Supplementary Material. Assessment of risk of bias for 15 RCTs used to determine the impact of sanitation on health outcomes (Adapted from The Cochrane Collaboration's tool for assessing risk of bias)

Reference	Domain	Reviewers' judgement	Support for judgement
Emerson et al. 2004 [26]	Random sequence generation	Low risk	Clusters recruited in sets of 3, randomly assigned to treatments/control by drawing from a hat
	Allocation concealment	Low risk	Clusters at community level, their recruitment unlikely to influence participant recruitment
	Blinding of participants & personnel	High risk	One latrine was allocated per household. Difficult to blind when latrine hardware was provided
	Blinding of outcome assessment	Low risk	All participants screened, both eyes inspected, single photograph taken and blinded clinicians
	Incomplete outcome data	Low risk	All clusters participated and were visited 3 times, participants lost to follow-up did not differ
	Selective reporting	Low risk	Active trachoma, primary outcome was reported
	Other biases	Low risk	No clusters were lost at follow up, proportions with active trachoma statistically not different
Gebre et al. 2011 [27]	Random sequence generation	Low risk	Randomization sequence was computer-generated in MS Excel
	Allocation concealment	Low risk	Concealment mentioned without details but we judged central randomisation to sufficiently conceal intervention allocations
	Blinding of participants & personnel	High risk	Subkebeles were not masked to the intervention
	Blinding of outcome assessment	Unclear risk	Separate authors did randomisation and participant enrolment. It is not clear who did the statistical analysis and mortality rate calculations (We), and its effect to outcome assessment
	Incomplete outcome data	Low risk	Census updated for deaths and migration, used in calculations. Repeat census to 24 sublevels
	Selective reporting	Low risk	Primary outcome 'age-specific all-cause mortality' pre-specified in the registered protocol reported
	Other biases	Low risk	Masked census auxiliary health workers to treatments and outcome. All sublevels were visited.
Stoller et al. 2011 [28]	Random sequence generation	Low risk	Randomization sequence was computer-generated in MS Excel for clinical comparisons
	Allocation concealment	Low risk	No detail, but we judged central randomisation to sufficiently conceal intervention allocations
	Blinding of participants & personnel	High risk	Intensification of an existing latrine programme, prior knowledge of treatment known
	Blinding of outcome assessment	Low risk	Swab samples from randomly selected participants at baseline and follow-up were pooled to detect ocular *C. trachomatis* by blinded laboratory personnel
	Incomplete outcome data	Low risk	Follow-up inclusions and exclusions described. Randomly sampled participants used in data collection. Intention-to treat analysis was done.
	Selective reporting	Low risk	Prevalence of *C. trachomatis* infection in children 0-9 years was reported as primary outcome
	Other biases	High risk	The two treatment groups were well balanced except for antibiotic coverage (cluster imbalance). on-going latrine construction programme (intervention contamination)
Clasen et al. 2014 [3]	Random sequence generation	Low risk	Cluster randomisation by computer-generated sequence
	Allocation concealment	Low risk	We judged central randomisation to sufficiently conceal intervention allocations
	Blinding of participants & personnel	High risk	Reported blinding of participants was not possible
	Blinding of outcome assessment	Low risk	Random assignment was by not being involved in data collection or intervention delivery

	Incomplete outcome data	Low risk	Village level clustering was statistically accounted for, adjustments at follow-up due to accounted-for attrition was given (baseline diarrhoea). Intention-to treat analysis was done.
	Selective reporting	Low risk	Primary outcome, 7-day diarrhoea prevalence was compared across treatments and control
	Other biases	Unclear risk	Care-giver self-reported data is prone to reporting bias. Its effect on the outcome is not clear
Patil et al. 2014 [29]	Random sequence generation	Low risk	Randomization took place by publicly picking lottery ticket to assign villages to treatments
	Allocation concealment	Low risk	We judged central randomisation to sufficiently conceal intervention allocations
	Blinding of participants & personnel	High risk	Programme implementers and researchers not blinded. Blinded interviewers could identify intervention villages during interviews of block officers or the village secretary.
	Blinding of outcome assessment	Unclear risk	Blinded interviewers could identify intervention villages during interviews. The effect to their data collection is not clear
	Incomplete outcome data	Low risk	No differential attrition by group, no missing data. Intention-to treat analysis was done.
	Selective reporting	Low risk	Study protocol's predefined outcomes were reported
	Other biases	Unclear risk	Care-giver self-reported data is prone to reporting bias. Its effect on the outcome is not clear
Dickinson et al. 2015 [17]	Random sequence generation	Low risk	Randomization took place by publicly picking slips from a bucket to assign villages to treatments
	Allocation concealment	Low risk	No detail but we judged central randomisation to sufficiently conceal intervention allocations
	Blinding of participants & personnel	High risk	Researchers/implementers were not blinded
	Blinding of outcome assessment	Unclear risk	Same authors did randomisation, participant enrolment and statistical analysis (We). Same enumerators collected data in base- and end line surveys. The effect to outcome assessment is not clear
	Incomplete outcome data	Low risk	Random subsamples within villages were used for data collection. Loss at follow-up was reported
	Selective reporting	Low risk	Pre-specified outcomes in the protocol were reported relative to the control.
	Other biases	Unclear risk	Care-giver self-reported diarrhoea data is prone to reporting bias. Its effect on the outcome is not clear
Pickering et al. 2015 [30]	Random sequence generation	Low risk	Computer-generated algorithm that randomly assigned villages to treatment and control groups
	Allocation concealment	Low risk	We judged central randomisation to sufficiently conceal intervention allocations
	Blinding of participants & personnel	High risk	Participants were not masked to treatment status
	Blinding of outcome assessment	Unclear risk	Although interviewees were blinded, they could infer status during interviews from presence of signage showing village certification of an open defecation free status w, with unknown effect
	Incomplete outcome data	Low risk	Attrition and re-inclusion at follow-up reported with numbers to balance groups.
	Selective reporting	Low risk	Registered study protocol with pre-specified outcomes were reported
	Other biases	Unclear risk	Care-giver self-reported data is prone to reporting bias. Its effect on the outcome is not clear
Briceño et al. 2017 [31]	Random sequence generation	Unclear risk	Factorial cluster-randomized control trial, 190 largest wards randomly sampled. Insufficient information about the sequence generation process to permit judgement of low or high risk.
	Allocation concealment	Low risk	Treatment groups knew their assignment, but not controls, unbeknown even to survey teams. However, knowing treatment (without controls) concealed knowledge of treatment comparisons
	Blinding of participants & personnel	High risk	Participants were not blinded
	Blinding of outcome assessment	Low risk	Survey firms were never provided information on treatment status of participating wards
	Incomplete outcome data	Low risk	No significant effect. Random subsamples within wards were used for data collection.
	Selective reporting	Low risk	Outcomes pre-defined in the protocol were reported

	Other biases	Unclear risk	Care-giver self-reported data is prone to reporting bias. Its effect on the outcome is not clear
Lin et al. 2018 [32]	Random sequence generation	Low risk	Random number generator used to randomise matched clusters to the double-sized control arm
	Allocation concealment	Low risk	We judged central randomisation to sufficiently conceal intervention allocations
	Blinding of participants & personnel	High risk	Study participants, intervention implementers, and outcome assessors were not masked because the interventions delivered visible hardware
	Blinding of outcome assessment	Low risk	Masked lab technician conducted analyses to detect protozoa infections. Two investigators conducted independent masked data processing and statistical analyses
	Incomplete outcome data	Low risk	Statistical analyses performed for loss and recovery to follow-up. Intention-to treat analysis was done.
	Selective reporting	Low risk	Registered trial protocol available. Pre-specified outcome (tertiary) of interest reported
	Other biases	Low risk	We judged the study to appear free of other sources of bias
Luby et al. 2018 [33]	Random sequence generation	Low risk	Clusters randomly allocated to treatment using a random number generator by a co-investigator
	Allocation concealment	Low risk	We judged central randomisation to sufficiently conceal intervention allocations
	Blinding of participants & personnel	High risk	Interventions included distinct visible components so neither participants nor data collectors were masked to intervention assignment
	Blinding of outcome assessment	Low risk	Independent, masked statistical analyses with the true group assignment variable replaced with a re-randomised uninformative assignment variable.
	Incomplete outcome data	Low risk	Loss to attrition with reasons and enrolment at follow-up were given. Intention-to treat analysis was done.
	Selective reporting	Low risk	Registered trial protocol available. Pre-specified outcome of interest reported
	Other biases	Unclear risk	Care-giver self-reported data is prone to reporting bias. Its effect on the outcome is not clear
Null et al. 2018 [34]	Random sequence generation	Low risk	Clusters were randomly allocated to treatment using a random number generator
	Allocation concealment	Low risk	We judged central randomisation to sufficiently conceal intervention allocations
	Blinding of participants & personnel	High risk	Cluster allocation was communicated directly to the field team, Participants were not blinded
	Blinding of outcome assessment	Low risk	Investigators remained blinded to treatment assignments. 2 blinded biostatisticians independently replicated the analyses following the pre-specified analysis plan
	Incomplete outcome data	Low risk	Monitoring data collected during unannounced visits to a random sample of at least 20% of participants in intervention groups at given time periods after the interventions began. Loss to attrition with reasons at follow-up was given. Intention-to treat analysis was done.
	Selective reporting	Low risk	Registered trial protocol available. Pre-specified outcome of interest reported
	Other biases	Unclear risk	Care-giver self-reported data is prone to reporting bias. Its effect on the outcome is not clear
Cameron et al. 2019 [35]	Random sequence generation	Unclear risk	Randomisation stratified at village and sub-village levels with comparison control groups described Insufficient information about the sequence generation process to permit judgement of low or high risk
	Allocation concealment	Low risk	We judged central randomisation to sufficiently conceal intervention allocations
	Blinding of participants & personnel	High risk	No detail was provided but we judged that interventions included distinct visible components (latrines), signage and certification of open defecation free zones, sanitation demand triggering sessions so neither participants nor data collectors were masked to intervention assignment
	Blinding of outcome assessment	Unclear risk	Insufficient information to permit reviewers' judgment of low or high risk

	Incomplete outcome data	Low risk	No imbalances in village characteristics. First and second rounds of visits were done with no details to attrition. We judged no incomplete outcome data due to stratified sampling for analysis
	Selective reporting	Low risk	Although we did not have the trial registration of the protocol, we judged low risk of bias as all outcomes reported
	Other biases	low risk	We judged the study to appear free of other sources of bias
Ercumen et al. 2019 [36]	Random sequence generation	Low risk	Off-site investigator used a random number generator to block-randomize clusters into study arms
	Allocation concealment	Low risk	We judged central randomisation to sufficiently conceal intervention allocations
	Blinding of participants & personnel	High risk	Participants and field staff were not blinded as interventions entailed distinct hardware
	Blinding of outcome assessment	Low risk	Blinded technicians enumerated STH outcomes, blinded analysts independently replicated data management and analysis
	Incomplete outcome data	Low risk	Loss to attrition with reasons, enrolment at follow-up were given and balanced in numbers across intervention groups. Intention-to treat analysis was done.
	Selective reporting	Low risk	Registered trial protocol available. Pre-specified primary outcome of interest reported
	Other biases	Low risk	We judged the study to appear free of other sources of bias
Pickering et al. 2019 [37]	Random sequence generation	Low risk	Independent investigator used a random number generator to randomly assign clusters
	Allocation concealment	Low risk	We judged central randomisation to sufficiently conceal intervention allocations
	Blinding of participants & personnel	High risk	Blinding of participants was not possible given the nature of the interventions
	Blinding of outcome assessment	Low risk	Blinded lab technicians analysed samples. 2 authors independently replicated the statistical analyses while blinded to intervention status.
	Incomplete outcome data	Low risk	Loss to attrition with reasons, enrolment at follow-up were given and balanced in numbers across intervention groups. No incomplete data
	Selective reporting	Low risk	Registered trial protocol available. Pre-specified outcome (tertiary) of interest reported
	Other biases	Low risk	We judged the study to appear free of other sources of bias
Steinbaum et al. 2019 [38]	Random sequence generation	Unclear risk	Authors referred to "We" in the methodology without indicating independent investigator to randomly assign clusters
	Allocation concealment	Low risk	We judged central randomisation to sufficiently conceal intervention allocations
	Blinding of participants & personnel	High risk	Blinding of participants was not possible as material subsidy was given for latrines. Blinding of the two laboratory technicians who did all sample analyses not clearly spelt status.
	Blinding of outcome assessment	Low risk	
	Incomplete outcome data	Low risk	Loss to attrition with reasons reported. No incomplete data
	Selective reporting	Unclear risk	Registered trial protocol available, but a not pre-specified outcome of interest reported. Effect unclear
	Other biases	Unclear risk	Use of not optimised method for other laboratory analyses may introduce 'other' unclear bias