

# Reporting standards in predictive modeling of cancer outcomes: an umbrella review of adherence to the TRIPOD-SRMA statement

Heather Ward, PhD, MSc; Mwedusasa Mtenga MPH  
Pfizer, Inc

## INTRODUCTION

The use of machine learning has increased substantially in recent years; synthesis of these studies has been achieved with systematic reviews (SR) and meta-analyses (MA).

The Transparent Reporting Of Multivariable Prediction Model For Individual Prognosis or Diagnosis: checklist for SR or MA (TRIPOD-SRMA) statement<sup>1</sup> was developed to support the quality of reporting in such reviews, drawing on existing review reporting guidelines (PRISMA<sup>2</sup> and TRIPOD<sup>3</sup>).

## OBJECTIVE

The objective of this umbrella review was to assess TRIPOD-SRMA adherence in machine learning publications, focused on the most prevalent cancer types (breast, lung, prostate, and colorectal cancer) to maintain a defined scope for the umbrella review.

## METHODS:

- Keywords searched in PUBMED; filtered to SR and MA, 08 June 2014-June 08 2024:  
*((machine learning OR deep learning OR supervised machine learning OR data mining[MeSH Terms]) OR (machine AND (learn\* or model\*)) AND (breast cancer[MeSH terms] OR lung cancer[MeSH terms] OR prostate cancer[MeSH terms] or colorectal cancer [MeSH terms]))*
- An adherence scoring system was developed based on the 26-item TRIPOD-SRMA checklist.
- Maximum possible scores: 59 (MA) and 50 (SR).
- Screening of abstracts and titles, and article scoring, was conducted independently by two reviewers, with third party resolution as required.

## RESULTS:

12 SR<sup>4-15</sup> and 4 MA<sup>6-19</sup> publications were identified for this review, published between 2021 and 2024.

For the majority of TRIPOD-SRMA checklist items, moderate adherence was observed (e.g. 30 to 75% of publications achieved the maximum possible score).

**Highest adherence** was observed for: rationale, methods: synthesis, methods: heterogeneity, study selection, study and model characteristics, results: synthesis, implications and competing interests (Figure 1).

**Lowest adherence** was observed for abstract, methods: certainty assessment (Figure 1).

A post-hoc evaluation of TRIPOD-SRMA scores ranked by journal IF as a measure of journal quality did not yield evidence of a relationship between adherence score and journal IF:

- For the 12 SR publications, median TRIPOD-SRMA scores values from the lowest to highest quartile of journal IF values were 42, 34, 26, and 35
- For the 4 MA publications, the scores followed a non-linear pattern from lowest to highest journal IF scores (TRIPOD-SRMA scores 49, 48, 42, and 49).

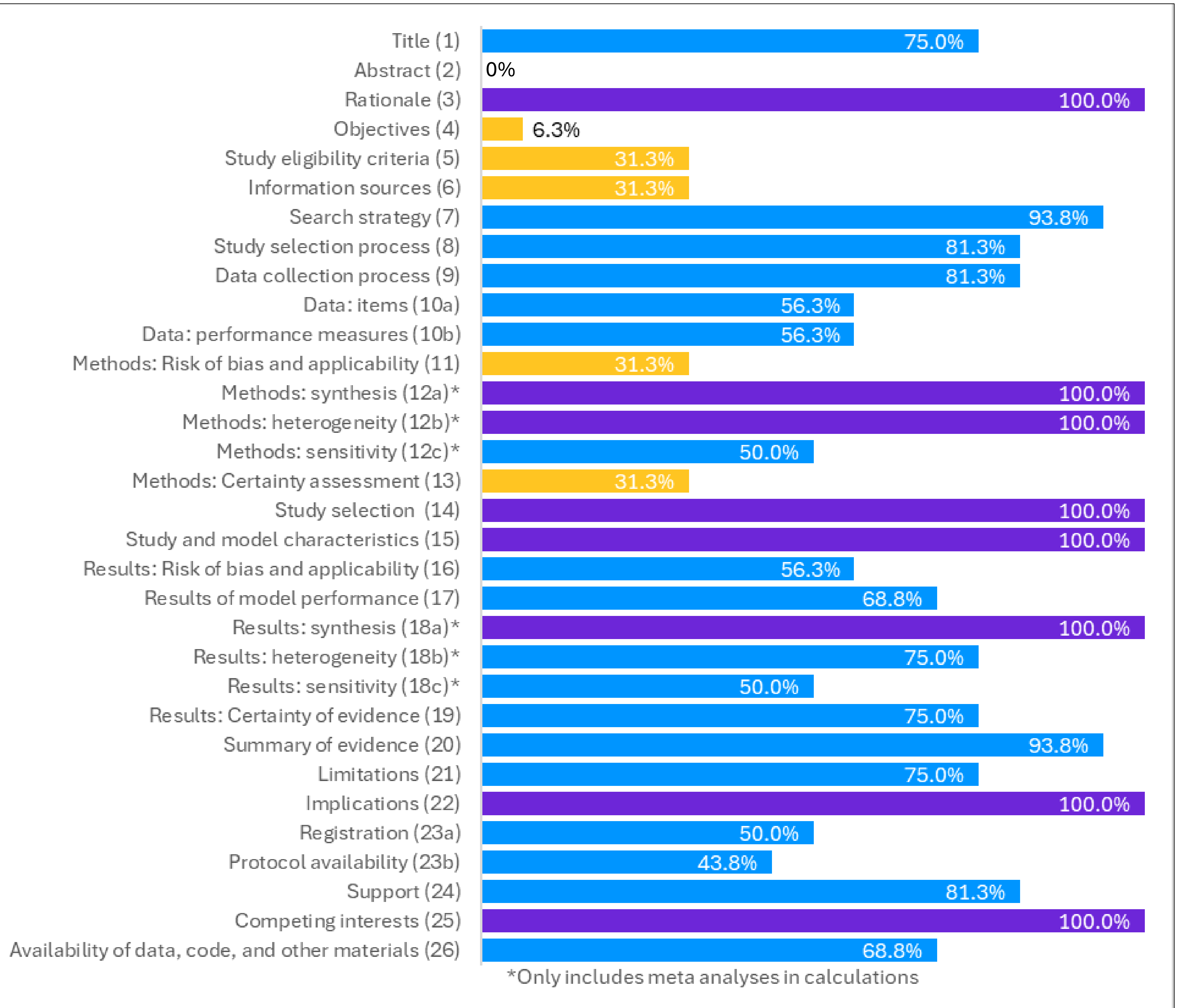


Figure 1  
Proportion of reviewed publications achieving the maximum score per checklist item.

## DISCUSSION AND CONCLUSION

- For most TRIPOD-SRMA checklist items, the degree of adherence was moderate or below.
- Scoring system was designed to be parsimonious and underwent pilot testing, however, scoring system values and guidance were subject to study team decisions, and values not weighted by complexity of checklist item
- Use of independent raters and abstractors was a strength of this review
- The feasibility of fully adhering to TRIPOD-SRMA guidelines considering word limits is warranted, particularly for abstracts; use of online supplements is recommended to provide additional information above wordcount limits
- The TRIPOD-SRMA checklist provides a comprehensive guide for aspects of a predictive modeling SR or MA to consider a priori, and wider uptake of such guidelines could improve the overall reporting quality of SR and MA publications

### References:

1. Snell K et al. BMJ-BRITISH MEDICAL JOURNAL. 2023;381.
2. Page M et al. BMJ-BRITISH MEDICAL JOURNAL. 2021;372
3. Collins G et al. BMJ-BRITISH MEDICAL JOURNAL. 2015;350
4. Altuhaifa FA et al. Comput Biol Med. 2023;165:107338.
5. El Haji H et al. JCO Clin Cancer Inform. 2023;7:e2300049.
6. Khan N et al. Tomography. 2022;8(6):2784-95.
7. Li J et al. PLoS One. 2021;16(4):e0250370..
8. Prabhakaran S et al. Langenbecks Arch Surg. 2023;408(1):321.
9. Prelaj A et al. Ann Oncol. 2024;35(1):29-65.
10. Qian L et al. Eur J Radiol. 2024;171:111314.
11. Salem H et al. BMC Med Inform Decis Mak. 2021;21(1):223.
12. Soh CL et al.. Br J Surg. 2022;109(11):1053-62.
13. Urso L et al. Int J Mol Sci. 2022;23(21)
14. Walls GM et al. Clin Oncol (R Coll Radiol). 2022;34(3):e107-e22.
15. Zhang C et al. Methods. 2021;188:61-72.
16. Kothari G et al. Radiother Oncol. 2021;155:188-203.
17. Liang X et al. Eur J Radiol. 2022;150:110247.
18. Lu D et al. J Cancer Res Clin Oncol. 2023;149(12):10659-74.
19. Shen H et al. Radiol Med. 2024;129(4):598-614.

**Acknowledgements.** The authors would like to thank Li Wang and Dominique Sighoko for contributions to article screening and resolution of reviewer discordance. HW, MM, LW, and DS are employees of Pfizer Inc and own Pfizer stock.

