Attending to Heat Illness & Pesticide Exposure among Farmworkers: Results from an Attention Placebo-Controlled Design

Joseph G. Grzywacz, Ph.D.
Chair & Norejane Hendrickson Professor
Family & Child Sciences

SCCAHS Heat Related Illness State of the Science Meeting: October 25-26, 2018
The PISCA Team
Presentation Goal & Aims

• Goal: Illustrate the state of the science in preventing heat-related illness among farmworkers

• Aims
  • Clarify misconceptions about farmworkers and describe the farmworker workforce in the U.S.
  • Review heat-related illness prevention recommendations and research within the agricultural sector
  • Describe the PISCA project: a community-academic partnership for protecting farmworker health
  • Share emerging evidence of PISCA’s effectiveness
Farmworker are not Farmers

SOC=11-9013
Med Earning: $31.91/hr, $66,360/yr

SOC=45-2092, 45-2093
Med Earning: $10.50/hr, $22,00/yr
Farmworkers, A Basic Overview

• Farmworkers are individuals involved in agricultural production including planting, cultivating, harvesting, and processing crops for sale, and caring for animals (Arcury & Quandt, 2009)

• Migrant – individuals whose principal employment is agriculture on a seasonal basis, and who establishes a temporary home.

• Seasonal – individuals who principal employment is agriculture on a seasonal basis, and does not change residence

<table>
<thead>
<tr>
<th>State</th>
<th>Adjusted MSFW Estimates</th>
<th>Migrant FWs</th>
<th>Seasonal FWs</th>
<th>Non-FWs In Migrant Households</th>
<th>Non-FWs In Seasonal Households</th>
<th>MSFWs &amp; Non-FWs</th>
</tr>
</thead>
<tbody>
<tr>
<td>California</td>
<td>731,745</td>
<td>338,798</td>
<td>392,947</td>
<td>124,508</td>
<td>445,897</td>
<td>1,302,150</td>
</tr>
<tr>
<td>Florida</td>
<td>194,817</td>
<td>120,430</td>
<td>74,387</td>
<td>44,556</td>
<td>43,914</td>
<td>283,287</td>
</tr>
<tr>
<td>N. Carolina</td>
<td>100,316</td>
<td>62,697</td>
<td>37,618</td>
<td>24,724</td>
<td>30,851</td>
<td>155,891</td>
</tr>
<tr>
<td>Texas</td>
<td>196,704</td>
<td>131,638</td>
<td>65,066</td>
<td>77,844</td>
<td>86,863</td>
<td>361,411</td>
</tr>
<tr>
<td>Washington</td>
<td>185,088</td>
<td>64,411</td>
<td>120,677</td>
<td>16,531</td>
<td>84,696</td>
<td>286,315</td>
</tr>
</tbody>
</table>
A National Profile of Farmworkers (NAWS 2009-16)

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>95% Confidence Level</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td>37.70</td>
<td>37.17 – 38.23</td>
</tr>
<tr>
<td><strong>Sex (Female=1)</strong></td>
<td>0.28</td>
<td>0.26 – 0.30</td>
</tr>
<tr>
<td><strong>Race/Ethnicity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Latino</td>
<td>0.81</td>
<td>0.79 – 0.83</td>
</tr>
<tr>
<td>White (not Latino)</td>
<td>0.15</td>
<td>0.14 – 0.17</td>
</tr>
<tr>
<td>Other Race/Ethnicity</td>
<td>0.04</td>
<td>0.03 – 0.05</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 9 years</td>
<td>0.61</td>
<td>0.59 – 0.63</td>
</tr>
<tr>
<td>10-12 years</td>
<td>0.28</td>
<td>0.26 – 0.29</td>
</tr>
<tr>
<td>&gt; 12 years</td>
<td>0.11</td>
<td>0.10 – 0.12</td>
</tr>
<tr>
<td>Foreign Born</td>
<td>0.74</td>
<td>0.72 – 0.76</td>
</tr>
</tbody>
</table>
A glimpse into a day....
Occupational Health Threats: Chronic Pesticide Exposure

Source: Arcury et al., 2009
Occupational Health Threats: Extreme Heat & Humidity

NOAA’s National Weather Service

Heat Index

Temperature (°F)

Relative Humidity (%)

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

- Caution
- Extreme Caution
- Danger
- Extreme Danger
Los trabajadores agrícolas tienen 20 veces más chances de morir por el calor que otros trabajadores.
State of Heat Illness, Prevention Research in Agriculture
• Develop culturally- and contextually appropriate occupational safety training targeting pesticide exposure and health illness

• Determine the effectiveness of curricula in promoting advocated behaviors for minimizing pesticide exposure and heat illness

• Determine the comparative effectiveness of "professional" and promotoras-based delivery of curricula
Design Features: Community-Advocate-Academic Partnership

This curriculum was made possible by a grant from the National Institute for Occupational Safety and Health (U54-OH011230). The Curriculum follows the requirements of the revised Worker Protection Standards of the United States Environmental Protection Agency, but the content, images, and facilitators’ guide are the authors’.
A Three-Phase Strategy

- Phase I
  - Develop Curricula
  - Beta-test

- Phase II
  - Finalize Curricula
  - Test

- Phase III
  - Disseminate
  - Compare
Phase 1 Results

Covariates appearing in the model are evaluated at the following values: 2. ¿Es usted hombre o mujer? = 68, 11. ¿Cuántos años lleva trabajando en la agricultura en los Estados Unidos? = 6.09
Enfermedades causadas por el calor
¡El calor nos afecta a TODOS!
¿Cómo puede protegerse mientras está trabajando?
El cuerpo no puede enfriarse, sufre un sobre-calentamiento.
¿El trabajo al aire libre se ha incrementado?

Los 10 años más calientes de la historia

Source: NOAA/NCEI Climate at a Glance
Difference from 20th century average temperature (°F). Data as of 1/8/2017
An Attention-Placebo Study Design

Day 1

Pretest
- P Knowledge
- P Attitudes
- P Behavior
- HI Knowledge
- HI Attitudes
- HI Behavior

Randomization

Treatment
- **Focal**
  - Pesticide (WPS) Curricula
  - 60 minutes
- **Attention Placebo**
  - Heat Illness Curricula
  - 60 minutes

Posttest
- P Knowledge
- P Attitudes
- P Behavior Intentions
- HI Knowledge
- HI Attitudes
- HI Behavior Intentions

Follow-Up
- P Knowledge
- P Attitudes
- P Behavior
- HI Knowledge
- HI Attitudes
- HI Behavior

PRETEST | TREATMENT | POSTTEST | FOLLOW-UP
--- | --- | --- | ---
P Knowledge | Focal Pesticide (WPS) Curricula 60 minutes | P Knowledge P Attitudes P Behavior Intentions | P Knowledge
P Attitudes | | HI Knowledge HI Attitudes HI Behavior Intentions | HI Knowledge
P Behavior | | | HI Attitudes
HI Knowledge | Attention Placebo Heat Illness Curricula 60 minutes | HI Behavior Intentions | HI Behavior
HI Attitudes | | | HI Behavior
HI Behavior | | | |
## Phase II Progress

<table>
<thead>
<tr>
<th></th>
<th>Phase 2 (Year-1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-test</td>
<td>235/115</td>
</tr>
<tr>
<td>Post-test</td>
<td>235/115</td>
</tr>
<tr>
<td>3-month follow-up</td>
<td>/69</td>
</tr>
<tr>
<td>Lost to follow-up</td>
<td>/27</td>
</tr>
</tbody>
</table>

### Phase 2 (Year-1)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>$\Delta = 29.19$ years; Range 17-61 years</td>
</tr>
<tr>
<td>Age</td>
<td>Male = 113 Female = 31</td>
</tr>
<tr>
<td>Country of birth</td>
<td>Mexico = 128 Guatemala = 15</td>
</tr>
<tr>
<td>H2A Visa</td>
<td>Yes = 110 No = 31</td>
</tr>
</tbody>
</table>

N = 147 total surveys (randomized and non-randomized) that have been entered
Summary of Key Points

• Farmworkers are health disparate and vulnerable population

• Heat illness-related prevention/intervention research in Agriculture is underdeveloped

• Culturally- and contextually-relevant curricula appear to change knowledge and behavioral intentions related to heat illness prevention

• Partnerships among community groups, advocacy organizations and academics are useful tools for heat-related illness prevention in Agriculture