



Short communication

## Successful implementation of the Healthy Diné Nation Act in stores on the Navajo Nation

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### ABSTRACT

In 2014, the Navajo Nation Council passed the Healthy Diné Nation Act (HDNA), a 2% tax on unhealthy foods and beverages and a waiver of the 5% sales tax on healthy foods and water, to support health promotion and disease prevention among the Navajo people. Very little research has assessed implementation accuracy of food or beverage taxes and none were implemented within a sovereign Tribal nation. This study assessed the accuracy of HDNA tax implementation among 47 stores located on the Navajo Nation. A pair of tax-exempt items [e.g. a bottle of water and fresh fruit] and a pair of HDNA-tax eligible items [e.g. sugary beverage and candy bar] were purchased between July-December 2019. Receipts were retained to assess taxation. A total of 87.2% of stores accurately implemented the 2% tax on unhealthy items while 55.3% of the stores accurately implemented the 6% tax waiver on healthy items. In all, 51.1% of the stores accurately applied both taxes. There were no significant differences across store type (convenience or grocery stores and trading posts) or geographic region. In conclusion, almost all stores on the Navajo Nation accurately applied a 2% tax on unhealthy foods and beverages, while the proportion of stores applying a waiver on healthy foods was lower. Successful HDNA tax implementation among stores remains an important priority in achieving the goal to support health promotion and disease prevention among Navajo communities.

### 1. Introduction

With over 330,000 enrolled members and over 27,000 square miles of land, the Navajo Nation is one of the largest Tribal nations in the world (Navajo Epidemiology Center, Navajo Department of Health, Navajo Population Profile Report, 2013; U.S. Bureau of the Census, 2021). Organized into 5 regions and 110 communities called 'Chapters' (Navajo Epidemiology Center, Navajo Department of Health, Navajo Population Profile Report, 2013), the Navajo Nation emphasizes local decision-making and a system of kinship. Historically, Navajo lifestyles included healthy, traditional foods and high levels of physical activity. However, as with many indigenous communities, colonization and federal policies have disrupted traditional food systems and led to high

levels of food insecurity and consumption of processed foods (Pardilla et al., 2014; Kuhnlein and Receveur, 1996; Diné Policy Institute, 2021). The Navajo Nation is characterized as a 'food-desert', with only about a dozen grocery stores in an area the size of West Virginia (United States Department of Agriculture (USDA), 2015). Smaller stores located on the reservation offer fewer healthy options at higher prices and lower quality compared with grocery stores and small stores in surrounding areas (Kumar et al., 2016; Navajo Department of Health, 2021). Today, Navajo people experience disproportionate rates of food-related illnesses including diabetes, obesity, heart disease and cancers (Navajo Epidemiology Center, Navajo Department of Health, 2013; Powell et al., 2019).

As a sovereign nation, the Navajo Nation has the right to enact

*Abbreviations:* AZ, Arizona; df, degrees of freedom; HDNA, Healthy Diné Nation Act; NM, New Mexico; SD, standard deviation; SSB, sugar-sweetened beverage; UT, Utah.

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policies to promote the interests of its community. In November 2014, the Navajo Nation Council passed the Healthy Diné Nation Act (HDNA), the first-ever unhealthy food-and-beverage tax in the United States and in any sovereign Tribal nation. Designed to combat high rates of metabolic diseases and promote the health and wellness of the Navajo (Diné) people, the HDNA was re-authorized as permanent law in December 2020 (Resolution of the Navajo Nation Council, 2021; Nation Council-Fourth Year, 2014). The HDNA applies an added 2% tax on all unhealthy foods and beverages, including sugar sweetened beverages (SSB), cookies, candy, and chips (Resolution of the Navajo Nation Council, 2021; Nation Council- Fourth Year, 2014; Navajo Epidemiology Center, 2014; Navajo Nation Tribal Council. CD-96-20. Resolution of the 24th Navajo Nation Council- Second Year, 2020). A lesser-known legislation passed earlier in 2014 waived the Navajo Nation sales tax (6% as of 2018) on healthy items, such as water, fresh produce and nuts (Navajo Nation Tribal Council. CD-96-20. Resolution of the 24th Navajo Nation Council- Second Year, 2020; Navajo Epidemiology Center, 2014). While the 2% tax is lower than SSB or “junk food” taxes in large cities in the U. S. (ranging from 5% to 22%) (Colchero et al., 2017; El-Sayed et al., 2020 Jul; Falbe et al., 2016; Roberto et al., 2019; Bíró, 2015; Batis et al., 2016; Jensen and Smed, 2013), the combination of the tax and waiver results in a net difference of 7–8% between healthy versus unhealthy items. The HDNA has generated about \$1.8 million each year, with small decreases of 3–4% each year (Yazzie et al., 2020). A unique element of the legislation is that revenue is directly distributed to the 110 Navajo Chapters, which utilize funds for community-driven wellness projects (Yazzie et al., 2021).

Implementation challenges of similar taxes have been previously described. For example, in Cook County, Illinois, a \$0.01 per ounce SSB tax was applied correctly in 87.8% of taxable beverage purchases and 97.3% of nontaxable beverage purchases (El-Sayed et al., 2020). In Berkeley, California, a study found 11.5% of stores incorrectly charged the SSB tax on diet drinks (Misapplication of the Berkeley soda tax to diet drinks). These studies underscore the importance of understanding the degree to which stores successfully operationalize these taxes, reflecting an important evaluation component to understand the overall impact of the legislation. In rural, indigenous settings, while research has linked price reductions with perceived affordability of healthy foods and reduced SSB consumption (Misapplication of the Berkeley soda tax to diet drinks. The Incidental Economist. November 8, 2016; Brimblecombe et al., 2018), no study has evaluated the implementation of a Tribally-enacted tax policy.

The objective of this study was to assess the rate of successful HDNA implementation among stores on the Navajo Nation, and to assess differences by store type and geographic region. Due to the relative complexity of both an added tax and a waiver of sales tax, we hypothesized that rates of accurate implementation would be lower compared with other studies, and higher in grocery stores relative to convenience stores.

## 2. Methods

### 2.1. Study design and store selection

This observational study was nested in a longitudinal study evaluating trends in the store food environment, described in detail elsewhere (Kumar et al., 2016; Navajo Department of Health, 2021). In 2013, surveys were conducted in 63 stores located on and adjacent to the Navajo Nation (Kumar et al., 2016; Navajo Department of Health, 2021). Stores were identified using a national proprietary dataset of businesses from InfoUSA (InfoUSA Database of US Businesses, 2016) and updated using data from the Yellow Pages, Google Maps and local residents. InfoUSA uses standardized criteria to assign Standard Industrial Classification to define the store type. Stores were sampled in all five Navajo Nation regional agencies and included both grocery and convenience stores, including trading posts (small stores originally founded for

trading in rural areas). In 2019, repeat surveys were collected in 51 stores; of these, all 47 stores located on Navajo Nation comprised the sample for this nested study.

### 2.2. Measures

As shown in Table 1, the tax system is complicated because items are subjected to both Navajo and varied state taxes. As of July 1, 2018, the Navajo Nation applies a 6% sales tax on food items. Arizona (AZ) and New Mexico (NM) have 0% sales tax on food, whereas Utah (UT) applies a 1.75% tax on food. HDNA legislation stipulates an added 2% tax to unhealthy items and waives the 6% Navajo Nation sales tax on healthy items. Thus, we defined accurate HDNA implementation as the following applied tax (+/- 1% to allow for rounding errors, especially on small purchases): 1) Healthy foods and beverages: 0% tax for NM and AZ stores, 1.75% for UT; 2) Unhealthy foods and beverages: 8% for NM and AZ stores, 9.75% for UT.

### 2.3. Procedures

From July-December 2019, trained study staff purchased four items from each store: a healthy beverage (bottled water), a healthy food (fresh fruit or vegetable), an unhealthy beverage (SSB) and an unhealthy snack (e.g. potato chips). Healthy and unhealthy purchases were made at different times to obtain separate receipts. Store staff were not aware that purchases were part of a study: since study staff were onsite for another purpose (to repeat store surveys), purchases appeared to be snacks for personal consumption. The study was approved by the Navajo Nation Human Research Review Board (NNR.17–284).

### 2.4. Analyses

Receipts were scanned and reviewed, entering the following data into an Excel file: purchase date, store name, store type / region, percent tax applied to the healthy purchase, percent tax applied to the unhealthy purchase. Data were analyzed using SPSS v27 (SPSS Inc. Chicago, Illinois), generating descriptive statistics and frequency of correct implementation. We calculated the percent of stores that accurately applied the tax exemption on healthy items, the tax on unhealthy items, and both the tax and waiver. Chi-square analyses with Fisher-Freeman-Halton Test (for cell sizes < 5) assessed whether accuracy (yes or no, separately for healthy and unhealthy items) varied by store type (grocery, convenience or trading post) and region.

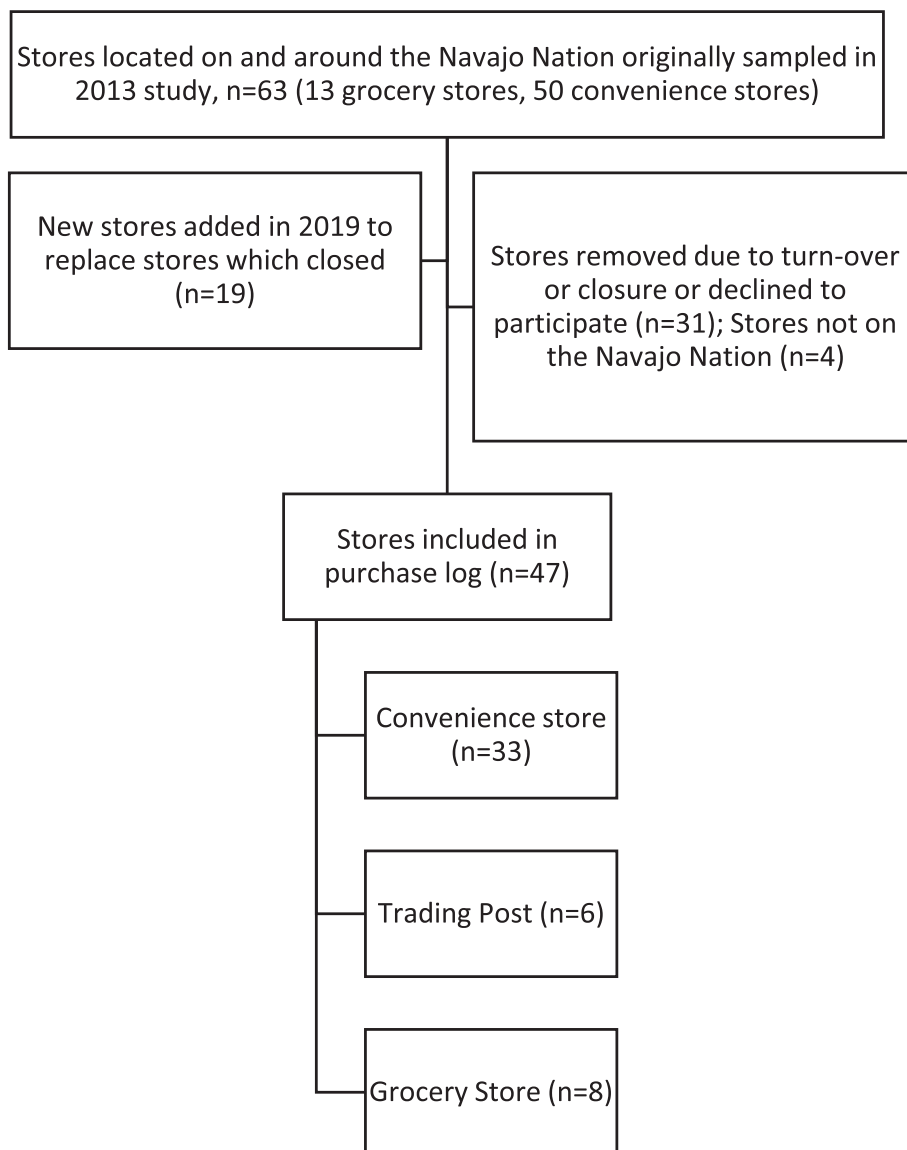
## 3. Results

The 47 stores included eight grocery stores, 33 convenience stores and six trading posts (Fig. 1). Unhealthy purchases included an unhealthy beverage (a soda or other sugary beverage) at an average price of \$1.34 (SD = \$0.57) and unhealthy snack (chips, a candy bar, or cookie) at an average price of \$1.48 (SD = \$0.44). Healthy purchases included a healthy beverage (water) at an average price of \$1.07 (SD = \$0.43) and a healthy snack (fruit or vegetable) with an average price of \$0.80 (SD = \$0.43).

Forty-one stores (87.2%) stores correctly applied the unhealthy 2% tax, and a total of 26 (55.3%) stores accurately waived sales tax on healthy items. Approximately half of the stores (48.9%) applied both tax components correctly. As shown in Fig. 2a, 90.9% of convenience stores, 87.5% of grocery stores, and 66.7% of trading posts applied the junk food tax correctly ( $p = 0.82$ ). For the tax waiver on healthy items, convenience stores had the highest accuracy (60.6%), compared to 50% of trading posts and grocery stores ( $p = 0.907$ ). Regional variability in implementation accuracy was also observed (see Fig. 2b), but was without statistical significance ( $p = 0.219$  for tax and  $p = 0.290$  for tax waiver).

**Table 1**  
Summary of total unhealthy and healthy food taxation by store location.

Healthy or unhealthy foods	Location of store (state)	State sales tax on food	Navajo Nation sales tax	HDNA tax	Total expected tax on unhealthy foods	Acceptable range for "correct" HDNA tax
Unhealthy	AZ or NM	0.00%	6.00%	2.00%	8.00%	7.50%–8.50%
Unhealthy	UT	1.75%	6.00%	2.00%	9.75%	9.25%–10.25%
Healthy	AZ or NM	0.00%	0.00%	0.00%	0.00%	0.00%–1.00%
Healthy	UT	1.75%	0.00%	0.00%	1.75%	1.25%–2.25%



**Fig. 1.** Inclusion Flowchart of Navajo Nation stores.

**4. Discussion**

This study assessed the implementation accuracy of the Healthy Diné Nation Act (HDNA), both in terms of the 2% tax on unhealthy foods and beverages and the Navajo sales tax waiver for healthy items. The HDNA is the first-ever such policy in the U.S. or any indigenous nation. We found that correct implementation of the “junk food tax” was high: almost 9 of 10 stores accurately taxed unhealthy items, highlighting the successful implementation of a Tribal legislation to tax unhealthy foods and beverages in a rural setting.

HDNA uniquely details specific taxable food and beverage items

(Resolution of the Navajo Nation Council, 2021; Nation Council- Fourth Year, 2014; Navajo Nation Tribal Council. CD-96-20. Resolution of the 24th Navajo Nation Council- Second Year, 2020) and is thus more complex than other legislations, such as taxes focused on SSBs. Despite its complexity, HDNA implementation was nearly identical to SSB taxation accuracy in Cook County, Illinois: 87.8% in Cook County compared to 87.2% on the Navajo Nation (El-Sayed et al., 2020). Although not directly measuring compliance, other studies have suggested that unhealthy food and beverage taxes may not be passed through entirely to consumers and ranged from 47% to 69% in Berkeley (Falbe et al., 2015) and 73%–100% in rural areas of Mexico (Colchero

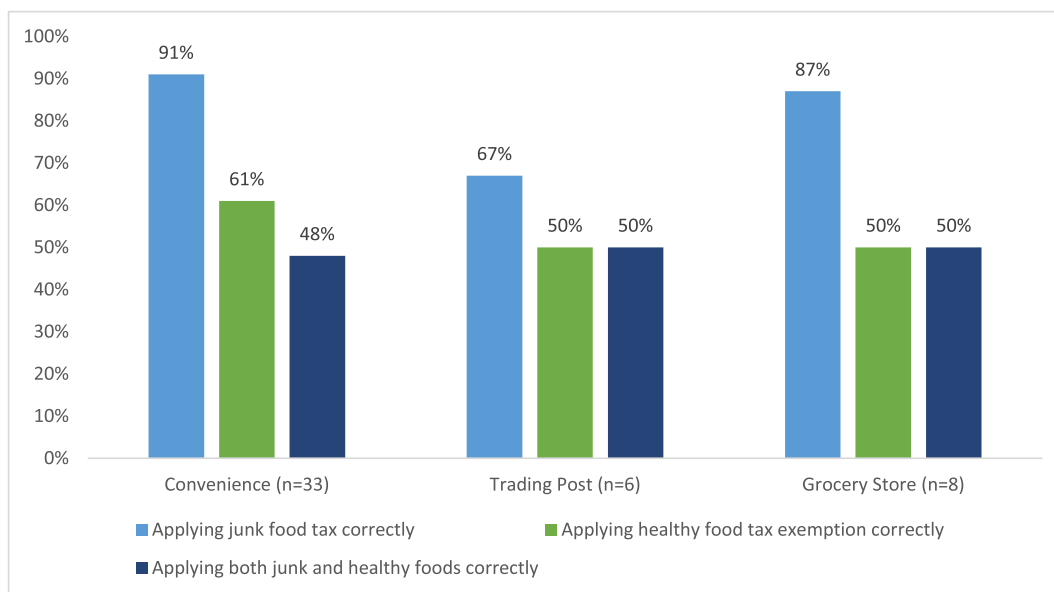


Fig. 2a. Percentage of HDNA Implementation by Store Type, n = 47.

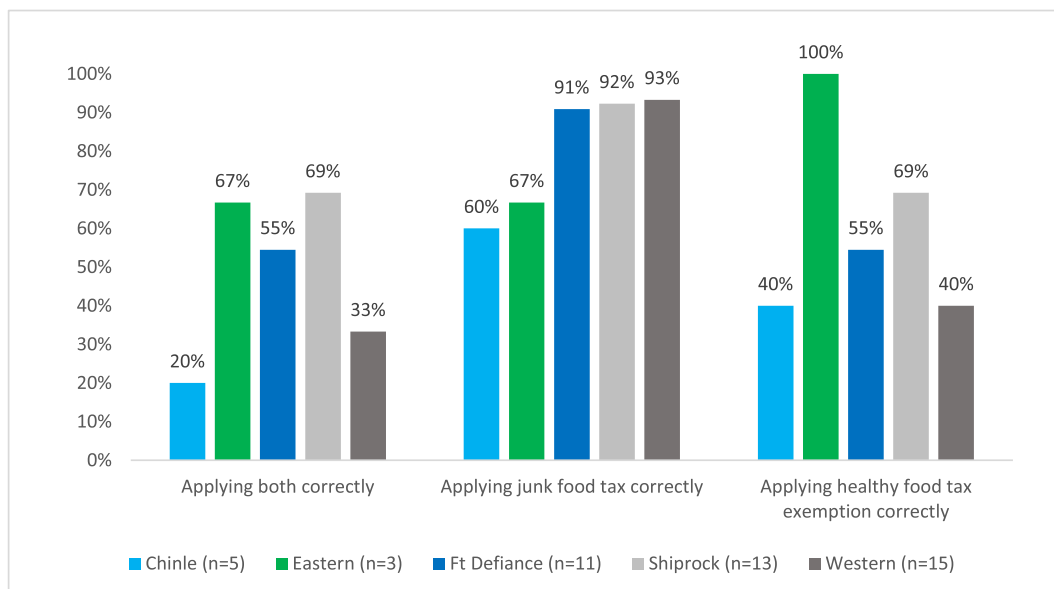


Fig. 2b. Percentage of HDNA Implementation by Regional Agency, n = 47.

et al., 2017). While the Office of the Navajo Tax Commission provided initial guidance to the stores via a memo, funds were unavailable for training, enforcement, or monitoring (Resolution of the Navajo Nation Council, 2014). Therefore, it is particularly noteworthy that implementation of the HDNA tax was highly accurate and comparable to urban areas.

The waiver was less accurately implemented, with just over half of stores correctly waiving sales tax on healthy items. While other settings have not applied a tax exemption for healthy foods, the error rate of applying a SSB tax on diet soda was <3% (El-Sayed et al., 2020) and 11.5% in Cook County and Berkeley, respectively (Falbe et al., 2015). Our community-based team did not perceive that stores intentionally implemented HDNA incorrectly. Rather, informal stakeholder feedback suggested confusion regarding whether water should be taxed as an item of “little to no nutritional value” or tax-free. HDNA’s complexity – which includes both a tax and a tax waiver – along with varying state-specific rates may have also contributed to inadvertently failing to apply the tax

exemption on healthy items. In an effort to improve operationalization, the HDNA Reauthorization Act in 2020 provided clearer language regarding unhealthy foods and beverages subject to tax (Navajo Nation Tribal Council, 2021).

The current study contributes to the scarcity of peer-reviewed research on implementation accuracy of food-and-beverage taxation policies, and an absolute lack of such research among indigenous nations. No research has evaluated a policy such as the HDNA in a tribal nation, although some research has assessed the impact of pricing structures on behaviors in rural indigenous communities (Brimblecombe et al., 2013; The Incidental Economist. November 8, 2016; Brimblecombe et al., 2018). We sampled stores throughout Navajo Nation and used similar methods to other studies assessing compliance or pass-through of food taxation (El-Sayed et al., 2020; Colchero et al., 2017; Falbe et al., 2014). Still, assessments were based on purchasing of a limited number of items during a selected number of visits. In addition, findings may not be generalizable to other settings.

## 5. Conclusions

The HDNA tax on unhealthy foods and beverages was accurately implemented in grocery stores and small stores on Navajo Nation. These data suggest that an unhealthy food-and-beverage tax can be implemented in a rural Tribal nation with accuracy comparable to large urban settings. In light of these findings, the 3–4% annual decline in HDNA revenue (now \$1.7 million a year, down from \$1.8 million initially) may be explained by a decline in unhealthy purchasing behavior rather than inaccurate implementation by retailers (Yazzie et al., 2020).

A unique aspect of the Navajo legislation was the 5% waiver on healthy foods and beverages. The complexity of this legislation may have resulted in less awareness among store managers or greater hesitancy to apply the waiver. Implementation accuracy could be improved through additional store support such as informational materials, technical assistance and printed labels for tax-free healthy items. Research is underway to gain understand store manager perspectives and facilitate accurate implementation. This study provides important context for rural communities and/or indigenous nations considering such policies, particularly with populations at high risk for common chronic conditions such as the Navajo Nation.

## Ethical Standards Disclosure

This study did not involve study participants; nonetheless, all activities were conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving research study participants were approved by the Navajo Nation Human Research Review Board [NNR-17.284] and Northern Arizona University. Partners IRB deemed the study exempt (2018P002365).

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## CRedit authorship contribution statement

**Carmen George:** Conceptualization, Investigation, Methodology, Data curation, Supervision, Writing – review & editing. **Carolyn Bancroft:** Formal analysis, Methodology, Data curation, Writing – review & editing. **Shine Salt:** Investigation, Methodology, Data curation, Writing – review & editing. **Caleigh Curley:** Project administration, Writing – original draft. **Cameron Curley:** Investigation, Methodology, Data curation, Writing – review & editing. **Regina Eddie:** Writing – review & editing. **Tierra Edison:** Investigation, Methodology, Data curation, Writing – review & editing. **Hendrik de Heer:** Conceptualization, Validation, Investigation, Methodology, Data curation, Supervision, Writing – original draft, Funding acquisition, Project administration, Resources. **Priscilla R. Sanderson:** Funding acquisition, Project administration, Writing – review & editing. **Del Yazzie:** Conceptualization, Investigation, Writing – review & editing. **Ramona Antone-Nez:** Conceptualization, Investigation, Writing – review & editing. **Sonya Shin:** Conceptualization, Funding acquisition, Investigation, Methodology, Data curation, Supervision, Writing – review & editing, Visualization.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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