Impact of the Air Quality Flag Program on elementary school policy and environmental health curriculum

Vickie Krenz, Ph.D., California State University, Fresno
Christy Sharp, M.P.H., San Joaquin Air Pollution Control District
Karen Kitchen, **RDH**, M.P.H., Anthem Blue Cross State Sponsored Business
Susie Rico Vasquez, B.S., American Lung Association in California
Eric Krenz, Ph.D., California State University, Fresno

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Background

- Asthma is the second most common chronic childhood condition and is the leading cause of activity restrictions among children in California.[1]
- About 1 in 7 California children ages 6-17 have been diagnosed with asthma.[2]
- The overall lifetime adolescent asthma prevalence in California was 18.4%, with rates higher than 18.9% for males.[3]
- Asthma is the leading chronic illness and leading cause of school absences for children and adolescents.[3]

[1]Chia, J. and colleagues. (2004). *Asthma among California's Children, adults and the elderly: A geographic look at legislative districts.* Los Angeles: UCLA Center for Health Policy Research. [2]California Department of Health Services. (2004). *Asthma in schools: Results from the California Healthy Kids Survey, 2001-2003.* Retrieved July 23, 2008, from http://www.californiabreathing.org/files/21908_fnl.pdf. [3]American Lung Association. (2004). *New law enables children to carry and self-administer asthma medication at schools.* Retrieved January 3, 2008, from http://www.californialung.org/press/041229Asthma.html.

Background

- Children spend most of their daily lives on school campuses, an ideal setting that offers unique opportunities for health and school campus officials to improve the quality of life for students with asthma.
- Taking action to address both indoor and outdoor pollutants is crucial because asthma symptoms may interfere with students' learning and participation in school activities.

Tools for Schools

- The United States EPA Indoor Air Quality Program's "Tools for Schools," and other asthma programs, have been implemented in many school-based sites around the nation to reduce students' exposure to environmental triggers that result in asthma symptoms.
- Interventions have focused on controlling indoor environmental triggers such as dust, mold, and cleaning chemicals.
- Research suggests that exposure to outdoor air pollutants may also play a relevant role in both asthma disease severity and lung development.

"Flags Program"

- The "Flags Program"[a] was designed to alert students, parents, and school staff to air quality status and to inspire the development of action plans and procedures to limit children's exposure to poor air quality.
- The goal of the program is to increase awareness and educate teachers and staff members on school campuses to plan activities around poor air quality days by displaying a colored flag that coincides with the Air Quality Index (AQI) for that particular day.

Funded by The California Endowment and implemented by the Community Action to Fight Asthma[4] initiative. The Asthma Coalitions in Merced, Mariposa, Tulare, and Kern Counties were active in implementing this initiative.

"Flags Program"

- Each day a contact person at each school is sent a message from the local Air Pollution Control District that indicates the Air Quality Index (AQI) for the following day.
- The next morning the flag that has the same color as the designated AQI for that day is raised along with the American and California flags on the school's flag pole.
- This serves as a reminder for all staff and students throughout that day to monitor those with asthma and to modify their outdoor activities, as needed, for maximum respiratory safety.

Previous evaluation findings

- In 2005, the Asthma Coalitions of Kern, Merced, Mariposa, and Tulare counties, and the Central California Asthma Project, in collaboration with Central Valley Coalitions of Community Action to Fight Asthma (CAFA) evaluators, Philliber Research Associates, and the University of California at San Francisco Institute for Health Policy Studies, completed the very first evaluation of the Air Quality Flags Program in the San Joaquin Valley.[b]
- The overall results indicated:
  - Participating schools were highly compliant with the program (98% reported flying the flags on most, if not all, school days).
  - Air pollution awareness was increased among students and staff and improved school policies and procedures revolving around physical activity and poor air quality days (i.e., less strenuous or indoor activity should be the protocol for a bad air quality day).

[b]Shendell et al. (2007). The outdoor Air Quality Flags Program in central California: A school-based educational intervention to potentially help reduce children's exposure to environmental asthma triggers. *Journal of Environmental Health, 70*, 2–31.

Why this "Flags Program" evaluation?

- The initial evaluation was performed within 1 to 2 years following the Flags Program's implementation and was based on a survey mailed out to only the schools that were using the Flags Program at the time.

Why this "Flags Program" evaluation?

- In the 2005 evaluation of the Flags Program, several components were omitted that were added in this current study including:
  - No controls used in the original evaluation with which to compare schools implementing the Flags Program to schools that were not implementing the Flags Program.
  - Evaluating controls is important to determine the impact of implementation, as well as the barriers/challenges in the school/district setting.
  - The larger counties (i.e., San Joaquin, Stanislaus, and Fresno) were left out of the original evaluation.
  - Only individual school policies were addressed and the significant impact of district-wide policy "institutionalization" was not included.

Purpose of the "Flags Program" evaluation

- The purpose of this study was to evaluate the impact of the Flags Program within the school environment through policy and curriculum implementation.
- This study:
  1. Evaluated the extent to which the Flags Program was associated with modified school policies; teacher curriculum regarding air quality; and outdoor activities for students, teachers, and school staff.
  2. Identified the barriers to implementing the Flags Program, as well as challenges with associated policies and curriculum at schools.
  3. Evaluated whether schools were implementing the Flags Program by using the air quality information provided to their sites by the San Joaquin Valley Air Quality Control District.

Methods

- The study population was administrators at elementary schools and middle schools across six counties: Tulare, San Joaquin, Stanislaus, Merced, Mariposa, and Fresno.
- There were 29 participating and 28 nonparticipating schools in this study.
- A questionnaire was used in the interviews and all findings derived from open-ended responses and direct quotations.

Evaluation Design

- A case study qualitative analysis was conducted to evaluate the Flags
- Program's impact on asthma advocacy and social change within San Joaquin Valley communities.

Evaluation Design

- A quasi-experimental with nonequivalent control groups design was used to measure the effectiveness of the Flags Program in the Central Valley.
- Qualitative evaluation methodologies were used within this case study design.
  - The intervention group consisted of schools and school districts implementing the Flags Program.
  - This group was compared to a nonequivalent control group that included schools and school districts that were not implementing the Flags Program.

Phase 1: Structured Interviews

- The principal (or their designee) was interviewed using a structured instrument.
- All interviews were tape recorded, transcribed, and coded.
- Afterwards, recordings of the interviews were destroyed.
- During the interview, the survey questions pertaining to the Flags Program were omitted for all nonparticipating schools.

Phase 2: Air quality data

- AQI data were collected during the timeframe of the Flags Program was being implemented.
- Data that revealed the percentage of schools flying the correct color flag as provided by the Air Pollution Control District.
- These data were verified by date-stamped photographs of the flags at the schools on those days.

Interview Instrument

- The interview instrument assessed:
  - Air Quality (i.e., appropriate AQ flag flying, definition of a "poor" AQ day, and alternative activities on bad AQ days)
  - Air Quality curriculum (i.e., type of curriculum, grades taught, district level curriculum, and implementation in classroom setting)
  - Asthma Policy (i.e., school level, specific teacher/administrator/ other staff training, student tracking, required Asthma Action Plan, policies on asthma medications, activities and policies)
  - Nursing credentials (i.e., full/part time; RN time spent at school site, and specific nursing staff credentials)

Interview Instrument

- Flags Program implementation (i.e., introduction of program to school sites, parents, and students; understanding of parents and students; dissemination of AQ information to school personnel; implementation of Flags program; and staff responsible, training, knowledge of AQI flags.
- Program administration (i.e., personal opinion on ease of administration, school policies, and increased awareness of asthma related issues
- Challenges/Barriers
- Need for additional information and/or assistance

Data Analysis

- Once all face-to-face interviews were completed, each tape recording, consent form, and survey tool was placed in a labeled envelope and sent, or brought back, to the ALA in Fresno, California for transcribing.
- Transcriptions began in early January 2008 and were completed by May 2008.
- The tape, consent form, and survey tool were then placed back into an envelope and stored under lock and key in a cabinet at the ALA.
- When all transcriptions for all 57 schools were completed, each transcription was saved as a text file document and imported into Envivo NUD*IST for coding.

Results

What does your school consider a poor air quality day?

Color of Flag	% Participating Schools n = 29	% Nonparticipating Schools n = 28
Red	4/29 = 13%	3/28 = 10%
Orange	7/29 = 24%	1/28 = 3%
Yellow	0/29 = 0%	1/28 = 3%
Orange and Red	15/29 = 51%	4/28 = 14%
Yellow, Orange, Red	1/29 = 3%	3/28 = 10%
Don't know	2/29 = 6%	8/28 = 28%
Alternative Answer	0/29 = 0%	8/28 = 28%

Flag Compliance

- Only 29 school sites in the study participated in the Flags Program. Even though all 29 sites were given a set of flags and an introductory presentation by the ALA on the dangers of poor air quality and the importance of using the flags, 31% did not fly a flag on the day of the interview.

Does your school have an asthma policy?

Answers	% Participating Schools n = 29	% Nonparticipating Schools n = 28
Yes	21/29 = 72%	13/28 = 46%
No	5/29 = 17%	12/28 = 42%
Don't Know	3/29 = 10%	3/28 = 10%

Do you allow students to carry inhalers at school?

Answers	% Participating Schools n = 29	% Nonparticipating Schools n = 28
Yes, with doctor's note	23/29 = 79%	16/28 = 57%
Yes	5/29 = 17%	7/28 = 25%
No	1/29 = 3%	4/28 = 14%

Does your school have a specific training component for teachers or administrators?

Answers	Teachers	Administrators
	Participating Schools	
Yes	7/29 = 24%	6/29 = 20%
No	20/29 = 68%	20/29 = 68%
Don't know	2/29 = 6%	3/29 = 10%
	Nonparticipating Schools	
Yes	4/28 = 14%	3/28 = 10%
No	19/28 = 67%	21/28 = 75%
Don't know	5/28 = 17%	4/28 = 14%

On poor air quality days, does your school provide alternative activities?

Answers	% Participating Schools n = 29	% Nonparticipating Schools n = 28
Yes	26/29 = 89%	16/28 = 57%
No	2/29 = 6%	6/28 = 21%
Don't know	1/29 = 3%	2/28 = 7%

Barriers and Challenges to Using the Air Quality Flags Program

Answers	% Participating Schools n = 29
Yes - Barrier/Challenge	12/29 = 41%
No - Barrier/Challenge	16/29 = 55%
No answer	1/29 = 3%

Challenges and Barriers

- Many schools did not have a set policy or curriculum for running the Flags Program.
- Lack of follow-up on the education
  - "I don't think there's been a lot of follow-up with it, so I think follow-up because there is always turn over."
- Relatively short tenure for most school administrators (i.e., missed the AQ Flags Program presentation or learned it at a previous school site yet were not implementing it at their current site).

Challenges and Barriers

- Reluctance of school to cancel sporting events or practices on account of poor air quality days
  - "You know, it gets down to a point if you're looking at athletics or whatever like that. Some districts are getting more practices in than other districts because the other districts aren't implementing the program and the Flags Program tends to actually, uh, inhibit their athletics program."

Challenges and Barriers

- Teachers can also be a barrier as to why students are not brought indoors on poor air quality days.
  - "The other barrier that get in the way is that, I hear this from teachers, is that they don't want to stay indoors on the red flag days. They want a break from their students."
  - "The teachers complain a little bit about having, you know, having them locked in their rooms on those days but, because it's sunny, unlike rainy days, it's sunny outside, so the only barrier is that the kids are kind of confused about why, "I'm inside and it's nice outside.'"

Challenges and Barriers

- Changes in air quality by midday, when the air becomes unhealthy
  - "So we get, um, you know let's say the day is predicted to be red but it only ends up being yellow. Well, we kind of get raked over the coals a little bit by parents because if we're out practicing, they'll go 'how come you were practicing?' So, that's why we'll typically raise our flag as to the prediction. And then at 2 o'clock (our day is over at 2:25) we do a procedure where we check between our feeder high school and us. We have a person who has some method for checking the air quality. And then we make a determination at 2 o'clock whether or not, how we will modify sports practice."

Conclusions

- Participating school interviewees knew more about the definition of a poor air quality day than did interviewees of the nonparticipating schools.
- Participating schools were also more apt to be in compliance with flying the correct air quality flag on poor air quality days.
- Participating schools were more likely to implement or follow an asthma policy and inhaler use policy at their school sites.
- Participating schools were more likely to have a training component for teachers and administrators.
- Participating schools were more likely to provide alternative activities on poor air quality days.
- Participating school interviewees found fewer barriers and challenges to implementing the program as compared to interviewees who did not find challenges and barriers and did not implement the Air Quality Flags Program.

Recommendations for Future Study

1. Schools implementing the Air Quality Flags Program were more likely to be aware of poor air quality, have an asthma policy, comply with an inhaler use policy, provide alternative indoor activities, and have a specific training component for teachers and administrators, as compared to schools that were not participating in the Air Quality Flags Program. Claims data and the tracking of illness among school children are not shared because of HIPAA regulations. Therefore, it is recommended that all schools in the state of California have a universal system to track school absenteeism for reasons of illness in order to see directly how many children are absent and why.

- 2. It is recommended that a California or San Joaquin Valley law or policy be placed in the school system in order to make schools and after-school agencies or organizations that run programs for children ages 0 to 18, be accountable for curtailing outdoor activities on poor air quality days. Not every school in the San Joaquin Valley provides an alternative activity on poor air quality days, and according to this study, not every school participating in the Air Quality Flags Program was in consistent compliance with the program. A law or policy will require the schools to be accountable for maintaining compliance with asthma and air quality policies.

3. It is recommended that the California State superintendent set a universal protocol for outdoor activity when the air quality is poor. Even in areas where air quality is good most of the year, there are occasions when there are fires and disasters that affect the air quality. A protocol to protect children during times of crisis should be set in place so schools know how to address the issue.

- 4. It is recommended that the ALA follow up with schools implementing the Air Quality Flags Program. Due to a high turnover rate with staff, schools need to be updated on new lung health information and be given a follow-up Air Quality Flags Program presentation.