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INTRODUCTION

- Aircraft may introduce insect vectors of infectious disease agents to distant locations (1).
- Insect vectors may transmit pathogens to people in places served by aircraft (giving rise to "airport malaria").
- Mosquitoes act as vectors of pathogens that cause serious diseases such as malaria, dengue, chikungunya, Zika virus disease and yellow fever.

RATIONALE

- Aircraft disinsection using aerosol or residual sprays of chemical (insecticidal) products has been widely used to eliminate relevant vectors.
- Increased geographical spread of mosquito-borne infections in recent years has drawn renewed attention to the effectiveness of disinsection of aircraft.
- Using an evidence-based approach, we examined the effectiveness of disinsection for eradicating adult mosquitoes aboard international air, marine, and land conveyances.

METHODS

- A systematic review was conducted to evaluate evidence, with the search strategy capturing literature up to May 31, 2024.
- Conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines.
- Registered in the International Prospective Register of Systematic Reviews, PROSPERO (CRD42024543998).
- The certainty of the evidence was rated and key primary outcomes including mosquito mortality following aircraft disinsection were synthesized.
- A novel quality assessment checklist was developed by four study authors based on the WHO Guidelines for testing the efficacy of insecticide products used in aircraft (2)
- Summary estimates of both continuous and dichotomous outcomes were pooled for each combination of disinsection and efficacy and, where applicable, safety outcome.

RESULTS

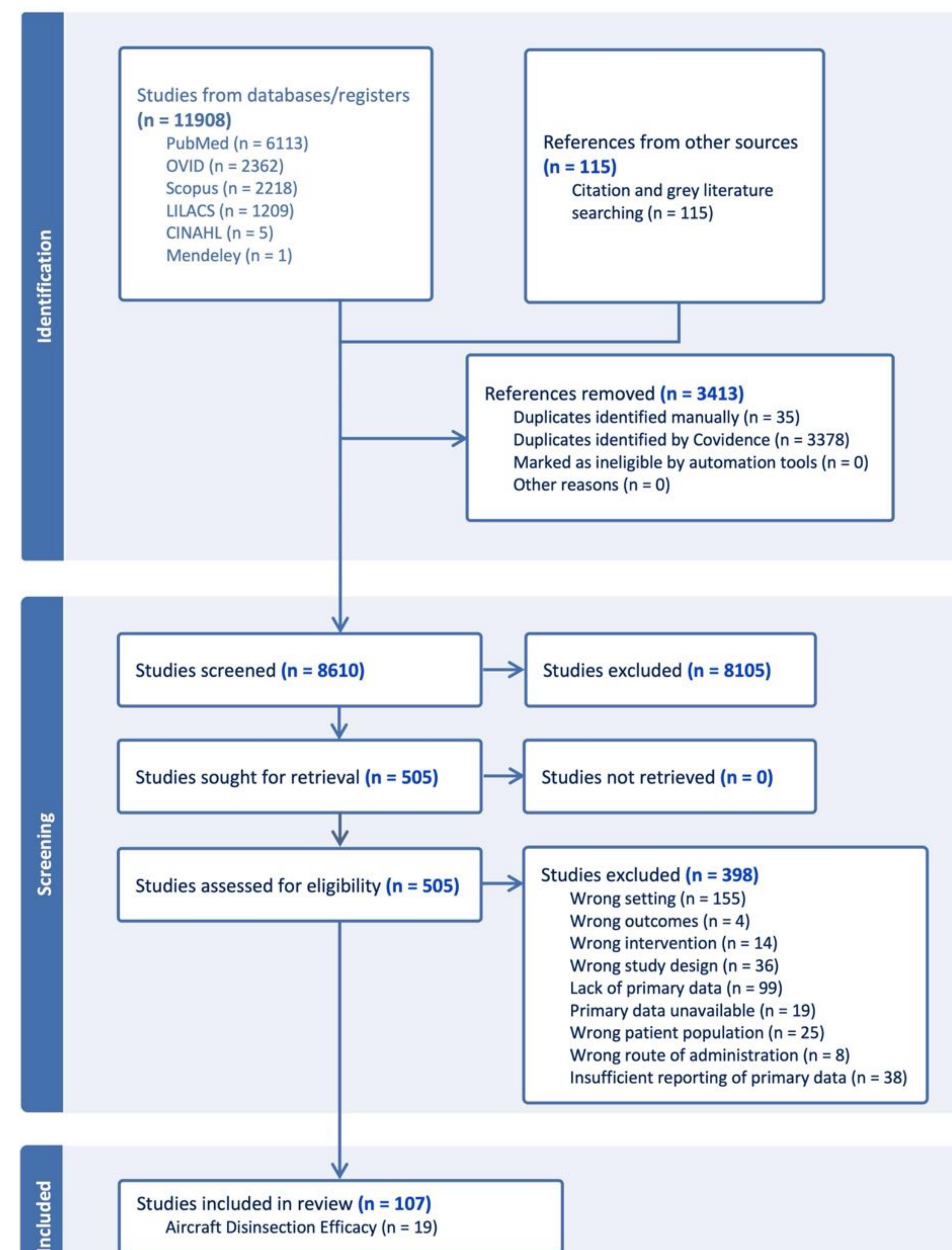


Figure 1. PRISMA Flowchart

RESULTS

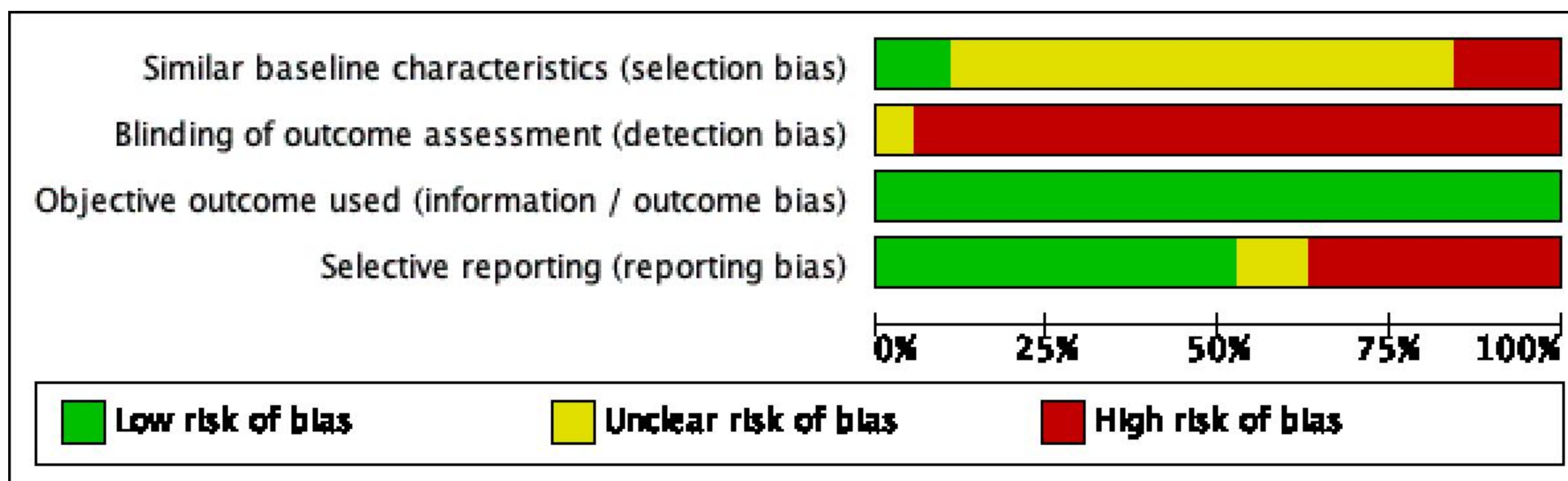
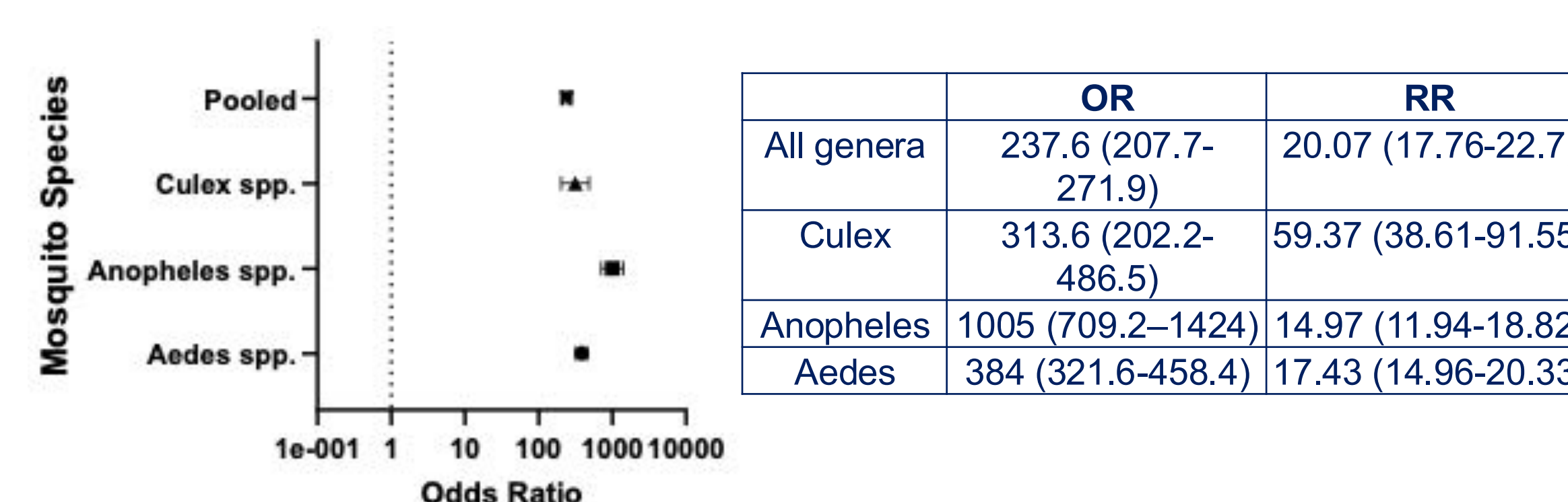
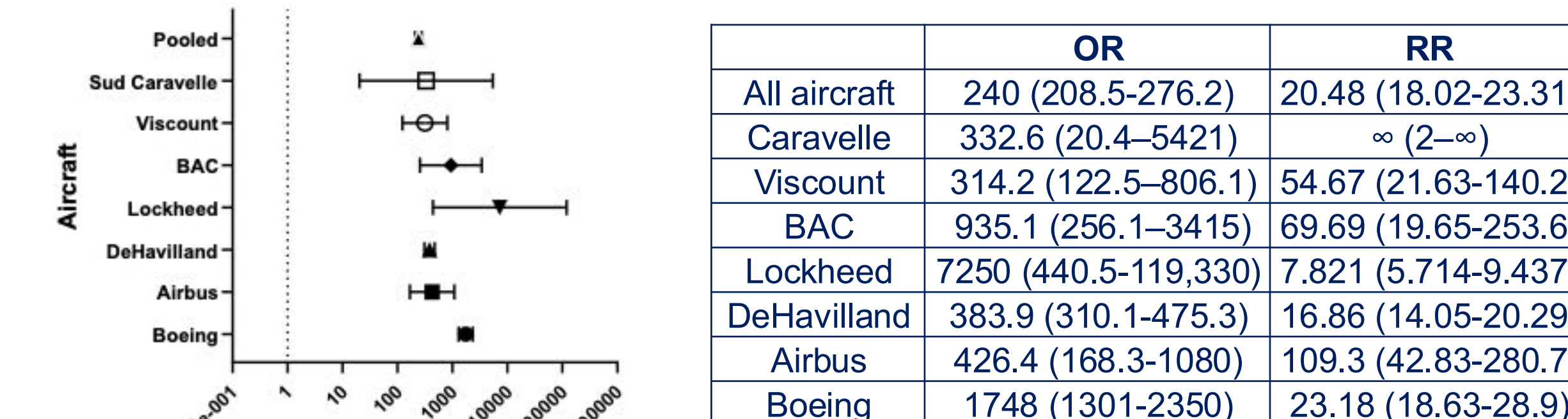


Figure 2. Summary of GRADE Risk of Bias Assessment

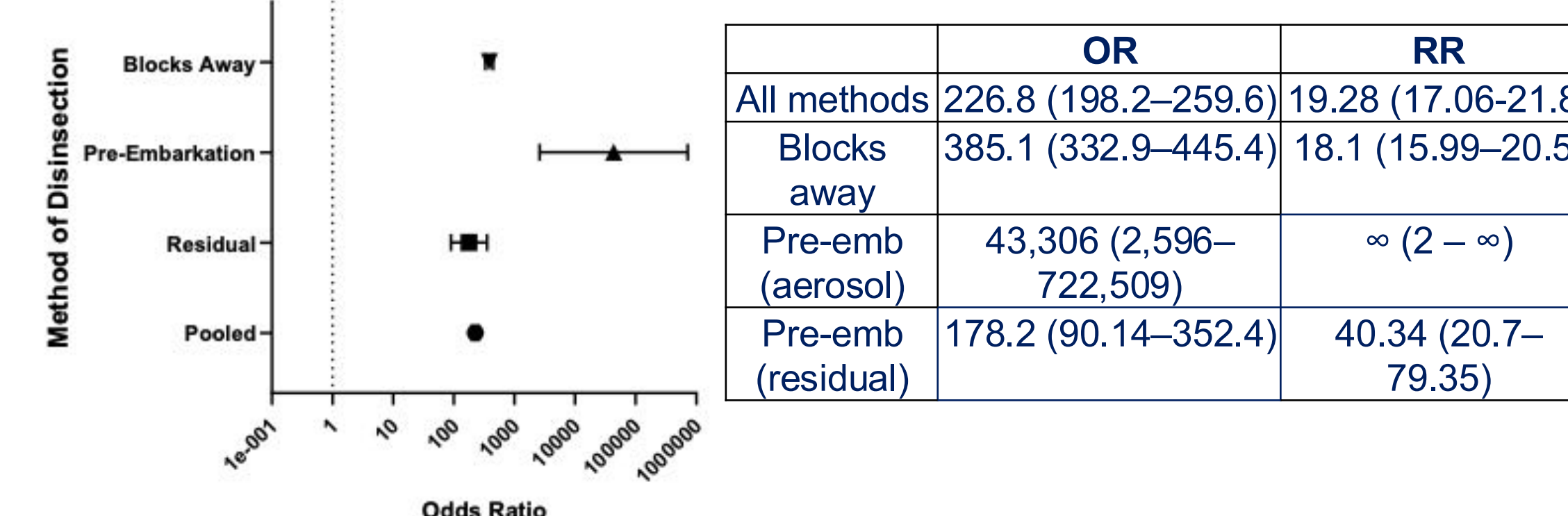
Disinsection vs. Control for Mosquito Mortality by Species



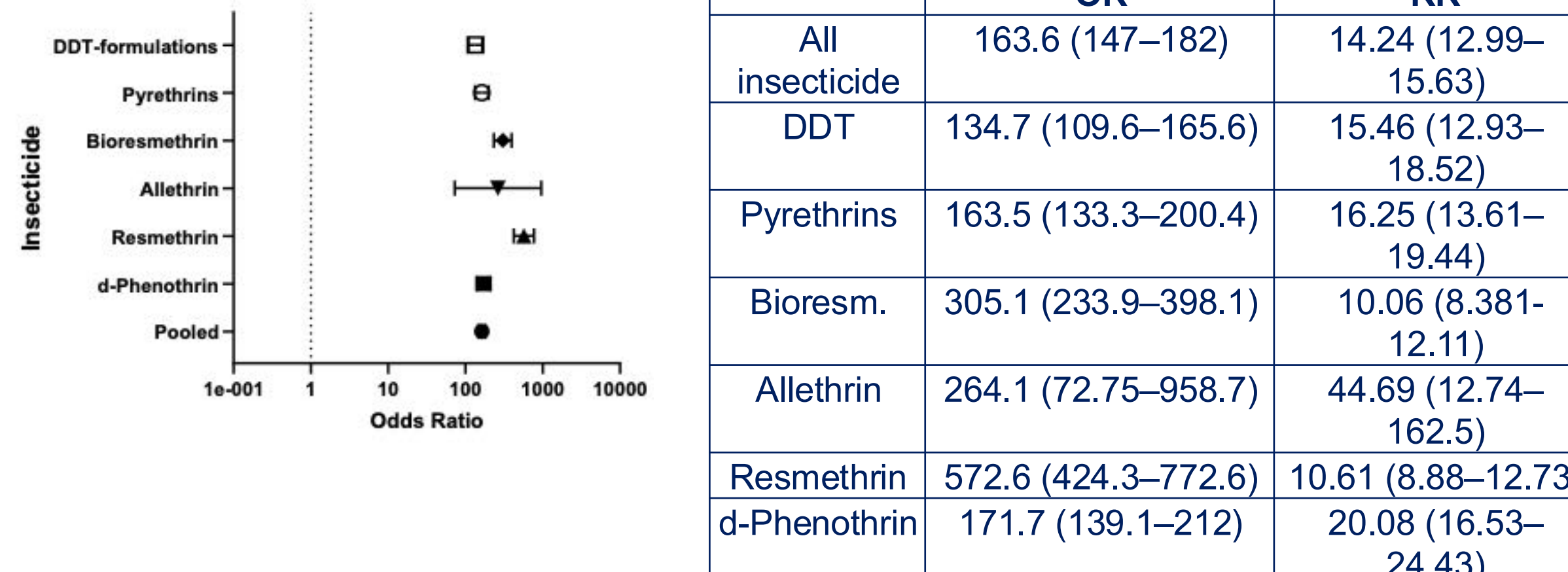
Disinsection vs. Control for Mosquito Mortality by Aircraft Brand



Disinsection vs. Control for Mosquito Mortality by Method of Disinsection



Disinsection vs. Control for Mosquito Mortality by Insecticide



CONCLUSIONS

- 19 experimental trials of disinsection reporting mosquito mortality were included, 9 of which were conducted with an unexposed arm of comparator mosquitoes.
- Of 9 comparator studies included, 4 evaluated one of the insecticides currently recommended for use in aircraft disinsection procedures.
- Studies reporting the main primary outcomes of mosquito mortality were of generally poor quality and high risk of bias, with low to very low certainty of estimates of effect.
- Adherence to WHO's published guidelines for studies evaluating the efficacy of aircraft disinsection was 33.3%, ranging from 18.2% to 60.5%.
 - No included studies adhered fully to recommended study procedures (2), and consequently the generalizability of findings is uncertain.
- Across comparator trials of aircraft disinsection efficacy, the odds of mosquito mortality in the experimental (exposed) arms compared to control (unexposed) arms was 163.6 (95% confidence interval [CI] 147 - 182) and the risk of mosquito death in the exposed versus unexposed arms was 14.24 (95% CI 12.99 - 15.63). **This supports the high insecticidal efficacy of disinsection.**
- The only WHO-recommended insecticide formulation to be tested in a mosquito-controlled comparator trial was 2% d-phenothrin, which yielded an odds of mosquito mortality for disinsection versus control of 171.7 (95% CI 139.1 - 212) across 4 studies with relative risk of 20.08 (95% CI 16.53 - 24.43).**
- The role of disinsection measures imposed at points of entry in preventing or mitigating the importation of vector-borne diseases such as dengue into non-endemic regions remains *uncertain*.

REFERENCES

- WHO aircraft disinsection methods and procedures, second edition. Geneva: World Health Organization; 2023
- Guidelines for testing the efficacy of insecticide products used in aircraft. Geneva: World Health Organization; 2012