Advancing Health Equity through Leveraging Citizen Science Methods & Digital Tools

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*Our Voice* Global Citizen Science Research Initiative & Network
Stanford University School of Medicine
‘It Takes a (global) Village’ – Collaborating Organizations

**U.S. Collaborators include:**
- Stanford University *(organizing institution)*
- Arizona State U.
- CA Peace Partnership
- City of Seattle, Human Services Dept.
- Cornell
- East San Jose,
- GirlTrek, USA
- LeadingAge, USA
- Place Labs, San Francisco, CA
- San Francisco State U., CA
- TransForm/Green Trip
- U Alaska, Anchorage
- U California, Irvine
- San Mateo Co. CA Public Health Dept.
- Santa Clara Co. CA Public Health Dept.; Somos Mayfair
- Solano Co. CA Public Health Dept.
- Tulane U. School of Public Health & Tropical Medicine, LA
- Washington University at St. Louis, MO
- Youth Leadership Institute

**International Collaborators include:**
- Aukland Univ of Tech, New Zealand
- FA Univ of Erlangen-Nuremberg, Germany
- Federal U. of Santa Maria, Brazil
- Glasgow Caledonian U, Scotland
- Instituto Nacional de Salud Pública, Mexico
- ITRI-Taiwan; Kaohsiung Medical U., Taiwan
- JDC Israel Eshel • University of Haifa, Israel
- Mälardalen University, Västerås, Sweden
- Pontific Catholic U. of Paraná, Curitiba, Brazil
- Public Health Foundation of India
- Univ. de los Andes, Bogotá, Colombia
- Univ. of Birmingham, UK
- Univ. of Cape Town, S. Africa
- Universidad de la Frontera, Temuco, Chile
- Univ. of Kwa-Zulu-Natal, S. Africa
- Univ. of Manitoba, Canada
- Université Nice Sophia Antipolis, France
- Univ. of Queensland, Australia

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Background

• Compelling evidence that individual & community health shaped by **environmental contexts**, but “top-down” policy approaches take time & can be less accessible to underserved communities

• A complementery, “**bottom up**” citizen science approach for promoting health-enhancing environments through **micro-environmental data capture & applications** (especially in underserved populations)
What is “Citizen Science”?  

• A centuries old tradition of resident engagement

**Today, at least 3 general types:**

**For the people:**
• Donation of biological specimens (biomedical research)

**With the people:**
• Active systematic data collection (natural phenomena or built environments)

**By the people:**
• Participate in setting objectives; 
• Collect & help interpret data; 
• Solution building
Empowers residents to assess & activate environmental changes for healthier neighborhoods & communities (in partnership with local decision-makers)

**Facilitators** of this process can be researchers, community organizations, govt. or business groups, or residents themselves
How does the *Our Voice* Citizen Science Method work?

http://ourvoice.stanford.edu

Facilitated **4-step process** to engage residents in data capture, analysis & application:

Discover  
Discuss & Prioritize  
Share & Activate  
Change

- **8 languages**
- **Users aged 9-90**
- **Walking maps**
- **Geo-tagged photos & narratives**

• Build an **online, interactive world map** of citizen science data & results for use by scientists, non-academic orgs., & residents to build health-enhancing communities

• Could be **linked with other data platforms** to provide contextually relevant, micro-scale information
Our Citizen Science Multi-level Research Model
(King AC, Inter J Behav Nutr & Phys Act, 2015)

Starts with **4-step Our Voice Intervention**
Residents collect data & learn how to activate environment changes in their community

leads to **Proximal Effects:**
Changes in relevant neighborhood structures, policies, social activities

creates changes in **Mediators** (e.g.):
- Neighborhood cohesion, trust
- Self-efficacy to create envir. change
- Neighborhood social networks
- Communication/advocacy skills

leads to **Distal Outcomes:**
goal of more Distal Outcomes:
- Individual-level health behaviors/outcomes
- Neighborhood-level health behaviors/outcomes
  (e.g., physical activity, wt. gain prevent.)

**Multi-dimensional data linkage possibilities include**
- Other types of qualitative measures
- Geospatial info.
- Quantitative data
- Observational info/audit tools (e.g., # people walking)
- Biol. & environmental sensors
Combining Discovery Tool with *Sensors* to expand understanding of effects of environment on health

- **Example:** Use **Air Quality Monitors** to capture local air quality along different walking routes

Community Air Quality Monitor (neighborhood-level)  
Portable Air Particle Monitor (Univ. of Washington)
Another Example:

- Use of wrist-worn sensor of electrodermal & heart rate activity

- Identifies locations along walking routes linked with increased arousal/stress

Chrisinger B & AC King (International J Health Geography, 2018). Stress Experiences in Neighborhood and Social Environments (SENSE). (with Place Labs, SF [Empatica])
Major Goal:
Dynamic exchange of data, measures, & learnings to advance global health equity

‘Our Voice’ Global Citizen Science Research Network for Health Equity, 2019
(Robert Wood Johnson Foundation planning grant)
Successes of *Our Voice* projects to date include:

- Safer *city-wide ‘open streets’ recreational programs* (Colombia, USA)
- Increased *age-friendly & safer walking routes* (Israel, Chile, Australia, Canada, USA)
- Identification of *accessible indoor recreational spaces* for elderly (Taiwan)
- More *walking/biking to school* (US); *activity-friendly schools* (NZ, S.Africa, Colombia)
- Containing *roaming dogs* to promote neighborhood safety & walkability (Mexico)
- Developing *healthier food access* in urban & rural areas (Colombia, USA, S. Africa)
- **Enacting local park improvements** to increase community physical activity, greater park utilization, & more accessible transportation (Colombia, USA)
- Improved *indoor environments in a geriatric rehabilitation unit* to promote mobility among patients (Australia)

In Summary:
Resident-centric data capture of local environments can enrich & contextualize data to advance precision population health

Thank you!  http://ourvoice.stanford.edu