



The Convergence of Science and Culture: Developing a Framework for Diabetes Education in Tribal Communities

## Journal of Health Disparities Research and Practice

Volume 1 | Issue 3

Article 7

© Center for Health Disparities Research, School of Public Health, University of Nevada, Las Vegas

2007

### The Convergence of Science and Culture: Developing a Framework for Diabetes Education in Tribal Communities

Michelle Chino Dr , *University of Nevada, Las Vegas*, michelle.chino@unlv.edu

Carolee Dodge Francis , *University of Nevada, Las Vegas*, carolee.dodgefrancis@unlv.edu

Lemyra DeBruyn , *Centers for Disease Control, Native Diabetes Wellness Program*

*See next page for additional authors*

Follow this and additional works at: <https://digitalscholarship.unlv.edu/jhdrp>



Part of the [Community-Based Research Commons](#), [Community Health and Preventive Medicine Commons](#), [Endocrinology, Diabetes, and Metabolism Commons](#), [Inequality and Stratification Commons](#), [Public Health Education and Promotion Commons](#), and the [Race and Ethnicity Commons](#)

#### Recommended Citation

Chino, Michelle Dr; Dodge Francis, Carolee; DeBruyn, Lemyra; Short, Lynn; and Satterfield, Dawn (2007) "The Convergence of Science and Culture: Developing a Framework for Diabetes Education in Tribal Communities," *Journal of Health Disparities Research and Practice*: Vol. 1: Iss. 3, Article 7. Available at: <https://digitalscholarship.unlv.edu/jhdrp/vol1/iss3/7>

This Article is protected by copyright and/or related rights. It has been brought to you by Digital Scholarship@UNLV with permission from the rights-holder(s). You are free to use this Article in any way that is permitted by the copyright and related rights legislation that applies to your use. For other uses you need to obtain permission from the rights-holder(s) directly, unless additional rights are indicated by a Creative Commons license in the record and/or on the work itself.

This Article has been accepted for inclusion in Journal of Health Disparities Research and Practice by an authorized administrator of Digital Scholarship@UNLV. For more information, please contact [digitalscholarship@unlv.edu](mailto:digitalscholarship@unlv.edu).

---

# The Convergence of Science and Culture: Developing a Framework for Diabetes Education in Tribal Communities

## Abstract

In an unprecedented effort to address the epidemic of diabetes in tribal communities, the Diabetes Education in Tribal Schools project brought together a group of individuals from eight tribal colleges and three federal agencies to develop a diabetes prevention curriculum for American Indian and Alaska Native school children. The curriculum incorporates Western and Native science with culturally responsive teaching techniques. Both the project and its evaluation process have reached beyond conventional bounds to acknowledge fundamental issues of tribal culture, history and health and the integration of science, culture, and community. This article will discuss the challenges and rewards of the inter-cultural dynamics of the project's development process, the tribal community context within which the curriculum will be implemented, and the necessary convergence of science and culture, requisite for education in this population and the elimination of diabetes-related health disparities.

## Keywords

Alaska Natives; American Indians; Children; Cultural competence; Diabetes – Prevention; Diabetes – Study and teaching; Diabetes education; Disparities; Health education; Indians of North America; Native science

## Cover Page Footnote

Cankdeska Cikana Community College, Fort Totten, ND; Fort Peck Community College, Poplar, MT; Haskell Indian Nations University, Lawrence, KS; Keweenaw Bay Ojibwa Community College, Baraga, MI; Leech Lake Tribal College, Cass Lake, MN; Northwest Indian College, Bellingham, WA; Southwest Indian Polytechnic Institute, Albuquerque, NM; Stone Child College, Box Elder, MT; National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health, Bethesda, MD; Native Diabetes Wellness Center, Centers for Disease Control and Prevention, Albuquerque, NM; National Diabetes Program, Indian Health Service, Albuquerque, NM; Office of Science Education, National Institutes of Health, Bethesda, MD; PS International, Annapolis, MD. Developing a Framework for Diabetes Education in Tribal Communities

## Authors

Michelle Chino Dr, Carolee Dodge Francis, Lemyra DeBruyn, Lynn Short, and Dawn Satterfield



## **The Convergence of Science and Culture: Developing a Framework for Diabetes Education in Tribal Communities**

Michelle Chino, University of Nevada Las Vegas, School of Public Health  
Carolee Dodge-Francis, University of Nevada Las Vegas, School of Public Health  
Lemyra DeBruyn, Centers for Disease Control, Native Diabetes Wellness Program  
Lynn Short, Analytic Systems Associates, Inc.  
Dawn Satterfield, Centers for Disease Control, Division of Diabetes Translation

### **Abstract**

In an unprecedented effort to address the epidemic of diabetes in tribal communities, the Diabetes Education in Tribal Schools project brought together a group of individuals from eight tribal colleges and three federal agencies to develop a diabetes prevention curriculum for American Indian and Alaska Native school children. The curriculum incorporates Western and Native science with culturally responsive teaching techniques. Both the project and its evaluation process have reached beyond conventional bounds to acknowledge fundamental issues of tribal culture, history and health and the integration of science, culture, and community. This article will discuss the challenges and rewards of the inter-cultural dynamics of the project's development process, the tribal community context within which the curriculum will be implemented, and the necessary convergence of science and culture, requisite for education in this population and the elimination of diabetes-related health disparities.

Key Words: diabetes education, American Indians, native science, disparities

### **Introduction**

The development of American Indian and Alaska Native community health programs takes place within cultural, social, political and historical contexts defined by the community and shaped by individual experiences (SenGupta, Hopson, and Thompson-Robinson 2004). Tribal culture encompasses a way of living informed by local history, language, economics, politics and the environment, all of which should be integrated into

community health programs. As such, programs should be designed and implemented within the context of the community culture, and their evaluation must reflect the depth of the cultural contributions. The implication is that a program embedded in a cultural framework is more responsive to integrating local issues and perspectives and would be more useful to the community in reinforcing strengths to solve problems and implement appropriate solutions.

Every community has a cultural history and context. In mainstream society, however, history, culture, and context are rarely included as acknowledged attributes of programs or program evaluation. In contrast, programs implemented in American Indian and Alaska Native communities require not only an understanding of unique cultural and political issues, but inclusion of the cultural and historical context as primary variables (Chino and DeBruyn 2006). Too often programs developed in a cultural context merely add a description of the culture under study and do not integrate cultural variables into the process itself. Rarely are programs and their subsequent evaluations embedded in an indigenous framework which, despite the need for a careful consideration of design and methods, will likely be more responsive to tribal values (LaFrance 2004) and lead to the establishment of necessary partnerships and reciprocity.

The importance, the challenges, and the methodological considerations of program design and evaluation in cultural context have been put to the test recently in developing, implementing, and evaluating the Diabetes Education in Tribal Schools (DETS) project. In 2000, the National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases (NIH-NIDDK) and Office of Science Education; the Centers for Disease Control and Prevention Division of Diabetes Translation (CDC); and the Indian Health Service (IHS), co-funded the Diabetes Education in Tribal Schools (DETS) project to develop a diabetes prevention curriculum specifically designed for American Indian and Alaska Native school children.

The project brought together approximately 28 individuals including two representatives from each of the three federal agencies, teams of Native curriculum developers from eight Tribal Colleges and Universities (TCUs), and an evaluation team comprised of two Native evaluators and one non-Native evaluator and an external curriculum evaluation consultant. The primary working groups included three curriculum committees: K-4, 5-8, and 9-12. These curriculum committees further involved teachers and community members from their local communities to facilitate the development of curriculum content.

Once rare among Native people, type 2 diabetes is now one of the most common and most serious illnesses facing American Indians and Alaska Natives in the United States today. Native people, on average are more than two times as likely to have type 2 diabetes as non-Hispanic whites (Centers for Disease Control). Further, type 2 diabetes among children has become a growing phenomenon with children as young as age five being diagnosed with what was once called “adult onset diabetes” (Haney, 2003). The impact of diabetes among American Indians and Alaska Natives has been devastating, contributing to a long legacy of loss of land, culture, and language (Satterfield et al., 2007).

## Diabetes Education in Tribal Schools

Type 2 diabetes is a complex illness involving reciprocal interactions of related factors: acquired patterns of eating and activity; inherent factors such as gender, age, and genetic predisposition; histories of dispossession of land, language, and culture (Narayan 1997), and other sociological and environmental factors (e.g., economic status and natural and constructed physical environments). Powerful risk factors for diabetes including obesity and sedentary living cannot be isolated from their context in communities (Bird 2002; Satterfield, Murphy, Essien et al. 2004).

With chronic diseases such as diabetes, “the health of the individual is almost inseparable from the health of the larger community” (Healthy People 2010, 2000). As such, behavioral and social components are critical to diabetes prevention, early intervention and disease management. Patients, families, communities, and particularly children need information about both the medical and the behavioral aspects of prevention and disease management. Children are not only at an increasingly high risk of developing diabetes, but many help care for family members who have the disease. Further, as potential future scientists and clinicians for their communities, children must have access to science and health education, an effort that will ultimately increase American Indian participation in research and health professions.

## Project Methods

The DETS project is part of a national effort to decrease the incidence and improve the care of type 2 diabetes among American Indians and Alaska Natives. The DETS Project is a K-12 curriculum that has a multidisciplinary approach. There are three project goals: 1) Increase the understanding of health, diabetes, and maintaining life in balance among American Indian/Alaska Native students. 2) Increase American Indian / Alaska Native students’ understanding and application of scientific and

community knowledge about health, diabetes, and maintaining balance, and of the processes of development of that knowledge, and 3) Increase interest in science and health professions among American Indian / Alaska Native youth.

To address these goals, the DETS project is developing curriculum supplements designed to complement, align with, and be consistent with the National Science Education Standards.<sup>1</sup> The curriculum consists of units that incorporate these standards and also have an inquiry-learning format, and include American Indian/Alaska Native cultural and community knowledge. The lessons within each unit are structured in the 5-E format (Engage, Explore, Explain, Elaborate, and Evaluate) because it supports a constructivist teaching strategy and is based on how student learning occurs. The lesson plans include inquiry-based characteristics such as science problem solving, utilizing critical and scientific reasoning skills, and meta-cognition, allowing students to experience and integrated instructional unit. The DETS project team believes that an inquiry-based classroom is the ideal setting for these lesson plans and is also reflective of more traditional Native teaching methods.

The purpose of the full curriculum is to enhance student learning and understanding about diabetes and to heighten interest in science and health careers. Content in the K-4 curriculum will teach students to: develop a concept of health and being healthy through balance in life; identify how making healthy food choices and being physically active everyday can prevent diabetes; and explore the concepts of balance and imbalance through learning activities and visual aids. These concepts of balance are applied to maintaining health. The 5-8 curriculum contents teaches students to: describe lifestyle in terms of dietary patterns, physical activity levels, and personal choices; identify environmental changes that can be made to improve or maintain personal health as well as the health of families and communities; understand, as the result of scientific investigation and the accumulation of evidence, that disease develops slowly across time; and understand that diabetes is a disease in which a person's body is not able to use glucose properly. The 9-12 content teaches high school students to understand three main science concepts: blood glucose, homeostasis and that health is life in balance; to define diabetes, identify risks for type 2 diabetes, and explore the involvement of five professions in the treatment and prevention of type 2 diabetes; and to identify educational pathways to scientific careers and health professions.

What makes these curriculum lessons unique is the blending of cultural teachings and Native science with Western science and multime-

dia technology. The effort is timely in that discussions among American Indian and other indigenous researchers about Native or indigenous approaches to knowledge and science that contrast Western “ways of knowing” (LaFrance 2004; Christensen 2002; Garoutte 2003; Duran 1996; Deloria 1999) have increased dramatically in recent years. These concepts go well beyond the notion of cultural competence<sup>2</sup> between Western institutions and Native community groups to provide a framework based on community values and Indigenous perspectives not typically included in Western models (Smith 1999).

This approach is a very different way of teaching children about health, science, and tribal culture that currently exists in any tribal school. According to Cajete (1999), most schools present science from an entirely Western cultural perspective, focusing on experimentation and methodological rigor without considering art or philosophy. The western model can create conflict for students raised in more holistic and ecological ways of looking at the world. In fact, they may find the Western framework more limited and uninteresting. Cajete (1999) defines models for Native science education that expand the boundaries of measurement and honor the importance of direct experience, inter-connectedness, relationship, and value. Smith (1999) describes an indigenous research agenda based on Native-centered priorities, linking self-determination with decolonization, healing, mobilization, and transformation. These approaches suggest that research goals must provide for indigenous peoples not only taking charge of their own agendas, but naming the processes and methodologies that respect Native framing of place, community, values, and culture (Cajete 1999).

The DETS project is not solely about developing a curriculum. There is also a strong community component allowing each set of curriculum lessons to work in tandem with other community diabetes prevention efforts that involve children, their parents, and communities in the process. This vital component provides opportunities for local activities and programs to establish linkages with school-based efforts and create a consistent, community-wide focus on diabetes prevention and education.

Another key element of the conceptual framework for developing the DETS curricula and the corresponding community activities was recognition of the multiple dimensions of Native wellness. Most tribal groups define health and wellness in terms of physical, emotional, cognitive, and spiritual components. Diabetes is viewed as not only a disease of the body but one that also impacts an individual and community's heart, mind, and spirit. This multidimensional framework was further expanded to demonstrate the projects' commitment to community

involvement, healthy lifestyles, prevention and education. Multiple discussions of health and disease lead the DETS group to adopt the phrase "Health is Life in Balance" as the impetus for creating the curriculum and for staying true to concepts of Native wellness.

## **Core Challenges for the Project**

A project of this scope has myriad complex issues that were not necessarily apparent until the project unfolded. The melding of cultural distinctions related to American Indian/Alaska Native people and health within an educational framework posed unique pedagogical issues. The process of developing a culturally responsive health education curriculum that integrates Native history, language, knowledge, and perspectives often pushed the development process from educational intentions to political stances. In addition to process, curriculum, and scientific integrity issues, three core issues emerged that required dialogue and continued study by project partners: 1) intercultural dynamics, 2) the convergence of science and culture, and 3) community context.

### **The Challenge of Intercultural Dynamics**

Cultural dimensions for this project included not only the eight distinct tribal cultural communities who are piloting the curriculum, but the "agency cultures" of the three federal partners, the "culture" of the science community, and the "culture" of the education and academic community. Project partners realized that, while the curriculum is designed for American Indian students, many of the classrooms will have a mix of students from different tribes as well as non-Indian students. Teachers will be both Indian and non-Indian with varying degrees of experience working in Native communities.

While the group was addressing the broader issues of American Indian/Alaska Native cultures, there were still questions of the curriculum's application to specific community cultures. As lessons were designed and tested, it became more apparent how each could be adapted to local community cultures and integrate local symbolism, local foods, and local activities. Pilot testing further revealed the need for teacher guidance in some culture and science content areas. The lessons now include suggestions for infusing localized cultural elements and cultural guidance for teachers.

The problem of understanding how to address the multiple cultural dimensions of the project was recognized from the start; however, the full scope of what was needed took more time to articulate. For example, throughout the curriculum development process, both tension and il-



lumination permeated efforts to understand the historical and contemporary marginalization of Native people and efforts to integrate the Native cultural context with the culture of the Western educational process. Westernized educational systems have institutionalized a dominant, linear perspective that pays nominal heed to the understanding of Indian students and which minimizes the importance of Native culture and worldview within the educational context.

It became increasingly clear that cultural responsiveness goes beyond what happens in the classroom. Every member of the project team was challenged to acknowledge and accept the array of cultural differences within the group and decide how to honor, value, and integrate differences and contributions. Four ideological themes were continually critiqued among the group:

- The role of historical trauma<sup>3</sup>: in particular, the historically paternalistic role of the US government with regard to American Indian/Alaska Native people, and the negative relationship between western education and Native people resulting from the boarding school era.
- The framing of education and discourse regarding an educational system that does not represent and reflect the cultural spirit of American Indian/Alaska Native people, and that potentially diminishes a Native student's belief that s/he can be successful in science and math and, ultimately, the biomedical professions.
- Conceptualizing life in balance and the understanding that good health is not just the absence of disease. For American Indian/Alaska Natives with diabetes, health also includes striving to maintain a healthy lifestyle while managing the disease.
- The autonomy to define American Indian/Alaska Native existence including a firm conviction that the often stereotypical Westernized definition of American Indian/Alaska Natives does not define Native people. Rather, it is tribal culture, traditions and knowledge that give meaning to the essence of American Indian/Alaska Native people.

Establishing cross-cultural relationships and agreeing on principles of productive communication were essential to building a strong project. Going far beyond mere information sharing, the DETS partners have worked to create a safe and respectful environment in which members can discuss, disagree, negotiate, problem solve, and accept different perspectives, values, and ideas. Quarterly face-to-face meetings held in each of the different tribal communities, regular conference calls, and

small and large group discussions all helped provide a forum for familiarity, formal and informal conversation, and learning. Each meeting provided project members an opportunity to look past the workload and the inherent challenges of such a complex project to remind each other of the importance of the project to future generations of Indian people. As the project evolved and new and unexpected issues arose, the foundation of relationships, open communication, and shared commitment to a common purpose help keep the project vibrant with everyone invested in its success.

### **The Challenge of Infusing Culture into Science Lessons**

A second core issue the project development and evaluation teams have had to address is the curriculum's approach. The DETS curriculum is not only about diabetes awareness and prevention. The intent of the curriculum initially was to integrate state-of-the-art diabetes science with Native culture. The curriculum framework soon added the concepts of Native science and culturally responsive curricula while maintaining the rigor of clinical science.

Native science is a multidimensional definition of the knowledge and teachings of tribal cultures regarding fields that intersect with western science such as environmental ecology, biology, agriculture, medicine, and physics. Lessons necessarily focus both on the cultural and traditional teachings as well as the science of diabetes. This approach is a very different way of teaching children about health, science, and tribal culture than currently exists in any tribal school. According to Cajete (1999), most schools present science from an entirely Western cultural perspective, focusing on experimentation and methodological rigor without considering the art and philosophy that is also an aspect of any scientific endeavor.

All societies tend to emphasize development of competencies that are deemed valuable within that context. Consequently, the extent to which American Indian/Alaska Native students learn in culturally conditioned ways is a key element in making science relevant. Most Western science education is conducted entirely through textbooks (Kuhn 1977). Native science, however, is a more integrated process with no separation of science, art and philosophy (Cajete 2000). The western model can create conflict for students raised in more holistic and ecological ways of looking at the world. In fact, these students may find the Western framework more limited and uninteresting.

Addressing the issue of infusing culture and science has been, at times, contentious and illuminating, both essential to the project's de-

velopment. As various interpretations of “culturally integrated science lessons” were presented, the project team recognized the need for high level communication and time devoted to working through issues and alternative understanding. Often the group was forced to revisit the original intent of the project, the project goals, and the very core of what constitutes both “culturally responsive education” and “science education.” Agreeing on project goals was relatively easy. Agreeing on their interpretation and manifestation was far more challenging.

The curriculum now includes an array of lesson formats that integrates Western science, Native science, and Native cultural elements in varying ways. Some lessons start with the science of diabetes and interweave cultural and historical elements. Others start with cultural lessons that are then linked to understanding diabetes and its impact on tribal communities. There are also lessons that start with Native science, such as traditional ecology, but expand to address lifestyle changes over time and new knowledge from Western science and medicine.

### **The Challenge of Context**

As the initial pilot testing of the lessons progressed, the issue of community context became another core issue. While most tribes share some commonalities in terms of history, values, and worldview, they are culturally, geographically, economically and politically diverse. Consequently, an understanding of the context into which the curriculum will be introduced was deemed essential. Context also reflects each community’s ability to adopt and adapt the curriculum in ways appropriate to local needs and resources. This project will challenge teachers, school administrators, parents and community leaders to rethink possibilities for educating children and addressing diabetes for the long term.

In order to understand and define the context and each community’s readiness to implement the curriculum, the tool of ethnography was introduced as a means to explore and define culture and context, receptivity, involvement, and potential impact of the curriculum in the pilot communities. Ethnography is a qualitative research process that produces cultural interpretation through rich description. An ethnographer goes beyond reporting events and details of experience to explaining how these events represent the webs of meaning of people’s lives (Gold 1997). Rather than relying on a preconceived method for gathering information, an ethnographic approach facilitates definition of a framework for understanding and assessing curriculum implementation in each of the pilot communities. The information learned from this process helped the project identify core contextual issues that would help or hinder communities’ ability to successfully adopt and adapt the materials.

An additional aspect of context is how the project and the communities will address the third project goal—increasing American Indian/Alaska Native student interest in entering science and health professions. Multiple and complex areas need to be addressed, from the perception of what a “scientist” is and “looks like,” to the need for math and science skills, multi-dimensional support for higher education (including financial, emotional and social support), opportunities for working with tribes, and inequities that contribute to a low representation of American Indians and Alaska Natives in science professions. For the project to be successful, both short and long-term, tribal communities must not only be able to integrate the curriculum into local schools, but support and enhance school based activities with community-wide diabetes prevention interventions.

## Conclusions

Two valuable lessons have been learned from the DETS project so far. First, a commitment to a high level of on-going, interpersonal communication is essential to problem solving and forward progress. Communication was at the heart of creating a long-term individual and group investment in the process. Second, knowledge and skills are necessary but not sufficient. Just as Native wellness models incorporate physical, emotional, cognitive, and spiritual dimensions, projects such as DETS that are designed to promote Native wellness must also incorporate physical, emotional, cognitive and spiritual dimensions in the developmental process from the beginning. It is essential to come to the process with mind, body, culture, history, and spirit open to creating interdependent and sustained relationships. As a result, true partnerships have developed, and evaluation has become an essential part of the progress with mutual learning and involvement at all levels. The need for innovation has helped ensure both the project’s viability and that the evaluation framework and methods are capturing its true essence and outcome. Above all, the cultural exchange—among tribes, tribal colleges, federal agencies, and community and school partners—has invigorated and inspired both the project design and the resulting curricula.

This project has faced multiple challenges in developing both the curriculum and evaluation processes. However, as a result of the high level of communication among project team members and their strong dedication to the project, these challenges have been regularly addressed and resolved. The ability to address fundamental issues of tribal diversity, cultural and geographic distances between multiple project partners, and the identification of project stakeholders set the groundwork for how the project team would address even more daunting issues. All

team members faced unexpected and sometimes uncomfortable learning curves. For example, in-depth discussions of issues peripheral to the curricula but central to American Indians, such as the impact of historical trauma and cultural oppression on chronic disease, provided opportunities for every person to expand his or her thinking, whether or not they agreed. With a curriculum designed to be an agent of change for diverse communities and potentially for tribal nations across the country, all possible interpretations and manifestations are being explored.

The Diabetes Education in Tribal Schools project has challenged all the partners' physical and mental stamina with the time investment and effort needed to do the best job possible. It has pushed the limits of everyone's cognitive abilities regarding knowledge of the science and art of diabetes prevention for American Indian and Alaska Native peoples. More importantly, this project has challenged us all to bring our emotions and spirits to the process. Having done so, the impact of that process and the resulting curriculum will be a groundbreaking innovation in diabetes education and wellness. And hopefully, this curriculum will achieve its objective to divert the advancement of type 2 diabetes within American Indian and Alaska Native youth populations.

Currently, the DETS curriculum is in the final implementation phase of evaluation. This final evaluation component will collect teacher feedback and pre- and post-test student achievement. The long-term measure of success will be the adoption and use of the DETS curriculum within Tribal K-12 school systems. This curriculum will be available at no cost to all Tribal schools in the fall of 2008.

## **Acknowledgments**

Cankdeska Cikana Community College, Fort Totten, ND; Fort Peck Community College, Poplar, MT; Haskell Indian Nations University, Lawrence, KS; Keweenaw Bay Ojibwa Community College, Baraga, MI; Leech Lake Tribal College, Cass Lake, MN; Northwest Indian College, Bellingham, WA; Southwest Indian Polytechnic Institute; Albuquerque, NM; Stone Child College, Box Elder, MT; National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health, Bethesda, MD; Native Diabetes Wellness Center, Centers for Disease Control and Prevention, Albuquerque, NM; National Diabetes Program, Indian Health Service, Albuquerque, NM; Office of Science Education, National Institutes of Health, Bethesda, MD; PS International, Annapolis, MD.

## Notes

1. In 1996, the National Academy of Sciences released the National Science Education Standards, which outlines what all citizens should understand about science by the time they graduate from high school. The Standards encourage teachers to select major science concepts that empower students to use information to solve problems rather than stressing memorization of unrelated information.
2. A mainstream construct usually defined as skills, attitudes, and knowledge that allow persons, organizations, and systems to work effectively with diverse racial, ethnic, and social groups; in our estimation, this construct is most often enacted by a one-way relationship designed to help communities accept western concepts and programs, but not necessarily integrate the cultural ways of the community into the respective programs themselves.
3. The concept of historical trauma has been defined as a natural consequence of tragic historical events (including genocide and the forced removal of children to boarding schools) affecting the health of Indigenous Peoples. The concept includes the collective emotional and psychological injury resulting from traumatic events, the disruption of adaptive social and cultural patterns, and the breakdown of social functioning across generations. Currently, many tribes are consciously working to rebuild and heal from these losses as well as express resilience through the use of traditional healing methods such as talking circles.

## References

- Bird, M.E., 2002. Health and indigenous people: recommendations for the next generation. *American Journal of Public Health* 92: 1391-1392
- Cajate, G. 1999. *Igniting the Sparkle: An Indigenous Science Education Model*, Skyand, NC; Kivaki Press.
- Cajate, G. 2000. *Native Science: Natural Laws of Interdependence*. Santa Fe, NM; Clear Light Press.
- Centers for Disease Control and Prevention (CDC). Division of Diabetes Translation Fact Sheet. 2005. Atlanta: Available at: [www.cdc.gov/diabetes/pubs/pdf/ndfs\\_2005.pdf](http://www.cdc.gov/diabetes/pubs/pdf/ndfs_2005.pdf).
- Chino, M., DeBruyn, L. (2006). Building True Capacity: Indigenous models for Indigenous communities. *American Journal of Public Health* 96(4): 596-599
- Christensen, R. 2002. Cultural context and evaluation: a balance of form and function. In: *Workshop Proceedings of the Cultural Context of Educational Evaluation: A Native American Perspective*. Arlington, VA; National Science Foundation.
- Deloria, V. 1999. Ethnoscience and Indian Realities. In: *Spirit and Reason: The Vine Deloria Reader*, edited by B. Deloria, K. Foehner, S. Scinta S, Golden, CO; Fulcrum Press.
- Duran, B. 1996. Indigenous versus colonial discourse: alcohol and American Indian identity. In: *Dressing in Feathers: The Construction of the Indian in American Popular Culture*. Edited by E. Bird 111-128. Boulder, Westview Press.

- Garoutte, EM. 2003. *Real Indians: Identity and the Survival of Native America*. Berkeley; University of California Press.
- Gold, R 1997. The ethnographic method in sociology. *Qualitative Enquiry*, 3(4): 387-402.
- Haney, D. 2003. The National Alarm over Rise in Diabetes in Children: The Type 2 Disease Rarely Occurred before Age 50. Doctors Blame the Dangerous Shift on Inactivity and Overeating. *Los Angeles Times*, April 13.
- Healthy People 2010: Understanding and Improving Health. U.S. Public Health Service. Centers for Disease Control and Prevention. November 2000. Page 3.
- Kuhn, T 1977. *The essential tension: selected studies in scientific tradition and change*. Chicago; University of Chicago Press.
- LaFrance, J. 2004 Culturally competent evaluation in Indian country. In M. Thompson-Robinson, R. Hopson, & S. SenGupta,(Eds.), *New Directions for Evaluation: In Search of Cultural Competence in Evaluation*, (102, 39-50). American Evaluation Association.
- Narayan, KMV. 1997. Diabetes mellitus in Native Americans: the problem and its implications. *Population Research and Policy Review*, 16:169-192.
- Satterfield DW, Eagle Shield J, Buckley J, Taken Alive S. 2007. So That The People May Live (Hecel Lena Oyate Ki Nipi Kte): Lakota and Dakota Elder Women as Reservoirs of Life and Keepers of Knowledge about Health Protection and Diabetes Prevention. *Journal of Health Disparities Research and Practice*, 1 (2): 1-28.
- Satterfield DW, Murphy D, Essien JDK, Hosey G, Stankus M, Hoffman P, Beartusk K, Mitchell PL, & Alfaro-Correa A. 2004. Using the essential public health services as strategic leverage to strengthen the public health response to diabetes. *Public Health Reports*, 2004, 119(3): 311-321.
- SenGupta, S., Hopson, R.,& Thompson-Robinson, M. Cultural Competence in Evaluation: An Overview. In *Directions for Evaluation: In Search of Cultural Competence in Evaluation*, Edited by M. Thompson-Robinson, R. Hopson, & S. SenGupta, 102, 5-19. American Evaluation Association.
- Smith LT. 1999. *Decolonizing Methodologies: Research and Indigenous Peoples*. London: Zed Books, Ltd.

**Michelle Chino**, PhD, University of Nevada Las Vegas, School of Public Health, Center for Health Disparities Research, Las Vegas, Nevada

**Carolee Dodge-Francis**, EdD, University of Nevada Las Vegas, School of Public Health, American Indian Research and Education Center, Las Vegas, Nevada

**Lemyra DeBruyn**, PhD, Centers for Disease Control Native Diabetes Wellness Program, Albuquerque, New Mexico

**Lynn Short**, PhD, Analytic Systems Associates Inc. Atlanta, Georgia

**Dawn Satterfield**, PhD, Centers for Disease Control Division of Diabetes Translation, Atlanta, Georgia

