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SHORT META-ANALYSIS · Peer-reviewed · Published · Same-author engine figures

RR/OR NMA: An Interactive R Shiny App for Conducting Frequentist Network Meta-Analysis of Ratio Outcomes

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KEY WORDS Network meta-analysis, NMA, netmeta, Shiny, R, frequentist, odds ratio, risk ratio, hazard ratio, inconsistency

Background

Network meta-analysis (NMA) is a valuable technique for comparing three or more treatments. Yet, performing the analysis and checking crucial factors such as consistency and bias tends to necessitate statistical programming abilities, and therefore represents a drawback in the meta-analysis of research studies with ratio measures (RR,OR, HR)

Methods

We created 786-MIII RR/OR NMA, an R (v4.4.0) and Shiny framework (v1.8.1.1) interactive web application with a bs4Dash (v2.3.2) dashboard layout. It performs frequentist NMA through the netmeta package (v[e.g., 2.8-1]). Data (arm-level for RR/OR binary; contrast-level for log-ratios) are uploaded via CSV. visNetwork and igraph are used for network plots.Results and Functionality: The 786-MIII RR/OR NMA offers functionalities for uploading data, choosing the outcome (binary RR/OR or survival/ratio HR), visualizing the network graph, conducting fixed- or random-effects NMA, and investigating results.

Outputs comprise forest plots (with RR/OR/HR) that can be customized, league tables, P-score rankings, inconsistency diagnostics (design decomposition, heat plots, node-splitting), comparison-adjusted funnel plots, and leave-one-out analysis. Results and plots can be downloaded as well

Conclusions

The 786-MIII RR/OR NMA provides a graphical workflow for the frequentist network meta-analysis (NMA) of ratio measures under the netmeta package. With integrated analysis, visualisation, and diagnostic capabilities, it is designed to optimize the accessibility and efficiency of NMA

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Engine figures (live frequentist-NMA engine, same author)

This paper describes a frequentist network meta-analysis of ratio outcomes. The figures below are rendered directly from **LivingNMA** — an open-source, browser-based frequentist NMA engine by the same author (Mahmood Ahmad) that implements exactly this class of analysis (graph-theoretic frequentist NMA, node-splitting consistency, P-scores, comparison-adjusted funnel) — running one of its own bundled example networks of ratio outcomes. They illustrate the method the paper describes on openly-available example data, and are not output of the paper's own R Shiny build; because the engine is public, each figure can be reproduced first-hand. **Live engine:** https://mahmood726-cyber.github.io/LivingNMA/

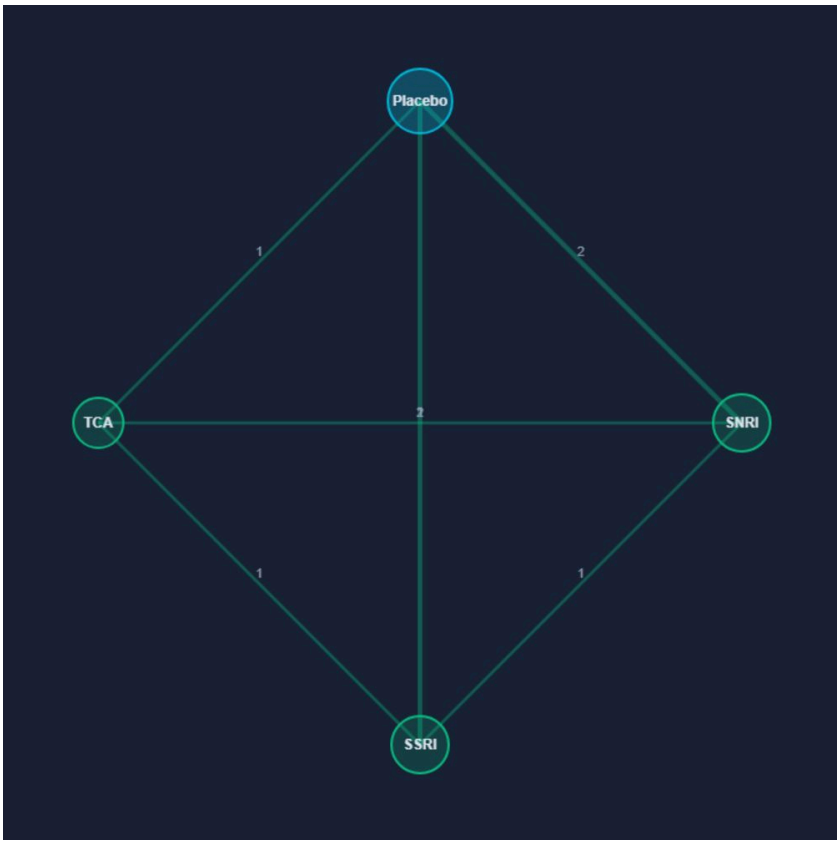

Figure 1. Network Graph Rendered from the open LivingNMA engine (same author) running one of its bundled ratio-outcome example networks.

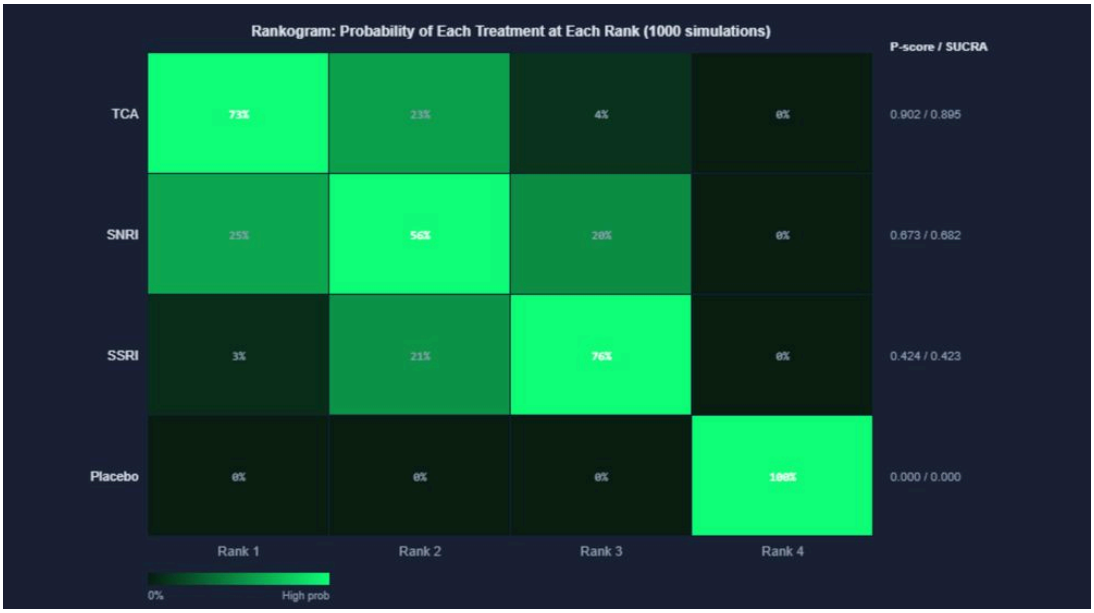

Figure 2. Rankogram (Salanti et al. 2011) — Probability of Each Rank Rendered from the open LivingNMA engine (same author) running one of its bundled ratio-outcome example networks.

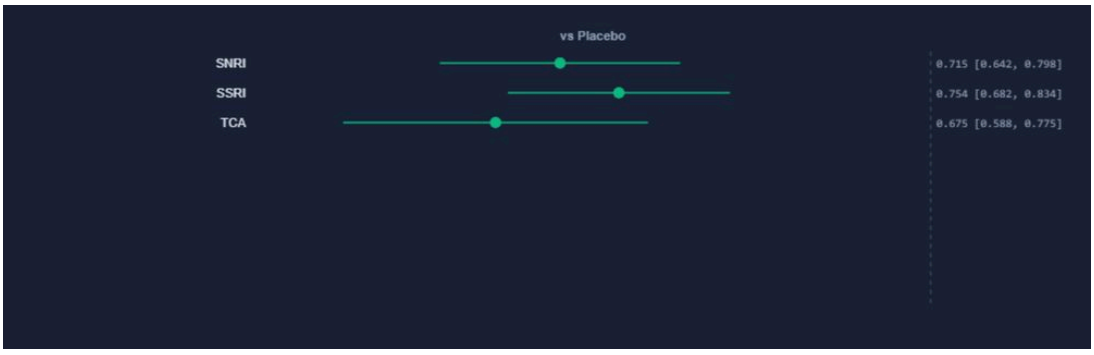

Figure 3. Forest Plot — All Comparisons vs Reference Rendered from the open LivingNMA engine (same author) running one of its bundled ratio-outcome example networks.

Figure 4. Net Heat Plot (Krahn et al. 2013) Rendered from the open LivingNMA engine (same author) running one of its bundled ratio-outcome example networks.

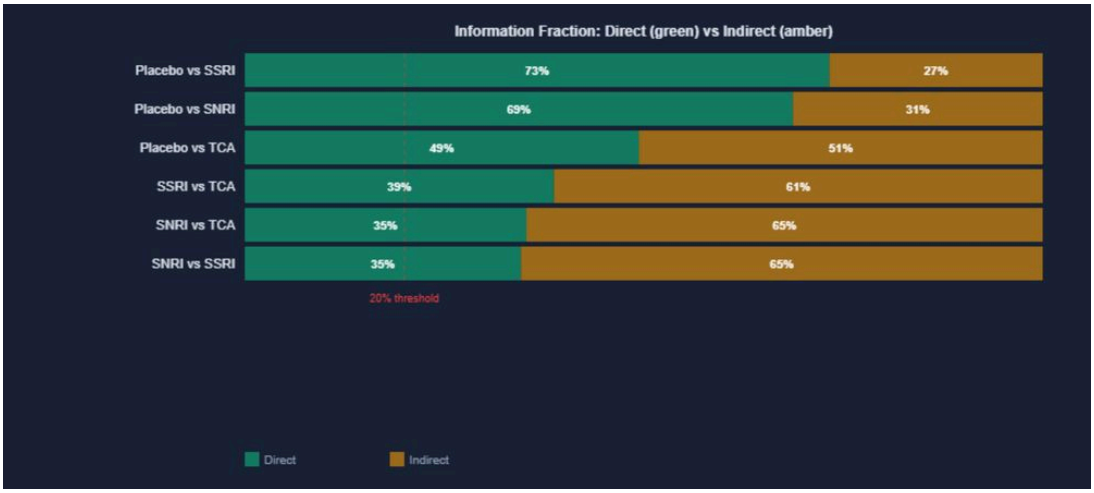

Figure 5. Information Fraction: Direct vs Indirect Evidence Rendered from the open LivingNMA engine (same author) running one of its bundled ratio-outcome example networks.

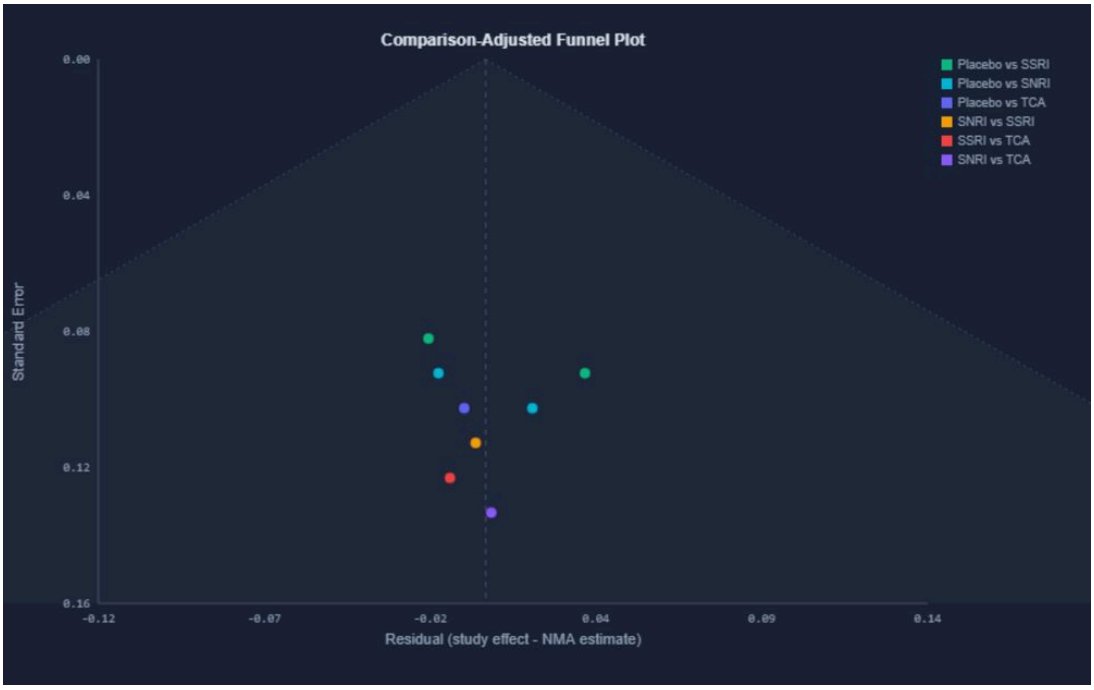

Figure 6. Comparison-Adjusted Funnel Plot (Chaimani & Salanti 2012) Rendered from the open LivingNMA engine (same author) running one of its bundled ratio-outcome example networks.

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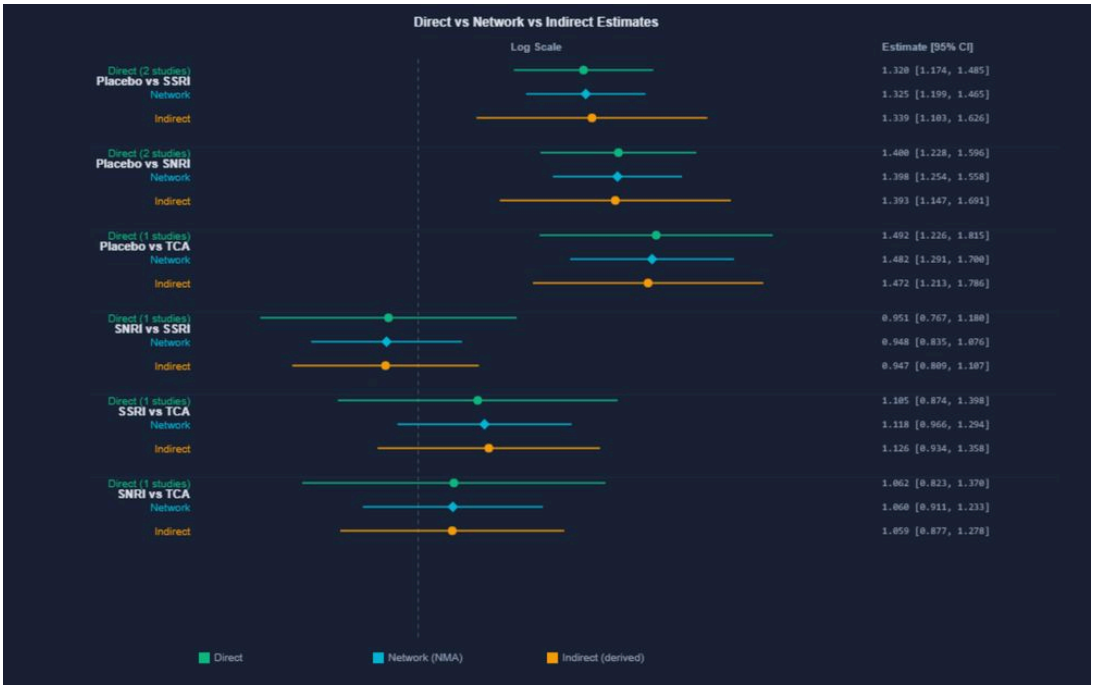

Figure 7. Direct vs Network Estimates (Split Forest) Rendered from the open LivingNMA engine (same author) running one of its bundled ratio-outcome example networks.

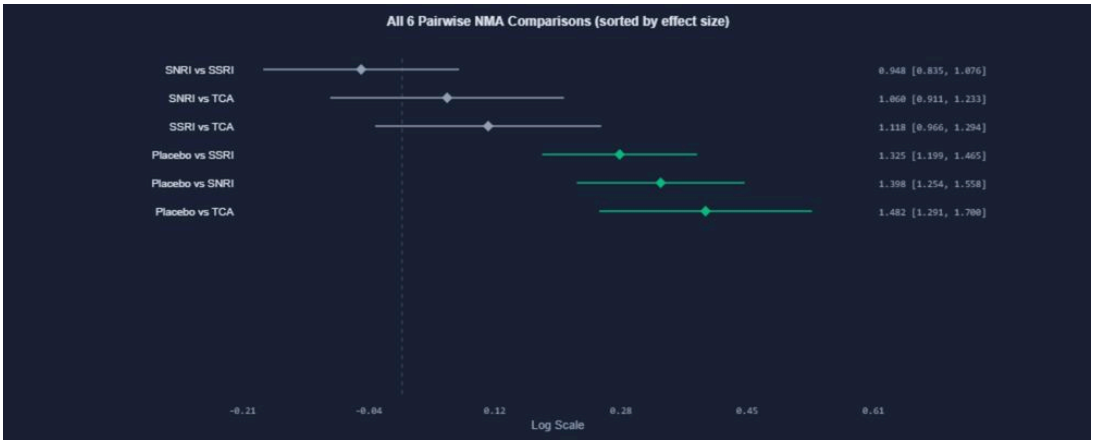

Figure 8. Network Forest Plot — All T(T-1)/2 Pairwise Comparisons Rendered from the open LivingNMA engine (same author) running one of its bundled ratio-outcome example networks.

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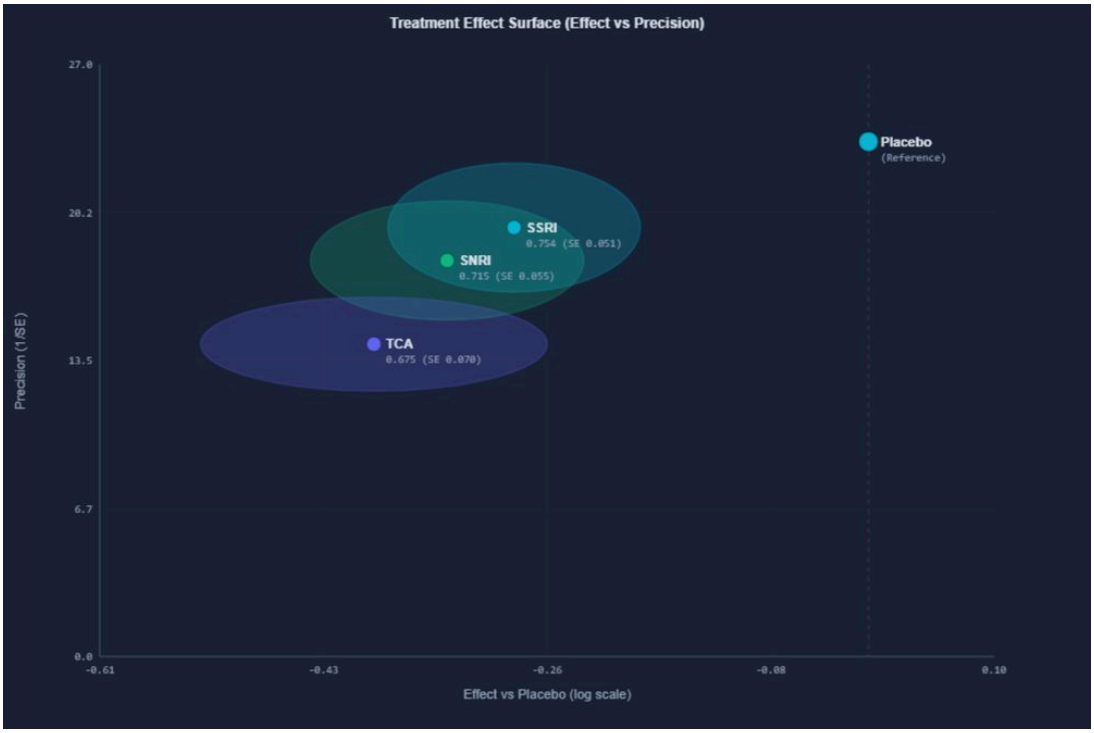

Figure 9. Treatment Effect Surface Rendered from the open LivingNMA engine (same author) running one of its bundled ratio-outcome example networks.

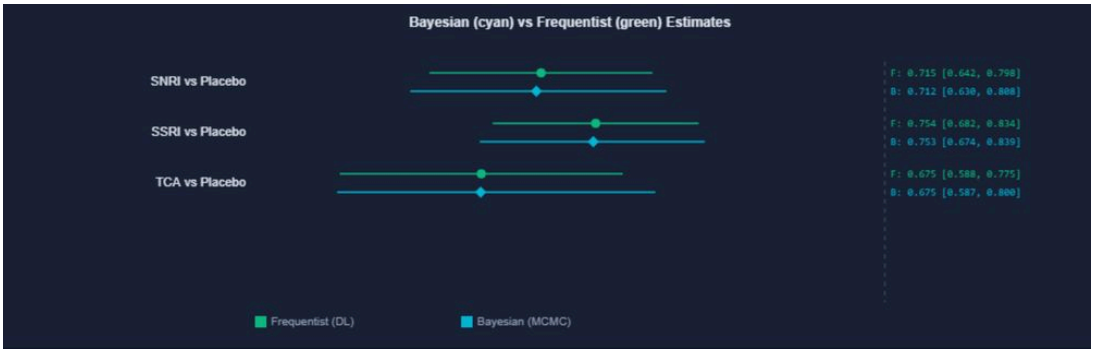

Figure 10. Bayesian vs Frequentist Comparison Rendered from the open LivingNMA engine (same author) running one of its bundled ratio-outcome example networks.

HOW TO CITE

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Reproducibility & data provenance. The figures above are rendered from https://mahmood726-cyber.github.io/LivingNMA/ (LivingNMA, an open frequentist-NMA engine by the same author) running its own bundled ratio-outcome example network. They demonstrate the method this paper describes on openly-available example data, and are not output of the paper's original R Shiny application; because the engine is public, each figure can be reproduced first-hand. The article text, authors and abstract follow the journal's published record.

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