Promoting Culturally Sensitive Risk Communication with the Community

THURSDAY, APRIL 13, 2023; Session 4: Strategies for Communication about Environmental Exposures and Cancer Risk
The Potential Contribution of Cancer Genomics Information to Community Investigation of Unusual Patterns of Cancer
Collaborative workshop convened by: National Cancer Policy Forum, Roundtable on Genomics and Precision Health

Mónica Ramírez-Andreotta, MPA, PhD, Associate Professor
Department of Environmental Science (home); Mel and Enid Zuckerman College of Public Health's Division of Community, Environment & Policy and Global Change – GIDP (joint)
University of Arizona on occupied Tohono O'odham and Pascua Yaqui Indigenous lands

THE UNIVERSITY OF ARIZONA
COLLEGE OF AGRICULTURE & LIFE SCIENCES
Environmental Science

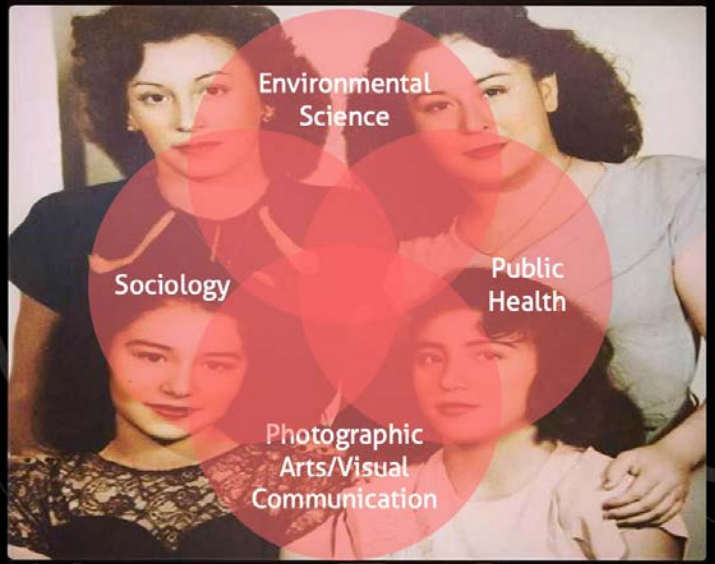
THE UNIVERSITY OF ARIZONA
Mel & Enid Zuckerman
College of Public Health

LAND ACKNOWLEDGEMENT

We respectfully acknowledge the University of Arizona is on the land and territories of Indigenous peoples. Today, Arizona is home to 22 federally recognized tribes, with Tucson being home to the O'odham and the Yaqui.

HSI
HISPANIC SERVING INSTITUTION

University of Arizona is a Hispanic Serving Institution



ENVIRONMENTAL RACISM & STRIVING FOR JUSTICE

Pollution is now the leading global cause of premature death and disease

Your zip code can be more important than your genetic code

One in four Americans lives within 3 miles of a hazardous waste site (U.S. General Accounting Office 2013)

FUNDAMENTAL AND CRITICAL CHALLENGES

1. Limits of epidemiology & the public health context
2. Technical Elitism

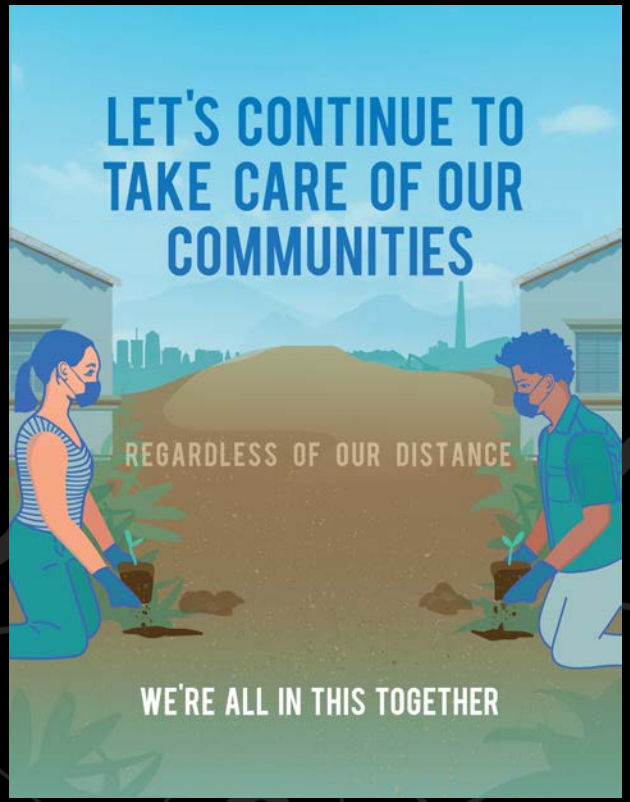
CONVENTIONAL METHODS FAIL

Conventional health intervention and health promotion strategies have largely failed to mitigate the sources of environmental health risk for EJ communities because the strategies often address health at the individual behavior level **rather than interacting with relevant social, cultural, and political contexts** (Masuda et al. 2010).

STRUCTURAL CHANGE

Ramírez-Andreotta

Integrated Environmental Science & Health Risk Laboratory



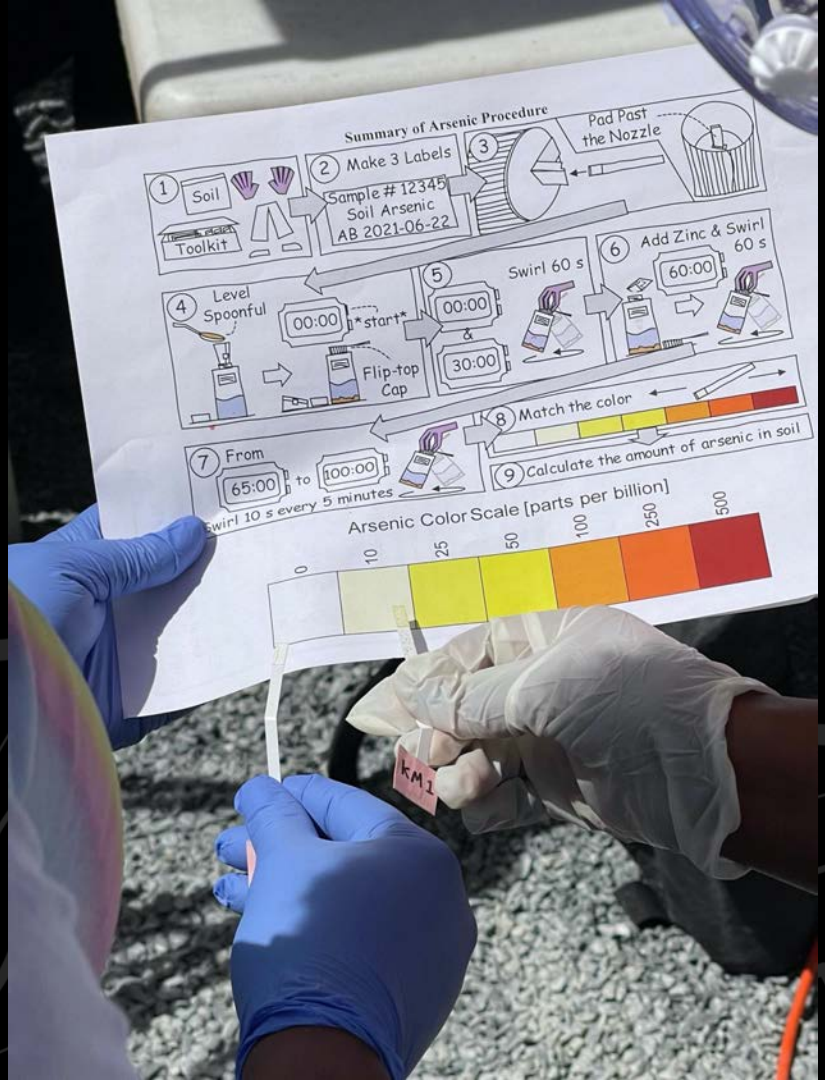
Designed by Dorsey Kaufmann, MFA

Participatory Research Methods

Terms

1. Participatory research
2. Participatory action research
3. Community-based participatory research
4. Community-based participatory research
5. Community-engaged research
6. Community-driven research
7. Community-owned and -managed research
8. Civic science
9. Citizen science
10. Volunteer monitoring
11. Photovoice/videovoice
12. Community–academic partnership
13. Community–university partnership
14. Community–academic collaboration
15. Participatory GIS
16. Equity-Centered Community Design

Davis LF, Ramírez-Andreotta MD. 2021. *Participatory Research for Environmental Justice: A Critical Interpretive Synthesis*. Environmental Health Perspectives, 129(2). DOI: https://doi.org/10.1289/EHP6274.***Environmental Health Perspectives Editors' Choice Collection 2021,** January 2022.



These efforts are transforming investigations

Image credit: Our Soils Project, Rensselaer Polytechnic Institute. https://oursoil.wp.rpi.edu/

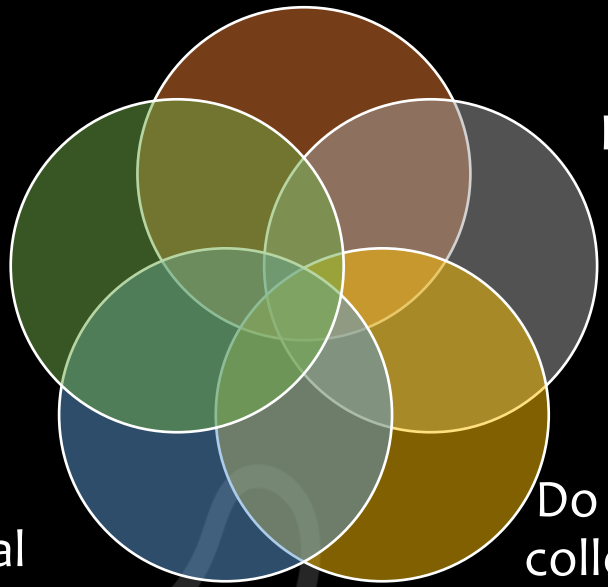
This process needs to begin with listening and humility, which leads to partnership building

Image credits: Project Harvest, University of Arizona.
https://projectharvest.arizona.edu/

Community Participation in the Scientific Research Process.

1. Partnership building and defining question(s)
2. Gather information and resources
3. Develop explanations
4. Design data collection methodologies
5. Collect samples, record data
6. Analyze samples
7. Analyze data
8. **Interpret data/draw conclusions**
9. **Dissemination/Translate results into action**
10. **Discuss results, new questions**

INTERSECTIONALITY



Crenshaw, Kimberle. "Demarginalizing the Intersection of Race and Sex: A Black Feminist Critique of Antidiscrimination Doctrine, Feminist Theory and Antiracist Politics," University of Chicago Legal Forum: Vol. 1989: Iss. 1, Article 8. Available at: http://chicagounbound.uchicago.edu/uclf/vol1989/iss1/8

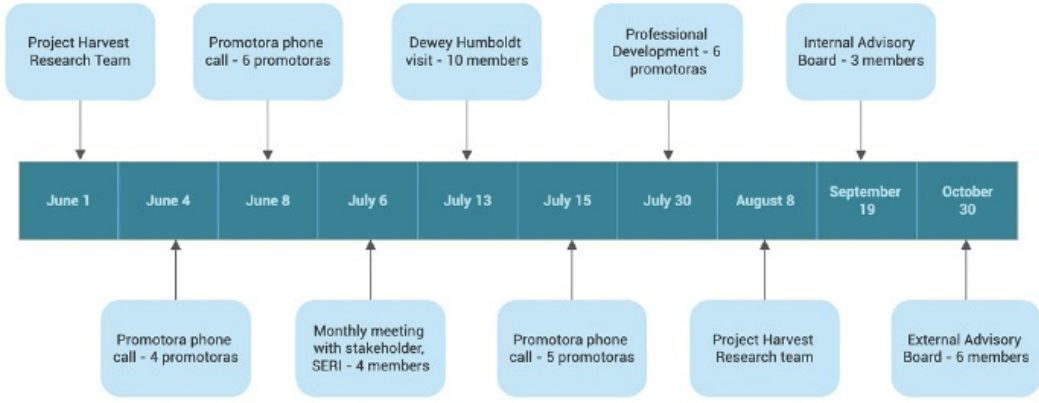
Davis LF, Ramírez-Andreotta MD, Buxner S. 2020. Engaging Diverse Citizen Scientists for Environmental Health: Recommendations from Participants and Promotoras. Citizen Science: Theory and Practice, 5(1): 7, pp. 1–27. DOI: https://doi.org/10.5334/cstp.253.

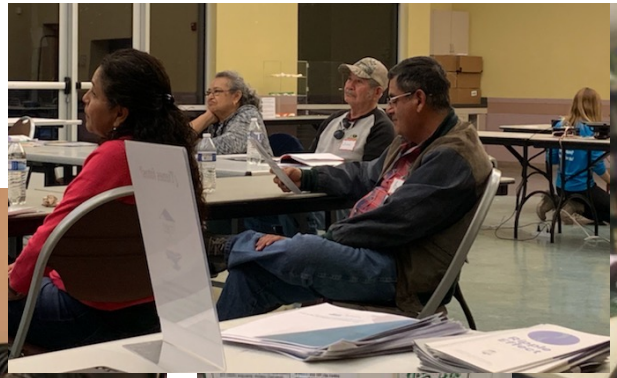
Formative and summative evaluation to inform all data sharing practices

Image credits: Project Harvest, University of Arizona. https://projectharvest.arizona.edu/

Kaufmann D, Jones M, Ramírez-Andreotta MD. Equity Centered Community Design: Building Environmental Health Literacy through a Sociocultural Model of Design. To be submitted.


Analysis
Draft
Sharing &
Co-design
Evaluation


Project Harvest Research Team
Promotora phone call - 6 promotoras
Dewey Humboldt visit - 10 members
Professional Development - 6 promotoras
Internal Advisory Board - 3 members
June 1
June 4
June 8
July 6
July 13
July 15
July 30
August 8
September 19
October 30
Promotora phone call - 4 promotoras
Monthly meeting with stakeholder, SERI - 4 members
Promotora phone call - 5 promotoras
Project Harvest Research team
External Advisory Board - 6 members



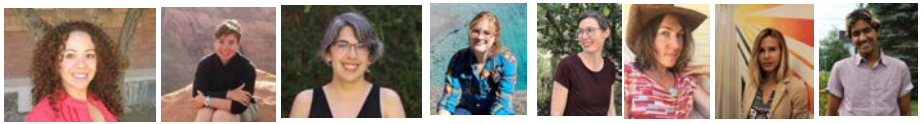

Results for Lunch
Your Soil, Water and Vegetable Outcomes
gardenroots
The Dewey-Humboldt, Arizona Garden Project
Saturday January 28, 2012
11:00AM to 2:00PM
Dewey-Humboldt Town Library
2735 S. Corral Street


Community Gathering & Results Sharing Data
Wednesday, December 14th | 9AM-11AM
Sierra Vista Cooperative Extension Office
1140 N Colombo, room 503, Sierra Vista, AZ 85635
gardenroots


The results are in!
Project Harvest
COMMUNITY GATHERING & DATA SHARING
Date & Time
Dec. 14, 2018
5:30PM-7:30PM
Location
Bullion Plaza Cultural Center & Museum
150 N Plaza Cir,
Miami, AZ 85539


The results are in!
Project Harvest
COMMUNITY GATHERING & DATA SHARING
Date
Dec. 15, 2018
Location
Bullion Plaza Cultural Center & Museum
Time
10AM-12PM
150 N Plaza Cir,
Miami, AZ 85539

Mixed-methods approach to data sharing and learning research:



Ramirez-Andreotta, Buxner, Sandhaus, Skelton, Davis, Mohr-Felson, Kaufmann, Palawat
New members: Jessika Mesa, Tashnim Alshuli and Annabelle Guptill!!

Written survey instruments with participants

Focus groups after data sharing

Semi-structured interviews

- Participant Observations
- Analysis of journal entries
- Participant emails
- Chalk Talks

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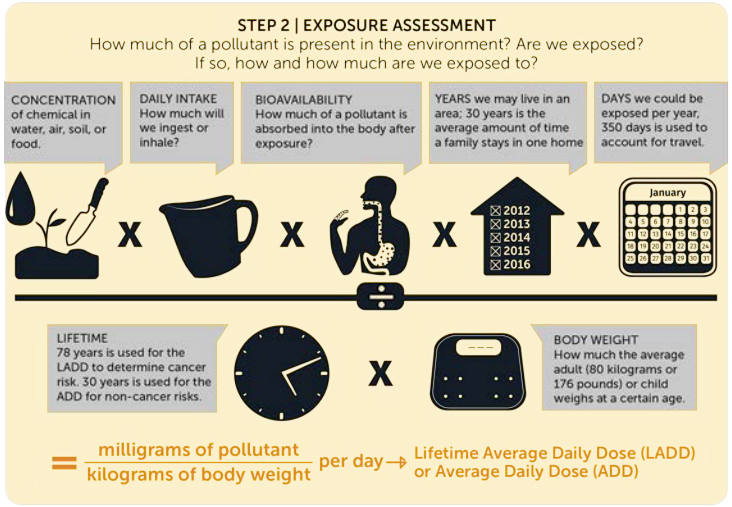
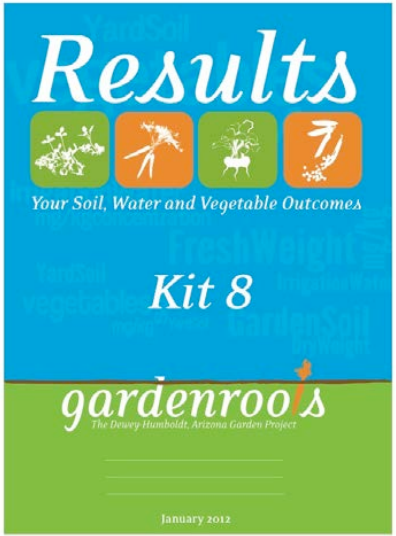


How much can I eat from my garden?



Amount You Can Eat from Your Garden Based on a Cancer Target Risk

Location	Target Risk 1/1,000,000	Target Risk 1/100,000	Target Risk 1/10,000	USDA Recommended Amount (cups/week)
Onion				
Your Garden	3/4	7	70	4 cups/week total of "Other Vegetables"
Lettuce				
Your Garden	1/2	5	50	3 cups/week total of "Raw Leafy Dark Green Vegetables"
Tomato				
Your Garden	1-1/2	15	150	5 cups/week of "red and orange vegetables"

Ramírez-Andreotta MD, Brusseau, ML, Artiola, JF, Maier, RM. 2013. *A Greenhouse and Field-Based Study to Determine the Accumulation of Arsenic in Common Homegrown Vegetables*. Science of the Total Environment, 443, 299-306, PMID: 23201696.

Ramírez-Andreotta MD, Brusseau, ML, Beamer, P, Maier, RM. 2013. *Home Gardening Near a Mining Site in an Arsenic-Endemic Region of Arizona: Assessing Arsenic Exposure Dose and Risk via Ingestion of Home Garden Vegetables, Soils, and Water.* Science of the Total Environment, 454-455:373-82, PMID: 23562690

Ramirez-Andreotta MD, Brusseau ML, Artiola JF, Maier RM, Gandolfi AJ. 2015. *Building a Co-Created Citizen Science Program with Gardeners Neighboring a Superfund site: The Gardenroots Case Study.* International Public Health Journal, 7(1):139-153, PMID: 25954473.

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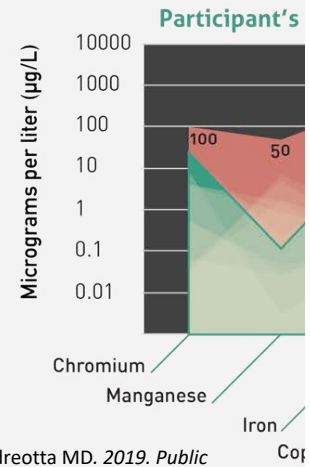
How much can I eat from my garden?

Greenlee



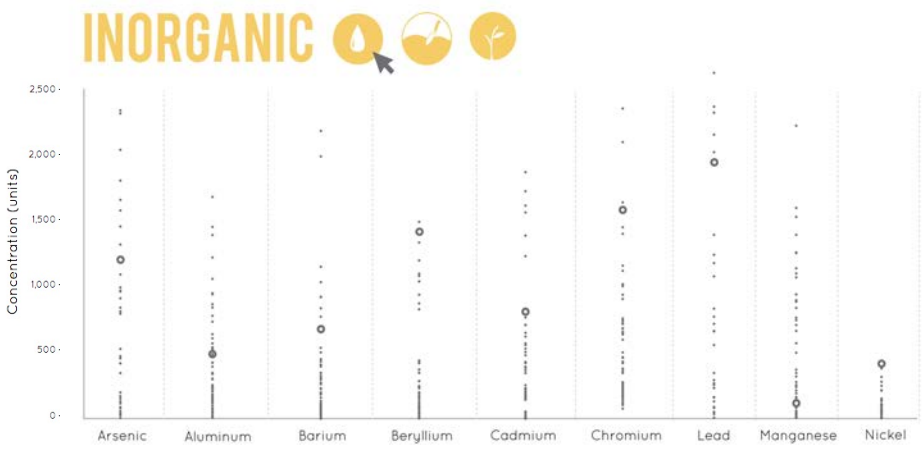
Sandhaus S, Kaufmann D, Ramirez-Andreotta MD. *2019. Public Participation, Trust and Data Sharing: Gardens as Hubs for Citizen Science and Environmental Health Literacy Efforts. International Journal of Science Education, Part B, 9(1), 54-71. DOI: 10.1080/21548455.2018.1542752.*

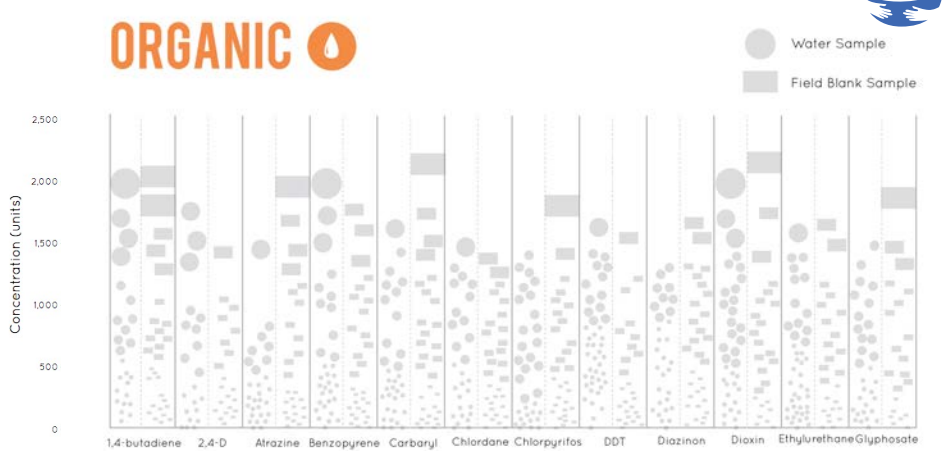
Amount you can eat from your garden based on an increased excess lifetime cancer risk due to arsenic exposure

Vegetable	Increased Excess Lifetime Cancer Risk 1/1,000,000			Increased Excess Lifetime Cancer Risk 1/100,000			Increased Excess Lifetime Cancer Risk 1/10,000			USDA Recommended for a female 51+ yrs old (cups/week)	USDA Recommended for a male 51+ yrs old (cups/week)
Concentration	Low Arsenic	Median Arsenic	High Arsenic	Low Arsenic	Median Arsenic	High Arsenic	Low Arsenic	Median Arsenic	High Arsenic		
Asparagus (N=1)		2.2			22			220		3.5 cups per week of "other vegetables"	4 cups per week of "other vegetables"
Beets (N=2)		2			2			1		4 cups per week of "red and orange vegetables"	5.5 cups per week of "red and orange vegetables"
Broccoli (N=2)	0.6	0.4	0.3	6	4	3	64	37	26	4 cups per week of "red and orange vegetables"	5.5 cups per week of "red and orange vegetables"
Carrot (N=1)		0.2			2.1			21.3		3.5 cups per week of "other vegetables"	4 cups per week of "other vegetables"
Cucumber (N=3)		1.0			0.7			0.4		4 cups per week of "red and orange vegetables"	5.5 cups per week of "red and orange vegetables"
Green or wax beans (N=5)	3	2	0	33	17	3	327	171	29	3 cups per week of "raw leafy greens"	3 cups per week of "raw leafy greens"
Lettuce (N=1)		0.003			0.030			0.30		3.5 cups per week of "other vegetables"	4 cups per week of "other vegetables"
Mixed Apple (N=1)		0.48			5			48		3.5 cups per week of "other vegetables"	4 cups per week of "other vegetables"
Okra (N=2)		3			2			1		4 cups per week of "red and orange vegetables"	5.5 cups per week of "red and orange vegetables"
Onion (N=3)	5.0	0.4	0.1	49.8	3.8	0.9	497.6	38.4	9.3	1.5 cups per week of "dark green vegetables"	1.5 cups per week of "dark green vegetables"
Peach, white (N=1)		0.12			1.2			12		3.5 cups per week of "other vegetables"	4 cups per week of "other vegetables"
Pepper (N=6)	10.3	1.2	0.5	103	11.5	5.5	1034	115	55	3.5 cups per week of "other vegetables"	4 cups per week of "other vegetables"
Pumpkin (N=1)		0.18			1.8			18		1.5 cups per week of "fruits"	2 cups per week of "fruits"
Squash (N=3)	5	0.6	0.0	47	6	0	466	58	4	1.5 cups per week of "fruits"	2 cups per week of "fruits"
Strawberry (N=2)	28.1	0.22	0.11	281	2	1	2805	22	11	1.5 cups per week of "fruits"	2 cups per week of "fruits"
Tomato (N=14)	BDL	5.5	0.050	BDL	55.1	0.5	BDL	551.4	5.0	1.5 cups per week of "fruits"	2 cups per week of "fruits"
Watermelon (N=1)		0.9			9			90		1.5 cups per week of "fruits"	2 cups per week of "fruits"

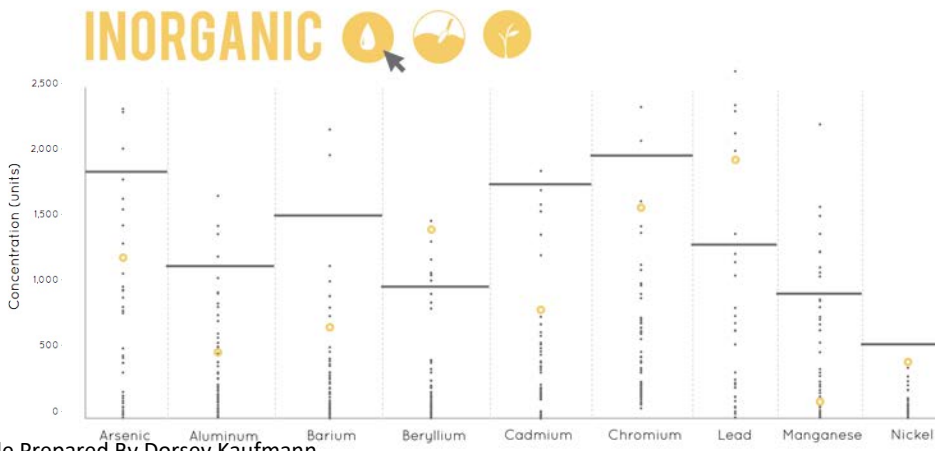
It is your choice to decide what target risk you want to use to make decisions about how many cups per week to consume from your garden.

USING SHAPE

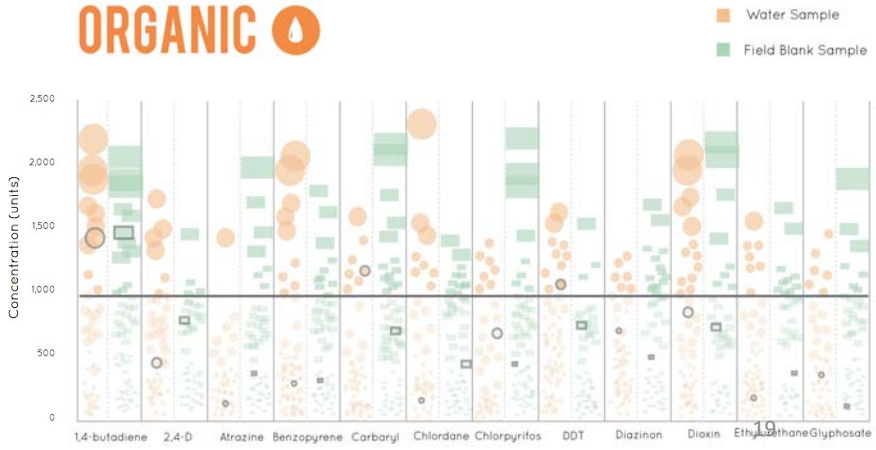




USING COLOR



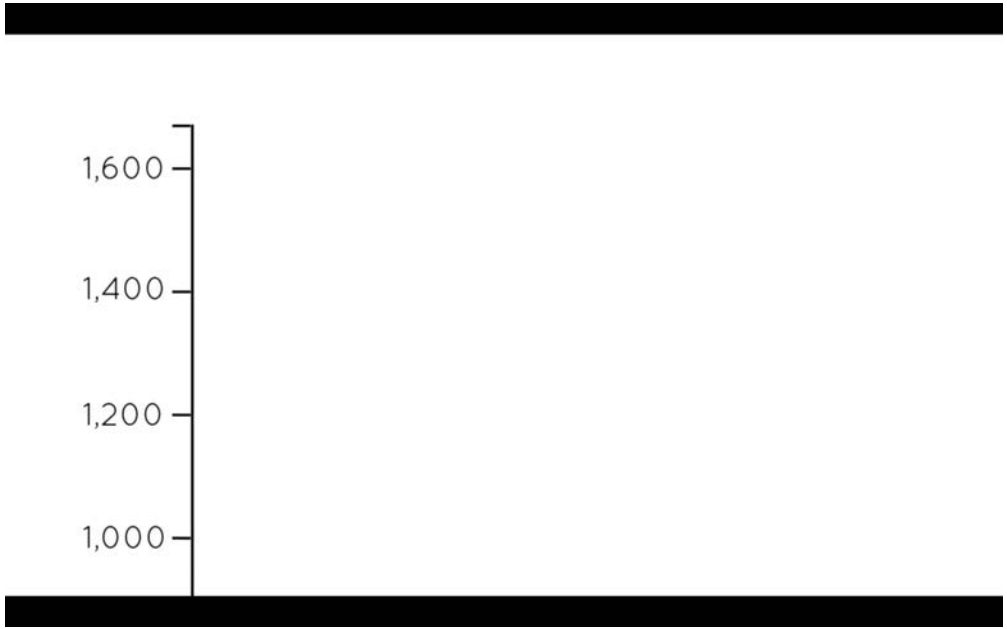
USING COLOR and SHAPE



Slide Prepared By Dorsey Kaufmann

Data was contextualized based on:

- How Project Harvest participants **currently** use their harvested rainwater
- Promotora recommendations and preferences
- Availability of useful standards or advisories



How do you use your water?
Look for the corresponding standard, advisory, and/or guideline on the graph to see if your rainwater sample is below or above the value, represented by a colored line.

- Drinking Water Standard
- Agricultural Irrigation Standard
- Livestock and Poultry Standard
- Surface Water - Partial Body Standard
- Surface Water - Full Body Standard
- Non-potable Indoor Use of Harvested Rainwater Guideline
- Lifetime Health Advisory
- World Health Organization Drinking Water Quality Guideline

Present solutions and strategies to prevent and reduce exposures

Consumo Seguro de Vegetales Cultivados en su Jardín

Preparación del Jardín

Jardinería Segura

Estándares de Arsénico	Estándar µg/L	¿El agua de lluvia que capturé está por encima de esta norma o estándar, ¿qué significa esto?
ADEQ - Agua de Superficial Contacto Corporal Completo	30	-No beba el agua de lluvia capturada. -No nade en el agua de lluvia que capturo ni realice una actividad recreativa que lo haga estar completamente bajo el agua.
ADEQ - Agua de Superficial Contacto Corporal Parcial	280	-No beba su agua de lluvia cosechada. -No permita que el agua de lluvia capturada entre en sus ojos, oídos o nariz.
USEPA - Primario para Agua Potable	10	-No beba el agua de lluvia capturada.
USDA - Agua para Riego Agrícola	100	-El agua de lluvia que recolecto podría dañar sus plantas. -Con el tiempo, los elementos tóxicos en el agua de lluvia capturada pueden concentrarse en el suelo y dañar el suelo y los animales.
USDA - Consumo del Ganado y de Aves de Corral	10	-No le dé el agua de lluvia capturada a su ganado o aves de corral.

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Pick A Theory or Framework to Measure Outcomes!

Project Harvest

- Self-efficacy (Ryan et al., 2000
- Community-first reporting (Emmett et al., 2009)
- Functional art (Cairo, 2013)
- Environmental Health Literacy (Grey 2018, Finn and O'Fallon, 2019)
- Sense-making (Warren et al., 2001, Odden and Russ 2019)

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We hypothesized that a collaborative citizen science project combined with community-first reporting and effective data visualizations would increase participant's:

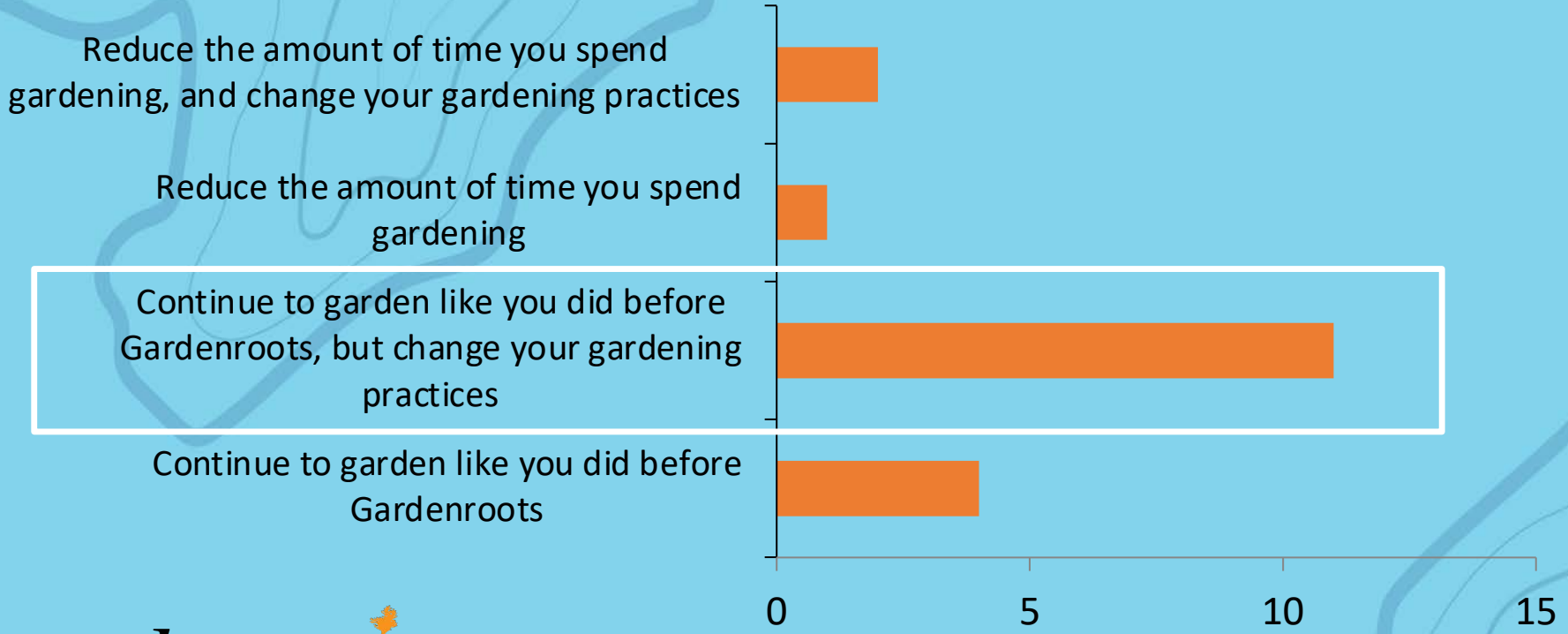
- Self-efficacy and capacity to make personalized decisions about their risk
- Trigger individual prevention and intervention strategies

Ramirez-Andreotta MD, Brusseau ML, Artiola JF, Maier RM, Gandolfi AJ. 2015. *Building a Co-Created Citizen Science Program with Gardeners Neighboring a Superfund site: The Gardenroots Case Study.* International Public Health Journal, 7(1):139-153, PMID: 25954473

Sandhaus S, Kaufmann D. Ramirez-Andreotta MD. 2019. *Public participation, trust and data sharing: gardens as hubs for citizen science and environmental health literacy efforts.* International Journal of Science Education, Part B, 9(1), 54-71. DOI: 10.1080/21548455.2018.1542752.

Did this Risk Communication Method Work?

Now that you have the results from your garden, will you:



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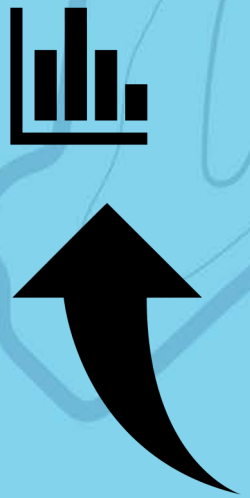


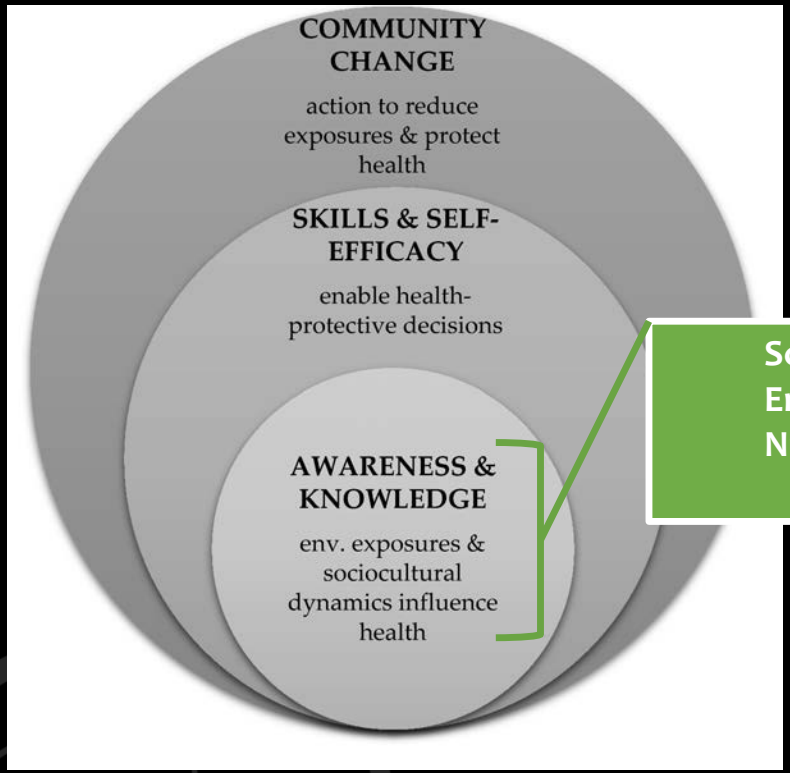
Results:

The combination of public participation, information design, and face-to-face community first reporting with a trusted researcher helps:

- Address information disparities in rural communities
- Increase in participant knowledge and efficacy
- Increase our understanding of what motivates a participant to engage in environment health research

Sandhaus S, Kaufmann D. Ramirez-Andreotta MD. 2019. *Public participation, trust and data sharing: gardens as hubs for citizen science and environmental health literacy efforts*. International Journal of Science Education, Part B, 9(1), 54-71. DOI: 10.1080/21548455.2018.1542752.

WHAT CAN I/WE DO?



Scientific literacy
Environmental Literacy
Numeracy

Gray KM. From Content Knowledge to Community Change: A Review of Representations of Environmental Health Literacy. Int J Environ Res Public Health. 2018 Mar 7;15(3):466.

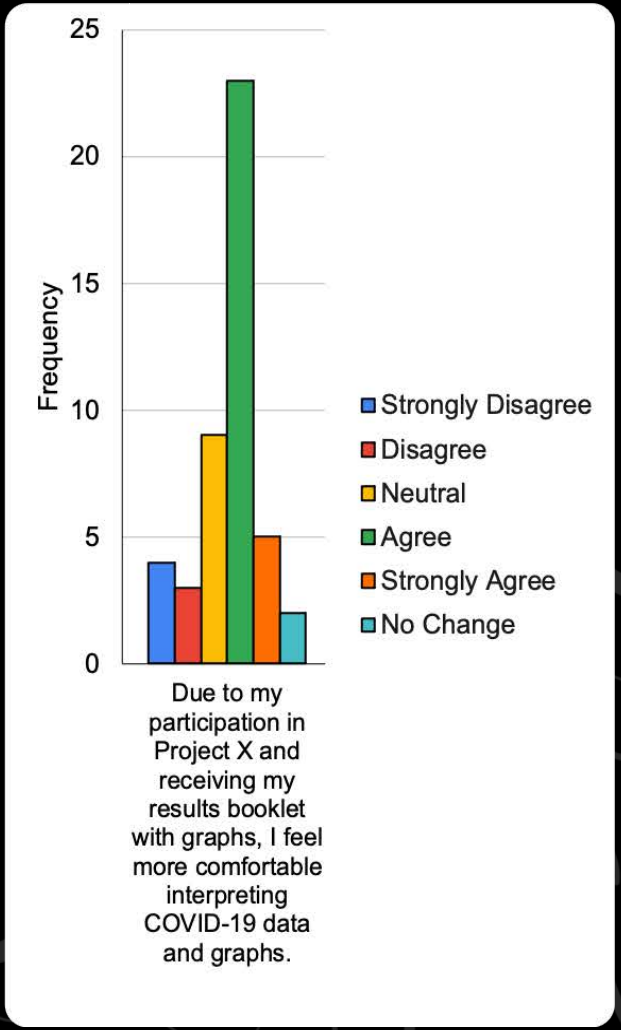
“Being able to participate in something that’s at my home, and I can see what happens there, and then get these type of laboratory results that show exactly what’s going on, is really valuable, and that – and if I have any perceptions that’s different than what this [booklet] is, I have to reconsider, and say, these are the facts.”

- Participant

Ramírez-Andreotta MD, Buxner S, Sandhaus S. Co-created environmental health science: Identifying community needs and co-generating knowledge to support science learning. In review, Journal of Research Science in Teaching.

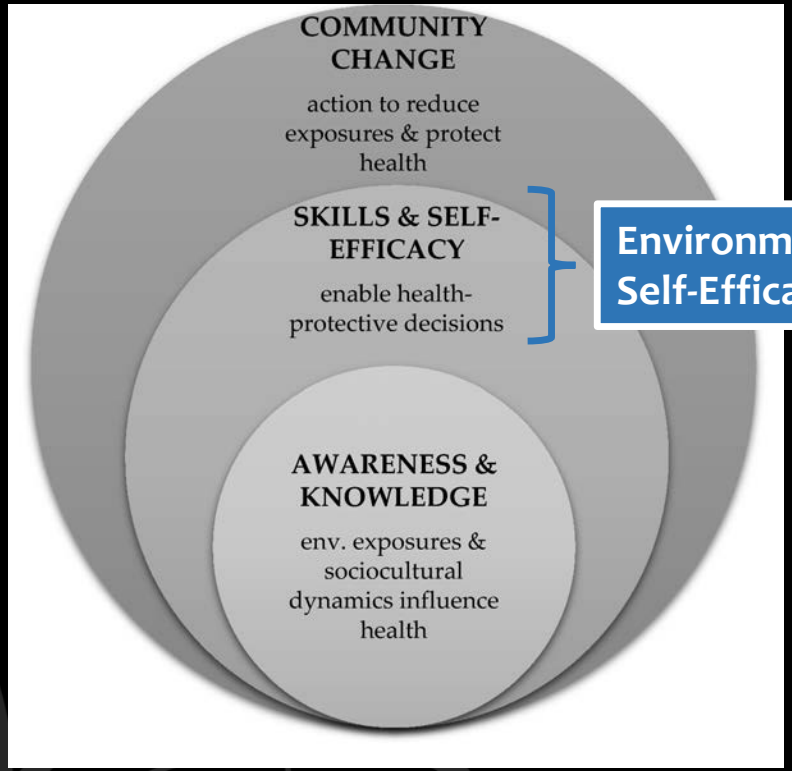
Project Harvest During COVID 19:

Public Health Adaptations to Ensure Ongoing Social Justice



- Sandhaus S., Buxner S., Ramírez-Andreotta, MD. Project Harvest During COVID 19: Public Health Adaptations to Ensure Ongoing Social Justice in a Citizen Science Project. AGU Fall Meeting 2020.
- Ramírez-Andreotta MD, Buxner S, Sandhaus S. Co-created environmental health science: Identifying community needs and co-generating knowledge to support science learning, In review, Journal of Research Science in Teaching.

WHAT CAN I/WE DO?



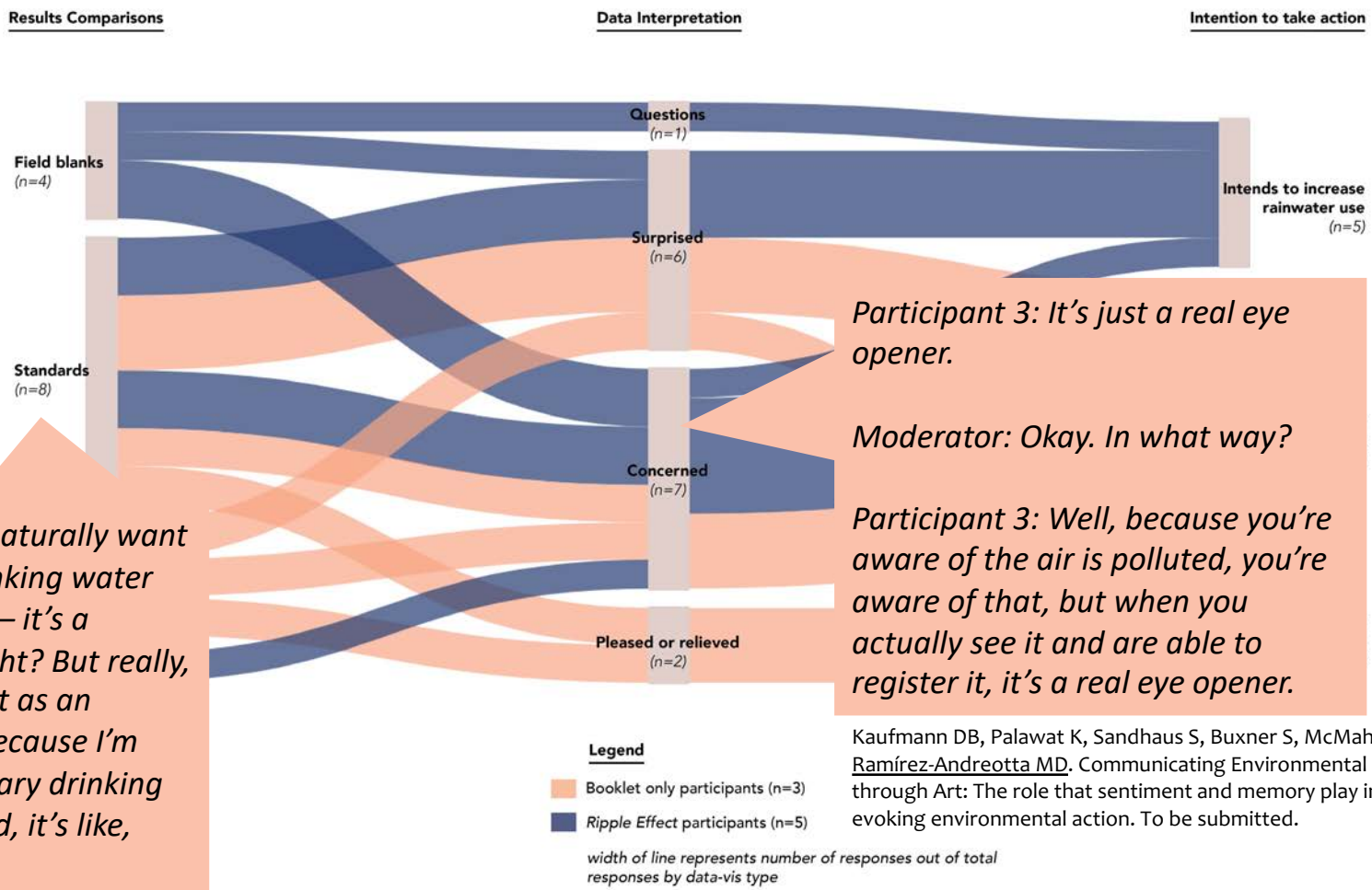
Environmental Health Action Self-Efficacy

Gray KM. From Content Knowledge to Community Change: A Review of Representations of Environmental Health Literacy. Int J Environ Res Public Health. 2018 Mar 7;15(3):466.

Data interpretation and action

Action Taken	Data	Supported?
Stopped using rainwater – pets	Arsenic level is 10 µg/L, which is the poultry and livestock standard	✓
Stopped using rainwater – edible plants	E. coli exceeds the agricultural irrigation standard	✓
Does not drink rainwater	Manganese, Total Coliform, and E.coli exceed the drinking water standard	✓
Uses rainwater - hot tub	All data points are below the surface/ partial body standard	✓
Uses rainwater - garden	All data points are below the agricultural irrigation standard	✓
Uses rainwater - mopping	All data points are below the U.S. EPA's E. coli and Total Coliforms non-potable indoor use guideline.	✓

Ramírez-Andreotta MD, Buxner S, Sandhaus S. Co-created environmental health science: Identifying community needs and co-generating knowledge to support science learning. In review, Journal of Research Science in Teaching.



One thing for me is I naturally want to go towards the drinking water standard, and I really – it's a perception or bias, right? But really, I'd only be looking at it as an irrigation standard. Because I'm not using it for a primary drinking source. But in my mind, it's like, well, can I drink it?

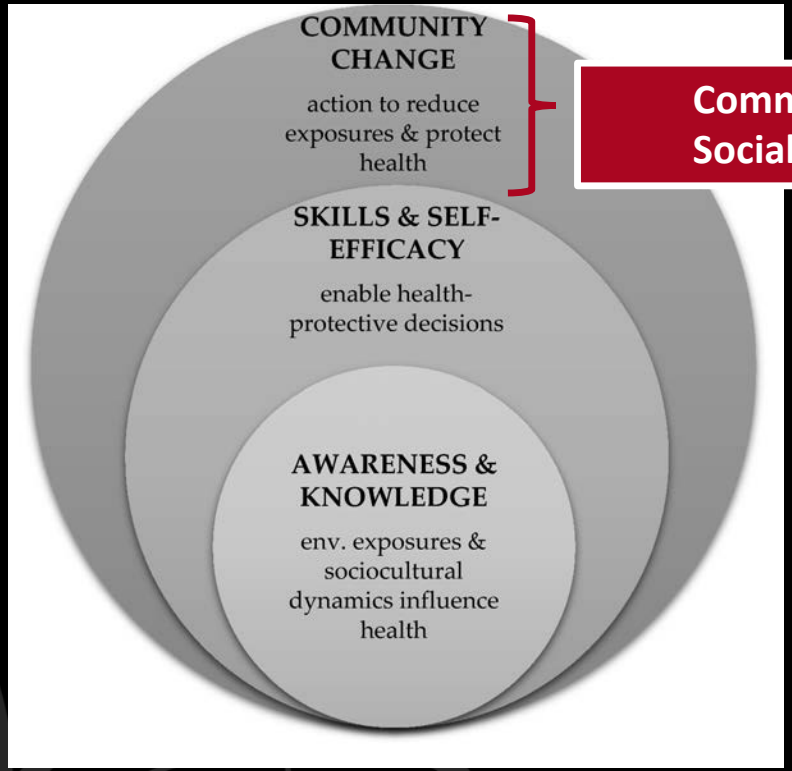
Participant 3: It's just a real eye opener.

Moderator: Okay. In what way?

Participant 3: Well, because you're aware of the air is polluted, you're aware of that, but when you actually see it and are able to register it, it's a real eye opener.

Kaufmann DB, Palawat K, Sandhaus S, Buxner S, McMahon E, Ramírez-Andreotta MD. Communicating Environmental Data through Art: The role that sentiment and memory play in evoking environmental action. To be submitted.

WHAT CAN I/WE DO?



Community Building
Social Engagement

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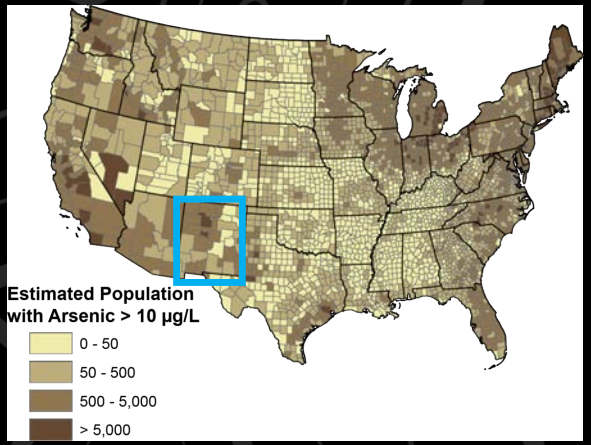
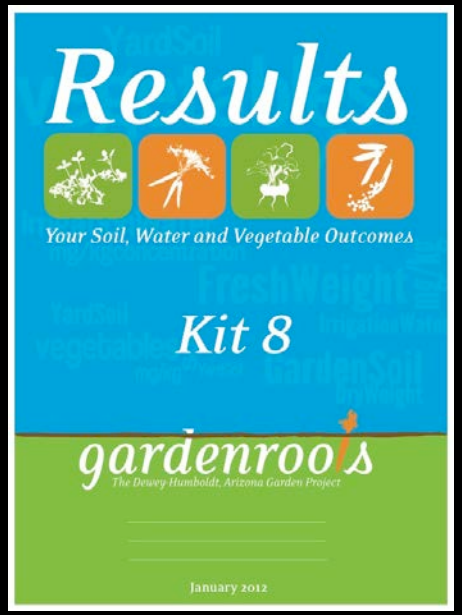
gardenroots



USGS, 2019. Estimates of how many private domestic well users in each county may be drinking water with levels of arsenic of possible concern for human health.



ADEQ Arizona Department of Environmental Quality

Ramírez-Andreotta MD et al., 2015. Building a Co-Created Citizen Science Program with Gardeners Neighboring a Superfund site: The Gardenroots Case Study. International Public Health Journal, 7(1):139-153, PMID: 25954473.

Boundary Object (Star and Griesemer, 1989)

- Individual research results can serve as boundary object.
- Research results not only report the data back, they can be used to bridge, link, and stimulate dialogue across stakeholders.
- This can lead to structural change and the little “p”.

Star, S. L., & Griesemer, J. R. (1989). Institutional Ecology, `Translations' and Boundary Objects: Amateurs and Professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39. Social Studies of Science, 19(3), 387–420. https://doi.org/10.1177/030631289019003001.

Coombe CM, Israel BA, Reyes AG, Clement J, Grant S, Lichtenstein R, et al. 2017. Strengthening community capacity in Detroit to influence policy change for health equity. Mich J Community Serv Learn 23(2): 101–116, https://doi.org/ 10.3998/mjcsloa.3239521.0023.208.

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Summary and Practical Recommendations:

1. Engage end-users and trusted community members and co-create data sharing materials to address technical elitism and justice challenges.

2. View the returning of individual results as a way to connect with existing knowledge to then build:
   - Environmental health, data, and visual literacy
   - A (new) relationship to science
   - A way to repair historically underserved/underrepresented communities' relationship to science

3. Intentionally design report back materials as a boundary object to support communication and action.
   - This can open the policy and decision-making window

Ramirez-Andreotta
Integrated Environmental Science
& Health Risk Laboratory

Thank you to ALL community researchers and students!

THE UNIVERSITY OF ARIZONA
COLLEGE OF AGRICULTURE & LIFE SCIENCES
Environmental Science

THE UNIVERSITY OF ARIZONA
Mel & Enid Zuckerman
College of Public Health

Superfund
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