Using "citizen science" to assess drinking water access in schools:

A photo-evidence technique

Project partners: University of California, Division of Agriculture and Natural Resources – Nutrition Policy Institute; University of California, San Francisco; University of Washington; National Children's Oral Health Foundation

Christina Hecht, PhD
Senior Policy Analyst

Introduction

Drinking water instead of sugar-sweetened beverages can help prevent chronic diseases such as obesity and dental caries.

But, not all schools provide good access to drinking water. Previous school water surveillance was done by administrator survey. These typically record only the presence of a water dispenser. We wanted to learn about **effective** access to drinking water for children in school. "Effective" access means not simply the presence of a water source but also such considerations as the condition, appearance and accessibility of the water source, water flow, water promotion and, ideally, the availability of cups; in other words, a drinking water source that children can and will use.

Aims

(1) Develop and validate a protocol for photographing and coding the characteristics of effective water access in schools
(2) Assess feasibility of national implementation of method using students as data-collectors
(3) Explore applications of the method by likely end-users
(4) Explore barriers in order to develop recommendations for improving effective water access in schools

Method

Aim 1: Photo Tool Development

- Review existing tools used to evaluate drinking water access in schools
- Draft protocol for a defined series of photos to capture equivalent information; content expert review
- Pre-test tool with variety of water sources
- Analyze data for validity

Aim 2: Feasibility Testing of Method

- National Children's Oral Health Foundation liaise with HOSA: Future Health Professionals of America high school student leadership organization
- 12 Chapters, representing each census region
- 40 total schools: diverse (FRPL eligibility/ethnic groups), all school levels
- Train students via webinar
- Code and analyze data

Aim 3: Potential Applications

- Present method; solicit feedback

Aim 4: Barriers to access

- Analyze photo-evidence results
- Develop recommendations

Photo-taking Protocol

1. Obtain school map and identify and label free drinking water sources
2. Create source information cards
3. Create source labels
4. Create photo-type cards
5. Take photos of each water source, per protocol
6. Upload final photos and school map to the project Google Drive

Results

Aim 1: The method is valid; comparing photo audits with observational audits we found:

- Almost perfect agreement (κ > 0.80) for type of water source, water flow, presence and type of cups, and presence of promotion
- Substantial agreement (κ = 0.61 to 0.80) for presence and type of obstructions, size of cups, type of promotion, and presence of branding
- Moderate agreement (κ = 0.41 to 0.60) for level of wear and tear and for a composite of 14 characteristics related to cleanliness of water sources (correlation coefficient 0.66)

Aim 2: The method is feasible, with 99% of photos useable and 95% of photos coded the same by 2 different coders. Students liked the project.

Aim 3: We found a high level of interest, with possibility of its adaptation to other settings and for other end-goals.

Aim 4: The schools in our study were from a convenience sample and therefore not generalizable to U.S. schools as a whole. In the sample, 61% were clean, 68% had no wear, 25% had moderate wear, and 77% had satisfactory water flow. Few water sources had cups (7%) or promotional posters (<1%). Nonetheless, **findings point to preliminary policy recommendations for improvement of school water access.**

- Provide cups and promotional material: two evidence-based, easy ways to increase drinking water consumption
- Improve upkeep: a sizeable minority of study sources were unappealing; 1/3 exhibited wear; 1/3 were dirty in some way; 8% had no water flow or were broken

Study Implications

Actual effective access to water is likely lower than the high (>87% to >97%) rates of compliance with Child Nutrition Act water requirements reported by school administrators via survey.

Citizen scientists can use a simple photo method to assess drinking water access in schools.

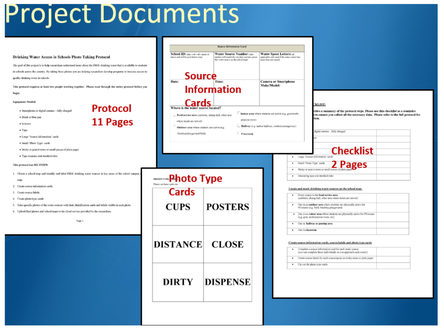

Photo-evidence protocol and auxiliary documents to undertake protocol.

Some of our HOSA student photographers.

Healthy Food Systems
Healthy Environments
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Agriculture and Natural Resources
Nutrition Policy Institute

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