Request for Approval under the "Generic Clearance for Citizen Science and Crowdsourcing Projects" (Original OMB Control Number: 2080-0083)

TITLE OF INFORMATION COLLECTION: Smoke Sense

PURPOSE:

The health effects of air pollution range from low severity outcomes that impact large segments of populations (respiratory symptoms), to the most severe ones including hospitalization and death. Wildfires are a significant source of air pollution, however less is known about wildfire specific impacts on health. Better insight into the magnitude and scope of health impacts and improved health risk communication tools are key elements to improving health outcomes in the affected communities. We are proposing a specific research activity that integrates environmental models of smoke with EPA's current communication strategy in the context of wildfire smoke to characterize the impacts on human health and provide an understanding on how the public responds to existing health risk communication strategies.

The purpose of this research is to quantify health impacts and examine the ability of environmental models to provide timely information on when and where smoky conditions are likely to occur and improve health outcomes.

NEED AND AUTHORITY FOR COLLECTION:

The information is needed to: quantify health impacts, examine the ability of environmental models to provide timely information on when and where hazardous conditions are likely to present, and to quantify how individuals respond to that information.

The health impacts from air pollution exposures range from low severity outcomes that impact large segments of populations such as increased incidence of respiratory symptoms, to the most severe ones including hospitalizations and death. The impacts of air pollution on the most severe outcomes are established based on hospital records and large administrative databases and are well documented. However, a number of questions remain unanswered: at what concentrations do impacts occur? Who is the most susceptible? What pre-existing health conditions increase susceptibility? Is the susceptible segment of the population aware of their risks?

By comparison, but less understood, is the magnitude of the health burden and loss of productivity due to less severe outcomes. This is due in part to the difficulty in measuring the health burden using traditional research methods. Low levels of smoke can be intangible and often invisible, resulting in the public's perception of risk that is lower than actual risk. It is therefore critical that we improve health risk messaging surrounding wildfire smoke and provide people with tools that allow them to make informed decisions on how to reduce exposures and protect their health.

Figure 1 summarizes the magnitude of air pollution-related health effects, along with the severity of effects and the proportion of population affected. The largest portion of population is affected by less severe effects such as lung function decrements and airway inflammation. Symptoms stemming from these effects are also the hardest to measure. At the top of the pyramid is death, the most severe effect, impacting the smallest proportion of population, while accounting for 90% of the monetized benefits of air pollution regulation and the most straight-forward and easiest to measure.

In this study we are particularly interested in the frequency of symptoms including low severity symptoms (e.g., coughing, headache, etc.) that impact the population at large but are not reported officially.
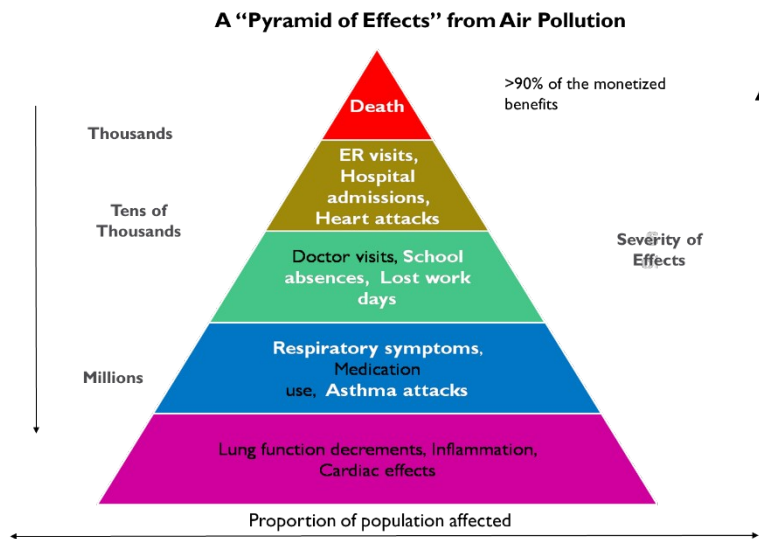

Figure 1: Magnitude and Severity of Health Effects with Proportion of Population Affected

This information will be collected under the legal authority of the Clean Air Act § 103, 42 U.S.C. § 7403, the National Environmental Education Act, § 4, 20 U.S.C. § 5503, and OMB Memo M-15-16. The Clean Air Act authorizes research into techniques for monitoring and controlling air pollution, including the health effects of air pollution. This study is concerned with low severity health effects of wildfire smoke, a growing contributor to particulate matter air pollution. The National Environmental Education Act, § 4, 20 U.S.C. § 5503 authorizes EPA to develop and support programs to increase environmental literacy. The EPA provides information on air quality and wildfire smoke, but how individuals respond to that information is generally not well known. This study has the potential to improve EPA's communication on wildfire smoke through better quantification of responses to air quality messaging. OMB Memo M-15-16 encourages agencies to use approaches such as citizen science, which is a cornerstone of this study.

USES OF RESULTING DATA:

The information collected in this study will provide knowledge about the effectiveness of wildfire communications, the effects of wildfire smoke on daily activities and low severity health symptoms, and the engagement of participants in citizen science. This knowledge will allow for better communication planning for public health messages regarding wildfire smoke. This information is not for regulatory use.

DATA COLLECTION METHODS:

Data will be collected through the "Smoke Sense" mobile application. The Smoke Sense App was developed by Sonoma Technologies, Inc. (STI) 1450 N. McDowell Blvd., Suite 200, Petaluma, CA 94954-6515. STI has developed air pollution and health web-based studies including the EPA Village Green.

The Smoke Sense App is available free of fee for users to download, and data will be collected when citizen scientists report their smoke and health observations. Each data file shall be accompanied with clear documentation of both data management programs and the data fields in hardcopy and in electronic format.

Data management: Data will be backed up daily and is located on EPA secure server. Study documents and data will be kept on a secure workstation in the EPA Human Studies Facility. Secondary data files, computer code, and documentation will reside on the Smoke Sense shared network directory administered by the data custodian.

This project falls under record schedule 1035(b), which has a 20-year retention requirement. Records will be kept in accordance with ORD PPMs 13.2 and 13.4 which can be found here: http://intranet.ord.epa.gov/about-ord/chapter-13-quality-assurance. Study materials that are not Federal records according to EPA Records Schedule 0008: Non-records (http://intranet.epa.gov/records/schedule/final/0008.html), including copies, intermediate data files, computer programs under development, output not used for any manuscripts or reports, prior versions of analytic software, working papers, draft manuscripts, and technical reference materials, are disposable and may be destroyed when obsolete, superseded or no longer needed for reference.

Smoke Sense study protocol has been reviewed and approved by the Office of Human Research Ethics University of North Carolina-Chapel Hill Institutional Review Board and was determined to be exempt from further review according to the regulatory "category 2" exemption which include user reports, interview, public observation under 45 CFR 46.101(b). Study protocol does not use personally identifiable data such as phone numbers, names or addresses however, for research purposes we have to collect data longitudinally and need to be able to track responses by user. For this purpose, we will use "vendor/advertiser mobile device ID". Research data will be stripped of "vendor/advertiser ID" and only an assigned participant ID will be saved for research purposes. We will use advertiser/vendor ID of device because these identifiers are "non-permanent and non-personal" mobile device identifiers that cannot be traced to individuals. (https://developer.apple.com/reference/uikit/uidevice/1620059-identifierforvendor). We will not use GPS to track individuals, only their preferred locations provided by the participant will be saved and used to establish exposure levels retrospectively. Other information collected, such as age group, race, and sex are not considered Personally identifiable information (PII).

The probability of harm from a potential data breach is very low, as the only way to identify individuals is through advertising and vendor identifiers of the app. The magnitude of the possible risk of harm is also very low because disclosure of the general information (i.e., demographic, general health, activity level and symptoms) collected would not reasonably place the participants at risk of criminal or civil liability or be damaging to the participants' financial standing, employability, or reputation. Moreover, unlike most survey-based research, participation will provide benefits to participants. Participants will be provided with sophisticated environmental model predictions of smoke, as well as EPA-approved and recommended measures to reduce health impacts as benefits of participating in the study. It is important to state that all recommendations and health risk communications in this study will be based on the same data that federal agencies provide to citizens through AirNow (https://www.airnow.gov/), the most widely used air quality and health risk communication tool.

PARTICIPANT UNIVERSE:

Burden estimate on 2017 pilot study

Category of Respondent	No. of Respondents	Number of responses per respondent	Participation Time per response	Burden Hours
Participant registration	4,508	1	0.1 hours	451
Health and behavior reports	4,508	Average 2.5	~0.25 hours	2,818
Total Respondents/ responses	15,778			
Total Burden Hours				3,269

Burden estimates for 2018

Category of Respondent	No. of Respondents	Number of responses per respondent	Participation Time per response	Burden Hours
Participant registration	19,000[*]	1	0.1 hours	1,900
Health and behavior reports	19,000	16 maximum	~0.20 hours[**]	60,800
Total Respondents/ responses	323,000			
Total Burden Hours				62,700
Total Respondents and Burden Hours, 2017 and 2018	**338,778**			**65,969**

*expectation of increased word of mouth engagement and partner outreach post-pilot study

** questions have been updated and streamlined for better interaction

Burden estimates for 2019-2021

Category of Respondent	No. of Respondents Per year	Number of responses per respondent	Participation Time per response	Burden Hours
Participant registration	30,000[*]	1	0.1 hours	3,000
Health and behavior reports	30,000	10 maximum	~0.05 hours[**]	15,000
Total Respondents/ responses	330,000			
Total Burden Hours				**18,000**
Total Respondents and Burden Hours, 2019-2021				**54,000**

*expectation of increased engagement

** questions have been updated and streamlined for better interaction and adjusted by the average length of session per user in 2018 (2:52 minutes per session, however only a fraction is due to reporting of observations)

Burden estimates are based on the previous and expected number of Smoke Sense app users per day (number of respondents), actual average participation for the 2017 pilot and 2018, and the expectation that participants will take no more than 10 minutes (or less) to review the consent and learn about the study. The average duration of engagement per session in 2018 was 2 minutes and 52 seconds however only a fraction of that is required for reporting. The respondent universe may vary among the activities listed because not all respondents must complete each activity.

There will not be fees associated with participation in the data collections. Participants will not be required to purchase any equipment to collect data, as all data collection will be through applications on personal smartphones.

AGENCY COST: The estimated annual cost to the Federal government for 2019-2021 is $18,334 (or $55,000 over three-year period). EPA labor costs are calculated using an hourly rate for a GS-14 (step 1, 114,590) based in Washington, DC[1] including an additional 60% for overhead and benefits. This project is estimated to occupy approximately 10% of an FTE annually at a cost of $18,334 per year. An additional $50,000 in annual contract support costs are anticipated to maintain and update the mobile application or to add additional features.

STATISTICAL ANALYSIS:

Once the study period is complete, data will be analyzed to determine onset and incidence rates of health impacts in association with wildfire events/PM.

Analyses will be performed in standard statistical software, such as SAS, R, or Stata. Descriptive analyses using univariate and bivariate distributions and frequencies will be used to characterize and describe the data. Poisson regression and case crossover analysis are the main statistical techniques that will be employed to estimate effect measures and 95% confidence intervals. For a Poisson regression analysis (time-series), health events will be aggregated into time-series of Poisson counts by date of event within each category and metropolitan region, matched with data on environmental stressors by date and locality, and analyzed using either a generalized additive model or a mixed-effects model to estimate the association between time-varying health event counts and time-varying environmental measure(s) while adjusting for time-varying confounders such as trend, season, and other environmental stressors. For a case-crossover analysis, the date of each health event (case-period) is used to identify one or more randomly selected dates within the same calendar month (reference-periods). Each case-period and reference-period is then matched with environmental stress and meteorological data by date and region. Finally, conditional logistic regression is used to analyze the relationship between case status and an indicator of environmental stress while adjusting for time-varying confounders such as meteorology. In this analytic approach, confounding by trend and season are controlled by design.

Reported responses will be tested for representativeness of underlying population and appropriate statistical methods will be used to adjust sampled populations.

The anticipated results will satisfy the study objectives of quantifying low severity health outcome response to wildfire smoke exposure and provide information on behavioral response to wildfire smoke exposure. This information may then be used to improve messaging/communication in regard to wildfire smoke hazards.

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[1] https://www.opm.gov/policy-data-oversight/pay-leave/salaries-wages/salary-tables/pdf/2018/DCB.pdf

DATA QUALITY ASSESSMENT PROCEDURES:

After data is received by EPA investigators, will perform cleaning and quality checks on the data. Within the study design, we incorporated a number of measures to reduce the chance of erroneous data. For example, because responses are constrained by the nature of the electronic report (i.e., answers to questions are restricted to pull down or checkbox responses. Therefore, no out of range or inappropriate responses will be allowed.), out of range values are not expected to be of concern; data will be examined to ensure these criteria is met. This will be done through frequency and distribution statistics. Data will also be examined for potential outliers. While at present potential outliers are unknown, an example might be a person who fills out experiencing all symptoms for every day of every week during the study period, as this is an unlikely scenario. Any observed outliers will be examined for influence on the data using sensitivity analyses with and without their inclusion. In this way impact of outlier removal can be ascertained. Any outlier removal from further analyses will be documented, in both study procedures and in any resulting study publications. Due to the nature of citizen science, missingness of report responses is a potential issue. Participants are not required to answer any items in the instrument. Data will therefore be examined for patterns of missing data, in particular data missing at random (MAR) or data missing not at random (MNAR). Established statistical techniques for handling MAR and MNAR data will then be used. For MAR data, these include adjusting for variables which are known to influence missingness. For MNAR, possible techniques include complete case analysis that is then specified to only apply to certain subpopulations within the study, imputation of missing data which depends on completeness of non-missing data, stratification, and others (Little and Rubin 2014; Rubin 1976).

ADMINISTRATION OF THE INSTRUMENT: (Check all that apply)

[X] Web-based or Social Media   [x] Other, Explain

[ ] Telephone

[ ] In-person   Smart phone app

[ ] Mail

INSTRUMENT: The text/script for the web-based survey is included below. A final version will include an EPA Form Number, the OMB Control Number and expiration date, and a Burden Statement.

CONTACT NAME: Ana Rappold;   **EMAIL:** Rappold.Ana@epa.gov;

Comments are denoted in Italics and bracketed out.

iOS and Android permission screens

1) Permissions Screen *[we may not have control over this screen – platform dependent common for all apps]*

      1a) Allow "Smoke Sense" to access your location while you are using the app?
      Smoke Sense location use.

1a.i)   Don't Allow

1a.ii)   Allow

      1b) "Smoke Sense" would like to send you notifications.
      Notifications may include alerts, sounds, and icon badges. These can be configured in Settings.

1b.i)   Don't Allow

1b.ii)   Allow

Study Consent

2) Study Consent

      2a) Hello, and welcome to the Smoke Sense Project!
      The Smoke Sense Project is a <u>completely</u> <u>voluntary</u> citizen science research study where together we will learn how wildfire smoke affects people and ways to protect our health.   EPA Form number EPA 6000-004, Expiration Date TBD.
      By clicking below, I agree to participate and certify that I am at least 18 years old.

2a.i)   I agree and let's get started. [*Must agree to proceed within the app*]

Profile Report S1 – completed by participant once when they first use the app:

[Questions with multiple answers will be given in rectangles and each should say "(Check all that apply)". Single-choice questions are given in oval bubbles and they don't need the note.]

"I" info button text: Why are we asking for this information?

3) My Profile

[Welcome Screen (part 1)]

      3a) As a Smoke Sense citizen scientist, you will be able to:

- Get information about current wildfires and smoke plumes
- Learn about smoke exposure and how to protect your health
- Monitor your current air quality conditions and forecast
- Report your smoke observations

- Record your health symptoms

But first, let's set up your profile.

3b) Enter your zip code:

3b.i)   [*Type in zip code or use location finding feature*]

3c) What is your gender? [Select one]

3c.i)   Female

3c.ii)   Male

3c.iii) Other

3d) Your age? [Select one]

3d.i)   18—29

3d.ii)   30—39

3d.iii) 40—49

3d.iv)   50—64

3d.v)   65+

3e) What race/ethnicity best describes you? (Select all that apply)

3e.i)   White

3e.ii)   African-American/Black

3e.iii) Asian/Pacific Islander

3e.iv)   Native American

3e.v)   Hispanic/Latino

3e.vi)   Other

3f) What is your highest education level? [Select one]

3f.i)   High school degree, GED, or less

3f.ii)   Technical school, trade or vocational training, or associate degree

3f.iii) Bachelors, masters, doctorate, or professional degree

3g) Would you say your own health, in general is: [GSS – general health item] [Select one]

3g.i)   Excellent

3g.ii)   Very Good

3g.iii) Good

3g.iv)   Fair

3g.v)   Poor

3h) Select conditions that currently affect your health: (Select all that apply) [Select all that apply]

3h.i)   Asthma

3h.ii)   Chronic Obstructive Pulmonary Disease (COPD)

3h.iii) Other respiratory disease

3h.iv)   Hypertension or high blood pressure

3h.v)   Other heart disease

3h.vi)   Type II diabetes, metabolic syndrome, or obesity

3h.vii)   Allergies related to the upper respiratory tract, eyes, and ears

3h.viii) Other chronic disease

3h.ix)   None of the above

3i) Do you commonly experience any of these symptoms? (Select all that apply) [Select all that apply]

3i.i)   Coughing, trouble breathing, wheezing, asthma attacks, or similar

3i.ii)   High blood pressure

3i.iii)   Chest pain or tightness, rapid or irregular heartbeat, or similar

3i.iv)   Stinging eyes, scratchy throat, or similar

3i.v)   Runny or stuffy nose, irritated sinuses, or similar

3i.vi)   Tiredness, headaches, or similar

3i.vii)   Trouble sleeping

3i.viii) None of the above

3j) Which of the following do you use or have readily available to use? (Select all that apply) [Select all that apply]

3j.i)   A HEPA (high efficiency particulate air) room purifier

3j.ii)   A car with recirculate mode for the ventilation system

3j.iii)   Single room air conditioner(s)

3j.iv)   Whole house (central) air conditioning

3j.v)   Work place air conditioning

3j.vi)   An N95 (or similar) respirator mask

3j.vii)   Protective gear such as plastic gloves and goggles

3j.viii) Access to Air Quality Index levels and associated health related warnings

3j.ix)   None of the above

3k) On average, when you are outside, how active are you? [Select one]

3k.i)   Not Very Active

3k.ii)   Mild (walking, standing)

3k.iii)   Moderate (regular jog, gardening)

3k.iv)   Very Active (run, bike daily, work outdoors)

4)   *[Welcome Screen cont., Part 2]*

4a) And now a few thoughts about wildfires -

4b) Please rate your level of agreement:

NOTE: Each item in 4b.i-4b.xviii below is ranked on the following Likert-type scale. [Select one]

Strongly agree
Somewhat agree
Neither agree nor disagree
Somewhat disagree
Strongly disagree

NOTE: Only 4 highlighted questions among 4b.i-4b.xviii will be used. We are asking for pre-approval in case some questions turn out to be not clear.

    4b.i)   Version A: I have been personally affected by smoke from wildfires.

    4b.ii)   Version B: Smoke from wildfires is a common occurrence where I live.

    4b.iii)   Version A: Wildfire smoke is a threat to my health.

    4b.iv)   Version B: Wildfire smoke is a threat to the health of others (family with chronic disease, older adults, children, outdoor occupations, etc.).

    4b.v)   Version A: A few hours of wildfire smoke in the air can impact my health.

    4b.vi)   Version B: Short-term (a few hours) exposures to wildfire smoke are a concern to my health.

    4b.vii) Version A: Persistent wildfire smoke conditions for days can impact my health.

    4b.viii) Version B: Chronic exposures to wildfire smoke are a concern to my health.

    4b.ix)   Version A: It is possible for me to reduce my wildfire smoke exposure.

    4b.x)   Version B: I know what to do to reduce my wildfire smoke exposure.

    4b.xi)   Version A: Information resources help me protect myself from the health impacts from wildfire smoke.

    4b.xii)   Version B: Information alerts are likely to help me reduce my exposure to wildfire smoke.

    4b.xiii) Version A: Data from air pollution monitors help me to understand pollution levels in general.

    4b.xiv) Version B: Data from air pollution monitors help me to understand what I see and smell when there is wildfire smoke.

    4b.xv)   Version A: I have thought "a lot" about how I can reduce my wildfire smoke exposure.

    4b.xvi) Version B: If there is wildfire smoke in the air, I will think about how to protect my health.

    4b.xvii) Version A: Health impacts of wildfire smoke can last for days and weeks.

    4b.xviii) Version B: A few hours of wildfire smoke in the air can impact my health.

           4c) Before considering reducing wildfire smoke exposure, I need more information on: [Select all that apply]

    4c.i)   whether smoke impacts my health

    4c.ii)   whether specific measures will help my health

    4c.iii)   whether the measure was recommended by a trusted source

    4c.iv)   the effort required for a specific measure

    4c.v)   the monetary costs of a specific measure

    4c.vi)   I would not consider reducing exposure

    4c.vii)   I don't need additional information before I reduce exposure

(Double-click or double-tap on the slide to show Microsoft PowerPoint Presentation)

Symptoms and Smoke Report S2: completed by participant on a weekly basis

5) Observations

        5a) Complete each section and select "Save" to earn your badge

        5b) Week ## (MMM DD – MMM DD)

6) *[Observations Screen:]* Smoke Observations *[use fire symbol]*

        6a) Yes *[If Yes, then go to questions below]*

6a.i)	How was your air quality yesterday?
6a.i(1)	Good
6a.i(2)	Moderate
6a.i(3)	Somewhat poor
6a.i(4)	Very poor
6a.i(5)	Dangerous
6a.ii)	Did you smell smoke outside your home/workplace/school during this time? *[Select one]*
6a.ii(1)	Not at all
6a.ii(2)	1-2 days
6a.ii(3)	3+ days
6a.iii)	Did you smell smoke inside of your home? *[Select one]*
6a.iii(1)	Not at all
6a.iii(2)	1-2 days
6a.iii(3)	3+ days
6a.iv)	How many days was your visibility impacted by smoke? *[Select one]*
6a.iv(1)	None
6a.iv(2)	1-2 days
6a.iv(3)	3+ days
6a.v)	On a cloudy day visibility ranges from 7 to 10 miles. On the worst day over the past week, how did your visibility compare? *[Select one]*
6a.v(1)	About the same
6a.v(2)	A little worse
6a.v(3)	Much worse
6a.v(4)	Extremely worse
6a.v(5)	Almost no visibility
6a.vi)	To what extent do you agree with this statement (thinking about the past week): I was sensitive to wildfire smoke. *[NOTE: this is separate from the health section because we want to know their personal rating of the smoke impact agnostic to health impact questions – like before we go to the 'health section' – there's this smoke – did you care?]* *[Select one]*
6a.vi(1)	Strongly disagree
6a.vi(2)	Somewhat disagree
6a.vi(3)	Neither agree nor disagree

6a.vi(4)   Somewhat agree

6a.vi(5)   Strongly agree

6a.vii)   Save *[goes to main observations screen]*

      6b) No *[If No, then go to the following question only]*

6b.i)   How was your air quality yesterday?

6b.i(1)   Good

6b.i(2)   Moderate

6b.i(3)   Somewhat poor

6b.i(4)   Very poor

6b.i(5)   Dangerous

6b.ii)   Save *[and go back to the observations page]*

7) Health Symptoms *[Select one]*

      7a) Yes *[If Yes, go to health symptoms questions page]*

7a.i)   Have you experienced smoke recently? *[Select one.]*

7a.i(1)   Yes, I experienced smoke this week

7a.i(2)   Yes, I experienced smoke in the last month but not this week

7a.i(3)   No, I didn't experience smoke

7a.ii)   Thinking about the past week, I experienced the following symptoms: (Select all that apply) [NOTE: this list was previously split into body systems – now it is an all-encompassing list] [Select all that apply.]

7a.ii(1)   Stinging, itching, or watery eyes

7a.ii(2)   Ear or other viral infections

7a.ii(3)   Scratchy throat

7a.ii(4)   Runny or stuffy nose

7a.ii(5)   Irritated sinuses, congestion

7a.ii(6)   Coughing, trouble breathing normally, shortness of breath

7a.ii(7)   Wheezing

7a.ii(8)   Asthma attack

7a.ii(9)   Tiredness, dizziness, or similar

7a.ii(10)   Fast or irregular heart beat

7a.ii(11)   Chest pain

7a.ii(12)   High blood pressure

7a.ii(13)   Anxiety

7a.ii(14)   Trouble sleeping

7a.ii(15)   Other

7a.iii)   Select days you experienced any of the symptoms [Check all that apply.] [NOTE: there is a calendar view that will autofill the date. Same calendar view as in pilot season]

7a.iii(1)   Mon *[auto-filled date]*

7a.iii(2)   Tue *[auto-filled date]*

7a.iii(3)   Wed *[auto-filled date]*

7a.iii(4)   Thu *[auto-filled date]*

7a.iii(5)   Fri *[auto-filled date]*

7a.iii(6)   Sat *[auto-filled date]*

7a.iii(7)   Sun *[auto-filled date]*

7a.iv)   On the day you felt the worst over the past week, how much discomfort did you feel compared to your normal state? *[Select one.]*

7a.iv(1)   Same as normal

7a.iv(2)   Mild discomfort

7a.iv(3)   Moderate discomfort

7a.iv(4)   Severe discomfort

7a.iv(5)   Very severe discomfort

7a.v)   Over the past week, I: (Select all that apply) *[NOTE we may need to visually separate these actions into groups – to better fit the screen]*

   7a.v(1)   used a mask (dust, surgical, or similar)

   7a.v(2)   used a respirator mask (N95 or similar with extra filtration)

   7a.v(3)   used an air cleaner (room HEPA air purifier or similar)

   7a.v(4)   used air conditioning

   7a.v(5)   avoided daily activities such as going to work/school

   7a.v(6)   reduced normal outdoor recreation

   7a.v(7)   stayed indoors

   7a.v(8)   kept windows and doors closed

   7a.v(9)   didn't add to indoor pollution (avoided frying food, vacuuming, burning candles)

   7a.v(10)   left the area impacted by smoke

   7a.v(11)   had an unscheduled doctor's visit (office, urgent care, ER, hospital)

   7a.v(12)   took medicine (Rx, over-the-counter)

   7a.v(13)   took other actions to reduce smoke exposure

   7a.v(14)   did not try to reduce smoke exposure

7a.vi)   Did you take these actions before you first had symptoms? *[Select one.]*

7a.vi(1)   Yes

7a.vi(2)   No

7a.vi(3)   Does not apply

7a.vii)   To what extent do you agree with this statement: If there is a serious smoke event next week, it will be worth it to take actions to reduce my exposure. *[Select one.]*

7a.vii(1)   Strongly agree

7a.vii(2)   Somewhat agree

7a.vii(3)   Neither agree nor disagree

7a.vii(4)   Somewhat disagree

7a.vii(5)   Strongly disagree

7a.viii)   Save *[and return to the Observations Module Menu]*

   7b)   No

8) *[Observations Screen:]* <u>Change Reporting Location</u> *[This tab should be colored differently from 5a-b and separated with some extra space. If selected "Change Reporting Location" then go to Reporting Location screen.]*

      8a) Why are we asking for this information?

8a.i)   Wildfire smoke can affect everyone. Completing My Profile advances the Smoke Sense research initiative by enabling us to compare whether groups of people are affected differently. For example, are older participants at higher risk than younger participants? Are participants with certain health issues more vulnerable to health impacts of smoke?

A zip code is required to provide reference for current- hour and forecast AQI which appears on your dashboard and to understand the smoke conditions near you. Smoke Sense does not collect or track GPS coordinates or other identifying information. The information you provide is anonymous and is only used for research.

8a.i(1)   OK

      8b) Your zip code from your profile is [show zip code]. Would you like to change your reporting location to your current location?

      8c) *[Use clickable location button]* ⊕ *[or choose state and city from dropdown menus]*

      8d) Save *[and return to the Observations Menu]*

Health Behavior Module S3 – Smoke Smarts Questions

9) **Smoke Smarts** *[NOTE: This section shows the text of the questions in the Smoke Sense app that users are asked to answer in the Smoke Smarts Module. There are 12 question-groups, and each is composed of several parts: a base statement, a personal estimate of likelihood of individual adoption, a personal suggestion of percentage of societal adoption, a framing message, and two follow-up questions. The base statement is fact-based with an educational and health literacy focus. The personal estimate allows users to evaluate their own likelihood of engaging in a target behavior. The intention of the base question is to estimate the prevalence of target behavior in affected populations (how common is it for people to do something?). Following the base question, a message is shown that employs either a personal health promotion (A), personal risk prevention (B), or generic (C) frame of which the user will randomly see only one version. Following the framed message, users are asked to recommend a percentage of the affected population that should engage in the target behavior. The user can identify barriers that would prevent them from engaging in the target behavior. By engaging with a "Smoke Smarts/Smoke Ready? Consider this!" question, users will consider several of the key variables involved in planning and executing a target behavior. Furthermore, by allowing users to compare their responses to others' responses, facilitates social comparison. Finally, by comparing framed messages, we will be able to assess whether personalized messages result in increased preferences for behavioral adoption.]*

10) **[Instructions]** *In Smoke Smarts you will see a series of 6 related questions on the topic of air quality and health. Answer all six questions. At the end you will see graphs that show how you and others responded to the questions in the series.*

11) GROUP 1 BASE STATEMENT: A HEPA (high efficiency particulate air) room purifier can remove 99.97% of particles in indoor air. The cost of a room HEPA filter starts at around $100.

    11a)   *FOLLOW-UP 0*: How likely are you to use a HEPA room purifier to keep the air in your house cleaner if you experience wildfire smoke?

11a.i)   Not at all likely

11a.ii)   Somewhat unlikely

11a.iii)   Unsure

11a.iv)   Somewhat likely

11a.v)   Very Likely

    11b)   BASE QUESTION: *What percentage of people do you think use a HEPA room purifier in their house when they experience wildfire smoke?*

11b.i)   Slider scale from 0 to 100.

11b.ii(1)   FRAMING MESSAGE VERSION A: Sarah is a nurse. A good night's rest is essential for her job. She turns on her HEPA room purifier to improve her sleep when she smells wildfire smoke inside her bedroom.

11b.ii(2)   *FRAMING MESSAGE VERSION B:* Sarah is a nurse. A good night's rest is essential for her job. She turns on her HEPA room purifier to avoid losing sleep when she smells wildfire smoke inside her bedroom.

11b.ii(3)   *FRAMING MESSAGE VERSION C:* Use a HEPA room purifier with particle removal to help protect your body from the effects of wildfire smoke. Follow the manufacturer's instructions on filter replacement and where to place the device.

11c)   FOLLOW-UP 1: With that in mind, what percentage of people should use a HEPA room purifier in their house during wildfire smoke?

11c.i)   Slider scale from 0 to 100.

11d)   FOLLOW-UP 2: Check barriers that would prevent you from using a HEPA filter:

11d.i)   Cost (monetary)

11d.ii)   Effort/Time

11d.iii)   Forgetting

11d.iv)   Not enough benefit

11d.v)   Other

11d.vi)   No barriers

12) GROUP 2 BASE STATEMENT: Setting the car ventilation to "recirculate" can reduce the amount of pollution that enters the car.

12a)   *FOLLOW-UP 0*: How likely are you to set your car ventilation to "recirculate" if you experience wildfire smoke?

12a.i)   Not at all likely

12a.ii)   Somewhat unlikely

12a.iii)   Unsure

12a.iv)   Somewhat likely

12a.v)   Very Likely

12b)   BASE QUESTION: What percentage of people who experience wildfire smoke do you think set their car ventilation to "recirculate"?

12b.i)   Slider scale from 0 to 100.

12b.i(1)   FRAMING MESSAGE VERSION A: David has a long commute into the city. In the past when he drove through wildfire smoke he experienced headaches. Now, he regularly uses recirculate and keeps the air cleaner during his commute.

12b.i(2)   FRAMING MESSAGE VERSION B: David has a long commute into the city. In the past when he drove through wildfire smoke he experienced headaches. Now, he regularly uses recirculate and avoids the headache during his commute.

12b.i(3)   FRAMING MESSAGE VERSION C: To protect your health when driving during a wildfire, keep windows closed with air conditioning set to recirculate.

12c)   FOLLOW-UP 1: With that in mind, what percentage of people should set their car ventilation to "recirculate" during wildfire smoke?

12c.i)   Slider scale from 0 to 100.

12d)   FOLLOW-UP 2: Check barriers that would prevent you from doing this:

12d.i)   Cost (monetary)

12d.ii)   Effort/Time

12d.iii)   Forgetting

12d.iv)   Not enough benefit

12d.v)   Other

12d.vi)   No barriers

12e)

13) GROUP 3 BASE STATEMENT: Exercise and strenuous activity makes people breathe faster. During wildfire smoke, outdoor exercise increases how much smoke and harmful particles people breathe.

13a)   *FOLLOW-UP 0*: How likely are you to avoid outdoor exercise/strenuous activity if you experience wildfire smoke?

13a.i)   Not at all likely

13a.ii)   Somewhat unlikely

13a.iii)   Unsure

13a.iv)   Somewhat likely

13a.v)   Very Likely

13b)   *BASE QUESTION:* What percentage of people do you think avoid outdoor exercise/strenuous activity when they experience wildfire smoke?

13b.i)   Slider scale from 0 to 100.

13b.ii(1)   FRAMING MESSAGE VERSION A: Jessica is training for a 5k. She used an indoor treadmill instead of her usual outdoor jog when the wildfire smoke covered her town. She was motivated to stay healthy for her race so she could maintain her fitness and have the best race possible.

13b.ii(2)   FRAMING MESSAGE VERSION B: Jessica is training for a 5k. She used an indoor treadmill instead of her usual outdoor jog when the wildfire smoke covered her town. A cough and headache from wildfire smoke would ruin her training and hurt her performance on race day.

13b.ii(3)   FRAMING MESSAGE VERSION C: Avoiding outdoor exercise and strenuous activity during wildfire smoke may improve your personal comfort.

13c)   FOLLOW-UP 1: With that in mind, what percentage of people should avoid outdoor exercise and strenuous activity during wildfire smoke?

13c.i)   Slider scale from 0 to 100.

13d)   FOLLOW-UP 2: Check barriers that would prevent you from doing the same:

13d.i)   Cost (monetary)

13d.ii)   Effort/Time

13d.iii)   Forgetting

13d.iv)   Not enough benefit

13d.v)   Other

13d.vi)   No barriers

14) GROUP 4 BASE STATEMENT: During wildfire smoke, less pollution enters the house when windows are kept closed and air conditioning is used (when available).

14a)   *FOLLOW-UP 0:* How likely are you to keep your windows closed and run your air conditioning (when available) if you experience wildfire smoke?

14a.i)   Not at all likely

14a.ii)   Somewhat unlikely

14a.iii)   Unsure

14a.iv)   Somewhat likely

14a.v)   Very Likely

14b)   BASE QUESTION: What percentage of people who experience wildfire smoke do you think keep their windows closed (and run AC when available)?

14b.i)   Slider scale from 0 to 100.

14b.ii(1)   FRAMING MESSAGE VERSION A: Michael had a patio party planned for this weekend but the wildfire smoke was making everything smell bad. Instead he moved the party inside, closed the windows, and ran the AC all day to protect the health and well-being of his guests.

14b.ii(2)   FRAMING MESSAGE VERSION B: Michael had a patio party planned for this weekend but the wildfire smoke was making everything smell bad. Instead he moved the party inside, closed the windows, and ran the AC all day to avoid harm and discomfort for his guests.

14b.ii(3)   FRAMING MESSAGE VERSION C: If you smell wildfire smoke, keep windows and doors closed unless it is very hot outside. Run an air conditioner if you have one, but keep the fresh-air intake closed and the filter clean to prevent outdoor smoke from getting inside.

14c)   FOLLOW-UP 1: With that in mind, what percentage of people should keep their windows closed (and run AC when available) during wildfire smoke?

14c.i1(a)   Slider scale from 0 to 100.

14d)   FOLLOW-UP 2: Check barriers that would prevent you from doing the same:

14d.i)   Cost (monetary)

14d.ii)   Effort/Time

14d.iii)   Forgetting

14d.iv)   Not enough benefit

14d.v)   No benefit/Other

14d.vi)   No barriers

15) GROUP 5 BASE STATEMENT: A properly fitted N95 respirator mask blocks 95% of small particles in the air. However, people with heart or lung disease should consult with their doctor before using a respirator.

15a)   *FOLLOW-UP 0*: How likely are you to use an N95 mask if you must spend time outside during wildfire smoke?

15a.i)   Not at all likely

15a.ii)   Somewhat unlikely

15a.iii)   Unsure

15a.iv)   Somewhat likely

15a.v)   Very Likely

15b)   BASE QUESTION: What percentage of people who must spend time outside during wildfire smoke do you think use an N95 respirator mask?

15b.i)   Slider scale from 0 to 100.

15b.ii(1)   FRAMING MESSAGE VERSION A: Kate works at the garden center and spends most of her day outside. During wildfire season her employer provides N95 masks to the staff. It can get uncomfortable, but she knows that wearing it when there is smoke in the air keeps her healthy.

15b.ii(2)   FRAMING MESSAGE VERSION B: Kate works at the garden center and spends most of her day outside. During wildfire season her employer provides N95 masks to the staff. It can get uncomfortable, but she knows that wearing it when there is smoke in the air keeps her from missing work due to breathing issues and fatigue.

15b.ii(3)   *FRAMING MESSAGE VERSION C:* An N95 mask is suggested for those who must be outside during wildfire smoke and will offer some protection if worn properly. Avoid other masks, such as paper "comfort" or "dust" masks, which trap only large particles, such as sawdust.

15c)   FOLLOW-UP 1: With that in mind, what percentage of people who must spend time outside during wildfire smoke should wear an N95 mask?

15c.i1(a)   Slider scale from 0 to 100.

15d)   FOLLOW-UP 2: Check barriers that would prevent you from doing the same:

15d.i)   Cost (monetary)

15d.ii)   Effort/Time

15d.iii)   Forgetting

15d.iv)   Not enough benefit

15d.v)   No benefit/Other

15d.vi)   No barriers

16) GROUP 6 BASE STATEMENT: Ash deposits from wildfires include harmful and even toxic chemicals.

    16a)   *FOLLOW-UP 0:* How likely are you to use protective gear for ash cleanup after a wildfire?

16a.i)   Not at all likely

16a.ii)   Somewhat unlikely

16a.iii)   Unsure

16a.iv)   Somewhat likely

16a.v)   Very Likely

    16b)   BASE QUESTION: What percentage of people do you think use protective gear while cleaning up ash after a wildfire?

16b.i)   Slider scale from 0 to 100.

16b.ii(1)   FRAMING MESSAGE VERSION A: Amanda's new car was covered in wildfire ash. Before cleaning it, she made sure to find her gloves, mask, and protective goggles to safeguard her health. Ash contains chemical irritants to the skin, nose, eyes, and throat.

16b.ii(2)   *FRAMING MESSAGE VERSION B:* Amanda's new car was covered in wildfire ash. Before cleaning it, she made sure to find her gloves, mask, and protective goggles to avoid harm to her health. Ash contains chemical irritants to the skin, nose, eyes, and throat.

16b.ii(3)   *FRAMING MESSAGE VERSION C:* Always wear proper personal protective equipment (long sleeve shirts, pants, gloves and safety glasses) when cleaning ash. If you do get ash on your skin, wash it off as soon as possible.

    16c)   FOLLOW-UP 1: With that in mind, what percentage of people who need to clean up after a wildfire should use protective gear?

      16c.i1(a)   Slider scale from 0 to 100.

    16d)   FOLLOW-UP 2: Check barriers that would prevent you from doing the same:

16d.i)   Cost (monetary)

16d.ii)   Effort/Time

16d.iii)   Forgetting

16d.iv)   Not enough benefit

16d.v)   Other

16d.vi)   No barriers

17) GROUP 7 BASE STATEMENT: Many indoor activities including smoking cigarettes, using gas, propane and wood-burning stoves and furnaces, spraying aerosol products, frying or broiling meat, burning candles and incense, and vacuuming can increase air pollution indoors.

17a)   *FOLLOW-UP 0:* How likely are you to avoid activities that are sources of indoor air pollution if you see or smell wildfire smoke?

17a.i)   Not at all likely

17a.ii)   Somewhat unlikely

17a.iii)   Unsure

17a.iv)   Somewhat likely

17a.v)   Very Likely

17b)   BASE QUESTION: What percentage of people do you think avoid activities that are sources of indoor air pollution when they see or smell wildfire smoke?

17b.i)   Slider scale from 0 to 100.

17b.ii(1)   *FRAMING MESSAGE VERSION A:* At the start of the weekend Erica saw the news report about the wildfire nearby. She planned to clean the apartment, but when she smelled smoke she put off vacuuming. Since vacuuming stirs up particles, postponing it keeps the indoor air cleaner and helps her breathe better.

17b.ii(2)   *FRAMING MESSAGE VERSION B:* At the start of the weekend Erica saw the news report about the wildfire nearby. She planned to clean the apartment, but when she smelled smoke she put off vacuuming. Vacuuming stirs up particles and adds to indoor pollution, which would not help her breathe better.

17b.ii(3)   *FRAMING MESSAGE VERSION C:* When wildfire smoke is present, avoid activities that increase air pollution indoors.

17c)   FOLLOW-UP 1: With that in mind, what percentage of people should avoid activities that are sources of indoor air pollution when they see or smell wildfire smoke?

17c.i1(a)   Slider scale from 0 to 100.

17d)   FOLLOW-UP 2: Check barriers that would prevent you from doing the same:

17d.i)   Cost (monetary)

17d.ii)   Effort/Time

17d.iii)   Forgetting

17d.iv)   Not enough benefit

17d.v)   Other

17d.vi)   No barriers

18) GROUP 8 BASE STATEMENT: Wildfire smoke can trigger air quality related health warnings. However, conditions can change so rapidly that better air quality may be experienced than was forecasted or vice versa.

    18a)   *FOLLOW-UP 0:* How likely are you to heed air quality related health warnings related to wildfire smoke in your area?

18a.i)   Not at all likely

18a.ii)   Somewhat unlikely

18a.iii)   Unsure

18a.iv)   Somewhat likely

18a.v)   Very Likely

    18b)   BASE QUESTION: What percentage of people do you think heed health warnings related to wildfire smoke in their area?

18b.i)   Slider scale from 0 to 100.

18b.ii(1)   *FRAMING MESSAGE VERSION A:* Coach Brittany cancelled soccer practice based on a health warning. Although clear skies emerged in time for practice, she felt it was important to protect the kids' health, especially their lungs. Better be safe than sorry.

18b.ii(2)   *FRAMING MESSAGE VERSION B:* Coach Brittany cancelled soccer practice based on a health warning. Although clear skies emerged in time for practice, she felt it was important to not put the kids' health at risk, especially their lungs. Better be safe than sorry.

18b.ii(3)   *FRAMING MESSAGE VERSION C:* When a wildfire occurs in your area, watch for news or health warnings about smoke. Pay attention to public health messages and take extra safety measures such as avoiding spending time outdoors.

    18c)   FOLLOW-UP 1: With that in mind, what percentage of people do you think should heed health warnings related to wildfire smoke?

        18c.i1(a)   Slider scale from 0 to 100.

    18d)   FOLLOW-UP 2: Check barriers that would prevent you from doing the same:

18d.i)   Cost (monetary)

18d.ii)   Effort/Time

18d.iii)   Forgetting

18d.iv)   Not enough benefit

18d.v)   Other

18d.vi)   No barriers

19) GROUP 9 BASE STATEMENT: The CDC indicates that in the United States, about 1 in 12 people (about 25 million) have asthma and the numbers are increasing every year. Poor air quality during wildfires can aggravate the lungs and worsen asthma.

19a)   *FOLLOW-UP 0*: If your doctor told you that you have asthma, how likely would you be to consider the health impacts of poor air quality?

19a.i)   Not at all likely

19a.ii)   Somewhat unlikely

19a.iii)   Unsure

19a.iv)   Somewhat likely

19a.v)   Very Likely

19b)   BASE QUESTION: What percentage of people with asthma do you think consider the impacts of poor air quality on their breathing?

19b.i)   Slider scale from 0 to 100.

19b.i(1)   *FRAMING MESSAGE VERSION A:* Jennifer finally feels like she is managing her asthma well. During a recent wildfire when the smoke became especially bad, she protected her breathing and progress managing her asthma by leaving the area. Instead of staying home, she went to visit her family in another part of the state where there was no smoke.

19b.i(2)   *FRAMING MESSAGE VERSION B:* Jennifer finally feels like she is managing her asthma well. During a recent wildfire when the smoke became especially bad, she avoided risks to her breathing and losing recent progress with managing her asthma by leaving the area. Instead of staying home, she went to visit her family in another part of the state where there was no smoke.

19b.i(3)   *FRAMING MESSAGE VERSION C:* Leaving the area with thick smoke from wildfires can sometimes be the safest choice for those with respiratory conditions such as asthma.

19c)   FOLLOW-UP 1: With that in mind, what percentage of people who have asthma should consider the impacts of poor air quality on their breathing?

19c.i1(a)   Slider scale from 0 to 100.

19d)   FOLLOW-UP 2: Check barriers that would prevent you from doing the same:

19d.i)   Cost (monetary)

19d.ii)   Effort/Time

19d.iii)   Forgetting

19d.iv)   Not enough benefit

19d.v)   Other

19d.vi)   No barriers

20) GROUP 10 BASE STATEMENT: The CDC indicates that heart disease is the leading cause of death in the United States. Poor air quality is linked to serious cardiovascular outcomes.

20a)   *FOLLOW-UP 0*: If your doctor told you that you have heart disease, how likely would you be to consider the health impacts of poor air quality on your heart?

20a.i)   Not at all likely

20a.ii)   Somewhat unlikely

20a.iii)   Unsure

20a.iv)   Somewhat likely

20a.v)   Very Likely

20b)   BASE QUESTION: What percentage of people with heart disease do you think consider the impacts of poor air quality on their heart?

20b.i)   Slider scale from 0 to 100.

20b.ii(1)   *FRAMING MESSAGE VERSION A:* Joshua had a stroke last summer. Doctors said regular exercise is important for recovery but his heart condition makes him more susceptible to poor air quality outside. To protect his heart and brain, he checks the air quality daily and chooses to exercise indoors when air quality is poor and outside only on good air quality days.

20b.ii(2)   *FRAMING MESSAGE VERSION B:* Joshua had a stroke last summer. Doctors said regular exercise is important for recovery but his heart condition makes him more susceptible to poor air quality outside. To avoid risks to his heart and brain, he checks the air quality daily and chooses to exercise indoors when air quality is poor and outside only on good air quality days.

20b.ii(3)   *FRAMING MESSAGE VERSION C:* People with heart disease should take precautions on days with poor air quality. Factors that increase sensitivity include irregular heartbeat, previous stroke or heart attack, coronary artery disease, defibrillator, congestive heart failure, COPD, and other heart and lung disease.

20c)   FOLLOW-UP 1: With that in mind, what percentage of people with heart disease should consider the impacts of poor air quality on their heart?

20c.i)   Slider scale from 0 to 100.

20d)   FOLLOW-UP 2: Check barriers that would prevent you from doing the same:

20d.i)   Cost (monetary)

20d.ii)   Effort/Time

20d.iii)   Forgetting

20d.iv)   Not enough benefit

20d.v)   Other

20d.vi)   No barriers

21) GROUP 11 BASE STATEMENT: The color of the Air Quality Index (AQI) indicates the severity of air pollution. Orange AQI alert days indicate that sensitive populations may experience health effects while red AQI alert days indicate all people may experience symptoms.

21a)   *FOLLOW-UP 0*: How likely are you to try to reduce your exposure on an orange AQI alert day?

21a.i)   Not at all likely

21a.ii)   Somewhat unlikely

21a.iii)   Unsure

21a.iv)   Somewhat likely

21a.v)   Very Likely

21b)   BASE QUESTION: What percentage of people do you think try to reduce their exposure on an orange AQI alert day?

21b.i)   Slider scale from 0 to 100.

21b.i(1)   *FRAMING MESSAGE VERSION A:* All week, Matt had been looking forward to the weekend bike ride with his kids. When the orange AQI alert went out, he changed their plans to play inside instead. He knew that even though he is healthy and would probably be ok, children are considered a sensitive group, and he should make an extra effort to protect their health. They will ride next weekend.

21b.i(2)   *FRAMING MESSAGE VERSION B:* All week, Matt had been looking forward to the weekend bike ride with his kids. When the orange AQI alert went out, he changed their plans to play inside instead. He knew that even though he is healthy and would probably be ok, children are considered a sensitive group, and he should not take any unnecessary risks with their health. They will ride next weekend.

21b.i(3)   *FRAMING MESSAGE VERSION C:* Children are more likely to be affected because their airways are still developing, they breathe more air per pound of body weight than adults and they often spend more time outdoors engaged in activity and play. It is recommended to reduce their exposure on orange AQI alert days.

21c)   FOLLOW-UP 1: With that in mind, what percentage of people should try to reduce their exposure on an orange AQI alert day?

21c.i)   Slider scale from 0 to 100.

21d)   FOLLOW-UP 2: Check barriers that would prevent you from doing the same:

21d.i)   Cost (monetary)

21d.ii)   Effort/Time

21d.iii)   Forgetting

21d.iv)   Not enough benefit

21d.v)   Other

21d.vi)   No barriers

22) GROUP 12 BASE STATEMENT: The human body is impacted by the air we breathe. It is important to ask your health professional how and why poor air quality can influence your health, and about ways to reduce exposure.

22a)   *FOLLOW-UP 0:* How likely are you to discuss air pollution with your health professional?

22a.i)   Not at all likely

22a.ii)   Somewhat unlikely

22a.iii)   Unsure

22a.iv)   Somewhat likely

22a.v)   Very Likely

22b)   BASE QUESTION: What percentage of people do you think have discussed air pollution with their health professional?

22b.i)   Slider scale from 0 to 100.

22b.i(1)   *FRAMING MESSAGE VERSION A:* George knew that poor air quality impacts health, but not how and why. His doctor explained that pollution can inflame airways, making it hard to breathe. He learned it can also enter the bloodstream where inflammation can affect the nervous system and blood clotting. This can lead to heart problems with serious consequences. George was ready to use his doctor's suggestions to limit his exposure and keep his body healthy.

22b.i(2)   *FRAMING MESSAGE VERSION B:* George knew that poor air quality impacts health, but not how and why. His doctor explained that pollution can inflame airways, making it hard to breathe. He learned it can also enter the bloodstream where inflammation can affect the nervous system and blood clotting. This can lead to heart problems with serious consequences. George was ready to use his doctor's suggestions to avoid damage to his health.

22b.i(3)   *FRAMING MESSAGE VERSION C:* Health professionals can educate patients about how and why air pollution impacts the body, and suggest precautions to take on days with poor air quality. Pollution can penetrate deep in the lungs and enter the bloodstream, where it can increase inflammation and damage the nervous system and heart function.

22c)   FOLLOW-UP 1: With that in mind, what percentage of people should discuss air pollution with their health professional?

22c.i)   Slider scale from 0 to 100.

22d)   FOLLOW-UP 2: Check barriers that would prevent you from doing the same:

22d.i)   Cost (monetary)

22d.ii)   Effort/Time

22d.iii)   Forgetting

22d.iv)   Not enough benefit

22d.v)   Other

22d.vi)   No barriers

About the Study

Why this study?

Wildfire smoke affects our health. To protect ourselves, we need to know how and when we are at risk, and what actions we can take. Through crowd-sourcing, citizen scientists can help answer these questions. As a citizen scientist, your reported observations about wildfire smoke and health impacts make an important contribution to this research.

What will this study do?

Smoke Sense informs users about wildland fire smoke events across the country and health effects reported by users. The study is designed to learn how smoke affects the body and what we need to do to reduce those impacts. Findings from the project will improve how we communicate health-related information. To get there, we need your participation!

What am I being asked to do?

As a citizen scientist, you are being asked to report smoke observations, answer a few questions about health symptoms, and share your perceptions about wildfire smoke. If you have push notifications enabled, you will receive a weekly reminder to record this information. You are asked to report observations at least once a week, but are welcome to report more frequently if you have additional observations. While participating, you will collect in-app badges and learn about the relationship between smoke, air quality, and your health.

How long will I be in the study?

The Smoke Sense study is an ongoing project. The more you participate, the more we are all able to learn about how wildfire smoke impacts our lives. You may stop participating at any time and continue to use the app as desired. We do not collect identifying information (phone number, GPS coordinate, IP address) to protect your privacy. Combined (aggregated) responses will be shown in the app under Weekly Statistics and posted online at www.epa.gov/air-research/smoke-sense.

Thank you for participating in the Smoke Sense Project!

The public reporting and recordkeeping burden for this collection of information is estimated to average 6 minutes to set up and about 3 minutes to report observations. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include EPA 6000-004 in any correspondence.

Air Quality Index info button

Current AQI	AQI Tomorrow
Particle Pollution	Ozone

AQI Value and Category Color	AQI Color Range
AQI Category	Pollutant of Concern

THE AIR QUALITY INDEX

The Air Quality Index (AQI) reports daily air quality and associated health effects that might be a concern for you. The higher the AQI value, the greater the level of air pollution and the greater the health concern. The AQI uses a color range to communicate health hazards. Smoke Sense reports AQI for fine *particle* matter that is 2.5 micrometers in diameter or smaller (also known as PM2.5) and for ground-level *ozone*.

The chart below shows the AQI color range with two fields, Who and Health Actions. These list who is likely to experience health effects and the level of health actions they should consider at each AQI level.

Who (Populations):
General Population: The general public.
Outdoor Active: People who are routinely active outdoors for six or more hours a day.
Sensitive Groups: People with heart or lung disease, older adults, children, and teens.

Unusually Sensitive: People who may experience health effects from particle pollution at lower levels.

Health Action Levels:
Usual: Enjoy your outdoor activities.
Precaution: Choose less strenuous activities (like walking instead of running) so you don't breathe as hard; Shorten the amount of time you are active outdoors; Be active outdoors when air quality is better.
Alert: Avoid strenuous outdoor activities; Keep outdoor activities short; Consider moving physical activities indoors or rescheduling them; Stay tuned to local news media for advisories.
Warning: Avoid physical activities outdoors; Stay indoors; On **hazardous particle pollution** days, reduce activity levels because particle pollution can affect indoor air; Stay tuned to local news media for advisories.

[GREEN] 0 TO 50
GOOD

Who: General Population, Everyone
Health Action Level: Usual

[YELLOW] 51 TO 100
MODERATE

Who: Unusually Sensitive People
Health Action Level: Precaution

[*ORANGE*] 101 TO 150
UNHEALTHY FOR SENSITIVE GROUPS
Who: Sensitive Groups and Outdoor Active (Ozone)
Health Action Level: Precaution

[*RED*] 151 TO 200
UNHEALTHY
Who: Sensitive Groups, Outdoor Active (Ozone)
Health Action Level: Alert

201 TO 300
[*PURPLE*] VERY UNHEALTHY
Who: Sensitive Groups, Outdoor Active (Ozone)
Health Action Level: Warning

Who: General Population
Health Action Level: Alert

[*MAROON*] 301 TO 500

HAZARDOUS
Who: General Population, Everyone
Health Action Level: Warning

AQI is calculated based on data from air quality monitors across the country. Your Smoke Sense dashboard displays *Current AQI* and *AQI Tomorrow* values calculated by state and local agencies (using the NowCast algorithm). If you see No Data on your dashboard, agencies in your area may be experiencing temporary lag in data reporting or they do not generate daily forecasts. To see what states have forecasts and learn more about AQI please visit AirNow.gov. However, you can always see the most recent air quality date by tapping the numbered icon shown in the *Fire and Smoke Near Me* map.

ADD SPACE

When your Future Forecast air quality is in an undesirable range, consider making changes to your schedule to spend less time outdoors until the air is better.

Data source: AirNow.gov

Onboarding Questions info Button - EMVL

Wildfire smoke can affect everyone. Completing My Profile advances the Smoke Sense research initiative by enabling us to compare whether groups of people are affected differently. For example, are older participants at higher risk than younger participants? Are participants with certain health issues more vulnerable to health impacts of smoke?

A zip code is required to provide reference for current hour and forecast AQI which appears on your dashboard and to understand the smoke conditions near you. Smoke Sense does not collect or track GPS coordinates or other identifying information. The information you provide is anonymous and is only used for research.

Fire Near you "i"

Pulldown menu: Tap on a layer below to hide/show data.

About the Data

Map and forecast data are collected using federal reference or equivalent monitoring techniques or techniques approved by the state, local or tribal monitoring agencies and can be found at airnow.gov. To maintain "real-time" maps, the data are displayed after the end of each hour. The U.S. Environmental Protection Agency, National Oceanic and Atmospheric Administration, National Park Service, tribal, state, and local agencies developed the AirNow system to provide the public with easy access to

national air quality information. State and local agencies report the air quality index (AQI) for cities across the US and parts of Canada and Mexico. AirNow data are used only to report the AQI, not to formulate or support regulation, guidance or any other EPA decision or position. Centralization of AQI creates a one-stop source for real-time and forecast air quality data. The benefits include quality control, national reporting consistency, access to automated mapping methods, and data distribution to the public and other data systems. See https://airnow.gov/index.cfm?action=topics.about_airnow.

Fire Information

InciWeb is an interagency incident information management system. The system was developed to provide the public a single source of incident related information, and provide a standardized reporting tool for public affairs. For more information visit https://inciweb.nwcg.gov.

Forecast "I"

NOAA / NWS ozone predictions are generated using an implementation of the Community Multiscale Air Quality modeling system running at the supercomputers of the National Center for Environmental Prediction. Smoke predictions are generated using the NOAA / Air Resources Laboratory Hybrid Single-Particle Lagrangian Integrated Trajectory model. These models are run twice a day and produce hourly forecast guidance for a 48-hour period on a 12-kilometer grid resolution. One- and eight-hour averages of ozone concentration predictions and one-hour averages of surface and vertically integrated smoke concentrations for the continental United States, Alaska, and Hawaii can be viewed at https://airquality.weather.gov/. More information on NOAA forecast guidance can be obtained from the Science and Technology Integration webpage at https://www.weather.gov/sti/stimodeling_airquality.

End of the Study

End of the study message:

Thank you for participating in the Smoke Sense Project!

Your participation will help us better understand how wildfire smoke affects health. At the end of the study we will share summarized results at

www.epa.gov/air-research/smoke-sense

Thank you and goodbye.