

# Climate for women in climate science: Women scientists and the Intergovernmental Panel on Climate Change

Miriam Gay-Antaki<sup>a,1</sup> and Diana Liverman<sup>a</sup>

<sup>a</sup>School of Geography and Development, University of Arizona, Tucson, AZ 85709

Edited by Susan Hanson, Clark University, Worcester, MA, and approved January 17, 2018 (received for review June 6, 2017)

The Intergovernmental Panel on Climate Change (IPCC) is an authoritative and influential source of reports on climate change. The lead authors of IPCC reports include scientists from around the world, but questions have been raised about the dominance of specific disciplines in the report and the disproportionate number of scholars from the Global North. In this paper, we analyze the as-yet-unexamined issue of gender and IPCC authorship, looking at changes in gender balance over time and analyzing women's views about their experience and barriers to full participation, not only as women but also at the intersection of nationality, race, command of English, and discipline. Over time, we show that the proportion of female IPCC authors has seen a modest increase from less than 5% in 1990 to more than 20% in the most recent assessment reports. Based on responses from over 100 women IPCC authors, we find that many women report a positive experience in the way in which they are treated and in their ability to influence the report, although others report that some women were poorly represented and heard. We suggest that an intersectional lens is important: not all women experience the same obstacles: they face multiple and diverse barriers associated with social identifiers such as race, nationality, command of English, and disciplinary affiliation. The scientific community benefits from including all scientists, including women and those from the Global South. This paper documents barriers to participation and identifies opportunities to diversify climate science.

climate science | women in science | IPCC | climate change | intersectionality

The Intergovernmental Panel on Climate Change (IPCC) has become the authoritative scientific voice on climate change since its first report in 1990 (1). Several studies have examined the demographics of authorship of the IPCC reports and have shown that authorship leans toward the natural sciences, the more developed countries, nonindigenous voices, and men. These studies suggest that this bias could challenge the representativeness, legitimacy, and content of the reports if they fail to adequately incorporate the scientific expertise of developing countries, indigenous knowledge, a diversity of disciplines in natural and social sciences, and the voice of women (2–7).

## Gender, Science, and Intersectionality

Many studies have documented the gender imbalance in science and have explored the reasons that women are not included or represented, especially at more senior levels of research (8–13). A 2013 special report in the journal *Nature* concludes that, despite some improvements, female scientists continue to face discrimination, unequal pay, and funding disparities and notes that, internationally, 70% of men and women view science as a male pursuit (14). Women face barriers associated with their family responsibilities and are poorly represented in journals and citations (15–18). Including women in research teams enhances innovation and discovery (19–21). Claims about data and explanations of women's underrepresentation in science can be controversial with some suggesting women choose to not pursue

a career in science and others recognizing more structural causes (17, 22–24). In our own discipline of geography, several studies have identified barriers facing women in physical geography including the masculinist culture of fieldwork, lack of role models, and family responsibilities (25–29).

A more nuanced understanding of difference can be found through “intersectionality,” a term coined by Crenshaw to show how social categorizations (e.g., gender, race, ethnicity) are dynamic and, often in combination, serve as grounds for inclusion and exclusion in our social fabric (30). Feminist inquiries see gender as a constructed analytical category within which humans think about and organize their social activity, rather than as a natural consequence of sex difference. In the same way, we can begin to appreciate the extent to which sexism, racism, classism, and cultural imperialism restrict the life opportunities of individuals and thus their contribution to science (31). These multiple exclusions have been proven to undermine the quality of scientific knowledge, job satisfaction, and career advancement (13, 20, 32–35).

An intersectional approach has been used to understand how multiple roles and identities contribute to vulnerability to climate impacts. Characteristics such as gender, socioeconomic status, ethnicity, nationality, health, sexual orientation, age, and place can disadvantage or empower in experiencing and responding to climate change and environmental problems (36–40). Gender is now a reviewed research topic for the IPCC because of the differential impacts of climate change and climate policy on women [e.g., in chap. 13 of the Working Group II IPCC fifth assessment (41)]. Poor representation of women decision makers has been

## Significance

**Women in science face barriers to professional advancement. One of the most important forums for international climate science is the Intergovernmental Panel on Climate Change, where there has been a slow increase in the proportion of women authors since the first assessment in 1990. Our survey of more than 100 female Intergovernmental Panel on Climate Change authors explores their experience and perceptions, the barriers to their full participation that they identify, and recommendations for improvements. While we find that some women reported a positive experience, others felt women were poorly represented and heard and encountered barriers beyond their gender including race, nationality, command of English, and discipline. The study contributes to the larger literature on gender and science and provides recommendations for greater inclusion.**

Author contributions: M.G.-A. and D.L. designed research; M.G.-A. performed research; M.G.-A. contributed new reagents/analytic tools; M.G.-A. and D.L. analyzed data; and M.G.-A. and D.L. wrote the paper.

The authors declare no conflict of interest.

This article is a PNAS Direct Submission.

This open access article is distributed under [Creative Commons Attribution-NonCommercial-NoDerivatives License 4.0 \(CC BY-NC-ND\)](https://creativecommons.org/licenses/by-nc-nd/4.0/).

<sup>1</sup>To whom correspondence should be addressed. Email: [mgayantaki@email.arizona.edu](mailto:mgayantaki@email.arizona.edu).

Published online February 12, 2018.

raised as an issue for the United Nations Framework Convention on Climate Change (42–48). Although several studies have documented how women are underrepresented in earth and ecological sciences (5, 49–53), **the challenges facing women in climate science have not been adequately addressed**. A few studies have found low percentages (less than 15%) of women studying atmospheric sciences in the past few decades, and several surveys find that women see family responsibilities, isolation, and discrimination as obstacles to their careers. Women climate scientists identify with a range of disciplines, especially geoscience, meteorology, ecology, and physical geography and likely share the interests, barriers, and opportunities facing women in science, technology, engineering, and mathematics more generally (54–58). Those working across the natural and social sciences to study climate impacts and policy include geographers as well women from anthropology, economics, international relations, and law. Within universities worldwide, women tend to be better represented in social than in natural sciences (59, 60).

Our survey contributes to other surveys and mixed-method approaches to understanding the gendered and racial climate in science (27, 28, 33, 61–64) and responds to the concerns that quantitative methods tend to erase the diversity of voices among women (28, 62). Specifically, we focus on gendered social relations from the viewpoint of women and examine how women scientists themselves make sense of underrepresentation and exclusions (61). We use an intersectional approach to highlight the many different relationships between women and science (31, 65) and seek to contribute to feminist understandings about science (65). Our study provides an intersectional analysis of women’s participation in the IPCC reports, women’s perceptions of their experience as IPCC authors, and a summary of their recommendations to increase diversity in climate science.

Results

In terms of trends in IPCC female participation, our best estimate is that the first assessment in 1990 had no more than a dozen female authors and contributors, constituting 2% of the total scientists involved. The number and proportion of women authors rose over time from 26 (5% of all lead authors) in the 1997 second assessment to almost 100 in the 2001 fourth report (21%) and 182 (22%) in the fifth and most recent report in 2013. The most powerful positions in IPCC are those of chair or vice-chair of a working group. Only three women have ever filled these roles until the most recent election for the sixth assessment in which **eight women are now in executive roles (of 32)**. Women have had slightly more representation within the technical support units and task forces that sustain IPCC.

The demography of our 111 survey respondents shows a predominance of authors from the United States followed by the United Kingdom, Mexico, and Australia (Table 1). Fifty-one percent of respondents identified as natural scientists, 24% as social scientists, and 21% reported as both; 72% identified as Caucasian/white/European, and most were over 56 y old with only 4% under 40; 11% had served in the senior role of coordinating lead authors (CLA).

**Experience as an IPCC Author.** We asked about women’s most recent experiences in the IPCC, including their views as to why they were selected, whether they felt treated with respect, and whether their voice was heard (Fig. 1).

Almost all our respondents were confident in their ability to contribute to the IPCC, and most were confident in their ability to challenge senior researchers when they had a different opinion. Eighty-two percent of women reported being treated with respect by their chairs and 87% by their coauthors. While most felt that they were listened to and could influence their own chapter, many felt that they had little impact in influencing the overall report. Sixty percent reported that discussions and writing of the IPCC report were controlled by only a few scientists, and half reported that the workload was not equally distributed.

Table 1. Country affiliation of respondents

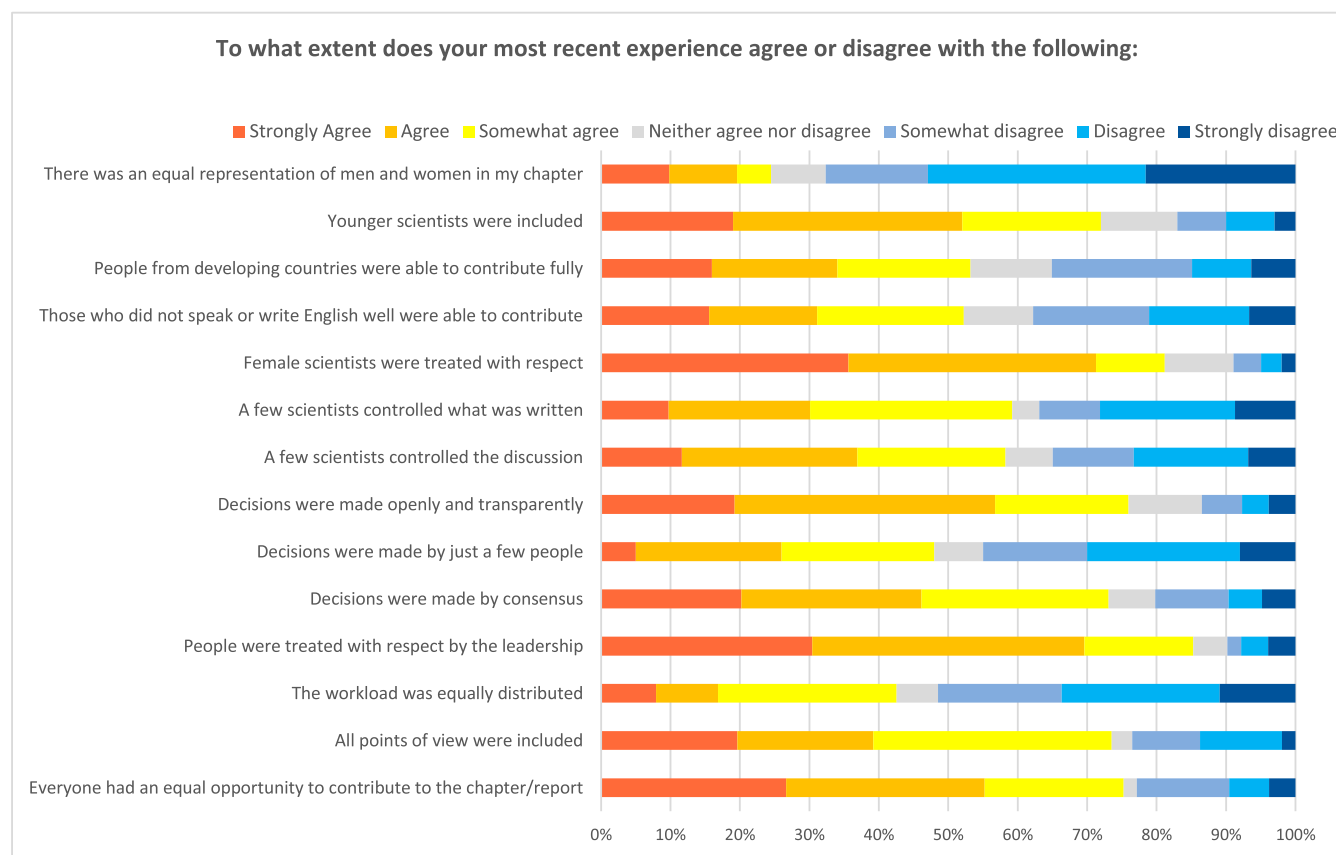
Country	No. of participants
United States	28
United Kingdom	11
Mexico	9
Australia	6
Argentina	5
France	5
Brazil	4
India	4
South Africa	4
Canada	3

Two respondents each from Chile, China, Finland, Germany, The Netherlands, Norway, Spain; one each from Botswana, Brazil/United States, Denmark, France/Italy, Hungary, Japan, Malaysia, Mexico/Argentina, Morocco, Mozambique, Russia, Slovakia, Sudan/Ivory Coast, Trinidad and Tobago, United States/Germany/Fiji, Venezuela, Zimbabwe.

The open-ended responses, where women could provide more detail on their experiences, were less positive. For example, several felt that more work was required from women than from men, but without appropriate credit. Others reported feeling marginalized and ignored: “I felt that IPCC scientists are in small impenetrable groups. . . . I didn’t feel welcome” and found “the IPCC process to be male dominated . . . by the older established men.” Other respondents wrote that “there was no equal opportunity to contribute . . . decisions were unilateral, non-transparent, a few scientists controlled the write-up” and “the leadership . . . [was] rather arrogant and not very inclusive. He only seemed to be interested in your opinion if you were an Ivy League-tenured, white male professor. In particular, researchers from developing countries felt excluded by him.” Another respondent told us that it seemed as if “some people’s views seemed more important than others, making information from some regions more important than others . . . rendering the whole exercise a big lie . . . it is a pity.” Some had different experiences over several assessments and received support from fellow authors: “there was one author of my chapter who occasionally did not treat me respectfully. He was arrogant and dismissive, but I prevailed through persistence and taking him on directly both inside meetings and in chapter meetings. My co-authors were also aligned with me, so I had their support.”

Women reporting positive experiences mentioned an overall inclusive, safe, and respectful atmosphere where they felt listened to and could make important contributions: “My chapter team were great people, we had really good discussions and a lot of fun. We all treated each other with respect. Most of us worked very hard. While there was one male in our group who talked a lot, the CLA would always make sure I got to make my point, and he often backed me up in discussions. . . . I always felt that my views were considered and I was listened to. We achieved balance across the literature, and distilled it, just as the IPCC should . . . there was a pleasant camaraderie and a mutual understanding of the different personalities in the group. In short, one of the best team efforts I have ever known!” Other women told us “I met extraordinary people, I strengthened my (belief) in responsibility and teamwork” and “I was in a chapter with a lot of senior female scientists which . . . made it easier for the younger and less experienced.”

**Barriers to Participation and Influence.** We asked scientists whether gender, race, ethnicity, language, youth, and nationality were barriers to their and other women’s full participation in the IPCC (Fig. 2). Respondents saw few barriers to their own participation but reported problems for others. Fourteen percent saw their gender and 14% saw their command of English as barriers; 9% reported their race/ethnicity to be barriers. For example, one woman wrote “my responses for ‘others’ . . . are only a guess at



**Fig. 1.** Most recent experiences participating in the IPCC.

some of the difficulties that I think that some of the developing country representatives must have.” Seventy-five percent saw lack of English ability as a barrier for others, 37.5% saw gender as a barrier for others, and 28% perceived a barrier for others associated with race. The open-ended responses were numerous in identifying women from developing countries as marginalized.

Many respondents commented that one of the most important tools for success in the IPCC was a good command of spoken and written English: “I found that in many instances having a good English command and speaking out loud defined a discussion.” English as the dominant language for all working groups of the IPCC (with the exception of some regional chapters), excludes those with imperfect command of English while gives greater voice to native English speakers and those with degrees from English-speaking institutions. One scientist commented “having earned my PhD in an English-speaking country, I have good speaking and writing skills. Without those aspects, my participation would have been a lot more frustrating, as I could observe with other female Latin-American colleagues.”

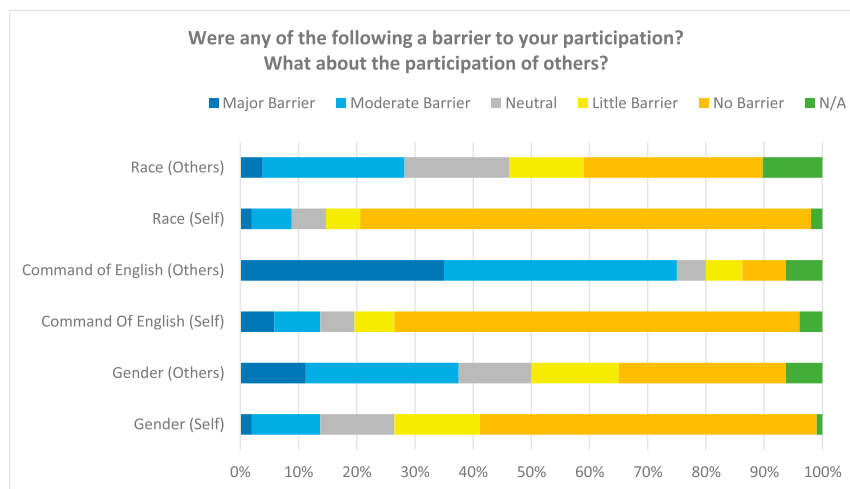
Some women noted that gender was an issue in holding leadership positions. For example, one respondent noted: “It seemed very difficult for some of the men in my chapter to accept that a woman was leading them. Women were rarely given the word; our suggestions were almost never taken up.” Others noted their multiple intersecting challenges: “in my case, I think it was the factor of: gender + age + command of English” and “being a woman and not particularly tall or loud, I found myself struggling to get attention from ‘senior’ scientists at meetings.” An intersectional lens highlights how individuals often experience discrimination based on social signifiers such as gender, race, class, and sexuality at the same time. These are not discrete categories but intersect; thus, a scientist who is a woman of color and small stature and from a developing country may face multiple levels of discrimination (30, 63).

Although most respondents reported little discrimination based on race, 35% of women of color reported race as a barrier to their full participation. As one African woman expressed: “The only reason that I could have felt not required at all in the team could be that I am an African woman. I have very good command of English, I am as qualified as others, I am confident also—but I was never listened to.”

A third of respondents reported that childcare and family responsibilities were barriers to their full participation in IPCC (Fig. 3). Women noted that if they had children, childcare responsibilities were their biggest obstacle, particularly those who were single parents or with babies. Several confessed that this responsibility might have negatively impacted their performance during the IPCC; as one noted, “I was a single parent during the last IPCC cycle, so traveling was a major obstacle. I managed because I really wanted to do this, but it was a large extra hurdle that caused me to arrive stressed at meetings and sometimes to not have full attention.”

Almost two-thirds saw a lack of time as a major barrier, and 21% had problems with lack of financial support from their country and/or institution for travel. The considerable time devoted to being a responsible IPCC author was a challenge, especially for less senior scholars: “One issue is the fact that being an IPCC author comes on top of other professional duties (research, teaching, administration, meetings) with extra work, travel to remote places, and with a timeline that is sometimes totally incompatible with the usual rhythm: report versions to be delivered during summer break or at the end of winter break, which are usually to spend with family.” Some women did not receive support from their supervisors and had to take vacation time to participate: “I was under a lot of pressure not to participate” or “There was retribution against me by others where I work because I chose to participate.”

Time needed for the IPCC is a particular problem for early career authors. While IPCC authorship can be helpful in increasing

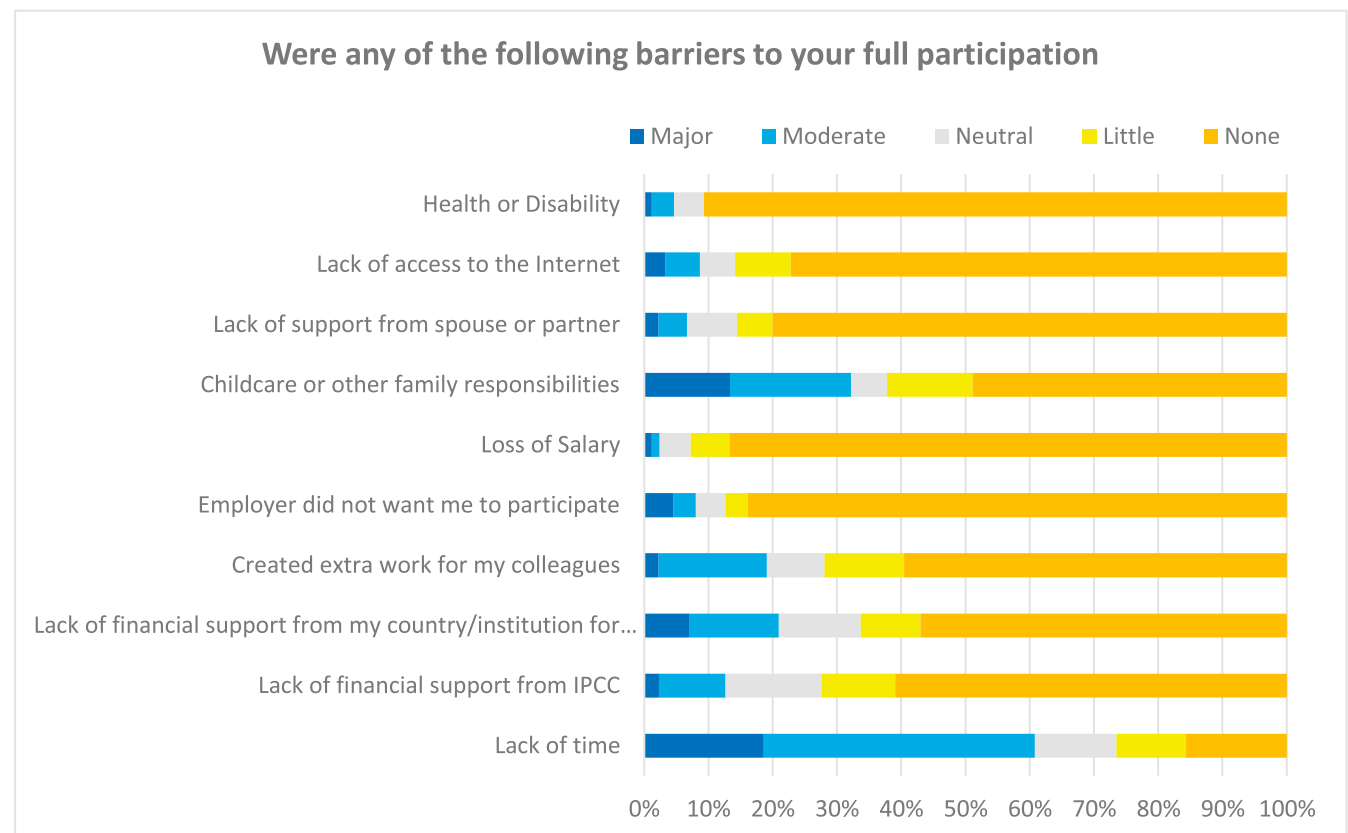


**Fig. 2.** Barriers to participation considering race, gender, and command of English: respondents' view of their experience and their perceptions of that of others.

one's national and international reputation, it may not increase your publication record: "for junior colleagues the barriers included a reduction in their publications given the large amount of time the process takes over the course of the 2-y cycle. The loss of individual productivity could influence their advancement in academe, which does reward publication over service, regardless of its importance." One woman reported that as a younger author "I was petrified, and often silent in author meetings."

We note that IPCC authors do not receive any payment for their work. A few women reported that participation resulted in

a significant reduction of income, and others reported having to take vacation days to work on the IPCC because of basic incompatibility with their regular work schedules or lack of understanding from their supervisors. This reflects common barriers facing women in the workplace (66). Women do most of the housework, including childcare, and this is consistent around the globe with women working 2 h more per day than men in the United Kingdom, 1.5 h more than men in France, and 4.3 h more than men in Mexico (18). This leaves little time for voluntary duties such as the IPCC on top of family and work responsibilities.



**Fig. 3.** Barriers to participating and influencing the IPCC report.



**Gender and Climate Science.** Finally, we asked survey participants specifically about the role of gender in being a climate scientist. Forty-one percent of women saw gender as a barrier to their success, and 43% believed that female climate researchers are not well represented in the climate community. The open-ended responses to these questions provide insights into the different types of discrimination based on gender that might include active discrimination, subtle discrimination, and discrimination based on family responsibilities.

Active discrimination occurs when women are not included, silenced, ignored, not supported, or not given the credit that they deserved because they are female. As a respondent noted, “There are enough female scientists that are capable of contributing . . . [but] males promote other males. It is a fact that there are many male scientists in IPCC that discriminate against female scientists based on the simple fact that they are women.” Another told us “women are still not listened to as much in committees. Many times, a male colleague repeated what I’d just said, and it was then tagged in the future as (his) idea rather than mine.”

Subtler discrimination was reported when women recognized that gender must have been a barrier in their career as scientists but were unsure of how or when it happened. For example: “I suspect that gender has delayed my career, it’s hard to say exactly how, but probably through lack of mentoring, not being ‘seen.’ . . . I now have a full professorship, but I still feel that a male of the same standing might be more likely to be picked for a leadership role than I would.” Another woman wrote “in my view being a female scientist is never neutral. Mostly it is detrimental, people do not take you seriously when you speak. . . . Rarely do I feel just ‘normal,’ only with very close colleagues.” Some attributed their success to good luck because they saw many of their female colleagues’ struggle. One expressed the following: “While I have been lucky in my career opportunities, I see many of my female peers dropping out along the way due to lack of job security and flexibility, which impacts females more than males.”

## Discussion and Recommendations

Women in the IPCC are among the world’s most recognized climate scientists yet their responses to this survey suggest that gender, especially when combined with race, nationality, family responsibilities, or language, are important barriers for their and other women’s full participation in climate science and assessments. Several women reported that they adopt traditionally male characteristics to be heard, such as being loud or exhibiting high confidence. Women often have to struggle to make their voices heard and overcome barriers (11, 67). Our survey indicates that barriers are greater for women with young children, for women of color, and for those from the developing world. These power differences generate particular types of knowledge and can influence the tone and content of assessments.

To be sure, some of the barriers identified by women in our survey are also experienced by men, especially those men who have problems with English fluency, racism, family responsibilities, or lack of time.

Many of our respondents made suggestions on how to improve the experience of women participating in the IPCC, including:

Encouraging remote participation via videoconferencing or phone calls to decrease the burden of travel.

Asking IPCC leadership to invite more women, and governments to nominate more women, to increase the pool size of qualified candidates.

Ensure that women have travel support or pay to compensate for using vacation.

Creating a support network for women involved in the IPCC to actively connect with each other.

Finding ways to be more family friendly (e.g., childcare, remote participation, timing of meetings) so that women do not

have to choose between participating in the IPCC or having a family.

Pay attention to gender concerns in meetings and in report content on climate impacts and responses.

Increase the proportion of women in leadership positions.

Invite younger women to participate as observers or chapter scientists.

Require training on gender issues to raise awareness of how to be gender-sensitive and open to different methods of encouraging full participation.

Monitor perceptions of participation throughout the process through evaluations that would highlight any barriers and allow for adjustment.

Ensure that women authors are included in synthesis reports and summaries for policy makers, reports to the Conference of the Parties, and relevant publications resulting from IPCC reports.

Make English language editors or translators available to overcome language barriers.

Compensate for accumulated discrimination by selecting women even if it means that some may have a slightly less impressive publication list than their male counterparts.

Recognize the multiple sources of discrimination and lack of voice that include gender, race, language, national origin, age, and other challenges.

Some of these recommendations are already being addressed by the IPCC. For example, the Special Report on 1.5C has 38% women authors, and there are now more women in leadership positions. IPCC authors are leaders in science, able to inform policy, and recognized globally as when the IPCC received the Nobel Prize for Peace in 2007. Role models are important to young aspiring scientists (68, 69), and women climate scientists can give voice and equal power and recognition to the half of the world that is female. Increasing the participation and voice of diverse women in the IPCC—especially those of color and from the developing world—will not only promote fairness and increase representation, but also can result in better and more influential climate science.

## Materials and Methods

All methods and materials were reviewed and approved by the Institutional Review Board (IRB) at the University of Arizona. Participants were presented in writing with the same information required in a written consent document, but signing of the consent form was waived by the IRB. The research involves no more than minimal risk of harm to subjects and involves no procedures for which written consent is normally required. Our goal was to survey as many women as we could identify who had been a coordinating lead author or lead author of an IPCC report. We chose to survey only women because we were interested in their experiences and views rather than a comparison with men. Identifying female IPCC authors is challenging because the first two assessments identified authors only by their initials and did not distinguish lead authorship. Some women could not be located. After undertaking a pilot survey and removing duplicates of women who served in multiple roles and reports, we contacted 223 individuals by email asking if they would complete a web survey. A total of 111 responded to some questions, and 98 completed the full survey—a response rate of 44%. We asked both closed and open questions to understand (i) the basic demography, (ii) views of the IPCC author experience and impact on her professional career, (iii) perception of barriers to their participation and voice and those of other women, and (iv) recommendations to improve women’s participation in the IPCC. We report both quantitative and qualitative results with illustrative quotations to give voice to our respondents.

**ACKNOWLEDGMENTS.** We wish to thank the Editor and Reviewers for their helpful comments and suggestions. M.G.-A. thanks Dave Rockoff for the helpful discussions.

1. Hulme M, Mahony M (2010) Climate change: What do we know about the IPCC? *Prog Phys Geogr* 34:705–718.
2. Corbera E, Calvet-Mir L, Hughes H, Paterson M (2015) Patterns of authorship in the IPCC Working Group III report. *Nat Clim Change* 6:94–99.
3. Ford JD, Vanderbilt W, Berrang-Ford L (2012) Authorship in IPCC AR5 and its implications for content: Climate change and indigenous populations in WGII. *Clim Change* 113:201–213.
4. Demeritt D (2001) The construction of global warming and the politics of science. *Ann Assoc Am Geogr* 91:307–337.
5. Carey M, Jackson M, Antonello A, Rushing J (2016) Glaciers, gender, and science: A feminist glaciology framework for global environmental change research. *Prog Hum Geogr* 40:770–793.
6. Ho-Lem C, Zerriffi H, Kandlikar M (2011) Who participates in the Intergovernmental Panel on Climate Change and why: A quantitative assessment of the national representation of authors in the Intergovernmental Panel on Climate Change. *Glob Environ Change* 21:1308–1317.
7. Cortina LM (2008) Unseen injustice: Incivility as modern discrimination in organizations. *Acad Manage Rev* 33:55–75.
8. Hill C, Corbett C, St Rose A (2010) *Why So Few? Women in Science, Technology, Engineering, and Mathematics* (American Association of University Women, Washington, DC).
9. Long JS, Fox MF (1995) Scientific careers: Universalism and particularism. *Annu Rev Sociol* 21:45–71.
10. Pearson WJ, Frehill LM, McNeely CL (2015) *Advancing Women in Science and Engineering*, eds Pearson WJ, Frehill LM, McNeely CL (Springer, Berlin).
11. White MS (1970) Psychological and social barriers to women in science. *Science* 170: 413–416.
12. Miss-Racun CA, Dovidio JF, Brescoll VL, Graham MJ, Handelsman J (2012) Science faculty's subtle gender biases favor male students. *Proc Natl Acad Sci USA* 109: 16474–16479.
13. Settles IH, Cortina LM, Malley J, Stewart AJ (2006) The climate for women in academic science: The good, the bad, and the changeable. *Psychol Women Q* 30:47–58.
14. Shen H (2013) Women in science: Women's work. *Nature* 495:21.
15. Budden AE, et al. (2008) Double-blind review favours increased representation of female authors. *Trends Ecol Evol* 23:4–6.
16. Dutt K, Pfaff DL, Bernstein AF, Dillard JS, Block CJ (2016) Gender differences in recommendation letters for postdoctoral fellowships in geoscience. *Nat Geosci* 9: 805–808.
17. Ceci SJ, Williams WM (2011) Understanding current causes of women's underrepresentation in science. *Proc Natl Acad Sci USA* 108:3157–3162.
18. Parker K, Wang W (2013) Chapter 6: Time in Work and Leisure, Patterns by Gender and Family Structure. Pew Research Center. Available at [www.pewsocialtrends.org/2013/03/14/chapter-6-time-in-work-and-leisure-patterns-by-gender-and-family-structure/](http://www.pewsocialtrends.org/2013/03/14/chapter-6-time-in-work-and-leisure-patterns-by-gender-and-family-structure/). Accessed January 20, 2017.
19. Nielsen W, et al. (2017) Correction for Nielsen et al., opinion: Gender diversity leads to better science. *Proc Natl Acad Sci USA* 114:E2796.
20. Loder N (1999) Gender discrimination undermines science. *Nature* 402:337.
21. Campbell LG, Mehtani S, Dozier ME, Rinehart J (2013) Gender-heterogeneous working groups produce higher quality science. *PLoS One* 8:e79147.
22. Alaimo S (2009) Insurgent vulnerability and the carbon footprint of gender. *Women Gender Res* 3–4:22–35.
23. Armstrong MA, Jovanovic J (2015) Starting at the crossroads: Intersectional approaches to institutionally supporting underrepresented minority women STEM faculty. *J Women Minor Sci Eng* 21:141–157.
24. Beck S, et al. (2014) Towards a reflexive turn in the governance of global environmental expertise: The cases of the IPCC and the IPBES. *GAIA Ecol Perspect Sci Soc* 23: 80–87.
25. Maddrell A, Strauss K, Thomas NJ, Wyse S (2016) Mind the gap: Gender disparities still to be addressed in UK higher education geography. *Area* 48:48–56.
26. Luzzadder-Beach S, Macfarlane A (2000) The environment of gender and science: Status and perspectives of women and men in physical geography. *Prof Geogr* 52: 407–424.
27. Madge C, Bee A (1999) Women, science and identity: Interviews with female physical geographers. *Area* 31:335–348.
28. Bracken L, Mawdsley E (2004) "Muddy glee": Rounding out the picture of women and physical geography fieldwork. *Area* 36:280–286.
29. Bee A, Madge C, Wellens J (1998) Women, gender, feminisms: Visiting physical geography. *Area* 30:195–196.
30. Crenshaw K (1989) Demarginalizing the intersection of race and sex: A black feminist critique of antidiscrimination doctrine, feminist theory and antiracist policies. *Univ Chicago Leg Forum* 140:139–167.
31. Harding SG (1986) *The Science Question in Feminism* (Cornell Univ Press, Ithaca, NY).
32. Cortina LM, Magley VJ, Williams JH, Langhout RD (2001) Incivility in the workplace: Incidence and impact. *J Occup Health Psychol* 6:64–80.
33. Settles IH, Cortina LM, Stewart AJ, Malley J (2007) Voice matters: Buffering the impact of a negative climate for women in science. *Psychol Women Q* 31:270–281.
34. De Vita L, Viteritti A, Sciannamblo M (2016) Re-thinking intersectionality through science and technology studies: Trajectories of women in technoscientific fields. *Rass Ital Sociol* 57:503–524.
35. Smooth WG (2016) Intersectionality and women's advancement in the discipline and across the academy. *Polit Groups Identities* 4:513–528.
36. Nightingale AJ (2011) Bounding difference: Intersectionality and the material production of gender, caste, class and environment in Nepal. *Geoforum* 42:153–162.
37. Djoudi H, et al. (2016) Beyond dichotomies: Gender and intersecting inequalities in climate change studies. *Ambio* 45(Suppl 3):248–262.
38. Hausermann HE (2014) Unintended developments: Gender, environment, and collective governance in a Mexican ejido. *Ann Assoc Am Geogr* 104:784–800.
39. Perez C, et al. (2015) How resilient are farming households and communities to a changing climate in Africa? A gender-based perspective. *Glob Environ Change* 34:95–107.
40. Kaijser A, Kronsell A (2014) Climate change through the lens of intersectionality. *Environ Polit* 23:417–433.
41. Olsson L, et al. (2014) Livelihoods and poverty. *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, eds Field CB, et al. (Cambridge Univ Press, Cambridge, UK), pp 793–832.
42. Robinson M (2015) Women must have a seat at the climate table. *Outreach: A Multi-Stakeholder Magazine*. Available at [outreach.stakeholderforum.org/index.php/previous-editions/cop-21-paris/edition-2-climate-and-gender/11909-women-must-have-a-seat-at-the-climate-table](http://outreach.stakeholderforum.org/index.php/previous-editions/cop-21-paris/edition-2-climate-and-gender/11909-women-must-have-a-seat-at-the-climate-table). Accessed March 6, 2017.
43. United Nations Framework Convention on Climate Change (2012) *Promoting Gender Balance and Improving the Participation of Women in UNFCCC Negotiations and in the Representation of Parties in Bodies Established Pursuant to the Convention or the Kyoto Protocol* (United Nations, General Assembly, New York).
44. Buckingham S (2010) Call in the women. *Nature* 468:502.
45. Gay-Antaki M (2016) "Now we have equality": A feminist political ecology analysis of carbon markets in Oaxaca, Mexico. *J Lat Am Geogr* 15:49–66.
46. Denton F (2002) Climate change vulnerability, impacts, and adaptation: Why does gender matter? *Gend Dev* 10:10–20.
47. Arora-Jonsson S (2011) Virtue and vulnerability: Discourses on women, gender and climate change. *Glob Environ Change* 21:744–751.
48. Driouech MF, Niang AD, Ko Va C (2016) Women Advancing Climate and Climate Change Sciences (Women-ACUS) Opening Charafat Afailal, Deputy Minister for Water Petterri Taalas, Secretary-General of WMO Hoesung Lee, Chair of the Intergovernmental Panel on Climate Change (IPCC). COP22Marakech. Available at [https://www.wcrp-climate.org/News-Highlights/2016/Flyers/Women\\_Advancing\\_Climate.pdf](https://www.wcrp-climate.org/News-Highlights/2016/Flyers/Women_Advancing_Climate.pdf). Accessed March 6, 2017.
49. Buck HJ, Gammon AR, Preston CJ (2014) Gender and geoengineering. *Hypatia* 29: 651–669.
50. Glass JB (2015) We are the 20%: Updated statistics on female faculty in earth sciences. U.S. *Women in the Geosciences: Practical, Positive Practices Toward Parity* (Wiley, Hoboken, NJ), pp 17–22.
51. Fischer HW, Chhatre A (2013) Environmental citizenship, gender, and the emergence of a new conservation politics. *Geoforum* 50:10–19.
52. Nast HJ (1994) Women in the field: Critical feminist methodologies and theoretical perspectives. *Prof Geogr* 46:54–66.
53. Oester S, Cigliano JA, Hind-Ozan EJ, Parsons ECM (2017) Why conferences matter—an illustration from the International Marine Conservation Congress. *Front Mar Sci* 4:257.
54. LeMone MA, Waukau PL, LeMone MA, Waukau PL (1982) Women in meteorology. *Bull Am Meteorol Soc* 63:1266–1276.
55. Hartten LM, LeMone MA, Hartten LM, LeMone MA (2010) The evolution and current state of the atmospheric sciences "pipeline." *Bull Am Meteorol Soc* 91:942–956.
56. Avallone LM, et al. (2013) Supporting the retention and advancement of women in the atmospheric sciences: What women are saying. *Bull Am Meteorol Soc* 94: 1313–1316.
57. MacPhee D, Canetto SS (2015) Women in academic atmospheric sciences. *Bull Am Meteorol Soc* 96:59–67.
58. Adams AS, et al. (2016) The earth science women's network (ESWN): Community-driven mentoring for women in the atmospheric sciences. *Bull Am Meteorol Soc* 97: 345–354.
59. O'Connor P, Carvalho T, Vabø A, Cardoso S (2015) Gender in higher education: A critical review. *The Palgrave International Handbook of Higher Education Policy and Governance* (Palgrave Macmillan UK, London), pp 569–584.
60. Henley MM (2015) Women's success in academic science: Challenges to breaking through the ivory ceiling. *Social Compass* 9:668–680.
61. Beddoes K, Pawley AL (2014) "Different people have different priorities": Work-family balance, gender, and the discourse of choice. *Stud High Educ* 39:1573–1585.
62. Pawley A, Phillips C (2014) From the mouths of students: Two illustrations of narrative analysis to understand engineering education's ruling relations as gendered and raced. *ASEE Annual Conference and Exposition*. Available at [https://www.researchgate.net/publication/286836391\\_From\\_the\\_mouths\\_of\\_students\\_Two\\_illustrations\\_of\\_narrative\\_analysis\\_to\\_understand\\_engineering\\_education's\\_ruling\\_relations\\_as\\_gendered\\_and\\_raced](https://www.researchgate.net/publication/286836391_From_the_mouths_of_students_Two_illustrations_of_narrative_analysis_to_understand_engineering_education's_ruling_relations_as_gendered_and_raced). Accessed December 7, 2017.
63. Clancy KBH, Lee KMN, Rodgers EM, Richey C (2017) Double jeopardy in astronomy and planetary science: Women of color face greater risks of gendered and racial harassment. *J Geophys Res Planets* 122:1610–1623.
64. Nelson RG, Rutherford JN, Hinde K, Clancy KBH (2017) Signaling safety: Characterizing fieldwork experiences and their implications for career trajectories. *Am Anthropol* 119:710–722.
65. Haraway D (1988) Situated knowledges: The science question in feminism and the privilege of partial perspective. *Fem Stud* 14:575–599.
66. Sayer LC (2005) Gender, time and inequality: Trends in women's and men's paid work, unpaid work and free time. *Soc Forces* 84:285–303.
67. Clancy KBH, Nelson RG, Rutherford JN, Hinde K (2014) Survey of academic field experiences (SAFE): Trainees report harassment and assault. *PLoS One* 9:e102172.
68. Robinson CV (2011) Women in science: In pursuit of female chemists. *Nature* 476: 273–275.
69. Dennehy TC, Dasgupta N (2017) Female peer mentors early in college increase women's positive academic experiences and retention in engineering. *Proc Natl Acad Sci USA* 114:5964–5969.