



**PACIFIC NORTHWEST AGRICULTURAL
SAFETY AND HEALTH CENTER**

NIOSH ANNUAL REPORT
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FISCAL YEAR 2007
(October 1, 2006 to September 30, 2007)

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PACIFIC NORTHWEST AGRICULTURAL SAFETY AND HEALTH CENTER

ANNUAL REPORT

Fiscal Year 2007

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I. EXECUTIVE SUMMARY

The Pacific Northwest Agriculture Safety and Health (PNASH) Center, established in 1996, serves Alaska, Idaho, Oregon, and Washington with a goal of reducing occupational disease and injury among agricultural operators, workers, and their families. In recognition of the importance of all agricultural industries to the Northwest, our scope of work includes farming, fishing, and forestry industries. The PNASH Center's emphasis is on injury and illness prevention and health promotion, especially among populations not well represented in current research, including hired laborers, migrant/seasonal workers, women, and children. Our approach is to:

- Work in partnership with employers, workers, agencies and other research and service organizations
- Develop innovative research and intervention programs that focus on problem solving
- Take solutions to the workplace through training, outreach, and participatory research

The faculty, staff and students of the PNASH Center are pleased to have completed the 2007 Fiscal Year (FY), the first year of our NIOSH awarded 5-year program cycle. In this period the PNASH Center has 12 NIOSH funded projects and 10 from other federal and state sponsors. This assemblage of projects supports a comprehensive Center that can be productive in reducing the injuries and illnesses experienced by workers in the Northwest agricultural industries.

CENTER ACCOMPLISHMENTS FOR FY 2007

1. Risk Factors for Cholinesterase Depression among Pesticide Handlers.

This project works in coordination with the Washington State Cholinesterase (ChE) Monitoring Program to identify the key risk factors responsible for ChE depressions, including individual genetic susceptibility. Worker exposure information is collected at health clinic visits through a literacy friendly computer-based questionnaire and compared to their ChE results. As of FY 2007, we have enrolled a total of 183 agricultural pesticide handlers in this study and are gaining specific information to shape pesticide safety training and other interventions. By improving our understanding of the causes of ChE depression, we can help the agricultural community to reduce the burden of acute and chronic pesticide-related illnesses among handlers.

2. Interventions to Minimize Worker and Family Pesticide Exposures.

This is a field-based study that tests and disseminates best agricultural pesticide practices brainstormed by a team of industry experts that includes managers, workers, and pesticide safety educators. In FY 2007 we have conducted 31 interviews with experts in the day-to-day aspects of tree fruit production and agricultural pesticide safety, including 15 from the tree fruit industry (managers, growers, agricultural safety managers, and field men), eight pesticide handlers, and eight professional staff from government agencies (pesticide safety educators and safety professionals). These interviews are providing an in-depth look at current interventions that work well and the limitations of current measures used to protect pesticide handlers. Also in Year 1, the Expert Working Group (EWG) was formed, the industry experts that will ensure the relevancy and success of the project. The first EWG meeting will be held November 28, 2007.

3. Community Health Interventions with Yakima Ag workers “El Proyecto Bienestar”

The primary goal of this project is to develop strategies that will enable the community of Hispanic agricultural workers to effectively identify, characterize, and respond to the occupational and environmental health risks they and their families face. A community advisory board that includes 13 different constituencies guides the project. The University of Washington and three partners serve as catalysts, educators, and resources for the community: Northwest Communities Education Center/Radio KDNA; Heritage College; Yakima Valley Farmworkers Clinic (YVFWC)/Northwest Community Action Center. In PNASH’s 2007 FY and the fourth year of the project, achievements included:

- A summer training program on environmental and occupational health to 10 disadvantaged/low-income undergraduates from the Yakima Valley who are pursuing health professions. The program is called “ConneX: Connecting students to health careers” and is run through the YVFWC. In addition, there is now a college-visit day for minority students to the UW School of Public Health and Community Medicine.
- The Connex students carried out a community survey with 221 Yakima individuals identifying the most commonly requested information and their most reliable and trusted sources for information about workplace safety and health. Results indicate that supervisors may play an important role in disseminating workplace information and may be effective players in health interventions. Information was most often requested on workers’ rights issues, followed by pesticides and chemicals, how to deal with workplace abuses, and work-related injuries. They would like to receive this information mainly through brochures, radio programs, information sessions/trainings/public meetings and television programs. This information will help inform *El Proyecto* when designing interventions and communicating with the public.
- *El Proyecto* partners received an EPA CARE grant to further their work and the group will continue to work together on issues with the community’s guidance.

3. Pilot Project Program

In the 2007 FY, PNASH offered two rounds of pilot project funding. The program’s goal is to stimulate and support new and expanded research, prevention/intervention, and education/translation activities in the area of occupational safety and health in Northwest farming, forestry and fishing.

We are happy to announce our 2007 pilot project awards.

Pilot 1: Skills Retention in Commercial Fishing Safety Training (J. Duzgen, AMSEA)

Pilot 2: Characterization of Bioaerosols in Washington Dairy Barns (S. Meschke, UW)

Pilot 3: Inhibition of Cholinesterase by Pharmacological and Dietary Agents

(C. Simpson, UW)

Pilot 4: Safety and Health of Immigrant Forest Workers on the Olympic Peninsula

(M. Keifer, UW)

Pilot 5: Point-of-View Video Analysis of the Impact of a Faller Safety Training Program (G. Rischitelli, OHSU)

4. 'Nurse Murf' Column in Western Farmer-Stockman

Helen Murphy, PNASH Director of Outreach is now under contract for writing a monthly column, "Nurse Murf," in the *Western Farmer Stockman* magazine. This is new relationship is a result of our October 2006 Journalist Workshop: Children and Agriculture – Telling the Story. Plans are underway to reissue the articles in *El Mundo*, a Spanish-language newspaper in Wenatchee, WA and to syndicate the column to encourage wider distribution. Articles published in the 2007 FY include:

- June: Beat Heat Before Illnesses Hit
- July: Protecting Skin from Sun's Rays Today Prevents Cancerous Growths in Future
- August: Ladders Raise Orchard Injuries
- September: Take Heed in Contact with OP Pesticides

A PNASH survey of pesticide handlers identified that articles in leading trade journals is an effective method for disseminating research results to the English speaking agricultural community.

5. Awards and Honors

In addition to the projects funded through the NIOSH Agricultural Center Initiative, PNASH successfully competed in the 2007 FY for funding of projects that contribute to its mission of agricultural safety and health. Below are new awards granted in the 2007 FY.

CARE: Community Action for Renewed Environment,
EPA, 10/07- 9/08 (M. Keifer)

Examination of Airborne Pesticide Concentrations in Washington Agriculture WA
Department of Health, 12/07- 6/09 (R. Fenske)

Pesticide Exposure Assessment during Egyptian Cotton Production
NIH flowed through OHSU, 10/07- 9/11 (R. Fenske)

Honors

Richard Fenske, 2006 NIOSH Director's Award for outstanding scientific research achievement in occupational safety and health, specifically for work with fluorescent tracer methods to investigate occupational skin exposure in agriculture.

Richard Fenske, International Society of Exposure Assessment's 2007 Jerome J. Welsowski Award for "sustained and outstanding contributions to the knowledge and practice of human exposure assessment." Fenske and his colleagues at the PNASH Center pioneered measurements for children's exposure to pesticides.

Washington State Department of Agriculture, **Ofelio Borges and Flor Servin, School of Public Health and Community Medicine's 2007 and first Community Service Award** for their partnership activities with the PNASH Center and our students. See the article at: <http://uwnews.washington.edu/ni/uweek/uweekarticle.asp?articleID=36066>.

REGIONAL ACTIVITIES

1. **States Served by Center:** Washington, Oregon, Idaho, Alaska
2. **States with Center Activity for FY 2007:** Washington, Oregon, Idaho, Alaska

II. ADMINISTRATIVE REPORT

The Administrative and Planning and Outreach Core for the 2007 FY provided the administrative infrastructure for the entire Center program and assisted in the implementation of individual project objectives. It ensured that project activities are well coordinated within the Center and are of high scientific quality and responsive to stakeholder needs. The components of this core include the following:

- Management.
- Pilot Project Program.
- Internal and External Advisory Committees.
- NIOSH Agricultural Center Collaboration.
- Agricultural Community Outreach and Education Program.

MANAGEMENT

The Administrative and Planning Core provides the organization, internal communications, and facilities for the conduct of research, education, translation, and intervention activities.

Highlights of the 2007 FY include:

New Personnel

Several new personnel were hired at the beginning of our new program cycle, including:

Lesley Hoare, PNASH Center Research Coordinator. Ms. Hoare brings a unique background in forestry and working with immigrant forest green harvesters, is fluent in Spanish and understands community-based participatory methods.

Tino Alonzo, Health Education Specialist. Mr. Alonzo is based out in the Moses lake region working in Center outreach and education activities and projects. Mr. Alonzo has a background in social work, risk management, and public health.

Pablo Palmandez, Agricultural Workplace Specialist. Mr. Palmandez work focuses on PI Richard Fenske's Pesticide Intervention Project (PIP). He works out of the PNASH Yakima field office. Mr. Palmandez has a MS in Plant Pathology from WSU and has excellent experience in lab and field-based research, farmworker training, and pesticide application practices.

Remote Communications

Desktop and conferencing webcams are in use to improve our communications and coordination with the PNASH Center's Yakima Field Office, home-based offices, and distant partners such as with Oregon Health Sciences University.

Data and Statistical Program

This program provides statistical consultation and is currently developing a data security system. As a first step to improving data security, PNASH Center is working with institutional computer support to establish a department-wide secure backup and storage system. The system provides users with a secure server space that is automatically backed up three times each day. This is in

addition to any manual backups that users choose to run. This system also allows access to files from off-site locations, minimizing the need for portable data storage devices. The PNASH Center is providing space in our Yakima Field Office for offsite storage on quarterly backups of the entire system.

Other Research Support

In addition to the projects supported through the NIOSH Agricultural Center Initiative, PNASH successfully competed in the 2007 FY for funding of projects that contribute to its mission of agricultural safety and health. Below are new awards granted in the 2007 FY. For a complete listing of other research support, refer to the section, "Center Project Listing" on **page 9**.

CARE: Community Action for Renewed Environment (PI: Matthew Keifer)

\$12,500 Total Costs (EPA, 10/07- 9/08)

Examination of Airborne Pesticide Concentrations in Washington Agriculture

(PI:Richard Fenske), \$250,000 Total Costs (WA Department of Health, 12/07- 6/09)

Pesticide Exposure Assessment during Egyptian Cotton Production

(PI: Richard Fenske), \$245,052 Total Costs (NIH flowed through OHSU, 10/07- 9/11)

Honors

- **Richard Fenske, 2006 NIOSH Director's Award** for outstanding scientific research achievement in occupational safety and health, specifically for work with fluorescent tracer methods to investigate occupational skin exposure in agriculture.
- **Richard Fenske, International Society of Exposure Assessment's 2007 Jerome J. Welsolowski Award** for "sustained and outstanding contributions to the knowledge and practice of human exposure assessment." Fenske and his colleagues at the PNASH Center pioneered measurements for children's exposure to pesticides.
- Washington State Department of Agriculture, Ofelio Borges and Flor Servin, School of Public Health and Community Medicine's 2007 and first Community Service Award for their partnership activities with the PNASH Center and our students. See the article at: <http://uwnews.washington.edu/ni/uweek/uweekarticle.asp?articleID=36066>.
- 2007 University of Washington School of Public Health and Community Medicine recognition of the PNASH Team for extraordinary contributions to the Department of Environmental and Occupational Health Sciences.

PILOT PROJECT PROGRAM

In the 2007 FY, PNASH offered two rounds of pilot project funding. One request for application was sent out in Fall 2006 and another in Summer 2007. The program was administered by PNASH with the goal of stimulating and supporting new and expanded research, prevention/intervention, and education/translation activities in the area of occupational safety and health in Northwest farming, forestry and fishing.

We encouraged applications from Northwest academic institutions, government agencies, health care organizations, and other groups. The general process includes: 1) release of a request for proposals to Northwest investigators, 2) submission of letters of intent and then after

consultation/invitation, a full proposal 3) internal and external review and scoring of proposals, 4) notification of award or request for revision and resubmission, and 5) a record of program process and project results.

An evaluation and redevelopment of our program process took place after the first request for proposals saw few final applicants. A survey of past applicants and interested parties identified an application process that was overly complex for the amount of the award. Both or internal and external advisory committees informed the following modifications to our program process:

- Improved dissemination to eligible Northwest investigators
- Increase funding amount to a more attractive \$25,000 per year and open applications to requests for two years of funding (with a competitive renewal for the second year)
- Letters of intent required more information, which decreased the minimum number of pages required in the final research plan. This put the applicants further down the road to a full application and allowed the Internal Advisory Committee to provide more feedback to prospective applicants earlier in the process.

The results from the first year of the revamped program were excellent. We received a slightly greater number of letters of intent than in years past. However the number of final proposals received was greatly increased. The initial feedback is encouraging, indicating that the shorter research section requirement made the final application step less daunting to investigators.

See following section, Center Project Listing, on [page 11](#) for listing of small/pilot projects.

INTERNAL AND EXTERNAL ADVISORY COMMITTEES

The Internal Advisory Committee (IAC) meets monthly, assisting the Principal Investigator and project investigators in making scientific and administrative decisions in the operation of the Center. The External Advisory Committee (EAC) provides the Center with overall guidance on program direction and relevance of activities to the region and the nation. In the 2007 FY, the EAC convened by phone in November 2006 and in person at the PNASH Research Review on March 20, 2007. The Center EAC is an active and committed group of 9 members from agriculture, health care, extension, labor and academia. Two advisors changed: 1) Mike Gempler of the Washington Growers League referred us to our new advisor, Deborah Carter of the Northwest Horticultural Council, and 2) Erik Nicholson of the United Farmworkers Union referred us to our new advisor, Steven Witte of the United Farmworkers Union. The EAC meetings focused on learning about each other and each participant's particular interests in the PNASH Center, learning more about the PNASH Center, and reviewing newly initiated and proposed projects.

NIOSH AGRICULTURAL CENTER COLLABORATION

PNASH continues to serve as the Coordinating Center for the NIOSH Ag Centers and was an active participant in the Agricultural Centers Evaluation Program and the National Agricultural Tractor Safety Initiative.

AGRICULTURAL COMMUNITY, OUTREACH, AND EDUCATION PROGRAM (ACOEP)

The ACOEP is the Center's foundation for building relationships and sharing information with producers, farmworkers, health care providers, extension specialists, government workers, and other researchers and educators. The Center's ACOEP continues in line with its strategic plan and regular commitments to Washington Governor's Ag Safety Day, the Western Migrant Stream Forum, the Community Health Worker Network, Health and Safety in Western Agriculture Conference, and the Northwest Forest Worker Update newsletter. New activities in the 2007 FY include:

Journalist Workshop: Children and Agriculture – Telling the Story

Wenatchee, WA, October 20-21, 2006

The PNASH Center joined the National Children's Center for Rural and Agricultural Health and Safety and the Washington Department of Labor and Industries in hosting a workshop for 10 Northwest journalists with the hope of elevating awareness regarding the complexities of safety and health issues for children and adolescents who live, work and play on farms, ranches, and orchards. The 10 journalists spanned a range of media, from public radio (English and Spanish), daily newspapers, and trade journals. Journalists participated in discussion led by speakers and panelists, and local field visits. The major topics included 1) Youth at Work, 2) Farmworker Housing, 3) Environmental Hazards. The outcomes and major benefits for PNASH included:

- Building a relationship with journalists who are in a position to inform our target audience
- The trade journal, *Western Farmer-Stockman*, asking Helen Murphy to write a monthly health column, "Nurse Murf."
- Immediate articles, including:
 1. Farmworker Housing, Autumn DEOHS Newsletter, <http://depts.washington.edu/envhlth/info/publications.html>
 2. Group Says Children and Tractors a Deadly Mix, KUOW, 11/30/2006 (PODCAST)
 3. Safety Essential to a Successful Farm, *Western Farmer-Stockman*, December 2006
 4. Taking the Tragedy out of Tradition, *Capital Press*, November 3, 2006

Health Fair at Washington Governor's Ag Safety Day

Yakima, WA, March 22, 2007,

A first and now ongoing event was the PNASH-hosted Health Fair in conjunction with the annual Washington Governor's Ag Safety Day. Ag Safety Day annual gathers 300 agricultural employers and their workers with a one-day forum to learn and discuss safety and health. Sessions are held in both Spanish and English. The Health Fair included demonstrations and participatory learning games that featured, fluorescent tracer demonstrations, a heat stress interactive game, diet and diabetes tests and education (sugar and fat demos, and tests for blood pressure, and body-mass index), and skin cancer screenings by local volunteer professionals. Educational materials and staff were on hand for both English and Spanish languages. Participation was good, with many people visiting and picking up information and 38 people participating in at least three full demonstrations or educational games (ball caps with a safety message were distributed to those who completed three).

Nurse Murf

Helen Murphy, PNASH Director of Outreach is now under contract for writing a monthly column, "Nurse Murf," in the *Western Farmer Stockman Magazine*. Plans are underway to reissue the articles in *El Mundo*, a Spanish-language newspaper in Wenatchee, WA and to syndicate the column to encourage wider distribution. Articles published in the 2007 FY include:

- June: Beat Heat Before Illnesses Hit
- July: Protecting Skin from Sun's Rays Today Prevents Cancerous Growths in Future
- August: Ladders Raise Orchard Injuries
- September: Take Heed in Contact with OP Pesticides

Pesticide Education

As an outgrowth of a Washington state funded project to educate the agricultural community on pesticide risks, PNASH now has a strategic outreach effort in pesticide education. Specifically the aim was to translate and communicate current scientific information regarding health risks of pesticides to farmers, farmworkers, and their families, with special emphasis on high-use chemicals such as the OP pesticides. In 2007, results of our survey of 409 Washington pesticide applicators pointed to the following strategy to disseminate information:

- Newspapers and radio are the preferred awareness-raising placement for the English speaking audience while television - assuming adequate financing - would be best suited for Spanish speakers.
- Summary information will be included in general annual meetings for both the English and Spanish speaking applicators as well as in magazines for the former group.
- Detailed information needs to be given to those most used and trusted information sources; Washington State University (WSU) and Washington Department of Agriculture (WSDA) staff, fieldmen, medical providers, and poison control staff..
- Finally for the English speakers we will submit articles to leading trade journals as well as posting summary information on our website.

The curriculum will include acute illnesses, effects on the nervous system, cancers, and special risks to children. Copies of our materials on these topics of interest will also be shared with Washington State Poison Control, National Pesticide Information Center, and the major industries providing fieldmen consultants to the grower community. Training for medical providers is already ongoing through PNASH medical education.

For a listing of the resulting products from these and other ACOEP activities, please refer to Center Products section starting on page **11**.

CENTER PROJECT LISTING FOR FY 2007

1. Ongoing Projects:

- R1: Risk Factors for Cholinesterase Depression among Pesticide Handlers
- R2: Neurobehavioral Assessment of Pesticide Exposure in Children
- R3: Enhancements to Cholinesterase Monitoring: Oxime Reactivation and OP-ChE Adducts

R4: Assessment of Job-related Exposures for Diarrheal Illness in Farmworker Families
P1: Interventions to Minimize Worker and Family Pesticide Exposures
E1: Introducing a Cholinesterase Test Kit into Clinical Practice
E2: Reality Tales Storytelling to Translate Agricultural Health and Safety Research
R01: Community Health Intervention with Yakima Agricultural Workers

2. Projects Completed:

None

3. New Projects:

P1: Skills Retention in Commercial Fishing Safety Training
P2: Characterization of Bioaerosols in Washington Dairy Barns

For 2008 FY

Pilot 3: Inhibition of Cholinesterase by Pharmacological and Dietary Agents
Pilot 4: Safety and Health of Immigrant Forest Workers on the Olympic Peninsula
Pilot 5: Point-of-View Video Analysis of the Impact of a Faller Safety Training Program

4. Pilot Projects:

P1: Skills Retention in Commercial Fishing Safety Training
P2: Characterization of Bioaerosols in Washington Dairy Barns

For 2008 FY

Pilot 3: Inhibition of Cholinesterase by Pharmacological and Dietary Agents
Pilot 4: Safety and Health of Immigrant Forest Workers on the Olympic Peninsula
Pilot 5: Point-of-View Video Analysis of the Impact of a Faller Safety Training Program

5. External Projects:

CARE: Community Action for Renewed Environment (PI: Matthew Keifer)

\$12,500 Total Costs (EPA, 10/07- 9/08)

Examination of Airborne Pesticide Concentrations in Washington Agriculture

(PI:Richard Fenske)

\$250,000 Total Costs (DOH, 12/07- 6/09)

Pesticide Exposure Assessment during Egyptian Cotton Production

(PI: Richard Fenske), \$245,052 Total Costs (NIH flowed through OHSU, 10/07- 9/11)

Pesticide Effects: Integration into Health Care Provider Curricula (PI: Matthew

Keifer) \$662,500 Total Costs (EPA, 10/05- 9/10)

Idaho Partnership for Hispanic Health (Co-PI: Matthew Keifer)

\$180,000 Total Costs (Intermountain State Group, 9/05 – 8/08)

Pesticide Exposure Pathways in Agricultural Communities (PI: Michael Yost)

\$274,022 Total Costs (EPA and NIEHS 8/03-7/08)

Tractor-Related Injuries and Fatalities (PI: Richard Fenske)

\$32,940 Total Costs (NIOSH 10/05-12/07)

Community Health Intervention with Yakima Agricultural Workers “El Proyecto Bienestar” (PI: M. Keifer)

\$969,777 Total Costs (NIOSH and NIEHS 9/03-8/08)

Fluorescent Tracer Technique for Hands-on Pesticide Handler Training

(PI: Richard Fenske)

\$137,438 Direct Costs (Washington State Medical Aid and Accident Fund 7/05-6/07)

Communication of Pesticide Health Risks to Agricultural Producers, Workers, and their Families (PI: Richard Fenske)

\$135,573 Direct Costs (Washington State Medical Aid and Accident Funds 7/05-6/07)

TOTAL CENTER BUDGET FOR FY 2007

1. Total NIOSH Expenditures: \$948,000* Total Cost

* Estimate as of 11/26/07. The fiscal status report will be submitted on 12/30/07 and a justification for these remaining funds and request for carryforward will be submitted in January 2008.

2. In-Kind Contributions: \$ 124,282

3. Other Outside Funding: \$600,000* approximate Total Cost (other projects)

CENTER INVESTIGATORS

1. Scientific Investigators: 19

2. Program Support Staff: 15

3. Student Research Assistants: 4

COLLABORATIONS FOR FY 2007

Regional agricultural pesticide applicators, supervisors, producers and educators in tree fruit and dairy.

Alaska Longline Fishermen's Association

Alaska Marine Safety Education Assn. (AMSEA)

Central Washington Occupational Medicine

Columbia Valley Community Clinic

Harborview Occupational Medicine Clinic

Heritage University

Idaho Mountain States Group

National Institute for Occupational Safety and Health (NIOSH)

NIOSH Agricultural Centers

Northwest Communities Education Center/Radio KDNA

Oregon growers and shippers organizations

Oregon Health Sciences University

Oregon State University Agricultural Extension

Pesticide Incident Reporting and Tracking Panel (WA DOH PIRT)

Pesticide Laboratory, Centers for Disease Control and Prevention

US Environmental Protection Agency

Washington State University

Washington State University Cooperative Extension

Washington State Labor and Industries

Washington State Department of Agriculture

Washington State Department of Health
Washington State Department of labor and Industries
UW Center for Ecogenetics and Environmental Health
UW Department of Environmental and Occupational Health Laboratory
UW Northwest Center for Occupational Safety and Health
UW Pediatric Environmental Health Specialty Unit
Yakima Valley Farm Workers Clinic

External Advisory Committee members:

Jim Blackman, Assistant Dean, Idaho WWAMI
Deborah Carter, Northwest Horticultural Council
Jim Doornick, Doornink Fruit Ranch
Leda Garside, Tuality Healthcare's ¡Salud! Services
Barbara Lee, Director, National Children's Center for Rural and Agricultural Health and Safety
Karen Lewis, Extension Educator, Washington State University
Carol McCormick, Outreach Coordinator, Columbia Valley Community Health
Sara Quandt, Professor, Wake Forest University
Steven Witte, Northwest Region United Farmworkers Union

CENTER PRODUCTS

Including project products.

1. Presentations:

- National Academy of Sciences NIOSH Ag Initiative review. Richard Fenske presented on March 28, 2007.
- 2006 NIOSH Directors award. Richard Fenske received for work on the Fluorescent Tracer Technique. Acceptance included a presentation on September 18, 2007.
- Awards to Flor Servin and Ofelio Borges - School of Public Health and Community Medicine's Community Service Award for their work through with PNASH Center and Washington State Department of Agriculture.
- R1: Hofmann J, Keifer M. A computer-based survey instrument for exposure assessment among agricultural pesticide handlers. Oral presentation. National Institute for Farm Safety 2007 Annual Meeting. Penticton, BC: June 27, 2007.
- R1: Hofmann J. Identifying risk factors for cholinesterase depression among pesticide handlers in Washington State. Poster presentation. Epi Expo. Seattle, WA: November 7, 2006.
- R1: Hofmann J, Keifer M. A computer-based survey instrument for exposure assessment among agricultural pesticide handlers. Oral presentation. American Public Health Association Annual Meeting. Boston, MA: November 6, 2006.
- R1: Hofmann J, Checkoway H, De Roos A, Fenske R, Furlong C, Keifer M. Identifying risk factors for cholinesterase depression among pesticide handlers in Washington State. Oral presentation. Northwest Center for Occupational Health and Safety Interdisciplinary Research Seminar. Seattle, WA: November 1, 2006.
- E2: Heat Related Illness Training of Community Health Workers/Promotoras, Brotje Orchards, May 12
- E2: Orchard Injuries: Summary of the Research Conducted by PNASH, Advanced Agriculture Training- 318. Washington State Labor and Industries April 31, 2007
- E2: The Impact of Migrant Hired Help: Understanding Your Hispanic Audience for Health and Safety Communications, 2007 National Institute for Farm Safety "Applying What We Know", Penticton, Canada. June 27, 2007 and Webinar October 9, 2007
- E2: The Impact of Migrant Hired Help: Understanding Your Hispanic Audience for Health and Safety Communications, WEBINAR for UI, October 9, 2007.
- R01: "Power and Participation in *El Proyecto Bienestar*." Oral presentation. November 6, 2006: APHA Conference; Washington, DC.
- R01: "Struggles and Successes in *El Proyecto Bienestar*, a community based participatory research project for environmental and occupational health." Oral presentation. November 6, 2006: APHA Conference; Washington, DC.
- R01: "*El Proyecto Bienestar: A Community-based Participatory Research Project Exploring Environmental Justice for Farm Workers in the Yakima Valley*." Oral presentation. February 2, 2007: Northwest Communities Education Center Board Meeting; Yakima, WA.

- R01: “Power and Participation in CBPR: A Process Evaluation of *El Proyecto Bienestar*.” Oral presentation. April 18, 2007: CAB/Core meeting; Yakima, WA.
- R01: “Research Study of Agriculture Issues in the Yakima Valley: *Proyecto Bienestar/ConneX*.” Oral presentation. April 19, 2007: Pesticide Incident Reporting and Tracking (PIRT) Review Panel meeting; Yakima, WA.
- R01: “An Impact Evaluation of a Farm Worker Environmental and Occupational Health Community-Based Participatory Research Course in the Yakima Valley, Washington.” Oral presentation. May 31, 2007: Thesis defense (UW); Seattle, WA.
- R01: “Seasonal Fluctuations of Asthma Hospitalizations in the Yakima Valley Community of Washington.” Oral presentation. June 1, 2007: Thesis defense (UW); Seattle, WA.
- R01: “ConneX 2007 Survey Data Results.” Oral presentation. August 1, 2007: ConneX class (open to public); Toppenish, WA.
- R01: “*El Proyecto Bienestar*: “The Well-Being Project.” Poster presentation. August 15, 2007: Charles Drew Minority Pre-Health Society Scholarship Conference; Washington, DC.
- R01: “*El Proyecto Bienestar*: “The Well-Being Project.” Oral presentation. August 15, 2007: Charles Drew Minority Pre-Health Society Scholarship Conference; Washington, DC.
- R01: “Connex 2007 Survey Data Results.” Oral presentation. August 29, 2007: CAB/Core meeting; Yakima, WA.
- R01: “Students’ Perceptions of the College ConneX Community-Based Participatory Research Course.” Oral presentation. August 29, 2007: CAB/Core Meeting; Yakima, WA.

2. Publications

Peer Reviewed Journal:

- R01: V Ybarra and Postma, J. *El Proyecto Bienestar: An Authentic CBPR Partnership in the Yakima Valley*. In Seifer SD and Sgambelluri AR (editors). *Partnership Perspectives*. 2007; IV:I. Seattle, WA: Community-Campus Partnerships for Health.

Trade Journals:

- E2: “Beat heat before illnesses hit.” *Western Farmer Stockman*, June, 2007
- E2: “Ladders raise orchard injuries.” *Western Farmer Stockman*, August, 2007.
- E2: “Hot Tips on heat stress: They can save a life.” *Good Fruit Grower* July, 2007.

Fact Sheets / Brochures / Technical Publications:

- R1: PON1 Fact Sheet, communication strategy for the PON1 results to participants.
- P1: “Interventions to Minimize Worker & Family Pesticide Exposures” - Project fact sheet for lay audience in both Spanish and English.
- E1: Cholinesterase test kit fact sheet.

- E2: [Heat Illness Quick Reference Table \(html or pdf\)](#)
- E2: [Personal Risk Factors for Heat Illness \(pdf\)](#)
- E2: [Article in Western Farmer-Stockman, June 2007](#)
- E2: [Training tool: Heat Stress Jeopardy \(PowerPoint\)](#)
- E2: [Training tool: Heat Stress Jeopardy in Spanish \(PowerPoint\)](#)
- E2: [Training tool: Heat Stress Slide Presentation \(PowerPoint\)](#)
- E2: [Training tool: Heat Stress Slide Presentation in Spanish \(PowerPoint\)](#)

Other Publications

- R1: Human subjects training and certification.
- R2: Human subjects training and certification. Additionally, applied for a certificate of confidentiality from CDC.
- R3: Institutional animal care and use committee (IACUC) approval for in vivo studies with rats and OP pesticides
- R3: SOP for in vivo studies with rats and OP pesticides
- R3: SOP for ChE determination using 96-well plate assay
- P1: Human subjects training and certification.
- E1: Human subjects training and certification.
- E1: Lab evaluation of what effect blood sample storage conditions have on the reliability and accuracy of ChE activity measurements with the Test-mate test kit. (unpublished)
- E2: Human subjects training and certification.
- P1: Human subjects training and certification.
- P2: Human subjects training and certification.
- R01: Human subjects certification

3. Education / Training / Outreach

Training:

- R4: John Scott Meschke “Exposures to communicable diseases in Ag inspections” in Course 318 Advanced Agriculture Training at the Moses Lake, WA Labor and Industry office, May 1, 2007.
- E2: [Community Health Workers/Promotoras](#). "Heat Related Illness Training" Brotje Orchards, May 12, 2007.
- E2: [Agriculture Workplace Inspectors](#). “Orchard Injuries: Summary of the Research” in Course 318 Advanced Agriculture Training at the Moses Lake, WA Labor and Industry office, May 1, 2007.

Hazard Surveys / Consultations:

- P1: Expert Working Group: Interviews – Interviews conducted to assess needs of the agricultural community and create contacts with prospective members of the expert working group.
- E1: Consultation with Central Washington Occupational Clinic on how to integrate

the ChE kit within the clinic structure and problem solving around quality assurance and laboratory oversight.

- E1: Clinic interview questionnaire.

Academic Training:

- Michelle Sommergren, MPH 2007
- Yolanda Sanchez, MS 2007
- Joyce Tseng, MPH 2007

News Letters:

- 2007 Northwest Forest Worker Safety Review
- PNASH Internal E-News

CD-ROMs or other Computer Based Training Programs:

- R1: Exposure history questionnaire. Delivered in health clinics to pesticide handlers coming in for base-line ChE tests. Surveyed 183 individual pesticide handlers, and collected total of 256 exposure histories.

Other:

- R01: Outreach/Informational Brochure about El Proyecto Bienestar. English and Spanish versions. August 2007.

4. Conferences / Meetings Sponsored:

- Internal Advisory Committee Meetings: monthly meetings of PNASH Center Directors and Operations Manager.
- External Advisory Committee: meeting of 10 regional and national advisors to provide review and direction to PNASH Center activities. Meetings are twice each year, one in person and one by phone.
- Intra Center Communications: bimonthly internal e-news, monthly brown bag meetings, and installation of personal webcams with access to web conferencing.
- PNASH Center Staff Retreat: Research to Practice. October 31, 2007
- PNASH Center Research Review: Open meeting for input into PNASH Center projects and activities, March 20, 2007.
- R2: Stakeholder meetings with 15 community members in Oregon.
- R4: Community Meeting, July 2, 2007, Granger, WA
- R4: Community Meeting, July 12, 2007, Granger, WA
- R4: Community Meeting, September 4, 2007, Granger, WA

CAB/Core meetings (R01):

- October 4, 2006: Yakima, WA
- November 30, 2006: Toppenish, WA
- January 17, 2007: Yakima, WA
- February 21, 2007: Yakima, WA
- March 21, 2007: Yakima, WA

- April 18, 2007: Yakima, WA
- May 30, 2007: Yakima, WA
- July 11, 2007: Yakima, WA
- August 29, 2007: Yakima, WA

Core (only) meetings (**R01**):

- November 15, 2006: teleconference
- December 29, 2006: teleconference
- March 9, 2007: teleconference
- March 16, 2007: Toppenish, WA
- July 11, 2007: Yakima, WA
- August 29, 2007: Yakima, WA

5. Other Products:

- Cycle II Final Report to NIOSH
- 2005/2006 Evaluation Database
- New award for NIOSH Agricultural Center: Pacific Northwest Agricultural Safety and Health Center (2 U50 OH07544-07)
- CDC Conference proposal submitted for 2008 Health and Safety in Western Ag Conference.
- R1: Assays for paraoxonase status.

III. CENTER PROJECT REPORTS

PROJECT TITLE

R1: Risk Factors for Cholinesterase Depression among Pesticide Handlers

PROJECT OFFICER

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PROJECT DESCRIPTION

The goal of this research project is to identify risk factors that are associated with depressed cholinesterase (ChE) activity among participants in the Washington State ChE monitoring program. Ultimately, we hope to incorporate findings from this study into trainings and other interventions to prevent pesticide overexposure among agricultural pesticide handlers.

The specific aims of this project are to:

1. Enroll 50% of Washington State agricultural pesticide handlers who undergo repeat ChE testing in an ongoing cross-sectional study;
2. Collect information about likely key risk factors for pesticide overexposure from participating handlers;
3. Characterize paraoxonase (PON1) status in blood specimens from each participant;
4. Determine which risk factors are associated with ChE inhibition, including workplace conditions, behavioral factors, and PON1 status; and
5. Evaluate the impact of educating workers and growers about risk factors for ChE depression.

PROJECT START AND END DATES: October 1, 2006 to September 30, 2011

STATES THE PROJECT WAS ACTIVE IN: Washington

COLLABORATIONS FOR FY 2007

Central Washington Occupational Medicine
Washington State Department of Agriculture's Farmworker Education Program

PROJECT ACTIVITIES / ACCOMPLISHMENTS

Aim 1. Enroll 50% of Washington State pesticide handlers who undergo repeat ChE testing in an ongoing cross-sectional study.

To date, we have enrolled a total of 183 agricultural pesticide handlers in this study (125 participants were first enrolled during the 2006 spray season, and 58 new participants were enrolled during the 2007 spray season). Enrollment has been somewhat lower than expected due to participant refusal and declination by some employers to engage in this study. An overall decrease in the number of workers participating in the ChE monitoring program (possibly due to work reorganization) has also affected our study enrollment.

During the summer of 2007, we developed a new database for recording and tracking participants' information and visit history. This database will facilitate enrollment efforts in subsequent years of the project.

Aim 2. Collect information about likely key risk factors for pesticide overexposure from participating handlers.

We have collected self-reported information about potential sources of pesticide overexposure from 154 study participants using the computer-based survey instrument. Among these participants, 22 completed the survey in both the 2006 and 2007 spray seasons. Participants have been asked about a number of potential sources of pesticide exposure including: 1) pesticide handling activities performed and spray equipment used; 2) crops treated and pesticides applied; 3) duration and frequency of handling activities; 4) use, condition, and storage of personal protective equipment; 5) use of decontamination facilities; 6) pesticide safety trainings received; 7) non-routine exposures; and 8) acute exposure events. In addition to the workplace exposure history, we also collect information about non-occupational risk factors for ChE depression, symptoms of pesticide-related illnesses, and demographic information.

Based on preliminary descriptive analyses of survey data from the 2006 spray season, we made some revisions to the computer-based survey instrument prior to the 2007 spray season. Several new items were added to the survey, and some questions were modified to address difficulties encountered by participants in the 2006 spray season. For example, several questions with numerical responses were reformatted as categorical questions to facilitate more accurate reporting.

Aim 3. Characterize PON1 status in blood specimens from each participant.

PON1 status is hypothesized to be a biological marker of susceptibility to some organophosphate pesticides including chlorpyrifos. Blood specimens have been obtained from a total of 163 study participants. These blood specimens have been analyzed to determine PON1 status based on the two-substrate assay developed by Dr. Clement Furlong and colleagues. Genotyping assays have also been performed on samples obtained during the 2006 spray season for the C-108T polymorphism in the PON1 promoter region and the Q192R polymorphism in the PON1 coding region.

Aim 4. Determine which risk factors are associated with ChE inhibition, including workplace conditions, behavioral factors, and PON1 status.

Analyses of ChE inhibition in relation to self-reported exposures and PON1 status based on data

collected during the 2006 and 2007 spray seasons are currently underway.

Aim 5. Evaluate the impact of educating workers and growers about risk factors for ChE depression.

This aim will be addressed in subsequent years of the project when data about work practices and workplace conditions are available over an extended time period.

Other project activities / accomplishments

In the summer of 2007, we met with Dr. Barry Wilson and colleagues at the University of California-Davis. Dr. Wilson has extensive experience with assays measuring ChE activity. The purpose of this meeting was to become more familiar with the laboratory methods used to determine ChE enzyme activity.

RESEARCH TO PRACTICE

Ultimately, results of this study will be used to inform pesticide safety training efforts, and to help develop other interventions to minimize occupational pesticide exposure among agricultural pesticide handlers. By improving our understanding of the causes of ChE depression, we can help the agricultural community to reduce the burden of acute and chronic pesticide-related illnesses among handlers.

PROJECT PRODUCTS

1. Presentations:

- Hofmann J, Keifer M. A computer-based survey instrument for exposure assessment among agricultural pesticide handlers. Oral presentation. National Institute for Farm Safety 2007 Annual Meeting. Penticton, BC: June 27, 2007.
- Hofmann J. Identifying risk factors for cholinesterase depression among pesticide handlers in Washington State. Poster presentation. Epi Expo. Seattle, WA: November 7, 2006.
- Hofmann J, Keifer M. A computer-based survey instrument for exposure assessment among agricultural pesticide handlers. Oral presentation. American Public Health Association Annual Meeting. Boston, MA: November 6, 2006.
- Hofmann J, Checkoway H, De Roos A, Fenske R, Furlong C, Keifer M. Identifying risk factors for cholinesterase depression among pesticide handlers in Washington State. Oral presentation. Northwest Center for Occupational Health and Safety Interdisciplinary Research Seminar. Seattle, WA: November 1, 2006.

2. Publications

Fact Sheets / Brochures / Technical Publications:

- PON1 Fact Sheet, communication strategy for the PON1 results to participants.

Other Publications:

- Human subjects training and certification.

3. Education / Training / Outreach

CD-ROMs or other Computer-Based Programs:

- Exposure history questionnaire. Delivered in health clinics to pesticide handlers coming in for base-line ChE tests. Surveyed 183 individual pesticide handlers, and collected total of 256 exposure histories.

4. Other Products:

- Assays for paraoxonase status.

PROJECT TITLE:

R2: Neurobehavioral Assessment of Pesticide Exposure in Children

PROJECT OFFICER(S)

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PROJECT DESCRIPTION

The purpose of this research is to learn more about the exposure and health effects of pesticides in children. Pesticide exposure will be measured by examining pesticide metabolites in children's urine. A specialized test battery will measure neurobehavioral effects of pesticide exposure.

We propose a 5-year plan of research that will: (1) establish an optimal exposure measurement protocol; (2) recruit a cohort of 150 exposed and 150 non-exposed control children; (3) compare neurobehavioral performance of children of applicators to children of controls in a cross-sectional study, and relate neurobehavioral performance of all children to estimates of (potential) home dust exposure and estimates of lifetime exposure; (4) repeat the same measurements in a second year to obtain longitudinal data that will characterize developmental progress and relate that progress to exposure estimates; (5) develop one-page English/Spanish brochures for the various communities to describe research outcomes and their implications for school, work, home and clinical diagnosis.

There are five specific aims:

1. Establish a sampling protocol to characterize organophosphate (OP) exposures in urine metabolites in children over a spraying season. Obtain self-reports of pesticide use by applicators and family members using an icon-based interview approach to develop an estimate of lifetime pesticide exposures in the children tested.
2. Recruit a cohort of 150 school-age children whose parents are active OP pesticide mixer-loader-applicators, and an age- and gender-matched control group (N=150); and implement procedures for maintaining contact with the sample over two application seasons.
3. Conduct a cross-sectional study of neurobehavioral performance in 5-12 year old children of pesticide mixer-loader-applicators, compared to same-age control children, and relate performance of all children to home dust exposures (following the protocol in aim 1).
4. Examine neurobehavioral performance of the same 300 children in the following (second) year to determine if home pesticide exposures affect neurodevelopment.

5. Develop a series of communications to the orchard worker, orchard owner, school and medical communities in Hood River that describe the research outcomes and targeted implications.

PROJECT START AND END DATES: October 1, 2006, to September 30, 2011

STATES THE PROJECT WAS ACTIVE IN: Oregon

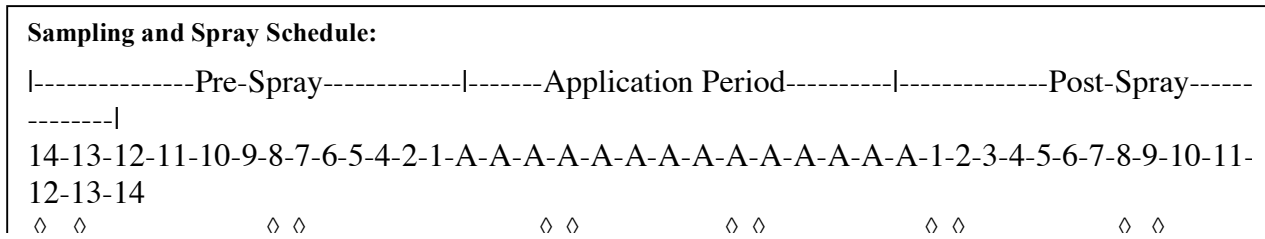
COLLABORATIONS FOR FY 2007

Members from the Oregon growers and shippers organizations
Members of the Oregon State University Agriculture Extension Office

PROJECT ACTIVITIES / ACCOMPLISHMENTS

The project received IRB approval at OHSU and we have applied for a Certificate of Confidentiality from CDC, (which was requested from the OHSU IRB). Until the Certificate of Confidentiality is granted, data collection cannot begin. The application process for the Certificate of Confidentiality was begun in October 2006. We have met with the growers' organization in our community and have begun assembling materials for the study. Members of the community have been invited to be on the project advisory board and a meeting is being scheduled for December. During a planning meeting for the project, we decided to modify the Sampling Study (Aim 1). Because the study is being conducted with school-age children, who spend a significant amount of time outside the home and have different behaviors than younger children, we decided to focus the Sampling Study on trying to capture the pattern of metabolites in the urine over an application period instead of measuring dust in the homes.

The Sampling Pilot Study will recruit 30 children between the ages of 5 and 12 years from families whose parent(s) handle pesticides (mix, load, or apply). Informed consent and child assent will first be obtained. During the initial interview, parents will complete a demographics questionnaire and the Lifetime Exposure Questionnaire that asks questions about pesticide exposure in a child's lifetime. Urine samples will be collected from the children at bedtime and the following morning. The samples will be analyzed for metabolites of organophosphate pesticides. Urine samples (bedtime and first morning void) will be collected from the children at six time points. Samples will be collected two days at each time period. There are six time periods: two pre-spray periods (approximately two weeks and one week before applications of Organophosphate pesticides), two application periods (at the middle of the application period and at the end of the application period), and two post-spray periods (approximately 1 week and 2 weeks after the application period). Thus, a total of 24 urine samples will be collected from the children (6 time periods of 2 days each x 2 samples (bedtime and first morning void). Urine samples will be collected at the end of each two-day time periods. Parents will be provided with coolers and/or refrigerators to store the samples. The goal of the Sampling Study is to establish the pattern of metabolites produced by the exposure over an application period, develop a sample collection protocol to be used in the Neurobehavioral Study, and to establish basis for an estimate of lifetime exposure.



PROJECT PRODUCTS

2. Publications

Other Publications:

- Human subjects training and certification. Additionally, applied for a certificate of confidentiality from CDC.

6. Conferences / Meetings Sponsored:

- Stakeholder meetings with 15 community members in Oregon.

PROJECT TITLE:

R3: Enhancements to Cholinesterase Monitoring: Oxime Reactivation and OP-ChE Adducts

PROJECT OFFICER(S)

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PROJECT DESCRIPTION

The overall goal of this proposal is to improve the specificity, sensitivity and reliability of cholinesterase monitoring, thereby providing a tool to detect and reduce overexposure of agricultural workers to cholinesterase (ChE)-inhibiting pesticides.

The specific aims of this proposal are:

- 1a.** Develop/validate a sensitive, accurate and robust analytical procedure based on HPLC/MS/MS for the measurement of OP-adducts to plasma ChE (butyryl ChE, BuChE).
- 1b.** Evaluate the potential of oxime reactivation followed by measurement of ChE activity for confirmation of depressed ChE activity
- 2.** Evaluate the relationships between OP-adduct levels, reactivatability of ChE, and ChE activity *in vitro*, *in vivo* in rats, and in humans exposed to OP pesticides
- 3.** Research to practice: Incorporate the assays developed in Aim 1 with the practice of OP pesticide exposure monitoring in Washington state.

PROJECT START AND END DATES: October 1, 2006, to September 30, 2011

STATES THE PROJECT WAS ACTIVE IN: Washington

COLLABORATIONS FOR FY 2007

Dana Barr, Ph.D.
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PROJECT ACTIVITIES / ACCOMPLISHMENTS

Aim 1a: Develop/validate a sensitive, accurate and robust analytical procedure based on HPLC/MS/MS for the measurement of OP-adducts to plasma ChE (butyryl ChE, BuChE).

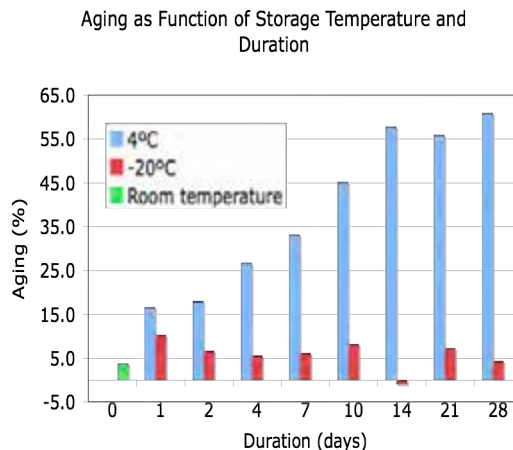
- The ChE active site nonapeptide was custom synthesized by a contract synthetic laboratory.

- Our laboratory at UW recently acquired an Agilent model 6410 triple quadrupole MS system that will be used for this assay. Optimization of the MS parameters for analysis of the ChE active site nonapeptide on this instrument has been completed
- An initial session whereby the CDC researchers would train the UW researchers in the implementation of this assay was scheduled took place in October 2007.

Aim 1b: Evaluate the potential of oxime reactivation followed by measurement of ChE activity for confirmation of depressed ChE activity.

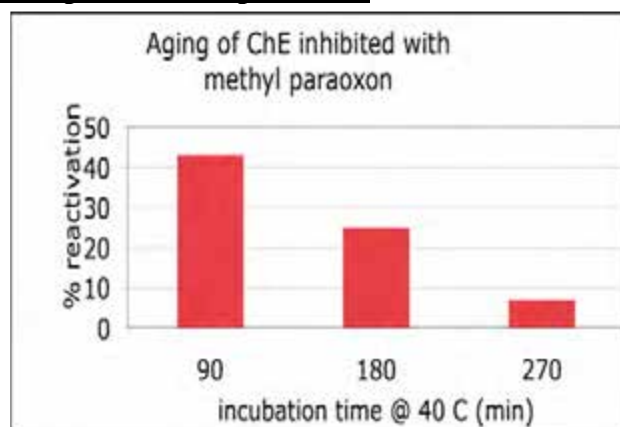
- Development of a 96-well plate implementation of the Ellman assay to permit high throughput determination of ChE activities
- Our initial studies have shown oxime reactivation is effective for non-aged OP-ChE adducts.
- The effect of different storage conditions on ChE activity in blood and plasma samples for both untreated ChE, and ChE that has been treated with chlorpyrifos oxon was evaluated.

An example of data from these studies is shown in the figure at right. We found that adduct levels and reactivatability remain stable for at least 30 days when plasma samples are stored at -20 C or -80 C (i.e. frozen), but not at 4 C (refrigerator). These studies will be critical to ensure that human blood samples obtained from the farmworkers for aims 2 and 3 are handled in a manner that does not compromise the measurement of ChE activity, ChE reactivatability, and OP-ChE adducts.



Aim 2: Evaluate the relationships between OP-adduct levels, reactivatability of ChE, and ChE activity *in vitro*, *in vivo* in rats, and in humans exposed to OP pesticides

- ChE activity and reactivatability have been evaluated *in vitro* for human blood samples. An example of data from these studies is shown in the figure at right. In the case of methyl paraoxon, aging of the ChE adduct proceeds rapidly at 40 C such that, after 270 min of incubation, only 7% of the ChE activity can be recovered using the oxime reactivation procedure.



Aim 3: Research to practice: Incorporate the assays developed in Aim 1 with the practice of OP pesticide exposure monitoring in Washington State.

This aim is slated to commence in year 5.

RESEARCH TO PRACTICE

None at this time. This project could improve on the current cholinesterase analysis, specifying the pesticides and reducing error.

PROJECT PRODUCTS

2. Publications

Other Publications

- Institutional animal care and use committee (IACUC) approval for *in vivo* studies with rats and OP pesticides
- SOP for *in vivo* studies with rats and OP pesticides
- SOP for ChE determination using 96-well plate assay

4. Education / Training / Outreach

Other:

- Three graduate students (Travis Cook, Michael Paulsen and Marion Roy) who have worked on these projects have developed knowledge and skills related to measuring, understanding and mitigating pesticide exposures in farmworkers.

PROJECT TITLE:

R4: Assessment of Job-related Exposures for Diarrheal Illness in Farmworker Families

PROJECT OFFICER(S)

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PROJECT DESCRIPTION

The primary objective of the proposed project is to assess job-related exposures for farmworkers and their families to three common zoonotic bacterial pathogens (*Salmonella* spp., *Campylobacter* spp., and *E.coli* O157:H7). The specific aims of the proposed project are:

1. Adaptation, development, and/or validation of methods for sampling of bacteria on surfaces (e.g. vehicle and household carpets, worker apparel, and other workplace, vehicle and household surfaces)
2. Assessment of fomite surfaces, bioaerosol, and water as workplace exposure pathways
3. Assessment of the paraoccupational (or take-home) exposure pathway for three zoonotic pathogens (*Salmonella* spp., *Campylobacter* spp., and *E.coli* O157:H7)
4. Assessment of residential proximity to job-related livestock operations as an exposure pathway.

PROJECT START AND END DATES: October 1, 2006, to September 30, 2008

STATES THE PROJECT WAS ACTIVE IN: Washington

COLLABORATIONS FOR FY 2007

Heritage University
3 regional dairies
2 regional growers

PROJECT ACTIVITIES / ACCOMPLISHMENTS

In project year one, significant progress was made on several aspects of this project. Human subjects approval was applied for and received. However following consultation with several regional dairymen and based on observations during preliminary sampling, exposure surveys are being reworked to better address perceived exposures. Approval of the amended surveys will be sought early in 2008. Recruitment of study subjects is progressing, though slower than expected. Recruitment will continue through the winter. Interview of subjects and sampling of their home and work environments will begin in early spring. Extensive laboratory experiments have been conducted to evaluate the sensitivity and precision of surface sampling methods. Experiments have focused on swab and contact plate techniques. Contact plates have generally outperformed

swabs in terms of recovery and enumeration of multiple bacteria types. Additional experiments were performed to evaluate the effect of pressure and contact time on the precision of recovery for contact plates from various surfaces. Recoveries were unacceptably low for soft, porous, and irregular surfaces. Preliminary experiments with a vacuum-assisted elution method have also been performed and suggest better recoveries are possible from these surfaces. Another concern is loss of viability of test organisms during the method evaluation process (e.g. drying on the surface), experiments comparing the recovery of organisms by culture as compared to PCR are currently underway to address this issue. Preliminary sampling has also been conducted at a large dairy to empirically determine appropriate sampling locations and times in order to optimize detection, prevent overloading, and assess worker exposure.

RESEARCH TO PRACTICE

None to date. It is anticipated that this study will be used to guide potential intervention studies and develop practice recommendations to minimize exposures of dairyworkers and their families to enteric bacteria of zoonotic origin.

PROJECT PRODUCTS

3. Training:

- John Scott Meschke “Exposures to communicable diseases in Ag inspections” in Course 318 Advanced Agriculture Training at the Moses Lake, WA Labor and Industries office, May 1, 2007.

5. Other Products:

- Community meeting, July 2, 2007, Granger, WA
- Community meeting, July 17, 2007, Granger, WA
- Community meeting, September 4, Granger, WA

PROJECT TITLE:

P1: Interventions to Minimize Worker and Family Pesticide Exposures

PROJECT OFFICER(s)

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PROJECT DESCRIPTION

The overall objective of this five-year project is to identify and test practical interventions that reduce pesticide exposures of agricultural workers and their families, and to disseminate these “best practices” into agricultural workplaces and workers’ homes in the Northwest and around the nation. We define interventions very broadly, including changes in product use and innovations in application equipment, as well as changes in specific work practices. We will work closely with producers, workers, and our regional land-grant institutions to develop cost-effective interventions that are acceptable to both employers and employees.

Specific aims are to:

1. **Convene an Expert Working Group to define intervention strategies appropriate to the Northwest tree fruit industry.** We will identify orchard managers and workers, industrial hygienists, and pesticide safety educators in Washington, Oregon, and Idaho to serve as members of the group; develop short-term and long-term strategies for minimizing pesticide exposures among producers, workers, and their families; propose and prioritize specific interventions for testing in ongoing field studies; and propose a model expert working group process for developing best practices in agricultural health and safety.
2. **Conduct worksite intervention studies of pesticide applicator exposure.** We will identify chemical protective clothing (CPC) failures and exposure-related worker behaviors with fluorescent tracer techniques; test the effectiveness of interventions proposed by the Expert Working Group to reduce handler exposures through fluorescent tracer evaluation, biological monitoring, and work practice observations; and test the effectiveness of interventions to reduce children’s exposures due to transmission of agricultural chemicals from the workplace to the home.
3. **Implement and evaluate a novel pesticide applicator safety training program.** We will incorporate findings of the Expert Working Group into a safety training program; conduct safety training with pesticide handlers at multiple worksites; evaluate the effectiveness of safety training through workplace observations.
4. **Translate Best Practices into a document for a national audience.** We will establish a national partnership group with key organizations involved in worker safety; conduct audience research to define document format and content; convene a national workshop on best practices;

field-test a best-practices document with target audiences; and partner with NIOSH to produce a best-practices document and associated web-based resources valuable to employers, workers, and educators.

PROJECT START AND END DATES: October 1, 2006, to September 30, 2011

STATES THE PROJECT WAS ACTIVE IN: Washington, Idaho

COLLABORATIONS FOR FY 2007

7 agricultural applicators, supervisors, producers and educators that form the Expert Working Group.

PROJECT ACTIVITIES / ACCOMPLISHMENTS

Aim 1. Convene an Expert Working Group to define intervention strategies appropriate to the Northwest tree fruit industry

Key Informant Interviews: We conducted 31 interviews with experts in the day-to-day aspects of tree fruit production and agricultural pesticide safety, including 15 from the tree fruit industry (managers, growers, agricultural safety managers, and field men), eight pesticide handlers, and eight professional staff from government agencies (pesticide safety educators and safety professionals).

These interviews are providing an in-depth look at interventions that work well and limitations of current measures used to protect pesticide handlers. Analysis of the data will be completed during the winter of 2008.

Expert Working Group. Ten key informants provide the basis for Expert Working Group. The first EWG meeting will be held November 28, 2007. During this meeting, the participants will be provided background on the issues of pesticide exposure in agriculture and intervention research in Washington state, as well as nationally and internationally. In addition the EWG members will establish criteria for practical interventions to minimize pesticide exposure.

Aims 2 and 3.

Activities for these aims were delayed because of the delay in the start of funding. Field studies will take place in 2008.

Aim 4. Translate Best Practices into a document for a national audience

Key Informant Interviews: Six subjects during the interview were also asked about their learning styles and the media that would be appropriate for distribution of best practices in pesticide safety at the conclusion of the project.

Literature Review: We are completing an extensive review of the effectiveness of interventions that have been reported in peer-reviewed literature. The review focuses on airblast pesticide

applications and includes minimizing exposures to both applicators and family members. We are also reviewing lay literature for similar articles.

National Partners: National partners for the translation of best practices are currently being identified. Current we have identified partners at NIOSH, EPA Office of Pesticide Programs, and individual investigators at academic institutions.

RESEARCH TO PRACTICE

None to date. We fully anticipate that this project will develop practical interventions to reduce pesticide handler exposure and will contribute to reducing their children's exposures.

PROJECT PRODUCTS

2. Publications

Fact Sheets / Brochures / Technical Publications:

- "Interventions to Minimize Worker & Family Pesticide Exposures" - Project fact sheet for lay audience in both Spanish and English.

Other Publications:

- Human subjects training and certification.

5. Education / Training / Outreach

- Expert Working Group: Interviews – 31 Interviews conducted to assess needs of the agricultural community and create contacts with prospective members of the expert working group.

PROJECT TITLE

E1: Introducing a Cholinesterase Test Kit into Clinical Practice

PROJECT OFFICER(S)

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PROJECT DESCRIPTION

The overall goals of this translation project are to introduce a simple, portable, clinic-based cholinesterase (ChE) testing methodology to medical providers who offer cholinesterase monitoring services to agricultural employers in Washington state, and to introduce a newly developing testing verification methodology to providers using the onsite testing.

Specific aims of this project are:

1. To work with a single clinic in Washington state to design a “use model” for onsite ChE testing using the Test-mate™ ChE test system
2. To identify clinic-specific issues that interfere with use of the Test-mate™ system and adapt the “use model” to resolve these issues
3. To expand participation to three to five clinics with smaller ChE monitoring programs and adapt the use model for dissemination to other clinical providers
4. To determine the potential for the Test-mate™ to augment or replace laboratory-based cholinesterase testing based on the performance of the Test-mate™ in the clinic settings and the cost of incorporating the Test-mate™ into the monitoring system; and
5. To introduce to clinics two new methods for ChE inhibition verification.

PROJECT START AND END DATES: October 1, 2006, to September 30, 2011

STATES THE PROJECT WAS ACTIVE IN: Washington

COLLABORATIONS FOR FY 2007

Central Washington Occupational Medicine (CWOM) is collaborating with PNASH in this project. They have participated in preliminary conversations about how the Test-mate™ kit may be beneficial in their clinic. As the project progresses, we expect that their role will increase as we train their employees in the use of the Test-mate™ and they provide feedback on feasibility, trouble shooting and potential uses.

PROJECT ACTIVITIES / ACCOMPLISHMENTS

Due to a delay in the release of funds (approximately six months) and the loss of a key staff member (Angela Carden, who has worked on testing the accuracy of the Test-mate™), this

project is behind schedule. However, we still hope to be able to complete the project on schedule.

Over the past year, our efforts have concentrated on conducting lab experiments to test the validity of the Test-mate™ test kit in varying conditions and developing a conversational interview guide for clinic workers that will help researchers to understand the clinic's business model and where the kit might be useful.

To date, we have worked on lab experiments to test the validity of the Test-mate™ test kit as temperature and time change. This work has evaluated what effect blood sample storage conditions have on the reliability and accuracy of ChE activity measurements with the Test-mate™ test kit. To investigate the effect of storage environments we analyzed ChE activity of blood stored in four different environments likely to be encountered in the field of clinical setting: a freezer (-20°C), a refrigerator, an insulated cooler, and at room temperature. We tracked ChE activity in samples hourly for 12 hours for samples stored at room-temperature and in the ice-cooler, and daily for two weeks for samples stored in the freezer and refrigerator. In each storage environment, blood was stored both in 0.5ml microtubes and pre-mixed in the buffer tubes used for analysis with the Test-mate™ (10µl blood per microtube).

Since data collection is not complete, we have not yet rigorously analyzed the data. However, preliminary analysis suggest that blood is stable both at room-temperature and in a cooler for up to 12 hours when stored in either microtubes or pre-mixed in buffer solution. One problem we identified likely to be encountered is temperature error readings by the test kit from samples that are removed from a cold temperature environment, which might produce activity values lower than the actual activity. To further investigate this, we documented how long samples taken out of cold storage environments take to equilibrate to room temperature. We found that samples taken from either a refrigerator or a freezer should be allowed to warm at room temperature for at least 60min and 90min, respectively, before activity measurements are taken.

We will continue this work to see how the Test-mate™ test kit can accurately be used in clinical practice. The results will tell us if we can use the kit only in the clinic or if it may be used in the field and transported back to lab for testing. In addition, it will tell us if we can store blood samples over time and only test the samples of those who return for follow-up blood draws.

In the coming months, we will start to interview workers in the clinic to understand the clinic's business model. We are in the process of finalizing an interview guide to use with clinic staff to develop a thorough understanding of clientele, testing procedures currently being used, and the business aspects of ChE monitoring program (the economic feasibility of Test-mate™).

RESEARCH TO PRACTICE

It is too early to see any specific improvements/impacts that have resulted from this project. This research project is expected to increase the rate at which depressed levels of ChE can be identified. By expediting the removal of participants with depressed ChE activity, we will be

able to prevent those participants from continued exposure that might result in the development of pesticide-related illnesses. In addition, a ChE monitoring system based on the Test-mate™ methodology would likely be substantially cheaper than the existing program.

PROJECT PRODUCTS

2. Publications

Fact Sheets / Brochures / Technical Publications:

- Cholinesterase test kit fact sheet.

Other Publications:

- Human subjects training and certification.
- Lab evaluation of what effect blood sample storage conditions have on the reliability and accuracy of ChE activity measurements with the Test-mate test kit. (unpublished)

6. Education / Training / Outreach

Hazard Surveys / Consultations:

- Consultation with Central Washington Occupational Clinic on how to integrate the ChE kit within the clinic structure and problem solving around quality assurance and laboratory oversight.
- Clinic interview questionnaire.

PROJECT TITLE:

E2: Reality Tales Storytelling to Translate Agricultural Health and Safety Research

PROJECT OFFICER(S)

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PROJECT DESCRIPTION

The goal of this project is to use the ancient oral tradition of storytelling to translate health and safety research and education for agriculture producers and workers on two critical issues: ladder injuries and heat stress.

This is not a new educational model. Medical educators use it quite effectively in the form of “clinical cases” to teach decision making, case management, the meaning of illness, values, empathy, and cultural competency. The model also has been widely used to inform qualitative researchers about human behavior in the social sciences. Finally, there are a few recent good examples in agricultural safety and health. In a tractor safety campaign, farmers preferred stories over pure information or statistics.

Previous work at PNASH and in Washington state has demonstrated that this method is a highly effective educational method to reach the Hispanic farmworker community. Word-of-mouth is the most common source of information for this population who make up most of the agricultural workforce in Washington state. Studies using stories in the form of live drama were highly successful in knowledge retention. Radio novellas (soap operas) effectively reached this target audience with messages that were remembered. Finally, other studies report that farmers prefer the narrative form to communicate agricultural hazards such as tractor overturns.

The specific aims of this project are to:

1. Define the key take-home educational messages to be communicated (behavioral, technical and social) through the storytelling methodology by a review of current research findings and prevailing educational materials aimed at preventing ladder injuries and heat stress
2. Determine the most effective means to reach agricultural producers and workers by identifying their preferred communication channels
3. Gather agriculture workers who have directly or indirectly experienced heat related illnesses, ladder injuries or near-miss ladder accidents to form “story groups”
4. Engage these worker story groups to recount, discuss, document, and evaluate their stories for model educational narratives
5. Develop pilot storytelling narratives and field-test them in three cycles with members of the

target audiences

6. Place the storytelling narratives in three communication channels; 1) face-to-face Community Health Worker (CHW)-led educational sessions in farmworker camps, 2) local radio call-in talk shows, and 3) a popular growers' magazine
7. Evaluate the use of the storytelling narratives in all three communication channels
8. Document the project through a user's manual, presentations and publications; produce and disseminate storytelling narratives.

PROJECT START AND END DATES: October 1, 2006, to September 30, 2011

STATES THE PROJECT WAS ACTIVE IN: Washington

COLLABORATIONS FOR FY 2007

Radio KDNA

Washington State University Cooperative Extension

Washington State Labor and Industries

One regional grower who is also a PNASH External Advisory Committee member

Columbia Valley Community Clinic

PROJECT ACTIVITIES / ACCOMPLISHMENTS

1. The key take-home educational messages to be communicated (behavioral, technical and social) through the storytelling methodology have been defined by a review of current research findings and prevailing educational materials aimed at preventing ladder injuries and heat stress.

Ladder Injuries

- The findings from PNASH research on ladder injuries have been identified and summarized as well as individualized stories from previously injured workers who made Labor and Industries worker compensation claims.
- The key messages were summarized in a slide presentation and presented to Washington State Labor and Industries inspectors.
- An review of 31 existing training materials was conducted documented with an annotated bibliography.

Heat Related Illnesses

- The key messages for heat stress were identified through an extensive literature review which included peer-reviewed journal articles, agency guidelines and educational materials. The key messages have been summarized in a PowerPoint training presentation, in icon based handouts as well as categorically in a worker "Heat Jeopardy" game. (available on request)
- Two fact-based articles on heat related illnesses were written for the farming community featured in the *Good Fruit Grower* and the *Western Farmer Stockman*
- A website for heat related illnesses has been developed to house these materials, http://depts.washington.edu/pnash/heat_illness.php
- The project has provided input as a stakeholder to Washington State Labor and Industries rule making process for WAC 296-62-095, heat-related illness in the outdoor environment.

- The PI with the team reviewed ten educational videos on the proper use of ladders. Only one applied to the tripod agriculture ladder.
 - 12 orchards were surveyed to find out what materials they were using to train workers on ladder safety.
 - The PI spent a day in an orchard picking pears with a 10-foot ladder to get hands-on experience being trained and manipulating a ladder. During the same field visit, she observed other workers.
2. Determined the most effective means to reach agricultural producers and workers by identifying their preferred communication channels.
- The most effective means to reach agricultural producers and workers who are pesticide applicators (who also may be at risk for heat illnesses and possibly ladder injuries) have been identified. A final report has been produced (see attachment).
 - Information on farmworkers information sources was summarized and presented at a National Institute for Farm Safety in Penticton, Canada and later as an Elluminate Webinar teleconference.
 - Data from two other surveys (Connex I and III community study) were analyzed and summarized.
 - The PI met and exchanged presentations with James Glasnapp, PhD from JBS International on worker's training preferences. As part of his presentation on "What do Farmworkers Know and Want to Know About Pesticides," he identified key issues with icon recognition, when workers want training *vis-à-vis* starting work, training frequency, and from whom (neutral parties).
3. Recruit and train staff
- We recruited and trained an outreach worker for the study and trained an existing staff member to assist with the project.
 - Training consisted of content review for heat related illness and ladder injuries; a walk through on how to facilitate a storytelling session, and a mock storytelling group session using staff posing as farmworkers with stories.
 - Subsequent to training, we planned to conduct a trial run pilot storytelling session. Both trainees were asked to recruit from 3-5 workers for an informal session as described in the project proposal. Both were unable to find any willing workers, possibly as it was during the summer high season for orchard harvesting.
4. Develop detailed project plan with staff and collaborators
- First step was to conduct interviews with key informants knowledgeable about the audiences in Eastern Washington. These included a grower, a clinic outreach director who works in migrant camps, a Hispanic training specialist from the Washington State Labor and Industries (LNI), a Spanish language radio station (Radio KDNA) and a bilingual public health consultant living in the Yakima area. After reviewing the study design with each, the PI asked for their comments. Their advice proved to be invaluable and many of the suggestions have been adopted. They include:

- The best means to recruit good stories from workers would be through a story contest promoted through a trusted neutral party like a Spanish-language radio station.
- Incentives are critical for Hispanic farmworkers - \$50 Visa card that they can use anywhere would be the best.
- One-to-one interviews to screen for good stories on the first round may be effective than initial group sessions.
- Project Plan Developed: Subsequently we decided to spend the next year (Year 2) focusing on our methodology (as advised by our External Advisory Committee) with our Hispanic population. We have formed a partnership with Radio KDNA and hired as a consultant their producer, Jesus Sosa, who is recruiting storytellers through a story contest. It is being promoted through 1) radio spots aired twice daily for 20 days, 2) a press release to local Spanish language newspapers, 3) fliers at local Hispanic events, and 4) e-invitations sent to organizations and key members of the community who may know some potential participants.

Contestants will call our study team to register and then, at their convenience, will be screened with a phone interview by our study team. After the contest cut off date (one month) the project team will review all the stories and select 10 finalists. Sosa will conduct taped interviews that will be transcribed, and reviewed by a selection committee consisting of the study team, our PNASH bilingual occupational medicine physician, a bilingual community health outreach nurse, a Hispanic LNI training specialist, and a state leader in Hispanic affairs.

Three storytellers will be selected to come into the studio for a live radio call-in show that will be hosted by Sosa. A bilingual technical expert on ladders from LNI will provide the technical commentary during the show. The live show will be reviewed and selections of the recording will be extracted from the one-hour program for the final production of the Storytelling Training Tool recording. This program will include the stories and the talking points for the final production of the tape (for use on other stations and in worker camps, facilitated by Community Health Workers). The PI will provide the health and safety research translational points to be embedded in the tool as well as any technical commentary not previously touched upon for each story in terms on how the accident could have been prevented and some of the lessons learned.

RESEARCH TO PRACTICE

1. The results of all our orchard injury research have been disseminated to a broader audience through our Nurse Murf article in the *Western Farmer Stockman* (August 2007 edition) and training of LNI inspectors
2. An update on the state of the science on heat-related illnesses (risk factors, diagnosis and treatment, especially studies on the most effective means to lower body temperature to prevent deaths from heat stroke) was summarized and integrated into all our training materials and articles which have gone out to a broad audience to include training of nurses, community health workers, and agricultural managers.

PROJECT PRODUCTS

1. Presentations:

- Heat Related Illness Training of Community Health Workers/Promotoras, Brotje Orchards, May 12
- Orchard Injuries: Summary of the Research Conducted by PNASH, Advanced Agriculture Training- 318. Washington State Labor and Industries April 31, 2007
- The Impact of Migrant Hired Help: Understanding Your Hispanic Audience for Health and Safety Communications, 2007 National Institute for Farm Safety “Applying What We Know”, Penticton, Canada. June 27, 2007 and Webinar October 9, 2007
- The Impact of Migrant Hired Help: Understanding Your Hispanic Audience for Health and Safety Communications, WEBINAR for UI, October 9, 2007.

2. Publications

Other Publications:

- Human subjects training and certification.

Trade Journals:

- “Beat heat before illnesses hit.” Western Farmer Stockman, June, 2007
- “Ladders raise orchard injuries.” Western Farmer Stockman, August, 2007.
- “Hot Tips on heat stress: They can save a life.” Good Fruit Grower July, 2007.

Fact Sheets / Brochures / Technical Publications:

- [Heat Illness Quick Reference Table \(html or pdf\)](#)
- [Personal Risk Factors for Heat Illness \(pdf\)](#)
- [Article in Western Farmer-Stockman, June 2007](#)
- [Training tool: Heat Stress Jeopardy \(PowerPoint\)](#)
- [Training tool: Heat Stress Jeopardy in Spanish \(PowerPoint\)](#)
- [Training tool: Heat Stress Slide Presentation \(PowerPoint\)](#)
- [Training tool: Heat Stress Slide Presentation in Spanish \(PowerPoint\)](#)

3. Education / Training / Outreach

Training Seminars:

- Community Health Workers/Promotoras. "Heat Related Illness Training" Brotje Orchards, May 12
- Agriculture Workplace Inspectors. Orchard Injuries: Summary of the Research Conducted by PNASH, ADVANCED AGRICULTURE TRAINING - 318. Washington State Labor and Industries April 31, 2007
- Graduate Students University of Iowa. The Impact of Migrant Hired Help: Understanding Your Hispanic Audience for Health and Safety Communication

IV. PILOT PROJECTS

CONTENTS

Pilot 1: Skills Retention in Commercial Fishing Safety Training.....
Pilot 2: Characterization of Bioaerosols in Washington Dairy Barns.....

PROGRAM DESCRIPTION

PNASH's Pilot Project Program goal is to stimulate and support new and expanded research, prevention/intervention, and education/translation activities in the area of occupational safety and health in Northwest farming, forestry, and fishing.

Pilot project proposals may include but are not limited to projects that:

1. Provide support for innovative lines of investigation that may lead to a larger project
2. Allow exploration of new directions in research, education, or intervention
3. Stimulate investigators from other fields of study to apply their expertise to agriculture safety and health issues.

We encourage applications from Northwest academic institutions, government agencies, health care organizations, and other groups. The general process includes: 1) release of a request for proposals to Northwest investigators; 2) submission of letters of intent and then after consultation/invitation, a full proposal; 3) internal and external review and scoring of proposals; 4) notification of award or request for revision and resubmission; and 5) a record of program process and project results.

Projects are evaluated for scientific merit, relevance to the goals of the PNASH Center, and the potential for the project to develop into a major research, education, or intervention project.

PROJECT TITLE:

Pilot 1: Skills Retention in Commercial Fishing Safety Training

PROJECT OFFICER(s)

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PROJECT DESCRIPTION

Since 1994, commercial fishermen have been required to take a U.S. Coast Guard approved Emergency Drill Conductor course before they are recognized as being competent to lead the required monthly emergency drills on a vessel. It is not known, however, the degree to which the survival skills they have been taught and that they are teaching their crew decay over time. It is well documented in cardio-pulmonary resuscitation (CPR) and other training that skills decay over time without refresher training. While we feel safe to hypothesize that marine safety skills would also decay over time, in what timeline this would occur in this occupational group has never been studied. Also, since there are requirements for periodic self-training during monthly emergency drills, and these drills are often not being conducted as required, it has been difficult to ascertain what effect this lack of refresher training may have on skill levels.

Three questions will be asked. First, what should the frequency be for emergency drills to be conducted on fishing vessels based on skills decay? Second, what are the obstacles to drills not being done? Thirdly, is there a need for refresher training for Drill Conductors due to skills decay and if so what is a reasonable interval for refresher training?

There were two test subject groups of thirty each. The first group was fishermen who were trained Drill Conductors. They were tested on the decay of their skills and interviewed to learn about impediments to monthly emergency drills. The second group was untrained fishermen. The second group was trained in four of the Drill Conductor skills then post-tested one month and three months later to measure skills decay. Thus, this study would provide both quantitative and qualitative data that are both timely and meaningful, especially in light of a proposed rule making which is to determine whether or not Drill Conductors should be required to have refresher training

PROJECT START AND END DATES: December 15, 2006, to September 30, 2007

STATES THE PROJECT WAS ACTIVE IN: Alaska

COLLABORATIONS FOR FY 2007

Alaska Longline Fishermen's Association (ALFA) Sitka, AK
Alaska Marine Safety Education Association
University of Washington, PNASH

PROJECT ACTIVITIES / ACCOMPLISHMENTS

This project was successfully concluded and all objectives met. The results of the study will be valuable in providing input for policy changes being considered in safety training for the fishing industry. It will also be useful for AMSEA and safety trainers in terms of understanding some of the elements of training effectiveness and retention. Despite the fact that this study took place during the busy fishing season when fishermen were hard to reach, the minimum of 30 test subjects from both the previously trained and untrained fishermen was exceeded. Following are the results of the research questions that were asked in the study:

Question 1: What is the rate of skills decay from initial training (100%), after one month and three months later in the group without previous training?

There was a significant difference between the 100% baseline scores in those not previously Drill Conductor trained one month from baseline training (85.9% +/- 11.6 std dev) and three months from baseline (86.6 +/- 10.1 std dev). These both had p-values of <0.001. This demonstrates that there is a significant loss of skills in just one month. This skills loss however remains essentially unchanged out to three months.

In addition, there was a significant difference in previously trained fishermen who overall had a mean score of 70.5 compared to a baseline of 100. This demonstrates that fishermen had an even greater loss of skills several years out from initial training. This fact, along with question 4 which asked the frequency with which monthly drills are conducted (6.3% in the previously trained group and 6.5 % in the trained group), would imply that the lack of regular drills contributes to the decay of skills.

Question 2: What are the obstacles to drills being conducted?

The biggest problem reported as the biggest obstacle was "Master/captain doesn't enforce it" (37.5% of not previously trained fishermen and 25.8% of previously trained). "Crew too busy" was reported as a major problem by 37.5% of untrained but only 6.5% of trained fishermen, which perhaps demonstrates that trained fishermen realize more than untrained crew that emergency drills do not actually take up that much of the crew's time.

Question 3: Does the age of the subject have an effect on retention?

At one month ($r=0.348$) and three months ($r=0.217$) there is a slight negative correlation between age of subject and retention. As age increases, retention decreases.

Question 4: What is the average frequency that the subjects reported conducting emergency drills?

Fishermen who had been previously trained as Drill Conductors had a higher probability of participating in emergency drills at least once in the season than those who had not been previously trained (71.1% versus 40.7%). Of the untrained group, 46.9% reported they had never participated in an emergency drill and in the previously trained group, only 3.2% (one person) reported never participating in a drill. However only two people from each group reported conducting the drills monthly as required.

Thus it appears as if fishermen who had taken Drill Conductor training were more likely to conduct drills at some point in the season, and with more frequency than untrained fishermen, but it made no difference in the frequency of conducting the drills monthly as required.

Question 5: What percentage of the subjects responded that refresher training for Drill Conductors would be useful?

100% of the previously trained and 90% of the untrained groups felt that refresher training would be useful for Drill Conductors.

Question 6: What did the subjects report as the average reasonable time for refresher training for drill conductors?

90.5% of all fishermen interviewed recommended that refresher training take place from 1 to 5 years from date of initial training with 17.5% stating every year, 38.1% every three years and 22.2% every five years.

Question 7: What are the most common sources for fishermen to get marine safety education? (Subjects were allowed more than one choice so numbers add up to more than 100%)

Talking to other fishermen 82.5%, practicing drills 52.4%, trade journals 46%, safety videos 42.9%, safety workshops 30.2%, part of another job outside of fishing 22.2%, other 14.3%, Internet 6.3%.

Question 8: In the previously trained group, was there a correlation between how often they reported conducting drills, and how well they performed on the skills test?

There is a virtually no correlation ($r = -.060$) between self-report of drill frequency and skills retention. The Pearson correlation p -value = 0.750 ($n=31$).

Question 9: Were there any groupings of similar comments (question 10) about “how could emergency drills training be improved to make fishing safer?”

Half of the subjects suggested the training be more accessible/flexible and promoting awareness.

Question 10: What was the increase from their pre-training scores to the 100% score they achieved with training in the not-previously-trained group?

Yes, the mean score of 64.3 ± 9.4 (std dev) is significantly different than 100%, t-test p-value < 0.001.

Question 11: Was there a difference between skippers and crew in skills retention?

No, the differences in skills checked at one month and three months are not significantly different.

Question 12: Was there a correlation between the number of years in school and skills retention in the not-previously-trained group?

At one month and three months, there is a virtually no correlation between years in school and skills retention.

RESEARCH TO PRACTICE

The research results of this project will provide important data to the public rulemaking scheduled for early 2008, which will determine if, and with what frequency, safety refresher training should take place for commercial fishermen. Since this is the only research that has been conducted on skills retention in this occupational group, this project has the ability to affect public policy. This is a high-risk occupation that generally has the highest fatality rates of any major U.S. industry.

In addition, this data will be used in promotional materials to convince fishermen to retain currency in essential survival skills in case of an emergency at sea.

PROJECT PRODUCTS

NOTE: As the results of this study are being finalized as this report is being written, the results of this study will be distributed in the next, 2008, fiscal year and beyond, via publications, presentations, education outreach efforts, conferences and meetings.

Other Publications

- Human subjects certification.

PROJECT TITLE

Pilot 2: Characterization of Bioaerosols in Washington Dairy Barns

PROJECT OFFICER(S)

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PROJECT DESCRIPTION

The overall objective of this research project is to characterize and quantify bioaerosol production in a freestall dairy barn at a concentrated animal feeding operation (CAFO).

To achieve this objective the following specific aims will be addressed:

1. Characterize and quantify fungi, bacteria, actinomycetes, and endotoxins in bioaerosols from a typical dairy open freestall barns, and
2. Evaluate the levels and types of bioaerosol contaminants in relation to concurrently collected environmental data (under a concurrent EPA funded study) and activities occurring in the barn.

PROJECT START AND END DATES: December 15, 2007, to September 30, 2008

STATES THE PROJECT WAS ACTIVE IN: Washington

COLLABORATIONS FOR FY 2007

Washington State University
A regional dairy

PROJECT ACTIVITIES / ACCOMPLISHMENTS

This study leverages from an EPA study to assess air quality in concentrated animal feeding operations. Access to the study site was delayed, due to coordination with collaborators and setup delays for the EPA study. As a result, sampling did not begin until early September. Initial results show high levels of aerobic bacteria at all stages of an Andersen six-stage impactor. Surprisingly few *Enterobacteriaceae* were identified from initial aerosol or surface samples. Water samples contained considerable bacteria of the family *Enterobacteriaceae*. Additional analysis is pending and sampling is continuing.

RESEARCH TO PRACTICE

None to date. It is anticipated that this study will be used to guide potential intervention studies and develop practice recommendations to minimize dairy worker exposure to bioaerosols.

PROJECT PRODUCTS

Other Publications

- Human subjects certification.

Training:

- John Scott Meschke “Exposures to communicable diseases in Ag inspections” in Course 318 Advanced Agriculture Training at the Moses Lake, WA, Labor and Industries office, May 1, 2007.

V. NIOSH R01 PROJECTS

PROJECT TITLE

R01: Community Health Intervention with Yakima Agricultural Workers

PROJECT OFFICER

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PROJECT DESCRIPTION

The primary purpose of this project is to develop strategies that will enable the Hispanic community in the Yakima Valley, WA, to effectively respond to the many occupational and environmental risks related to agricultural work. This will be achieved through a collaborative process that will yield active discussion and dialogue, appropriate training programs, and a research program that focuses on occupational and environmental risks. The target population includes seasonal and migrant farmworkers and other agricultural workers in the Yakima Valley.

The specific aims of this research project are to:

1. Develop structures and processes to facilitate the Hispanic community's involvement in the identification and prioritization of occupational and environmental stressors among farmworkers in Yakima Valley
2. Create opportunities and mechanisms for this community to understand and actively participate in decision-making related to their occupational and environmental health
3. Develop an issues-driven action plan that focuses on the needs articulated by Hispanic agricultural workers
4. Cultivate a cadre of new investigators with preliminary training related to the investigation and remediation of occupational and environmental health threats
5. Develop a sustainable partnership among the following entities: the Hispanic community in Yakima Valley, community organizations: Northwest Communities Education Center (NCEC)/Radio KDNA; Heritage University; health care providers from the Yakima Valley Farm Workers Clinic (YVFWC); and scientists from the University of Washington.

PROJECT START AND END DATES: September 1, 2003, to August 31, 2008

STATES THE PROJECT WAS ACTIVE IN: Washington

COLLABORATIONS FOR FY 2007

1. Northwest Communities Education Center/Radio KDNA – equal partner in the Core of *El*

- Proyecto Bienestar* and lead community agency for seeking additional funds into the future.
2. Yakima Valley Farm Workers Clinic – equal partner in the Core of *El Proyecto Bienestar* and highly involved in data collection by ConneX students over summer 2007
 3. Heritage University – equal partner in *El Proyecto Bienestar* Core group and provided facilities for summer classes for ConneX college classes (UW portion).

PROJECT ACTIVITIES / ACCOMPLISHMENTS

Project activities and accomplishments are described below according to the specific aims of the project.

1. Develop structures and processes to facilitate the Hispanic community's involvement in the identification and prioritization of occupational and environmental stressors among farmworkers in Yakima Valley

Analysis was completed of community surveys (carried out by students from the community) and presented to the Community Advisory Board (CAB). The goal of this survey was to find out how people in the Yakima Valley, especially agricultural workers, would like to receive information (findings from the study), from whom, and how they would like to provide feedback/input. The distribution of participants by gender was approximately even, with 72% of the participants being of Hispanic ethnicities. The average age of participants was 36 years old. Some interesting findings included:

- Farmworker participants cited supervisors as the most common source for reliable information about workplace safety and health, and the sources they are mostly likely to turn to when facing unsafe working conditions. This indicates that supervisors may play an important role in disseminating workplace information and may be effective players in health interventions.
- Participants most commonly requested more information on workers' rights issues, followed by pesticides and chemicals, how to deal with workplace abuses, and work-related injuries. They stated that they would like to receive this information mainly through brochures, radio programs, information sessions/trainings/public meetings and television programs.

This will help inform *El Proyecto* when designing interventions and communicating with the public. In addition, we developed a color brochure, in both Spanish and English, to use for community outreach and education, highlighting the accomplishments and purpose of *El Proyecto Bienestar*.

- ### **2. Create opportunities and mechanisms for this community to understand and actively participate in decision-making related to its occupational and environmental health;**
- The CAB and Core continue to use a consensus-based decision making process as we advance in our work. In addition, facilitation is shared at each meeting by one CAB and one Core member so that all members participate. CAB members have recruited several new members throughout the year to strengthen the community's representation and participation.
- ### **3. Develop an issues-driven action plan that focuses on the needs articulated by Hispanic agricultural workers;**

We are in the initial stages of developing an action plan to address the four top prioritized environmental and occupational health concerns by the community: pesticides and chemicals, workplace injuries, workplace illnesses, and abusive workplaces.

4. Cultivate a cadre of new investigators with preliminary training related to the investigation and remediation of occupational and environmental health threats

A total of 10 ConneX students participated in a four-credit course, focusing on environmental and occupational health, which included an intensive field-research component. Students carried out a community survey with 221 individuals. The students analyzed the data and presented their findings to their peers and families, as well as to the Core and CAB. Two of these students were awarded the Charles Drew Scholarship and presented their work at the Charles Drew Minority Pre-Health Society Scholarship Conference in Washington, DC. In addition, ConneX students attended the UW Health Sciences open house at the Seattle campus to learn about possible future educational opportunities.

In addition, two master's candidates graduated in June 2007 with the thesis focusing on aspects of *El Proyecto Bienestar*: an evaluation of the ConneX program on the students and the seasonal fluctuations of asthma hospitalizations in the Yakima Valley (an environmental health concern identified by the community during *El Proyecto Bienestar* data gathering). T

5. Develop a sustainable partnership among the following entities: the Hispanic community in Yakima Valley, community organizations: Northwest Communities Education Center (NCEC)/Radio KDNA and Heritage University; health care providers from the Yakima Valley Farm Workers Clinic (YVFWC); and scientists from the University of Washington.

The strong partnerships from this project have led to a fourth year of work in *El Proyecto Bienestar*, as well as other collaborations including: the development of a pesticide curriculum; the development of a University of Washington accredited course for students in the ConneX program; the coordination of a college-visit day for interested minority students to the University of Washington School of Public Health and Community Medicine and the inclusion of a Core member (non-UW) on the project committee of a UW graduate student. In addition, this collaboration submitted a grant to the EPA for an additional year of funding to further identify environmental health hazards in the Yakima Valley. This application was successful and the group will continue to work together on these and new issues with the community's guidance.

RESEARCH TO PRACTICE

There are several specific impacts/improvements that can be seen over the past year from this project including: training of ConneX students, training of graduate students at the University of Washington, and the award of the EPA funding. Ten ConneX students participated in a summer academic program. They received four college credits from the University of Washington, learned how to conduct a scientific survey using personal digital assistants (PDAs) to collect data

(including informed consent and recruitment procedures), using Excel to analyze data, and learning about a new field in the health sciences (environmental and occupational health). Two graduate students in UW's environmental and occupational health program completed their degrees with their research thesis based this project. They learned about community-based participatory research processes, gained valuable experience working with community members and organizations, and further learned about environmental justice, which they are now using in their current jobs. The award of funding for one year of work from the EPA has enabled us to continue work in the coming year and move forward in developing and implementing an action plan. This continues to strengthen our collaboration. Furthermore, with NCEC being the grantee, it moves the project further into the hands of the community.

PROJECT PRODUCTS

1. Presentations:

- "Power and Participation in *El Proyecto Bienestar*." Oral presentation. November 6, 2006: APHA Conference; Washington, DC.
- "Struggles and Successes in *El Proyecto Bienestar*, a community based participatory research project for environmental and occupational health." Oral presentation. November 6, 2006: APHA Conference; Washington, DC.
- "*El Proyecto Bienestar*: A Community-based Participatory Research Project Exploring Environmental Justice for Farm Workers in the Yakima Valley." Oral presentation. February 2, 2007: Northwest Communities Education Center Board Meeting; Yakima, WA.
- "Power and Participation in CBPR: A Process Evaluation of *El Proyecto Bienestar*." Oral presentation. April 18, 2007: CAB/Core meeting; Yakima, WA.
- "Research Study of Agriculture Issues in the Yakima Valley: *Proyecto Bienestar/ConneX*." Oral presentation. April 19, 2007: Pesticide Incident Reporting and Tracking (PIRT) Review Panel meeting; Yakima, WA.
- "An Impact Evaluation of a Farm Worker Environmental and Occupational Health Community-Based Participatory Research Course in the Yakima Valley, Washington." Oral presentation. May 31, 2007: Thesis defense (UW); Seattle, WA.
- "Seasonal Fluctuations of Asthma Hospitalizations in the Yakima Valley Community of Washington." Oral presentation. June 1, 2007: Thesis defense (UW); Seattle, WA.
- "ConneX 2007 Survey Data Results." Oral presentation. August 1, 2007: ConneX class (open to public); Toppenish, WA.
- "*El Proyecto Bienestar*: "The Well-Being Project." Poster presentation. August 15, 2007: Charles Drew Minority Pre-Health Society Scholarship Conference; Washington, DC.
- "*El Proyecto Bienestar*: "The Well-Being Project." Oral presentation. August 15, 2007: Charles Drew Minority Pre-Health Society Scholarship Conference; Washington, DC.
- "ConneX 2007 Survey Data Results." Oral presentation. August 29, 2007: CAB/Core meeting; Yakima, WA.
- "Students' Perceptions of the College ConneX Community-Based Participatory Research Course." Oral presentation. August 29, 2007: CAB/Core Meeting; Yakima, WA.

2. Publications

Peer Reviewed Journals:

- V Ybarra and Postma, J. *El Proyecto Bienestar: An Authentic CBPR Partnership in the Yakima Valley*. In Seifer SD and Sgambelluri AR (editors). *Partnership Perspectives*. 2007; IV:I. Seattle, WA: Community-Campus Partnerships for Health.

Other Publications

- Human subjects certification.

5. Education / Training / Outreach

Other:

- Outreach/Informational Brochure about El Proyecto Bienestar. English and Spanish versions. August 2007.

7. Conferences / Meetings Sponsored:

CAB/Core meetings:

- October 4, 2006: Yakima, WA
- November 30, 2006: Toppenish, WA
- January 17, 2007: Yakima, WA
- February 21, 2007: Yakima, WA
- March 21, 2007: Yakima, WA
- April 18, 2007: Yakima, WA
- May 30, 2007: Yakima, WA
- July 11, 2007: Yakima, WA
- August 29, 2007: Yakima, WA

Core (only) meetings:

- November 15, 2006: teleconference
- December 29, 2006: teleconference
- March 9, 2007: teleconference
- March 16, 2007: Toppenish, WA
- July 11, 2007: Yakima, WA
- August 29, 2007: Yakima, WA

APPENDIX

Publication for R01 Project: Community Health Intervention with Yakima Agricultural Workers.

V Ybarra and Postma, J. *El Proyecto Bienestar: An Authentic CBPR Partnership in the Yakima Valley*. In Seifer SD and Sgambelluri AR (editors). *Partnership Perspectives*. 2007; IV:I. Seattle, WA: Community-Campus Partnerships for Health.

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The opinions expressed by the authors in this magazine are their own and not necessarily opinions held by Community-Campus Partnerships for Health.

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El Proyecto Bienestar: An Authentic CBPR Partnership in the Yakima Valley

Vickie Ybarra and Julie Postma

The Partnership

In 2002, the National Institute of Environmental Health Sciences (NIEHS) and the National Institute of Occupational Safety and Health (NIOSH) released a request for applications entitled, “Environmental Justice: Partnerships in Communication.” The purpose of their request was to support research “...aimed at achieving environmental justice for socioeconomically disadvantaged and medically underserved populations” through community-based research strategies (p.3). In response to this request for applications, a community member notified a University of Washington researcher that we had an opportunity to work together to write a community-based research proposal focused on the health of Yakima Valley agricultural workers and their families. It was funded, and El Proyecto Bienestar, or The Well-Being Project, was born.

The Yakima Valley is located in central Washington State, a rich agricultural region producing most of the nation’s apples and hops, along with many other labor-intensive crops. With the highest concentration of migrant and seasonal farmworkers in Washington State, the Yakima Valley has long attracted researchers interested in studying occupational and environmental health issues that affect this largely Hispanic migrant and seasonal farmworker population.

Within El Proyecto Bienestar, environmental justice refers to the equal protection and education of all communities regarding environmental and occupational hazards. The primary goal of the project is to develop strategies that will enable the community of Hispanic agricultural workers to effectively identify, characterize, and respond to the many occupational and environmental health risks they and their families face. El Proyecto’s approach is novel in that previous attempts at collaborative agenda setting in the Yakima Valley failed to incorporate the expertise of local agricultural workers, even though they were often subjects of occupational health research in the Valley. Within this partnership, data collection was designed to obtain key informants’ and Yakima Valley residents’ perspectives on locally relevant occupational and environmental health risks. Issues were identified by numerous members of the agricultural community including farmworkers, growers, health care professionals, and representatives from state agencies. A Town Hall Meeting was held so that farmworkers and their families could rank the issues that had been identified. With this information, El Proyecto’s Community Advisory Board developed a set of priorities. This research agenda will be used to support the project’s primary outcome: development of an issues-driven action plan to be incorporated into future community-driven research proposals (See Figure 1).

El Proyecto’s approach is novel in that previous attempts at collaborative agenda setting in the Yakima Valley failed to incorporate the expertise of local agricultural workers, even though they were often subjects of occupational health research in the Valley.

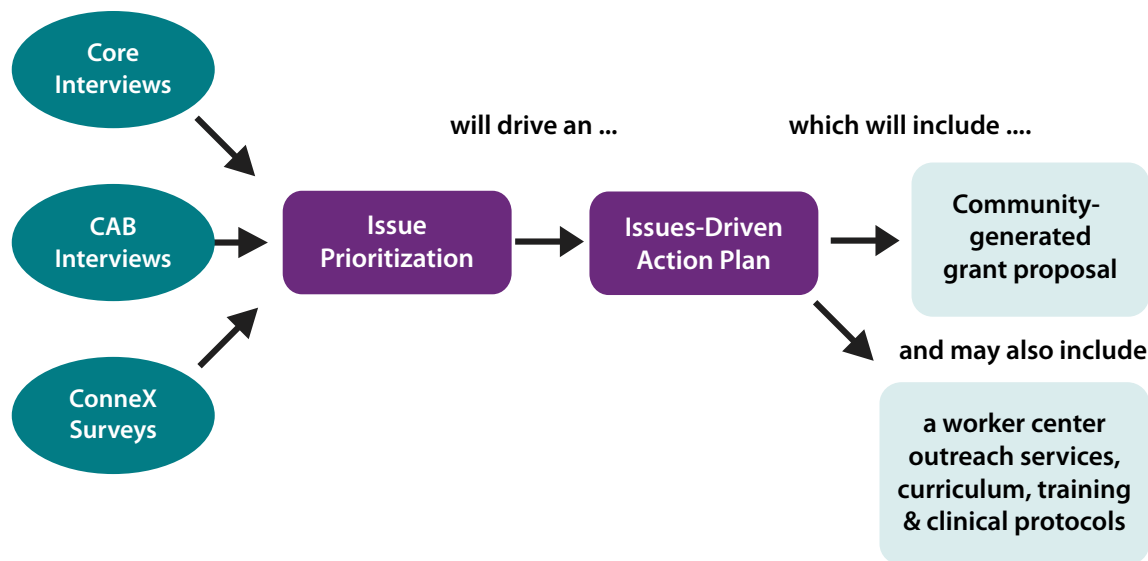


Figure 1. The El Proyecto Bienestar Research Process

CAB=Community Advisory Board ConneX=Connecting students to health careers

Strategies and Skills Used to Create an “Authentic” Community-University Partnership

Currently in its fourth and last year of funding, El Proyecto Bienestar is in a stage of reflection and planning for the future. What worked in this partnership? What challenges do we face? What made it “authentic?” El Proyecto Bienestar has created and maintained an authentic four-year academic-community partnership through cross-pollinating people and projects, partnering with the community using multiple levels of community involvement, building trust, and negotiating roles and budgets.

Cross-pollinating People and Projects

Although this particular partnership started in 2002, there was a historical relationship between the principal investigator, Dr. Matt Keifer from the University of Washington, and the community. Dr. Keifer is an occupational medicine specialist who has been faithfully coming into the community once a month for over ten years to provide medical care for patients who have been referred by family medicine physicians, primarily those with injuries and illnesses related to farm work. Through his work at the YVFWC he has demonstrated a commitment to farmworkers and their families in the Valley. He is someone who is trusted within the community. This history of collaboration and commitment brought the YVFWC “to the table” to discuss a collaborative funding opportunity.

Recognizing the breadth of potential opportunities between community and university partners is one way to maximize future partnership possibilities.

In addition, the YVFWC partners with other schools and research centers within the University of Washington including the School of Dentistry’s Northwest/Alaska Center to Reduce Oral Health Disparities and the School of Nursing’s Center for the Advancement of Health Disparities Research. Recognizing the breadth of potential opportunities between community and university partners is one way to maximize future partnership possibilities.

Partnering with the Community Using Multiple Levels of Community Involvement

El Proyecto Bienestar university partners include students and faculty from the School of Public Health and Community Medicine and the School of Nursing at The University of Washington. The project is also supported by the Pacific Northwest Agricultural Safety and Health Center, funded by the National Institute of Occupational Safety and Health.

Often researchers and funders of research struggle to determine which community member or community organization is the “true” representative of a community within a community-based participatory research (CBPR) project. Some CBPR has involved community-based organizations, others have involved grassroots, unaffiliated community members, and it could be argued that both constitute “involving the community.” However, in El Proyecto Bienestar we recognize that “community” broadly defined is not a homogeneous set of opinions nor can its diversity be accurately characterized by one community-based organization or by a handful of grassroots, unaffiliated community members. In this project we have endeavored to involve community, and to hear community voice, on multiple levels and using multiple methods. These have included 1) working contractually with multiple, established and respected community-based organizations that have responsibility for decision making for the project through their membership in the Core group; 2) involving community organization and leader representation on the Community Advisory Board; 3) surveying grassroots, unaffiliated community members to determine their environmental and occupational health concerns; and 4) holding a large Town Hall Meeting specifically recruiting migrant/seasonal farmworkers and their family members to elicit their concerns and priorities. No single one of these mechanisms by itself could be said to “represent the community”, but collectively we believe these voices do represent the community. This combined approach to community involvement created the first farmworker driven occupational and environmental health research agenda in the Yakima Valley.

Organizational community partners: Community involvement in El Proyecto Bienestar is institutionalized through the contractual involvement of three community-based organizations. (See Figure 2.) Three well-respected and established community-based organizations are involved as primary subcontractors with both fiscal and programmatic responsibilities, including the YVFWC, The Northwest Communities Education Center/Radio KDNA, and Heritage University. The YVFWC is a large community and migrant health center founded in 1978. The YVFWC is the primary health care provider for the Hispanic agricultural workers in the Yakima Valley. The Northwest Communities Education Center is a community based non-profit organization that, in 1979, created Radio KDNA. Radio KDNA is a community-owned, Spanish language radio station in the Yakima Valley that provides health education messages to their farm worker audience. A third community partner is Heritage University, a small private Hispanic and Native American serving institution. Heritage has been in the community since the early 1980's. The University of Washington and the community-based organization partners make up El Proyecto Bienestar's “Core group,” which meets regularly every month to determine policy direction and ensure grant commitments are being met.

Community Advisory Board: El Proyecto Bienestar's Community Advisory Board represents a variety of community interests including farmworkers, farmworker organizations, growers, and the Yakama Indian Nation. The Community Advisory Board was developed after the

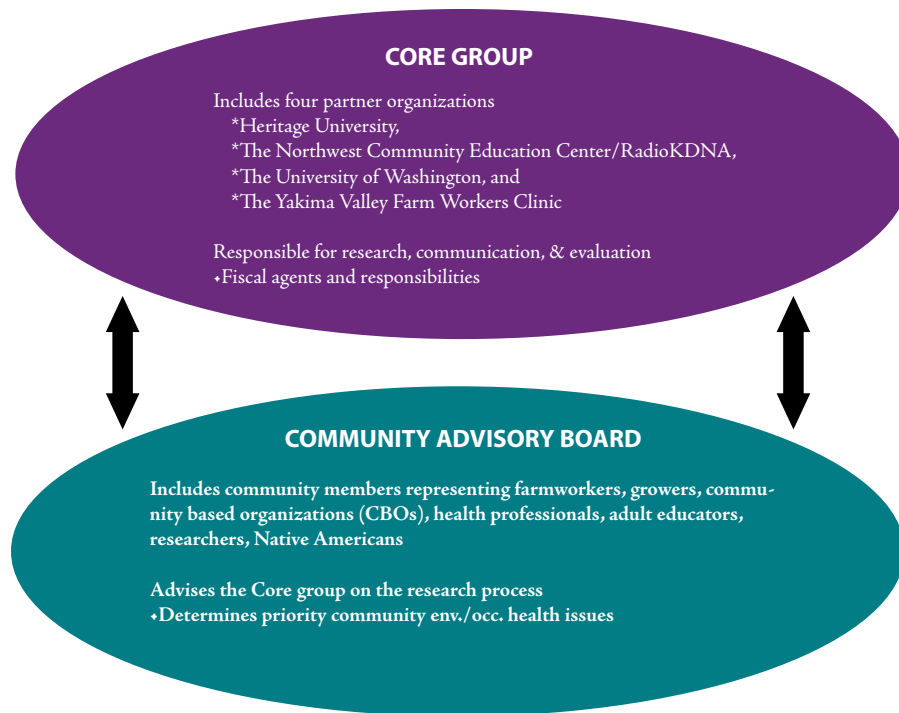


Figure 2. El Proyecto Bienestar’s Organizational Schematic

Core group took part in a nominal group process to determine constituencies of interest. Positions were advertised over the radio and by word of mouth. Members applied and were chosen by the Core group. Farmworkers are represented by a field worker, a dairy worker, a pesticide applicator, and a warehouse worker, as well as a representative from a farmworker organization. Others, while representing categories such as “student” or adult educator, come from farmworker families. The advisory board meets regularly with the Core group at least four times a year, with additional meetings as necessary. Meeting times with The Community Advisory Board are negotiated, and usually held in the evenings after the workday or on Saturdays.

Work is shared between the groups, with the Core group handling most administrative duties, external communication and evaluation. The Community Advisory Board contributes to the research process by making recommendations on the appropriateness and completeness of data collection instruments, data collection locations, and relevant forms of communication that will reach the farmworker community. In addition, The Community Advisory Board has the responsibility for prioritizing the many environmental and occupational health risks identified by the community for future work and funding.

Community Surveys: Over 170 farmworkers were surveyed in the community each of three consecutive summers as to what they thought the most important occupational and environmental health issues are in the Valley. Each summer’s survey had a different area of focus based on information gathered during the year leading up to the survey. Students from the community, most of whom were children of migrant and seasonal farmworkers, were used in survey administration, data collection and initial data analysis. Participants were recruited at community events, grocery stores, soccer games and other places that farmworkers gather in the community.

Town Hall Meeting: El Proyecto Bienestar held an evening Town Hall meeting in the third year of the project to generate environmental and occupational health priorities from farmworkers in the community. The Town Hall meeting was heavily publicized on local Spanish-language radio and other local Spanish-language media. The meeting was conducted in Spanish and translation was provided for English speakers. Childcare and food were also provided and helped reduce barriers to participation for the target community. Over 60 farmworkers attended the meeting, and provided valuable qualitative information that helped to complement the data collected through the summer surveys of farmworkers.

Building Trust

Successful historical relationships have been an important part of building trust among the partners in the first year of the project. That level of trust enabled the grant writing and project development to evolve quickly and collaboratively. Many processes were established in the first year including how decisions were to be made, how resources were to be divided, and how the community would be involved in the research process. In addition, a tragedy occurred during the first year of the project that brought the team closer together. At a national conference highlighting all the partnerships funded through the environmental justice grants, the project coordinator, Samuel Martinez, passed away. Samuel was a community leader who had been a driving force behind the project through his vision for improving farm worker health, and in fact the name of the project, “El Proyecto Bienestar,” was his idea. Although tragic and difficult, grieving together and supporting one another through Samuel’s passing provided a point of bonding for the Core group members.

Negotiating “Statements of Work” and Shared Budgets

The grant was written collaboratively over approximately three months. Statements of work were negotiated for each Core partner with corresponding budgets. Each community-based organization partner had an opportunity to articulate the staffing and indirect costs that they needed. The University of Washington established a subcontract with each of the community-based organizations. They, in turn, are responsible for billing the university every quarter for reimbursement. Although these roles and budgets were initially negotiated in the first year for the entire project, there was opportunity at each year’s budget renewal for each community partner to make changes based on their needs and the needs of the project.

Cross-pollinating people and projects, partnering with the community using multiple levels of community involvement, building trust, and negotiating roles and budgets are four ways that academic and community partnerships are created. But then what? Now that the partners are “at the table,” how do they communicate with each other? And make decisions? How is power shared among the different players? Consensus decision making is one way to share power in a group. Both the Core group and the Community Advisory board adopted consensus as a way to make group decisions. Admittedly, communication and decision making among this diverse group has been and continues to be a challenge. Adding structure to these processes is one way to facilitate participation and transparency in cross-cultural communication.

Consensus Decision Making

In Latin, consensus means to “think and feel together.” It is a process. Unanimity, which in Latin means “one spirit,” is the result (Butler, C.T. L & Rothstein, A., 2006). In a consensus

process: a) decisions are adopted when participants consent to the result of discussion about the original proposal, b) decisions aren't adopted until there is resolution of all concerns, c) participants can *agree to disagree* by acknowledging that they have unresolved concerns but consent to the proposal anyway (Butler, C.T. L & Rothstein, A., 2006).

One example of a formal consensus process is outlined in the book, *On Conflict and Consensus* (2006). In this approach, a proposal is presented to the group. After questions are clarified regarding the proposal, a broad and open round of discussion occurs. After that discussion, the facilitator calls for consensus. At this point, consensus may either be reached or unresolved concerns may be brought to the table. There are a variety of techniques that can be used to help structure the discussion at this stage. For example, each participant may be invited to express his/her approval or concerns one by one regarding the proposal. This approach works well in groups when there are language barriers or power dynamics that affect participants' willingness to speak their opinion. Alternatively, if a group is short on time, a simple show of hands of those that endorse the proposal may suffice. However, if there are concerns, they should be stated at this time.

Next, concerns are brought to the group. *The Facilitator's Guide to Participatory Decision Making* is a useful resource to help structure this stage (Kaner, S., Lind, L., Toldi, C., Fisk, S. & Berger, D., 1996). The authors provide a variety of "gradients of agreement" scales to be used when participants do not unanimously agree on the proposal. For example, one scale offers five choices for participants to express how they honestly feel towards a proposal. These include; 1) endorse, 2) agree with reservation, 3) mixed feelings, 4) don't like but won't block, and 5) veto. If, for example, a participant does not want to block a proposal but he or she has unresolved concerns that need to be discussed, that person could indicate "agree with reservation." This framework encourages discussion until all concerns are resolved.



After concerns are shared and potentially resolved, a call for consensus occurs again. If unanimity is not reached, concerns are restated. Discussion is limited to resolving once concern at a time. If unanimity still cannot be reached, participants can choose to step aside, declare a block, or reformulate the original proposal. Although "one spirit" may not have been reached through this process, the group will have been "thinking and feeling together" throughout the process. Participants in El Proyecto Bienestar have found this to be a fruitful exercise, and another way to share power between community and university partners.

The Core group's first opportunity to utilize and demonstrate success with the consensus decision making process was in negotiating the specific role of the Core in work flow and decision making, as distinct from the Community Advisory Board and other project stakeholders. This deliberative work, during which each component of the workplan proposed in the initial grant application was deconstructed and assigned responsibility, took three months and was at times difficult. However, that initial work has proven a basis on which the specific tasks of the project can move forward.

The consensus process was also successfully used by the Community Advisory Board when they refined the list of occupational and environmental health issues that the farmworker community had ranked during the town hall meeting (See Table 1). They started with a ranked list of 34 issues divided into three categories: exposures, outcomes, and contextual factors. In approximately an hour and a half they came to consensus on their four top issues. While the formal consensus process was not strictly followed (the issue was presented before the process was clarified, and issues were identified but not clearly grouped) it did provide some structure that, in conjunction with a good facilitator, encouraged everyone to participate and express their views.

The Role of Students

The involvement of local undergraduate students was built into the project during the grant writing phase, and has been a key accomplishment of the project. Community-based organization partners feel that development of local undergraduate students will help to develop and institutionalize knowledge and leadership around occupational and environmental health issues in the community. It is from an educated community young people that future community leadership will be drawn, and investing in that future leadership is one essential component to building capacity in the community.

For El Proyecto Bienestar, involvement of local undergraduate students was accomplished through the partnership with the YVFWC which operates a health professions pipeline program called “ConneX: Connecting students to health careers”. As a part of the pre-existing ConneX program, YVFWC provides a six-week summer enrichment program for 15-20 disadvantaged/low-income undergraduates from the Yakima Valley who are pursuing BA or higher-level health professions. During the grant writing phase, El Proyecto Bienestar partners decided to build on this existing cohort of undergraduate students by providing instruction in community-based participatory research during the six-week summer session, and using project resources to extend the summer session an additional two weeks for fieldwork in community survey data collection. In practice, the students brought many strengths that facilitated data collection such as bilingual ability and connections with the community. Later, the university partner was able to gain approval to grant credit to the undergraduate students for the CBPR instruction and fieldwork. In this manner the project benefits students in the short run (skill building and credit), provides an important source of data (surveys of grassroots community members) for El Proyecto Bienestar, and builds long-term capacity in the community by investing in local students.

Other examples of successful student involvement in local environmental and occupational health community-based participatory research projects include development of youth leadership through the POWER Project in south central Los Angeles which used population empowerment education as a tool to involve local high school youth in environmental justice work (Delp, L. et al., 2005), and involvement of high school, undergraduate, and graduate students in an prevention project with farmworkers in North Carolina (Roa, P. et al., 2004). While these two projects used distinct approaches to involve students in their environmental health community-based participatory research projects, each explicitly approached student’s involvement as a strategy for capacity building in the community.

Table 1. Consensus-in-Action: The Community Advisory Board Prioritizes the Issues

Note: Selected quotes illustrate stages of the consensus process. Not all comments were included in this table.

Consensus Process	Representative	Quotes (<i>italics represent text that has been translated from Spanish to English</i>)
INTRODUCTION		
Present the issue	Facilitator	<i>Dr. X, he's going to talk for about five minutes about what we're going to do...</i>
Clarify the Process	Primary investigator	<i>I want to give a little bit of orientation about ... the next step.</i>
Questions to clarify presentation	Adult educator	<i>Remind us where the students were recruited from and who they were?</i>
Clarify the process	Primary investigator	<i>So what we have is 3 lists, and we would like you to unite them...we would like to have priorities to 4</i>
LEVEL ONE		
Broad open discussion	At-large	<i>...you just take the first four that people took [from the town hall meeting]... that's the people, that's what they chose</i>
Broad open discussion	Facilitator	<i>What I'm thinking is [there are] too many ...maybe cut them, modify them ...</i>
Broad open discussion	Researcher	<i>If you had to merge these lists what would you think would come out on top?</i>
Broad open discussion	Healthcare professional	<i>If we were to try and select what we think they thought is the most important then I think we're misconstruing it</i>
Call for consensus	Facilitator	<i>So what do you think?</i>
LEVEL 2		
List concerns	Pesticide applicator	<i>I think they are all important but if you have to make the list smaller ... Let's say we can group under contamination [air and water] ... And also if you talk about issues of work ...you have to talk about low income and documents and being mistreated...</i>
List concerns	Adult educator	<i>Why did we break it out [into exposures, outcomes and contextual factors] and now we are going to put it back together?</i>
List concerns	At-large	<i>We need to follow ... the rule that they chose</i>
List concerns	Community based organization	<i>They were talking about injuries from work, I had the experience of seeing these issues with the workers, for me it's really important. Because it is not just the injury, but the separation of their families ...the way that it impacts the society, the community, the children, the family, those probably are the ones that have the main priority</i>
List concerns	At-large	<i>Why don't we leave 2, the first two of each one [category]</i>
List concerns	Farmworker organization	<i>... if you get hurt or you get injured, if you get sick, it's the same condition.</i>
LEVEL 3		
Resolve concerns	Warehouse worker	<i>We have to be realistic</i>
Resolve concerns	Facilitator	<i>I agree with everybody, that everything is important. But we don't have the capacity to see them all. So that's why we have to give – two, let's say four, so we can put all our time and emphasis, all our energy on those things and maybe next year we can see another four.</i>
Call for consensus	Facilitator	<i>Can we find consensus about that? ... I'm going to repeat the order. If somebody doesn't agree, they can raise their hands...pesticides & chemicals ... That's one of those priorities, the other one is going to be work related illnesses. Number three is going to be conditions, abusive conditions, workplace conditions and fourth one is work related injuries. So are we in consensus? And the ones that are not, the ones that don't agree raise their hand? ... - nobody? We find consensus, Doctor, thank you.</i>

While the specific mechanisms by which local students are involved in community-based participatory research projects will vary, investment in local students, particularly disadvantaged or low-income students who are from local families that have experienced the issues under study, is one important tool for building long-term capacity in the community. And without long-term community capacity building, community-university partnerships run the risk of exploiting the community for short-term gains.

Community Assertiveness Strategies

In sum, there are a number of strategies that El Proyecto Bienestar's community partners have used to ensure an authentic community-university partnership. The following methods help operationalize the idea that ensuring a genuine partnership is not just the responsibility of the university partner.

Fostering relations between university and community partners outside of the constraints of a grant process has proved important to the success of partnerships in El Proyecto Bienestar.

- **Community research review process:** For example, the YVFWC has set up its own institutional research review process. While not an IRB, the local process provides a mechanism for YVFWC to determine which research projects it will engage in, and sets out expectations for researchers who wish to partner with them. These include a commitment to a set of partnership principles, equitable distribution of grant funds, and organizational review and comments on findings.
- **Relationship development:** Fostering relations between university and community partners outside of the constraints of a grant process has proved important to the success of partnerships in El Proyecto Bienestar.
- **Local data collection:** Keeping data collection local with community members assisting in data interpretation helps keep the research relevant to the community.
- **Involvement of local students:** A crucial mechanism in building long-term capacity in the community.
- **Multiple levels of community involvement:** Including multiple community-based organizations as well as grassroots community members.
- **Multiple and ongoing methods for hearing community voices directly:** Methods may include community health surveys, key informant interviews, town hall meetings, and radio call-in shows.
- **Communication back to the community:** Transparency of the research process is maintained through regular meetings with community partners, public service announcements on radio and other Spanish-language media, and town hall meetings.
- **Building on research to create action that will benefit the local community:** Examples of potential benefits include locally relevant curriculum, clinical protocols, and possibly an intervention grant.

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About the Authors



Vickie Ybarra is the Director of Planning and Development for the Yakima Valley Farm Workers Clinic, one of the largest community/migrant health care systems in the country, with clinics in Washington and Oregon. She has experience in development, oversight, and evaluation of community programs targeting Hispanic and Spanish-speaking populations. She earned her undergraduate degree in nursing from the University of Washington School of Nursing, and in 1996 completed her Masters in Public Health at the University of Washington. As an appointed member of the Washington State Board of Health for 6 years from 1998-2004, she provided leadership for the Board's Health Disparities efforts, and in May 2001 co-authored the Board's report on Health Disparities focusing on diversifying the state healthcare workforce. She served on the Institute of Medicine committee that produced the February 2004 report, "In the Nation's Compelling Interest: Ensuring Diversity in the Health Care Workforce". Ms. Ybarra has been active in efforts to connect local communities to institutions of higher education. She also served as a member of the founding Community-Campus Partnerships for Health board of directors from 1995-2000. Ms. Ybarra is active in her community in Hispanic academic achievement. Ms. Ybarra is also an elected member of the local School Board, with a particular focus on closing the achievement gap.



Julie Postma is a nurse and fourth year doctoral student in the Occupational and Environmental Health Nursing program at the University of Washington School of Nursing. She has been actively involved in El Proyecto Bienestar since the first year of the project. Her primary role has been to conduct an in-depth process evaluation centered on how different project participants conceptualize and carry out "environmental justice." Julie is a graduate of the University of Michigan's School of Nursing and the recent recipient of the Warren G. Magnuson Scholarship for Academic Excellence.

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