Transportation Systems a Political Artifact: How Infrastructure Can Improve the Economy and Public Health on Native American Reservations

A Research Paper submitted to the Department of Engineering and Society

Presented to the Faculty of the School of Engineering and Applied Science
University of Virginia • Charlottesville, Virginia

In Partial Fulfillment of the Requirements for the Degree
Bachelor of Science, School of Engineering

Julie Gawrylowicz
Spring, 2020

On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

Transportation Systems as a Political Artifact: How Infrastructure Can Improve the Economy and Public Health on Native American Reservations

Transportation: from Stability to Control

Imagine a world without paved roads, sidewalks, or public transit: a world without a developed transportation system. A lack of infrastructure exists in third world countries across the globe, but rarely in the United States. A mature transportation system affords economic stability, geographic connections, and public health benefits. These benefits have a lot to offer one of the most troubled minorities in the country: Native Americans. Indian reservations face economic instability and public health concerns at a higher rate than any other population demographic in the United States (*Demographics | NCAI*, n.d.). Poverty and unemployment have ravished reservations for centuries, in part due to the volatile pattern of relocation. The American government has a longstanding history of displacing and appropriating Native American land and property (Poupart, 2003). Each new geographic location has marked the beginning of a brand-new transit system, an expensive and time-consuming investment to make with each move. These political circumstances have yielded severely underdeveloped transportation infrastructure on today's Native American reservations across the United States (*Tribes & Transportation*, n.d.). By neglecting the transportation resource needs of reservations, the American government is using this technology as a political artifact as a means to exercise authority over a minority, limiting the progress and growth of reservations (Winner, 1980). On the other hand, the lack of infrastructure affords an inspiring opportunity to help solve the unique economic and public health struggles faced by America's first inhabitants.

Wicked Problem Framing and Historical Case Studies

How can an investment in transportation infrastructure improve the economy and public health on reservations, and how has the government used this transportation technology as a political artifact to exercise authority over Native Americans?

Several techniques enhance the depth of this research, including the Wicked Problem Framing and historical case study methodologies. Prior to enlisting the assistance of these practices, a thorough background of the location, demographic, and history of Indian Reservations in the United States frames the context of the research question. The background introduces the challenges and inequalities of Indian reservations that the Wicked Problem Framing and historical case study methodologies analyze. Seager's Wicked Problem Framing technique reveals hidden relationships between actions and consequences through the presentation of evidence (Seager et al., 2012). For the specific research question, the consequences presented in the background reveal the connection to infrastructure investments in studies conducted by rural scientists. Academic scholars studying transportation disparities typically find major gaps in urban and rural communities and focus their studies in those areas. Rarely do scholars in this area of study focus their research on Indian Reservations. Thus, Seager's Wicked Problem Framing methodology helps reveal consequential relationships by extending scholarly research on rural areas to Native American communities. Experts in the Rural American transportation gap have studied vehicle crash rates, economic opportunity, job creation, and active commuting with respect to developed transportation networks (Eff & Livingston, 2007; Fan et al., 2017; Gallagher & Albert, 2019; *Rural Connections: Challenges and Opportunities in America's Heartland*, 2019; Shoup & Homa, 2010). The studies and research conducted in rural geographies establish the connection of increased transportation infrastructure and an improvement in the public health and economy on American Indian

Reservations. While Seager's technique proves the connection between transportation and socioeconomic inequalities, historical case studies explore the relationship between reservations and the American government.

Historical case studies add a new dimension of understanding of the past through primary or secondary sources. Primary sources frame the treatment of Native tribes through personal statements, supporting new ways of interpreting historical relations. Given the complicated history of displacement of American Indians, President Andrew Jackson's speech after he signed the Indian Removal Act into law reveals government attitudes toward Native Americans (Jackson, 1830). President Jackson's language and diction displayed the attitude and prejudice toward the minority. In addition, a poem recounts the brutality and perception of the Trail of Tears from its victims (Jones, n.d.). Displacement brought new challenges to tribal communities as they built infrastructure from scratch that they previously built and operated on old soil. Ultimately, the government's relocation of the American Indian population was a method of exercising authority over the minority, and the effects of those laws are evident today in the economic and public health inequalities.

Socioeconomic Circumstances on Reservations

The timeline United States history is up for interpretation to scholars and education institutions across the country. While the nation was established with the signing of the constitution in 1787, the land was discovered by European voyagers hundreds of years prior. While many Americans accept the beginning of their history as Columbus' sea travels to the new land, there existed an entire population on this land before its European discovery. This population of Native Americans once occupied the new found land but were quickly driven out by the colonization of settlers. The native population soon became a minority in today's United

States, making up just 1 percent of the American population (*Demographics | NCAI*, n.d.). As typically seen in minority demographics, American Indians experience a variety of economic and public health burdens that cultivate a socioeconomic gap between them and non-native Americans.

Economic instability and uncertainty have affected tribal communities for years. Employment and labor are the backbone of a thriving economy, and an underdeveloped system for financial success negatively affects the very people it seeks to serve. Economic struggles on reservations leads to higher unemployment rates and poverty rates. On the Cheyenne River Reservation, 75 percent its population lived in poverty or hovered slightly above it; the rate across other reservations was lower at 45 percent (Rotondaro, 2015). The high poverty rates create challenges like access to affordable housing, healthcare and education. In addition to poverty, unemployment has ravished reservation communities as they are left without a means to provide for their families. The unemployment rate from 2009-2011 among working aged Native Americans was 14.9 percent, almost double that of the White population (Austin, 2013). These statistics seem to propel each other upwards: if an indigenous person cannot hold a job, this person and potentially their family of dependents live in poverty. Although other areas and minorities across the United States face similar issues of unemployment and poverty, the rates on Indian Reservations are high even compared to other minorities (Austin, 2013). While these statistics may seem isolated, economic instabilities invite a plethora of public health concerns.

Similar to the economic struggles on reservations, Native Americans face public health insecurities at higher rates than other minorities. Public health concerns manifest through historical death and disease rates. For example, suicide rates have spiked across reservation communities at an alarming 62 percent higher than the national average (*Demographics | NCAI*,

n.d.). Some tribal communities have buried children lost to suicide as young as twelve years old (Rotondaro, 2015). In small tribal towns where everyone seems to know everyone, suicide devastates their community. Native Americans are also 229 percent most likely to be involved in a vehicle crash. While driving under the influence of alcohol attributes to some of this statistical inflation, vehicle crashes can be prevented through other infrastructural measures. Finally, obesity and metabolic diseases like diabetes occur at greater rates on reservations. Over half of the population of Native women and 43 percent of men have a metabolic disease (Wiedman, 2012). Studies show a high correlation between obesity and diabetes and an increasing rate across the country (Mokdad et al., 2003). With an obesity rate of 43 percent (*Obesity—The Office of Minority Health*, n.d.), the indigenous population as a whole is 189 percent most likely to suffer from diabetes (*Demographics | NCAI*, n.d.). Although previously considered an "adult disease," pediatric diabetes rates are rising on reservations (Wiedman, 2012). The public health concerns discussed place the minority demographic at greater, life-threatening risks than the majority of the population. The alarmingly high rates concerning public health coupled with economic instability threaten the Native American livelihood and their individual pursuit of life, liberty and the pursuit of happiness, establishing motivation for research on solving the epidemic.

Political Technology

Socio-technical analysis offers a new lens to study the socioeconomic inequalities experienced on Native American reservations. With a complicated history between tribal and American governments, relational dynamics prove difficult to define. STS scholar Langdon Winner coined the phrase technology as a political artifact to describe the imposition of authority on one entity using technology (Winner, 1980). He describes two possibilities of the political

artifact: technologies that are inherently political, or are used in a political manner in an attempt to exercise authority (Winner, 1980). Another scholar defined political artifacts as "technological devices intended to facilitate a particular political aim" (Foner, 2002). Political artifacts frame the socioeconomic struggles faced on reservations in a lens of political intention as opposed to coincidence. The theory is founded on the Moses Bridge example, where a New York bridge was supposedly designed to keep out public transportation, typically carrying lower income minorities, from certain parts of the city. Critics find discrepancies in his theory on the intentions of the Moses Bridge and argue a different narration of the bridge's construction (Joerges, 1999). Contradicting the notion of barring busses from reaching certain areas of New York, scholars have found a timetable indicating modes of public transportation have reached the island Winner previously deemed impossible to reach due to the Moses Bridge (Woolgar & Cooper, 1999). Although scholars may not entirely agree on the use of a political artifact in the case of the bridge, this paper presents evidence for the socioeconomic inequalities and underdeveloped transportation to avoid criticism on factual representation as in the Moses Bridge case. This paper analyzes the unique economic and public health circumstances under a lens of intention of political authority and reveals an underlying tone of institutional racism otherwise hidden.

Other fields of emerging technology use the political artifact theory to analyze the effects of the technology on its users and people. One workshop in the field of cybersecurity studied the political aims of computers "to enable certain civil liberties to be more easily protected worldwide" (Foner, 2002). Another sociotechnical piece considered the politics behind biobanks in medical research and their racial and ethnic undertones (Lee, 2015). Both examples attempt to prove intentional authority with the use of technology. Although the political artifact theory has

been used to characterize medical and cyber research, it has yet to be applied to infrastructure on reservations.

Given a history of displacement in tribal communities, scholars have attempted to recognize the sacrifice and hardship faced by American Indians. A lack of trust in the American government stems from centuries of oppression with the Indian Removal Act, Dawes Act, and the Trail of Tears (Poupart, 2003). Scholars studying American history more recently recognize that "the U.S. created much of its wealth by appropriating Native American land" (Asante-Muhammad & Initiative, 2017). In other words, historians identify a significant wealth gap within the United States associated with displacement. Despite the acknowledgement, scholars fail to recognize the political and intentional aspect behind displacement initiatives. Winner's theory adds the dimension of calculated authority to the analysis on the socioeconomic inequalities of American Indian Country.

Transportation as a Political Artifact and the Benefits of Improved Infrastructure

The socioeconomic gap between American Indian reservations and the rest of America gives reason to investigate the situation. With the longstanding history of volatile displacement, underdeveloped transportation systems plague indigenous populations. Behind the relocation patterns lies the American government's intent to control the growth of tribal communities. The political intention left reservations with economic instability and high rates of vehicle crashes, obesity, and suicide. Providing resources to improve transportation infrastructure across reservations can improve the economic and public health concerns. Improving infrastructure represents a way for the government to improve the political effects behind relocation without manipulative nature. Reservations would experience safer roads that lower crash rates, active commutes that lower obesity rates, and job creation that lowers unemployment and suicide rates.

The results and discussion are broken into two parts. The first part proves the governments use of transportation as a political artifact while the second part describes benefits of improved infrastructure to help the political situation on reservations without a controlling aspect.

Part One: Transportation System as a Political Artifact

Similar to the economic and public health inequalities on reservations described in the Background section of this paper, Native American communities experience an infrastructure gap separating tribal geographies from the rest of America. Underdeveloped transportation systems and lack of maintenance characterize the infrastructure gap describing reservation life. One report detailing the transit system reported 93 percent of roads maintained by Indian tribes are unpaved, and 75 percent of roads maintained by the Bureau of Indian Affairs are unpaved (*Broken Promises: Continuing Federal Funding Shortfall for Native Americans*, 2018). The same report described the transportation system as unsafe and underdeveloped, making access to healthcare and emergency services particularly difficult (2018). Designed to meet transit needs on reservations, the Tribal Transportation Program (TTP) has not fulfilled its intent. Historically, the TTP has only granted around 40 percent of the requested budget amount (*Agriculture | NCAI*, n.d.). Despite initiatives like the TTP, funding for transportation infrastructure has not met the needs of reservation communities. While lack of funding has certainly contributed, the history of displacement has only exacerbated the infrastructure gap existing on Native American reservations across the country.

For hundreds of years, Native Americans have been victim of legislative displacement, cases of the American government mandating the relocation of entire tribal communities. Having once occupied most of North America, indigenous tribes began relocating at the mercy of western settlers who invaded the space in the 15th century. Unfortunately, displacement and

relocation have shaped the history of Native Americans. With each new geographic location, American Indian reservations have had to begin construction of a new transportation system. Several fresh starts throughout their history have also contributed to the infrastructure gap. Each relocation demonstrates the American government's ability to exercise authority and control over Native Americans. Beyond legislature, the federal government has autonomy over budgetary constraints and monetary allocations. Thus, the government directly controls both the location of residence of American Indian tribes and their access to resources to build infrastructure. Given the apparent socioeconomic and transportation inequalities as described above, a level of intentionality exists behind the government's aim to limit the social progress of Native Americans through tribal relocation and restricting resources that hinder a well-developed transit system.

The intentional expression of authority over Native Americans is most obvious through the relational patterns with the government. One of the earlier displacement initiatives was the Indian Removal Act in 1830. President Andrew Jackson's speech directly exhibits the specific intention of control and authority. In his message to congress regarding the piece of legislation, he says, "[The Indian Removal Act] will separate the Indians from immediate contact with settlements of whites; free them from the power of the States; enable them to pursue happiness in their own way and under their own rude institutions" (Jackson, 1830). In his speech, Jackson spoke of the intention to isolate Native Americans from white culture through relocation. He seems to even dismiss the responsibility of the United States to provide them the inalienable right of life, liberty, and the pursuit of happiness as they move westward. Finally, he suggests American Indians live independently under their inferior governments as opposed to living under the American government. His diction and tone both indicate the intention behind the relocation

to isolate and limit the progress of the American Indian. His word choice throughout his address to Congress alludes to a sentiment that the tribe desired relocation, although Native Americans disagree. Following the Indian Removal Act, Native Americans embarked on the Trail of Tears, or the path they took from the South Eastern United States to the west (Bowman, 2005). In a poem detailing the Trail of Tears from the experience of a Cherokee Indian, the poet writes, "He ordered the removal // Of the Cherokee from their land // And forced them on a trek // That the Devil must have planned," and "Washington, D.C. had decreed // They must be moved Westward // And all their pleas and protests // To this day still go unheard," (Jones, n.d.). From the point of view of a Native American, Jones describes the relocation as planned by the devil due to the treacherous winter and militant conditions. He also details the plea to stay as met with hostility in the nation's capital. Ultimately, the poem shows the treatment of the American Indian despite their efforts to live as they wish. Despite the feelings of the tribes, the government moved forward with relocation in their efforts to control the minority and limit their sovereignty.

Relocation patterns did not stop in the 1800s with the Trail of Tears. Almost 50 years ago, legislation displaced members of the Navajo tribe off reservation boundaries toward urban areas (Tsosie-Paddock, 2018). Although the theme of relocation can describe much of the Native American history, displacement initiatives boil down to the governments intentional expression of controlling and limiting social growth. Each new location sparks the start of a new, but underfunded, transportation system on the newly established tribal boundaries. Because the government has controlled both location and resources of Native American reservations, the government has used transportation infrastructure as a political artifact to exercise control and authority over the minority population. With the legislative ability and resources to close the infrastructure gap on Native American reservations, the government has deliberately chosen not

to address the inequalities while creating "much of its wealth by appropriating Native American land" (Asante-Muhammad & Initiative, 2017). The government has continued aggressive relocation and underfunded transportation programs specific to tribal governments, leaving reservations with a compromised economy and deprived public health condition. Given the complex socioeconomic disadvantages of Native American reservations, an investment in transportation infrastructure offers a unique opportunity for the government to use the technology in a positive manner to enhance the political situation. An investment in infrastructure would offer a unique solution to the complex socioeconomic issues by improving the economy and public health for Native Americans.

Part Two: Effects of an Improved Transportation System

The lack of investment in transportation infrastructure has residual effects on the economy of Indian reservations. As described in the Background section of this paper, reservations experience higher unemployment and poverty rates than any other minority in the United States. Providing resources to expand infrastructure gives the American government an opportunity to facilitate economic development without exercising its authority. Several studies have linked transportation infrastructure to economic benefits. Currently, many roadways bypass small towns and focus their geographies on larger metropolitan areas. Roadway maintenance in smaller towns on reservations could improve street connectivity and facilitate economic development within the smaller towns (Shoup & Homa, 2010). Within reservation communities, roads provide access to shops, healthcare and other businesses, fostering economic growth. In addition, infrastructure investments afford the creation of thousands of jobs in communities struggling to find work and living in poverty. In previous years, resources for enhancing the tribal transportation system have created over 8,500 jobs as of 2017 (*Tribal Transportation,*

2017). One project in Alaska completed its maintenance strictly employing tribe members, indicating a direct link between employment and infrastructure. Another study specifically on the Pine Ridge Reservation in South Dakota studied the link between economic development and highway improvements. While a traditional cost-benefit analysis does not support the research, the study predicted economic benefits from tourism would total $153 million and create 1,375 jobs; researchers also cited benefits like an increase in total spending on the local economy, enhancing access for residents, and increased support of industrial development (Khan & Levy, 2003). Although long-term benefits are difficult to predict, both studies on existing Native American reservations show a positive relationship between infrastructure and job creation. With the shift away from railroad transit, the need for roadway maintenance has only increased (Shoup & Homa, 2010). This shift indicates the jobs created are long-term, sustainable and foster workforce development, several key characteristics of impact according to Gallagher and Albert (2019). If given abundant resources for change, Native American reservations could foster the economic revitalization that the community needs, helping eliminate the socioeconomic inequalities. With exclusive access to the resources to make these improvements a reality, the American government would have to relinquish its interest in limiting the growth of Native Americans. Furthermore, investments in transportation infrastructure would help close the economic gap in unemployment and poverty between reservations and the rest of the United States.

In addition to monetary compensation, job creation benefits the psychological state of the working population. On reservations with alarmingly high suicide rates, mental health awareness has the potential to make a resounding impact. Studies have linked unemployment with somatization, depression, anxiety, and an overall increase in psychiatric behaviors (Linn et al.,

1985). Linn's study also describes the benefits of employment beyond monetary gain: a heightened self-esteem and an avenue for achievement (1985). With an investment in infrastructure, job creation can impact the unemployed population and improve their mental health. Because suicide is often linked to mental health struggles like depression and anxiety, the impact of job creation can lower the suicide rate across Native American reservations. Lower suicide rates would benefit both the unemployed population and their families, improving the overall health of the community. The public health benefit of increasing mental health status across reservation communities can be achieved with the investment in transportation infrastructure. Although the intention to ignore suicide rates seems unlikely, the American government maintains the authority to fund transportation infrastructure that would greatly improve the public health of Native American reservations.

Another public health concern that infrastructure would impact is the vehicle crash rate on reservations. As discussed in the Background section of this paper, Native Americans are involved in fatal vehicle crashes at higher rates than the rest of the population. Although some aspects of vehicle crashes, like driver behaviors, are outside the scope of transit systems, poor road conditions and surface maintenance directly causes many fatal accidents (Quick et al., 2019). Quick's research yields a solution to the vehicle crash rates in the form of roadway repairs. Since heightened automobile incident rates characterize several reservations, several tribes mark repair as a high-priority concern (Quick et al., 2019). Given that many of the crashes are related to high speed collisions, engineers can repair roads specifically to reduce speeding. One approach to reduce speeding is to mark the shoulder of the road without widening roads, as this tends to increase speeding (Shoup & Homa, 2010). This engineering approach would lower the speed of drivers while also lowering crash rates. Tribal governments are aware of the needed

repairs and prioritize these improvements; they simply do not have the resources to fulfill the maintenance requests (Quick et al., 2019). With the funds and resources to lower crash rates and improve the overall public health of reservations, the government could begin to close the gap in crash rates while simultaneously relinquishing some of their historic control over the advancement of Native Americans.

Although less obvious in nature, transportation infrastructure can increase health across Native American reservations. With higher rates of obesity, metabolic diseases have spread rapidly throughout tribal communities. According to a study on rural and urban commuting patterns, greater physical activity and active commuting associate with improved transportation systems (Fan et al., 2017). In response to infrastructure investments, active commuting patterns foster physical activity, weight loss and lower metabolic disease risks like diabetes. The unsafe highway infrastructure makes transportation for the elderly, disabled, and children is particularly difficult (Shoup & Homa, 2010). The mentioned demographics seek safe methods of transportation to access healthcare and education. Fan advises the promotion of walking and biking as modes of transportation in rural areas like Native American reservations (2017). Another study on arterial highway design reported infrastructure investments provide a "link within pedestrian and bicycle networks," fostering healthy modes of transportation (McAndrews et al., 2017). Roadway repairs for safer transportation promote greater physical activity, thus lowering obesity and diabetes rates. The American government can fulfill these public health benefits with the appropriate funding needed to resource the maintenance.

The evidence above perpetuates the government's use of technology as a political artifact throughout history. The negative effects of displacement on the economy and public health on reservations support the argument on the role of transportation infrastructure in the

socioeconomic inequalities. Scholars recognize “transportation and land development policies have resulted in gentrification … of historically marginalized populations” (McAndrews et al., 2017). The government intentionally displaced and withheld funds from tribal governments to maintain control over their lives and limit their social growth. Transportation has the capacity to begin to close the gap existing between American Indian reservations and the rest of the United States. Often located in rural geographies, reservations lack the resources for developed urban planning and funding for infrastructure to which the government has access (Shoup & Homa, 2010). With capital for improvement and maintenance, investment in transportation infrastructure on Native American reservations offers a revitalization of the community without displacement (McAndrews et al., 2017). Revitalization comes in the form of lowering unemployment and poverty rates while improving public health in terms of obesity, suicide and vehicle crash rates. While the socioeconomic struggles experienced on reservations are unique and well-defined, one solution does not exist to address the economic and public health inequalities. Rather, seemingly insolvable problems with multifaceted administrative systems have a variety of factors that may dissect the issues (Rittel & Webber, 1973). The framing of the complex socioeconomic struggles and solutions of Native American reservations is best explained by scholars Khan and Levy. They describe transportation infrastructure as a necessary but not sufficient clause for development (2003). In other words, transportation alone does not close the gap in economic success or public health; instead, transportation infrastructure plays a vital role in the economic revitalization and public health improvement when coupled with other factors. The improvements in the quality of life of the American Indian are possible if the government terminates use of transportation infrastructure as a means of exercising authority over the minority, giving the minority a greater chance at equality.

Limitations

Although a considerable amount of time and effort went into this research, it does not come without limitations in context. One obvious constrain on the research is the time to prepare. For a full-time student, just a few months for research limits the comprehensive analysis. In addition, many of the conclusions in this paper are based on research on rural communities. Although reservations typically occupy rural geographies, cultural differences exist between tribal and agricultural communities. Despite the parallels in location, there may be reason to limit conclusions drawn from studies in rural areas and focus on studies specifically on reservations. Further, cultural tendencies between tribes are not always synonymous, meaning results from a study on the Pine Ridge reservation may not yield the same results on another reservation. Considering the cultural differences across tribes will help make the most informed decisions regarding transportation funding allocation. Finally, the federal government has a limited budget for resources to pledge to transportation infrastructure. While research suggests greater funding could begin to close the socioeconomic gap in economy and public health on reservations, the government operates under its own budgetary constraints and cannot possibly fulfill all requests for increased resources.

Future Research

Moving forward, more research on the effects of transportation investments specifically on reservations would greatly aid this research. Because of the limitations described above, results directly from tribal communities would give more clarity on expected socioeconomic improvements after investments in infrastructure. Currently, scholars are not discussing the technological politics with regards to Native American policies. This is an opportunity to extend sociotechnical theory to historical artifacts that exercise authority over a particular group of

people. Specifically, analyzing the diction of political leaders in public announcements of Native American policy may yield more evidence of technology used as a political artifact. Finally, in a similar vein of technological politics, studying the distrust of the American government in Native Americans may allude to other means of control not previously considered. These research points would be best completed with the collaboration of an STS scholar, historian, anthropologist and Systems Engineer.

Conclusion

Despite the label of America's first inhabitants, Native Americans have a long history of displacement by American legislature and resulting socioeconomic inequalities. Each new location as outlined by governmental provision sparks the creation of a new transportation system. As a biproduct of the turmoil, unemployment, vehicle crashes, and obesity overwhelm reservations across the country. Given the compounding socioeconomic factors faced by reservations, transportation infrastructure has been used as a means to control and limit the progression of tribal communities. If the government can relinquish this power and desire to relocate entire populations of people, Native American reservations would experience a revitalized economy and enhanced public health. The socioeconomic improvements would come from the investment in transportation infrastructure and help close the apparent gap between Native Americans and the rest of the American population. In a culture where sovereignty and independence have so much cultural relevance, transportation infrastructure offers part of a solution to the complex system without the exertion of governmental authority.

Works Cited

Agriculture | NCAI. (n.d.). Retrieved October 16, 2019, from http://www.ncai.org/policy-issues/land-natural-resources/agriculture

Asante-Muhammad, D., & Initiative, C. F. for the R. W. D. (2017, December 6). *The Ongoing Struggle for Native American Economic Empowerment and Self Determination*. HuffPost. https://www.huffpost.com/entry/the-ongoing-struggle-for_b_13279192

Austin, A. (2013, December 17). Native Americans and Jobs: The Challenge and the Promise. *Economic Policy Institute*. https://www.epi.org/publication/bp370-native-americans-jobs/

Bowman, R. (2005). 1838: The Trail of Tears. *New York Times Upfront*, *137*(9), 16–18.

Broken Promises: Continuing Federal Funding Shortfall for Native Americans. (2018). [Briefing Report]. U.S. Commission on Civil Rights. https://www.usccr.gov/pubs/2018/12-20-Broken-Promises.pdf

Demographics | NCAI. (n.d.). Retrieved October 16, 2019, from http://www.ncai.org/about-tribes/demographics

Eff, E. A., & Livingston, S. G. (2007). Is There a Rural/Urban Export Gap? *Journal of Regional Science*, *47*(2), 339–363. https://doi.org/10.1111/j.1467-9787.2007.00512.x

Fan, J. X., Wen, M., & Wan, N. (2017). Built environment and active commuting: Rural-urban differences in the U.S. *SSM - Population Health*, *3*, 435–441. https://doi.org/10.1016/j.ssmph.2017.05.007

Foner, L. N. (2002). Technology and Political Artifacts: The CFP2000 Workshop on Freedom and Privacy by Design. *Information Society*, *18*(3), 153–163. https://doi.org/10.1080/01972240290074922

Gallagher, S., & Albert, S. (2019). Chapter Thirteen - Cultivating a rural lens: Successful approaches to developing regional transportation corridors through professional capacity building. In T. Reeb (Ed.), *Empowering the New Mobility Workforce* (pp. 289–314). Elsevier. https://doi.org/10.1016/B978-0-12-816088-6.00013-4

Jackson, A. (1830). *President Andrew Jacksons Message to Congress On Indian Removal (1830)*. https://www.ourdocuments.gov/print_friendly.php?flash=false&page=transcript&doc=25&title=Transcript+of+President+Andrew+Jacksons+Message+to+Congress+On+Indian+Removal+%281830%29

Joerges, B. (1999). Do Politics Have Artefacts? *Social Studies of Science*, *29*(3), 411–431. https://doi.org/10.1177/030631299029003004

Jones, A. (n.d.). *The Neverending Trail*. Retrieved January 26, 2020, from http://www.aboutnorthgeorgia.com/ang/The_Neverending_Trail

Khan, S., & Levy, D. (2003). Linking Economic Development to Highway Improvements: Pine Ridge Reservation, South Dakota. *Transportation Research Record*, *1848*(1), 106–113. https://doi.org/10.3141/1848-15

Lee, S. S.-J. (2015). The Biobank as Political Artifact: The Struggle over Race in Categorizing Genetic Difference. *The Annals of the American Academy of Political and Social Science*, *661*, 143–159. JSTOR.

Linn, M. W., Sandifer, R., & Stein, S. (1985). Effects of unemployment on mental and physical health. *American Journal of Public Health*, *75*(5), 502–506.

McAndrews, C., Pollack, K. M., Berrigan, D., Dannenberg, A. L., & Christopher, E. J. (2017). Understanding and Improving Arterial Roads to Support Public Health and

Transportation Goals. *American Journal of Public Health*, *107*(8), 1278–1282. https://doi.org/10.2105/AJPH.2017.303898

Mokdad, A. H., Ford, E. S., Bowman, B. A., Dietz, W. H., Vinicor, F., Bales, V. S., & Marks, J. S. (2003). Prevalence of Obesity, Diabetes, and Obesity-Related Health Risk Factors, 2001. *JAMA*, *289*(1), 76–79. https://doi.org/10.1001/jama.289.1.76

Obesity—The Office of Minority Health. (n.d.). Retrieved October 16, 2019, from https://minorityhealth.hhs.gov/omh/browse.aspx?lvl=4&lvlid=40

Poupart, L. M. (2003). The Familiar Face of Genocide: Internalized Oppression among American Indians. *Hypatia*, *18*(2), 86–100. https://doi.org/10.1111/j.1527-2001.2003.tb00803.x

Quick, K. S., Larsen, A., & Narváez, G. E. (2019). Tribal Transportation Specialists' Priorities for Reservation Roadway Safety: Results of a National Survey. *Transportation Research Record*, *2673*(7), 652–661. https://doi.org/10.1177/0361198119844979

Rittel, H., & Webber, M. (1973). Dilemmas in a general theory of planning. *Policy Sciences*, *4*(2), 155–169. https://doi.org/10.1007/BF01405730

Rotondaro, V. (2015, September 2). *Limited housing, poor economy plagues reservation*. National Catholic Reporter. https://www.ncronline.org/news/justice/limited-housing-poor-economy-plagues-reservation

Rural Connections: Challenges and Opportunities in America's Heartland. (2019). https://tripnet.org/wp-content/uploads/2019/08/Rural_Roads_TRIP_Report_May_2019.pdf

Seager, T., Selinger, E., & Wiek, A. (2012). Sustainable Engineering Science for Resolving Wicked Problems. *Journal of Agricultural and Environmental Ethics*, *25*(4), 467–484. https://doi.org/10.1007/s10806-011-9342-2

Shoup, L., & Homa, B. (2010). *Principles for Improving Transportation Options in Rural and Small Town Communities*. 28.

Tribal Transportation: Paving the Way for Jobs, Infrastructure and Safety in Native Communities. (2017, April 10). [Text]. US Department of Transportation. https://www.transportation.gov/content/tribal-transportation-paving-way-jobs-infrastructure-and-safety-native-communities

Tribes & Transportation. (n.d.). National Congress of Indian Affairs. Retrieved December 9, 2019, from http://civilrightsdocs.info/pdf/reports/Tribes_and_Transportation_Report.pdf

Tsosie-Paddock, A. (2018). Second-Generation Navajo Relocatees Coping with Land Loss, Cultural Dispossession, and Displacement. *Wicazo Sa Review*, *33*(1), 87–116. https://doi.org/10.5749/wicazosareview.33.1.0087

Wiedman, D. (2012). Native American Embodiment of the Chronicities of Modernity: Reservation Food, Diabetes, and the Metabolic Syndrome among the Kiowa, Comanche, and Apache. *Medical Anthropology Quarterly*, *26*(4), 595–612. https://doi.org/10.1111/maq.12009

Winner, L. (1980). *Computer Ethics* (1st ed.). Routledge. https://doi.org/10.4324/9781315259697

Woolgar, S., & Cooper, G. (1999). Do Artefacts Have Ambivalence? Moses' Bridges, Winner's Bridges and Other Urban Legends in S&TS. *Social Studies of Science*, *29*(3), 433–449. JSTOR.