**Additional file 4 Examples of risk of bias tools and checklists for specific study designs**

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| **Study design** | **Tools and checklists** | **Sources of bias covered in tool or checklist** |
| **Randomised controlled trials** | Cochrane risk of bias tool (1) | ● Selection bias (selection & allocation of participants)  ● Performance bias (deviations from intended interventions)  ● Detection bias (measurement of the outcome)  ● Attrition bias (missing outcome data)  ● Reporting bias (selection of the outcome and/or reported result) |
| Cochrane RoB2 tool (2) | ● The randomisation process  ● Baseline confounding  ● Deviations from intended interventions  ● Measurement of the outcome  ● Missing outcome data  ● Selection of the reported result |
| Cochrane EPOC checklist (3) | ● Random sequence generation  ● Allocation concealment  ● Baseline outcome measurements similar  ● Baseline characteristics similar  ● Incomplete outcome data  ● Knowledge of the allocated interventions adequately prevented during the study  ● Protection against contamination  ● Selective outcome reporting |
| NIH tool for controlled intervention studies (4) | ● Baseline similarity of groups  ● Random sequence generation  ● Allocation concealment  ● Participant and investigator blinding  ● Outcome assessor blinding  ● Dropout (including intention to treat and crossover)  ● Confounding with other interventions  ● Outcome measures assessment |
| **Randomised and non-randomised comparative environmental studies** | CEE critical appraisal tool (prototype) (5) | ● Confounding  ● Post-intervention/selection biases  ● Misclassified comparison biases in observational  studies (deviation from  exposure)  ● Performance biases in experimental studies  (deviation from intervention)  ● Detection biases  ● Outcome reporting biases  ● Outcome assessment biases (biases in statistical  methods) |
| **Non-randomised studies of interventions** | Cochrane ROBINS-I tool (6) | ● Confounding  ● Selection of participants  ● Deviations from intended interventions  (includes performance bias in experimental studies)  ● Measurement of the outcome  ● Missing outcome data  ● Selection of the reported result |
| **Human experi-mental study** | OHAT (2015, 2019) (7, 8) | ● Selection bias  ● Performance bias  ● Attrition/Exclusion bias  ● Detection bias  ● Selective reporting bias |
| **Controlled before-after studies** | Cochrane EPOC checklist (3) | Same criteria as Cochrane EPOC criteria above for randomised controlled trials |
| **Non-randomised trials** | Cochrane EPOC checklist (3) | Same criteria as Cochrane EPOC criteria above for randomised controlled trials |
| **Non-randomised experimental studies** | JBI checklist for quasi-experimental studies (9) | ● Selection of groups  ● Measurement of the outcome  ● Missing outcome data  ● Statistical analysis |
| **Non-randomised studies (general)** | Wells et al. (2013) (10) | ● Selection of the outcome and/or reported result  ● Selective analysis reporting  ● Confounding |
| **Experimental animal studies** | Hooijmans et al. (2014) (11)  OHAT (2015, 2019) (7, 8)  Rooney et al. (2014) (12)  Krauth et al. (2013) (13) | ● Selection of groups  ● Deviations from intended interventions / exposures  ● Measurement of the outcome  ● Missing outcome data  ● Selection of the outcome and/or reported result  ● Confounding |
| **Diagnostic test accuracy studies** | QUADAS (14) and QUADAS-2 (15) tools | ● Specific named biases inherent in test accuracy studies |
| **Behavioural ecological studies** | Stuber et al. (2013) (16) | ● Measurement of the outcome (NB this is an example, not a checklist) |
| **Interrupted time series** | Greenhalgh et al. (2005) (17) | ● Secular changes (i.e. confounding trends)  ● Measurement of the outcome  ● Missing outcome data |
| Cochrane EPOC checklist (3) | ● Intervention independent of other changes  ● Shape of the intervention effect pre-specified  ● Intervention unlikely to affect data collection  ● Knowledge of the allocated interventions adequately prevented during the study  ● Incomplete outcome data adequately accounted for  ● Selective outcome reporting |
| **Case control studies** | Viswanathan et al. (2013) (18)  OHAT (2015, 2019) (7, 8)  CASP checklist (19)  JBI checklist (20)  NIH tool for case control studies (4) | ● Selection of groups  ● Measurement of the exposure  ● Measurement of the outcome  ● Exposure/risk measure implementation  ● Exposure/risk assessor blinding  ● Confounding  ● Statistical analysis |
| **Cohort studies** | Viswanathan et al. (2013) (18)  OHAT (2015, 2019) (7, 8)  Jarde et al. (2013) (21)  CASP checklist (22)  JBI checklist (23) | ● Selection of groups  ● Measurement of the outcome  ● Missing outcome data  ● Confounding  ● Statistical analysis |
| **Observational cohort and cross-sectional studies** | NIH tool for observational cohort and cross-sectional studies (4) | ● Similarity of source populations  ● Exposures measured prior to outcomes  ● Sufficient timeframe to detect an association  ● Appropriate levels of exposure  ● Exposure assessed more than once over time  ● Blinding of outcome assessors  ● Missing data  ● Key potential confounding variables |
| **Cross-sectional studies** | Viswanathan et al. (2013) (18)  OHAT (2015, 2019) (7, 8) | ● Selection of groups  ● Measurement of the outcome  ● Confounding |
| **Questionnaires or surveys** | Choi & Pak (2005) (24)  Sedgwick (2013) (25) | ● Selection of participants  ● (Non-) response  ● Recall  ● Missing outcome data  ● Other sources of bias inherent in surveys |
| **Case series** | Viswanathan et al. (2013) (18)  OHAT (2015, 2019) (7, 8)  JBI checklist (26)  NIH tool for case series (4) | ● Selection of cases  ● Comparability of cases  ● Measurement of the outcome  ● Adequacy of follow-up  ● Confounding  ● Statistical analysis |
| **Prevalence studies** | JBI checklist (27) | ● Selection of participants  ● Measurement of the exposure  ● Statistical analysis |
| **Case reports** | JBI checklist (28) | Bias is difficult to assess; focus on likely plausibility, clarity, applicability of the reported result |
| Note that some tools include other constructs besides risk of bias (internal validity), e.g. precision, or clarity of reporting. Only the internal validity items are summarised here. | | |

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