

RR_OR_RD_cattle

April 15, 2023

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[ ]: 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(87, 32, 98, 263)
results

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[ ]: {'Risk Ratio': 2.6931058137540727,
      'Odds Ratio': 7.296237244897959,
      'Risk Difference': 0.4596242929304685,
      '95% CI for Risk Ratio': (1.6884059935922338, 4.295660493744736),
      '95% CI for Odds Ratio': (4.574276521940456, 11.637922997985546),
      'p-value for Risk Ratio': 3.2010235663681996e-05,
      'p-value for Odds Ratio': 0.0}

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[ ]: #sex
results = calculate_statistics(25, 94, 95, 266)
results

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[ ]: {'Risk Ratio': 0.7983193277310925,
      'Odds Ratio': 0.7446808510638298,
      'Risk Difference': -0.05307386112339671,
      '95% CI for Risk Ratio': (0.4844945173770747, 1.3154199401043207),
      '95% CI for Odds Ratio': (0.4519416942610338, 1.227037861261925),
      'p-value for Risk Ratio': 0.37669257921392885,
      'p-value for Odds Ratio': 0.24728240921332523}

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[ ]: #Presence of Cat
results = calculate_statistics(106, 13, 56, 305)
results

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[ ]: {'Risk Ratio': 5.742196878751502,
      'Odds Ratio': 44.40934065934066,
      'Risk Difference': 0.7356316487813963,
      '95% CI for Risk Ratio': (3.019967323533583, 10.918272107581242),
      '95% CI for Odds Ratio': (23.356001280130275, 84.44037633596015),
      'p-value for Risk Ratio': 9.764948272206198e-08,
      'p-value for Odds Ratio': 0.0}

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[ ]: #Cat Contact with Cattle
results = calculate_statistics(114, 5, 30, 331)
results

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[ ]: {'Risk Ratio': 11.527731092436976,
      'Odds Ratio': 251.56,
      'Risk Difference': 0.8748807002025187,

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'95% CI for Risk Ratio': (4.368294290569739, 30.421161052820466),
'95% CI for Odds Ratio': (95.32561984002855, 663.8554641050116),
'p-value for Risk Ratio': 7.89770913334209e-07,
'p-value for Odds Ratio': 0.0}
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[ ]: #Contact with Can in Driking Water
results = calculate_statistics(87, 32, 34, 327)
results
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[ ]: {'Risk Ratio': 7.762481463173504,
'Odds Ratio': 26.14797794117647,
'Risk Difference': 0.6369096114900253,
'95% CI for Risk Ratio': (4.534787171129101, 13.287529533852261),
'95% CI for Odds Ratio': (15.275465130725994, 44.75914445557419),
'p-value for Risk Ratio': 7.882583474838611e-14,
'p-value for Odds Ratio': 0.0}
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[ ]: #Presence of Rats
results = calculate_statistics(112, 7, 242, 119)
results
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[ ]: {'Risk Ratio': 1.4039863879436072,
'Odds Ratio': 7.867768595041323,
'Risk Difference': 0.27081635978491114,
'95% CI for Risk Ratio': (0.6343296819911123, 3.1074973054131108),
'95% CI for Odds Ratio': (3.5547062234571207, 17.4140361464009),
'p-value for Risk Ratio': 0.4025585064600927,
'p-value for Odds Ratio': 3.60571790425368e-07}
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[ ]: #Housing Type
results = calculate_statistics(107, 12, 283, 78)
results
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[ ]: {'Risk Ratio': 1.146984588888559,
'Odds Ratio': 2.4575971731448765,
'Risk Difference': 0.11522614586000612,
'95% CI for Risk Ratio': (0.6004672502647804, 2.1909165680022427),
'95% CI for Odds Ratio': (1.2865967259828468, 4.694387715650236),
'p-value for Risk Ratio': 0.6779143064220883,
'p-value for Odds Ratio': 0.006466555942741481}
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[ ]: #Water Souce
results = calculate_statistics(65, 54, 241, 120)
results
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[ ]: {'Risk Ratio': 0.8181944977160989,
'Odds Ratio': 0.5993545412632549,
'Risk Difference': -0.12137154030587305,
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'95% CI for Risk Ratio': (0.53645105133358, 1.247909262976953),  
'95% CI for Odds Ratio': (0.3929681447134257, 0.9141348248338406),  
'p-value for Risk Ratio': 0.3515120092535786,  
'p-value for Odds Ratio': 0.01746318500784927}
```