Supplemental Material

How Well Does Climate Change and Human Health Research Match the Demands of Policymakers? A Scoping Review

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Search strategies

Search strategies for scoping review

**MEDLINE (1950-present)**
1. climate change.tw
2. climate stabil*.tw
3. climate disrupt*.tw
4. global warming.tw
5. (greenhouse gas emission* or greenhouse-gas emission* or carbon emission* or carbon dioxide emission* or CO2 emission*).tw
6. exp climate change/
7. or/1-6
8. health.tw
9. 7 and 8
10. limit 9 to yr="2008 -Current"
11. limit 10 to review
12. limit 10 to journal article
13. 12 not 11

**EMBASE (1947-present)**
1. climate change.tw
2. climate stabil*.tw
3. climate disrupt*.tw
4. global warming.tw
5. ((greenhouse gas* or CO2 or carbon) adj2 emission*).tw
6. climate change/
7. greenhouse effect/
8. or/1-7
9. health.tw
10. 8 and 9
11. limit 10 to yr="2008 -Current"
12. limit 11 to article

**Web of Science (Science Citation Index Expanded 1900-present, Social Sciences Citation Index 1900-present, Arts & Humanities Citation Index 1975-present)**
Databases=SCI-EXPANDED, SSCI, A&HCI; timespan=2008-2010
1. ts="climate change"
2. ts="climate stabil**
3. ts="climate disrupt**
4. ts="global warming"
5. ts="greenhouse gas emission**
6. ts="CO2 emission**
7. ts="carbon dioxide emission**
8. ts="carbon emission**
9. ts=health
10. #1 or #2 or #3 or #4 or #5 or #6 or #7 or #8
11. #9 and #10
12. #11 AND Document Type=(Article)

Note: .tw: text word (search terms in title or abstract); .yr: year; *: wildcard; adj2: search for terms within 2 words of each other; climate change/: search for citations classified under Medical Subject Heading "climate change"; exp: explode (that is, include subheadings under the Medical Subject Heading); OR/a-n: a OR b OR c … OR n; ts=: topic (search terms in title, abstract or keywords).

Search strategies for additional analyses (all MEDLINE, 1950-present)

Climate change
1. climate change.tw.
2. climate stabil*.tw.
3. climate disrupt*.tw.
4. global warming.tw.
5. (greenhouse gas emission* or greenhouse-gas emission* or carbon emission* or carbon dioxide emission* or CO2 emission*).tw.
6. exp climate change/
7. or/1-6
8. health.tw.
9. 7 and 8
10. limit 9 to yr="2000 -Current"
11. limit 10 to journal article
12. limit 10 to "review"
13. limit 10 to editorial
14. limit 10 to comment
15. limit 10 to letter
16. limit 10 to news
17. or/12-16
18. 11 not 17

**Air pollution**
1. air pollution/ or air pollution, indoor/
2. limit 1 to yr="2000 -Current"
3. limit 2 to journal article
4. limit 2 to "review"
5. limit 2 to editorial
6. limit 2 to comment
7. limit 2 to letter
8. limit 2 to news
9. or/4-8
10. 3 not 9

**Tobacco smoking**
1. smoking/
2. limit 1 to yr="2000 -Current"
3. limit 2 to journal article
4. limit 2 to "review"
5. limit 2 to editorial
6. limit 2 to comment
7. limit 2 to letter
8. limit 2 to news
9. or/4-8
10. 3 not 9

**Obesity**
1. obesity/
2. limit 1 to yr="2000 -Current"
3. limit 2 to journal article
4. limit 2 to "review"
5. limit 2 to editorial
6. limit 2 to comment
7. limit 2 to letter
8. limit 2 to news
9. or/4-8
10.3 not 9

Note: .tw: text word (search terms in title or abstract); .yr: year; *: wildcard; climate change/: search for citations classified under Medical Subject Heading “climate change”; exp: explode (that is, include subheadings under the Medical Subject Heading); OR/a-n: a OR b OR c … OR n
## Supplemental Material, Table 1: PRISMA checklist

| Section/topic       | # | Checklist item                                                                                                                                                                                                 | Reported in section                                      |
|--------------------|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| TITLE              |   |                                                                                                                                                                                                              |                                                          |
| Title              | 1 | Identify the report as a systematic review, meta-analysis, or both.                                                                                                                                              | Title: scoping review                                     |
| ABSTRACT           |   |                                                                                                                                                                                                              |                                                          |
| Structured summary | 2 | Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number. | Abstract                                                 |
| INTRODUCTION       |   |                                                                                                                                                                                                              |                                                          |
| Rationale          | 3 | Describe the rationale for the review in the context of what is already known.                                                                                                                                  | Introduction                                              |
| Objectives         | 4 | Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).                                                                 | Introduction                                              |
| METHODS            |   |                                                                                                                                                                                                              |                                                          |
| Protocol and registration | 5 | Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.                                             | Scope of review; no protocol used                         |
| Eligibility criteria | 6 | Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.                                                 | Eligibility criteria                                      |
| Information sources | 7 | Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.                                               | Search strategy                                           |
| Search             | 8 | Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.                                                                                  | Supplemental material                                    |
### Supplemental Material, Table 1: PRISMA checklist (cont.)

| Study selection | 9 | State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis). | Search strategy |
| Data collection process | 10 | Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators. | Data collection |
| Data items | 11 | List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made. | Data items |
| Risk of bias in individual studies | 12 | Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis. | Not assessed |
| Summary measures | 13 | State the principal summary measures (e.g., risk ratio, difference in means). | Not assessed |
| Synthesis of results | 14 | Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I²) for each meta-analysis. | Not assessed |
| Risk of bias across studies | 15 | Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies). | Not assessed |
| Additional analyses | 16 | Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified. | Methods (additional analyses) |

### RESULTS

| Study selection | 17 | Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram. | Study selection; Fig.2 |
| Study characteristics | 18 | For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations. | Study characteristics |
| Risk of bias within studies | 19 | Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12). | Not assessed |
| Results of individual studies | 20 | For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot. | Not assessed |
| Synthesis of results | 21 | Present results of each meta-analysis done, including confidence intervals and measures of consistency. | Not assessed |
| Supplemental Material, Table 1: PRISMA checklist (cont.) |
|-------------------------------------------------------|
| **Risk of bias across studies**                        |
| 22 | Present results of any assessment of risk of bias across studies (see Item 15). | Not assessed |
| **Additional analysis**                                |
| 23 | Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]). | Results (additional analyses) |

**DISCUSSION**

| Summary of evidence |
|---------------------|
| 24 | Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers). | Discussion |

| Limitations |
|-------------|
| 25 | Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias). | Discussion |

| Conclusions |
|-------------|
| 26 | Provide a general interpretation of the results in the context of other evidence, and implications for future research. | Discussion |

**FUNDING**

| Funding |
|---------|
| 27 | Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review. | Front page |

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(6): e1000097. doi:10.1371/journal.pmed1000097

Protocol and registration: Note that systematic review registration and protocols are recorded by several organizations, such as the Cochrane Collaboration (www.thecochranelibrary.com)

PICOSS: participants, interventions, comparisons, outcomes, and study design

For more information, visit: [www.prisma-statement.org](http://www.prisma-statement.org).
## Supplemental Material, Table 2: Characteristics of included studies

| Citation               | Research priority area(s) | Country / countries in which health assessed | Health outcome(s)                           | Brief description                                                                                                                                 |
|------------------------|---------------------------|---------------------------------------------|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Andrae et al. 2008     | 3b                        | Japan                                       | Multiple                                  | LCA of electronics adhesives, including GHG and health effects                                                                                  |
| Babbitt and Lindner 2008 | 3b                        | United States                              | Multiple                                  | LCA of re-use of coal combustion products, including GHG and health effects                                                                      |
| Bedsworth 2009        | 4                         | United States                              | Multiple                                  | Survey of public health officers about climate and health risks and preparedness                                                                  |
| Bernier et al. 2009   | 4                         | Canada                                      | Multiple                                  | Results of a vulnerability assessment tool with health component                                                                                |
| Bloomberg et al. 2008  | 3b                        | OECD countries                             | Life expectancy                           | Ecological analysis of relationship between greenhouse gas intensity of economy, and life expectancy                                              |
| Chapman et al. 2009   | 5                         | New Zealand                                | Multiple                                  | Cost-benefit analysis of housing insulation                                                                                                       |
| Confalonieri et al. 2009 | 1                        | Brazil                                      | Multiple                                  | Results of a vulnerability assessment tool with health component                                                                                |
| Creutzig and He 2009  | 5                         | China                                       | Multiple                                  | Models effects of congestion pricing on GHG emissions and health in monetary terms                                                               |
| De Schryver et al. 2009 | 4                        | Global                                      | Multiple                                  | Provides a method for calculating health impacts of climate change in LCA studies                                                                 |
| Doyon et al. 2008     | 1                         | Canada                                      | Heat and/or cold-related health effects   | Models heat- and cold-related mortality using climate scenarios                                                                                |
Supplemental Material, Table 2: Characteristics of included studies (cont.)

| Citation         | Research priority area(s) | Country / countries in which health assessed | Health outcome(s)                  | Brief description                                                                 |
|------------------|---------------------------|---------------------------------------------|------------------------------------|-----------------------------------------------------------------------------------|
| Ebi 2008         | 5, 1                      | Global                                      | Multiple                           | Models costs of treating diarrheal disease, malaria and malnutrition for climate scenarios |
| Friel et al. 2009| 3b                        | Brazil, United Kingdom                     | Ischaemic heart disease, stroke    | Models health co-benefits of reducing emissions by less consumption of livestock products |
| Garg et al. 2009 | 1                         | India                                       | Malaria                           | Modeling of malaria incidence using climate change scenarios                       |
| Gilmore et al. 2010 | 5                      | United States                              | Air quality-related health effects | Assesses health and climate change effects, in monetary terms, of batteries in electricity grid |
| Hahn et al. 2009 | 4                         | Mozambique                                  | Multiple                           | Results of a vulnerability assessment tool with health component                   |
| Hill et al. 2009 | 5                         | United States                              | Air quality-related health effects | Estimates climate and health costs of biofuels and gasoline                       |
| Hubler et al. 2008| 5, 1                     | Germany                                     | Heat and/or cold-related health effects | Models heat- and cold-related mortality using climate scenarios                   |
| Husain et al. 2008| 1                        | Multiple within EMR                         | Multiple                           | Models climate-related health burden in five countries near Persian Gulf           |
| Jacobson 2008    | 3b                        | Global                                      | Air quality-related health effects | Analyses effect of CO₂ on other air pollutants, and resulting health effects       |
| Jansen et al. 2008| 4                        | Germany                                     | Vector-borne diseases              | Evaluates VBD surveillance system for shifts in disease patterns from climate change |
Supplemental Material, Table 2: Characteristics of included studies (cont.)

| Citation            | Research priority area(s) | Country / countries in which health assessed | Health outcome(s)                  | Brief description                                                                 |
|---------------------|---------------------------|---------------------------------------------|------------------------------------|------------------------------------------------------------------------------------|
| Lindgren et al. 2008 | 1                         | Sweden                                      | Heat and/or cold-related health effects | Estimates effects of climate change on health in Sweden                            |
| Maibach et al. 2008  | 4                         | United States                               | Multiple                           | Survey of public health directors on preparedness for climate change               |
| Markandya et al. 2009 | 3b, 5                    | European Union region, India, China          | Air quality-related health effects | Models air quality-related co-benefits of low-carbon electricity generation         |
| Martinez 2009       | 5                         | Peru                                        | Multiple                           | Models impacts on climate change and health, in monetary terms, from new transport system |
| Morris and Bagby 2008 | 5, 3b                    | United States                               | Multiple                           | LCA of natural lawn and garden care practices, including GHG and health effects     |
| Nadal et al. 2009   | 5, 3b                     | Spain                                       | Cancer                             | Cost-benefit analysis of new use of sewage sludge, including health and emissions effects |
| Nakatani et al. 2008 | 4                         | Japan                                       | Life expectancy                    | Choice experiment for sorting of plastic waste and its climate change and health effects |
| O'Neill et al. 2010  | 4                         | United States                               | Heat and/or cold-related health effects | Survey of local government action on heat, health and climate change               |
| Park et al. 2008    | 3b                        | United Kingdom                              | Air quality-related health effects | Estimates effects on health and CO₂ emissions of a fuel additive                  |
| Pattanayak et al. 2009 | 5                       | Brazil                                      | Multiple                           | Models economic costs of the health effects of climate change                      |
| Saikawa et al. 2009 | 3b                        | Global                                      | Air quality-related health effects | Models air quality-related mortality under emissions scenarios                      |
| Citation          | Research priority area(s) | Country / countries in which health assessed | Health outcome(s)                         | Brief description                                                                 |
|-------------------|---------------------------|---------------------------------------------|------------------------------------------|-----------------------------------------------------------------------------------|
| Selin et al. 2009 | 1, 5                      | Global                                      | Air quality-related health effects       | Models health and economic effects of ozone using climate scenarios                |
| Smith et al. 2008 | 5                         | China, United States, India                 | Multiple                                 | Estimates cost-effectiveness, for climate and for health, of several mitigation strategies |
| Sulda et al. 2010 | 4                         | Australia                                   | Nutrition                                | Survey of nutritionists about link between climate and public health nutrition       |
| Sundblad et al. 2009 | 4                        | Sweden                                      | Multiple                                 | Survey of knowledge in different population groups about climate change, including health effects |
| Tagaris et al. 2009 | 1                       | United States                               | Air quality-related health effects       | Modeling of air quality-related mortality using climate scenarios                  |
| Tol 2008          | 5, 1                      | Global                                      | Malaria                                  | Models economic losses due to increased malaria incidence from climate change        |
| Tollefsen et al. 2009 | 5                    | European Union region                       | Air quality-related health effects       | Calculates economic benefits of accounting for GHG emissions in air quality strategies |
| Wilkinson et al. 2009 | 3b                    | India, United Kingdom                       | Multiple                                 | Models health co-benefits of strategies to lower emissions from household energy use |
| Woodcock et al. 2009 | 3b                    | India, United Kingdom                       | Multiple                                 | Models health co-benefits of different low-emission transport policies              |

EMR: Eastern Mediterranean Region; GHG: greenhouse gas; LCA: life-cycle assessment; OECD: Organisation for Economic Co-operation and Development; VBD: vector-borne disease. Global research priority areas: 1. Assessing the risks; 2. Identifying effective interventions; 3. Co-benefits and co-harms of adaptation (3a) and mitigation (3b); 4. Improving decision support; 5. Estimating the costs.
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