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The *Pesticides and Farmworker Health Toolkit*: An Innovative Model for Developing an Evidence-Informed Program for a Low-Literacy, Latino Immigrant Audience

Abstract

Migrant and seasonal farmworkers are typically Spanish-speaking, Latino immigrants with limited formal education and low literacy skills and, as such, are a vulnerable population. We describe the development of the *Pesticides and Farmworker Health Toolkit*, a pesticide safety and health curriculum designed to communicate to farmworkers pesticide hazards found in their working environments. Using evidence-informed principles, the *Toolkit* curriculum for low-literacy, Latino farmworkers and its developmental process described herein serve as an innovative and useful model for Extension programming with non-traditional audiences.

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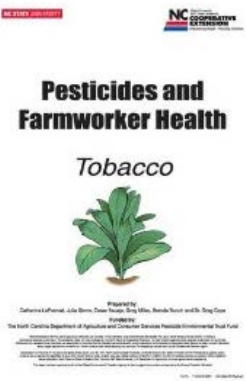
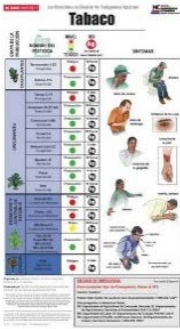
Introduction



Migrant and seasonal farmworkers are a special risk population because of the cultural and linguistic barriers they face in maintaining safety and health at work (Donham & Thelin, 2006). Farmworkers in the United States (U.S.) are typically young to middle-aged males, foreign-born, and Spanish speaking (U.S. Department of Labor, 2005). The population can be characterized, generally, as having limited formal education and low literacy skills in Spanish and English (Tamassia, 2007).

The *Pesticides and Farmworker Health Toolkit* (*Toolkit*) (LePrevost et al., 2011) is a pesticide safety and health curriculum designed to communicate to farmworkers pesticide hazards found in their working environments. This comprehensive educational resource consists of a training flip chart, hands-on learning activities, and a take-home handout for learners, available in English and Spanish for 11 hand-labor intensive crops produced in the Southeastern U.S. (Table 1). Through an hour-long lesson, the materials highlight pesticide safety, hazard communication, exposure prevention, and health promotion messages focused on commonly used pesticides.

Table 1.

Pesticides and Farmworker Health Toolkit Curricular Components with Associated Images and Descriptions

Curricular Component	Image	Description
<p>Flip Chart</p>		<ul style="list-style-type: none"> • Side one is visual to engage the farmworker audience • Side two displays measurable learning outcomes, discussion points, background information, and all of the content a trainer needs to lead a conversation about pesticide hazards and safety information and facilitate hands-on activities
<p>Handout</p>		<ul style="list-style-type: none"> • Single page design contains key concepts from the flip chart training • Handout designed to be taken home by the worker at the end of the training • Most commonly used pesticides included on the handout are organized by crop production stage, mirroring the flip chart's topic progression
<p>Hands-On Activities: Symptom Charade Cards, Jug and Jug Labels</p>		<ul style="list-style-type: none"> • Activities integrated into the flip chart training to reinforce key concepts • Symptom charade game reviews illness and irritation symptoms introduced in the training • Jug labeling group activity prompts workers to use the handout to identify the toxicity signal word and restricted entry interval for a

		<p>specific pesticide</p>
<p>DVD for Trainers</p>		<ul style="list-style-type: none"> DVD provides 20-minute introduction to curriculum, including modeling of effective delivery strategies
<p>Note: Curricular components are available for the following crops: apples, bell peppers, blueberries, Christmas trees, cucumbers, grapes, landscape/turf, strawberries, sweet potatoes, tobacco, and tomatoes.</p>		

Evidence-based programs, as defined by Cooney, Huser, Small, and O'Connor (2007), require substantial resources and time to develop (Fetsch, MacPhee, & Boyer, 2012), while presenting unique challenges for the migrant farmworker population and other non-traditional Extension audiences. Small, Cooney, and O'Connor (2009) propose a practical alternative for program development with their evidence- *informed* principles. The *Toolkit* was developed with these principles and serves as a model for program development for low-literacy, Latino immigrant audiences.

Development Process

Engaging Stakeholders

The statewide need for a comprehensive educational resource to teach farmworkers pesticide safety and health was identified at a community stakeholder meeting held in North Carolina (N.C.) in 2007. Representatives from state (agriculture, labor, health, Extension) and non-profit (health, advocacy, commodity) organizations serving farmers and farmworkers attended. Stakeholders requested the development of a complete educational package consisting of crop-specific, bilingual materials, including pesticide safety lessons and associated take-home handouts that incorporated illustrations and minimal text. Later in 2007, the state Pesticide Board awarded a Pesticide Environmental Trust Fund grant for *Toolkit* curriculum development.

Creating and Evaluating a Prototype

A literature review informed the *Toolkit's* development; review findings suggested the need for pesticide education programs that are culturally responsive (Donham & Thelin, 2006), highly visual with the incorporation of realistic symbols (Glasnapp, Gabbard, & Nakamoto, 2006), and informed by farmworker input (Rother, 2008). Because N.C. is the largest producer of tobacco nationally and production occurs statewide (Krueger, 2011), tobacco served as the prototype crop for the *Toolkit* series. N.C. State University tobacco production specialists identified the most commonly used pesticides for inclusion in curriculum discussions regarding workplace hazards. Based on diverse images provided by the authors, a medical illustrator developed full-color illustrations of pesticide poisoning symptoms and tobacco plants at various growth stages. As described previously (LePrevost, Blanchard, Storm, Asuaje, & Cope, 2012), an iterative process of focused small group discussions and interviews with farmworkers took place during the 2008 and 2009 growing seasons in N.C. and Florida to develop effective visual curriculum components and assess farmworker understanding of associated safety concepts.

For the 2008 season, four graphic layouts and visual concepts for the take-home handout were produced with a graphic designer. After review, stakeholders selected two layouts for field-testing. A prototype lesson plan and corresponding flip chart were developed and produced based on adult education principles, social constructivist theory (Brooks, 1990) and health communication best practices (National Cancer Institute, n.d.). During field testing in 2008, using the evaluation concept described by Jayaratne (2007), four sample groups of N.C. farmworkers indicated their preferences for the handout layout by depositing a token in a box corresponding to their preferred handout design (Figure 1). Farmworker and trainer feedback, *Toolkit* developers' observations, and reviewers' suggestions during field-testing informed major flip chart revisions.

Figure 1.

Take-Home Handout Design for the Prototype Crop Tobacco Associated with the *Pesticides and Farmworker Health Toolkit* Selected by Farmworkers During Field Testing



In 2009, trainers from stakeholder organizations, who had themselves been trained by the authors (train-the-trainer concept), field tested the entire *Toolkit* curriculum. Flip charts, activities, and handouts were assessed by N.C. farmworkers and trainers. Based on trainer evaluation, curriculum content was expanded to include all worker training criteria mandated by the federal Worker Protection Standard (W.P.S.) (1992). In July 2010, Region 4 of the U.S. Environmental Protection Agency (E.P.A.) approved the *Toolkit* for W.P.S. worker training.

Expanding to Other Crops

The final content and designs of the tobacco prototype curriculum components were applied to the remaining 10 crops for expansion of the curriculum series. For each crop, production specialists identified the most commonly used pesticides and relevant production stages for organization of the lessons and handouts. The illustrator created crop production stage images for each crop. For all 10 crops, the prototype handout, flip chart, and hands-on activities were revised to reflect the production practices of each individual crop, resulting in complete crop-specific *Toolkits*.

Distributing to Users and Implementing Training

To date, more than 400 *Toolkits* have been disseminated in the southeastern U.S. and beyond. Through train-the-trainer workshops, over 175 individuals—including growers, landscapers, migrant and community health center outreach workers, state agency personnel, Extension agents, migrant education staff, and farmworker advocates—have become proficient *Toolkit* trainers.

Alignment with Evidence-Informed Principles

The *Toolkit* development process illustrates how a program for a low-literacy, non-English speaking, Latino, agricultural audience may be developed using evidence-informed principles, as described by Small et al. (2009). The *Toolkit* applied these principles (Table 2) in each of the four categories of

program design and content, relevance, implementation, and assessment and quality assurance.

Table 2.

Evidence-Informed Principles and Associated *Pesticides and Farmworker Health Toolkit* Curriculum Attributes

Evidence-Informed Principles		Toolkit Attribute
Program Design and Content	Theory Driven	Based on <ul style="list-style-type: none"> • adult education principles • social constructivist theory • health communication best practices
	Of Sufficient Dose and Intensity	Meets experienced farmworker trainer recommended length and frequency <ul style="list-style-type: none"> • 1-hour maximum due to long, physically-taxing farmworker work day • single session reflects seasonal, physical, and time demands of farm work and few bicultural, bilingual trainers
	Comprehensive	Consists of complete curriculum <ul style="list-style-type: none"> • flip chart with trainer's guide • hands-on activities • take-home handouts • bilingual leader's guide (available separately) • bilingual poster (available separately)
	Actively Engaging	<ul style="list-style-type: none"> • Discussion-driven • Builds on worker knowledge and

		<p>experience</p> <ul style="list-style-type: none"> • Contains multiple hands-on activities
Program Relevance	Developmentally Appropriate	<ul style="list-style-type: none"> • Iterative development process included farmworkers and trainers • Inclusion of images, symbols, and discussion (informed by above corresponding to "Theory Driven") • Text for trainers and farmworkers (minimal) is in appropriate-level Spanish
	Appropriately Timed	<p>Trainings offered to farmworkers</p> <ul style="list-style-type: none"> • at arrival to work site/farm • throughout working season
	Socioculturally Relevant	<ul style="list-style-type: none"> • Images reflect diversity of workers in farm settings • Development included farmworker and trainer input
Program Implementation	Delivered by Well-Qualified, Trained, and Supported Staff	<p>Trainers prepared by</p> <ul style="list-style-type: none"> • train-the-trainer workshops offered throughout N.C. and Southeast • 20-minute introductory DVD
	Focused on Fostering Good Relationships	<ul style="list-style-type: none"> • Discussion-driven training respects learner knowledge and experience • Train-the-trainer workshops encourage collaborations among local trainers and employers
Program	Well-	Fidelity of implementation facilitated by

Assessment and Quality Assurance	Documented	<ul style="list-style-type: none"> • flip chart display of learning objectives, discussion questions, background information • bilingual trainer's guide for less fluent or monolingual trainers • train-the-trainer workshops and DVD to provide background and model effective delivery
	Committed to Evaluation and Refinement	<ul style="list-style-type: none"> • Implementation of formative and process evaluation • Iterative development process engaged farmworkers and farmworker trainers • Inclusion of performance-based assessments in training
	Endorsed by Government Agency	Approved by U.S. E.P.A. Region 4 for W.P.S. worker training (July 2010)

Implications

There is a movement within Extension toward the use of evidence in the development and implementation of programs (Cooney et al., 2007; Fetsch et al., 2012). Simultaneously, Extension is increasingly aware of the need for culturally appropriate programs for Latino audiences, some of whom are low-literacy and non-English speaking (Herndon, Behnke, Navarro, Daniel, & Storm, 2013). Narrowly defined and rigorous evidence-based programs may not be feasible in all situations, particularly those involving non-traditional audiences. Therefore, evidence-informed program development—such as that described here for the *Toolkit* for a low-literacy, Latino farmworker audience—is a useful model for research-based, practical Extension programming.

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