

## Delphi Survey for Health Co-Benefits Modeling - Round 2



### Goals of this process

This is the second survey round of the Delphi process leading up to the March workshop on estimating mitigation health co-benefits. As a reminder, the Delphi process has three goals:

1. To scope and focus the group's efforts prior to the meeting;
2. To evaluate the degree of agreement on central methodological issues; and
3. To move toward consensus regarding these issues where possible through iterative, online, anonymous discussion.

This round of the survey builds on findings from the first round. You have access to all of the raw, anonymized data to review as you would like. We have also created a summary of the findings to help focus your reflections for this round.

## Delphi Survey for Health Co-Benefits Modeling - Round 2



### Process overview

As in Round 1, this survey has two elements - a set of scoping questions, mostly aimed at guiding the overall inquiry and providing input for the workshop agenda - and a set of statements framed as guidance questions for the mitigation health co-benefits modeling community. There are several new scoping questions and practice guidance statements in this round, in addition to the the same statements that were in Round 1. In some cases, based on input from the first round, we have refined and clarified the statements or provided additional material to review. We have indicated which questions are new or modified with notes after the questions. We have also indicated response statistics from Round 1 (median, interquartile range, and % agreement, i.e. % responding 7-9).

You will again be asked to rate the extent to which you agree with the statements, on a scale of 1-9, with 1 being “complete disagreement” and 9 being “complete agreement”. Supporting materials for Round 2, including data from Round 1, are [here](#). We encourage you to refresh your memory of your own responses while reviewing the group findings. Because Round 1 was anonymous, we cannot give you a list of your own responses, but you will likely be able to identify your own answers from the file

in the Google Drive (which, incidentally, is also organized by date of response, with the last responses at the top, which should further help you narrow in on your responses). Please note that we have changed the settings for this round and we will be able to give you an individualized report of your responses for Round 2. Only the survey administrators will have access to this information, and all results reporting will be anonymized.

While there was considerable agreement on many statements in Round 1, the comments indicated a diversity of opinion and demonstrated that specifics and nuances matter. We would like to capture more of those nuances in this round. We encourage you to comment liberally, and to address your comments to the group to clarify your position and, as appropriate, recruit others to your perspective by presenting rationales, highlighting relevant examples, etc. Please review available materials on topics that may be novel to you and attempt to take a position to the extent you feel comfortable.

After reviewing the findings from Round 1, rather than designating certain issues as having a firm consensus, the workshop organizers have opted to present the findings using descriptive statistics illustrating the degree of agreement around each of the items. While it is already clear that there is strong agreement on certain items, the group will defer determination of consensus until the process is complete and we are able to meet and discuss in person.

## Delphi Survey for Health Co-Benefits Modeling - Round 2



### Mitigation health co-benefits modeling - Round 2 - Scoping and direction

The questions on this page are generally meant to help scope and focus our discussion. Depending on answers to these questions, we may add additional questions to future survey rounds.

- \* 1. The primary goal of the workshop should be harmonization of methods in mitigation health co-benefits studies such that multiple studies can be combined in a meta-analysis. Stats: 7 (5-8), 60%.

Complete  
disagreement

Complete  
agreement

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2. Please provide any comments you may have related to the question above.

\* 3. Deciding upon a common approach to conceptualizing mitigation policy scenarios across major areas (e.g., emissions reductions of a certain percent from a defined baseline in a given sector) should be the first step in harmonizing methods. Stats: 7 (5-8), 56%.

Complete  
disagreement

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agreement

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4. Please provide any comments you may have related to the question above.

\* 5. Mitigation health co-benefits estimates should incorporate climate change into relevant exposure pathways (e.g. the impact of warming on atmospheric chemistry should be included in co-benefits estimates related to air pollutants). Stats: 8 (5-8), 67%.

Complete  
disagreement

Complete  
agreement

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6. Please provide any comments you may have related to the question above.

\* 7. Please rank the following audiences in terms of their importance for mitigation health co-benefits estimations. Note: This question was revised based on input from Round 1.



Policy makers at an international scale



Domestic policy makers at a national scale



Domestic policy makers at a regional or sub-national scale, including cities



Environmental scientists



The health sector



Practitioners in sectors other than health

8. Please provide any comments you may have related to the question above.

\* 9. Mitigation health co-benefits estimation studies are put to various uses, and developing use cases may advance our discussion. From your perspective, what are the principal use cases for these studies? Note: This is a new question.

- \* 10. Uncertainty analysis in mitigation health co-benefits modeling should map explicitly to the Shared Socioeconomic Pathways (SSP) and related quantitative projections. For example, each SSP might have an associated pre-defined set of parameters related to mitigation policy ambition and uptake, and uncertainty analyses would incorporate available projections for each SSP. Stats: 7 (5-8), 56%.

Complete  
disagreement

Complete  
agreement



11. Please provide any comments you may have related to the question above.



- \* 12. Mitigation health co-benefits studies are currently able to achieve certain ends relatively well (e.g., model linear pathways between well-quantified exposures and outcomes) and others less so (e.g., model dynamic inter-relationships). From your perspective, what aspects of mitigation health co-benefits estimation would benefit the most from attention during this workshop, and how should that attention be focused? Note: This is a new question.




- \* 13. Mitigation health co-benefits studies have been categorized in various ways. Generally speaking, the categorizations either focus on exposure pathway (e.g. air pollution, diet, active travel, etc.), location (e.g. cities, Annex I countries, etc.), policy (e.g. carbon tax, renewables, methane emissions reduction, etc.), or sector (e.g. power generation, transit, housing, etc.). Having a common framing will facilitate our discussion. Understanding that each approach has value and multiple approaches will continue to be used, please indicate which you prefer for our discussion. Note: This is a new question.


- ☐ Exposure pathway
- ☐ Location
- ☐ Policy
- ☐ Sector


14. Please provide any comments you may have related to the question above.





15. Engaging policymakers and other stakeholders has been identified as a priority and a challenge. From your perspective, please rank the following challenges in terms of the impediment they pose (greatest to least) to policymaker engagement. Note: This is a new question.



Resources for robust engagement


Shared language


Access


Potential for policies to be overturned


Identifying appropriate targets to engage


Additional time required and other impacts on modeling process

16. Please provide any comments you may have related to the question above.

\* 17. NOTE: THIS QUESTION IS IN ERROR; PLEASE SKIP. Engaging policymakers and other stakeholders has been identified as a priority and a challenge. From your perspective, please rank the following challenges in terms of the impediment they pose (greatest to least) to policymaker engagement. Note: This is a new question.

- ☐ Resources for robust engagement
☐ Potential for policies to be overturned
- ☐ Shared language
☐ Identifying appropriate targets to engage
- ☐ Access
☐ Additional time required and other impacts on modeling process
- ☐ Other (please specify)

\* 18. Developing standardized approaches to modeling policy uptake for mitigation health co-benefits estimation was identified as a possible priority in Round 1. Please indicate your agreement with the need to devote an aspect of the workshop to exploring this activity. Note: This is a new question.

Complete  
disagreement

Complete  
agreement



19. Please provide any comments you may have related to the question above.



\* 20. Developing an inventory of relevant data, including but not limited to risk-outcome pairs in different contexts, was identified as a possible priority in Round 1. Please indicate your agreement with the need to devote an aspect of the workshop to exploring this activity. Note: This is a new question.

Complete  
disagreement

Complete  
agreement



21. Please provide any comments you may have related to the question above.



\* 22. Encouraging additional mitigation health co-benefits estimations for low and middle income countries (LMICs) was identified as a need in Round 1. From your perspective, what are the most significant barriers to developing estimates for LMICs, and what are some high-yield strategies for addressing this issue during the workshop? Note: This is a new question.



\* 23. Moving across scales (e.g., scaling up an analysis done at a city level to generate estimates at a national level, and vice-versa) was identified as an issue to explore in Round 1. Can you suggest any examples of studies that addressed this challenge well? As a corollary, what are some high-yield strategies for addressing this issue during the workshop? Note: This is a new question.



\* 24. Using Value of Information Analysis (VoIA) has been suggested as a worthwhile approach for identifying the most important parameterization data gaps to close in mitigation health co-benefits studies. Please indicate the degree to which you believe a VoI analysis would be a useful exercise for clarifying priorities related to model parameters and related uncertainties. Note 1: This is a new question. Note 2: Papers outlining VoIA have been uploaded to the Google Drive for you to review if needed; click [here](#).

Complete  
disagreement

Complete  
agreement

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25. Please provide any comments you may have related to the question above.

\* 26. Using Multi-Criteria Decision Analysis (MCDA) has been suggested as a worthwhile approach for synthesizing findings across mitigation health co-benefits studies, with the the possibility that MCDA could serve as an adjunct or alternative to meta-analysis as an approach for pooling findings across studies. Please indicate your agreement with the need to devote an aspect of the workshop to exploring this possibility. Note 1: This is a new question. Note 2: Papers outlining MCDA have been uploaded to the Google Drive for you to review if needed; click [here](#).

Complete  
disagreement

Complete  
agreement

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27. Please provide any comments you may have related to the question above.

## Delphi Survey for Health Co-Benefits Modeling - Round 2



### Mitigation health co-benefits modeling - Round 2 - Practice guidance

The questions on this page are potential consensus statements that are phrased as guidelines to be applied to mitigation health co-benefits modeling efforts. They are subdivided to focus on (1) policymaker engagement, (2) model structure, (3) parameterization and uncertainty, and (4) synthesis and applicable guidelines.



**(1) The following questions refer to engagement with policymakers and stakeholders.**

- \* 28. Guidelines should acknowledge that modelers may choose to provide additional estimates in response to stakeholder interest and other considerations. Stats: 9 (9-9), 100%.

Complete  
disagreement

Complete  
agreement



29. Please provide any comments you may have related to the question above.



- \* 30. Health co-benefits modeling studies are a form of health impact assessment (HIA) and, as such, the HIA professional practice standards pertain to mitigation health health co-benefits estimation. (N.B.: These guidelines can be used in conjunction with others that may be relevant.) Stats: 6 (5-7), 44%.

Complete  
disagreement

Complete  
agreement



31. Please provide any comments you may have related to the question above.



**(2) The following questions refer to model structure and approach.**

- \* 32. To facilitate intercomparison of estimates, mitigation health co-benefits studies should adopt a recommended set of practices for model structure, parameterization, metrics, sensitivity testing, and results reporting. Stats: 7.5 (7-9), 85%.

Complete  
disagreement

Complete  
agreement



33. Please provide any comments you may have related to the question above.



\* 34. Mitigation health co-benefits estimation studies should use methods that allow for comparison of changes in population health over time resulting from shifts in population exposure to specified risks, of which comparative risk assessment (CRA) is one widely used example. Note 1: This question was modified from Round 1. Note 2: For the purpose of this discussion, CRA refers to the methods developed and promulgated by the World Health Organization and referred to in [Campbell-Lendrum and Woodruff 2006](#). Stats: 7 (5.3-8), 54%.

Complete disagreement

Complete agreement

35. Please provide any comments you have related to the question above.

\* 36. Based on the total forcing resulting from the combination of global warming potential, residence time in the atmosphere, and current atmospheric concentration, modeling efforts should primarily focus on activities with substantial carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), black carbon (BC), or ozone (O<sub>3</sub>) emissions. Note: This question was revised based on feedback from Round 1. Stats: 7 (6-8), 65%.

Complete disagreement

Complete agreement

37. Please provide any comments you may have related to the question above.

\* 38. The default health metric for modeling studies should be Disability Adjusted Life Years (DALYs). Stats: 6 (4.3-7), 30%.

Complete disagreement

Complete agreement

39. Please provide any comments you may have related to the question above.

\* 40. The default geopolitical metric for modeling studies should be the country. Stats: 6 (3-8), 44%.

Complete  
disagreement

Complete  
agreement



41. Please provide any comments you may have related to the question above.



\* 42. The default time metric for modeling studies should be the year. Stats: 7 (6.3-8).

Complete  
disagreement

Complete  
agreement



43. Please provide any comments you may have related to the question above.



\* 44. The default metric of mitigation potential for modeling studies should be tons of CO<sub>2</sub> equivalent (tons of CO<sub>2</sub>e). Stats: 8 (6-9), 78%.

Complete  
disagreement

Complete  
agreement



45. Please provide any comments you may have related to the question above.



\* 46. The default financial metric for modeling studies should be the US dollar. Stats: 7 (5-9), 52%.

Complete  
disagreement

Complete  
agreement



47. Please provide any comments you may have related to the question above.



\* 48. Causal pathways for each mitigation pathway being examined, principal linkages with health, and the criteria for identifying relevant risk-outcome pairs should all be explicitly stated. Stats: 9 (8-9), 93%.

Complete disagreement

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Complete agreement

49. Please provide any comments you may have related to the question above.

\* 50. Assumptions regarding mitigation policy uptake should be explicitly stated and alternatives to full uptake should be incorporated into sensitivity testing. Stats: 8 (7-9), 91%.

Complete disagreement

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Complete agreement

51. Please provide any comments you may have related to the question above.

\* 52. Mitigation policies resulting in chronic disease reductions should be discounted to net present value using standardized, accepted approaches (as outlined in the [WHO Guide to Cost Effectiveness Analysis](#)). Stats: 7 (6-8), 65%.

Complete disagreement

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Complete agreement

53. Please provide any comments you may have related to the question above.

\* 54. There should be core scenarios for each major area of mitigation policy (transport, energy production, land use, buildings, and food production in our present, sector-oriented formulation) stipulating emissions pathways expressed as proportional reductions from standardized baselines. Stats: 7 (5.3-8), 63%.

Complete disagreement

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Complete agreement

55. Please provide any comments you may have related to the question above.

- \* 56. There should be standardized estimates of the linkages between specific mitigation activities and associated emissions reductions. Stats: 7 (5-8), 57%.

Complete  
disagreement

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agreement

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57. Please provide any comments you may have related to the question above.

- \* 58. Models should allow for phasing in of mitigation policies and accrual of health benefits, and assumptions regarding rates of policy phase-in and health benefit accrual should be explicitly stated and alternatives included in sensitivity testing. Stats 7 (8-9), 85%.

Complete  
disagreement

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agreement

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59. Please provide any comments you may have related to the question above.

- \* 60. Population and demographic projections should be incorporated into modeling studies. Stats: 8 (7-9), 87%.

Complete  
disagreement

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61. Please provide any comments you may have related to the question above.

**(3) The following questions refer to model parameterization and uncertainty.**

\* 62. Health impacts should be valued at a rate of twice the local gross domestic income per capita per DALY. Stats: 5 (4-5), 17%.

Complete disagreement

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Complete agreement

63. Please provide any comments you may have related to the question above.

\* 64. Risk-outcome pair associations (e.g., associations between physical activity from active transport and associated health impacts) should, whenever possible, be taken from meta-analyses of peer-reviewed literature. Stats: 8 (7-9), 78%.

Complete disagreement

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Complete agreement

65. Please provide any comments you may have related to the question above.

\* 66. Standard time horizons for modeling studies should be in 15 year increments including 2035, 2050, 2065, and 2080. Stats: 6 (5-7), 44%.

Complete disagreement

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Complete agreement

67. Please provide any comments you may have related to the question above.

\* 68. Baselines for emissions and population health status should be set at calendar year 2015. Stats: 6 (5-7), 48%.

Complete disagreement

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Complete agreement

69. Please provide any comments you may have related to the question above.

- \* 70. Costs and benefits should be discounted at a 3% rate with sensitivity testing of rates of 0%, 1%, 2%, and 6%. Note: This question is a combination of two related questions from Round 1, now merged based on respondent feedback. Stats (based on question related to sensitivity testing from R1): 7 (5-8), 56%.

Complete  
disagreement

Complete  
agreement

71. Please provide any comments you may have related to the question above.

**(4) The questions in this section refer to synthesis of mitigation health co-benefits studies and applicable reporting and other guidelines.**

- \* 72. Health co-benefits modeling studies generate health estimates and, as such, the GATHER (Guidelines for Accurate and Transparent Health Estimates Reporting) [statement and checklist](#) pertain to mitigation health co-benefit estimation. Note: These guidelines can be used in conjunction with others that may be relevant. Stats: 7 (6-8), 67%.

Complete  
disagreement

Complete  
agreement

73. Please provide any comments you may have related to the question above.

- \* 74. Meta-analyses of health co-benefits studies should conform to the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) [guidelines and checklist](#) and the Meta-analysis Of Observational Studies in Epidemiology (MOOSE) [guidelines and checklist](#). Stats: 6 (5-7), 48%.

Complete  
disagreement

Complete  
agreement

75. Please provide any comments you may have related to the question above.

- \* 76. Meta-analysis of mitigation health co-benefits modeling analyses should use random effects. Note: This question was revised based on input from Round 1. Stats: 6 (5-7), 33%.

Complete  
disagreement

Complete  
agreement

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77. Please provide any comments you may have related to the question above.

- \* 78. Authors should use the Grading of Recommendations Assessment, Development and Evaluation (GRADE) [approach](#) when making recommendations regarding mitigation health co-benefits. Stats: 6 (5-7), 39%.

Complete  
disagreement

Complete  
agreement

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79. Please provide any comments you may have related to the question above.

- \* 80. Authors should use the [Rooney et al. 2014](#) guidance on systematic review for environmental health science assessments when making recommendations regarding mitigation health co-benefits. Note: This is a new question.

Complete  
disagreement

Complete  
agreement

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81. Please provide any comments you may have related to the question above.

82. Are there any questions that you wish had been posed to the group? If so, please suggest them here.



