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Guidelines for Children's Work in Agriculture: Implications for the Future

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ABSTRACT. The North American Guidelines for Children's Agricultural Tasks (NAGCAT) were developed to assist parents in assigning developmentally appropriate and safe farm work to their children aged 7–16 years. Since their release in 1999, a growing body of evidence has accumulated regarding the content and application of these guidelines to populations of working children on farms. The purpose of this paper is to review the scientific and programmatic evidence about the content, efficacy, application, and uptake of NAGCAT and propose key recommendations for the future. The methods for this review included a synthesis of the peer-reviewed literature and programmatic evidence gathered from safety professionals. From the review, it is clear that the NAGCAT tractor guidelines and the manual material handling guidelines need to be updated based upon the latest empirical evidence. While NAGCAT do have the potential to prevent serious injuries to working children in the correct age range (7–16 years), the highest incidence of farm related injuries and fatalities occur to children aged 1–6 years and NAGCAT are unlikely to have any direct effect on this leading injury problem. It is also clear that NAGCAT, as a voluntary educational strategy, is not sufficient by itself to protect children working on farms. Uptake of NAGCAT has been sporadic, despite being geographically widespread and has depended, almost solely, on a few interested and committed professionals. Key recommendations for the future are provided based upon this review.

KEYWORDS. Agriculture, child, wounds and injuries, young workers

BACKGROUND

Children on farms are often assigned work typically performed by adults, and much of this work is beyond their physical and cognitive capabilities. The recognized need to match children's developmental characteristics with the requirements of the agricultural job, as a key injury prevention strategy, led to the development of the *North American Guidelines for Children's Agricultural Tasks* (NAGCAT).[1]

Many farms are exempt from occupational safety and health regulations because they employ 10 or fewer employees.[2] These farms are also exempt from federal child labor regulations because children are working for their

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parents who own/operate the farm.[3] Thus, NAGCAT were developed to assist parents in assigning developmentally appropriate farm work to their children 7 to 16 years old.[1] NAGCAT address the involvement of children in the most common types of agricultural work by identifying the physical, cognitive, and psychosocial abilities that a child must have in order to safely conduct a specific agricultural job. In addition, adult responsibilities, potential hazards of the agricultural job, and recommended levels of supervision for the particular job are included.

NAGCAT were developed over a 4-year period and released in 1999. The NAGCAT resources provide assessment tools that cover 62 different agricultural jobs. Each parent resource booklet is a collection of 6 to 10 illustrated posters grouped by the following job types: animal care, general activities, haying operations, implement operations, manual labor, specialty production, and tractor fundamentals (see www.nagcat.org). Spanish and French translations of the posters were also developed.

When NAGCAT were developed, there was little empirical evidence that could be used to inform work guidelines. Therefore, a consensus development process was used, relying on the knowledge, judgment, and the experiences of 10 primary advisors.[1] Consensus decisions were many and included (1) what agricultural jobs should be included; (2) what child developmental abilities were required for each job; (3) what levels of supervision were required for each job; (4) what the main hazards were for each job; (5) what the adult responsibilities were prior to assigning each agricultural job; and (6) what type of youth training was necessary for each job.[1]

There were four interrelated evaluation questions to be answered about the consensus guidelines once they were released:

1. Is the NAGCAT content complete and accurate, particularly as it relates to child development?
2. Will NAGCAT prevent injuries if they are used and applied by parents?
3. Will parents use and apply NAGCAT as intended?
4. Will there be widespread uptake of NAGCAT among agricultural safety professionals and the agricultural populations?

Purpose

Since NAGCAT were released, a growing body of scientific evidence has accumulated regarding the content and application of these work guidelines to populations of working children on farms. There have also been considerable adaptations of the NAGCAT resources for prevention initiatives, both nationally and internationally. Therefore, the purpose of this paper is to review the scientific and programmatic evidence about the content, efficacy, application, and uptake of NAGCAT and propose key recommendations for the future.

METHODS

The methods for this review included a synthesis of the peer-reviewed literature and programmatic evidence gathered from safety professionals.

RESULTS

Scientific Evidence

NAGCAT Content

Evidence will be presented in this section regarding what has been learned about physical and cognitive development and youth tractor work, ergonomic data related to lifting and carrying jobs for youth, and supervision requirements specific to the farm environment.

Tractors. The safe operation of farm tractors is heavily emphasized within NAGCAT because farm tractors account for the majority of fatal injuries to youth working on farms in North America.[1] One limitation of the NAGCAT guidelines at the time of their development was the lack of evidence surrounding the physical and cognitive demands of tractor operation, and whether mismatches existed between these

FIGURE 1. NAGCAT poster, *Driving a farm tractor*, with physical development components highlighted (figure available in color online).

demands and children's physical and cognitive abilities.

A series of three studies evaluated the physical development components of the "*driving a farm tractor*" guideline that serves as a basis for 22 specific guidelines (see Figure 1). Reach, strength, and field of vision of youth at different ages and stages of development were compared to the physical demands of operating tractors in common use in the United States.[4–6] The main study findings were the following: (1) many tractor controls were out of reach for the majority of youth operators[5]; (2) the forces required to activate sentinel controls on the tractor exceeded the physical abilities of most youth[4]; and (3) youth operators had a diminished field of vision compared to adult operators.[6] These mismatches between tractor characteristics and the anthropometric and physical developmental abilities of youth has serious implications for risks for runovers, rollovers, and collisions and calls into question the ability of youth to safely operate tractors.[4–6]

Both physical and cognitive skills are required to operate farm tractors safely, but very little empirical data exist concerning how cognitive requirements for operating a tractor (see Figure 2) compare with cognitive capabilities of youth at different ages and developmental stages. It is unknown whether youth operators consistently meet the cognitive demands of tractor work. A study examining the role of cognitive development in safe tractor operations using simulator technology was recently launched to gather empirical evidence to answer these

FIGURE 2. NAGCAT poster, *Driving a farm tractor*, with cognitive development components highlighted (figure available in color online).

important questions (Marlenga et al., National Institute for Occupational Safety and Health, 2011). The results of this study will assist in generating a model of cognitive developmental factors for safe tractor operation by youth that can be used to update NAGCAT.

Jobs Involving Lifting and Carrying. When NAGCAT were developed, there was little published evidence available to help identify high-risk manual material handling farm jobs for youth or to identify weight-lifting/carrying restrictions for youth working in agriculture. The consensus decision was to use a weight restriction of "less than 10%–15% of the child's body weight" to limit the potential risks for injury for 32 specific jobs within NAGCAT that had a lifting component (see Figure 3). In 2002,

FIGURE 3. NAGCAT poster, *Lifting*, with lifting and carrying components highlighted (figure available in color online).

the National Institute for Occupational Safety and Health co-sponsored a national conference to discuss research needs regarding prevention of work-related musculoskeletal disorders for youth working in agriculture.[7] Since that time, several studies have examined injury risks associated with lifting and carrying to address some of the knowledge gaps identified at the national conference.

Allread et al.[8] examined farm jobs that were commonly performed by youth to assess physical demands and risks for low back injury. They found that the average weight handled by farm youth in their study was higher than the average weight handled by adults in industrial settings.[8] Five jobs were identified that posed highest risks for low back disorders: (1) lifting water buckets; (2) lifting bales of hay, straw, and alfalfa; (3) lifting feed bags; (4) carrying feed buckets; and (5) filling feed buckets. These jobs should be priorities in any prevention effort aimed at reducing musculoskeletal disorders. Several potential ergonomic interventions have been tested, including modified feed bag handling,[9] modified feed bin,[9] add-on handles on shovels,[10] and alternative wheelbarrow styles.[11] Further evaluative research is needed to assess the effectiveness of these interventions.

Gillette et al.[12,13] analyzed upper and lower extremity kinematics as well as lower back moments during bucket carrying to assess the effect of age and load amount. These studies resulted in three key recommendations to decrease risk for injury that are relevant to NAGCAT: (1) weight limits should be 10% of the child's body weight[12]; (2) the load should be split for bilateral carrying, and smaller buckets should be used[12]; and (3) the 8- to 10-year-old age group should have particularly stringent weight limits for carrying buckets.[13]

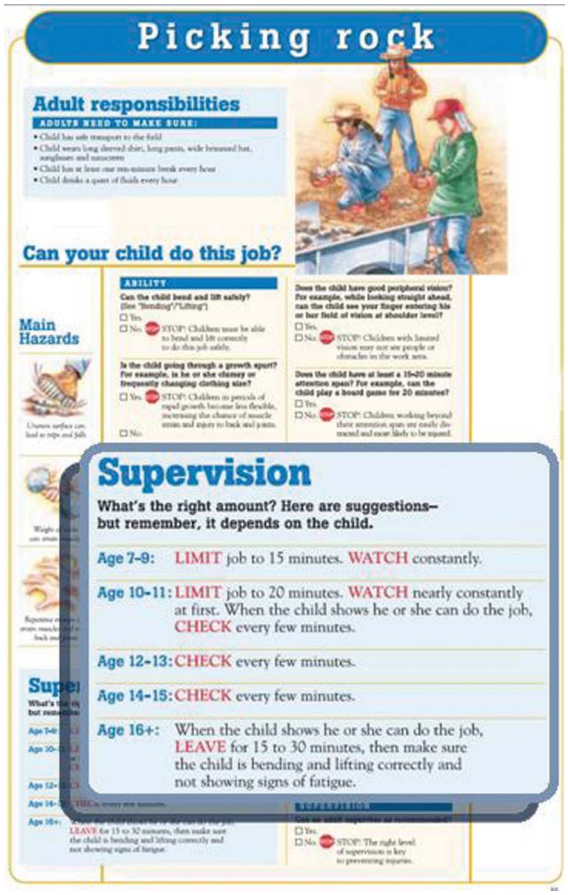
Supervision. Supervision is a key component in NAGCAT, with recommended levels based on the child's age and the specific job. Recommendations for youth worker supervision were originally developed based upon commonly held views about the developmental abilities of children at different ages, including physical abilities (e.g., weight bearing limits, growth spurts) and cognitive abilities (e.g., attention

span, ability to translate work experiences from one setting to another). A structured approach was taken to provide recommendations for children of different ages and therefore developmental abilities.

Levels of supervision for NAGCAT were adapted from work by Peterson et al.,[14] who developed supervision definitions/parameters from a consensus process focused on children from infancy to 10 years of age in nonfarm, nonwork settings. When applied to youth aged 7 to 16 years in a work setting, supervision recommendations included the need to constantly watch younger and developmentally immature children engaged in appropriate work tasks, to place varying limits on work time, to check on children with different frequencies related to their developmental abilities and the job at hand, and to leave more mature children for different lengths of time according to the perceived demands of their work, as appropriate (see Figure 4).

This framework for the assessment of child supervision needs was later expanded by Morrongiello et al.[15,16] (see also Morrongiello et. al., in this issue) who defined appropriate child supervision in farm work environments using three dimensions: attention, proximity, and continuity. Major lessons from this work were the following: (1) very young children on farms do not possess the developmental abilities to ensure that they can be safely brought into farm worksites, especially when adults are simultaneously engaged in farm work; (2) it was deemed impossible for adults who are engaged in work to simultaneously provide levels of supervision that are required for working children in many, many work situations; (3) even in the presence of adult supervision levels that were deemed to be optimal by contemporary standards (the supervision was proximal, continuous, and attentive), children on farms can still be injured due to the unpredictable nature of the work environment, and the powerful forces and hazards that can lead to major injury in many farm work situations. New paradigms are therefore required to ensure the adequate supervision of children on farms, and the original NAGCAT recommendations about supervision therefore require further refinement.[15,16]

FIGURE 4. NAGCAT poster, *Picking rock*, with the supervision component highlighted (figure available in color online).



NAGCAT Efficacy in Preventing Injuries

Two studies evaluated the efficacy of NAGCAT in preventing injuries to youth working in agriculture. The first retrospectively applied NAGCAT to a case series of fatal, hospitalized, and restricted activity injuries from the United States and Canada.[17] For injuries involving children engaged in farm work, there was an applicable NAGCAT guideline for the majority of work-related injury cases. Further, NAGCAT, when applied hypothetically would have prevented 70% to 80% of the most serious work-related injuries.

Despite the encouraging findings related to efficacy, NAGCAT were applicable in only 20% (161/823 injury cases) of the full case series of childhood farm injuries, mainly because the

child was not working.[17] Of great concern, the investigators found that nearly 50% of the fatalities and 40% of the hospitalized injuries in the case series were children 1 to 6 years of age. An in-depth analysis of the fatality cases revealed that the annual rate of fatal agricultural injury was substantially higher than the all-cause, unintentional, fatal injury rate among Canadian children aged 1 to 6 years.[18] Further, three mechanisms accounted for nearly 75% of the fatal injuries: (1) runover as a bystander; (2) runover as an extra rider who fell from a machine; and (3) asphyxia from drowning.[18]

The key recommendations for the NAGCAT development team that emerged from this retrospective case series were to (1) create a condensed version of NAGCAT to include only the guidelines most frequently associated with injury (10 individual guidelines accounted for 63% of the work injury cases); (2) reexamine the guidelines most commonly associated with injury and consider refining the adult responsibilities, developmental abilities, supervision levels, or consider completely restricting the job; (3) develop new guidelines to cover some important work activities that commonly lead to injury (maintaining farm machinery, using a tractor as a stationary power source, and traveling to the worksite)[17]; and (4) restrict young children's access to the farm worksite at all times, but especially during the course of adult work.[18]

A second study evaluated an active NAGCAT dissemination strategy on the incidence of childhood agricultural injuries using a randomized controlled trial.[19] Active dissemination of NAGCAT by way of an educational farm visit and modest intervention boosters halved the incidence of NAGCAT-preventable injuries in the intervention group as compared to the control group over the 21 months of quarterly surveillance. However, NAGCAT did not significantly decrease the overall incidence of childhood farm injuries, because 50% of the injuries were not work related. In fact, the highest incidence of agricultural injuries was observed among children aged 0 to 6 years. Although the efficacy of NAGCAT was promising, the investigators recommended that prevention efforts target a broader range of risk factors and intervention strategies.[19]

NAGCAT Application by Parents

NAGCAT have the *potential* to decrease the incidence of work-related injuries and prevent the most serious work-related injuries experienced by children in the specified age range (7 to 16 years). However, the actual effectiveness of NAGCAT depends on farm parents actively using NAGCAT as intended.

Several studies tested dissemination strategies that might influence parental application of NAGCAT.[19,20] As referenced in the previous section, Gadomski et al.[19] found that a face-to-face farm visit with modest reminders resulted in half the incidence of NAGCAT-preventable injuries in the intervention group as compared to the control group. It also appeared that the active strategy, according to self-reports, influenced several intermediate variables, including setting time limits for children's work, providing more supervision, and making more safety-related changes on the farm.

A multisite randomized controlled trial evaluated an enhanced dissemination strategy in influencing parents' use of NAGCAT when assigning farm work to their children.[20] The enhanced dissemination strategy included an educational video on child development, child development fact sheets, the NAGCAT booklets, and supportive telephone calls. The control group received the NAGCAT booklets. Parental use of NAGCAT was assessed using the stages of change model and revealed increased proportions of parents were actively using NAGCAT in the intervention group (49.5%) compared to the control group (37.1%). The NAGCAT booklets themselves were reported to be the most important influence in parents' decision to use NAGCAT.[20]

Although enhanced dissemination strategies appear to increase the likelihood that NAGCAT will be used by farm parents, 50% of the intervention parents in the above-referenced study were not actively using NAGCAT.[20] Several studies have tried to identify other factors that might influence parental use of these voluntary guidelines, beyond just dissemination strategies.[21,22]

Pickett et al.[21] assessed farm parents' knowledge of child development and determined whether this knowledge influenced the use of

NAGCAT in assigning tractor work to children. In general, farm parents had a relatively high level of knowledge about child development, as inferred from a set of true/false questions. However, even in the presence of high knowledge, some parents still assigned dangerous tractor work to their children. These findings bring into question the utility of voluntary guidelines as a primary strategy to prevent childhood farm injuries, specifically tractor injuries.[21]

Another study explored the risk perceptions of farm parents to assess whether farm parents realistically perceive the dangers of the farm work environment and if so, did they take action to make the farm work environment safer for their children.[22] The majority of farm parents perceived the dangers of farm work, but even among those who perceived the highest possible risk, nearly 50% were not using NAGCAT or making changes to enhance the safety of farm work for their children. These results suggest that voluntary guidelines alone may not be sufficient to protect children working on farms.[22]

Programmatic Evidence

Uptake of NAGCAT

Over the past 11 years, there has been uptake of NAGCAT from both the public and private sectors, as well as internationally, but there has been no strategic dissemination or marketing plan for NAGCAT. The National Institute for Occupational Safety and Health funded eight major studies on NAGCAT, and the US Department of Agriculture funded two projects. During this same period, NAGCAT were being distributed to farm parents across the United States and Canada through multiple strategies, such as direct mailings, presentations, newspaper inserts, and calendars. Oftentimes, material distribution occurred from a farm organization directly to its members. Modifications of NAGCAT were adopted in Sweden and the Philippines, and NAGCAT were used as a reference for the International Labour Organization (ILO).[23] To address needs of a Hmong population, the guidelines were adapted into safety stories.[24,25] Efforts are also underway to develop guidelines on agricultural tasks not included in the original NAGCAT process and to develop guidelines for rural recreational activities.

Upon request from agricultural employers who hire young workers, seven NAGCAT guidelines were modified to address the most common conditions under which teenagers are employed in agriculture. Where relevant, these modified guidelines include the US Child Labor in Agriculture Laws.[3] These illustrated Safety Guidelines for Hired Adolescent Farmworkers (SaGHAF),[26] along with supervisor training materials, were released in 2009. Research has yet to be conducted to test the efficacy of the SaGHAF resources in modifying behaviors of agricultural work supervisors or reducing work-related injuries among hired youth. However, website visits to free SaGHAF resources have been steady and dissemination of printed resources has been facilitated through agricultural employer representatives.

RECOMMENDATIONS FOR THE FUTURE

Based on the review of the scientific and programmatic evidence, questions posed at the beginning of this paper will be answered and recommendations for the future proposed.

1. Is the NAGCAT content complete and accurate, particularly as it relates to child development?

   From the review of literature, it is clear that although the NAGCAT guidelines provide reasonable coverage of the majority of injury-producing farm tasks, the NAGCAT tractor guidelines and the material handling guidelines need to be updated based upon the new evidence cited here. The NAGCAT guidelines most commonly associated with injury will also need to be critically reviewed and potentially revised. More research is needed to understand and define optimal supervision for different farm tasks based on the developmental stages of children aged 7 to 16 years.

   Recommendation No. 1: Update NAGCAT (and its adaptations) to incorporate the

latest empirical evidence on child development and high-risk jobs.

Recommendation No. 2: Conduct research to understand and define optimal supervision for children working in agriculture.

2. Will NAGCAT prevent injuries if they are used and applied by parents?

   NAGCAT do have the potential to prevent serious injuries to working children in the specified age range (7 to 16 years). However, the highest incidence of farm-related injuries and fatalities occurs to children aged 1 to 6 years and NAGCAT is unlikely to have any direct effect on this leading injury problem.

   Recommendation No. 3: Develop intervention strategies to address the leading pediatric farm injury problem, injuries and fatalities among children ages 1 to 6 years.

3. Will parents use and apply NAGCAT as intended?

   Some parents will use and apply NAGCAT as intended. But even with NAGCAT in hand, a high level of knowledge about child development, and a perception of farming as a dangerous occupation, many parents will continue to assign developmentally inappropriate and unsafe work to their children, and put children in the face of harm with supervision strategies that are ineffective or inappropriate.

   Recommendation No. 4: Implement environmental and incentive-based strategies to minimize risk, and legislated alternatives that provide equal protections for the youth workforce, as voluntary educational strategies alone are not sufficient to protect children working on farms.

4. Will there be widespread uptake of NAGCAT among agricultural safety professionals and the agricultural populations?

   Uptake of NAGCAT has been sporadic, despite being geographically widespread. There has been no strategic dissemination or marketing plan for NAGCAT, so promotion and dissemination of NAGCAT has depended, almost solely, on a few interested and committed professionals.

   Recommendation No. 5: Develop and implement a marketing and dissemination plan for the work guidelines that includes innovative partnerships with agricultural producers, agribusiness, and farm organizations to promote the use of NAGCAT and its modifications.

REFERENCES

1. Lee B, Marlenga B, eds. *Professional Resource Manual: North American Guidelines for Children's Agricultural Tasks*. Marshfield, WI: Marshfield Clinic; 1999.

2. US Department of Labor. *All About OSHA*. Washington, DC: US Government Printing Office; 2003 Available at: http://web.ics.purdue.edu/~rfeyen/Courses/ie558/OSHA_NIOSH/osha2056.pdf. Accessed December 13, 2011.

3. US Department of Labor, Wage and Hour Division. Child labor requirements in agricultural occupations under the Fair Labor Standards Act. Child Labor Bulletin 102. 2007. Available at: http://www.dol.gov/whd/regs/compliance/mwposter.htm. Accessed December 13, 2011.

4. Fathallah FA, Chang JH, Berg RL, Pickett W, Marlenga B. Forces required to operate controls on farm tractors: implications for young operators. *Ergonomics*. 2008;51:1096–1108.

5. Fathallah FA, Chang JH, Pickett W, Marlenga B. Ability of youth operators to reach farm tractor controls. *Ergonomics*. 2009;521:685–694.

6. Chang JH, Fathallah FA, Pickett W, Miller BJ, Marlenga B. Limitations in fields of vision for simulated young farm tractor operators. *Ergonomics.* 2010;53: 758–766.

7. Waters TR, Wilkins JR III. *Conference Proceedings: Prevention of Musculoskeletal Disorders for Children and Adolescents Working in Agriculture*. Cincinnati, OH: Department of Health and Human Services, National Institute for Occupational Safety and Health; June 2004. DHHS (NIOSH) Publication No. 2004-119.

8. Allread WG, Wilkins JR III, Waters TR, Marras WS. Physical demands and low-back injury risk among children and adolescents working on farms. *J Agric Saf Health.* 2004;10:257–274.

9. Allread WG, Waters TR. Interventions to reduce low-back injury risk among youth who perform feed handling and scooping tasks on farms. *J Agric Saf Health.* 2007;13:375–393.

10. Kotowski SE, Davis KG, Waters TR. Investigation of select ergonomic interventions for farm youth. Part 1: shovels. *J Agromedicine*. 2009;14:33–43.

11. Kotowski SE, Davis KG, Waters TR. Investigation of select ergonomic interventions for farm youth. Part 2: wheelbarrows. *J Agromedicine*. 2009;14: 44–57.

12. Gillette JC, Stevermer CA, Meardon SA, Derrick TR, Schwab CV. Upper extremity and lower back moments during carrying tasks in farm children. *J Appl Biomech*. 2009;25:149–155.

13. Gillette JC, Stevermer CA, Miller RH, Meardon SA, Schwab CV. The effects of age and type of carrying task on lower extremity kinematics. *Ergonomics.* 2010;53:355–364.

14. Peterson L, Ewigman B, Kivlahan C. Judgments regarding appropriate child supervision to prevent injury: the role of environmental risk and child age. *Child Dev.* 1993;64:934–950.

15. Morrongiello BA, Marlenga B, Berg R, Linneman J, Pickett W. A new approach to understanding pediatric farm injuries. *Soc Sci Med*. 2007;65:1364–1371.

16. Morrongiello BA, Pickett W, Berg RL, Linneman JG, Brison RJ, Marlenga B. Adult supervision and pediatric injuries in the agricultural worksite. *Accid Anal Prev*. 2008;40:1149–1156.

17. Marlenga B, Brison RJ, Berg RL, Zentner J, Linneman J, Pickett W. Evaluation of the North American Guidelines for Children's Agricultural Tasks using a case series of injuries. *Inj Prev.* 2004;10:350–357.

18. Brison RJ, Pickett W, Berg RL, Linneman J, Zentner J, Marlenga B. Fatal agricultural injuries in preschool children: risks, injury patterns and strategies for prevention. *CMAJ*. 2006;174:1723–1726.

19. Gadomski A, Ackerman S, Burdick P, Jenkins P. Efficacy of the North American guidelines for children's agricultural tasks in reducing childhood agricultural injuries. *Am J Public Health.* 2006;96:722–727.

20. Marlenga B, Pickett W, Berg RL. Evaluation of an enhanced approach to the dissemination of the North American Guidelines for Children's Agricultural Tasks: a randomized controlled trial. *Prev Med*. 2002;35: 150–159.

21. Pickett W, Marlenga B, Berg RL. Parental knowledge of child development and the assignment of tractor work to children. *Pediatrics*. 2003;112:e11–e16.

22. Zentner J, Berg RL, Pickett W, Marlenga B. Do parents' perceptions of risks protect children engaged in farm work? *Prev Med.* 2005;40:860–866.

23. Lee BC. Illustrative case study B: applying agricultural work guidelines from one country in another. In: Fassa AG, Parker DL, Scanlon TJ, eds. *Child Labour: A Public Health Perspective*. New York: Oxford University Press; 2010:229–241.

24. Rasmusen RC, Schermann MA, Shutsske JM, Olson DK. Use of the North American guidelines for children's agricultural tasks with Hmong farm families. *J Agric Saf Health.* 2001;9:265–274.

25. Yang C. *Orphan Boy the Farmer—Tub Ntsuag Tub ua Teb*. St. Paul, MN: Minnesota Agricultural Experiment Station; 2005. Available at: http://www.extension.umn.edu/distribution/cropsystems/DC8311.html. Accessed December 13, 2011.

26. Lee BC, Fisher RM, Miller ME. Development of safety guidelines for hired adolescent farm workers. In: *Proceedings of NIOSH Invitational Intra/Extramural Agriculture, Forestry, and Fishing Safety and Health Workshop*; August 11, 2009; Cincinnati, OH.