TRIBAL CONNECTIONS HEALTH INFORMATION OUTREACH: RESULTS, EVALUATION, AND CHALLENGES

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Tribal connections health information outreach: results, evaluation, and challenges

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In 1997, the National Library of Medicine (NLM), a component of the National Institutes of Health (NIH), initiated a program of intensified outreach to Native Americans, initially focusing on the Pacific Northwest in collaboration with the Pacific Northwest Regional Medical Library (PNRML). This initiative, known as the Tribal Connections Project, emphasized the establishment or strengthening of Internet connections at select Indian reservations and Alaska Native villages and related needs assessment and training. The hope was that these efforts would improve tribal access to health information available via the Internet and the Web. Phase I included sixteen tribal sites—eight in Washington, four in Alaska, two in Montana, and one each in Oregon and Idaho. Phase I results indicate that the project was successful in assessing local needs and building awareness of the Internet, forging new partnerships with and between the participating Indian reservations and Alaska Native villages and other organizations, making real improvements in the information technology (IT) infrastructure and Internet connectivity at fifteen of sixteen sites, and conducting training sessions with several hundred tribal participants across thirteen sites. Most importantly, the project demonstrated the key role of tribal community involvement and empowerment and contributed to development of an outreach evaluation field manual and the evolving concept of community-based outreach. The knowledge gained from Tribal Connections Project Phase I is helping refine and enhance subsequent NLM-sponsored tribal connections and similar community outreach efforts.

INTRODUCTION

The Tribal Connections Project reported here was conducted as part of the National Library of Medicine's (NLM's) health information outreach to rural, underserved, and minority communities [1, 2]. The project responded in part to a 1996 review [3] that concluded that up to that time, NLM outreach to Native American communities had been limited and unfocused, with only a handful of activities scattered among various regions of the country, mostly training classes conducted by some Regional Medical Libraries (RMLs) as part of their general outreach.

In 1997, NLM decided that the time was right to initiate a more focused outreach effort directed toward Native Americans. This decision was based on several factors:

- NLM's own review pointed to the need for greater emphasis on outreach to Native Americans [4].
- Health statistics showed that American Indians and Alaska Natives, as a group, have a higher incidence of various medical conditions such as alcoholism and diabetes [5, 6], the so-called "health disparities."
- Several studies pointed out that many Indian reservations and Native villages were underserved with regard to basic telephone service and the technical infrastructure needed to take advantage of the Internet and Web, the so-called "digital divide" [7–11].
- The Pacific Northwest Regional Medical Library (PNRML) was experienced and expressed strong interest in more intensive outreach to Native Americans.

The Pacific Northwest region is home to more than fifty Indian reservations, collectively, in Washington, Oregon, Idaho, and Montana, and more than 220 Native villages and Indian reservations in Alaska. This is one of the regions of the country with a relatively high number of Native Americans living in rural, remote areas. The PNRML had already included select tribal groups in its outreach program and was primed to expand this effort to include a more comprehensive community-based approach.

Thus in late 1997, NLM, working through its Office of Health Information Programs Development (OHIPD), initiated a formal collaboration with the PNRML for the Tribal Connections Project. OHIPD provided funding for hiring a project manager at the PNRML and about $25,000 per site for technical infrastructure improvements at sixteen tribal sites. OHIPD worked closely with the PNRML on project planning and execution and in setting up an advisory panel for the project. The PNRML provided training support at participating sites, with funding from its core National Network of Libraries of Medicine (NN/LM) outreach budget.

Implementation of Tribal Connections Project Phase I, at the sixteen sites, took place over a three-year period from September 1998 through September 2001.

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This paper briefly discusses the project methodology, presents in some detail the project results, and discusses the implications and resulting conclusions. The paper mentions other related NLM follow-up initiatives. These include Tribal Connections Project Phase II (with 4 sites in the Pacific Southwest) that started in September 2000 and Tribal Connections Project Phase III (intensive follow-up at select Phase I/II sites) that began in September 2001—both Phase II and III are still underway.

METHODS

The authors highlight the key elements of the Tribal Connections Project methodology in this paper. Further details can be found in a companion paper [12]. The central methodology of the project included:

- project advisory mechanism that included Native Americans,
- community-based approach to project planning and implementation,
- needs assessment in each participating community,
- emphasis on developing partnerships to leverage scarce resources,
- building of technical infrastructure for sustainability,
- training of key staff and community activists at participating sites, and
- evaluation of interventions at select project sites and for the overall project.

One of the first project actions by the PNRML was to hire a project manager who would be based in Seattle but spend substantial time traveling and working onsite at the participating locations. The person selected for this job, Roy Sahali, brought with him a decade of experience in grassroots and community-based development and implementation of community technology centers. The community-based approach meant that site-specific project planning and implementation would be done with the full engagement and participation of the local tribal community leaders and members.

The next project action was a joint effort by the PNRML and OHIPD to develop a project advisory panel for the Tribal Connections Project. The panel was composed of eleven members, including six Native Americans, along with others who brought a range of perspectives on Native American culture, issues, health needs, and technical infrastructure challenges. The first panel meeting took place in June 1998. Following that, the project team developed detailed procedures for soliciting proposals from tribal groups and ultimately selecting the sixteen project sites.

After making initial contacts and establishing relationships in the participating Native communities, the project manager conducted a needs assessment to ascertain what might be the priority technical needs (e.g., for computers, software, wiring, Internet connections) and how the limited project funds might be most advantageously applied. The needs assessments were carried out in collaboration with technical personnel available at each tribal site, as well as with the appropriate tribal managers. The intent was to help assure that the proposed actions were technically sound and fit well with other related tribal or village infrastructure improvement plans or projects.

To complement the technical infrastructure improvements, the project offered training of key tribal or village staff in use of the Internet and accessing health information on the Web. The PNRML provided the training with the goal of conducting two training sessions at each participating site. The training covered the basics of Internet use and searching the Web for health information and was essentially the standard approach used at that time for NN/LM outreach to health professionals.

Finally, the planned evaluation methodology included evaluation of project interventions at all sites, participant feedback on training sessions at select sites, and early evaluation of interventions at two project sites to provide guidance for optimizing later activities. The plan did not include evaluation of the impacts of the project on health information-seeking behavior or use.

Table 1 lists the specific participating tribes or villages, and Table 2 illustrates the range of geographies represented by these tribes.

The results reported in this paper are based primarily on site-specific observations and numerous discussions, meetings, and interviews with project participants over the course of the project.

RESULTS

Needs assessments

The project implementation began with an assessment of the tribal needs for infrastructure improvements that would facilitate access to the Internet and thus to health information available on the Web. The assessment was typically framed in the context of understanding the local community in an unassuming, open-minded manner with emphasis on collaboration and partnering (Table 3).

In many ways, engaging local tribal leaders and key staff in the local needs assessment was the single most important factor in Tribal Connections Project success. If key tribal staff were not involved, it would be difficult to move the project forward. Likewise, if a valid needs assessment could not be conducted, the investment of resources could very well be misdirected, inefficiently applied, or incompatible with other preexisting or planned systems and networks. The project manager gave priority to these two combined tasks—engaging and working with the tribal leaders and staff to understand and define needs and spending an estimated two to three work weeks per site on average to develop the needs assessment. The average two to three weeks included time onsite during one, or sometimes two, site visits, time on the telephone with tribal staff and potential partners, and time back at the office in Seattle consulting with technical personnel and ven-

Table 1
List of Native organizations participating in Tribal Connections Project Phase I

Site number	Organization
1	Arctic Slope Native Association, Barrow, Alaska
2	Norton Sound Health Corporation, Nome, Alaska
3	South East Alaska Regional Health Consortium, Sitka, Alaska
4	Toksook Bay Native Village, Alaska
5	Nez Perce Indian Tribe and Reservation, Lapwai, Idaho
6	Fort Belknap Indian Reservation (Assiniboine and Gros Ventre), Harlem, Montana
7	Fort Peck Indian Reservation (Sioux and Assiniboine), Poplar, Montana
8	Umatilla Indian Reservation (Cayuse, Umatilla, and Walla Walla), Pendleton, Oregon
9	Lower Elwha Klallam Tribe and Indian Reservation, west of Port Angeles, Washington
10	Lummi Indian Nation and Reservation, west of Bellingham, Washington
11	Nisqually Tribe and Indian Reservation, east of Olympia, Washington
12	Samish Indian Nation and Reservation, Anacortes, Washington
13	Sauk-Suiattle Indian Tribe and Reservation, Darrington, Washington
14	Spokane Indian Tribe and Reservation, Wellpinit, Washington
15	Stillaguamish Indian Tribe and Reservation, Arlington, Washington
16	Suquamish Tribe (Port Madison Indian Reservation), Port Madison, Washington

dors. This process was time consuming, but the time was well spent.

The needs assessment component of the Tribal Connections Project was largely accomplished, although with difficulty at some sites. The degree of difficulty depended in part on whether and to what extent each site had leaders who understood the Internet and Web, tribal health staff who were interested in health information outreach, and technical personnel who were onsite to help plan and implement infrastructure improvements. An additional challenge was the relatively high level of tribal staff turnover and vacancies. At some sites, the project manager had to work with two generations of key staff over the life of the project, especially among the tribal health staff. Sometimes these changes led to revisions in needs identification and related planning.

Overall, the project manager had to be adaptive, flexible, and creative in working with tribal staff to identify and define needs and craft workable plans. The needs assessments reflected the diversity of the preexisting level of technical infrastructure at the various sites, the degree of planning already in place, and the extent of involvement of the tribal information technology (IT) departments, as well as opportunities for partnering with others to leverage scarce resources. Despite these challenges, the project manager successfully collaborated on needs assessments at all sixteen Tribal Connections Project sites and implemented needed improvements at all but one site.

Infrastructure improvements

Technical infrastructure improvements were implemented at fifteen of the sixteen sites. The one exception was a site where major tribal and tribal health reorganizations took place during the life of the project, resulting in significant staff turnover and reassignments as well as severe resource constraints, such that the technical plans could not be implemented.

The actual technical infrastructure improvements varied widely (Table 4), reflecting the diversity of needs and conditions at each site. Some sites opted to allocate all project resources (up to $25,000 per site) into equipment (e.g., work stations, printers), others a mix of equipment and wiring, and one all wiring (i.e., trenching and laying fiber optic cable).

Table 2
Snapshot of participating Tribal Connections Project Phase I sites

Site number	Geography	Distance to nearest large town or city	Population served
1	Rural, remote, tundra	700 miles by air	Small town + villages
2	Rural, remote, tundra	500 miles by air	Small town + villages
3	Rural, remote, tundra	500 miles by air	Small town + villages
4	Metro/rural mix, coastal	40 miles by road or air	Metro area + villages
5	Rural, remote, mountains	10–40 miles by road	Several small towns
6	Rural, remote, high plains	150 miles by road	Several small towns
7	Rural, remote, high plains	100 miles by road	Small town
8	Rural, low plains, foothills	10–40 miles by road	Small town
9	Rural, coastal	10 miles by road	Small town
10	Semirural, coastal	10 miles by road	Small town
11	Semirural, lowlands	20 miles by road	Small town
12	Rural, coastal	50 miles by road	Small town
13	Rural, mountains	100 miles by road	Small town
14	Rural, low plains	50 miles by road	Small town
15	Rural, lowlands	60 miles by road	Small town
16	Metro/rural mix, coastal	50 miles by road	Small town

Table 3
Fourteen key elements of tribal community needs assessment

1. Stop, look, and listen; enter with respect.
2. Develop a mental image or picture of the community; onsite visits are essential.
3. Do your homework; review in advance what is known about the demographics, health status and issues, local leadership, technical infrastructure, etc.
4. Your goal is to understand the local community—its history, governance, members, interests, needs, priorities, and spirit.
5. Identify, search out, and connect with local organizations, leaders, and advocates—both health and information technology (IT)-related.
6. Understand the health information needs and users in the community and the facilitators and barriers to use.
7. Benchmark the current technical infrastructure (computers, local/wide area networks, Internet connections, IT staff support) in the community and specifically the health sector (e.g., clinics, hospitals, health providers) and related organizations (e.g., schools, libraries).
8. Get feedback through discussions with leaders, key contacts, elders, and users.
9. Look for partnership opportunities; be creative, work across boundaries.
10. Create a partnership plan—with emphasis on sustainability and capacity building.
11. Prepare technical, training, and outreach plans in collaboration with community leaders, and the health and IT staff. Remember it is their community, not yours.
12. Build on already existing community initiatives and activities (e.g., health fairs, disease-specific patient groups, wellness programs) to the extent possible.
13. Be prepared to be adaptive, iterative, supportive, and open-minded, yet be honest and realistic; balance vision with practicality.
14. Build flexibility into the project schedule; the pacing and timing should give priority to the community's needs, capabilities, and readiness.

- Five sites allocated 100% of available project funds to equipment.
- Four sites allocated 67% to 75% of funds to equipment, 25% to 33% to wiring.
- Five sites allocated 50% to 60% of funds to equipment, 40% to 50% to wiring.
- One site allocated 100% of funds to wiring.

Overall, across the fifteen sites where planned infrastructure improvements were implemented, about 60% of funds were allocated to equipment and 40% to wiring. The equipment funds paid for: 83 work stations (including servers), 5 laptop computers, 15 printers, 3 scanners, 2 digital projectors, 10 uninterruptible power supplies, 46 other hardware components (including modems, personal digital assistants, hubs, switches, and Ethernet cards), and 57 software packages (in addition to pre-loaded software). The wiring funds paid primarily for local area networks (cabling, switches, routers) and some fiber optic interconnects and related construction costs.

With one exception, the equipment was purchased on a centralized basis by the PNRML through the University of Washington, not by the tribes. This arrangement helped stretch the funding further, but on the other hand it slowed the procurement process down. Also, because the university procured the equipment, federal and university rules required that the equipment remain the property of the university for two years. This initially proved somewhat awkward. By the end of the project, however, ownership of almost all equipment obtained through Tribal Connections Project had been transferred to the participating tribal organizations.

The PNRML had responsibility for delivering and installing the equipment at the various sites. The project staff worked closely with the tribal staffs in scheduling the deliveries and in doing the installations, but the far flung geographic locations of the tribal sites and divergent time-phasing created formidable scheduling and logistical challenges. The project manager and other project staff spent an estimated two to three weeks per site on average for equipment ordering, delivery, installation, and follow-up. This included at least two site visits, often more, and significant office time in Seattle working with technical specialists, vendors, and the university procurement process. Further details on procurement and logistics are covered in the companion article [13].

Internet connectivity partnerships

Another key component of the technical infrastructure at participating sites was the Internet connectivity. Equipment alone would not be enough to facilitate access to health information on the Web. A satisfactory connection to the Internet was another necessary condition. Most sites had at least some initial connectivity but needed improvement. The initial needs assessment at each site included a review of the baseline situation with regard to Internet connections, an identification of viable options for upgrading connectivity, and consideration of possible partners who might assist in implementing improved connections.

The project manager gave priority to assisting the participating tribes and villages in developing partnerships with organizations that could help assure sustainable Internet connectivity well beyond the lifetime of the Tribal Connections Project. This took on average another two to three weeks of effort per site. This work paid off in that most sites were able to arrange partnerships for their initial Internet connectivity with either the federal Indian Health Service (IHS) or the Washington State Intergovernmental Networks (IGN). Eleven of the sites had IHS health clinics or other health care facilities on the reservation or in the village.

Working with the tribal staff, the project manager was able to successfully negotiate tribal health Internet access via the IHS, tribal, community college, and other networks at no additional cost to the tribes. Also, the project manager helped facilitate a determination that Washington State tribes were eligible for access to state telecommunications services. As a result, several in-state tribal sites were able to use IGN services for Internet connectivity and thereby take advantage of the economies of scale offered by such services. One site was able to benefit from access to the Internet connectivity of the Bureau of Indian Affairs (BIA). The project manager helped three sites to obtain favorable rates from the local Internet service provider (ISP) and

Table 4
Snapshot of Tribal Connections Project Phase I infrastructure improvements*

Site number	Brief description of infrastructure improvements
A	Server and work stations to support high-speed wide area network (WAN)
B	Hubs and work stations to support WAN and T-1 Internet access
C	Server, work stations, peripheral equipment, and wiring for dial-up Internet
D	Server, work stations, and wiring to support local area networks (LANs)
E	Work stations and peripheral equipment for LAN access to dial-up Internet
F	Router and fiber optic underground installation to support high-speed Internet
G	Routers, work stations, and wiring to support LAN and WAN
H	Server, work stations, and wiring to support fractional T-1 Internet access
I	Server, work stations, and wiring to support 56 Kbps frame relay Internet access
J	Server and fiber optic underground installation to support high-speed Internet
K	Server, work stations, network cards, and wiring to support LAN and WAN
L	Work stations, peripheral equipment, and wiring for computer lab
M	Server, work stations, and wiring to support 56 Kbps frame relay Internet access
N	Router, hubs, and antennas to support 128 Kbps cell relay Internet access
O	Work stations, peripheral equipment, and wiring for computer lab

* Note: For confidentiality reasons, the ordering of sites in Table 4 does not correlate with the list of participating Native organizations in Table 1.

to take advantage of Universal Service Fund (USF) subsidies for rural health care users and General Services Administration (GSA) FTS2000 volume discounted services, to the extent possible.

The installed connection speeds ranged from 56 Kbps dial-up access to full T-1 (1.54 Mbps), distributed as follows:

- 56 Kbps dial-up (1 site),
- 56 Kbps frame relay (4 sites),
- 128 Kbps frame relay (4 sites),
- 128 Kbps ISDN (1 site),
- 384 Kbps frame relay (1 site),
- 766 Kbps frame relay (1 site), and
- full T-1 (3 sites).

Several sites have since upgraded. Most dramatically, the 56 Kbps dial-up is now a full T-1 connection.

Other partnerships

Beyond partnerships for Internet connectivity, the project manager assisted the participating sites in developing partnerships with other user and provider organizations on and off the reservation or village proper. These included partnerships with various health, wellness, education, library, social services, public safety, university, and related institutions. The distribution of lead organizations at the participating sites was:

- health department or clinic (6 sites);
- information systems or services departments (4 sites);
- tribal council (2 sites); and
- tribal school, library, planning department (1 site each for a total of 3).

These organizations in turn partnered with anywhere from two to five other organizations on reservation and one to five offsite organizations.

Training

The project planned to provide tribal staff at participating sites with training in using the Internet and searching for health information on the Web. Most training sessions emphasized basic Internet and Web skills and ways to locate and use health information on the Web. The plan was to offer two training opportunities per site. Ideally, the training would take place after the technical infrastructure improvements had been completed, but this was not always the case. Also, scheduling and arranging training sessions at remote locations frequently proved difficult.

In all, the PNRML conducted seventeen onsite training visits and twenty-eight separate training sessions during the course of the Tribal Connections Project, with a total of 341 tribal staff participants. These included staff primarily from tribal health, social services, education, planning, and IT departments. The number of attendees per session ranged from three to thirty-five and averaged about fifteen. Additionally, in conjunction with the Tribal Connections Project, the PNRML conducted training sessions at relevant meetings and conferences, including the:

- Association of American Indian Physicians,
- American Indian Society of Engineers and Scientists,
- Tribal College Librarian Institute (Montana State University),
- Red Talon AIDS Prevention Program (Northwest Portland Indian Health Board),
- Northwest AIDS Training and Education Center (University of Washington), and
- Native American Center of Excellence (University of Washington).

The PNRML trained a total of 347 persons at these events, including American Indian/Alaska Native (AI/AN) physicians, tribal health staff, and non-Native health staff serving the AI/AN populations. Some of these trainees were from participating sites. In total, more than 650 persons received training during Tribal Connections Project Phase I.

DISCUSSION

Evaluation

Overall, the Tribal Connections Project Phase I was successful—in other words, project objectives were

met—at all sixteen sites with regard to process measures and interventions—the tribal consultation, site visits, needs assessment, and identification of partners. The results were somewhat more mixed when viewed in terms of outcome measures. On the plus side, the technical infrastructure and Internet connectivity improvements were implemented at fifteen of the sixteen sites, and these improvements are apparently being used and sustained and, at many sites, further improved upon, in a time frame of six to twelve or more months after implementation. Partnerships at these sites appear to be continuing, albeit with some changes in the partners and their roles over time, as conditions and interests evolve.

Also on the plus side, at least one training session was conducted at thirteen of the sites with more than 350 persons trained. The training appeared to be considered useful by those who attended, based on immediate feedback provided to the trainers. Also, comparison of pre- and post-training surveys, when conducted, indicated that the majority of participants reported improved Internet- or Web-related skills and heightened appreciation of the value of health information on the Web.

At a typical training session, assuming twenty attendees, sixteen returned evaluation forms. Of those, thirteen reported that skills learned in the training would have been helpful in the past month and will be used during the next month. Fifteen reported that the training was successful or very successful in improving skills in finding health information on the Web. The training was effective in enhancing the ability of most participants to use a computer keyboard and mouse, employ basic Web browser functions (including bookmarks), and search for health and other information on the Web. Typical trainees included tribal health, social services, education, outreach, and administrative staff.

Nonetheless, the training sessions frequently were difficult to implement, due to scheduling, logistics, and seasonal and weather conditions. Thus the training was insufficient at most locations, both in terms of users reached and frequency of training, to expect to see a significant or dramatic impact on the use of health information resources. As another consequence, the train-the-trainer model could not be implemented.

The initial project plan did not include comprehensive evaluation of the long-term impacts of training (and associated infrastructure and connectivity improvements) on tribal use of online health information. Tribal representatives did provide useful general feedback at a project advisory meeting held in October 1999 and in follow-up telephone interviews conducted in early 2000. Overall, however, later efforts to add evaluation of project impacts on health information-seeking behavior were frustrated by time delays between the technical improvements and the training, lack of follow-up training, tribal staff turnover, difficulties in obtaining necessary approvals for follow-up studies, or a combination of these.

Long-term follow-up interviews were conducted with health clinic staff at three tribal sites. The results suggested that while tribal staff persons at these sites were using the technical infrastructure to find health information on the Web, the perceived connection to the earlier training was vague or nonexistent, due to the passage of time and significant staff turnover. The project plan had not envisioned assessing impacts on actual tribal health behaviors and conditions—an even more difficult challenge—nor was such an evaluation attempted in Phase I.

The Tribal Connections Project Phase I also had several broader positive impacts of a more general nature. On a qualitative level, the project no doubt did increase tribal awareness of the Internet and of health information on the Web. Also, at most sites, the tribal leadership and key staff were engaged and empowered in the project planning and implementation, due to the community-based outreach approach used by the project management. The project contributed to broader tribal leadership on information infrastructure and Internet issues, through the efforts of tribal activists at some sites and the project manager, all of whom participated in meetings of tribal associations and Internet and tribal health-related conferences around the country. The project advisory panel concept proved out, as the panelists were effective in bringing valuable outside perspectives, Native and non-Native alike, to the project—some panelists participated in conferences and other leadership activities. One panelist obtained funding from another federal agency for a project intern who assisted with technical support. The project also was successful in substantially reducing the paperwork and administrative burden for the participating tribes but at a cost of increasing the burden for the PNRML (for detailed discussion, see Press et al. [14]).

The project clearly broadened the community of tribal staff in the region interested in Internet connectivity and Web applications. Staff persons from several tribes met for the first time as a part of Tribal Connections Project activities and have continued to communicate with each other on matters of common interest well beyond the conclusion of Phase I. Some tribes have leveraged their project involvement to obtain additional funds from other sources. For example, as a result of Tribal Connections Project Phase I, the PNRML staff worked with the Affiliated Tribes of Northwest Indians Economic Development Corporation. This work led directly to the Seattle Foundation providing significant funding to support tribal telecommunications consumer education for all tribes in Washington State. This in turn led to formation of the Tech Tribes Coordinating Committee with the goal of eliminating the tribal digital divide in Washington State.

Further, on a broader level, Tribal Connections Project Phase I clearly affirmed the efficacy of the community-based approach to outreach to rural, underserved, and minority population groups and geographic areas. The project reaffirmed the findings of earlier studies [15–18] that "grassroots" community

participation and empowerment are keys to successful, relevant, and sustainable solutions, whether in the health information arena or elsewhere.

Finally, the Tribal Connections Project significantly contributed to the development of an outreach planning and evaluation field manual. NLM's 1996 outreach review [19] had identified the need for an evaluation planning guide, and such a guide was developed by the PNRML and NLM's OHIPD in parallel with the Tribal Connections Project. While Tribal Connections Project Phase I was not itself able to benefit directly from the manual, subsequent tribal outreach and many other diverse outreach projects will hopefully find Measuring the Difference of value [20].

Challenges

Tribal Connections Project Phase I highlighted several challenges in conducting outreach to tribal communities, such as providing more intensive training opportunities at participating sites, more fully integrating outreach activities into the tribal community's own health promotion and wellness efforts, managing and reducing the administrative burden on outreach providers, assessing more deeply the project's impacts on tribal health information-seeking behavior, and determining if project concepts and learning were applicable in other geographic areas and for other types of underserved communities.

In September 2000, NLM funded a Tribal Connections Project Phase II that extended the project to sites in the Pacific Southwest. In Phase II, the Phase I concept was applied with two significant modifications. First, the number of new sites was limited to four, to provide greater focus and to reduce the administrative and logistical requirements. The four sites selected included two tribes in New Mexico (Pueblo of Taos and Pueblo of Jemez), one in Arizona (Colorado River Indian Tribes of the Colorado Indian Reservation), and one straddling the Nevada/Idaho border (Shoshone-Paiute Tribes of the Duck Valley Indian Reservation).

Second, the Phase II training phase involves additional organizations, including health resource libraries in the Southwest as well as the PNRML. This has resulted in new collaborative efforts among the four RMLs that serve this geographic area (the Pacific Southwest, Midcontinental, and South Central RMLs and PNRML). Further, the Bill and Melinda Gates Foundation is providing support to expand the Tribal Connections Project work, through training and related outreach assistance for a Tribal Health Connections Project at other tribal sites in the Four Corners Region (Colorado, Utah, Arizona, and New Mexico). The Gates Foundation continues to look to the Tribal Connections Project for input on its overall tribal program direction.

In September 2001, NLM funded a Tribal Connections Project Phase III with the PNRML that is designed to further develop the community-based outreach concept as applied to tribal communities and to implement a more robust and deeper evaluation methodology derived in part from the evaluation outreach field manual. Three sites from Tribal Connections Project Phase I have been selected for intensive Phase III follow-up (Nez Perce Indian Tribe, Confederated Tribes of the Umatilla, and Samish Indian Nation). At each site, community-based interventions are being designed collaboratively with the tribal leaders and staff, and training will be integrated and fine-tuned to mesh with local activities (e.g., wellness workshops, health fairs) that are judged to be effective in engaging the tribal members. The tribal health staff, health boards, and practitioners will be directly involved in this process.

Finally, in Phase III, the project staff will develop and apply an evaluation framework specifically designed to better understand the impact of the training and related health education and wellness promotion activities (and the underlying technical infrastructure as a facilitator) on tribal health information-seeking behavior and, to the extent possible, actual health-related decisions. The evaluation component will be addressed throughout the project—beginning with the needs assessment—and the evaluator will participate as part of the project team in the field.

The hope is that Phase III will help NLM and the broader health and biomedical information outreach community better understand how to apply and evaluate community-based outreach concepts. NLM and the NN/LM, including the PNRML, are reviewing and refining various concepts for community-based outreach and analyzing the facilitators and barriers to effective outreach at the community level. This so-called Community Based Outreach initiative is based on learning from the Tribal Connections Project and other NLM-sponsored outreach to minority, rural, and underserved populations and areas, as well as related experiences of other government agencies and not-for-profit organizations. As of August 2002, NLM, either directly or via the NN/LM, was supporting a variety of tribal projects in eight states: Nebraska, Colorado, Utah, North Dakota, South Dakota, Oklahoma, Maryland, and Virginia (Table 5) in addition to the Tribal Connections Project sites in nine states.

Further, NLM is making a concerted effort to develop and extend this knowledgebase to include learning from transnational infrastructure development and outreach projects, such as the NLM-sponsored Multilateral Initiative on Malaria Communications (MIMCOM) Project in Sub-Saharan Africa (Kenya, Ghana, Tanzania, and Uganda) and the Regional Disaster Information Center for Latin America and the Caribbean (CRID) Project (Honduras, Nicaragua, El Salvador, and Pan American Health Organization). Both of these projects have much in common with Tribal Connections. MIMCOM is establishing the networks needed for African malaria researchers to connect with people and information in the subcontinent and around the world [21]. CRID is helping rebuild and improve the health information infrastructure and networks especially in Central American countries that have been hard hit by a series of natural disasters.

Table 5
List of other National Library of Medicine (NLM)-supported tribal projects

Native organization and location	Activities supported
Winnebago Nation and Omaha Nation (Nebraska)	Needs assessment, health information outreach, and training
Tribal Colleges in North Dakota	Computer support, health information outreach, and training
Mandan, Hidatsa, and Arikara Nation—Three Affiliated Tribes, New Town, North Dakota (Fort Berthold Indian Reservation)	Internships and training
Oglala Lakota Sioux Tribal College, Kyle, South Dakota (Pine Ridge Indian Reservation)	Computer support, health information outreach, and training
Ute Nation (Utah, Colorado) and Navaho Nation (Utah)	Needs assessment, health information outreach, and training
Cherokee Nation, Tahlequah, Oklahoma	Upgrade Internet connections for 6 health clinics
Piscataway Indian Museum/American Indian Cultural Center, Waldorf, Maryland	Needs assessment, technical infrastructure improvements, and training
NIH American Indian Pow-Wow Initiative, various tribal sites in Virginia and Maryland	Participate in selected pow-wows with exhibits, materials, and outreach

Note: These currently active projects are supported by NLM through a combination of staff and resources from the NLM headquarters, Regional Medical Libraries, and/or resource libraries in the relevant geographic areas. Additional tribal activities are in the planning stages.
See the text for discussion of Tribal Connections Phases II and III—not listed here.

CONCLUSIONS

The Tribal Connections Project was NLM's first major activity focusing on Native Americans. Phase I, now complete, has met on balance many of the original project goals and has helped lay the groundwork for Phases II and III, still underway. Phase I also highlighted the challenges of conducting and evaluating health information outreach especially to tribal and other typically rural, underserved communities. Importantly, Phase I contributed to development of the NLM-PNRML outreach evaluation field manual and the now operational NN/LM Outreach Evaluation Resource Center [22] and to furthering the concepts of community-based outreach and capacity-building that appear key in reaching underserved communities—whether rural, metropolitan, or urban. Finally, Tribal Connections Project Phase I and its follow-on and related projects meaningfully address the continuing issues of the digital divide [23–27] and health disparities [28, 29]. The Tribal Connections Project does this in a manner designed to partner with and empower Native Americans in improving their own communities, strengthening Native values and culture, and assuring that the social impacts of computing and the Internet benefit Natives as well as other Americans.

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REFERENCES

1. National Library of Medicine (U.S.) Board of Regents. Improving health professionals' access to information: report of the Board of Regents. Bethesda, MD: U.S. Department of Health and Human Services, National Institutes of Health, 1989.
2. National Library of Medicine. NLM strategic plan to reduce racial and ethnic health disparities 2000–2005: focus on dissemination of information to minority communities. [Web document]. Bethesda, MD: NLM, 2000. [cited 16 Sep 2002]. <http://www.nlm.nih.gov/pubs/plan/nlmplanracialethnic.pdf>.
3. Wallingford KT, Ruffin AB, Ginter RN, Spann ML, Johnson FE, Dutcher GA, Mehnert B, Nash DL, Bridgers JW, Lyon BJ, Siegel ER, Roderer NK. Outreach activities of the National Library of Medicine: a five-year review. Bull Med Libr Assoc 1996 Apr;84(2 Suppl):1–60.
4. Ibid.
5. Indian Health Service. Trends in Indian health 1998–1999. Rockville, MD: U.S. Department of Health and Human Services, 2000.
6. National Institute of Diabetes & Digestive & Kidney Diseases. The Pima Indians: pathfinders for health. Bethesda, MD: National Institutes of Health, 1995.
7. Office of Technology Assessment. Telecommunications technology and Native Americans: opportunities and challenges. Washington, DC: U.S. Congress, 1995.
8. National Telecommunications and Information Administration. Falling through the net: a survey of the "have nots" in rural and urban America. Washington, DC: U.S. De-

partment of Commerce, 1995. See also: NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION. Falling through the net: a survey of the "have nots" in rural and urban America. [Web document]. Washington, DC: U.S. Department of Commerce, 1995. [cited 16 Sep 2002]. <http://www.ntia.doc.gov/ntiahome/fallingthru.html>.
9. NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION. Falling through the net II: new data on the digital divide. Washington, DC: U.S. Department of Commerce, 1998. See also: NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION. Falling through the net II: new data on the digital divide. [Web document]. Washington, DC: U.S. Department of Commerce, 1998. [cited 16 Sep 2002]. <http://www.ntia.doc.gov/ntiahome/net2/falling.html>.
10. CASEY J, ROSS R, WARREN M, SMITH J. Native networking: telecommunications and information technology in Indian country. Washington, DC: Benton Foundation, 1999.
11. RILEY LA, NASSERSHARIF B, MULLEN J. Assessment of technology infrastructure in Native communities. Washington, DC: Economic Development Administration, U.S. Department of Commerce, 1999.
12. PRESS N, SAHALI R, BURROUGHS C, FRANK K, RAMBO N, WOOD FB, SIEGEL E, FULLER SS. Program management and policy issues in health information outreach: lessons from tribal connections. J Health & Social Policy 2003 Jun/Jul: 17(2), in press.
13. IBID.
14. IBID.
15. OFFICE OF TECHNOLOGY ASSESSMENT, Telecommunications technology, op. cit.
16. OFFICE OF TECHNOLOGY ASSESSMENT. Rural America at the crossroads: networking for the future. Washington, DC: U.S. Congress, 1991.
17. OFFICE OF TECHNOLOGY ASSESSMENT. Making government work: electronic delivery of federal services. Washington, DC: U.S. Congress, 1993.
18. DUTTON WF. Society on the line: information politics in the digital age. London, U.K.: Oxford University Press, 1999.
19. WALLINGFORD, op. cit.
20. BURROUGHS C, WOOD FB. Measuring the difference: guide to planning and evaluation health information outreach. [Web document]. Bethesda, MD: National Library of Medicine and Seattle, WA: National Network of Libraries of Medicine Pacific Northwest Region, 2000. [cited 16 Sep 2002]. <http://nnlm.gov/evaluation/>.
21. SIEGEL ER, ROYALL J, BENNETT M. Enhancing communication and connectivity in Africa: the multilateral initiative on malaria (MIM) model. In: Patel V, Rogers R, Haux R, eds. MedInfo 2001. Amsterdam, Netherlands: International Medical Informatics Association and IOS Press, 2001:48–52.
22. BURROUGHS, op. cit.
23. NATIONAL LIBRARY OF MEDICINE (U.S.) BOARD OF REGENTS. National Library of Medicine long range plan 2000–2005. Bethesda, MD: National Library of Medicine, 2000. See also: NATIONAL LIBRARY OF MEDICINE (U.S.) BOARD OF REGENTS. National Library of Medicine long range plan 2000–2005. [Web document]. Bethesda, MD: National Library of Medicine, 2000. [cited 16 Sep 2002]. <http://www.nlm.nih.gov/od/ohipd/nlm-lrp.pdf>.
24. NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION. Falling through the net: toward digital inclusion. Washington, DC: U.S. Department of Commerce, 2000.
25. JOHNSTON RD. Connecting Indian country: tribally-driven telecommunications policy. Washington, DC: National Congress of American Indians, 2001.
26. NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION. A nation online: how Americans are expanding their use of the Internet. Washington, DC: U.S. Department of Commerce, 2002. See also: NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION. A nation online: how Americans are expanding their use of the Internet. [Web document]. Washington, DC: U.S. Department of Commerce, 2002. [cited 16 Sep 2002]. <http://www.ntia.doc.gov/ntiahome/dn/>.
27. ODASZ FB. Echoes in the electronic wind: a Native American cross-cultural Internet guide. [Web document]. Dillon, MT: Lone Eagle Consulting, 2000. [cited 16 Sep 2002]. <http://lone-eagles.com/nativeguide.htm>.
28. NATIONAL LIBRARY OF MEDICINE, Long range plan 2000–2005, op. cit.
29. NATIONAL LIBRARY OF MEDICINE, Strategic plan to reduce health disparities, op. cit.
30. BURROUGHS, op. cit.

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