Views of Pulmonary Physicians on the Health Effects of Climate Change

Key Findings: American Thoracic Society Survey of U.S. Membership | 2015

Mona Sarfaty, M.D., MPH

Jennifer Kreslake, Ph.D., MPH

Brittany Bloodhart, Ph.D.

Katherine Price, MPH

Thomas Casale, M.D.

Steve Folstein, M.Ed.

Edward Maibach, Ph.D.

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GEORGE MASON UNIVERSITY
CENTER for CLIMATE CHANGE COMMUNICATION

AMERICAN THORACIC SOCIETY AND CLIMATE CHANGE

Overview

The following report contains the findings of a survey of the U.S. members of the American Thoracic Society (ATS) regarding their perspectives on climate change and their experience with the health effects of climate change. Five thousand five hundred randomly selected U.S. ATS members were contacted via email to participate in the survey in the summer of 2014; 80 had invalid email addresses, leaving a total of 5420 individuals contacted. There were 915 responders. The responders were from 49 of the United States and the District of Columbia; the response rate was 17%. The regional distribution of the responders closely mirrored the regional distribution of the sample population by climate region, as defined in the US National Assessment (Northeast, Southeast, Great Plains, Mid-West, Northwest, Southwest).

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Key Findings

ATS physicians believe climate change is happening.

A large majority of respondents (89%) said that climate change is happening, and 68% said that it is mostly or entirely caused by human activity. [1]

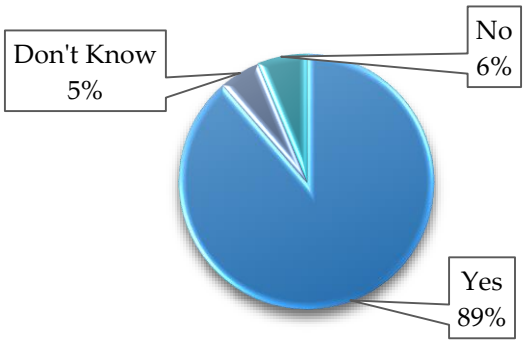

*Figure 1. Do you think climate change is happening***?**

ATS physicians report that climate change is relevant to the health of their patients. The majority of survey respondents think climate change is relevant to direct patient care (65%), *A great deal* (24%), or *A moderate amount* (41%). See Figure 2.

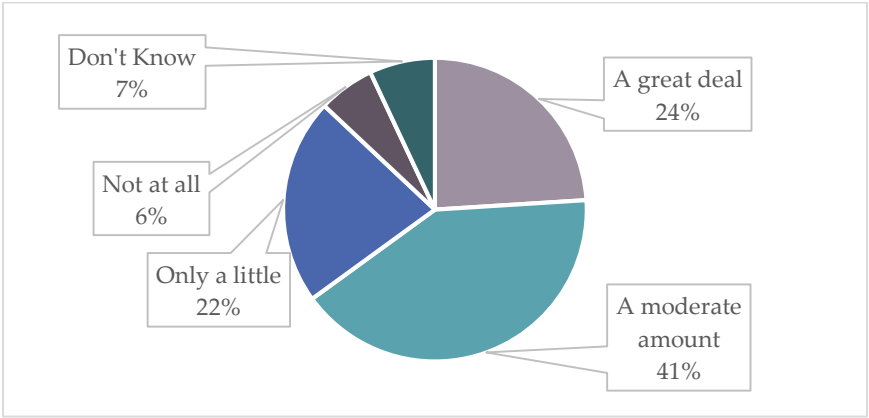

Figure 2. How much if at all do you think climate change is relevant to direct patient care?

[1] Responses were based on the following definition: "Climate change refers to the idea that the world's average temperature has been increasing over the past 150 years, may be increasing more in the future, and that the world's climate is changing as a result."

ATS physicians report that climate change is already affecting the health of their own patients.

A majority of survey respondents indicated that climate change is relevant to direct patient care, and is already affecting the health of their *own* patients. The most common health effects that participants noted among their own patients were air pollution-related increases in severity of chronic disease (77%), increased allergic symptoms (58%), injuries due to severe weather (57%), and heat related effects (48%). Across all the categories of health effects, *more* physicians thought their patients would experience harms in the next 10-20 years than are harmed currently (see Table below). A request for anecdotes about patient experiences produced over 100 comments. Find these in the Appendix.

Table 1. Responses to the question: In which of the following ways, if any, do you think *your* patients are currently being affected by climate change, or might be affected in the next 10-20 years? (Confidence Interval= +/- 3.5%)

	Yes %	No %	Don't Know %
Air pollution related increases in severity of illness			
Now	77	12	12
10-20 years from now	80	6	14
Increased care for allergic sensitization & symptoms of plant/mold exposure			
Now	58	17	25
10-20 years from now	66	8	26
Injuries due to severe storms, floods, droughts, fires			
Now	57	26	17
10-20 years from now	69	9	22
Heat-related effects			
Now	48	30	22
10-20 years from now	67	10	22
Vectorborne infection			
Now	40	32	28
10-20 years from now	62	9	28
Diarrhea from food/waterborne illnesses			
Now	26	43	31
10-20 years from now	48	14	38

Certain groups are more vulnerable to the health effects of climate change than others.

A large majority of respondents reported that *certain specific groups* of people will be disproportionately affected by climate change, including people with chronic diseases (75%), the poor and working poor (65%), young children ages 0-4 (66%), and adults over age 60 (63%).

Physician knowledge, Respondent Response, and Self Efficacy

There were 82% of responders who felt at least modestly knowledgeable about the association between climate change and health (38% "moderately" or "very" knowledgeable, 44% "modestly" knowledgeable). A substantial majority felt physicians should play a role in responding to climate change including encouraging offices, clinics and hospitals to be environmentally sustainable (80%), informing the *public* about the health effects of climate change (72%), and informing *patients* on the health effects of climate change (62%). There was support for several approaches to education on climate change and health: continuing medical education (CME)(74%), undergraduate medical education (73%), and patient education materials (71%). A majority agreed that physicians and their associations should be involved in advocacy pertaining to the health effects of climate change. Self-efficacy of the respondents was strong: 67% felt that "actions I take in my personal and/or professional life can contribute to effective action on climate change." The majority of respondents (81%) said that they had personally experienced climate change to some extent outside their role as a health professional.

Trusted Sources of Information

The most trusted sources of climate change information were the Centers for Disease Control and Prevention (86%), the American Thoracic Society (83%), the World Health Organization (79%), and the Institute of Medicine (National Academy of Sciences) (76%). The report of the global Intergovernmental Panel on Climate Change (IPCC, 5th report) was "Trusted/Strongly Trusted" by 40% of respondents, while 23% selected "Don't Know".

DETAILED SURVEY RESPONSES

SECTION A

Climate change refers to the idea that the world's average temperature has been increasing over the past 150 years, may be increasing more in the future, and that the world's climate is changing as a result. What do you think: Do you think that climate change is happening?
(Those that answered YES were then asked) How sure are you that climate change is happening?
(Those that answered NO were then asked) How sure are you that climate change is not happening?

Response Options	Percent Response CI ± 3%	Response Number (N)
Yes	**88%**	803
Extremely Sure	40%	359
Very Sure	31%	280
Somewhat Sure	17%	153
Not at all Sure	1%	9
Don't Know	**5%**	42
No	**6%**	55
Not at all Sure	1%	6
Somewhat Sure	3%	26
Very Sure	2%	15
Extremely Sure	1%	7
TOTAL[2]	**100%**	**897**

Do you think climate change over the past 150 years is…

Response Options	Percent Response CI ± 3%	Response Number (N)
Caused entirely by human activities	7%	66
Caused mostly by human activities	61%	545
Caused about equally by human activities and natural changes in the environment	20%	175
Caused mostly by natural changes in the environment	8%	74
Caused entirely by natural changes in the environment	2%	15
None of the above because climate change isn't happening	2%	18
TOTAL	**100%**	**893**

[2] Total N represents the total number of responses to the Question: Do you think climate change is happening? There were three respondents who answered this question, but did not answer the subsequent question about how sure they are that climate change is or is not happening.

How knowledgeable do you feel about the association between climate change and health impacts?

Response Options	Percent Response CI ± 3%	Response Number (N)
Very knowledgeable	7%	64
Moderately knowledgeable	31%	277
Modestly knowledgeable	44%	391
Not at all knowledgeable	18%	158
TOTAL	**100%**	**890**

SECTION B

How much, if at all, do you think climate change is relevant to direct patient care?

Response Options	Percent Response CI ± 3%	Response Number (N)
A great deal	24%	209
A moderate amount	41%	368
Only a little	22%	198
Not at all	6%	50
Don't know	7%	65
TOTAL	**100%**	**890**

How much, if at all, do you think climate change is affecting the health of your patients?

Response Options	Percent Response CI ± 3%	Response Number (N)
A great deal	10%	85
A moderate amount	34%	299
Only a little	29%	259
Not at all	8%	66
Don't know	10%	86
I don't currently see patients	10%	90
TOTAL	**100%**	**885**

In which of the following ways, if any, do you think your patients are currently being affected by climate change, or might be affected in the next 10-20 years?

Response Options	Percent Response CIs ± 3.5% or less			Response Number (N)
People are currently being affected	**Yes**	**Don't Know**	**No**	**TOTAL**
Heat-related effects (e.g., heatstroke, heat exhaustion, cardio-respiratory illness)	48%	22%	30%	**749**
Vectorborne infection (e.g. Lyme, West Nile, Dengue Fever, Malaria)	40%	28%	32%	**744**
Diarrhea from food/waterborne illnesses (e.g. Salmonella, Giardia, Cryptosporidia) following downpours or floods	26%	31%	43%	**742**
Injuries due to severe storms, floods, droughts, fires	57%	17%	26%	**749**
Air pollution related increases in severity of illness (e.g., asthma, COPD, pneumonia, cardiovascular disease)	77%	12%	12%	**752**
Increased care for allergic sensitization and symptoms of exposure to plants or mold (visits to office/ER for asthma/allergic symptoms)	58%	25%	17%	**749**
People will be affected in the next 10-20 years	**Yes**	**Don't Know**	**No**	**TOTAL**
Heat-related effects (e.g., heatstroke, heat exhaustion, cardio-respiratory illness)	67%	22%	10%	**709**
Vectorborne infection (e.g. Lyme, West Nile, Dengue Fever, Malaria)	62%	28%	9%	**706**
Diarrhea from food/waterborne illnesses (e.g. Salmonella, Giardia, Cryptosporidia) following downpours or floods	48%	38%	14%	**703**
Injuries due to severe storms, floods, droughts, fires	69%	22%	9%	**701**
Air pollution related increases in severity of illness (e.g., asthma, COPD, pneumonia, cardiovascular disease)	80%	14%	6%	**704**
Increased care for allergic sensitization and symptoms of exposure to plants/mold (office/ER visits for asthma/allergy)	66%	26%	8%	**704**

SECTION C

Which of the following, if any, are barriers that prevent you from addressing climate change-related health issues with patients?

Response Options	Percent Response CI ± 3.3% or less					Response Number (N)
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	TOTAL
Climate change is not occurring	3%	6%	11%	27%	53%	**754**
My patients would not be interested or knowledgeable enough about climate impacts to discuss this issue	4%	28%	30%	32%	6%	**756**
Lack of time	18%	43%	22%	13%	4%	**755**
Lack of knowledge regarding how to approach the issue with my patients	13%	45%	20%	18%	4%	**754**
Addressing these issues with my patients will not make much difference in their overall health	10%	32%	30%	24%	5%	**749**
Other barriers (please specify)	17%	19%	49%	12%	3%	**90**

*See Appendix for open-ended responses to "Other barriers"

The primary hospital that I admit to is well prepared for climate-related events (e.g., disasters/ emergencies, extreme weather events, increase in certain diseases, etc.)

Response Options	Percent Response CI ± 3.3%	Response Number (N)
Strongly agree	13%	96
Agree	42%	311
Neutral	29%	214
Disagree	13%	94
Strongly disagree	4%	26
TOTAL	**100%**	**741**

My primary place of work does an effective job minimizing its use of fossil-fuels (e.g., conserving energy/water, recycling equipment, etc.)

Response Options	Percent Response CI ± 3%	Response Number (N)
Strongly agree	6%	51
Agree	28%	230
Neutral	34%	281
Disagree	25%	208
Strongly disagree	7%	61
TOTAL	**100%**	**831**

Teaching about climate change and its association with health impacts should be integrated into medical education.

Response Options	Percent Response CI ± 3%	Response Number (N)
Strongly agree	20%	170
Agree	53%	446
Neutral	17%	141
Disagree	6%	50
Strongly disagree	4%	29
TOTAL	**100%**	**836**

Physicians should have a significant advocacy role in relation to climate change and health.

Response Options	Percent Response CI ± 3%	Response Number (N)
Strongly agree	22%	180
Agree	52%	435
Neutral	17%	143
Disagree	5%	45
Strongly disagree	4%	32
TOTAL	**100%**	**835**

My medical societies should have a significant advocacy role in relation to climate change and health.

Response Options	Percent Response CI ± 3%	Response Number (N)
Strongly agree	26%	219
Agree	49%	408
Neutral	15%	126
Disagree	6%	48
Strongly disagree	4%	35
TOTAL	**100%**	**836**

I feel that actions I take in my personal and/or professional life can contribute to effective action on climate change.

Response Options	Percent Response CI ± 3%	Response Number (N)
Strongly agree	19%	160
Agree	48%	401
Neutral	19%	160
Disagree	10%	85
Strongly disagree	3%	27
TOTAL	**100%**	**833**

Physicians have a responsibility to bring the health effects of climate change to the attention of their patients.

Response Options	Percent Response CI ± 3%	Response Number (N)
Strongly agree	18%	147
Agree	44%	368
Neutral	25%	212
Disagree	8%	70
Strongly disagree	5%	38
TOTAL	**100%**	**835**

Physicians have a responsibility to bring the health effects of climate change to the attention of the public.

Response Options	Percent Response CI ± 3%	Response Number (N)
Strongly agree	25%	211
Agree	47%	390
Neutral	18%	151
Disagree	5%	44
Strongly disagree	5%	38
TOTAL	**100%**	**834**

Physicians should have a leadership role in encouraging offices, clinics, hospitals to be as environmentally sustainable as possible.

Response Options	Percent Response CI ± 3%	Response Number (N)
Strongly agree	29%	240
Agree	51%	422
Neutral	15%	124
Disagree	3%	26
Strongly disagree	2%	18
TOTAL	**100%**	**830**

Which of the following resources, if any, would be helpful to you?

- Policy statements provided by my professional associations.

Response Options	Percent Response CI ± 3%	Response Number (N)
Strongly agree	27%	221
Agree	50%	417
Neutral	16%	129
Disagree	4%	36
Strongly disagree	4%	31
TOTAL	**100%**	**834**

Which of the following resources, if any, would be helpful to you? Continuing medical education (CME) on climate change and health.

Response Options	Percent Response CI ± 3%	Response Number (N)
Strongly agree	22%	184
Agree	52%	434
Neutral	17%	143
Disagree	5%	40
Strongly disagree	4%	35
TOTAL	**100%**	**836**

Which of the following resources, if any, would be helpful to you?

- Patient education materials.

Response Options	Percent Response CI ± 3%	Response Number (N)
Strongly agree	21%	170
Agree	50%	412
Neutral	21%	176
Disagree	5%	38
Strongly disagree	4%	32
TOTAL	**100%**	**828**

Which of the following resources, if any, would be helpful to you?

- Other resources (please specify)*:

Response Options	Percent Response CI ± 3%	Response Number (N)
Strongly agree	18	13
Agree	12	9
Neutral	65	48
Disagree	3	2
Strongly disagree	3	2
TOTAL	**100%**	**74**

*See Appendix for open-ended responses to "Other resources"

Which, if any, of the following groups will disproportionately experience any negative health effects from climate change? [check all that apply][3]

Response Options	Percent Response (of total survey responses, N = 915)	Number (N) of YES Responses
	Yes	TOTAL
Young children ages 0 to 4	66%	600
Older children ages 5 to 17	33%	305
Young adults ages 18 to 39	17%	151
Middle aged adults ages 40 to 60	14%	130
Older adults ages 60+	63%	573
People with chronic diseases	75%	686
The poor and the working poor	65%	590
People of color	27%	249
None of the above because climate change isn't happening	5%	41

SECTION D

Outside your role as a health professional, to what degree have you personally experienced climate change?

Response Options	Percent Response CI ± 3%	Response Number (N)
A great deal	8%	67
A moderate amount	30%	251
Only a little	43%	353
Not at all	14%	117
Don't know	5%	42
TOTAL	100%	830

[3] Respondents were asked to check a response box if they believed each group would experience the negative health effects of climate change, but were not asked to indicate whether they did not feel each group would experience these effects. Therefore, non-responses may be either an indication of disagreement with the item, or that the respondent skipped the question.

How much do you trust each of the following as a source of climate change information?

Response Options	Percent Response CI ±						Response Number (N)
	Strongly Trust	Trust	Neutral	Distrust	Strongly Distrust	Don't Know	TOTAL
American Thoracic Society	44%	31%	10%	2%	1%	2%	**829**
Centers for Disease Control and Prevention	47%	31%	7%	3%	2%	2%	**831**
Institute of Medicine (National Academy of Sciences)	39%	29%	13%	3%	2%	6%	**828**
World Health Organization	37%	35%	10%	4%	4%	2%	**832**
Intergovernmental Panel on Climate Change (IPCC)	21%	23%	23%	5%	6%	23%	**827**
US National Health Assessment*	11%	25%	27%	6%	3%	29%	**827**
American Medical Association	18%	36%	27%	10%	6%	3%	**827**

*This question was incorrect and should have said the US National Climate Assessment.

SECTION E

Which of the following degrees or certifications do you hold? [Primary degree as indicated by the respondent]

Response Options	Percent Response	Response Number (N)
M.D.	84%	691
Ph. D.	11%	93
PA / CRNP	1%	7
RN	1%	8
CRT or CRTT	0.5%	3
Master's degree	1%	9
Other clinical degree	1	9
Other non-clinical degree	1%	6
TOTAL	**100%**	**827**

Which of the following degrees or certifications do you hold? [Secondary degree as indicated by the respondent]

Response Options	Percent Response	Response Number (N)
Ph. D.	21%	45
PA / CRNP	1%	2
RN	3%	6
CRT or CRTT	0.5%	1
Master's degree	65%	138
Other clinical degree	8	17
Other non-clinical degree	1%	2
TOTAL	**100%**	**211**

What is, or if retired was, your primary work setting?

Response Options	Percent Response	Response Number (N)
Outpatient (clinical)	15%	125
Hospital (clinical)	27%	219
Non-clinical Administrative	2%	15
Other non-clinical	3%	23
Other clinical	1%	7
Academic	53%	431
TOTAL	**100%**	**820**

Which best describes your practice or type of work?

Response Options	Percent Response	Response Number (N)
Internal Medicine / Family Medicine	2%	16
Pulmonary Medicine	45%	376
Other specialty of Internal Medicine	3%	24
Occupational / Environmental Medicine	1%	9
Surgical Specialty / Subspecialty	1%	7
Other Practice	6%	52
Retired	2%	16
Critical Care	15%	128
Sleep	3%	21
Pediatrics	7%	54
Scientific Research	15%	127
TOTAL	**100%**	**830**

In which U.S. State do you (or did you) work?

Response Options	Percent Response	Response Number (N)
Alabama	1%	10
Alaska	0.3%	2
Arizona	2%	13
Arkansas	0.1%	1
California	11%	81
Colorado	5%	35
Connecticut	2%	14
Delaware	0.3%	2
District of Columbia	1%	7
Florida	3%	19
Georgia	2%	16
Hawaii	0.4%	3
Idaho	0.1%	1
Illinois	4%	33
Indiana	2%	15
Iowa	1%	7
Kansas	1%	7
Kentucky	1%	6
Louisiana	1%	10
Maine	1%	6
Maryland	4%	32
Massachusetts	6%	49
Michigan	3%	25
Minnesota	3%	22
Mississippi	0.1%	1
Missouri	3%	21
Montana	0.1%	1
Nebraska	1%	5
Nevada	0.1%	1
New Hampshire	1%	6
New Jersey	2%	18
New Mexico	1%	5
New York	6%	49
North Carolina	4%	29
North Dakota	0%	0
Ohio	5%	38
Oklahoma	0.4%	3
Oregon	1%	11
Pennsylvania	5%	38
Rhode Island	1%	6
South Carolina	1%	7
South Dakota	0.1%	1

Tennessee	2%	13
Texas	4%	30
Utah	1%	9
Vermont	0.5%	4
Virginia	2%	12
Washington	4%	30
West Virginia	0.4%	3
Wisconsin	1%	10
Wyoming	0.1%	1
TOTAL	**100%**	**768**

What is your gender?

Response Options	Percent Response	Response Number (N)
Female	32%	256
Male	68%	552
Prefer not to answer	0.2%	2
TOTAL	**100%**	**810**

What is your age?

Response Options	Percent Response	Response Number (N)
18-30	4%	32
31-50	48%	395
51-65	33%	273
66 or older	13%	109
Prefer not to answer	2%	16
TOTAL	**100%**	**825**

Please specify your ethnicity:

Response Options	Percent Response	Response Number (N)
Hispanic or Latino/a	4%	35
Not Hispanic or Latino/a	88%	721
Prefer not to answer	8%	64
TOTAL	**100%**	**820**

Please specify your race [check all that apply]:

Response Options	Percent Response	Response Number (N)
American Indian or Alaskan Native	0.3%	2
Asian	13%	98
Black or African American	1%	11
Native Hawaiian or other Pacific Islander	0%	0
White	81%	617
Other (please specify)	3%	19
Multiple / Bi-racial	2%	13
TOTAL	**100%**	**760**

Methods

The Survey

The survey was conducted in the summer of 2014 by George Mason University (GMU), and the American Thoracic Society (ATS), for the purpose of assessing physician's beliefs about and experiences with climate change, including whether they were witnessing any health effects among their own patients. The survey instrument was an expansion of a validated survey tool that was adapted for a clinical audience. The non-clinical questions on climate beliefs and policy preferences were drawn from earlier surveys developed for use with members of the general public. Questions on clinical observations were developed by the research team and the ATS Environmental Health Committee and piloted with clinicians. There were 46 questions and several open-ended questions. Respondents took, on average, 5-10 minutes to complete the survey.

Contact Procedures

The distribution of the survey was conducted online using Qualtrics software. In July and August of 2014, surveys were distributed by email to 5500 randomly selected U.S. members of the ATS (half of its U.S. membership). A letter of invitation and subsequent reminders came from the President of ATS with the link to the survey . The invitation letter outlined the importance of gaining ATS member perspectives on climate change to help shape the American Thoracic Society actions on the issue. Two incentives were offered: for every responder, a $1 donation would go to the ATS Foundation fund for promising new researchers; and responders were entered into a raffle to win a free registration for the ATS International Conference in Denver, Colorado in the Spring 2015. Only individuals who had not yet responded received reminders. Three reminders and one final appeal were sent at intervals of one week or more.

Sample

All recipients of the survey were U.S. ATS members. The reported race of participants was 81% White, 13% Asian, 1.5% Black, 2% multiple racial identities, and 2.5% who did not report a racial group. Only 4% of respondents identified as Latino/a. Age of the majority of responders was between 31-65, with those under 30 making up 4%, and those over 65 making up 13%. The age range of the responders was younger than the larger sample of the full ATS membership of 5420 (ages 18-30 4% vs. 0.9%; ages 31-50 48.8% vs. 41.4%; ages 51-65 33.7% vs 42.1%; age $\geq$66 13.5 % vs. 15.7%). As is typical of most surveys, the respondents were more likely to be women, as compared to the overall member sample (31.6% vs. 21.6%). Most respondents were physicians holding an M.D. or an M.D. plus another degree (84% and 23% respectively), while Ph.D.'s (11%) and other clinical professionals (registered nurses, respiratory therapists, and mid-level practitioners) made up the rest of the sample.

The respondents practiced pulmonary medicine (45%), critical care (15%), scientific research (15%), pediatrics (6.5%), internal medicine and specialties of internal medicine (5%), sleep medicine (2.5%), environmental/occupational medicine (1%), surgical specialties (1%), and other types of practice

(6%). The primary work settings were academic (53%), hospital-based (27%), and outpatient (15%). Two percent were retired.

Analysis

Descriptive statistics were applied to all data. No weighting was used to account for differences between the sample population and the general U.S. ATS population. All mean differences reported were significant at two-way $p < .05$. Confidence intervals (CI's) were calculated for each percent response entering the sample (5500) and respondent population size and the specific percent response using an online CI calculator.[4] Based on the sample size and the number of respondents, confidence intervals for all reported responses are +/- 3.5 % or less. Open-ended comments have been edited for grammar, spelling, and to abbreviate the length of statements without altering the meaning. The open-ended comments may be found below

Response Rate

Of the 5500 emailed surveys, 80 had invalid addresses, leaving a total of 5420 individuals contacted. The response rate was 17%, or 915, which is equivalent to about 10% of the U.S. membership. The respondents represented 49 of the United States and the District of Columbia. The regional distribution of the responders closely mirrors the regional distribution of the sample population by climate region, as defined in the US National Assessment (Northeast, Southeast, Great Plains, Mid-West, Northwest, Southwest).

Table. Distribution of Poll Responders vs. Random Sample, by Climate Region

Climate Region	Percent of Responders N=768	Percent of Sample N=5420
South-East	17%	19%
North-East	30%	32%
Great Plains	10%	12%
Mid-West	22%	21%
North West	5%	4%
South West	19%	17%
Alaska/Hawaii	1%	1%

[4] [4] http://www.surveysystem.com/sscalc.htm. Accessed September 29, 2014.

Open-Ended Response Items:

Prompt: "If you have a relevant anecdote about a patient who has experienced one of these impacts, please describe here:"

Injury from severe storms, floods, fires droughts	• Many of my patients with chronic lung diseases report increased symptoms on high pollution days, particularly when there are wild fires in close proximity to urban areas. • Asthma secondary to fires especially • Chronic obstructive pulmonary disease and asthma exacerbations from the more frequent wildfires here in San Diego; exacerbations of atopic & pulmonary illness following natural disasters: flooding & forest fires, which…are…in part consequential to climate change • A 51 y/o female with asthma had a severe exacerbation in June 2008 secondary to increased particulate air pollution from multiple wildfires in N CA…with high ozone…extreme heat. • Wildfires are increasing and have caused patients with lung disease increased hospital admissions and or aggravation of their disease • Wildfires throughout 2013 have resulted in increased exacerbations in asthma patients, cardiac failure patients, and severe wheezing episodes among former COPD patients. • Worsening asthma control with wildfires necessitating hospitalization. • I have asthmatic patients that have had exacerbations triggered by wildfire smoke exposure. • There was an air inversion a few years ago on the northeast coast and major fires in Canada. I remember walking into the hospital to see a new young (50's) stroke patient in Mass. and the visibility was noticeably reduced due to the particulate matter associated with the smoke. I had just read about the increase in stroke associated with particulate matter air pollution and felt strongly that this was the situation as the patient had no other risk factors. • Forest fires (believed related to higher temperatures and long periods of drought) in the mountain west region causing exacerbations in asthmatic and Cardiac Failure patients. • Fires in Washington state definitely contributing to chronic obstructive pulmonary disease exacerbations and impaired quality of life • I have asthmatic patients that have had exacerbations triggered by wildfire smoke exposure. • Increased wildfires in area-increased pulmonary exacerbations for cardiac failure and asthma patients. • Several patients with worsened respiratory symptoms following recent fires which appear to be related to drought conditions. • This winter, bad air pollution from "temperature inversion" exacerbated asthma and chronic obstructive pulmonary disease; similarly, last Fall, smoke from multiple wildfires did as well. What is alarming, the wildfires occurred in EARLY spring, long before dry summer and Fall.

	• Patient in recent flooding incident that lost all their medications and ended up in the intensive care unit with a severe asthma exacerbation. • Asthma patient with mold allergy with much worse control/ hospital stays after very rainy spring/ summer • …children with asthma with more frequent symptoms/exacerbations due to poor air quality; inversions, high allergen counts, rental living accommodations with visual mold, living in areas with high winds, fires • Our entire hospital closed for 3 months and our clinics for 1 month due to…Sandy. We could not even reliably access electronic records- cancer work ups were delayed. • …Sandy affected 20,000 ATS and NIH research samples…had to be rescued due to electricity break-down. MD suffered cellulitis and shingles subsequently… • Noted increased number of asthma exacerbations in this community immediately following Superstorm Sandy in 2012 • Patients in NYC region during Superstorm Sandy… suffered exacerbations of asthma due to weather related power outages -- storm severity linked to climate change. • …health care problems associated with prolonged power outages. I have had patients with hypothermia…patients with exacerbations after having to use the fireplace…elderly patients stay with their children during prolonged outages & have illness related to viruses from the grandchildren. • We treat asthmatics…some are very sensitive to barometric changes that seem to exacerbate their asthma • With dramatic weather swings this winter and summer, our asthmatics have really experienced flares during this shifts in weather, i.e. the "polar vortex" and "pollen vortex" • Dust storms-increased observation of temporal association of NTM infections and ABPA following these in cardiac failure patients (clusters)

Air Pollution Related:	• I practice in a large community with a substantial burden of particulate matter, especially in the winter, which affects my patients with known lung disease acutely (asthma, chronic obstructive pulmonary disease) - and also probably affects the entire community to a lesser known degree. • I have seen an increase in my asthma population in age and number. The average age is getting younger. • Air pollution effects on asthma in children in the cities. • Increased respiratory symptoms in cystic fibrosis patients during high ozone days and outdoor exposure.

	• Ozone exposure in my city worsens the symptoms of my COPD patients/asthmatics • Worsening dyspnea during ozone alerts •
Heat-related effects:	• Not a patient, but a neighbor with severe chronic obstructive pulmonary disease definitely had worsening of his disease on hot, humid summer days, forcing him to stay inside and use more of his oxygen than usual. • Frequency of chronic obstructive pulmonary disease and asthma exacerbations increased with high temperatures • Many of my COPD pulmonary disease patients have complained of increased frequency of exacerbations due to increased temperature, humidity, and allergies, particularly to molds. • I had a patient with a severe chronic obstructive pulmonary disease exacerbation related to increased temperatures and several asthmatic patients who have had significant worsening of their disease in the heat, requiring increase in medications. • Many of my patients with COPD describe worsened dyspnea with increased temperatures. …they are having a harder time each summer. • Summers in the Northeast are incredibly challenging for my patients with advanced lung disease. I have a young asthmatic (44yo) with complicated pulmonary history who is overall a bit tenuous but requires RTC supplemental O2 during the summers because his shortness of breath and hypoxemia are much worse with hot humid weather. Sadly, he is less able to play with his 6 year old son during these times, as well, because of his lung disease.

Allergy	• For the last 3-5 years there have been requests for interviews, news stories, etc. about the 'bad' allergy season or the prolonged allergy season. • Allergic symptoms are worsening each year for patients • I see many patients experiencing increases in respiratory symptoms as a result of local air pollution and/or increased seasonal allergens. • Increased allergies, resulting in less activity, resulting in gaining weight. • More patients presenting with allergies, increased visits due to results from air pollution. • Patient have experienced Increase in asthma, allergy, cough and dyspnea • Pollen seasons are longer affecting asthma control. Poor air quality effecting breathing. • Several of my patients have remarked on earlier and longer allergy seasons leading to worse asthma control. • Several of my patients with allergic rhinitis advanced to chronic coughing, intermittent bronchospasm, spirometers-documented airflow obstruction diagnostic of asthma. • Several of my patients with allergic rhinitis advanced to chronic coughing, intermittent bronchospasm, spirometers-documented airflow obstruction diagnostic of asthma. • Subjects with increased number of allergies • The change in rain and temperature in the west has been associated with a spike in cases of seasonal and year round allergies in not only children but adults and I think there is a relation to climate change here....
Infections	• We had a patient with cystic fibrosis exposured to flood waters/ water damaged area after a severe flood in our area. She became ill with multiple water-borne respiratory pathogens that she had not had previously. • I have found Enteroviral infections more commonly in the winter than before • I had tick bite in Vermont developing erythema migrans. There were not ticks until a few years ago in southern Vermont. • In Florida, has been raining and has caused the incidence of Dengue; summer has been very warm with high humidity which I think affects chronic obstructive pulmonary disease patients in a negative way • ….Certainly we see more vector borne illnesses such as deer tick caused problems not just within our patients but also within our staff members. • Outbreaks of legionella pneumonia in southeastern states associated with excess rainfall

Prompt: Which of the following resources, if any, would be helpful to you? (specify):

1) Education
- Summary of data/publications and facts about climate change and its impact on health to use in an informed way for patients and for advocacy efforts
- Key reference list
- List of reliable websites
- ATS sessions
- Session at ATS
- Patient safety CME's
- Medical school curriculum materials
- Educational materials that could be provided to health professional students
- I believe in educating my patients so that they are their best advocate
- Involve creative social media education
- State of the art Legislative Education materials regarding proven health associations with pollution / climate change should it pertain to active legislation so that personal visits to lawmakers can be factual and educational.
- Information free of political bias
- Need to focus on REAL health concerns
- TV shorts to offset denier: petroleum industry ads that claim they are green, coal industry saying they're investing is "safe coal."

2) Research:
- Data
- Research testing hypotheses between climate change and health outcomes
- Research on climate change and impacts health
- Research articles
- Research

3) Political Tools
- ATS needs to take a more active role in issues such as this--it has the power and voice to make changes but has not done so effectively so far.
- Political tools to influence the changes in your local area. Suggested discussion points, facts with your politicians.
- Lobbying efforts
- Lobby politicians
- Legislative advocacy
- How to advocate in Congress
- Politicians who respect science

4) Other
- Get electic car, bike more
- I don't want my professional society dues to be wasted on politically motivated propaganda such as "climate change"
- Please stay out of this morass

Which of the following, if any, are barriers that prevent you from addressing climate change-related health issues with patients? Other (specify):

1) Too Political
- This has mostly been presented as a political issue not a health issue.
- This can raise problems with political issues and patients may not agree about the impact of this issue on our environment and their health
- Some see it as a political discussion rather than a health discussion
- Unfortunately tied into politics, rather than science, I dislike talking about politics with patients
- Politics are ruining the country
- Political stance
- Political and social barriers
- Political affiliation concerns, not want to alienate patients
- Patient's don't agree with climate change
- Patient buy-in to the idea of climate change
- How does one chat about it in a non-politicized manner ?
- Don't want to enter politically complicated discussion with patients given limited time and potential to alienate patient
- Climate change itself is not a relevant issue to discuss directly with patients because it is too divisive and complicated, and it is better to stick with heat and pollution-related awareness, which I already do.
- Republicans
- Overcoming DENIERS lies
- Concerted effort by media and powers that be to deny science of climate change
- Climate change doubters

2) Insufficient Knowledge
- Lack specific evidence
- Insufficient clinical data
- INABILITY TO KNOW WHAT TO DO ABOUT IT.
- Don't know what to do, what to recommend. What are actions patients can take?
- No good solutions
- No barriers to discuss climate change and health with patients
- Need more specific evidence
- We just do not know enough yet about the direct (and current) health impact of climate change, other than from weather-related disasters

3) Priorities
- Patient likely has other priorities for the visit
- Most of my patients will be dead by then.

- Many other more pressing issues to discuss
- Not a major current problem in health care of my patients
- Priorities

4) Incompatible with medical care

- Its a public health issue, not a patient care issue
- What can honestly be done on an individual basis? Healthcare is about the individual. Climate change needs to occur by the individual but as a society
- Our health problems are mainly social in origin
- Pointless to discuss in office. Address it nationally or not at all
- It would be idiotic to bring this up. Patients are not stupid as this survey implies
- I work only in critical care. Patients leave my care before I can address the issues with them.
- I only work in the PICU
- This is an offensive form of non-medical propaganda. There are legitimate issues for debate regarding "climate change" including its causes, effects and most importantly the tradeoffs inherent in attempts to control it by restricting the use of fossil fuels. As a pulmonary critical care physician I have no special expertise in these areas beyond what any other reasonably knowledgeable citizen might have. To couch my own political views as a medical opinion and foist them on my patients would be inappropriate. It is offensive the ATS does not see this obvious fact.

5) Disagree that climate change is happening

- The questions make the assumption that man is causing climate change (global warming)
- I think with these questions you are assuming that all climate changes on earth are man-made and not a cycle of nature and if that is your premise I disagree
- Basically created by environmental nuts