RR_OR_RD_combine

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

    return results
```

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#age
results = calculate_statistics(182, 71, 305, 882)
results
```

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{'Risk Ratio': 2.7996371411909546,
 'Odds Ratio': 7.412791503117063,
 'Risk Difference': 0.4624172940718122,
 '95% CI for Risk Ratio': (2.0666053874055166, 3.7926776781395604),
 '95% CI for Odds Ratio': (5.471892993082234, 10.042133122514214),
 'p-value for Risk Ratio': 3.001310311390171e-11,
 'p-value for Odds Ratio': 0.0}
```

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#sex
results = calculate_statistics(64, 189, 314, 873)
results
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{'Risk Ratio': 0.9562699831323481,
 'Odds Ratio': 0.9414619350925083,
 'Risk Difference': -0.011568007831880944,
 '95% CI for Risk Ratio': (0.7003782918686755, 1.3056548029209991),
 '95% CI for Odds Ratio': (0.6895327821538558, 1.2854364551885198),
 'p-value for Risk Ratio': 0.7783881377614339,
 'p-value for Odds Ratio': 0.7042118759454468}
```

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#Presence of Cat
results = calculate_statistics(228, 25, 220, 967)
results
```

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{'Risk Ratio': 4.862306863097377,
 'Odds Ratio': 40.08654545454545,
 'Risk Difference': 0.7158445744578121,
 '95% CI for Risk Ratio': (3.1374260812409016, 7.535485273193449),
 '95% CI for Odds Ratio': (25.866029593990493, 62.125156110262836),
 'p-value for Risk Ratio': 1.4925838343060605e-12,
 'p-value for Odds Ratio': 0.0}
```

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#Cat Contact
results = calculate_statistics(230, 23, 121, 1066)
results
```

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{'Risk Ratio': 8.918106686701726,
 'Odds Ratio': 88.09917355371901,
 'Risk Difference': 0.8071532511296622,
```

```
 '95% CI for Risk Ratio': (5.584702446958707, 14.241157453018038),
 '95% CI for Odds Ratio': (55.169520550158204, 140.68391937160024),
 'p-value for Risk Ratio': 0.0,
 'p-value for Odds Ratio': 0.0}
```

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#Contact with animals in Driking Water
results = calculate_statistics(194, 59, 129, 1058)
results
```

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{'Risk Ratio': 7.055734289303552,
 'Odds Ratio': 26.967809749047433,
 'Risk Difference': 0.6581210811458788,
 '95% CI for Risk Ratio': (5.002127389779454, 9.952442727263065),
 '95% CI for Odds Ratio': (19.11869328647674, 38.039355083709296),
 'p-value for Risk Ratio': 0.0,
 'p-value for Odds Ratio': 0.0}
```

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```
#Presence of Rats
results = calculate_statistics(204, 13, 837, 350)
results
```

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{'Risk Ratio': 1.333201195844276,
 'Odds Ratio': 6.561896884477529,
 'Risk Difference': 0.23495316000139765,
 '95% CI for Risk Ratio': (0.7506769568725732, 2.3677634065199156),
 '95% CI for Odds Ratio': (3.69476475111606, 11.653919430055572),
 'p-value for Risk Ratio': 0.3264190710558976,
 'p-value for Odds Ratio': 1.3653789210366085e-10}
```

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```
#Housing Type
results = calculate_statistics(225, 28, 922, 265)
results
```

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{'Risk Ratio': 1.1449375391184313,
 'Odds Ratio': 2.309614192748683,
 'Risk Difference': 0.11257995877606874,
 '95% CI for Risk Ratio': (0.7554065547153691, 1.7353330604557686),
 '95% CI for Odds Ratio': (1.5238365766305189, 3.500583856007251),
 'p-value for Risk Ratio': 0.5235214987055286,
 'p-value for Odds Ratio': 7.970215324126784e-05}
```

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```
#Water Souce
results = calculate_statistics(140, 113, 787, 400)
results
```

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{'Risk Ratio': 0.8346098407420987,
 'Odds Ratio': 0.6297016788296544,
 'Risk Difference': -0.10965632294521344,
```

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'95% CI for Risk Ratio': (0.6336079244947078, 1.0993763798315141),
'95% CI for Odds Ratio': (0.4780484896024367, 0.8294644015100852),
'p-value for Risk Ratio': 0.19843425505591616,
'p-value for Odds Ratio': 0.0010019478042930796}
```