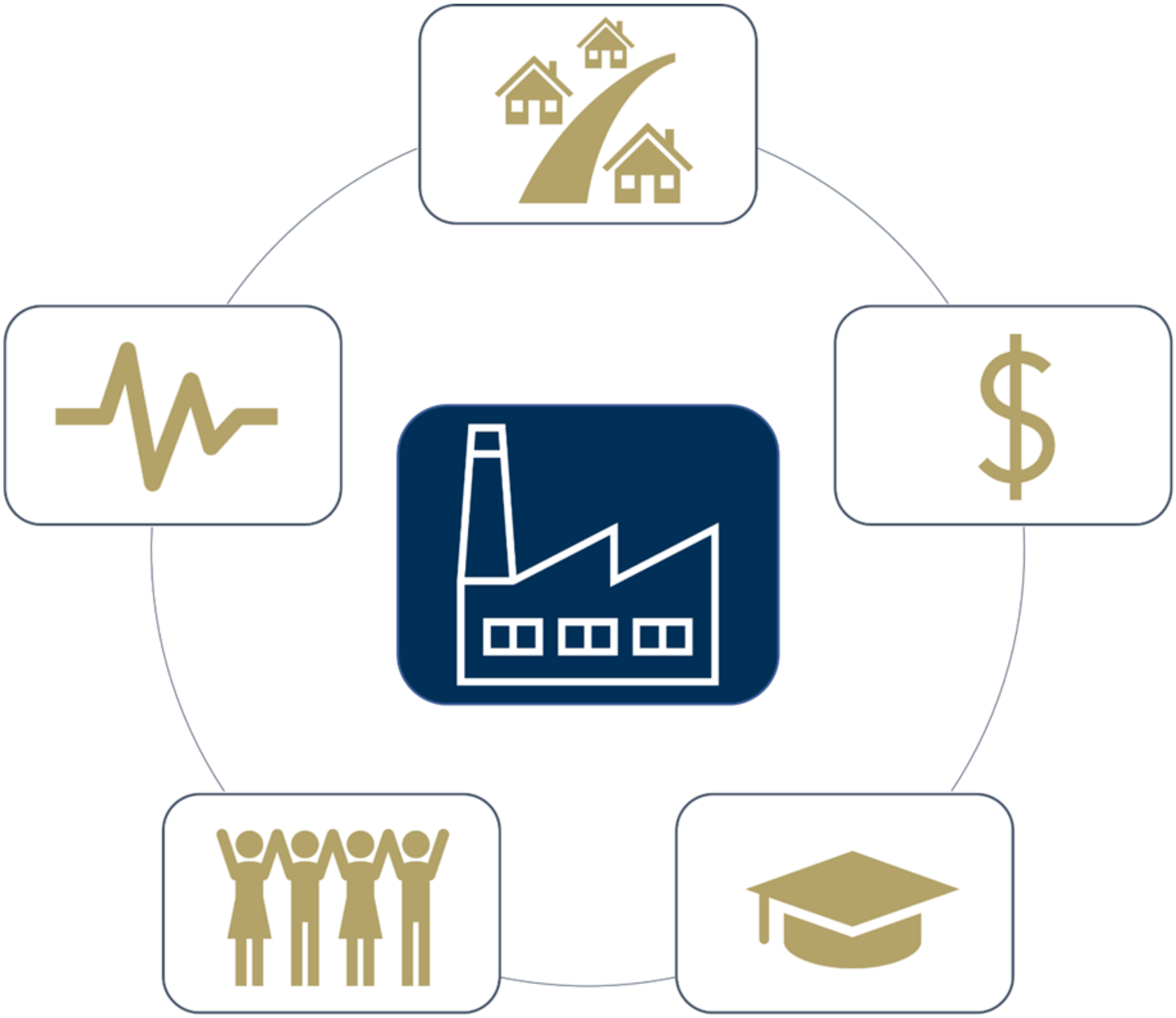

Building Vibrant Communities with Large-Producing-Advanced Manufacturers

L. Katie O'Connell, PhD, Nisha Botchwey, PhD, Baratunde A. Cola, PhD

CONTENTS

I. Executive Summary

Are there benefits beyond jobs for ZCTAs with Large-Producing-Advanced Manufacturing (LPAM) facilities compared to ZCTAs without facilities?

Manufacturing in the United States has long been an opportunity for people to build better lives for themselves and their families. Access to higher-paying wages and benefits, including insurance and job training, create impacts that ripple beyond the individual to create community benefits. At the same time, manufacturing facilities can attract supporting businesses, which will help to improve the community further. Our analysis seeks to understand these compounding impacts so that manufacturers, economic developers, and siting professionals can target new facilities in areas that create the most significant multiplier effect.

To answer this question, we look at LPAMs in the United States and assess changes in surrounding ZCTAs from 2011-2019. We classified ZCTAs by income (High Poverty) and race (Majority Black and Majority White). We look at thirteen indicators across five categories – economic stability, education, access to health care, neighborhood and built environment, and social/community context.

Across most measures, LPAMs have more businesses per capita than non-LPAM counterparts. The only measure by which LPAMs did consistently worse than their non-LPAM counterpart was supermarkets and grocery stores. Between 2011 and 2019, many regions experienced a decrease in the number of businesses per capita, with LPAMs experiencing smaller decreases in the number of businesses compared to non-LPAM ZCTAs. Although the proximity of LPAMs may protect businesses, residents may not always enjoy the same level of protection. For example, homeownership decreased significantly more in LPAM ZCTAs than in non-LPAM, while cost-burdened households decreased less in LPAM ZCTAs than in non-LPAM. Despite some measurements decreasing, MB and MBxHP LPAMs saw the most significant increases in employment between 2011 and 2019. Overall, MW consistently performs better than other areas, regardless of whether the area is LPAM or non-LPAM. At the same time, MB ZCTAs consistently have lower numbers, regardless of whether the area is LPAM or non-LPAM.

Our results (Table 2) demonstrate that LPAMs benefit communities beyond jobs, and that benefit is most acute in Black and High Poverty communities. We believe this research helps those in the economic development community and policymakers looking to support further growth for U.S. communities.

Large	More than 500 employees on site
Producing	On-site production of goods
Advanced	Manufacturers involved in technological innovation and STEM
LPAM	Large-Producing-Advanced Manufacturer

High Poverty (HP)	More than 20% of the population lives below the poverty line
Majority Black (MB)	More than 51% of the population classified as Black or African American
Majority White (MW)	More than 51% of the population classified as White

Table 1. Term Definitions

			HP		MB		MBHP		MW		MWHP	
			LPAM	No LPAM	LPAM	No LPAM	LPAM	No LPAM	LPAM	No LPAM	LPAM	No LPAM
Economic Stability	Employed Working-Age Residents (Percent)	2011	88%	88%	85%	85%	84%	85%	92%	92%	89%	89%
		2019	93%	92%	90%	90%	89%	90%	95%	95%	94%	93%
		RoC	5.3%	4.9%	6.1%	5.9%	6.4%	5.9%	3.7%	3.4%	4.9%	4.4%
	Busineses (Per Capita)	2011	259.18	193.15	210.36	161.18	210	161.37	294.6	234.4	274.57	203.41
		2019	257.98	197.3	192.07	163.16	212.28	163.33	298.43	240.23	271.94	206.82
		RoC	-0.5%	2.1%	-8.7%	1.2%	1.1%	1.2%	1.3%	2.5%	-1.0%	1.7%
Education Access	Child Day Care Facilities (Per Capita)	2011	2.82	2.38	3.76	3.67	3.92	3.67	2.56	2.28	2.57	2.06
		2019	2.55	2.05	3.34	3.23	3.49	3.23	2.38	1.89	2.32	1.68
		RoC	-9.6%	-13.9%	-11.2%	-12.0%	-11.0%	-12.0%	-7.0%	-17.1%	-9.7%	-18.4%
	Educational Services (Per Capita)	2011	2.87	2.22	2.39	2.31	2.39	2.31	3.58	2.89	2.99	2.19
		2019	2.79	2.16	2.37	2.11	2.39	2.11	3.88	2.97	2.81	2.12
		RoC	-2.8%	-2.7%	-0.8%	-8.7%	0.0%	-8.7%	8.4%	2.8%	-6.0%	-3.2%
Health Care Access	Physician Offices (Per Capita)	2011	7.5	5.97	5.76	4.66	5.12	4.67	8.56	7.23	8.34	6.4
		2019	6.49	5.05	5	3.86	4.47	3.86	8.02	6.64	7.14	5.44
		RoC	-13.5%	-15.4%	-13.2%	-17.2%	-12.7%	-17.3%	-6.3%	-8.2%	-14.4%	-15.0%
	Nursing and Residential Care Facilities (Per Capita)	2011	2.58	2.33	2.32	2.3	2.23	2.29	3.06	2.55	2.76	2.45
		2019	2.54	2.19	2.56	2.25	2.4	2.24	3.4	2.52	2.72	2.3
		RoC	-1.6%	-6.0%	10.3%	-2.2%	7.6%	-2.2%	11.1%	-1.2%	-1.4%	-6.1%
Neighborhood & Built Environment	Cost-Burdened Households (Percent)	2011	43%	43%	47%	48%	48%	48%	36%	36%	41%	40%
		2019	38%	38%	43%	42%	43%	42%	30%	30%	36%	35%
		RoC	-10.5%	-10.6%	-9.1%	-11.5%	-9.9%	-11.5%	-14.7%	-15.2%	-10.7%	-11.3%
	Owner-Occupied Homes (Percent)	2011	52%	54%	53%	53%	51%	53%	66%	69%	53%	58%
		2019	48%	51%	49%	49%	47%	49%	63%	67%	50%	56%
		RoC	-6.9%	-5.2%	-7.8%	-7.6%	-8.4%	-7.6%	-4.0%	-2.9%	-6.3%	-4.4%
	Commercial Banking Facilities (Per Capita)	2011	4.25	3.19	3.33	2.64	3.43	2.65	4.97	3.98	4.69	3.5
		2019	3.56	2.48	2.75	1.87	2.85	1.88	4.32	3.13	4.04	2.75
		RoC	-16.2%	-22.3%	-17.4%	-29.2%	-16.9%	-29.1%	-13.1%	-21.4%	-13.9%	-21.4%
Social & Community Context	Supermarkets and Other Grocery (Per Capita)	2011	2.47	2.66	2.52	3.01	2.69	3.01	1.83	1.89	2.33	2.14
		2019	2.17	2.14	2.11	2.51	2.25	2.51	1.61	1.3	2.06	1.61
		RoC	-12.1%	-19.5%	-16.3%	-16.6%	-16.4%	-16.6%	-12.0%	-31.2%	-11.6%	-24.8%
	Support Systems (Per Capita)	2011	11.27	9.55	11.76	9.74	12.26	9.75	10.15	9.6	11.4	9.78
		2019	10.47	8.9	11.22	9.25	11.77	9.26	9.58	8.84	10.56	9.04
		RoC	-7.1%	-6.8%	-4.6%	-5.0%	-4.0%	-5.0%	-5.6%	-7.9%	-7.4%	-7.6%
	Arts and Entertainment Facilities (Per Capita)	2011	2.93	2.61	1.84	1.82	1.89	1.82	4.11	4.21	3.25	2.9
		2019	3.21	2.9	1.96	1.96	1.98	1.96	4.76	4.52	3.5	3.1
		RoC	9.6%	11.1%	6.5%	7.7%	4.8%	7.7%	15.8%	7.4%	7.7%	6.9%
	Restaurants (Per Capita)	2011	21.95	16.85	15.82	13.02	16.18	13.04	22.43	18.74	23.32	17.85
		2019	23.64	18.51	17.16	14.47	17.58	14.48	24.02	19.94	24.98	19.35
		RoC	7.7%	9.9%	8.5%	11.1%	8.7%	11.0%	7.1%	6.4%	7.1%	8.4%

Table 2. All variables and data

II. The State of Manufacturing in the U.S.

Manufacturing has been an essential driver of economic growth in the United States, notably in the twentieth century. The sector contributed to the formation of the middle class, particularly for men with high school education, by providing wages and benefits well above the national average, thus providing employees with a stable income and allowing them to accumulate wealth over time. This stability enabled employees to invest in their families and communities, fostering economic and social expansion. Additionally, manufacturing employment provided workers with opportunities to advance their careers. Employees could earn higher wages and establish lasting careers through training and advancement to management positions.

Not only did manufacturing jobs provide individuals with financial stability and upward mobility, but they also played a crucial role in the growth and development of American cities. Large factories attracted workers and their families, who needed housing, schools, and stores. Simultaneously, the concentration of support industries such as transportation, logistics, and retail boosted local economic expansion and job creation. As a result, manufacturing cities like Detroit, Michigan, and Gary, Indiana, experienced rapid development and growth due to their thriving industries.

However, the United States began to see a decline in manufacturing for several reasons. Between 1965 and 2000, the manufacturing sector's contribution to the U.S. gross domestic product decreased from 27% to 12%, yet employment remained constant at approximately 17 million jobs. But between 2000 and 2010, employment dropped by nearly a third, with nearly 6 million positions lost. Many researchers attribute a decline in labor-intensive manufacturing jobs, such as textiles and others, to opening of trade relations between China and the United States. For example, the United States granted China Permanent Normal Trade Relations (PNTR), eliminating tariffs on Chinese imports. As a result, numerous U.S. factories shut down, and manufacturing employment in the United States declined by 18 percent between March 2001 and 2007. Besides offshoring, automation has significantly contributed to manufacturing job loss. The decline in U.S. manufacturing was further accelerated by the Great Recession (2007-2009), with the manufacturing industry being the sector most severely impacted. By 2009, manufacturing employment was at its lowest at 11.5 million jobs.

The closing of factories goes beyond the individual effects of job loss to take on a spatial component. After factories shut down, thriving manufacturing cities experienced steep declines due to high unemployment rates, poverty, and population decline. The loss of people led to decreased government tax revenue, which had further economic and social repercussions, including closed schools and deteriorating infrastructure. Left behind were spaces of "industrial ruination" that embodied both building and community abandonment. For example, Gary, Indiana, lost a third of its population and went from "magic city" in the 1960s to "murder capital USA" in the 1990s and "most miserable city" in 2019.

The loss of manufacturing jobs and the sense of abandonment contributed to economic and political divides across the U.S. For example, closing factories drove greater income inequality because the occupations replacing salaried factory jobs were typically lower-paying and less stable. This exacerbated the economic divide in the country, resulting in a group of people who felt abandoned by globalization and technological advancement. Consequently, political implications have emerged, including the rise of populism and protectionist policies by fueling worker frustration and discontent.

The U.S. has taken several steps to bring manufacturing back into the U.S. For example, in 2011, the White House Office of Science and Technology Policy (OSTP) wrote a report pushing to expand advanced manufacturing (AM) as part of a long-term solution to the Great Recession. That same year, they published a report, "Ensuring American Leadership in Advanced Manufacturing," arguing that federal investments could help the US become a global manufacturing leader while supporting high-paying jobs and domestic innovation.

Since 2011, manufacturing employment has seen modest increases. Manufacturing contributes 12.1% of the U.S.'s GDP and employs 12.3 million. At the same time, domestic manufacturing has a much larger footprint that goes beyond direct economic inputs, including research and development (R&D), corporate management, and advertising.

Output
- $2,497,000,000,000
- 11% of the State's total output

Employment
- 11,190,902
- $32 (Average Hourly Earnings)

Benefit to Economy
- For every $1.00 spent in manufacturing, there is a total impact of $2.60 to the overall economy

III. Defining

Advanced Manufacturing is "not limited to emerging technologies; rather, it is composed of efficient, productive, (emphasis added) highly integrated, tightly controlled processes across a spectrum of globally competitive U.S. manufacturers and suppliers." **(President's Council of Advisors on Science and Technology, 2011)**

While the definition of advanced manufacturing (AM) can vary based on the context and industry it typically refers to cutting-edge technologies and is the driving force behind R&D and innovation regarding efficiency and productivity in manufacturing. For this study, we chose AM because it represents 39% of U.S. manufacturing output and will remain a leading portion of the U.S. manufacturing economy while offering some of the highest-paying jobs within the manufacturing sectors. At the same time, we are interested in manufacturing production facilities as they employ both blue-collar and white-collar employees instead of headquarters that primarily employ managerial and administrative workers.

This report defines large-producing-advanced manufacturers (LPAM) as those employing more than 500 employees at a facility that creates products on site for advanced industries – see Appendix for analytic method. Based on this definition, the United States has 1,826 large-producing-advanced manufacturers, which include a broad range of industries (chemicals, clay products, machinery, electric lighting equipment, household appliances, motor vehicles, aerospace products and parts, and medical equipment and supplies).

To understand the impact of LPAMs on the broader community, we classified the ZIP codes of the facilities' locations as High Poverty, Majority Black, and Majority White. Based on data from the American Community Survey (ACS 2007- 2011), 25% of ZCTAs with LPAMs are High Poverty (HP), 6% are Majority Black (MB), 5% are Majority Black and High poverty (MBxHP), 88% are Majority White (MW), and 17% are Majority White and High Poverty (MWxHP).

Indicators

To understand the impacts of LPAMs beyond jobs, this study relied on the social determinants of health (SDoH) to provide a framework demonstrating community health outcomes are based on a complex web of factors beyond access to medical care. The World Health Organization (WHO) defines SDOH as "the conditions in which people are born, grow, live, work and age, including the health system. These circumstances are shaped by the

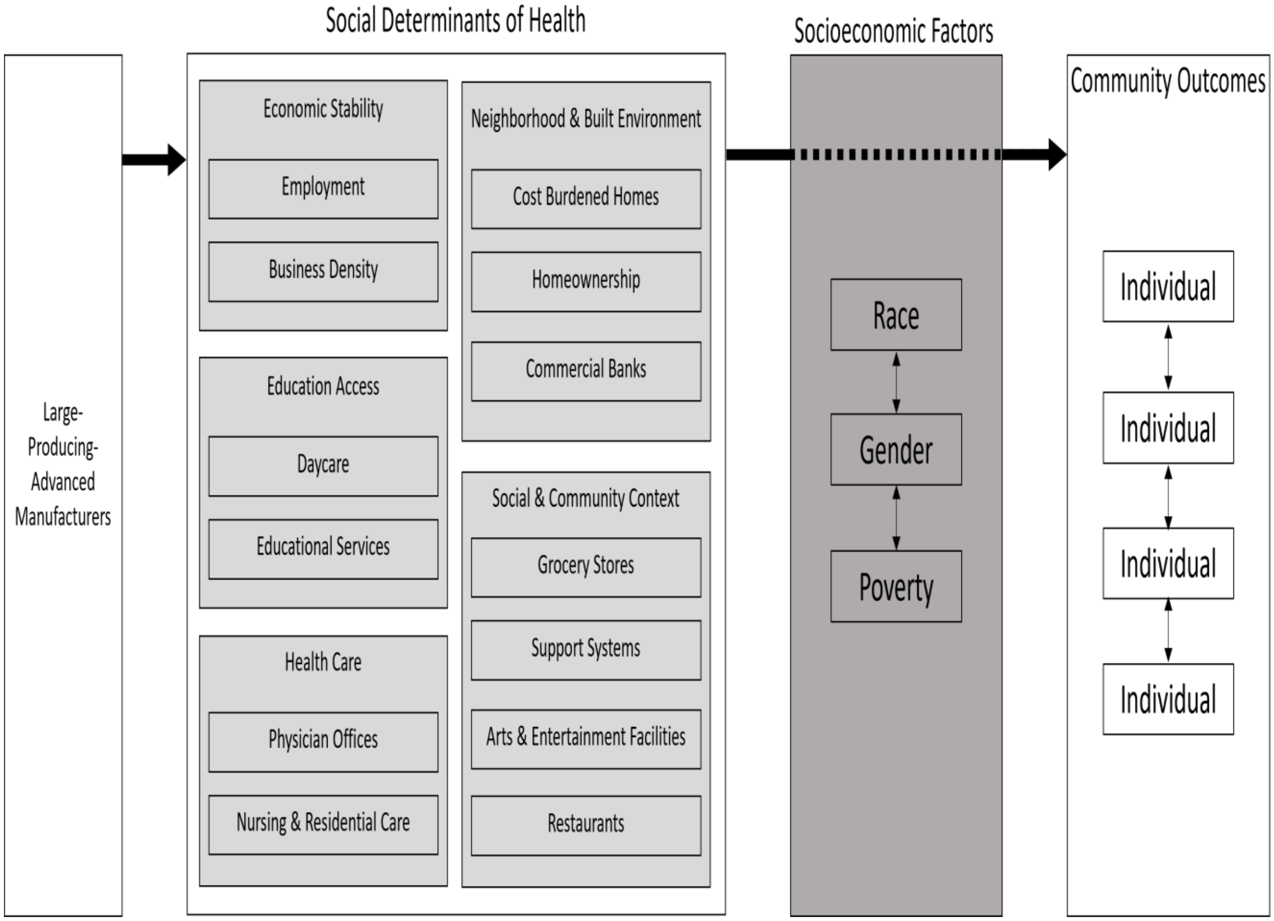

Figure 1. Concept Map

distribution of money, power and resources at global, national and local levels." The SDoH encompasses five domains (economic stability; education access and quality; health care access and quality; neighborhood and built environment; and social and community context), which is how we organize our data (Figure 1). We utilized Healthy People 2030, developed by the U.S. Department of Health and Human Services, to identify appropriate indicators based on evidence-based resources. By aligning our study with these objectives, we ensured our indicators were relevant and grounded in evidence-based resources. This alignment enables us to draw meaningful insights into how LPAMs can effectively address these social determinants, ultimately leading to higher thriving communities. The significance of SDoH encompass the broader societal factors that contribute to well-being and are essential for developing targeted, effective policies that address the root causes of health disparities and promote equitable health outcomes for all community members.

The *economic stability* domain included two indicators: employed working-age residents and the per capita business firms. We chose the employment indicators because employment can lead to stable income and improve health outcomes such as access to healthcare, food security, and mental health. Employment data came from the American Community Survey (ACS) and was calculated as an employment-population ratio. Likewise, the number of businesses indicates the economic well-being of a community. Data came from the ZBP (ZIP Codes Business Patterns) and is the number of businesses per 10,000 residents.

There are two indicators for *education access*: child daycare facilities and educational services. Childcare facilities provide crucial support to youth through early education programs, which can have long-term implications for their adult futures. Educational services include primary and secondary schools, technical colleges, and tutoring services, providing individuals with the skills and knowledge necessary for personal and professional success. Both indicators were calculated as the number of businesses per 10,000 residents and came from the ZBP.

The *healthcare access and quality* domain include two indicators: Physician offices and nursing and residential care facilities. Physician offices offer preventative care, screening services, and treatment options to improve health outcomes. Nursing and residential care facilities provide long-term care services for elderly and disabled individuals. Both indicators were obtained from ZBP.

There are three indicators for the *neighborhood and built environment domain*: cost-burdened households, owner-occupied homes, and commercial banking facilities. We include cost-burdened households and owner-occupied homes because housing instability can impact physical and mental health. At the same time, homeownership provides neighborhood stability, security, and a sense of belonging that contributes to overall well-being. We include commercial banking facilities as they give people financial stability while investing in affordable housing, infrastructure initiatives, and small businesses. The data was obtained from ACS and ZBP.

Finally, the *social and community context* domain included four indicators: supermarkets and other grocery stores; support systems; arts and entertainment facilities; and restaurants. We chose supermarkets and other groceries because they indicate greater access to healthy foods. Second, support systems include religious and social organizations; we chose them because they provide a sense of community and social connection, which helps mental health. Third, we chose arts and entertainment facilities because they provide opportunities for social interaction, community engagement, and personal development. Finally, we chose restaurants because they serve as gathering places for people to socialize and connect with others, which can positively affect mental health. All indicators were obtained from ZBP.

ANALYSIS

In our study, we examine the effects of LPAMs on various demographic regions between 2011 and 2019, examining a range of factors. First, we assess the impact of LPAMs on **Business Density** by comparing the number of businesses per capita in areas with LPAMs to those without, which sheds light on their role in either promoting or impeding local business growth. Additionally, we explore **Demographic Disparities** by analyzing how LPAMs impact different demographic areas (such as Majority Black, Majority White, and High Poverty), focusing on economic opportunities and business development. We also investigate **Temporal Changes**, examining the rate of change from 2011 to 2019 in both LPAM and non-LPAM areas, to determine if LPAMs' influence on local economies is increasing, decreasing, or stable over time. Finally, our **Intersectional Analysis** includes data from areas that are Majority Black and High Poverty (MBxHP) or Majority White and High Poverty (MWxHP), offering insight into the combined effects of race and economic status on the impact of LPAMs.

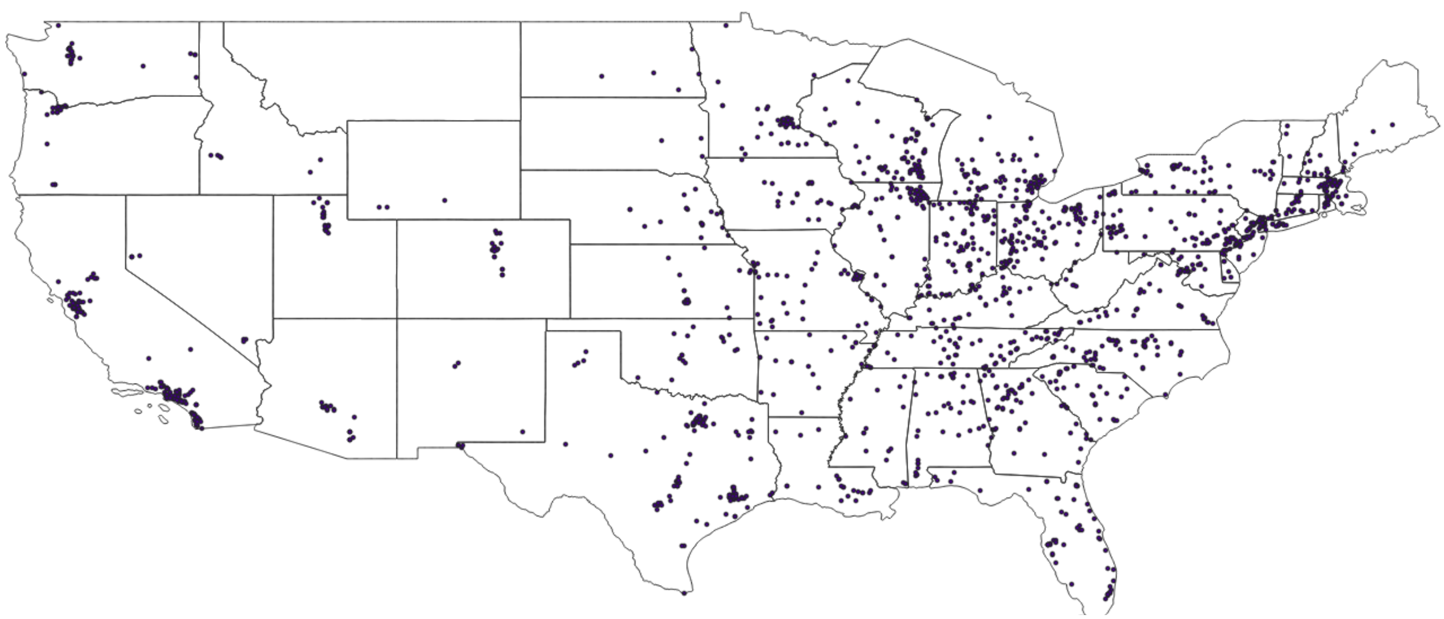

Figure 2. Map of LPAMs

IV. Trends in ZIP Codes with Large-Producing-Advanced Manufacturers

Economic Stability

Employed Residents

We chose the ACS indicator of employed working-age residents because employment can significantly impact the social determinants of health. Income is one such determinant, and employment can provide individuals with a steady income, improving their overall living standard. Higher-income can lead to better access to healthcare, healthier food options, and safer living environments. Education is another crucial determinant, and employment can provide opportunities for education and training, leading to better job prospects and increased earning potential. Education, in turn, can improve health outcomes by enabling individuals to make better health decisions and access health information. Employment can also impact social support and a sense of community. A job can provide social support and a sense of belonging, which can help individuals cope with stress and improve mental health. Additionally, employment can provide opportunities for socializing and networking, which can lead to stronger social connections.

To analyze residential employment, we looked at the percentage of the employed local civilian population participating in the labor market. For employed working-age residents, the data reveals that in 2011, there were similar employment numbers between LPAM and non-LPAM counterparts, with the highest employment rates in MW LPAM and MW non-LPAM at 92% and the lowest in MBxHP LPAM at 84%. However, from 2011 to 2019, all areas saw an increasing rate of change in employment. **LPAMs had larger increases in employment than non-LPAM counterparts, with MB and MBxHP having the largest increases** at 6.1% and 6.4%, respectively. MW LPAM and MW non-LPAM had the lowest rate of change at 3.7% and 3.4%, respectively. In 2019, MW LPAM and MW non-LPAM again had the highest employment rates at 95%, and MBxHP LPAM had the lowest at 89%.

Business Density

Business density is vital for communities due to its positive impacts. It boosts economic activity, creating more jobs and

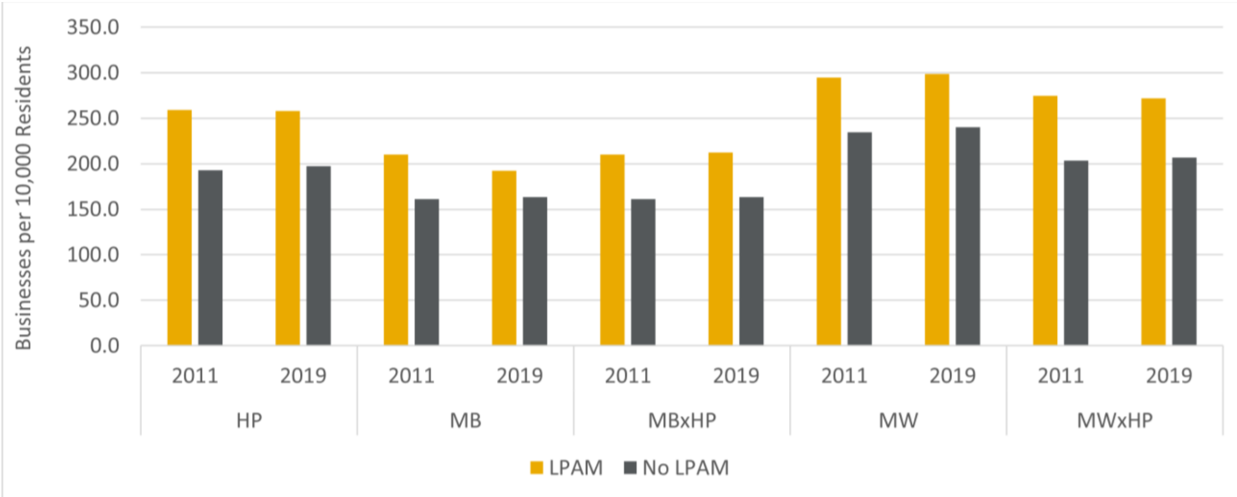

Figure 3. U.S. Businesses Per Capita by ZCTA Demographics (2011 & 2019)

opportunities, strengthening the economy, and generating higher tax revenue. Additionally, a higher density improves access to goods and services, saving time and money for residents and improving their quality of life. It also fosters increased social interaction, building stronger social ties and creating a vibrant community.

At the national level in 2011, areas with LPAMs exhibited higher per capita businesses across all demographics. By 2019, however, the landscape shifted. Non-LPAM areas generally improved in business per capita, especially in HP and MW areas, reducing the disparity seen in 2011. Despite these shifts, **LPAM areas in 2019 continued to have higher per capita businesses than their non-LPAM counterparts** (Figure 3). The rate of change during this period indicates a complex dynamic: **MB and MBxHP areas with LPAMs saw a significant decline in per capita businesses**, contrasting with a **modest increase in MW areas with LPAMs**. However, this positive trend did not extend to MWxHP areas with LPAMs, which experienced a decline.

The state-level analysis conducted in 2011 and 2019 highlighted consistent patterns. Areas with LPAMs generally exhibited a higher number of businesses per capita across various demographic groups. Notably, in most MW LPAMs, with the exception of Connecticut, Idaho, New Mexico, and Wyoming, showed higher business density per capita in comparison to non-LPAM.

Additionally, several states demonstrated that LPAM areas surpassed non-LPAM areas in terms of business density across all demographics. These states included, but were not limited to, Alabama, Arkansas, Florida, Georgia, Indiana, Mississippi, Missouri, New York, Pennsylvania, Tennessee, Virginia, and Wisconsin. Conversely, a few states were identified where non-LPAM areas had a higher per capita business density than LPAM areas across several demographic groups. These states were Illinois, New Mexico, and Texas.

Enriching Communities: The Transformative Impact of Advanced Manufacturing and LPAMs in Alabama

Alabama is a pivotal hub for advanced manufacturing, driven by innovative technologies and a skilled workforce. This growth stems from targeted policies and initiatives, notably by groups like the Alabama Defense Advanced Manufacturing Community (ADAMC) and the Alabama Initiative on Manufacturing Development and Education (Alabama IMaDE), which provide essential support and foster collaboration. These efforts have catapulted Alabama to the forefront of the industry.

The state's advanced manufacturing sector is diverse and significant, encompassing aerospace, defense, automotive, and more. These sectors bolster the economy and serve as hubs of innovation and regional growth. Governmental support through financial incentives, tax credits, and workforce development programs has been crucial in this expansion, contributing to both employment and regional development.

However, challenges like skill shortages and global competition persist, necessitating a focus on workforce training and technological adoption. Future manufacturing policies in Alabama are set to emphasize sustainability, automation, AI, and supply chain resilience, promising a sophisticated and sustainable growth trajectory.

LPAMs in Alabama extend their impact beyond industrial growth, significantly contributing to community well-being. They enhance economic stability by increasing business density, with LPAM areas surpassing non-LPAM areas in businesses per capita across all demographics. This not only marks economic vitality but also drives diversification and financial stability.

Education and healthcare access are notably improved in LPAM areas, with more daycare facilities, educational services, physician offices, and nursing facilities per capita. This access is crucial for community development and overall well-being. LPAMs also positively influence the neighborhood and built environment, increasing the per capita number of commercial banks and other amenities. This enhancement extends to the social and community context, where LPAM areas boast more supermarkets, grocery stores, and entertainment options, fostering a vibrant and cohesive community.

The presence of LPAMs in Alabama has a profound and positive effect on various aspects of community life, from economic stability to social contexts. As Alabama continues to invest in its advanced manufacturing sector, it's not just fostering job growth and technological innovation but also enhancing community health, prosperity, and resilience. This comprehensive approach is critical to driving the state towards a future of sustained growth and enriched community living, ensuring that the benefits of advanced manufacturing extend throughout society.

Education Access

Daycare Facilities

Daycare facilities include child daycare centers, preschools, and nursery schools, and the services provided may be full-time or part-time, center-based, or provided in the home. Child daycare facilities provide families with early education programs, safe environments, and social support. These facilities support the development of cognitive and linguistic abilities, resulting in improved academic performance and increased social mobility. In addition, they provide a safe and supportive environment conducive to healthy development, including nutritious meals, physical activity, and socialization. Furthermore, childcare centers provide social support, particularly for working parents, resulting in improved mental health and economic security.

To understand access to early childhood education facilities, we analyzed the number of daycare facilities per 10,000 residential population.

The national analysis of child daycare facilities from 2011 to 2019 highlights a correlation between LPAMs and the availability of these facilities. In 2011, **areas with LPAMs consistently had higher per capita daycare facilities, particularly notable in MWxHP** regions where LPAM regions had 0.5 more facilities per capita than non-LPAM regions. **Despite a decline in per capita daycare facilities by 2019, LPAM areas showed greater resilience, especially those in HP and MWxHP** demographics (Figure 4).

In a state-level analysis, the impact of LPAMs on child daycare facilities primarily shows a beneficial effect on communities compared to non-LPAM areas. In 2019 MW areas, all states except IN, NM, and WY had higher daycare facilities per capita in LPAM than non-LPAM. At the same time, many states including (among others) AL, GA, KY, LA, MS, PA, TN, and VA had higher daycares per capita in LPAM areas across all demographic groups. Only IN had non-LPAM higher than LPAM across all demographic groups (Figure 5).

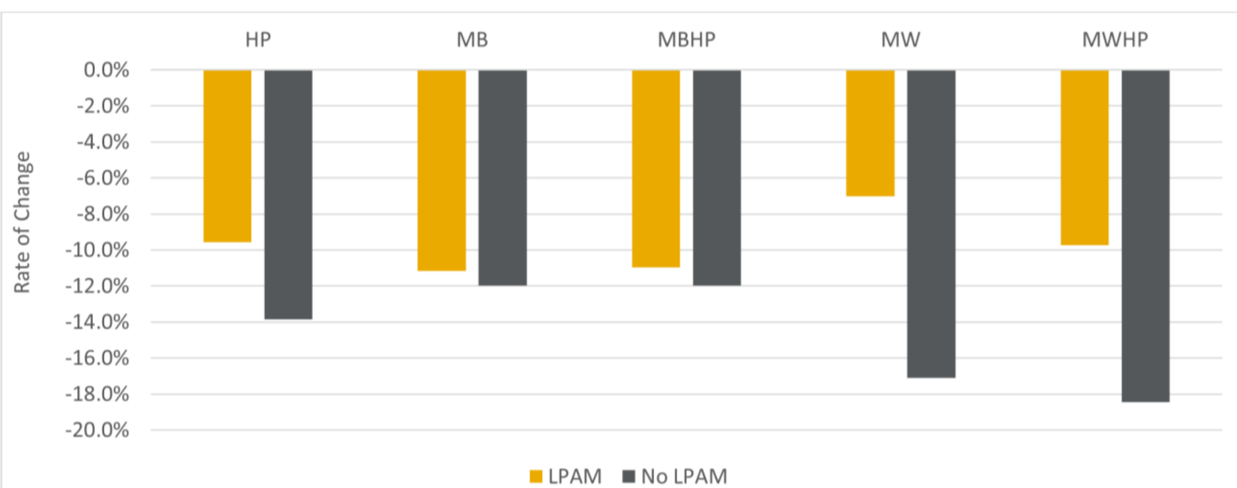

Figure 4. U.S. Child Day Care Facilities Per Capita Rate of Change by ZCTA Demographics (2011-2019)

	HP		MB		MBxHP		MW		MWxHP	
	LPAM	Non- LPAM	LPAM	Non- LPAM	LPAM	Non- LPAM	LPAM	Non- LPAM	LPAM	Non- LPAM
AL	2.02	1.63	2.72	1.83	2.72	1.83	1.46	1.26	1.51	1.50
AK		0.00						2.13		0.00
AZ	1.03	1.07					1.18	1.10	1.03	1.14
AR	2.26	1.95	2.94	2.95	2.94	2.95	2.29	1.60	2.17	1.58
CA	1.78	1.52		3.24		3.07	2.52	2.09	1.77	1.45
CO		1.61					2.36	1.67		1.64
CT		1.69	2.38	1.81		1.81	2.40	2.17		1.41
DE	7.28	7.33		8.65		8.65	4.23	2.82	7.28	0.00
DC		4.02		3.81		3.81		3.37		3.34
FL	3.32	2.72	2.73	3.19	2.32	3.19	2.28	1.77	3.70	2.50
GA	2.47	2.15	2.91	2.85	3.01	2.85	1.93	1.64	2.17	1.45
HI		1.68					4.77	1.62		0.80
ID	2.92	1.37					2.80	2.08	2.92	1.38
IL	3.03	2.62	4.05	3.33	4.15	3.33	2.09	1.80	1.82	1.93
IN	1.58	2.61	0.00	3.94	0.00	3.94	1.50	1.62	1.18	1.96
IA	3.34	2.21					2.56	1.72	3.34	2.18
KS	1.43	0.93		2.01		2.01	1.98	1.17	1.43	0.92
KY	2.31	1.45	7.98	6.82	7.98	6.82	2.23	1.49	1.77	1.16
LA	2.35	1.73	1.97	1.82	2.20	1.82	2.11	1.71	2.61	1.49
ME	5.16	3.71					5.34	3.73	5.16	3.71
MD		2.25	2.44	2.61		2.61	3.03	2.37		1.75
MA	2.15	2.56		2.77		2.77	3.89	2.90	2.15	2.20
MI	2.09	1.28	2.11	1.93	2.07	1.93	1.84	1.37	2.05	1.22
MN	3.12	2.73		4.49		4.49	2.96	2.01	3.12	2.62
MS	4.20	2.36	4.66	2.91	4.66	2.91	2.64	1.72	3.37	1.90
MO	2.75	2.11	5.56	3.62	5.56	3.62	2.11	1.76	1.75	1.58
MT		3.82						3.93		4.67
NE	4.90	2.66	8.08	7.48	8.08	7.48	3.40	2.67	0.00	2.47
NV	1.77	1.13					1.40	0.87	1.77	1.07
NH		2.59					3.37	2.36		2.59
NJ	2.95	2.89	4.44	2.84	4.44	2.84	2.91	2.47	2.61	3.20
NM	1.79	1.57					1.29	1.65	1.79	1.81
NY	4.24	3.53	2.60	4.38	2.60	4.38	3.01	2.47	4.17	2.61
NC	2.59	2.46	2.66	3.49	2.66	3.49	2.40	1.83	2.46	1.99
ND		0.00					3.29	2.69		0.00
OH	2.97	2.61	3.60	4.75	3.59	4.75	2.22	1.65	2.87	1.79
OK	3.46	1.91		4.37		4.37	2.71	1.75	3.46	1.73
OR	4.59	2.34					4.04	2.78	4.59	2.35
PA	4.40	3.75	5.81	5.66	5.81	5.66	3.12	2.10	3.49	2.53
RI	1.42	1.65					2.63	2.34	0.00	1.51
SC	2.54	1.41	2.55	1.36	3.42	1.36	2.08	1.36	2.01	1.31
SD	4.36	1.37					4.31	2.09	4.36	2.09
TN	2.04	1.64	3.42	2.87	3.42	2.87	1.64	1.32	1.67	1.22
TX	1.57	1.70	0.00	2.11	0.00	2.11	1.84	1.79	1.71	1.69
UT	2.11	1.33					1.99	1.41	2.11	1.42
VT		2.02					3.72	1.96		2.02
VA	2.98	1.56	3.29	1.94	3.79	1.94	2.99	1.98	2.68	1.46
WA	3.24	2.87					3.21	2.82	2.85	2.72
WV	2.55	1.19		0.00		0.00	1.66	1.13	2.55	1.19
WI	4.08	4.81	7.08	11.02	7.08	11.02	2.11	1.78	1.62	1.92
WY		3.28					2.26	3.60		3.55

Figure 5. State Per Capita Day Care

Nationally, the rate of change from 2011 to 2019 reveals a significant decline in per capita child daycare facilities across all areas, with non-LPAM areas generally experiencing a steeper decline. Notably, non-LPAM MWxHP areas faced the most significant decrease at -18.45%. Despite the overall downward trend, LPAM areas had a lesser rate of decline, with HP and MWxHP areas showing the most substantial difference in the rate of change, at 4.30% and 8.70% more favorable than their non-LPAM counterparts, respectively.

The state analysis indicates a nuanced impact of LPAMs across various regions and demographics, revealing a tapestry of growth, resilience, and contrasting trends influenced by a range of regional factors. While some states have shown an increase or stability in areas with LPAMs, others display differing patterns, underscoring the complex interplay of local dynamics.

For instance, nearly all states, with the notable exceptions of California and New York, experienced a decreasing rate of change in non-LPAM areas within the MW regions between 2011 and 2019. Conversely, 14 states witnessed an increasing rate of change in their MW LPAM areas. This group includes, but is not limited to, California, Delaware, Idaho, Massachusetts, Oregon, and Utah, highlighting the varied responses to LPAMs across states.

Certain states exhibited particularly stark differences in how LPAMs affected local services. For example, in North Dakota, MW LPAMs saw a substantial 55.66% increase in daycare facilities, while their non-LPAM counterparts experienced a significant decrease of 33.21%. Similarly, in New Mexico, MW LPAM areas enjoyed a 29.32% rise in daycare services per capita, in stark contrast to a 20.29% decrease in non-LPAM areas. These examples underline the significant disparities in LPAM impacts and suggest the influence of other regional and demographic factors shaping these outcomes.

Educational Services

Educational services include elementary and secondary schools, colleges and universities, technical and trade schools, language schools, driving schools, tutoring services, and educational support services. This industry also includes establishments that provide educational consulting services and educational testing services. Education provides individuals with the necessary skills and knowledge to succeed in their personal and professional lives, which can increase their employment and income. In addition, education can foster social inclusion and reduce social isolation, both of which are significant determinants of mental health. Education facilitates the development of social skills, forming social networks, and participating in community activities, all of which can enhance an individual's mental health and well-being.

The national analysis from 2011 to 2019 indicates that areas with **LPAMs generally had higher per capita educational services across all demographics** than those without LPAMs. This difference was especially pronounced in MWxHP areas. **By**

2019, while LPAM areas either maintained or slightly increased their educational services, non-LPAM areas saw no significant change or a decrease, particularly in MW areas where the gap increased to 0.9.

In the analysis of state data, areas designated as LPAM consistently outperformed their non-LPAM counterparts. Specifically, in 2019, within the MW regions, all states except Tennessee and Wyoming exhibited a higher per capita availability of educational services in LPAM areas compared to non-LPAM areas. However, this trend did not hold in areas characterized as MWxHP, where 12 states, including but not limited to Massachusetts, Missouri, Nebraska, North Carolina, Oregon, and Tennessee, saw non-LPAM areas surpassing LPAM areas in terms of educational services per capita.

In many MW regions with LPAM designations, the number of educational services per capita was nearly double that of their non-LPAM counterparts. For instance, in Maine, the LPAM areas had 4.75 services per capita, significantly higher than the 2.60 in non-LPAM areas. Similarly, Mississippi and Nevada showed substantial disparities, with Mississippi reporting 3.02 services per capita in LPAM areas compared to 1.37 in non-LPAM areas, and Nevada having 5.48 in LPAM versus 2.43 in non-LPAM areas.

The situation in MB regions presented a more mixed picture, with 15 states showing higher educational services per capita in LPAM areas than in non-LPAM areas and 9 states displaying the opposite. However, where LPAM areas did outperform, the differences were strikingly pronounced. For instance, Arkansas reported 6.3 educational services per capita in MB LPAM areas, a sharp contrast to the 1.79 in non-LPAM areas. Similarly, Indiana's MB LPAM areas had 6.35 services per capita compared to just 1.63 in non-LPAM areas, underscoring the significant disparities between LPAM and non-LPAM areas in certain states.

Comparing the rates of change between 2011 and 2019 in both analyses reveals varied patterns. MB and MBxHP areas with LPAMs experienced a minor decline or no change in educational services, while the same demographics without LPAMs saw a more significant decrease. MW areas with LPAMs observed an 8.40% rate of change, which contrasts sharply with the 2.80% rate of change in non-LPAM areas. However, MWxHP areas with LPAMs saw a -6.00% rate of change, whereas non-LPAM areas saw a smaller decline. MB areas without LPAM also saw significant decreases in educational services. The state-level data presents a landscape of significant variability concerning the impact of LPAMs. In the analysis of MW regions, a majority of states with LPAM designations observed an increasing rate of change in various metrics. Conversely, for MW non-LPAM areas, the results were split, with half of the states experiencing an increase and the other half a decrease.

This trend of variability extends further, with some states witnessing their LPAMs

	HP		MB		MBxHP		MW		MWxHP	
	LPAM	Non- LPAM	LPAM	Non- LPAM	LPAM	Non- LPAM	LPAM	Non- LPAM	LPAM	Non- LPAM
AL	3.35%	-30.64%	47.11%	-30.57%	55.40%	-30.57%	-6.90%	-22.30%	-18.12%	-37.78%
AK		-100.00%						-1.69%		-100.00%
AZ	-36.74%	-7.97%					-15.38%	4.30%	-36.74%	-5.55%
AR	10.53%	-24.06%	23.34%	-26.36%	23.34%	-26.36%	-7.10%	-3.66%	11.74%	-20.75%
CA	10.68%	3.95%		31.01%		15.28%	25.10%	16.37%	13.26%	0.09%
CO		4.02%					9.49%	4.95%		3.07%
CT		11.53%	-39.33%	-24.76%		-24.76%	22.48%	5.14%		28.68%
DE	39.07%	35.78%		36.54%		36.54%	23.47%	-9.22%	39.07%	#NULL!
DC		-2.74%		2.78%		2.78%		0.37%		0.62%
FL	6.24%	2.80%	23.35%	-0.32%	16.74%	-0.32%	6.24%	7.77%	3.54%	3.09%
GA	-5.44%	-5.57%	-17.33%	-10.54%	-24.17%	-10.54%	2.07%	2.93%	-14.14%	-10.83%
HI		-41.02%					29.88%	10.31%		-100.00%
ID	8.63%	-20.25%					13.03%	0.09%	8.63%	-20.37%
IL	15.91%	0.72%	-23.95%	0.56%	1.51%	0.56%	2.95%	4.75%	21.04%	-5.11%
IN	-25.34%	-15.72%	-13.44%	-30.71%	-13.44%	-30.71%	-4.77%	-13.94%	-25.36%	-10.61%
IA	-30.40%	4.47%					12.66%	-22.91%	-30.40%	8.21%
KS	48.13%	-6.56%		85.57%		85.57%	2.65%	-16.83%	48.13%	-5.77%
KY	-9.08%	-29.70%	39.73%	-17.10%	39.73%	-17.10%	-7.10%	-10.05%	-12.36%	-30.79%
LA	-23.46%	-0.70%	-28.35%	-7.05%	-27.52%	-7.05%	19.64%	-0.39%	-12.94%	-4.40%
ME	17.64%	-20.16%					8.32%	-25.60%	17.64%	-20.15%
MD		0.91%	20.35%	1.44%		1.44%	11.47%	3.50%		-7.49%
MA	-5.55%	5.86%		0.38%		0.38%	14.75%	6.24%	-5.55%	1.48%
MI	-11.13%	-7.50%	-41.70%	6.52%	-46.66%	6.52%	4.84%	-8.55%	-4.04%	-17.26%
MN	50.72%	-10.59%		-42.28%		-42.28%	1.57%	-10.31%	50.72%	-8.91%
MS	-4.29%	-40.77%	-8.54%	-52.28%	-8.54%	-52.28%	11.87%	-23.24%	6.44%	-32.36%
MO	4.13%	-23.38%	44.09%	-30.25%	44.09%	-30.25%	15.59%	-11.08%	-3.17%	-20.02%
MT		14.10%						-0.41%		29.10%
NE	-10.07%	-33.56%	23.82%	-100.00%	23.82%	-100.00%	9.35%	-13.97%	-100.00%	-27.60%
NV	-3.07%	-2.69%					1.93%	16.53%	-3.07%	-1.97%
NH		-20.16%					14.46%	-18.02%		-20.16%
NJ	-19.75%	23.15%	-11.11%	3.69%	-11.11%	3.69%	11.92%	8.32%	-45.87%	30.56%
NM	-100.00%	-23.17%					15.86%	-14.20%	-100.00%	-13.67%
NY	8.76%	9.96%	-100.00%	-1.68%	-100.00%	-1.68%	15.45%	8.50%	2.15%	19.39%
NC	-6.43%	-2.84%	-7.21%	-7.97%	-7.21%	-7.97%	9.38%	8.09%	-5.46%	-0.48%
ND		-100.00%					63.44%	-19.14%		-100.00%
OH	-3.18%	-23.81%	1.76%	-31.97%	0.02%	-31.97%	2.83%	-7.83%	-4.24%	-18.80%
OK	-0.53%	-12.72%		-40.42%		-40.42%	2.41%	-8.43%	-0.53%	-9.42%
OR	-12.57%	-6.16%					19.65%	-2.15%	-12.57%	-5.90%
PA	-4.96%	-0.07%	-3.35%	7.35%	-3.35%	7.35%	7.64%	-7.64%	-8.88%	-8.03%
RI	3.76%	5.82%					-3.83%	-4.56%	8.07%	-10.84%
SC	-4.50%	-7.47%	17.68%	-16.08%	28.66%	-16.08%	4.09%	-1.96%	-32.20%	-7.35%
SD	40.85%	-17.94%					40.44%	-25.82%	40.85%	16.92%
TN	-23.77%	4.78%	-8.47%	3.41%	-8.47%	3.41%	-21.93%	2.67%	-28.56%	1.12%
TX	-7.76%	-3.98%	138.62%	-18.06%	138.62%	-18.06%	0.24%	9.46%	-11.95%	-5.52%
UT	8.47%	17.00%					16.88%	12.47%	8.47%	17.44%
VT		1.29%					8.77%	-17.16%		1.29%
VA	15.24%	-18.61%	5.88%	-25.37%	28.09%	-25.37%	-1.80%	4.15%	10.95%	-14.31%
WA	41.13%	0.25%					34.23%	4.82%	19.45%	-2.00%
WV	26.51%	-27.71%					-1.78%	-31.29%	26.51%	-27.68%
WI	-14.32%	-16.30%	-15.99%	-18.28%	-15.99%	-18.28%	-2.19%	-11.50%	-27.58%	-14.60%
WY		8.07%					205.16%	24.86%		23.93%

Figure 6. State Rate of Change for Educational Services (2011-2019)

increase across most demographics while observing a decrease in their non-LPAM areas. For instance, in Arkansas, the HP, MB, MBxHP, and MWxHP LPAM areas all saw increases. In contrast, all their non-LPAM areas and MW LPAMs experienced a decrease. Similarly, in Missouri, HP, MB, MBxHP, and MW LPAMs all demonstrated an increase while their non-LPAM areas and MWxHP LPAM areas decreased, as detailed in Figure 6. These examples highlight the complex and varied effects of LPAM designations across different states and regions, indicating a nuanced interplay of local factors and LPAM status.

Health Care Access

Physician Offices

Physician offices include office-based medical services like family practitioners, internists, pediatricians, and other specialized physicians. These establishments may also provide diagnostic and laboratory services and preventive health services such as vaccinations and check-ups. It is important to note that establishments in this category do not include hospitals or other institutional setting. Physician offices play a crucial role in providing access to healthcare services, by offering preventative care, screening services, and treatment options to help patients manage chronic conditions and improve their overall health outcomes. In addition to providing access to healthcare services, physician offices can also address social and economic barriers to care by providing referrals to community-based organizations that offer services such as food banks, housing assistance programs, and transportation services. By providing these referrals, physician offices can help patients overcome barriers to accessing care, such as lack of transportation, unstable housing, or financial constraints.

In 2011, all demographic areas with LPAMs had a higher per capita number of physician offices than those without LPAMs. The difference was most substantial in MWxHP areas, with LPAM areas having 1.9 more physician offices per capita than non-LPAM areas. By 2019, the per capita number had decreased in both LPAM and non-LPAM areas across all demographics, but the decrease was generally less pronounced in LPAM areas. For instance, LPAM areas in the HP category saw a reduction of 1.0 in per capita physician offices, while non-LPAM areas saw a reduction of 0.9. **Despite the decrease, LPAM areas continued to outperform non-LPAM areas in 2019. It should be noted that MW areas both with and without LPAMs outperformed MB and MBxHP, with MW nearly 2x higher than MBxHP** (Figure 7).

The analysis at the state level reveals a diverse landscape regarding the presence of physicians' offices in LPAM versus non-LPAM areas. Within the HP zones, 24 states reported a higher per capita presence of physicians' offices in LPAM areas compared to their non-LPAM counterparts. However, 16 states exhibited the opposite trend, with non-LPAM areas surpassing LPAM areas in terms of physician office density.

Several states stood out by having LPAM areas with a higher presence of physician offices across all demographics when compared to their non-LPAM areas. These states include Alabama, Florida, Mississippi, Missouri, and New Jersey, indicating a clear trend of LPAM areas outperforming non-LPAM areas in terms of healthcare accessibility.

Conversely, a few states demonstrated a lower per capita presence of physician offices in LPAM areas compared to their non-LPAM counterparts, with the exception of their MW regions. These states are Minnesota, Nebraska, Tennessee, Texas, and Wisconsin. In these cases, while LPAM areas generally had fewer physician offices, the MW regions within these states presented an exception to this trend, as shown in Figure 8. This nuanced picture highlights the variability in healthcare access and infrastructure across different states and regions, reflecting the complex interplay of local demographics, geography, and LPAM status.

Both national and state analyses show a decline in per capita physician offices from 2011 to 2019, but the rate of change differs, with non-LPAM areas generally seeing a more considerable decrease. Nationally, the difference in the rate of change between LPAM and non-LPAM areas was most notable in MBxHP demographics, where LPAM areas had a 4.60% more favorable rate of change than non-LPAM areas. State data, however, is mixed with most states seeing decreases across all demographic categories.

Nursing and Residential Care Facilities

We selected the ZBP indicator of *nursing and residential care facilities* (NAICS 623) because they increase access to medical care as well as create jobs within the community. This industry comprises establishments primarily providing residential care and nursing services for elderly and disabled individuals who cannot live independently. It is important to note that establishments classified under NAICS 623 provide long-term care services and are distinct from establishments that provide short-term

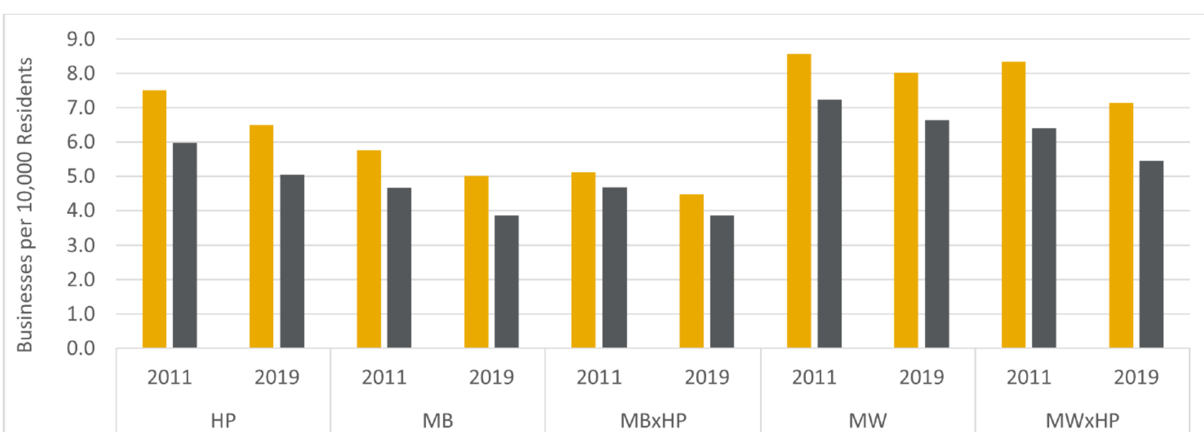

Figure 7. U.S. Physician Offices Per Capita by ZCTA Demographics (2011 & 2019)

	HP		MB		MBxHP		MW		MWxHP	
	LPAM	Non- LPAM	LPAM	Non- LPAM	LPAM	Non- LPAM	LPAM	Non- LPAM	LPAM	Non- LPAM
AL	2.93	1.59	1.40	1.57	1.40	1.57	2.83	1.48	3.54	1.55
AK		0.00						5.72		0.00
AZ	2.06	2.25					3.47	3.09	2.06	2.39
AR	1.71	1.75	1.68	1.72	1.68	1.72	1.73	1.46	1.71	1.78
CA	1.97	1.97		3.96		4.36	2.77	2.59	2.14	1.98
CO		1.70					2.24	1.62		1.75
CT		3.07	5.23	0.00		0.00	3.49	3.43		2.17
DE	2.86	2.18		2.57		2.57	3.55	3.10	2.86	0.00
DC		1.81		1.73		1.73		1.35		0.00
FL	3.42	2.10	3.51	2.34	3.48	2.34	2.34	1.74	3.39	2.02
GA	1.80	1.75	2.59	1.50	2.28	1.50	1.45	1.46	1.70	1.99
HI		1.06					0.00	0.38		0.00
ID	1.89	2.50					3.17	2.16	1.89	2.52
IL	1.41	2.31	1.01	1.74	0.86	1.74	3.30	2.33	2.04	3.59
IN	3.47	2.44	0.00	2.29	0.00	2.29	4.25	2.93	3.82	2.72
IA	4.45	1.63					5.19	3.23	4.45	1.57
KS	0.00	3.05		2.68		2.68	2.66	2.97	0.00	3.18
KY	2.93	1.99	0.00	3.64	0.00	3.64	3.10	2.29	3.20	1.90
LA	1.40	2.20	0.00	2.27	0.00	2.27	2.00	1.83	2.10	2.06
ME	20.66	6.69					14.75	5.55	20.66	6.69
MD		2.09	0.00	2.85		2.85	2.91	2.61		2.14
MA	2.15	4.04		4.22		4.22	5.40	3.89	2.15	4.22
MI	2.94	2.98	2.68	3.48	1.98	3.48	3.38	3.40	3.26	3.08
MN	4.99	7.11		3.21		3.21	9.86	7.06	4.99	7.63
MS	2.64	1.15	2.14	0.96	2.14	0.96	2.27	1.12	3.54	1.32
MO	3.75	2.84	2.45	2.18	2.45	2.18	3.50	2.50	4.22	3.07
MT		3.94						3.58		4.81
NE	0.00	1.26	0.00	0.00	0.00	0.00	3.53	2.11	0.00	1.45
NV	2.24	1.67					2.51	1.63	2.24	1.76
NH		3.14					2.86	2.05		3.14
NJ	1.69	1.57	3.70	1.44	3.70	1.44	3.53	2.32	1.22	1.89
NM	0.00	0.87					0.91	1.47	0.00	0.89
NY	2.65	2.47	5.20	1.91	5.20	1.91	5.06	3.08	2.82	4.20
NC	3.56	2.77	2.99	2.94	2.99	2.94	2.15	2.02	4.52	2.69
ND		0.00					4.82	2.87		0.00
OH	2.57	2.77	2.40	3.32	2.01	3.32	3.22	2.68	2.66	2.71
OK	2.65	1.82		0.85		0.85	2.80	1.91	2.65	1.93
OR	3.82	7.79					5.22	6.18	3.82	7.83
PA	3.03	2.99	2.62	2.68	2.62	2.68	3.81	3.03	3.64	3.44
RI	3.31	2.66					5.22	3.82	6.38	2.88
SC	3.11	1.80	4.78	1.92	4.81	1.92	2.24	1.53	2.08	1.61
SD	5.12	1.79					5.06	3.04	5.12	2.73
TN	2.86	1.81	0.77	1.40	0.77	1.40	2.91	1.83	3.41	1.99
TX	1.23	1.34	0.00	1.25	0.00	1.25	1.70	1.52	1.37	1.38
UT	1.06	2.39					1.77	1.70	1.06	2.47
VT		5.91					4.08	2.22		5.91
VA	2.92	2.18	1.91	2.93	0.89	2.93	2.33	1.55	3.69	1.93
WA	3.41	2.81					3.85	3.43	3.22	2.86
WV	4.84	3.26		0.00		0.00	5.11	3.10	4.84	3.26
WI	4.32	5.89	8.58	7.88	8.58	7.88	6.10	4.58	3.56	5.01

Figure 8. State Per Capita Physician Offices

care services, such as hospitals and outpatient care centers.

These facilities provide access to healthcare services for individuals who may not have had access otherwise, including regular medical check-ups, medication management, and access to specialist care. They can also reduce social isolation, particularly for older adults with limited social networks. Social support can positively impact mental health outcomes, improving overall health and well-being. Moreover, nursing and residential care facilities can impact the economic determinants of health by providing employment opportunities in the healthcare sector, leading to job creation and income generation.

The national analysis from 2011 to 2019 indicates that LPAM areas generally had a slightly higher per capita number of nursing and residential care facilities across most demographics, except for MBxHP areas**. By 2019, LPAM areas either saw an increase or stability in these facilities, in contrast to non-LPAM areas, which experienced stability or decline.** Notably, in MW areas, LPAM locations saw an increase of 0.3 in per capita facilities, while non-LPAM areas saw a decrease of 0.1.

In the state analysis, the impact of LPAMs varies significantly. While 24 states in HP regions and 41 in MW regions observed a higher per capita number of facilities in LPAM areas, other states showed contrasting trends. Only FL, MS, MO, NC, and SC had LPAMs with higher per capita than their non-LPAM counterparts across all demographic groups. Several states including AR, IL, OH, and TX had lower per capita in LPAM except for MW LPAMs which had higher per capita than MW non-LPAMs

The rate of change from 2011 to 2019 shows a striking difference in trends between LPAM and non-LPAM areas (Figure X). Nationally, LPAM areas in MB, MBxHP, and MW demographics experienced significant positive trends compared to non-LPAM areas. In contrast, non-LPAM areas experienced larger decreases, with MWxHP areas showing a decrease of 6.10%. The difference in the rate of change is particularly noteworthy in MB areas, where LPAM locations experienced an increase of

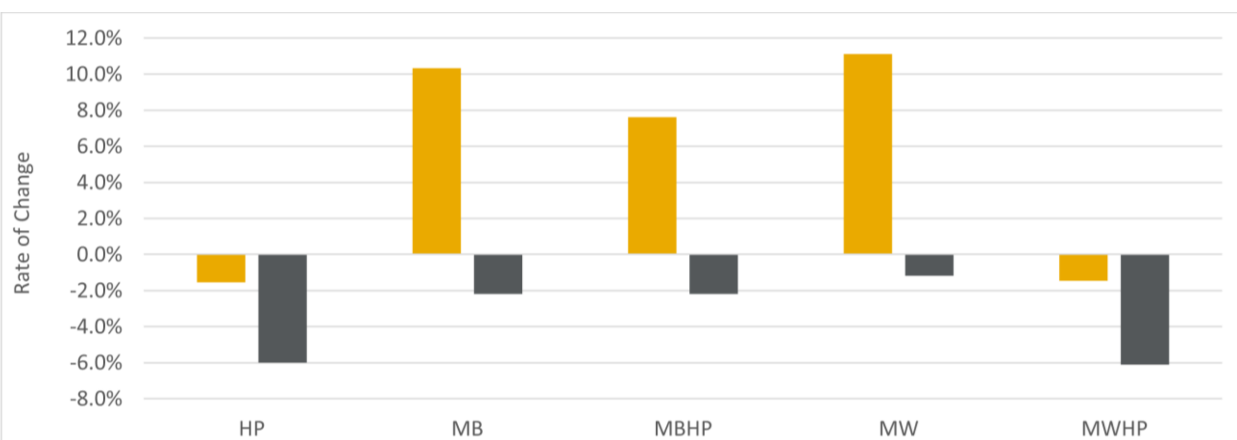

Figure 9. U.S. Nursing & Residential Care Rate of Change by ZCTA Demographics (2011-2019)

10.30% while non-LPAM areas saw a decrease of 2.20%. In contrast, state-level data shows more variability, with many MW LPAMs seeing a positive rate of change while MW non-LPAM saw both increasing and decreasing rates of change. MS and WV saw all LPAM demographics increasing while non-LPAMs decreased. GA and NC saw increasing in HP, MB, and MBxHP while decreasing in MW and MWxHP.

The state analysis underscores significant regional variations and notable outliers. Arkansas increased substantially in MB LPAM at 130.23% while MB non-LPAM decreased at 30.42%. Similarly, OH MB LPAM increased 261.83% while MB non-LPAM decreased at 2.09%.

Neighborhood & Built Environment

Cost-Burdened Households

We selected the ACS indicator of *cost-burdened households*, which spend more than 30% of their income on rent and mortgage, including utilities, condominium and homeowner association fees, taxes, and insurance.

Cost-burdened households immediately affect housing stability. Households that can't afford housing may live in overcrowded or unhealthy conditions or move often. Stress and anxiety can harm physical and mental health. Inadequate housing can expose families to lead, mold, and vermin, which can cause respiratory ailments and other health issues. Cost-burdened households may also lack access to healthy food, safe environments, and excellent education, all critical for indivdual's wellbeing.

In **2011, MB non-LPAM, MBxHP LPAM, and MBxHP non-LPAM had the highest percentage of cost-burdened households** at 48%, while **MW LPAM and non-LPAM had the lowest** at 36%. Over the following years, there was a **decrease in the percentage of cost-burdened households in all areas**. The largest decrease occurred in MW non-LPAM at -15.2%, while the smallest decrease was in MB LPAM at -9.1%. In 2019, MB non-LPAM and MBxHP LPAM still had the highest percentage of cost-burdened households at 43%, while MW LPAM and MW non-LPAM remained the lowest at 30%.

Owner-Occupied Homes

We selected the ACS indicator of *homeownership* as it can have a complex impact on the social determinants of health. The effects of homeownership depend on various factors, including socioeconomic status, access to resources, neighborhood conditions, and individual behaviors. Studies have shown that homeownership can positively impact health outcomes, such as better physical and mental health, lower mortality rates, and reduced risk of chronic diseases. Homeownership can provide stability, security, and a sense of belonging, contributing to overall well-being.

Additionally, owner-occupied housing has a spatial dimension affecting the surrounding neighborhood. Stability is one of the most evident impacts. Homeowners tend to reside in a neighborhood for extended periods, fostering a stable environment. As residents develop relationships, invest in local businesses, and become more engaged in community activities, this stability can positively affect the community. Additionally, owner-occupied residences are frequently associated with higher property values in the neighborhood. Homeowners typically invest in their properties to keep them attractive and well-maintained. In addition, owner-occupied residences generate property taxes, an important revenue source for local governments. This revenue can be utilized to enhance community services and infrastructure, which will benefit all residents. In addition, homeowners are more likely to participate in community events, organizations, and governance. This participation can create a greater sense of community and a more vibrant local culture.

To determine owner-occupied housing, we looked at the percentage of homes in the ZIP code occupied by owners. The data from 2011 shows that **LPAMs had a smaller percentage of owner-occupied houses than their non-LPAM counterparts, except for MB**, which had an equal amount at 53%. The lowest percentage was found in MB LPAMs at 51%. Over the years between 2011 and 2019, **all areas experienced a decrease in the percentage of owner-occupied homes, with LPAMs experiencing larger decreases compared to their non-LPAM counterparts**. The smallest decrease was seen in MB non-LPAM at -2.9%, while the largest was in MBxHP at -8.4%. In 2019, HP, MBxHP, MW, and MWxHP LPAMs had fewer owner-occupied homes than their non-LPAM counterparts. MB LPAMs and MB non-LPAMs had 49%, the lowest percentage. The lowest percentage of owner-occupied homes was found in MBXHP LPAM at 47%, while the highest was in MW non-LPAM at 67%.

Commercial Banking Facilities

We selected the ZBP indicator of *commercial banking facilities* (NAICS 5221) because This industry contributes to improving individual wellbeing by providing access to credit, which can help improve socioeconomic status, reduce tension, and alleviate financial insecurity. In addition, banks provide various financial services, including savings accounts, credit cards, and loans, which can assist individuals in managing their finances, reducing financial stress, and developing healthy financial practices. The establishments included in NAICS 5221 primarily accept deposits and make loans. Commercial banks, savings banks, credit unions, and other similar financial institutions that accept deposits from individuals and businesses and offer various financial services, such as loans, mortgages, credit cards, and other forms of credit, are included in NAICS 5221.

Additionally, commercial institutions have a spatial component. They contribute to community development by investing in

	HP		MB		MBxHP		MW		MWxHP	
	LPAM	Non- LPAM	LPAM	Non- LPAM	LPAM	Non- LPAM	LPAM	Non- LPAM	LPAM	Non- LPAM
AL	2.93	1.59	1.40	1.57	1.40	1.57	2.83	1.48	3.54	1.55
AK		0.00						5.72		0.00
AZ	2.06	2.25					3.47	3.09	2.06	2.39
AR	1.71	1.75	1.68	1.72	1.68	1.72	1.73	1.46	1.71	1.78
CA	1.97	1.97		3.96		4.36	2.77	2.59	2.14	1.98
CO		1.70					2.24	1.62		1.75
CT		3.07	5.23	0.00		0.00	3.49	3.43		2.17
DE	2.86	2.18		2.57		2.57	3.55	3.10	2.86	0.00
DC		1.81		1.73		1.73		1.35		0.00
FL	3.42	2.10	3.51	2.34	3.48	2.34	2.34	1.74	3.39	2.02
GA	1.80	1.75	2.59	1.50	2.28	1.50	1.45	1.46	1.70	1.99
HI		1.06					0.00	0.38		0.00
ID	1.89	2.50					3.17	2.16	1.89	2.52
IL	1.41	2.31	1.01	1.74	0.86	1.74	3.30	2.33	2.04	3.59
IN	3.47	2.44	0.00	2.29	0.00	2.29	4.25	2.93	3.82	2.72
IA	4.45	1.63					5.19	3.23	4.45	1.57
KS	0.00	3.05		2.68		2.68	2.66	2.97	0.00	3.18
KY	2.93	1.99	0.00	3.64	0.00	3.64	3.10	2.29	3.20	1.90
LA	1.40	2.20	0.00	2.27	0.00	2.27	2.00	1.83	2.10	2.06
ME	20.66	6.69					14.75	5.55	20.66	6.69
MD		2.09	0.00	2.85		2.85	2.91	2.61		2.14
MA	2.15	4.04		4.22		4.22	5.40	3.89	2.15	4.22
MI	2.94	2.98	2.68	3.48	1.98	3.48	3.38	3.40	3.26	3.08
MN	4.99	7.11		3.21		3.21	9.86	7.06	4.99	7.63
MS	2.64	1.15	2.14	0.96	2.14	0.96	2.27	1.12	3.54	1.32
MO	3.75	2.84	2.45	2.18	2.45	2.18	3.50	2.50	4.22	3.07
MT		3.94						3.58		4.81
NE	0.00	1.26	0.00	0.00	0.00	0.00	3.53	2.11	0.00	1.45
NV	2.24	1.67					2.51	1.63	2.24	1.76
NH		3.14					2.86	2.05		3.14
NJ	1.69	1.57	3.70	1.44	3.70	1.44	3.53	2.32	1.22	1.89
NM	0.00	0.87					0.91	1.47	0.00	0.89
NY	2.65	2.47	5.20	1.91	5.20	1.91	5.06	3.08	2.82	4.20
NC	3.56	2.77	2.99	2.94	2.99	2.94	2.15	2.02	4.52	2.69
ND		0.00					4.82	2.87		0.00
OH	2.57	2.77	2.40	3.32	2.01	3.32	3.22	2.68	2.66	2.71
OK	2.65	1.82		0.85		0.85	2.80	1.91	2.65	1.93
OR	3.82	7.79					5.22	6.18	3.82	7.83
PA	3.03	2.99	2.62	2.68	2.62	2.68	3.81	3.03	3.64	3.44
RI	3.31	2.66					5.22	3.82	6.38	2.88
SC	3.11	1.80	4.78	1.92	4.81	1.92	2.24	1.53	2.08	1.61
SD	5.12	1.79					5.06	3.04	5.12	2.73
TN	2.86	1.81	0.77	1.40	0.77	1.40	2.91	1.83	3.41	1.99
TX	1.23	1.34	0.00	1.25	0.00	1.25	1.70	1.52	1.37	1.38
UT	1.06	2.39					1.77	1.70	1.06	2.47
VT		5.91					4.08	2.22		5.91
VA	2.92	2.18	1.91	2.93	0.89	2.93	2.33	1.55	3.69	1.93
WA	3.41	2.81					3.85	3.43	3.22	2.86
WV	4.84	3.26		0.00		0.00	5.11	3.10	4.84	3.26
WI	4.32	5.89	8.58	7.88	8.58	7.88	6.10	4.58	3.56	5.01
WY		1.88					0.00	2.44		2.03

Figure 10. State Per Capita Banking Facilities

affordable housing, infrastructure initiatives, and small businesses.

In 2011, LPAM areas had a higher per capita number of commercial banking facilities in all demographics when compared to non-LPAM areas. The most significant difference was in MWxHP areas, where LPAM regions had 1.2 more facilities per capita than non-LPAM regions. **By 2019, while there was a general decrease in the per capita number of banking facilities in both LPAM and non-LPAM areas, the gap between LPAM and non-LPAM areas either remained the same or slightly increased in favor of LPAM areas**.

In the state analysis, a varied picture emerges. While 28 states in HP regions showed a more pronounced per capita presence of banking facilities in LPAM areas, states like Delaware and New Jersey displayed higher numbers in non-LPAM HP areas. MW areas in most states had LPAM higher than non-LPAM. Several states (KY, MI, NC, OH, TN) had LPAM higher in HP, MW and, MWxHP but lower in MB and MBxHP. Several states had LPAM higher in all demographic groups including (but not limited to) AL, GA, IN, MS, MO, NY, TX, VA, WV (Figure 10). In WV for example, MWxHP LPAMs had 9.69 banks per capita compared to 3.81 in MWxHP non-LPAM areas.

Both national and state data from 2011 to 2019 show a decline in per capita commercial banking facilities, but the decline was generally more pronounced in non-LPAM areas (Figure 11). Notably, in MBxHP areas, the rate of change was -16.90% for LPAM areas compared to -29.10% for non-LPAM areas, indicating a significantly better outcome for LPAM areas.

State-level data reflects similar trends. For example, Indiana, Missouri, New York, and Pennsylvania decreased across all areas, except MB and MBxHP while West Virginia and Maine increased in all LPAMs and decreased in non-LPAMs. Some states, like Alabama, saw lower declines in LPAM such as -3.54% in MB LPAMs compared to -22.55% in MB non-LPAMs.

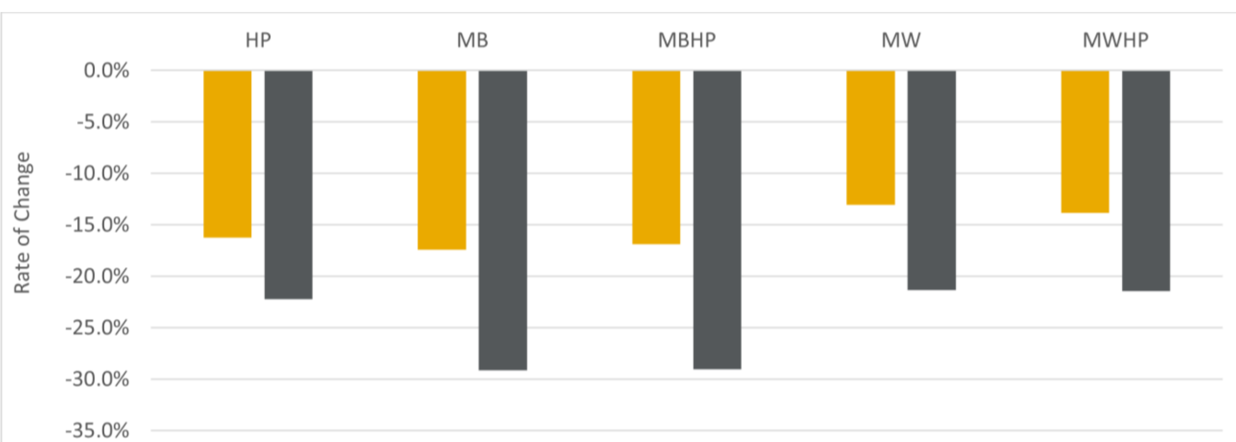

Figure 11. Banking Facilities Rate of Change by ZCTA Demographics (2011-2019)

Social and Community Context

Grocery Stores

We selected the ZBP indicator of *supermarkets and other grocery stores* (NAICS 44511) because they can substantially impact they can increase the access of fresh fruits and vegetables and other whole foods. This is particularly essential in areas with limited access to healthy food options, as it can improve the health of individuals and communities as a whole. Lower prices on healthy foods can make it simpler for individuals and families of all income levels to make healthier food choices. Additionally, supermarkets and grocery stores can provide employment opportunities, particularly for those who encounter employment barriers. In addition, these stores can function as community gathering places and facilitate social interaction and engagement.

Examples of establishments in NAICS 44511 include supermarkets, grocery stores, and food markets that typically carry a wide range of food products and may sell personal care items. These businesses may operate as either chain stores or independent retailers. It is essential to note that establishments classified under NAICS 44511 differ from those that predominantly sell convenience items, such as snack foods and beverages, and have a limited selection of grocery items.

In 2011, the presence of LPAMs was associated with a slightly lower per capita number of grocery stores in HP, MB, and MBxHP areas compared to non-LPAM areas, while MW and MWxHP areas with LPAMs had a higher or equal number of stores per capita. **By 2019, the per capita number of grocery stores in LPAM areas remained stable or decreased slightly, while non-LPAM areas, particularly MW and MWxHP demographics, experienced more significant declines**. This resulted in LPAM areas having a comparative advantage by 2019, especially in MWxHP areas where LPAM regions had 0.5 more stores per capita than non-LPAM regions.

The state analysis shows varied trends. In HP regions, 27 states, including Alabama, Arkansas, and Florida, demonstrated a significant per capita concentration of LPAM amenities. In MB areas, states like Arkansas and Louisiana favored LPAMs, whereas in other states, non-LPAMs prevailed. Similarly, in MBxHP regions, 13 states had higher per capita LPAM presence, while nine leaned towards non-LPAMs. In MW regions, 41 states had higher supermarkets per capita than their non-LPAM counterparts (Figure 12).

From 2011 to 2019, both national and state analyses revealed a general decline in per capita grocery stores, but the decline was less severe in LPAM areas (Figure 13). Nationally, LPAM locations in MW areas experienced a 12.0% decrease compared to non-LPAM areas at 31.2%. The state analysis corroborates this, showing that regions with LPAM typically experienced milder declines or positive growth than their non-LPAM counterparts.

	HP		MB		MBxHP		MW		MWxHP	
	LPAM	Non- LPAM	LPAM	Non- LPAM	LPAM	Non- LPAM	LPAM	Non- LPAM	LPAM	Non- LPAM
AL	1.61	1.02	1.05	0.77	1.05	0.77	1.34	0.86	2.09	1.06
AK		0.98						1.01		0.00
AZ	1.86	1.03					1.19	0.85	1.86	1.10
AR	2.36	0.76	2.10	1.64	2.10	1.64	1.92	0.66	2.40	0.43
CA	2.16	2.24		1.30		0.89	1.73	1.75	2.12	2.17
CO		1.41					1.09	1.02		1.44
CT		4.16	0.00	6.09		6.09	1.59	1.66		3.02
DE	2.60	4.95		5.85		5.85	2.12	1.27	2.60	0.00
DC		2.07		2.68		2.68		2.98		0.00
FL	2.44	2.11	2.21	2.53	2.05	2.53	1.88	1.44	2.59	1.91
GA	2.07	1.45	1.91	1.14	2.18	1.14	1.70	1.18	2.12	1.38
HI		1.06					6.36	1.94		0.80
ID	0.77	1.01					0.64	0.82	0.77	1.02
IL	3.15	2.76	3.38	2.52	3.72	2.52	1.78	1.37	2.37	2.15
IN	1.80	1.41	0.00	1.63	0.00	1.63	1.36	0.81	1.74	1.26
IA	2.45	1.47					2.22	0.72	2.45	1.34
KS	1.19	1.55		4.01		4.01	0.99	0.78	1.19	1.51
KY	1.81	1.22	2.22	3.03	2.22	3.03	1.18	0.95	1.77	1.12
LA	1.90	1.80	4.29	1.90	4.79	1.90	1.40	1.17	0.84	1.52
ME	1.80	2.32					2.03	1.57	1.80	2.32
MD		3.88	1.63	2.37		2.37	1.19	1.46		3.05
MA	2.15	2.79		2.14		2.14	1.84	1.37	2.15	2.42
MI	1.67	1.82	1.54	2.17	1.79	2.17	1.48	1.10	1.68	1.44
MN	1.40	1.94		2.57		2.57	1.41	0.99	1.40	1.71
MS	1.56	0.55	1.21	0.53	1.21	0.53	1.36	0.51	2.19	0.51
MO	1.82	1.39	3.11	1.74	3.11	1.74	1.32	0.91	1.35	1.25
MT		1.06						1.01		1.29
NE	0.00	1.71	0.00	1.76	0.00	1.76	1.06	0.95	0.00	1.84
NV	2.71	1.24					1.81	0.84	2.71	1.22
NH		0.55					1.24	0.91		0.55
NJ	5.91	6.24	5.18	5.55	5.18	5.55	2.39	1.97	6.08	5.52
NM	0.77	0.73					0.46	0.78	0.77	0.78
NY	4.80	7.51	7.80	6.33	7.80	6.33	2.92	3.31	4.29	5.22
NC	2.56	1.71	2.48	1.76	2.48	1.76	1.54	1.46	2.70	1.66
ND		0.00					1.53	0.53		0.00
OH	2.31	1.82	2.52	2.10	2.44	2.10	1.63	1.17	2.29	1.65
OK	2.02	0.80		0.00		0.00	1.26	0.73	2.02	0.88
OR	2.49	1.90					1.55	1.32	2.49	1.91
PA	3.67	2.97	4.67	4.64	4.67	4.64	1.70	1.08	2.27	1.73
RI	5.91	2.17					1.36	1.25	3.64	2.01
SC	1.74	1.25	1.20	0.90	1.28	0.90	2.08	1.35	2.01	1.39
SD	1.33	0.53					1.31	0.81	1.33	0.80
TN	1.51	1.34	1.10	1.28	1.10	1.28	1.23	0.92	1.62	1.32
TX	1.65	1.22	0.00	1.23	0.00	1.23	1.32	0.85	1.85	1.15
UT	1.34	1.51					0.95	0.79	1.34	1.62
VT		3.31					2.48	1.45		3.31
VA	1.52	1.53	1.27	1.86	1.34	1.86	1.97	1.41	1.59	1.38
WA	3.16	2.90					1.89	1.68	2.30	2.83
WV	2.80	0.67		0.00		0.00	1.61	0.65	2.80	0.67
WI	2.64	1.89	2.36	2.25	2.36	2.25	1.32	0.95	1.73	1.74
WY		0.00					0.00	0.89		0.00

Figure 12. State Per Capita Supermarket & Grocery Stores

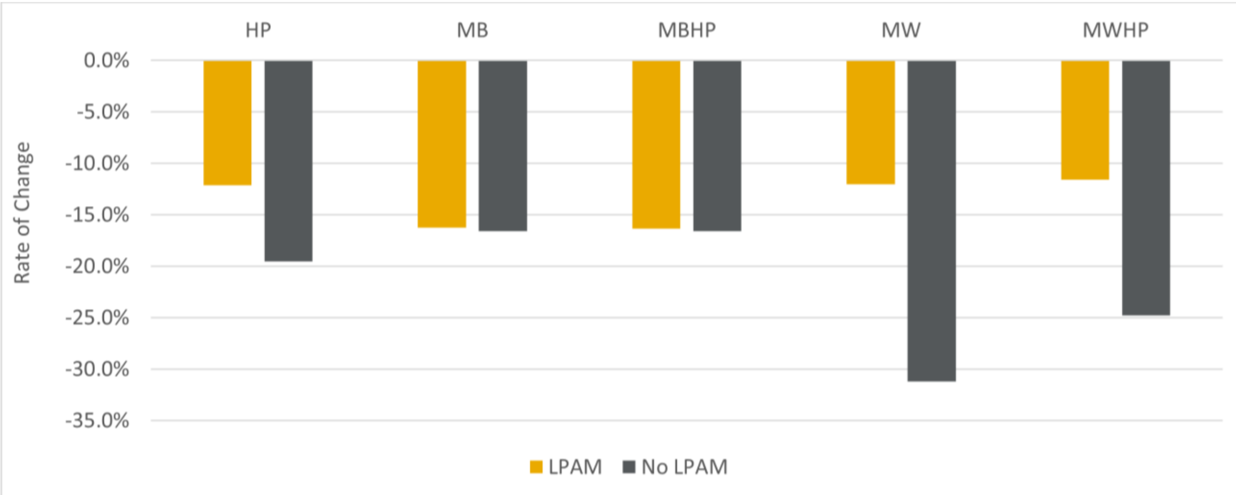

Figure 13. Supermarkets & Grocery Stores Rate of Change by ZCTA Demographics (2011-2019)

For example, all MW non-LPAMs decreased while several states (AR, DE, HI, IA, MD, MS, ND, OR, and SD) saw MW LPAMs with increasing rate of change. Arkansas, South Dakota saw increases in all LPAM demographics and decreases in non-LPAM. Kentucky and North Carolina only saw increases in MB LPAMs while Mississippi only saw increases in MW. Most states saw steeper decreases in non-LPAM than LPAM. For example, in Georgia MB LPAMs saw a decrease of 19.25% while MB non-LPAM decreased 41.07%.

Support Systems

We designated the ZBP indicator of religious, philanthropic, civic, professional, and similar organizations (NAICS 813) as a *support system* due to their significance for social determinants of health. Religious organizations, including churches, synagogues, mosques, and temples; grantmaking foundations and trusts, such as charitable organizations and endowments; civic and social organizations, including community centers, fraternal organizations, and political organizations, and professional organizations, including trade associations and professional societies, are examples of establishments included in NAICS 813. By providing access to healthcare services, religious and civic organizations impact the social determinants of health. Many religious organizations, for instance, operate health clinics or collaborate with healthcare providers to provide free or low-cost services to their communities. This can help increase healthcare access for individuals who lack the financial means to pay for conventional medical care. In addition to providing healthcare services, religious and civic organizations can offer social support and community resources that influence the social determinants of health. These organizations may, for instance, offer support groups for those coping with mental health issues, substance abuse, or chronic illness. In addition, they might offer educational programs on healthful living, nutrition, and physical activity. The sense of community and social connection provided by religious and civic organizations can also positively affect mental health and well-being. These organizations can bring together people from various backgrounds and provide a forum for social interaction, thereby reducing social isolation and enhancing social support. In addition, religious and civic organizations can advocate for policy changes that address social determinants of health, such as the availability of affordable housing, secure neighborhoods, and healthy food options. By advocating for these changes, these organizations can contribute to creating healthier communities and improving individual health outcomes.

In 2011, areas with LPAMs had a higher per capita number of support systems across all demographic areas, most notably in MBxHP regions, where the per capita difference was 2.5. **By 2019, despite a general decline in per capita numbers for both LPAM and non-LPAM areas, LPAM areas maintained higher support systems per capita**. The gap either remained consistent or increased slightly across all demographics (Figure 14).

complex landscape, with 32 states showing higher per capita facilities in LPAM areas, but 16 states exhibited an opposing trend. Several states (IL, ME, MI, MA, SC, WV) had lower support systems per capita in LPAMs except for MW LPAMs which had more support systems per capita than their non-LPAM counterpart (Figure 15).

From 2011 to 2019, both national and state data indicate a general decline in per capita support systems. However, LPAM areas typically experienced a smaller decline, or in some cases, a minor increase compared to non-LPAM areas. Nationally, in MW areas, LPAM regions experienced a 2.30% more favorable rate of change compared to non-LPAM regions. For example, in HP areas like Alabama, LPAMs showed a 1.95% decrease as opposed to a 4.35% decline in non-LPAM areas while MW and MWxHP LPAMs in AL increased while their non-LPAM counterparts decreased. Both Arkansas and South Carolina saw only increases in MB LPAMs while all non-LPAMs and MW LPAMs decreased. Utah saw increases in all LPAM areas and decreases in non-LPAM.

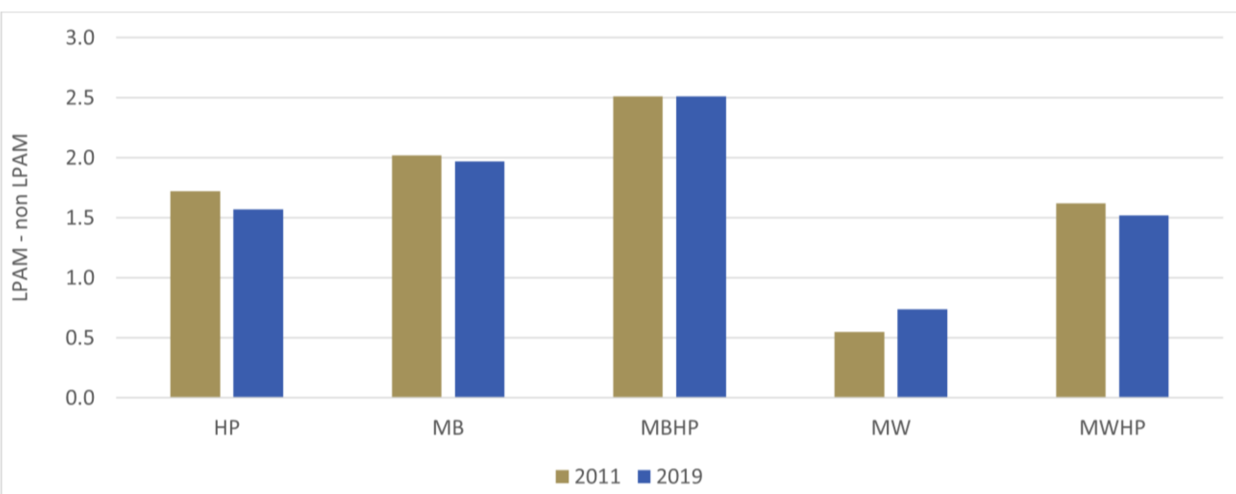

Figure 14. U.S. Difference in Support Systems Per Capita Between LPAM and Non-LPAM by ZCTA Demographics (2011 & 2019)

	HP		MB		MBxHP		MW		MWxHP	
	LPAM	Non- LPAM	LPAM	Non- LPAM	LPAM	Non- LPAM	LPAM	Non- LPAM	LPAM	Non- LPAM
AL	14.30	12.98	15.16	12.72	15.16	12.72	11.64	10.26	13.24	12.63
AK		0.00						12.35		0.00
AZ	8.19	5.36					5.28	5.16	8.19	5.63
AR	11.91	11.71	30.67	12.74	30.67	12.74	9.71	10.04	9.36	11.25
CA	6.69	5.56		4.77		4.69	5.93	6.24	6.47	5.57
CO		9.78					9.33	9.04		10.11
CT		12.04	12.37	10.61		10.61	6.83	8.64		11.69
DE	6.24	25.35		29.24		29.24	9.02	9.33	6.24	3.87
DC		65.08		41.73		41.73		117.77		357.66
FL	9.42	7.93	8.45	7.42	9.36	7.42	7.84	7.49	9.44	7.98
GA	9.67	10.07	8.13	7.42	8.46	7.42	8.58	8.42	10.40	10.33
HI		5.13					22.28	16.13		3.22
ID	6.09	7.45					6.89	6.92	6.09	7.49
IL	6.54	9.22	3.38	7.65	3.00	7.65	11.89	9.66	9.75	11.94
IN	16.12	12.24	14.30	10.83	14.30	10.83	12.90	10.66	17.59	12.86
IA	12.02	16.88					11.85	12.12	12.02	17.00
KS	8.33	14.76		20.07		20.07	9.20	11.68	8.33	13.33
KY	10.90	9.27	12.86	25.47	12.86	25.47	10.49	8.93	10.71	8.35
LA	12.23	10.36	10.37	10.35	10.99	10.35	9.25	8.06	13.39	9.82
ME	12.35	12.51					10.77	9.88	12.35	12.51
MD		11.08	9.36	8.77		8.77	9.11	10.07		11.44
MA	7.24	9.17		6.99		6.99	9.85	9.09	7.24	9.13
MI	8.88	10.47	7.56	9.62	7.06	9.62	9.56	8.65	9.47	10.96
MN	13.87	16.19		14.75		14.75	11.26	11.86	13.87	16.14
MS	12.73	12.05	14.83	11.05	14.83	11.05	10.12	10.63	8.93	13.25
MO	11.78	11.87	5.78	10.20	5.78	10.20	11.70	10.37	13.92	11.80
MT		13.18						13.94		15.43
NE	14.09	13.65	14.14	6.60	14.14	6.60	12.85	12.04	14.02	14.96
NV	9.68	5.34					6.76	3.69	9.68	5.17
NH		16.83					9.94	8.30		16.83
NJ	17.59	8.80	54.05	7.01	54.05	7.01	9.41	8.04	9.03	9.30
NM	1.41	6.37					4.42	8.45	1.41	6.98
NY	13.15	7.44	19.06	6.34	19.06	6.34	13.45	11.07	10.96	9.73
NC	12.58	12.30	10.65	12.22	10.65	12.22	9.35	10.49	15.87	12.58
ND		4.84					14.91	14.09		9.66
OH	16.30	11.03	7.80	12.25	8.19	12.25	11.64	9.47	17.62	10.08
OK	13.09	10.62		14.45		14.45	12.19	9.81	13.09	10.19
OR	8.03	13.59					9.07	10.28	8.03	13.66
PA	13.71	11.83	15.16	6.92	15.16	6.92	11.84	11.81	17.36	14.81
RI	31.23	7.84					11.75	8.18	78.33	7.50
SC	12.80	13.91	10.68	12.24	11.22	12.24	11.54	10.09	13.76	13.96
SD	19.53	10.00					19.30	13.52	19.53	13.02
TN	11.40	11.19	11.82	10.23	11.82	10.23	10.69	10.23	11.29	11.48
TX	5.62	7.53	9.58	7.41	9.58	7.41	7.21	7.12	5.82	7.65
UT	4.89	6.70					3.46	3.36	4.89	7.04
VT		15.56					11.88	12.09		15.56
VA	17.96	13.40	20.90	10.88	32.96	10.88	13.17	10.63	12.31	14.28
WA	12.98	11.58					7.39	8.63	6.07	11.90
WV	9.94	12.92		41.67		41.67	12.68	11.45	9.94	12.94
WI	13.79	9.93	6.86	7.18	6.86	7.18	11.05	9.89	20.49	11.36
WY		7.04					12.82	14.42		7.61

Figure 15. State Per Capita Support Systems

Arts and Entertainment Facilities

The ZBP indicator for arts and entertainment facilities (NAICS 71) consists of establishments predominantly engaged in providing recreational and entertainment services, such as spectator sports, performing arts, museums, amusement parks, and gambling. These facilities can considerably contribute to the well-being of individuals and communities by providing opportunities for social interaction, community engagement, and personal development. People can develop and maintain social connections through the various social events and gatherings held in local venues. These social interactions are essential for maintaining a person's mental health. In addition to providing opportunities for community engagement, arts and entertainment facilities foster a sense of community and connection which can enhance social and emotional well-being. Participating in creative activities such as painting or performing music can provide a sense of accomplishment and boost self-esteem, thereby fostering personal development and growth.

The national analysis from 2011 to 2019 indicates that areas with LPAMs generally had a slightly higher per capita number of arts and entertainment facilities across most demographics. **Initially, LPAM areas in MW demographics had a lower number than non-LPAM areas, but by 2019, this trend reversed, resulting in LPAM regions having higher per capita numbers across all demographics** (Figure 16).

The state analysis presents a varied landscape. In HP zones, 24 states reported a higher per capita presence of these facilities in LPAMs, while 16 states outperformed non-LPAM areas. The MW regions showed 33 states with a pronounced presence in LPAMs and 15 in non-LPAMs. However, the scenario in MB, MBxHP, and MWxHP areas was more split, with states showing diverse preferences between LPAM and non-LPAM areas. Only

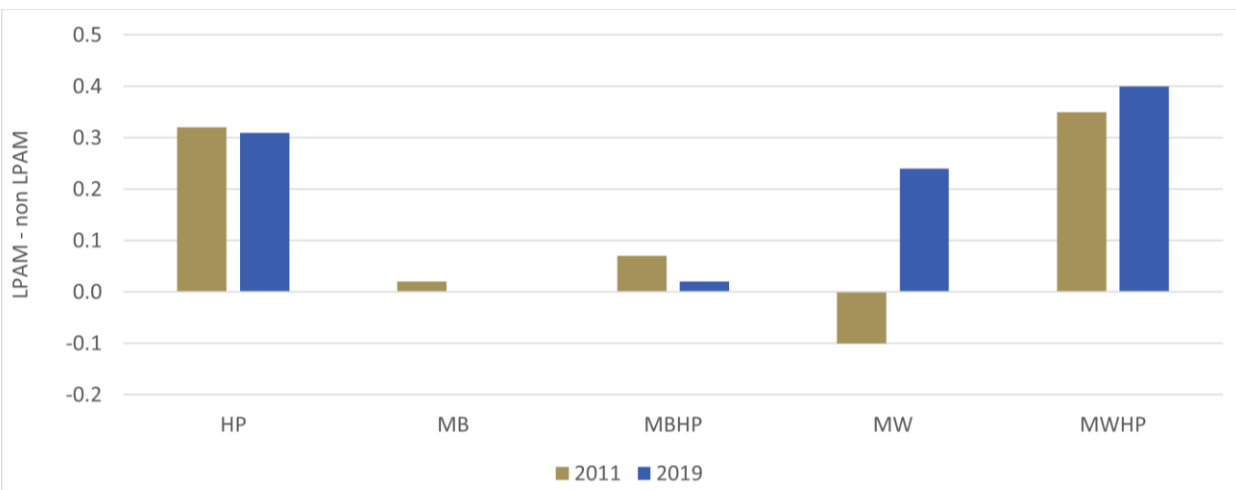

Figure 16. U.S. Difference in Arts & Entertainment Facilities Per Capita Between LPAM and Non-LPAM by ZCTA Demographics (2011 & 2019)

Alabama, Arkansas, New Jersey, West Virginia and Wisconsin had LPAMs higher in all demographics than their non-LPAM counterparts.

From 2011 to 2019, both national and state analyses indicate overall growth in per capita arts and entertainment facilities in LPAM areas. Nationally, the most significant growth was observed in MW areas, where LPAM regions experienced a 15.80% growth compared to 7.40% in non-LPAM areas.

The state analysis highlights significant regional variations and outliers. Most MW LPAM areas except for 10 states had increasing rate of change while MW non-LPAMs had a mix of increasing rate of change and decreasing rate of change. Arizona, California, Colorado, Delaware, DC, Nevada, increased in all demographics for both LPAM and non-LPAMs.

Restaurants

We chose restaurants (NAICS 722) because restaurants can serve as gathering places for people to socialize and connect with others, which can positively affect mental health. They can also provide employment opportunities for individuals in the community, which can positively affect economic well-being and overall health outcomes.

NAICS 722 comprises establishments primarily engaged in preparing and serving food and beverages for immediate consumption. These establishments may offer various services, such as table service, take-out, delivery, or self-service.

In 2011, LPAM areas had a higher per capita number of restaurants across all demographic categories. The most significant difference was observed in MWxHP areas, where LPAM regions had 5.5 more restaurants per capita than non-LPAM regions. By 2019, the per capita numbers had increased in both LPAM and non-LPAM areas, with LPAM areas maintaining or slightly increasing their lead in per capita restaurant numbers (Figure 17).

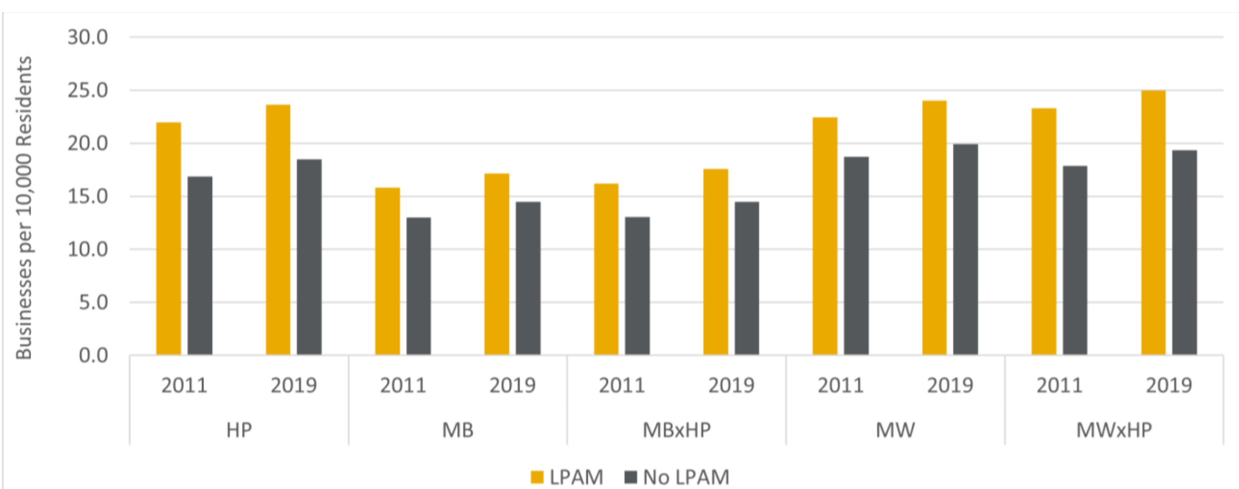

Figure 17. U.S. Restaurants Per Capita by ZCTA Demographics (2011 & 2019)

Catalysts of Community Prosperity: The Multifaceted Impact of Large-Producing-Advanced Manufacturers in Arkansas

Arkansas has embarked on a transformative journey from traditional to advanced manufacturing, driven by strategic state policies and a commitment to innovation. This evolution reflects a deliberate move towards adopting new technologies and processes, supported by both public and private sectors. Arkansas's approach has created a business-friendly environment that promotes industrial growth and diversification, establishing the state as a leader in the advanced manufacturing domain.

Arkansas's strength in manufacturing is a direct result of supportive state policies. The government has implemented measures such as the Arkansas Economic Development Commission's Advantage Arkansas Income Tax Credit, which incentivizes companies to hire new, full-time employees. Furthermore, financial incentives, tax credits, exemptions, and financing options have been tailored to lower operational costs and encourage expansion. On the research and development front, partnerships like those between the National Academies' Board on Science, Technology, and Economic Policy and the University of Arkansas underscore the state's dedication to innovation. Workforce development is another cornerstone, with programs focusing on skills such as programming and automation to ensure a competitive labor force.

Arkansas has built a robust infrastructure to support its growing manufacturing sector, featuring industrial parks with state-of-the-art facilities and a strategic transportation network. These parks offer scalable solutions and essential utilities, crucial for manufacturing operations. Public-private partnerships also play a pivotal role, with university-industry collaborations bringing together academic research and market insights to foster innovation. Interstate and international alliances further enhance Arkansas's manufacturing prowess, connecting the state to broader markets and global trends.

While Arkansas's advanced manufacturing sector has seen considerable growth, it faces challenges like a skills gap and the need to compete in a global market. Strategic policies and initiatives are vital in addressing these issues. For instance, the state's efforts to equip its workforce with advanced manufacturing skills through partnerships with educational institutions are crucial for filling the skills gap. Additionally, leveraging its geographic location and fostering a favorable business climate are strategies aimed at enhancing Arkansas's global competitiveness.

Arkansas's strategic embrace of advanced manufacturing, particularly Large-producing-advanced manufacturers (LPAMs), has supported of community well-being beyond just job creation. The presence of LPAMs in communities significantly influences various aspects of daily life, including economic stability, education access, health care access, neighborhood and built environment, as well as social and community context. This comprehensive analysis highlights how LPAMs contribute to these critical areas, underscoring their role in fostering robust and resilient communities.

LPAMs have a profound impact on the economic stability of their locales. Communities with LPAMs have seen a higher number of businesses per capita compared to those without, across all demographics. This indicates a vibrant economic environment where LPAMs act as catalysts for broader business growth and diversification, contributing to a stable and thriving local economy.

The influence of LPAMs extends significantly into education access. In LPAM areas, there is a higher per capita presence of daycare facilities and educational services compared to non-LPAM areas, demonstrating a commitment to nurturing early education and continuous learning. Notably, while non-LPAM areas experienced a decline, LPAM areas (except in the MW areas) saw an increasing rate of change in educational services per capita from 2011-2019, reflecting a growing investment in and prioritization of education.

Health care access is another critical area where LPAMs make a difference. LPAM regions generally surpass non-LPAM areas in terms of per capita physician offices, particularly in the HP, MW, and MWxHP demographics. This trend indicates enhanced health care availability, contributing to the overall well-being of the community. However, it's important to note that LPAM areas have fewer nursing and residential care facilities per capita, suggesting an area for further community investment and support.

LPAMs contribute to shaping the neighborhood and built environment. Regions with LPAMs have more commercial banks per capita in several demographics, indicating more robust financial services and support for businesses and individuals. Furthermore, while both LPAM and non-LPAM areas have seen a decrease in commercial banks from 2011-2019, the rate of decrease is slower in LPAM areas, suggesting a more resilient financial infrastructure.

The presence of LPAMs positively affects the social and community context by enhancing access to essential community services and amenities. Supermarkets and grocery stores are more prevalent in LPAM areas across all demographics, ensuring better access to fresh food and groceries. The rate of change for supermarkets in LPAM areas is also increasing, contrasting with a decrease in non-LPAM areas, highlighting a commitment to food accessibility. Support systems, arts and entertainment facilities, and restaurants per capita are higher in LPAM areas in several demographics, enriching the social fabric and quality of life. These amenities not only cater to daily needs and leisure but also foster a sense of community and cultural vibrancy.

V. KEY TAKEAWAYS

The data spanning from 2011 to 2019 illustrates a striking impact of LPAM on economic stability in various regions. Notably, HP and MW regions demonstrate a higher business density in areas with LPAMs than their non-LPAM counterparts. This trend signifies transient growth and a consistent pattern of economic enhancement in these regions, marked by an influx of diverse businesses and a robust economic environment. However, this positive impact is not uniformly experienced across all regions. The MB areas, in particular, exhibit a concerning disparity, raising critical questions about the equitable distribution of LPAM benefits and the potential for economic exclusion in less prosperous areas.

Employment trends provide a revealing insight into the role of LPAMs in economic development. In regions like MB and MBxHP, LPAM areas have witnessed more significant employment rate increases than their non-LPAM counterparts. This data underscores the potential of LPAMs in job creation and economic upliftment. On the business density front, the initial figures in 2011 showed LPAM areas outperforming non-LPAM ones across all demographics, with particularly notable disparities in MWxHP areas. However, by 2019, a shift is observed. Non-LPAM areas, especially in states like Maine and Vermont, showed signs of economic catch-up, particularly in HP and MW demographics. This trend suggests a dynamic economic landscape where LPAMs initially spur growth, but non-LPAM areas can also adapt and improve.

The presence of LPAMs seems to correlate positively with access to educational resources, especially in terms of child daycare facilities. In regions characterized by HP, MB, and MW demographics, LPAM areas consistently have more child daycare facilities than non-LPAM areas. This trend is essential, considering the role of early education in long-term societal development. Despite a decline in such facilities from 2011 to 2019, LPAM areas have shown greater resilience, particularly in HP and MWxHP demographics. This resilience is not just limited to daycare facilities but also to educational services. LPAM areas had a higher per capita presence of educational services, with a notable difference in MWxHP areas. The rate of change between 2011 and 2019 further highlights that LPAM areas in MB and MBxHP demographics maintained more stability in educational services compared to their non-LPAM counterparts.

Healthcare accessibility, as indicated by the density of doctors' offices and nursing facilities, generally shows a more favorable trend in LPAM areas. In 2011, LPAM areas had a higher per capita number of physician offices across all demographics, particularly in MWxHP areas. By 2019, despite a decrease across all areas, LPAM areas managed to maintain smaller declines in physician offices. This trend suggests that LPAMs might play a role in sustaining healthcare access even amidst broader challenges. The situation with nursing and residential care facilities is similar. LPAM areas, especially in MW demographics, demonstrated resilience or growth in these facilities, contrasting with the trends in non-LPAM areas.

The built environment, encompassing amenities like banking facilities, is markedly influenced by the presence of LPAMs. In 2011, LPAM areas boasted a higher per capita number of commercial banking facilities across all demographics, with MWxHP areas showing a notable difference. This higher density suggests that LPAMs may foster a more robust financial infrastructure crucial for economic growth. By 2019, despite an overall reduction, LPAM areas generally succeeded in maintaining or increasing their advantage in commercial banking facilities per capita. The rate of change from 2011 to 2019 was negative across the board but was less severe in LPAM areas, with MB and MBxHP areas showing the most substantial difference in favor of LPAM areas. However, the trend in owner-occupied homes presents a complex picture. LPAM areas generally had fewer owner-occupied houses than non-LPAM areas, except in MB, indicating a possible challenge in ensuring residential stability alongside economic development.

The social and community context within LPAM regions shows a complex but generally positive trend. For example, supermarkets and grocery stores in LPAM regions experienced a less drastic decline than in non-LPAM areas, particularly in MWxHP demographics. This trend might indicate LPAM's role in sustaining essential community services. The situation with arts and entertainment facilities and restaurants is even more encouraging. LPAM areas, especially in HP and MW regions, showcase robust growth in these sectors, suggesting that the presence of LPAMs can catalyze cultural and social vibrancy. This growth enriches the community life and contributes to a diverse local economy.

The comprehensive analysis of LPAM impacts across various regions from 2011 to 2019 underscores their positive influence on economic development, employment, education, health care, and community support. However, the disparities, especially in MB regions, highlight the need for nuanced and targeted policy interventions. Policymakers should aim to create inclusive environments that support LPAM growth while also addressing the diverse needs of all community members. Ensuring that the benefits of LPAMs are distributed more evenly will be crucial in leveraging their full potential for societal advancement.

VI. Strategies for Creating Vibrant Communities

In crafting policy recommendations to promote the importance of LPAMs, it is essential to understand the multifaceted impact of such entities on business growth and demographic economics. The correlation between LPAM presence and a rise in the number of businesses per capita across various demographic measures provides a compelling argument for states to incentivize the establishment of LPAMs actively. This can be achieved through targeted fiscal policies such as tax incentives, grants, or by streamlining regulatory processes that can expedite the establishment and operation of new LPAMs. By reducing the bureaucratic and financial barriers to LPAM development, states can foster an environment conducive to advanced manufacturing and, by extension, spur economic development.

However, the approach must be nuanced, considering the varying impacts of LPAM presence in different states. States should conduct thorough analyses to discern the reasons behind these variations. By understanding the specific local factors at play, policies can be tailored to address the unique challenges and leverage the unique opportunities of each state. The successful models of states with thriving LPAM-centric economies should be studied and

	Large-Producing-Advanced Manufacturers			
Policy Suggestions	High Poverty	Majority Black	Majority White	Majority White-High Poverty
Increase local employment through incentives and job training programs				
Support the location of childcare facilities in LPAM communities				
Support an expansion of educational services near LPAMs				
Support incentives to place physician offices near LPAMs				
Support incentives to place nursing and residential care facilities near LPAMs				
Support programs that lead to homeownership				
Support programs that reduce the cost-burden for renters and home-owners				
Increase incentives for supermarkets to locate near LPAMs				
Expand support systems				

Empowering Innovation: State Strategies to Advance U.S. Manufacturing

Advanced manufacturing is a critical driver of U.S. economic strength, with states implementing policies to foster this sector through cutting-edge technology and skilled labor. These initiatives aim to boost competitiveness, job creation, and investment, adapting to technological changes like automation and IoT. Key strategies include investment in R&D, workforce training, infrastructure enhancements, tax incentives, and partnerships with universities and research institutions.

Federal and state collaboration is vital, exemplified by initiatives like the Manufacturing USA Network, where states collaborate with the federal government on innovative technologies. States leverage federal grants, such as the Manufacturing Extension Partnership (MEP), to support local manufacturing, while workforce development programs and innovation and research efforts are tailored to state needs.

Financial incentives like tax credits, exemptions, and grants are widespread. Ohio and Florida offer tax incentives to reduce operational costs and encourage investment, while California and Texas deploy grant programs to stimulate R&D and innovation. Investment in technology hubs, such as New York's Buffalo Billion initiative and North Carolina's Research Triangle Park, further supports advanced manufacturing.

Workforce development is a priority, with states like California, Texas, and Michigan offering technical training and apprenticeship programs in partnership with local businesses and educational institutions. Infrastructure support is also critical, with Tennessee and Ohio investing in transportation and logistics to improve manufacturing efficiency.

The regulatory environment is optimized through streamlined permit processes and environmental compliance assistance, with states like California and Texas taking the lead. Public-private research partnerships are encouraged, with states like New York funding collaborative R&D projects to convert academic research into market-ready products.

International trade and export assistance programs in states like California and Texas help manufacturers access global markets, while Michigan and Ohio focus on expanding into new markets through dedicated programs. Renewable energy initiatives and sustainable manufacturing practices are promoted in states like California, New York, Washington, and Minnesota to align economic growth with environmental sustainability.

Public awareness and community engagement initiatives in states like Wisconsin, Pennsylvania, North Carolina, and Ohio aim to build a sustainable talent pipeline and improve the sector's public image. These states utilize media campaigns, educational partnerships, and outreach programs to engage the public and attract new talent.

sharing best practices and strategies that have proven effective.

Furthermore, the disparities in business growth between MW and MB areas underscore the importance of designing demographic-specific programs. Policies should aim to bridge these gaps by addressing the particular challenges and potentials within different regions, acknowledging that LPAM presence alone does not uniformly guarantee business proliferation. This necessitates a diversified strategy that avoids a one-size-fits-all approach, instead of catering to the nuanced needs of various demographics. Continuous data collection and analysis are critical for this endeavor, providing the necessary insights to refine strategies over time and achieve better outcomes. Additionally, it is vital to engage with community stakeholders, including leaders, business owners, and others, to understand grassroots challenges and develop targeted solutions.

Finally, there is a clear need for capacity building and collaborative efforts. States should implement training programs, seminars, and workshops to help businesses maximize the benefits of LPAM presence. Collaboration between states with successful LPAM-driven growth and those yet to realize such benefits can encourage the sharing of knowledge and solutions to common challenges. By fostering a collaborative environment, states can collectively enhance their manufacturing capabilities and, consequently, their economic landscapes.

VII. Conclusion

This report explores the benefits of manufacturing facilities that go beyond job growth. The data showed that LPAMs tend to positively impact communities, with higher number of businesses per capita and slower decreasing rates of change between 2011 and 2019. However, the study also revealed disparities between regions, with MW consistently performing better than MB, regardless of LPAM presence. Policymakers must focus on attracting supporting businesses around manufacturing facilities to ensure success in all regions. Additionally, LPAMs may protect nearby businesses from economic forces but may negatively impact homeownership. Policymakers must take steps to protect residents and ensure they can continue living in their communities even after establishing new manufacturing facilities. Overall, this study highlights the potential of LPAMs to drive socio-spatial growth and calls for policymakers to prioritize placing LPAMs in areas that would benefit the most.

Going forward, manufacturers, economic developers, and siting professionals must work together to situate new facilities in localities that will realize the most significant benefits. Combining these targeted siting decisions with specific policy measures will strengthen the U.S. economy and build vibrant communities.

VIII. APPENDIX

This report categorized manufacturers as large, producing, and advanced. First, we define large manufacturers as those that employ 500 or more on-site. To determine if a facility produces on-site, we matched facilities to EPA permits, including Air, National Pollutant Discharge Elimination System (NPDES), and Resource Conservation and Recovery Act (RCRA). Finally, to determine advanced manufacturing status, we used a list of NAICS codes created by the Brooking's Institute in their report defining advanced industries in America.

Finally, we analyzed the ZIP codes of the LPAMs based to understand if they were high poverty, majority black, or majority white. A definition of high poverty used the census definition of population that is 20% or more living below the poverty line. Majority Black and White were ZIP codes with greater than 51% of a single racial category. This was based on the poverty rate from the ACS 5-yr 2007-2012. Our data came from three publicly-available sources – American Community Survey (ACS), County Business Patterns (CBP), and Longitudinal Employer-Household Dynamics (LEHD). (Table 4)

	Indicator	**Source**	**Table/Identifier**
	Total Population	ACS	DP05
	Businesses	CBP	All
	Small Businesses	CBP	n1_99
Economic Stability	Employment in Area	LEHD	Work Area Profile
	Employed Working-Age Resident	ACS	DP03
	Residents Employed within the Community They Reside	LEHD	Input/Output
	Residents Working in Non-Low Wage Jobs	LEHD	Home Aea Profile
Education Access	Child Day Care Facilities	CBP	NAICS 6244
	Educational Services	CBP	NAICS 61
Health Care Access	Residents with Insurance	ACS	DP03
	Offices of Physicians	CBP	NAICS 6211
	Nursing and Residential Care Facilities	CBP	NAICS 623
Neighborhood & Built Environment	Cost-Burdened Households	ACS	DP04
	Owner-Occupied Homes	ACS	DP04
	Commerical Banking Facilities	CBP	NAICS 5221
Social & Community Context	Supermarkets and Other Grocery	CBP	NAICS 44511
	Support Systems	CBP	NAICS 813
	Arts and Entertainment Facilities	CBP	NAICS 71
	Restaurants	CBP	NAICS 722

Table 3. Variables