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GUEST EDITORIAL

Breadth of the Socio-Ecological Model

The socio-ecological model (SEM) was first introduced as a conceptual model for understanding human development by Urie Bronfenbrenner in the1970s and later formalized as a theory in the 1980s.[1–3] The initial theory by Bronfenbrenner was illustrated by nesting circles that place the individual in the center surrounded by various systems.[3] The microsystem closest to the individual contains the strongest influences and encompasses the interactions and relationships of the immediate surroundings. The second circle is the mesosystem that looks beyond immediate interactions and includes those the individual has direct contact with such as work, school, church, and neighborhood. The exosystem does not directly impact the individual, but exerts both negative and positive interactive forces on the individual such as community contexts and social networks. The macrosystem includes societal, religious, and cultural values and influences. Lastly, the chronosystem contains both internal and external elements of time and historical content; in revised models, this level includes the influence of policy.[2] The construct of health was broadly conceptualized in the SEM and focused on the major contributors that might affect health. The SEM states that health is affected by the interaction between the characteristics of the individual, the community, and the environment that includes the physical, social, and political components. The Centers for Diseases and Prevention have adapted the SEM for various health promotion endeavors to include the spheres of interpersonal, organizational, community, and policy.[4] In addition, as the initial model acknowledged the many contributors to human development, subsequent revisions and adoptions use the SEM to represent multilevel approaches to areas such as in public health promotion, violence prevention, healthy college campuses, geriatric preventive health, and colorectal cancer prevention to name a few.[5–8]

As a theory-based framework for understanding the multifaceted and interactive effects of personal and environmental factors, the *Journal of Agromedicine* has chosen the SEM[1–3] to examine a wide breadth of elements that influence and contribute to prevalence, prevention tactics, and evaluation of programming and policy to examine safety in the agricultural environment. Included in this edition, Lee et al.[9] discuss how the SEM was used to frame the discussion of agricultural safety and health interventions.

The SEM levels included in this review seek to be comprehensive with the individual, community, institution, and policy. The articles selected for inclusion in this special issue represent various levels of evidence and are commentary, case studies, program reports, brief reports, and research. Additionally, methodology and theory papers are included. The research endeavors are both qualitative and quantitative, and the geographic areas studied are international as seen in the United Kingdom, Ireland, and Australia. Agricultural safety is reviewed across the lifespan from safety in children to adulthood. Authorship of selected articles is also varied. Represented are university agricultural safety and health programs, university extension programs, state departments of health and human services, as well as individual researchers and research teams. Vulnerable populations are integrated into this edition, illustrated in farmers with disabilities, dairy farmers to migrant workers, pediatricians to adolescents, and intergenerational owners to agribusinesses. The collaborations between industry and individuals to promote safety and the impact of policy on organizational safety are likewise present.

The strength of this special edition is the variety of research methods seen in mixed methods, qualitative, and quantitative studies and the variety of hierarchical levels of evidence-based practice represented as categorized by Polit and Beck.[8] The breadth of agricultural safety topics is wide

and captures numerous situations and agricultural workplaces. The passion of authors is evident in their desire to improve safety for those who engage in the agriculture workplace. Difficult topics were included, such as the barriers from farmworkers and the under-reporting of acute occupational pesticide-related illness (AOPI)[10] and data that indicated knowledge of required occupational health and safety regulations does not ensure implementation.[11] New fresh information was brought to the agricultural safety stage with two contributions by Gasperini[12,13] where public policy and the next generation was discussed, as well as a discussion on the influence of workers' safety culture as influenced by leaders in agriculture.

With a critical eye, there are also weaknesses in this special edition. Two additional internationally based articles initially selected were unfortunately removed from the dedicated issue due to authors' time constraints for revisions, and, therefore, most articles focus on domestic issues. Some articles share findings from projects that initially were outreach endeavors, then, subsequently generated research questions that were not clearly identified from the projects' outset. Another weakness of this special edition is the research designs selected by the investigators and authors that were often of a descriptive or correlation nature. The levels of evidence-based practice that result from research design are lower ranked, and generalizability is limited. When quantitative, the majority of results are descriptive with means of central tendency. Sample sizes, generally convenient, are mostly small in number, but are seen to range from a low of 9 to a high of 3665. Few articles include a power analysis.

A synopsis of recommendations identified in the selected articles points to the utilization of all levels of the SEM framework to provide guidance to capture the multiple influences that impact agricultural safety. Initiatives from governmental state agencies have been shown to improve the health of agricultural workers, and it was demonstrated that the development of interagency agreements may strengthen programs and injury surveillance.[14,15] There was an acknowledged need to support comprehensive programs that strengthen relationships via networking, sharing information, appropriate legislation, and enhancing leadership, as well as developing best practices in safety management practices.[16,17] To be good stewards of resources, the already created safety curricula need to be promoted nationally and be available for free download shared by multiple agencies, schools, and institutions. Delivering safety messages through existing FFA Chapters and secondary education programs was found to be effective.[18] Additionally, results from one study suggested that mass mailings of injury prevention materials may be a low-cost method of bringing safety awareness to the public.[19] Furthermore, understanding individual characteristics and environmental factors such as attitudes toward safety climate, compliance, and motivation was shown to contribute nontechnical farming skills and can, therefore, guide the development of agricultural safety programs. Examining untapped collaborators, work by Bendixsen et al.[20] stated that agricultural bankers and insures can be good purveyors of safety training. Safety in children was considered within the lens of access to childcare, and findings showed migrant workers sought out employment opportunities based on the availability of childcare.[21] Likewise, a survey of agribusiness owners and human resource directors demonstrated that offering childcare contributed to the value of improved morale and company reputation, as well as providing a more stable workforce, however, many lacked guidance on how to do so.[22] In conclusion, it was noted that in examining safety and well-being the most influential factor in the SEM was interpersonal-organizational.

In summary, authors recommended the dissemination of eligible resources to owners about federally funded migrant health centers, improving toxicology training to health care students and professionals, expanding and strengthening existing programs, and developing interagency agreements to delineate roles and responsibilities for agricultural safety issues. But beyond the learned experience, agricultural bankers and insurers can also represent a positive force in influencing safety decision-making as well as including agribusinesses to support safety of children through appropriate childcare. The creation of social learning in peer groups may be an effective method to increase the adoption of safety standards. And there are untapped resources for promoting safety,

such as rural pediatricians, nurse practitioners, and other health care providers.[23]

Agriculture remains today a dangerous industry, and safety decreases mortality and morbidity. The impact of traditions, culture, research, technology, and policy all influence the interactions and relationships of the nesting circles of the SEM. Within the pages here, future research projects were identified that included exploring partnerships and collaborations that may be found in the levels of the SEM. Authors noted the need for more well-designed and rigorous research in all areas of agricultural safety. This special issue of the *Journal of Agromedicine*, guided by the adapted SEM, brings to the forefront the many facets of the microsystem, mesosystem, exosystem, macrosystem, and chronosystem that contribute to the determinants of agricultural safety.

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Guest Editor

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