



Food justice in Vermont’s environmentally vulnerable communities

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Abstract

In this study, we examine cases of food insecurity and food justice issues in Vermont’s environmentally vulnerable communities. Using a structured door-to-door survey (n = 569), semi-structured interviews (n = 32), and focus groups (n = 5), we demonstrate that: (1) food insecurity in Vermont’s environmentally vulnerable communities is prominent and intersects with socioeconomic factors such as race and income, (2) food and social assistance programs need to be more accessible and address vicious cycles of multiple injustices, (3) an intersectional approach beyond distribution is required to address food justice issues in environmentally vulnerable communities, and (4) paying attention to broader contextual and environmental factors may provide a more nuanced approach to understanding food justice.

Keywords Food justice · Environmental justice · Food insecurity · Food access

Abbreviations

BIPOC	Black, Indigenous, and People of Color
BRFSS	Vermont Behavioral Risk Factor Surveillance System
CI	Confidence interval
EJ	Environmental justice

FAP	Food Assistance Programs
FJ	Food justice
OR	Odds ratio
PFAS	Polyfluorinated Alkyl substances
REJOICE	Rural Environmental Justice Opportunities Informed by Community Expertise
SNAP	Supplemental Nutrition Assistance Program, a.k.a. food stamps
USDA	United States Department of Agriculture
VAAFM	Vermont Agency of Agriculture, Food and Markets
WIC	Special Supplemental Nutrition Program for Women, Infants, and Children

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Introduction

Despite having different origins, both the food justice (FJ) and environmental justice (EJ) movements take an intersectional approach to address a complex array of sociopolitical, environmental, and health factors. While environmental justice largely addresses environmental racism and disproportionate exposure to pollution among communities of color and low-income populations (Mohai et al. 2009; Bullard 2018), it has evolved to include multiple dimensions of environmental and social injustice around “where we live, work, play, and, more recently, to where, what and how we eat” (Gottlieb 2009; Agyeman et al. 2016). It explores both the distribution of environmental risks and benefits as well

as the procedural and recognitional injustices within environmental decision-making (Agyeman et al. 2016). Within this extended framing, access to healthy, nutritious food and food autonomy among communities of color and low-income communities helped inspire the food justice movement. Both the environmental justice and food justice movements and the scholarship concerning these movements have integrated tenets of intersectionality to show how race, class, gender, and other markers of identity are intertwined, both in terms of privileges and oppression linked to social structures, but also within individual experiences (Ducre 2018; Smith 2019).

This study explores food justice issues in Vermont's environmentally vulnerable communities. These are communities with higher proportions of residents of color and residents with low incomes and also carry heavier environmental, health, and social burdens. We use data from community surveys, interviews, and focus groups to reveal how food access is influenced by income, race, and gender identity to a great extent in the study areas. By examining the gaps in current food and social assistance programs, we show how food insecurity intertwines with other social and environmental injustices to form vicious cycles of inequalities and poverty. We highlight the importance of using approaches beyond distribution to address food injustice. We also connect food and environmental justice movements and make the case that paying attention to broader contextual and environmental factors may provide a more nuanced approach to understanding food justice.

Food justice study in environmentally vulnerable rural communities in Vermont

Few studies have investigated food justice issues in rural communities with higher environmental burdens. Vermont is the second most rural state in the U.S., with 65% of the population living in rural areas (Wickenheiser 2012; United States Census Bureau 2019 estimate). It has one of the lowest state populations (623,989 residents as of 2019). It is one of the least diverse states in the United States, and 92.5% of its population identifies as white alone for ethnicity. A total of 10.2% of Vermont residents live in poverty (slightly below average compared to the U.S. poverty rate). Agriculture plays an important role in the state's economy and identity. From 2007 to 2017, Vermont's food system economic output expanded by 48%, from \$7.5 billion to \$11.3 billion (VAAF 2020). The majority of Vermont's agriculture production is dairy. In 2018, dairy products accounted for 65% of the state's agricultural product sales (VAAF 2020), and the second largest production value was maple syrup (7.5%). The locally sourced staple food is far from sufficient to ensure food access in most areas. Also, local agricultural

products usually carry a premium and are rarely affordable to low-income populations.

The rurality of the state makes transportation a significant barrier to food access. Approximately 30% of residents of low-income towns in Vermont have to travel more than 15 min to get to a grocery store, with travel time being much greater for rural Vermont residents (Dougherty and Petenko 2019). There are few public transportation options in rural Vermont, making access to healthy food difficult without a personal vehicle (Johnke 2017). Petenko (2019) identifies that "food deserts"¹ are a problem in rural Vermont, and income (not race) is likely a major factor in the ability of a population to access fresh and healthy food. However, the 2018 Vermont Behavioral Risk Factor Surveillance System (BRFSS) showed that both BIPOC (Black, Indigenous, and People of Color) and those below the poverty line were almost equally food insecure.,^{2,3} A total of 13% of the BIPOC population was food insecure, compared to 4% of the white population. And a total of 14% of adults below the poverty line were food insecure, whereas less than 7% of adults above the poverty line were food insecure (BRFSS 2018). Latinx migrant farmworkers also face high food insecurity. They receive low salaries and work long hours. Lack of access to food growing space and transportation makes it difficult for them to get food (Mares 2019; Thompson 2021). In general, race-related food justice issues, such as the BIPOC community's food access (including access to culturally appropriate foods) and farmworkers' rights and well-being, are inadequately studied and addressed in Vermont (Mares 2019). A key concern is how the food system in Vermont has failed to address the needs of these underserved populations.

Food and environmental justice: intersectional movements

The origin and development of the food justice movement have been deeply intertwined with and shaped by

¹ Food desert is a controversial frame. In the cited article, the author uses the food desert concept defined by the USDA as low-income Census tracts at least 1 mile away from a grocery store in urban areas or 10 miles in rural ones.

² Food insecurity here is defined as limited access to adequate food due to a lack of money and other resources. (United States Department of Agriculture 2006).

³ In 2019, the Census Bureau estimated BIPOC residents (including two or more races) took up 7.5% of the state's population. Two or More Races 2.5%, Asian alone 1.4%, Black or African American alone 1.5%, Hispanic or Latino 2%, American Indian and Alaska Native alone 0.5%. The BIPOC community in Vermont also includes several thousand resettled refugees (the exact number is not available) and over a thousand Latinx farmworkers (estimated by Migrant Justice).

the environmental justice and other social justice movements (Sbicca 2018). The food justice movement was also a response to the inadequacies of community food security (CFS) and the local food movements, initiatives mainly driven by white and middle-class activists (Wekerle 2004; Mares and Alkon 2011). In the late 1990s, multicultural and intersectional food justice movements centered on historically marginalized communities emerged based on these critiques, which reframed the right to food as essential to creating an equitable and just society (Wekerle 2004). This movement was simultaneously shaped by parallel initiatives within social and environmental movements, such as environmental justice, regenerative agriculture, and food studies, to address inequities within the food system (Gottlieb and Joshi 2010; Alkon and Agyeman 2011). Gottlieb and Joshi (2010: 6) define food justice as “the benefits and risks of where, what and how food is grown and produced, transported and distributed, and accessed and eaten and shared fairly.” Alternatively, the Boston University Food justice program defines it as “universal access to nutritious, affordable, and culturally appropriate food for all, while advocating for the well-being and safety of those involved in the food production process. The movement address disparities in food access, particularly for communities of color and low-income communities, by examining the structural roots of our food system.” (2022).

In his book *Food Justice Now!*, Joshua Sbicca (2018) indicates that food justice widely intersects with economic, political, and social conditions, which produce subordination in the food system and broader society. Alkon and Agyeman (2011) define the food system as a racial project because communities of color often grapple with unjust food access issues. They also point out that food and environment are inherently interwoven as “the cultivation and celebration of meaningful food” is “central to place making” (p. 199). Here Alkon and Agyeman not only show that food and environmental justice are integrally connected but highlight the lack of access to basic environmental benefits for communities of color. Hoover’s work in the Akwesasne region presented challenges with food security in communities that are also grappling with environmental inequities and hazards caused by polluting facilities and how it disrupts the ability of communities of color and Indigenous communities to source local fish and food due to high levels of contaminants in them (Hoover 2017). Food justice also integrates concerns regarding occupational health and the well-being and safety of food and farm workers, especially those coming from immigrant backgrounds (Panikkar and Barrett 2021). Elevated environmental hazard exposures and socioeconomic vulnerabilities can pose a cumulative impact that magnifies the negative effects of each other and

cause “double jeopardy” for vulnerable communities (Institute of Medicine 1999; Morello-Frosch and Shenassa 2006). For example, a lack of food sovereignty, food access, utilities, and health services among socially vulnerable groups can limit their ability to access healthier diet choices and increase negative health impacts (Diez-Roux et al. 1997; Morland et al. 2002). Gottlieb (2009) identifies three key connections between EJ and FJ: sustainable agriculture/local food systems, community health and livability, and the built environment. Food production and unequal access to a healthy, nutritious diet also affect communities’ health conditions (Glanz et al. 2005). Factors within the natural and built environment include land access, housing, transportation, and the presence or absence of grocery stores, which are interconnected systems essential to food production and access. Mares and Peña (2011) draw connections between environmental and food justice by proposing that food justice could integrate frameworks developed by EJ activists and scholars, such as sovereignty and autonomy. One major distinction between food justice and food sovereignty is that food sovereignty is considered to explicitly oppose neoliberalism and address “more fundamental inequalities related to land distribution, resource management, and the commodification of food crops” (Mares and Alkon 2011, p. 78). Even though food sovereignty has its roots in the Global South, food justice and food sovereignty have considerable overlap, and many see a potential for a “unified path” (Giménez and Shattuck 2011). Cadieux and Slocum (2015) conclude that both discourses aim to institutionalize equity in the food system, and both advocate greater control over food production and consumption by marginalized individuals.

These studies show the interconnections between food and environmental justice. Looking into food justice issues in EJ communities can inform policymakers and community organizations by identifying the interwoven factors that affect these communities’ well-being to develop strategies to promote both food and environmental justice. By looking at food issues with both lenses in mind, it is easier to identify and break the vicious cycles of food and environmental injustices. In this mixed-methods study, we combine door-to-door surveys and interviews with community organizations and stakeholders to explore food justice issues by gender, race, and poverty in Vermont’s EJ communities.

Methods

Identifying study sites

We define environmentally vulnerable communities as communities of color and low-income communities with high environmental, health, and social burdens. Many states and federal agencies, such as the EPA using the EJ Screen⁴ and CDC through its Environmental Justice Index⁵ use varying spatially aggregated data to identify communities with higher environmental injustices. Our study similarly conducted a spatial analysis in partnership with Vermont state agencies to identify the cumulative environmental, social, and health risks in Vermont (Ren et al. 2022). See Table 1 for the variables included in the spatial analysis. We identified areas with the highest quartile of commutative environmental disparity scores and went to these communities to conduct interviews and surveys (Fig. 1). The details of the special analysis can be found in Ren et al. (2022).

Interviews and focus groups with community organizations and individuals

After obtaining IRB approval from the University of Vermont, the research team conducted semi-structured interviews with community organizations, state agency staff members, and legislators that served the target communities. The contact list was developed by reaching out to known environmental and community organizations, including food justice organizers in Vermont, and then snowball sampling (reaching out to people suggested by the interviewees). We reached out to a total of 127 potential interviewees. A total of 43 participants agreed to participate in the study and were interviewed. The interview guide included general environmental justice questions on climate, food justice, housing, energy, safety, and outdoor access. For this part of the study, we analyzed 32 interviews, that directly addressed food justice issues. Each interview lasted about 1–1.5 h. Audio recordings were obtained with the interviewee's consent. Most interviews were conducted between 2019 and 2020 by three trained graduate researchers affiliated with the project.

All interview transcripts were analyzed using the qualitative software NVivo 12. The text was initially coded based on an inductive approach to identify general themes such as climate, food justice, housing, energy, transportation, etc. Subsequent coding for emerging themes within food justice was conducted using deductive approaches, which were also influenced by the theoretical framing of food and

environmental justice. The goal was to further organize, code, and interpret the data. Double coding of 25% of the interviews was done to increase coding accuracy. A code-comparison query was conducted in NVivo to test the inter-coder reliability (Cohen's kappa).

Additionally, we drew from focus groups data collected by our community partners in REJOICE alliance (Rural Environmental Justice Opportunities Informed by Community Expertise). Two in-person focus groups were conducted in Rutland and Newport prior to COVID lockdown, and three virtual focus groups were conducted with migrant farmworkers, Bhutanese Nepali immigrants, and Somali Bantu immigrants during the COVID lockdown. The focus group participants were recruited using convenient sampling. They similarly explored the general themes of food, housing, energy, transportation, and health issues among low-income, communities of color, the disabled, and elderly communities. These focus groups lasted roughly an hour and a half, and the participants were compensated \$50 for their time. The focus groups were fully coded and analyzed by REJOICE, and the key highlights and results were made publicly available and can be found on REJOICE's website (2022a; b). In this study, we only report some key data points related to food justice issues.

Door-to-door surveys

We developed a survey instrument with 58 questions arranged under the following topical headings: local environmental risks and social concerns, water and climate change, housing (including indoor environmental risks), energy supply, food access, transportation, health, outdoor recreation, safety (including a sense of place), agriculture concerns, and demographic questions (Panikkar et al. 2021 In Review). All questions were voluntary, and not all questions were relevant to every respondent. The demographic variables analyzed included race, gender, income, and residence ownership. We left questions about race and gender open-ended. Annual household income was categorized into different income brackets based on the United States Department of Health and Human Services 2019 poverty guidelines, which set household income greater than \$25,750 per year for a four-person household as above poverty (Office of the Assistant Secretary for Planning and Evaluation 2019).

Six trained surveyors from our research team knocked on as many doors as possible between May and August 2019. An estimated 25% of people answered their doors, and approximately a third of those who answered their doors agreed to complete the survey. The survey took approximately ten minutes. No identifying information was collected. Additionally, we developed an online version of the survey using the Lime Survey web application. Surveyors left flyers with a link to the online survey at unanswered

⁴ <https://www.epa.gov/ejscreen>.

⁵ <https://www.atsdr.cdc.gov/placeandhealth/eji/index.html>.

Table 1 Variables included in the spatial analysis

Variable	Definition	Data sources	Original spatial unit and transformation
Environmental Risk Factors			
Traffic noise	24-h equivalent sound level (LEQ, denoted by LAeq) noise metric as of April 19, 2018	National Transportation Noise Map	Raster, values summed by census tract
Air pollution	Noncancer Whole-body Hazard Index from the National Air Toxics Assessment (NATA)	EPA 2014 National Air Toxics Assessment (NATA)	Census tract
Brownfields and hazardous sites	Active brownfields and hazardous sites in Vermont	VT Agency of Natural Resources	Point data, total count calculated by census tract
Landfills	Current and historic landfills/waste disposal storage sites	VT Agency of Natural Resources	Point data, total count calculated by census tract
Superfund sites	Locations currently on and deleted from Superfund's National Priorities List (NPL)	EPA Cleanups in My Community (CIMC)	Point data, total count calculated by census tract
Impaired surface water	All surface waters in the state for which beneficial uses are impaired by pollutants (Section 303(d) of the federal Clean Water Act)	VT Agency of Natural Resources	Polygon, area calculated by census tract
Lead in school drinking water	Lead concentration in sampled drinking water from K-12 schools and daycares in Vermont	VT Agency of Natural Resources	Point data, average value calculated by census tract
Flood hazard	Special Flood Hazard Areas of 1% annual chance flood based on the National Flood Hazard Layer	FEMA Map Service Center and VT Agency of Natural Resources	Polygon, area calculated by census tract
Heat Vulnerability	Variables included environmental characteristics, climate characteristics, and observed heat illness in the Vermont Heat Vulnerability Index	VT Department of Health	Sub-county, average value calculated by census tract
Health Risk Factors			
Cancer	Percent of adults who have cancer Behavioral Risk Factor Surveillance System (BRFSS)	VT Department of Health (2011–2015)	Sub-county, average value calculated by census tract
Diabetes	Percent of adults who have diabetes Behavioral Risk Factor Surveillance System (BRFSS)	VT Department of Health (2011–2015)	Sub-county, average value calculated by census tract
Obesity	Percent of adults who are obese Behavioral Risk Factor Surveillance System (BRFSS)	VT Department of Health (2011–2015)	Sub-county, average value calculated by census tract
Lung disease	Percent of adults who have lung diseases Behavioral Risk Factor Surveillance System (BRFSS)	VT Department of Health (2011–2015)	Sub-county, average value calculated by census tract
Cardiovascular disease	Percent of adults who have lung disease Percent of adults who have cardiovascular disease Behavioral Risk Factor Surveillance System (BRFSS)	VT Department of Health (2011–2015)	Sub-county, average value calculated by census tract
Social vulnerability			
Poverty	Population living below the Federal poverty level	SVI (VT Dept of Health, 2015)	Census tract
Unemployment	Population age 16 and over seeking work	SVI (VT Dept of Health, 2015)	Census tract

Table 1 (continued)

Variable	Definition	Data sources	Original spatial unit and transformation
Education	Population age 25+ without a high school diploma	SVI (VT Dept of Health, 2015)	Census tract
Health insurance	Population age less than 65 without insurance	SVI (VT Dept of Health, 2015)	Census tract
Children	Population age less than 18	SVI (VT Dept of Health, 2015)	Census tract
Elderly	Population age 65 and over	SVI (VT Dept of Health, 2015)	Census tract
Disability	Population age 5 or more with a disability	SVI (VT Dept of Health, 2015)	Census tract
Single parent	Percent of households with children that have a single parent	SVI (VT Dept of Health, 2015)	Census tract
Minority	Population of Hispanic or non-white race	SVI (VT Dept of Health, 2015)	Census tract
Limited English Proficiency (LEP)	Population age 5 and over who speak English less than "Well"	SVI (VT Dept of Health, 2015)	Census tract
Large apartment buildings	Buildings that have 10 or more housing units per building	SVI (VT Dept of Health, 2015)	Census tract
Mobile homes	Percent of mobile homes of total housing units	SVI (VT Dept of Health, 2015)	Census tract
Crowding	Housing units with more than one person per room	SVI (VT Dept of Health, 2015)	Census tract
No vehicle	Households with no vehicle available	SVI (VT Dept of Health, 2015)	Census tract
Group quarters	Population living in group quarters	SVI (VT Dept of Health, 2015)	Census tract
Food access	Population count beyond 1 mile for urban areas or 10 miles for rural areas from supermarket	2015 USDA Food Access Research Atlas	Census tract
Usage of food stamps	Number of housing units receiving the Supplemental Nutrition Assistance Program (SNAP) benefits in each tract	2015 USDA Food Access Research Atlas	Census tract

doors. The survey link was also posted on selected local neighborhood forums. A total of 569 survey responses were collected between May and August 2019, including 107 responses gathered online. The survey respondents came from all Vermont counties except Orange, Windham, and Windsor Counties. We canceled our plans to conduct survey responses in these counties due to the COVID-19 pandemic. The selection of survey locations was based on convenience sampling, and high-vulnerability neighborhoods identified in the special analysis were prioritized.

The survey results were entered into a spreadsheet and analyzed using SPSS Statistics (IBM, version 26). The research team categorized the demographic factors using a binary scale such as men/women, white/BIPOC (Black, Indigenous, People of Color), and above/under the poverty line. The reason for using binary scales was our relatively small sample size. Further breakdown of demographic categories would produce very small numbers in certain categories. For example, options for non-binary gender identity were offered in the questionnaire, but only three participants

identified as non-binary. The sample size was too small to be included in the quantitative analysis. We recognized the limitation of this binary approach and opted to keep it only to gain more statistical power. This study focused on the food-related variables of the survey dataset. We calculated descriptive statistics, including cross-tabulations between all demographic variables and food-related variables.

Further analysis was completed using binomial logistic regression to determine the odds ratios (ORs) at 95% confidence intervals (CIs) of the dependent food variables, such as access to fresh produce, obtaining enough nutrition, and ability to afford food. Three demographic variables, gender, race, and poverty line were set as independent covariates in SPSS. All results, including the statistically non-significant results, are reported in the results section to avoid overemphasizing or underemphasizing the results (Hewitt et al. 2008). The survey sought to oversample more BIPOC and low-income residents (defined by an annual income below the federal poverty line) to better characterize their experiences.

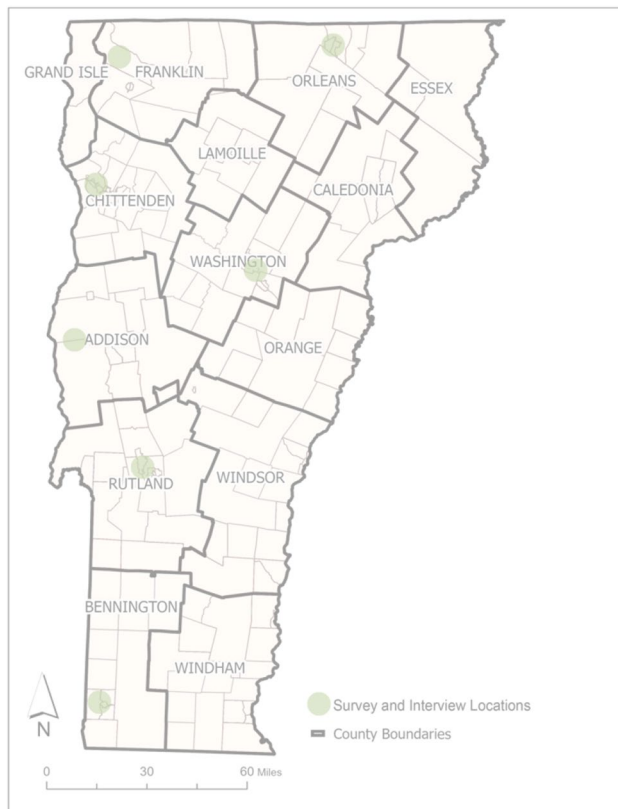


Fig. 1 Approximate locations of data collection sites

More women participated in the survey than men. The survey sought to oversample more BIPOC residents and residents with an income below the federal poverty line to better characterize their experiences. A little over 14% of the survey respondents were BIPOC, which is higher than the state average of 5.9% BIPOC residents. Over 40% of the respondents had a household income below \$25,750 (referred to as below the poverty line from here on), also a higher percentage than the statewide level of around 11% of households below the poverty line (see Table 2). The BIPOC respondents were poorer than the white respondents on average. No significant difference was detected between the poverty level between the binary genders. Approximately 46% of the BIPOC respondents lived under the poverty line, compared to 40% of the white respondents. However, the differences were not statistically significant to show a strong relationship between income, race, and gender.

Results

Food insecurity by income and gender

Vermont is predominantly a rural state with a strong farming tradition and a robust food movement. Still, many interviewees, including legislators and staff of food organizations serving vulnerable communities, commented that many Vermont residents struggled with hunger. One legislator noted:

“Food justice, you know, just all the issues of access to food, I think is a huge problem in Vermont. Which you think, oh Vermont, great farm to plate, this shouldn’t be a problem. It’s a really big problem.”

People with less economic means struggled to access food, especially fresh produce. One community member interviewed said: “So food insecurity is present in all of the counties in Vermont. You know, there’s some variation but it’s an issue everywhere.” Our results show that affordability issues have many dimensions and affect different populations in various ways. At the Rutland focus group, one member shared:

“There are many ‘food deserts’ and ‘dead zones’ in Rutland, and people may not know how to apply for EBT.”

Multiple interviewees stated that food was usually the first to be compromised when people with limited means were faced with competing costs of life necessities. Even with the assistance of SNAP benefits, some expressed that lower-income populations had difficulty affording food, “especially not enough money to buy a nutritious diet.” One interviewee who worked at a food shelf stated:

“People aren’t making it, you know, especially in Vermont... your income goes to rent and bills and medical expenses. And if you’re choosing between your prescriptions and rent and food, food probably will be one of the first things to go. We’ve had a lot of people that say they watered down their food, or they skip meals... Am I gonna eat or is my child gonna eat up all my check? People have to make those awful decisions every single day.”

Between rent, utility bills, and medical expenses, food was viewed as “stretchable.” These results on food security were largely consistent with the results of our quantitative analysis. Despite there was not much of a difference in proximity to the nearest grocery store by income, and about 14% of the population both below and above poverty were living in food deserts, our results showed that poverty played the biggest role in food insecurity. Survey respondents (see Table 3) whose annual income was below the poverty line

Table 2 Descriptive statistics of gender, race, and income

Variable	Category	Frequency (n=569)	Percent	Valid percent	U.S. Census (2019 estimates)
Gender	Men	250	43.9%	47.6%	49.4%
	Women	275	48.3%	52.4%	50.6%
	Missing or N/A	44	7.7%	–	
Race	White alone	429	75.4%	84.0%	94.2%
	BIPOC and two or more races	82	14.4%	16.0%	5.8%
	Missing or N/A	58	10.2%	–	
Income	> \$25,750	259	45.5%	59.1%	89.0%
	< \$25,750	179	31.5%	40.9%	11.0%
	Missing	131	23.0%	–	

were three times less likely to have good access to fresh, healthy food (OR: 0.29, CI: 0.128–0.66, Sig. 0.003), two times more likely to have trouble affording fresh fruits and veggies daily (OR: 2.069, CI: 0.999–4.288, Sig. 0.05), and seven times less likely to eat fresh produce weekly or daily compared to those above the poverty line (OR: 0.136, CI: 0.044–0.424, Sig. < 0.001). Respondents living under the poverty line were also five times more likely to have gone hungry in the past month (OR: 5.277, CI: 1.568–17.761, Sig. 0.007) and two times more likely to have trouble affording food compared to those above the poverty line (OR: 2.584, CI: 1.255–5.323, Sig. 0.01).

Some interviewees specifically identified single mothers as a group with a higher risk of food insecurity. The survey results (Table 3) also showed that women faced a higher rate of food insecurity. Women were over two times less likely to have access to fresh, healthy food (OR: 0.39, CI: 0.166–0.918, Sig. 0.031) and were almost three times more likely to have trouble affording food compared to men (OR: 2.953, CI: 1.354–6.442, Sig. 0.007).

The Inequalities in access to food were deepened by the polarization between food access and the choices of different social groups. While people with enough income enjoyed the good availability and abundance of food due to global trade, local production, and home gardening, low-income Vermont residents in the study areas were less likely to be part of this picture of prosperity due to affordability issues. A community educator stated:

“Equity is a real issue for food co-ops because their food is a little more expensive, and poorer people tend to not even go into them even though they might find some deals unexpected. They just don’t go there.”

Unexpected life events often incur extra expenses, and as we have seen, significant economic declines and other major social disturbances, such as a government shutdown, bring hardships. A resident in the Newport focus group stated:

“...income limits for meals on wheels is restrictive; you are either in or out of this program and cannot voluntarily sign up if you need assistance for a short period of time.”

Food insecurity in environmentally vulnerable communities was also linked to health conditions. In this study, respondents living below the poverty line (OR = 1.839, CI: 0.913–3.703) were 1.8 times more likely to report asthma and twice as likely to report cardiovascular disease (OR = 2.272, CI: 1.118–4.618) than those above the poverty line. Also, those who had trouble affording food were two times more likely to have asthma (OR: 2.148 CI: 1.146–4.026, Sig. 0.017) and autoimmune disorders (OR: 2.617 CI: 1.103–6.207, Sig. 0.029). Also, those with good access to food were significantly less likely to have asthma (OR: 0.389 CI: 0.193–0.784, Sig. 0.008).

Food insecurity by race

A critical component of food justice is the intersection of food insecurity and race. BIPOC survey respondents in environmentally vulnerable communities were poorer than white respondents in the survey results (see Table 3). Approximately 46% of the BIPOC respondents lived under the poverty line, compared to 40% of the white respondents. BIPOC survey respondents were also almost three times more likely to have trouble affording food (OR: 2.832, CI: 1.249–6.423, Sig. 0.013) than white respondents. BIPOC residents were also about twice as likely to have less access to fresh, healthy food (OR: 0.541 CI: 0.209–1.404) and were more than twice as likely to go hungry in the past month (OR: 2.666 CI: 0.679–10.465) compared to white residents but these observations were not statistically significant. Regarding the health implications of food access, the survey also showed that BIPOC respondents were almost twice as likely to report autoimmune disorders than white respondents.

Table 3 Results of logistic regression on socioeconomic variables and food access questions

	Gender		Race		Income	
	Male	Female	White	BIPOC	Above \$25,750	Below \$25,750
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
	Odds Ratio (95% CI)		Odds Ratio (95% CI)		Odds Ratio (95% CI)	
	Significance		Significance		Significance	
Food affordability and access						
Have good access to fresh, healthy food	177 (94.7%)	162 (86.6%)	283 (91.6%)	51(83.6%)	187 (94.9%)	102 (84.3%)
	0.39 (0.166–0.918)		0.541 (0.209–1.404)		0.29 (0.128–0.66)	
	0.031*		0.207		0.003*	
Have gone hungry in the past month	12 (12.8%)	4 (5.9%)	13 (8.9%)	4 (20.0%)	4 (4.2%)	12 (20.3%)
	0.509 (0.147–1.764)		2.666 (0.679–10.465)		5.277 (1.568–17.761)	
	0.287		0.16		0.007*	
Have trouble affording food	15 (7.6%)	33 (16.5%)	36 (11.0%)	15 (23.1%)	15 (7.3%)	26 (19.8%)
	2.953 (1.354–6.442)		2.832 (1.249–6.423)		2.584 (1.255–5.323)	
	0.007*		0.013*		0.01*	
Can afford fresh fruits and veggies daily	60 (65.2%)	66 (65.3%)	93 (87.9%)	31 (53.4%)	68 (70.8%)	26 (50.0%)
	1.022 (0.502–2.081)		1.293 (0.616–2.713)		2.069 (0.999–4.288)	
	0.952		0.497		0.05*	
Live more than 10 miles from a grocery store	17 (13.4%)	21 (13.5%)	27 (14.1%)	9 (12.3%)	19 (14.4%)	11 (13.9%)
	1.318 (0.593–2.932)		1.209 (0.492–2.969)		0.92 (0.404–2.098)	
	0.498		0.678		0.843	
Nutrition						
Eat fresh produce weekly or daily	179 (94.7%)	182 (94.3%)	295 (93.4%)	59 (96.7%)	198 (98.0%)	110 (87.3%)
	1.051 (0.401–2.754)		4.413 (0.56–34.784)		0.136 (0.044–0.424)	
	0.92		0.159		< 0.001*	
Able to get sufficient nutrients from diet	108 (89.3%)	125 (85.0%)	160 (85.6)	59 (89.4%)	112 (86.8%)	61 (81.3%)
	1.603 (0.712–3.609)		0.708 (0.28–1.789)		1.71 (0.776–3.764)	
	0.254		0.465		0.183	
Growing food, hunting, and fishing						
Grow some portion of food	52 (40.6%)	60 (39.2%)	76 (39.8%)	26 (35.6%)	53 (40.5%)	29 (36.3%)
	0.837 (0.47–1.489)		0.728 (0.383–1.383)		0.986 (0.543–1.792)	
	0.545		0.332		0.963	
Get food from hunting and fishing	35 (27.3%)	53 (35.3%)	64 (33.3%)	24 (33.3%)	37 (28.2%)	31 (28.2%)
	1.332 (0.725–2.446)		1.168 (0.602–2.266)		1.671 (0.907–3.081)	
	0.356		0.646		0.1	
Use VT Lakes for fishing	30 (29.4%)	43 (36.4%)	51 (34.9%)	21 (36.8%)	32 (30.5%)	23 (38.3%)
	1.317 (0.667–2.601)		1.129 (0.545–2.336)		1.369 (0.686–2.732)	
	0.428		0.744		0.373	

*Significant results at the 95% confidence level

Still, this observation was not significant (OR = 1.923, CI: 0.739–5.006).

When discussing different ethnic groups’ diverse needs for food production, acquisition, and consumption, the interviewees frequently mentioned resettled refugees. Interviewees who worked with refugees in the Burlington area noted that the resettled refugees faced a great deal of culture shock in terms of food upon arrival in the U.S. For example, some families did not have the habit of eating canned food, which

comprised a good portion of the prepared packages distributed by food shelves and Food Assistance Programs (FAPs). The focus groups conducted with Somali Bantu residents showed that “Often the pre-packaged food boxes and the choices at the food shelf contained food that was not consumed for religious and cultural reasons, which created a lot of waste.” One organization working with refugee families mentioned that some refugees had difficulties acquiring their traditional foods and also budgeting for food, especially

during COVID when food prices also went up. The food system in Vermont had largely failed to provide affordable and culturally appropriate food for them. In addition, resettled refugees and migrant workers were less likely to have access to land for growing food.

In our survey (see Table 3), BIPOC residents were four times as likely to eat fresh produce frequently, suggesting a healthier diet (OR: 4.413 CI: 0.56–34.784). However, barriers to cooking from scratch, which is usually associated with a healthier diet, were also mentioned in the interviews. Migrant farmworkers shared that they couldn't go shopping weekly for food. Instead, their employers took them shopping only twice a month, which changed their shopping and eating habits. One migrant farmworker interviewee stated:

“The problem is, since we are on farms, we always share a fridge between two people, so to buy that much food, that's a lot of [perishable] food to fit in the fridge. So, we have to buy a lot of canned things and non-perishable things that last forever. So, our way of feeding ourselves has changed too.”

In addition, some key informant interviewees also mentioned that food preparation remained a challenge for migrant farmworkers when cooking from scratch is not an option.

Invisibility, vicious cycles, and benefit cliff

Despite the prevalence of food insecurity, the issue might not appear visible as people could be ashamed to talk about it and hesitate to use community resources such as a food shelf. Besides people in true poverty, some interviewees working on food shelves mentioned that a larger population was only “one paycheck away” from food insecurity, especially when facing unexpected events such as “death in the family or job loss.” Sometimes it could take a significant amount of energy and time to piece together resources such as coupons and welfare benefits to get food. An interviewee who was a manager at a community organization talked about the ambiguity of “food security”:

“You know, going to the food shelf and using coupons at the farmers market, using SNAP, juggling all of these programs. Is that being secure or not? And that's something that's kind of tough too when you ask the questions. ‘Cause people might say they have access, but they're also spending a lot of time, energy, and stress trying to manage all the different programs they're on.”

Vulnerable populations especially suffered from these setbacks and struggled to recover from them. For example, the COVID-19 pandemic has been linked to increased food

insecurity in this population, as shown in other studies conducted in Vermont (Niles et al. 2020a). A staff member of a community justice center talked about the vicious cycle:

“And that's what happens a lot is that they end up borrowing money from people, and then they give it back, so they are short again, and then they have to borrow it again. So that becomes another cycle, that money piece.”

Food insecurity was not isolated and widely intersected with many other social inequities. While a low minimum wage compromises the affordability of food for low-income populations, money is not the only factor that affects food access. Geographic locations, transportation, isolation, knowledge, food preparation barriers, and limited access to land increased the difficulty of accessing fresh food.

Lack of transportation, either due to the cost of maintaining a personal vehicle or limited availability of public transportation, heightened the difficulty and cost of grocery shopping or growing food in these areas. According to a community center's manager:

“We know that we can't end hunger in isolation. You know, hunger is a symptom of poverty. And it's a symptom of people not being able to meet your basic needs. Like if you can't afford food, you're probably struggling to afford rent and to afford transportation. So, it all happens together.”

A few interviewees mentioned the connection between substance abuse and food insecurity. Addiction reduced job opportunities and perpetuated poverty, making food less affordable. Drug abuse also causes a decline in health and increased vulnerability to illness, limiting a person's mobility to get food. Meanwhile, not eating well and poor nutrition worsened health conditions. One employee of a community center noted:

“Those families are not only food insecure, they are also unable to help themselves.”

In the interviews, many critiques of approaches to address food insecurity focused on public food assistance programs (FAPs). While some interviewees believed that Vermont has strong FAPs such as SNAP (Supplemental Nutrition Assistance Program, a.k.a. food stamps), WIC (Special Supplemental Nutrition Program for Women, Infants, and Children), and free and reduced school lunch, many also identified major flaws in the system. Some interviewees mentioned that the program benefits were meant to be a supplement, even though they were often the only source of funds for a family to pay for their food. *“It's not enough money to get through a month, especially not enough money to buy a nutritious diet.”* Another commonly mentioned issue was that it was not easy to get

off the FAPs once someone became dependent. Many people “make too much to qualify” or just enough not to qualify. For people who work multiple part-time jobs and low-wage jobs, their income is just above the cutoff to qualify for programs like SNAP. However, they do not earn enough money “to actually get by.” Some interviewees referred to this pattern as the “benefits cliff,” where people were essentially penalized for working.

This emotional barrier was also intertwined with the format of the program arrangement. Despite being one of the last states to discontinue delivery services for WIC clients, Vermont saw a sharp decline in the redemption rate after delivery became unavailable. (According to one interviewee working with WIC clients: “We went from 100 to 46% redemption rate.”) This might be tied to the factor that some program participants did not have access to convenient transportation, but it could also be because “some people... may not redeem the food because they don't want people to know they have WIC.”

Intersections between food justice and environmental justice

The interviewees frequently mentioned environmental issues associated with farming, such as runoff, water contamination, and pesticide use. Runoff from agriculture remained one major cause of water quality issues in the Lake Champlain watershed. Agricultural chemicals could contaminate groundwater sources on farms. Exposure to farm chemicals such as pesticides and disinfectants through direct contact and air pollution could harm the health of farmworkers, including migrant workers. Interacting with food insecurity, the negative health impact of environmental issues could be amplified.

Environmental issues can also cause concerns about food produced locally. Bennington residents, exposed to polyfluorinated Alkyl substances (PFAS) from the St. Gobain factory for years before it shut down, were particularly concerned about water quality and the safety of their drinking water systems. The Newport focus group participants were also concerned about water quality issues in Lake Memphremagog caused by a nearby active landfill and blue-green algal blooms, which have associated effects on human and animal health. While low-income (38%) and people of color (37%) respondents were slightly more likely to eat fish from local lakes than the white (35%) and higher-income groups (31%), in a locally organized focus group in Newport, residents said:

“Fish cannot be eaten from the lake, and it is unsafe to allow pets to swim in and drink from the water. One participant spoke of two relatives dying of

Legionnaires disease, which was suspected to be connected to the local water quality.”

Discussion

Based on our key findings, we make the following arguments: (1) food insecurity in Vermont's environmentally vulnerable communities is prominent and intersects with socioeconomic factors such as race and income, (2) food and social assistance programs need to be more accessible and address vicious cycles of injustices, (3) an intersectional approach beyond distribution is required to address food justice issues in environmentally vulnerable communities, and (4) an environmental justice lens provides a broader and nuanced approach to understanding food justice.

Food insecurity in high environmental-risk communities is prominent and intersects with race, income, and other socioeconomic factors

Our results show that food insecurity is prevalent in Vermont's high environmental-risk communities. The distribution of fresh, healthy food is far from equitable in these communities despite the food services run by community organizations and government FAPs. Income was the most influential factor in food insecurity. Populations living under the federal poverty line were much less likely to have consistent access to sufficient, fresh, and healthy food. Consequently, they also eat fresh produce less frequently and are more likely to go hungry. People of color were also more likely to report having trouble affording food. Other food-insecure groups include children, the elderly, and single mothers.

Lack of access to food, especially culturally appropriate food, was commonly mentioned in conversations with resettled refugees and migrant workers. In *Life on the Other Border*, Teresa Mares (2019) also documents food insecurity among Latinx migrant workers in Vermont, who are usually receiving low wages and have no access to FAPs and other social benefits and insurance. Providing food supplements and ensuring food security for migrant workers will be vital to improving food injustices in Vermont.

Food insecurity can increase health burdens. Those who have trouble affording food are also more likely to report asthma and autoimmune disorders, an observation that needs further inquiry. These results echo the findings of other studies that show the connection between nutrition/food security and asthma (Allan and Devereux 2011; Alwarith et al. 2020; Laurent et al. 2022).

Food assistance programs and other social assistance programs need to be more accessible and address vicious cycles of injustices

Food is expensive in Vermont. In 2019, Vermont's per capita grocery expenditure was \$4,206, the second highest among all 50 states (Bureau of Economic Analysis 2019). According to the United States Department of Agriculture (Coleman-Jensen et al. 2022), the food insecurity rate in Vermont is lower than the national average rate (10.3%). Still, about half of the food-insecure population is above the eligibility threshold of FAPs such as SNAP (Feeding America 2019). This number is consistent with the "benefits cliff" identified by some interviewees. Even with the benefits of FAPs, it is still challenging to buy sufficient food. Due to a series of factors, such as lack of awareness or understanding, the perceived stigma associated with participation, and difficulties with transportation and shopping options (largely due to the transition from home delivery to an EBT system), the caseload of WIC in Vermont has also been steadily declining (Vermont Department of Health 2019). Addressing the flaws in SNAP to make it accessible to all food-insecure populations, increasing the enrollment and retention of WIC clientele, and leveraging school meal programs will help improve food access for food-insecure households (Khan et al. 2011).

Our study shows that other social inequalities, such as poor health, substance abuse, lack of transportation, and isolation, can also interact with food insecurity and intensify each other. As a result, it can be difficult to get back on track for people trapped in a vicious cycle of injustices. Many interviewees clearly suggested that food insecurity cannot be addressed without addressing the more fundamental questions of poverty. Increasing the minimum wage, providing short-term financial aid, and improving the overall economic conditions in vulnerable communities can help to lift people from vicious cycles and improve food access.

An intersectional approach beyond distribution is required to address food justice issues in environmentally vulnerable communities

Schlosberg (2009) calls attention to building the capabilities of underserved communities in addition to recognizing their particular needs and procedural engagement in coproducing local environmental decisions and actions to better address environmental inequities. These aspects are a good supplement to the current food justice approach, which pays much attention to distribution issues and exchange mechanisms but not enough to procedural engagement and recognizing and catering to the unique needs to advance individual capabilities (Cadieux and Slocum 2015). The themes that emerged from our interviews acknowledge these justice aspects

beyond distribution. Several interviewees mentioned using food as a medium for education and community building. This approach provides opportunities for individuals and communities to obtain and generate knowledge on healthy food production and access, which helps them gain agency and capabilities in food production and consumption.

The component of participatory or procedural justice in the theories of environmental justice also emphasizes the inclusion of voices and leadership of marginalized populations (Schlosberg 2009). Some interviewees noted that increasing community involvement and bringing "communities to work together" are critical for bringing the voices of marginalized groups to the discussions of the food system. These are good steps to promote the participation and leadership of people of color, migrant farmworkers, and low-income populations in the approach to food justice. Within the discourse of food systems and community participation, it is critical to reflect on the systemic oppression that frequently takes place in community work. True participation can only happen when members of marginalized groups truly feel recognized and empowered to speak up and take action.

Thompson and Carter (2022) highlight the importance of challenging structural and intersectional injustices in rural settings. They indicate that identifying intersectionality and intersectional engagement is critical in food justice. One example of such intersectional approaches is to consider the multiple identities and challenges faced by migrant farmworkers. Our interviews highlighted concerns about these challenges, such as discrimination, labor exploitation, occupational exposure, and limited access to health care. These are all injustices on top of food insecurity. Fighting for the rights of and justice for migrant workers and improving their life and work conditions, in general, will remain an important task in pursuing food justice. This work also presents opportunities to bring together communities and build capacities and agency among them.

Paying attention to broader contextual and environmental factors may provide a more nuanced approach to understanding food justice

Our study highlights a confluence of social, political, and environmental factors that contribute to food insecurity. The concentration of environmental disparities that contribute to food insecurity is not adequately explored. While Vermont has fewer industries, it has its own share of environmental risks, which impact low-income and communities of color disproportionately. Environmental pollution may cause health issues that can be exacerbated by food insecurity. Environmental concerns in these communities may also impact the safety of locally produced food. Hoover (2017) similarly shows how concerns about pollution and water

quality similarly impact local food access. Farmworkers, especially migrant workers, are disproportionately exposed to agricultural chemicals, which could also cause pollution in the local environment (Panikkar and Barrett 2021). The pollution associated with agricultural production, such as the nutrient runoff into the waterways, can be carried to remote locations and produce health consequences in a broader geographic range. These concerns need to be addressed to reduce both food and environmental injustice.

Limitations

This study was largely based on a purposive convenience sample rather than using established instruments, such as the U.S. Household Food Security Survey Module and the U.S. Adult Food Security Survey Module, developed by the United States Department of Agriculture (USDA). However, this survey provides a unique look into how food security is experienced in environmentally vulnerable areas in Vermont. A comparison between vulnerable and non-vulnerable areas would have provided more nuanced results to precisely show the greater risks to vulnerable communities in the state. While our survey data were collected directly from the high-risk communities, our interviews were mostly conducted with community groups, government workers, and legislators who work on food security issues in the state. The perception and knowledge of these key stakeholders could be different from the communities they serve. In future work, collecting qualitative data directly from community members will be critical.

We also recognize that our data were largely collected before the pandemic of COVID-19. Situations shifted greatly during the main course of the pandemic and will continue to change in the future. The research findings on food insecurity during the pandemic, however, show predictable patterns that echo our findings in food insecurity and food access. People who lost their jobs (economically disadvantaged), households with children, and Black, Indigenous, and People of Color (BIPOC) were at higher risk of food insecurity (Niles et al. 2021). With an even wider prevalence of food insecurity during the pandemic, it is not difficult to imagine that the larger group who is “one paycheck away” from food insecurity under normal circumstances can quickly be at risk. People adapt to the changes by buying cheaper food (usually non-perishable) and stretching meals (Niles et al. 2020b). Our results and recommendations based on pre-pandemic data may not entirely apply to the pandemic, which drastically exacerbates food issues in many communities. However, our findings are consistent with the general patterns observed during the pandemic, and all indicate that building resilience in intrinsically high-risk communities is critical for post-pandemic times.

Conclusion

Vermont is known for its strong food movement and community food programs and networks, which play an important role in serving at-risk populations. However, our study results reveal that low-income residents, residents of color, and women face greater food insecurity than the higher-income, white, and male residents in these communities. Even with the service and resources provided by food initiatives and government FAPs, major problems with poverty, food insecurity, and food-related environmental concerns broadly exist and require more attention and action. Flaws in the FAPs and social security system prevent them from fundamentally improving their livelihood to become self-sufficient in the long term. Recognizing and meeting the diverse food needs of different cultural groups, including resettled refugees and migrant workers, remains a challenge.

Poverty alleviation, revitalizing the local economy, and redesigning the benefit programs are some approaches that can have leveraging power to address food insecurity issues in Vermont's environmentally vulnerable communities. Such efforts should aim at mitigating the vicious cycles created by multiple social and environmental injustices.

Food justice interconnects with environmental justice through inequitable distributions of natural resources and environmental risks, the cumulative impact of risk factors, and shared paths and strategies for activism. They need to be examined together as the adverse impacts and inequities from both realms can interact and deepen each other. At the intersections of food and environmental justice, food insecurity and distribution are only part of the picture. Social recognition, capability building, leadership cultivation, and communities' participation in the justice-making process are equally important in pursuing food and environmental justice.

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