratio': 0.0}
```

[ ]:
```
#Contact with Goat in Driking Water
results = calculate_statistics(52, 11, 58, 359)
results
```

[ ]:
```
{'Risk Ratio': 5.93431855500821,
 'Odds Ratio': 29.260188087774296,
 'Risk Difference': 0.6863080963800388,
 '95% CI for Risk Ratio': (2.925964143151908, 12.035737619935142),
 '95% CI for Odds Ratio': (14.426974280720888, 59.34429425552065),
 'p-value for Risk Ratio': 7.984194738686057e-07,
 'p-value for Odds Ratio': 0.0}
```

[ ]:
```
#Presence of Rats
results = calculate_statistics(60, 3, 291, 126)
results
```

[ ]:
```
{'Risk Ratio': 1.364752086401571,
 'Odds Ratio': 8.65979381443299,
 'Risk Difference': 0.2545392257622473,
 '95% CI for Risk Ratio': (0.4201069807360931, 4.433509421990478),
 '95% CI for Odds Ratio': (2.665714798627583, 28.13205259133527),
 'p-value for Risk Ratio': 0.6049450070378419,
 'p-value for Odds Ratio': 0.0003294404073079793}
```

[ ]:
```
#Housing Type
results = calculate_statistics(54, 9, 330, 87)
results
```

[ ]:
```
{'Risk Ratio': 1.0831168831168831,
 'Odds Ratio': 1.5818181818181818,
 'Risk Difference': 0.06577595066803699,
 '95% CI for Risk Ratio': (0.5146288973821412, 2.279588628739025),
 '95% CI for Odds Ratio': (0.7515803321480193, 3.3291833930505184),
 'p-value for Risk Ratio': 0.8334398335590478,
 'p-value for Odds Ratio': 0.22712242738527033}
```

[ ]:
```
#Water Souce
results = calculate_statistics(37, 34, 268, 141)
results
```

[ ]:
```
{'Risk Ratio': 0.7953016607105318,
 'Odds Ratio': 0.5725417032484635,
 'Risk Difference': -0.13412996315300119,
```

```
'95% CI for Risk Ratio': (0.4783798904078404, 1.3221808529403085),
'95% CI for Odds Ratio': (0.3443881118130944, 0.9518447086714676),
'p-value for Risk Ratio': 0.37717817127773134,
'p-value for Odds Ratio': 0.03153461194061169}
```