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## Minority Participation in Technology Based Growth Industries in Northeast Ohio

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**MINORITY  
PARTICIPATION IN  
TECHNOLOGY BASED  
GROWTH INDUSTRIES  
IN NORTHEAST OHIO**

CENTER FOR  
ECONOMIC  
DEVELOPMENT

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## INTRODUCTION

This report was prepared for PolicyBridge and NorTech by the Center for Economic Development at the Levin College of Urban Affairs at Cleveland State University. The study uses secondary data sources to analyze minority participation in technology-based growth industries. This study complements research conducted by Policy Bridge, which is primarily based on interviews and focus groups; it assists these organizations in drafting policy recommendations on how to increase the role of minorities in technology based growth industries.

This report is organized into three chapters: Minority Participation in STEM Degrees, Minority Participation in High-Tech Industries, and Minority Business Ownership. Each chapter contains the same structure: a summary of findings based on information and data contained within the chapter followed by an analysis conducted by the Center for Economic Development. In most instances, the Center's analysis includes a graphic or table followed by bullet points highlighting the observations of data collected and studied. To create a benchmarking system, the Center compared the Northeast Ohio region and its counties to the state of Ohio and the United States.

## CHAPTER 1: MINORITY PARTICIPATION IN STEM DEGREES

This analysis examines university degrees awarded in science, technology, engineering, and mathematics (STEM)<sup>1</sup> to minority students in Northeast Ohio. In order to create a benchmarking system, the report compared Northeast Ohio<sup>2</sup> to the state of Ohio and the United States. In this report, graphics and tables are displayed, followed by bullet points highlighting the observations of data collected and studied.

For this analysis, information about degrees awarded by race from colleges and universities was gathered from the National Science Foundation (NSF) Integrated Postsecondary Education Data System. The NSF categorizes many degree types that are familiar to this report's audience, but definitions are provided for the infrequently referred to degree types: First Professional Degrees,<sup>3</sup> Post-Master's Certificates,<sup>4</sup> and Doctorate Degree-Professional Practice.<sup>5</sup> For the purposes of this study, the terms "minority" and "minorities" refer to African-Americans and Hispanics only. In addition, the racial grouping Asians encompasses Asians and Pacific Islanders.

### MAJOR FINDINGS

In 2009, twenty-eight (28) academic institutions in the Northeast Ohio region granted 740 degrees in the STEM disciplines to minority students; degrees ranged from the associate to the doctorate level.<sup>6</sup> The five largest universities—Case Western Reserve University, Cleveland State University, Kent State University, University of Akron, and Youngstown State University—awarded the majority of *Bachelor's* and *Graduate* STEM degrees (335) to minority students. Cuyahoga Community College awarded the highest number of *Associate's Degrees* (112) in STEM.

Examining the percentage of degrees awarded in STEM disciplines by racial/ethnic categories reveals interesting trends. The percentage of STEM degrees awarded, out of all degrees awarded, was similar across geographies (Northeast Ohio, Ohio, and the United States); however, African-American and Hispanic students, no matter the geography, accounted for lower percentage of degrees awarded in STEM fields than other racial/ethnic categories. In contrast, Asians had the highest STEM share of all degrees awarded in all geographies. When comparing the percentage of STEM degrees awarded out of all STEM degrees awarded within a particular racial/ethnic category in Northeast Ohio, African-American STEM degrees accounted for 6.1% and Hispanics accounted for 1.6%.

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<sup>1</sup> For a listing of STEM degree disciplines included in this study, see Appendix Table A.1. Listing of STEM Academic Disciplines.

<sup>2</sup> The Northeast Ohio region is defined for this study as the 11-county region that includes Ashtabula, Cuyahoga, Geauga, Lake, Lorain, Mahoning, Medina, Portage, Stark, Summit, and Trumbull counties. These counties were selected because they had at least 5% of minorities among their residents. Other Northeast Ohio counties where the minority population accounted for less than 5% were excluded from this study.

<sup>3</sup> Degrees Awarded in the following 10 areas: Chiropractic (D.C. or D.C.M.), Osteopathic medicine (D.O.), Dentistry (D.D.S. or D.M.D.), Pharmacy (Pharm.D.), Law (L.L.B. or J.D.), Podiatry (D.P.M., D.P., or Pod.D.), Medicine (M.D.), Theology (M.Div., M.H.L., B.D., or Ordination), Optometry (O.D.), and Veterinary medicine (D.V.M.).

<sup>4</sup> A certificate one has achieved after receiving a Master degree.

<sup>5</sup> A doctor's degree that is conferred upon completion of a program providing the knowledge and skills for the recognition, credential, or license required for professional practice. The degree is awarded after a period of study such that the total time to the degree, including both pre-professional and professional preparation, equals at least 6 full-time-equivalent academic years.

<sup>6</sup> For a listing of Northeast Ohio degree granting institutions included in this report and the number of STEM degrees awarded, see Appendix Table A.2. List of 2- and 4- Year Institutions and Number of STEM Degrees Awarded to Minorities in Northeast Ohio, 2009.

When comparing Northeast Ohio to the state of Ohio and the United States, it is important to take into consideration the minority share of the population aged 25-years and above that resides within each geographic area. In short, if a locality does not have a large minority population, then it cannot have a high participation rate. In order to evaluate this comparison, the STEM degree share of shares calculates STEM graduation rates in relation to the size of the minority population in a geographic region; if this measure equals one, the STEM graduation rate equals the relative size of the minority population in that geography. For African-Americans in Northeast Ohio, the share of shares was 0.44, indicating that a lower amount of African-Americans graduate with STEM degrees in proportion to their share in the Northeast Ohio population. This measure is less than the state of Ohio ratio (0.56) and the United States ratio (0.69). Hispanics in Northeast Ohio, on the other hand, reported a share of shares of 0.68, which is closer to 1.00, with Ohio reporting a larger share of shares (0.73) and the nation a lower value (0.48). As noted above, Asians had a high proportion of degrees awarded in STEM fields, and Asians across all regions reported a significant share of shares: 3.21 in Northeast Ohio, 2.32 in Ohio, and 1.84 in the United States. This indicates that Asians earn a greater share of STEM degrees than their proportion of the population over the age of 25.

These findings suggest that new policies are needed to incentivize higher participation of college-bound minorities in major STEM disciplines. The fact that African-Americans and Hispanics had lower percentages of degrees awarded in STEM disciplines than other racial and ethnic groups may reduce their probability of working and advancing in high-tech growth industries that are drivers of the regional economy. This could in turn lead to having fewer opportunities both to participate in regional economic growth and to accumulate personal wealth.



## ANALYSIS OF STEM DEGREES AWARDED

### OVERALL

#### STEM SHARE OF ALL DEGREES AWARDED BY RACIAL GROUP

Table 1. STEM Share of All Degrees Awarded By Racial Group, 2009

	Northeast Ohio (11-County)			Ohio			United States		
	Total degrees awarded	STEM degrees awarded	% of STEM degrees awarded	Total degrees awarded	STEM degrees awarded	% of STEM degrees awarded	Total degrees awarded	STEM degrees awarded	% of STEM degrees awarded
African-Americans	2,484	583	23.5%	8,545	2,095	24.5%	288,299	66,339	23.0%
Asians	878	458	52.2%	2,788	1,254	45.0%	186,020	70,866	38.1%
Hispanics	516	157	30.4%	2,086	527	25.3%	237,064	50,627	21.4%
Whites	22,335	7,319	32.8%	87,285	27,686	31.7%	1,962,690	540,433	27.5%
All Other Racial Groups	2,763	1,106	40.0%	11,367	4,227	37.2%	399,362	122,448	30.7%
<b>TOTAL</b>	<b>28,976</b>	<b>9,623</b>	<b>33.2%</b>	<b>112,071</b>	<b>35,789</b>	<b>31.9%</b>	<b>3,073,435</b>	<b>850,713</b>	<b>27.7%</b>

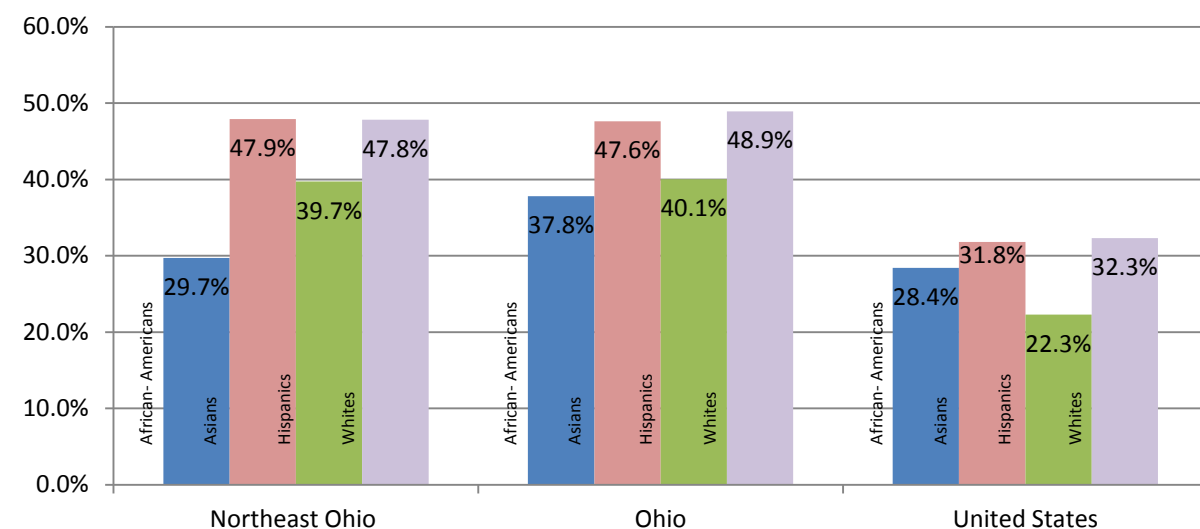
Source: National Science Foundation

- Examining the percentage of STEM degrees awarded out of the total amount of degrees awarded by each racial/ethnic category identifies that no matter the racial/ethnic category and geography more than 20% of students graduated with degrees in STEM (Table 1).
- In Northeast Ohio, STEM degrees accounted for similar shares for Hispanics (30.4%) and Whites (32.8%), while African-Americans reported a smaller share of STEM degrees (23.5%). Asians surpassed all other racial/ethnic categories with over half graduating with STEM degrees (52.2%).
- The Northeast Ohio share of STEM degrees for African-Americans (23.5%) was slightly lower than the state of Ohio (24.5%), but slightly higher than the United States (23.0%).
- The Hispanic share of STEM degrees in Northeast Ohio (30.4%) was higher than both the state of Ohio (25.3%) and the United States (21.4%).
- For all other racial groups,<sup>7</sup> the share of STEM degrees in Northeast Ohio (40.0%) was higher than both the state of Ohio (37.3%) and the United States (30.4%). Across all regions, this category earned a higher share than all other racial groups except Asians.

<sup>7</sup> All other racial groups include: American Indian or Alaska Native, Temporary residents, and Unknown Races & Ethnicities.

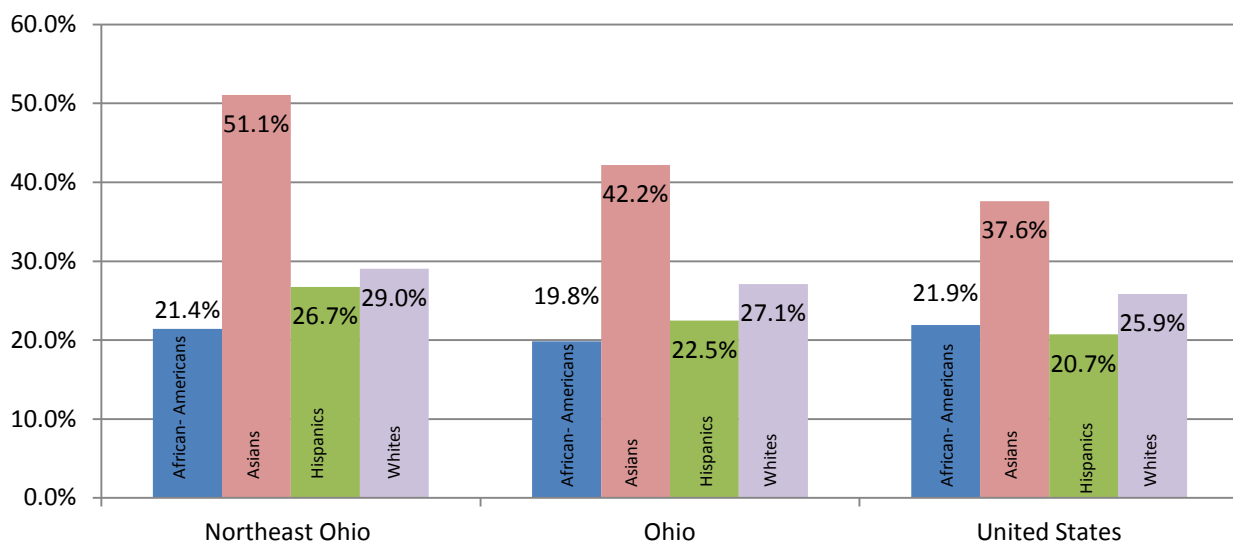
Figures 1-4 examine STEM participation rates by degree for each racial/ethnic group. For more information by degree type, see Appendix Table A. 3. STEM Percentage by Degree Type for Each Ethnic/Racial Group, 2009.

**Figure 1. STEM Percentage of Total Associate's Degrees Awarded By Racial Group, 2009**



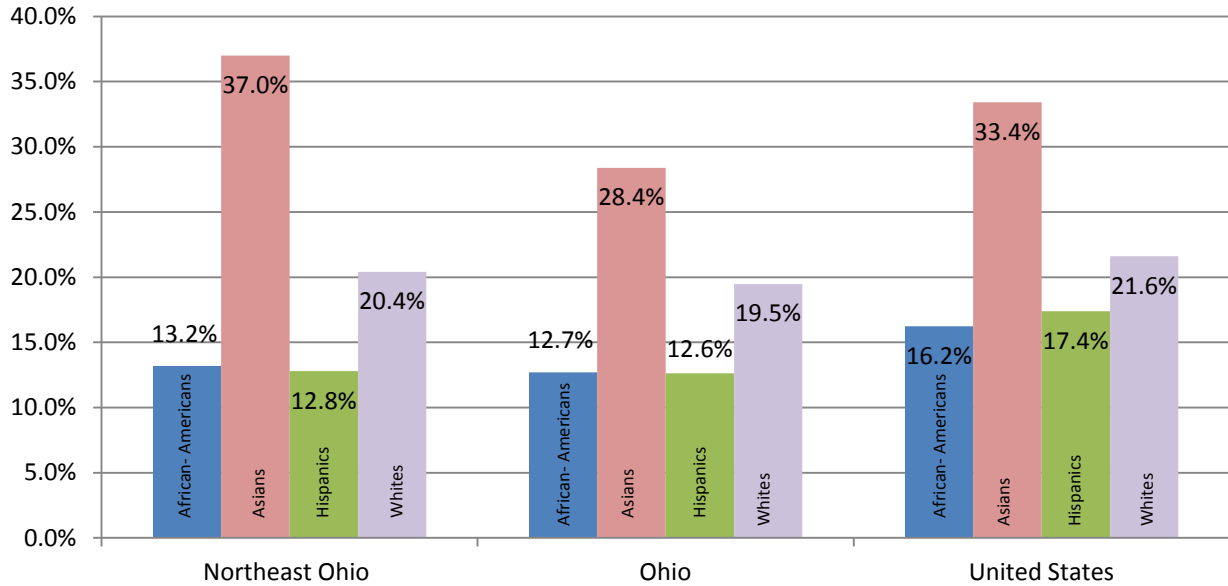
Source: National Science Foundation

**Figure 2. STEM Percentage of Total Bachelor's Degrees Awarded By Racial Group, 2009**



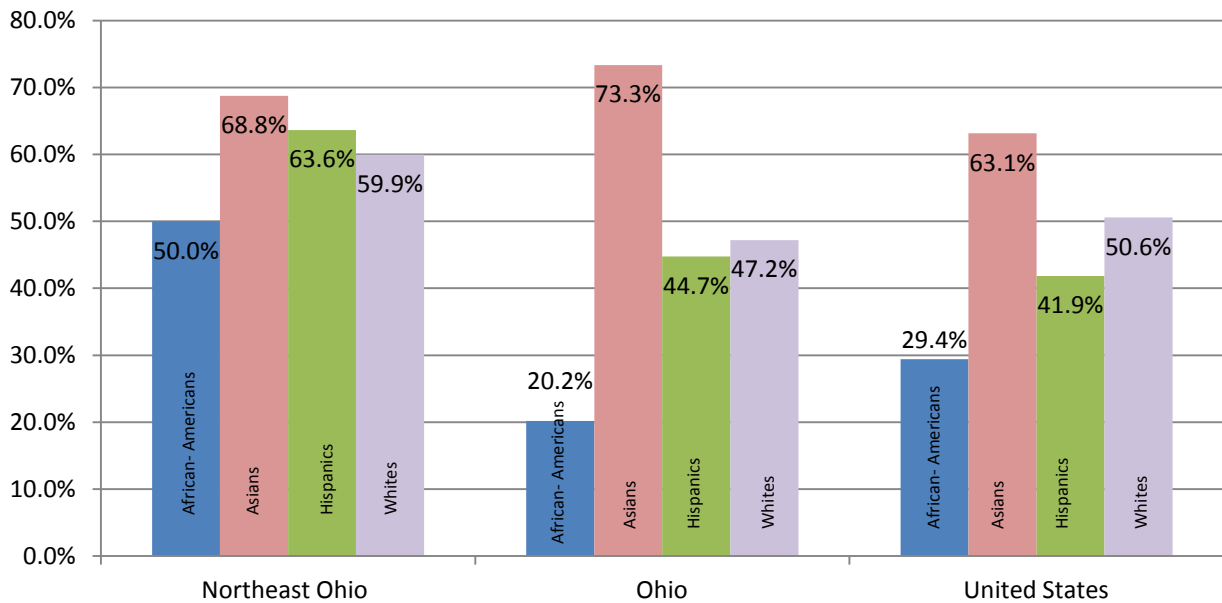
Source: National Science Foundation

**Figure 3. STEM Percentage of Total Master's Degrees Awarded By Racial Group, 2009**



Source: National Science Foundation

**Figure 4. STEM Percentage of Total Doctorate Degrees Awarded By Racial Group, 2009**



Source: National Science Foundation

Table 2 presents the share of shares of degrees awarded by racial/ethnic group in Northeast Ohio, the state of Ohio, and the United States. Share of shares compares the percent of degrees awarded by racial/ethnic group<sup>8</sup> to the percentage of that racial/ethnic group in the total population.<sup>9</sup> If the share of shares is equal to one, then the share of degrees awarded to a racial/ethnic group equals the proportion of that group in the respective population.

**Table 2. Share of STEM Degrees as a Share of Population Over 25 Years by Racial/Ethnic Group, 2009**

	Northeast Ohio (11- County)			Ohio			United States		
	Share of STEM Degrees	Share of Pop over 25 yrs	Share of Shares	Share of STEM Degrees	Share of Pop over 25 yrs	Share of Shares	Share of STEM Degrees	Share of Pop over 25 yrs	Share of Shares
Whites	75.73%	83.08%	<b>0.91</b>	77.36%	86.20%	<b>0.90</b>	63.53%	77.35%	<b>0.82</b>
African-Americans	6.03%	13.73%	<b>0.44</b>	5.85%	10.51%	<b>0.56</b>	7.80%	11.27%	<b>0.69</b>
Hispanics	1.62%	2.40%	<b>0.68</b>	1.47%	2.01%	<b>0.73</b>	5.95%	12.37%	<b>0.48</b>
Asians	4.74%	1.47%	<b>3.21</b>	3.50%	1.51%	<b>2.32</b>	8.33%	4.52%	<b>1.84</b>

Sources: American Community Survey, 2005-2009 Estimates; National Science Foundation

- For African-Americans in the Northeast Ohio region, the share of shares (the share of degrees earned in Northeast Ohio as a ratio of the share of the population over the age of 25) was 0.44. This was less than the ratios for the state of Ohio (0.56) and the United States (0.69).
- The share of shares for Hispanics in Northeast Ohio was 0.68. The corresponding share of shares was 0.73 in the state of Ohio and 0.48 in the United States.
- Whites in the Northeast Ohio region scored 0.91 for their share of shares. This was similar to the Ohio ratio of 0.91 and above the United States ratio of 0.82.
- Asians across all regions reported a significant share of shares: 3.21 in Northeast Ohio, 2.32 in the state of Ohio, and 1.84 in the United States. This indicates that Asians earned a greater share of STEM degrees in all regions when compared to their proportion of the respective populations over the age of 25.

<sup>8</sup> Source: National Science Foundation

<sup>9</sup> Source: American Community Survey, 2005-2009 Estimates

## AFRICAN-AMERICAN AND HISPANICS COMBINED

### *STEM DEGREES AWARDED TO MINORITIES AS A SHARE OF ALL STEM DEGREES*

- The total number of STEM degrees (associate to doctorate) awarded to African-Americans and Hispanics in Northeast Ohio (740) constituted 7.7% of all degrees awarded in STEM disciplines (9,623). This was similar to the ratio in Ohio (7.3%), but significantly lower than the ratio in the United States (13.8%) (Table 3).
- Of the 740 STEM degrees awarded to African-Americans and Hispanics in Northeast Ohio, the largest numbers were *Bachelor's Degrees* (310, 41.9%), closely followed by *Associate's Degrees* (303, 40.9%).
- The STEM *Associate's Degrees* awarded to African-Americans and Hispanics accounted for 10.1% of all STEM *Associate's Degrees* awarded to students of all races. The Northeast Ohio share was slightly higher than that of the state of Ohio (9.9%), but fell significantly below the share of African-Americans and Hispanics that earned STEM *Associate's Degrees* at the national level (19.1%).
- The share of minorities receiving STEM *Bachelor's Degrees* had a similar pattern to that of *Associate's Degrees*, although the gap between Northeast Ohio and the United States was smaller: 7.2% in Northeast Ohio, 6.8% in the state of Ohio, and 13.6% in the United States.
- For more information on STEM Degrees Awarded to Whites and Asians see:
  - Appendix Table A.4. Share of STEM Degrees Awarded to Whites of All Degrees Awarded to Whites, 2009.
  - Appendix Table A.5. Share of STEM Degrees Awarded to Asians of All Degrees Awarded to Asians, 2009.

Table 3. African-American and Hispanic Shares of STEM Degrees Awarded, 2009

	Northeast Ohio (11- County)			Ohio			United States		
Level of STEM Degrees	STEM Degrees for All Racial Groups	AA/Hispanic STEM Count	% of AA/Hispanic STEM Degrees Awarded	STEM Degrees for All Racial Groups	AA/Hispanic STEM Count	% of AA/Hispanic STEM Degrees Awarded	STEM Degrees for All Racial Groups	AA/Hispanic STEM Count	% of AA/Hispanic STEM Degrees Awarded
Associate's Degree	2,989	303	10.1%	11,112	1,105	9.9%	212,355	40,450	19.1%
Bachelor's Degree	4,326	310	7.2%	16,170	1,105	6.8%	404,036	54,786	13.6%
First Professional Degree	428	36	8.4%	996	66	6.6%	22,562	2,531	11.2%
Master's Degree	1,400	69	4.9%	5,139	238	4.6%	152,960	15,138	9.9%
Post-Master's Certificate	17	1	5.9%	51	4	7.8%	2,758	235	8.5%
Doctorate Degree	395	18	4.6%	1,265	41	3.2%	33,549	1,901	5.7%
Doctorate Degree-Professional Practice	68	3	4.4%	1,056	63	6.0%	22,493	1,925	8.6%
<b>TOTAL</b>	<b>9,623</b>	<b>740</b>	<b>7.7%</b>	<b>35,789</b>	<b>2,622</b>	<b>7.3%</b>	<b>850,713</b>	<b>116,966</b>	<b>13.8%</b>

Source: National Science Foundation

## AFRICAN-AMERICANS

### STEM DEGREES AWARDED TO AFRICAN-AMERICANS AS A SHARE OF ALL STEM DEGREES

- A total of 583 STEM degrees were awarded to African-Americans in the Northeast Ohio region in 2009. Of all the STEM degrees awarded to African-Americans, the majority was at the *Associate's* (241 degrees) and *Bachelor's* (244 degrees) levels (Table 4).
- Of the STEM *Associate's Degrees*, 87 were in *Life Sciences*, fifty (50) were awarded by Cuyahoga Community College and 11 by Lakeland Community College. In addition, 76 *Associate's Degrees* awarded to African Americans were earned in *Health Technologies*, of which more than one-third was awarded by Cuyahoga Community College (28).
- Of all STEM *Bachelor's Degrees*, 126 were in the field of *Life Sciences*. The universities awarding these degrees included The University of Akron (29), Ursuline College (28), Cleveland State University (24), Kent State University (16), and Youngstown State University (15).
- Of all STEM *Master's Degrees* in Northeast Ohio, 25 were awarded in *Life Science* disciplines.
- Although the share of African-Americans in Northeast Ohio was higher than in the United States, the share of STEM degrees awarded to African-Americans in NEO was lower than the share in the United States in all type of degrees, except *Post-Master's Certificates*. Why is that? It could be attributed to a different industry and occupation mix in NEO where African-Americans worked traditionally in jobs that did not required higher levels of education. The region needs new policies and strategies that would reverse this trend.

Table 4. African-American Share of STEM Degrees Awarded in Northeast Ohio, the State of Ohio, and the United States, 2009

	Northeast Ohio (11- County)			Ohio			United States		
Level of STEM Degrees	STEM Degrees for All Racial Groups	AA STEM Count	% of AA STEM Degrees Awarded	STEM Degrees for All Racial Groups	AA STEM Count	% of AA STEM Degrees Awarded	STEM Degrees for All Racial Groups	AA STEM Count	% of AA STEM Degrees Awarded
Associate's Degree	2,989	241	8.1%	11,112	948	8.5%	212,355	22,758	10.7%
Bachelor's Degree	4,326	244	5.6%	16,170	835	5.2%	404,036	30,612	7.6%
First Professional Degree	428	26	6.1%	996	50	5.0%	22,562	1,510	6.7%
Master's Degree	1,400	58	4.1%	5,139	190	3.7%	152,960	9,265	6.1%
Post-Master's Certificate	17	1	5.9%	51	4	7.8%	2,758	142	5.2%
Doctorate Degree	395	11	2.8%	1,265	24	1.9%	33,549	1,026	3.1%
Doctorate Degree-Professional Practice	68	2	2.9%	1,056	44	4.2%	22,493	1,026	4.6%
<b>Total Number of Degrees Awarded</b>	<b>9,623</b>	<b>583</b>	<b>6.1%</b>	<b>35,789</b>	<b>2,095</b>	<b>5.9%</b>	<b>850,713</b>	<b>66,339</b>	<b>7.8%</b>
<b>Share of Population 25-years and older <sup>A</sup></b>	<b>13.7%</b>			<b>10.5%</b>			<b>11.3%</b>		

Notes: <sup>A</sup> Share of population above 25-years-old for Northeast Ohio, Ohio, and the United States = Minority population over 25 years old / regional population over 25-years-old.

Sources: U.S. Census Bureau, 2004-2009 American Community Survey; National Science Foundation



### *STEM DEGREES AWARDED TO AFRICAN-AMERICANS AS A SHARE OF ALL DEGREES AWARDED TO AFRICAN-AMERICANS*

- Of a total 2,484 degrees awarded to African-Americans in Northeast Ohio, nearly one quarter (23.5%, 583) were degrees in STEM disciplines (Table 5).
- For African-Americans, Northeast Ohio had similar percentages of graduates with STEM degrees (as a percentage of total degrees awarded) compared to the state of Ohio (24.5%) and the United States (23.0%).
- In Northeast Ohio, of all *Associate's Degrees* awarded to African-Americans, STEM accounted for close to 30%, which fell below the Ohio rate of 37.8%. However, the Northeast Ohio share matched the United States rate of 28.4%.
- In the category of *Bachelor's Degrees*, Northeast Ohio (21.4%) had a rate higher than the state of Ohio (19.8%), but a slightly lower rate than the United States (21.9%).
- Fifty percent (50%; 11) of all *Doctorate Degrees* awarded to African-Americans in the NEO region were awarded in STEM. It is interesting to note that this accounted for nearly half of all STEM *Doctorate Degrees* awarded in the state of Ohio to African-Americans (24). Only 20.2% (24) of all *Doctorate Degrees* awarded in the state of Ohio were awarded in STEM, while the United States reported a higher percentage (29.4%).

Table 5. Share of STEM Degrees Awarded to African-Americans of All Degrees Awarded to African-Americans, 2009

	Northeast Ohio (11- County)			Ohio			United States		
Level of STEM Degrees	Degrees in All Disciplines Awarded to AA	STEM Degrees Awarded to AA	% of AA Degrees in STEM	Degrees in All Disciplines Awarded to AA	STEM Degrees Awarded to AA	% of AA Degrees in STEM	Degrees in All Disciplines Awarded to AA	STEM Degrees Awarded to AA	% of AA Degrees in STEM
Associate's Degree	811	241	29.7%	2,507	948	37.8%	80,076	22,758	28.4%
Bachelor's Degree	1,139	244	21.4%	4,208	835	19.8%	139,655	30,612	21.9%
First Professional Degree	62	26	41.9%	110	50	45.5%	3,471	1,510	43.5%
Master's Degree	440	58	13.2%	1,495	190	12.7%	57,042	9,265	16.2%
Post-Master's Certificate	8	1	12.5%	16	4	25.0%	2,226	142	6.4%
Doctorate Degree	22	11	50.0%	119	24	20.2%	3,489	1,026	29.4%
Doctorate Degree-Professional Practice	2	2	100.0%	90	44	48.9%	2,340	1,026	43.9%
Total Number of Degrees Awarded	2,484	583	23.5%	8,545	2,095	24.5%	288,299	66,339	23.0%

Source: National Science Foundation

## HISPANICS

### *STEM DEGREES AWARDED TO HISPANICS AS A SHARE OF ALL STEM DEGREES*

- A total of 157 STEM degrees were awarded to Hispanics in the Northeast Ohio region in 2009; *Associate's Degrees* constituted 39.5% (62) and *Bachelor's Degrees* accounted for 42.0% (66) (Table 6).
- It is interesting to note that almost one-half of STEM *Associate's Degrees* awarded to Hispanics in Northeast Ohio were awarded in *Life Sciences* (28). Of the *Life Sciences Associate's Degrees*, 12 were granted by Lorain County Community College and 10 by Cuyahoga Community College.
- Fifty percent (50%; 33) of STEM *Bachelor's Degrees* were in *Life Sciences* disciplines; nine were awarded by Cleveland State University, seven by Youngstown State University, six by Kent State University, and five by the University of Akron.
- In each type of degree, the share of Hispanics in both Northeast Ohio and state of Ohio was lower than the national share. This was expected given that the United States had much larger share of Hispanics (25-years or older) (12.4%) than Northeast Ohio (2.4%) and the state of Ohio (2.0%).

Table 6. Hispanics Share of STEM Degrees Awarded in Northeast Ohio, the State of Ohio, and the United States, 2009

	Northeast Ohio (11- County)			Ohio			United States		
Level of STEM Degrees	STEM Degrees for All Racial Groups	Hispanic STEM Count	% of Hispanic STEM Degrees Awarded	STEM Degrees for All Racial Groups	Hispanic STEM Count	% of Hispanic STEM Degrees Awarded	STEM Degrees for All Racial Groups	Hispanic STEM Count	% of Hispanic STEM Degrees Awarded
Associate's Degree	2,989	62	2.1%	11,112	157	1.4%	212,355	17,692	8.3%
Bachelor's Degree	4,326	66	1.5%	16,170	270	1.7%	404,036	24,174	6.0%
First Professional Degree	428	10	2.3%	996	16	1.6%	22,562	1,021	4.5%
Master's Degree	1,400	11	0.8%	5,139	48	0.9%	152,960	5,873	3.8%
Post-Master's Certificate	17	-	0.0%	51	-	0.0%	2,758	93	3.4%
Doctorate Degree	395	7	1.8%	1,265	17	1.3%	33,549	875	2.6%
Doctorate Degree- Professional Practice	68	1	1.5%	1,056	19	1.8%	22,493	899	4.0%
Total Number of Degrees Awarded	9,623	157	1.6%	35,789	527	1.5%	850,713	50,627	6.0%
Share of Population 25 years and older <sup>A</sup>	2.4%			2.0%			12.4%		

Notes: <sup>A</sup> Share of population above 25 years for North East Ohio, Ohio, and the United States = Minority population over 25 years/ regional population over 25 years.  
Sources: U.S. Census Bureau, 2004-2009 American Community Survey; National Science Foundation

*STEM DEGREES AWARDED TO HISPANICS AS A SHARE OF ALL DEGREES AWARDED TO HISPANICS*

- A total of 516 degrees were awarded to Hispanics in Northeast Ohio, one third of which (30.4%, 157) were in STEM disciplines (Table 7).
- For Hispanics, Northeast Ohio had higher percentages of graduates with STEM degrees (as a percentage of total degrees awarded) compared to the state of Ohio (25.3%) and the United States (21.4%).
- In Northeast Ohio, of all *Associate's Degrees* awarded, STEM accounted for close to 40%, which is higher than the percentage in the state of Ohio (37.8%) and much higher than nation (22.3%).
- In the category of *Bachelor's Degrees*, Northeast Ohio (26.7%) had a rate higher than the state of Ohio (22.5%) and the United States (20.7%).
- Northeast Ohio had higher percentages of Hispanic STEM *Doctoral Degree* graduates (63.6%) than the state of Ohio (44.7%) and the United States (41.9%).

Table 7. Share of STEM Degrees Awarded to Hispanics of All Degrees Awarded to Hispanics, 2009

	Northeast Ohio (11- County)			Ohio			United States		
Level of STEM Degrees	Degrees in All Disciplines Awarded to Hispanics	STEM Degrees Awarded to Hispanics	% of Hispanic Degrees in STEM	Degrees in All Disciplines Awarded to Hispanics	STEM Degrees Awarded to Hispanics	% of Hispanic Degrees in STEM	Degrees in All Disciplines Awarded to Hispanics	STEM Degrees Awarded to Hispanics	% of Hispanic Degrees in STEM
Associate Degree	156	62	39.7%	392	157	40.1%	79,369	17,692	22.3%
Bachelor's Degree	247	66	26.7%	1,201	270	22.5%	116,618	24,174	20.7%
First Professional Degree	15	10	66.7%	36	16	44.4%	2,516	1,021	40.6%
Master's Degree	86	11	12.8%	380	48	12.6%	33,799	5,873	17.4%
Post-Master's Certificate	-	-	0.0%	1	-	0.0%	570	93	16.3%
Doctorate Degree	11	7	63.6%	38	17	44.7%	2,091	875	41.9%
Doctorate Degree-Professional Practice	1	1	100.0%	38	19	50.0%	2,101	899	42.8%
Total Number of Degrees Awarded	516	157	30.4%	2,086	527	25.3%	237,064	50,627	21.4%

Source: National Science Foundation

## CHAPTER 2: MINORITY PARTICIPATION IN HIGH-TECH INDUSTRIES

This analysis examines the employment, occupations, and educational attainment of minority workers 16-years and older by place of work in the 12-county<sup>10</sup> Northeast Ohio region using data from the American Community Survey Public Use Microdata Sample (PUMS), 2010 1-year data set. In order to create a benchmarking system, we compared the Northeast Ohio region to the United States. For the purposes of this study, the term “minority” refers to African-Americans and Hispanics only. In this report, graphics and tables are displayed, followed by bullet points highlighting the observations of data collected and studied.

### MAJOR FINDINGS

Minority participation in Northeast Ohio and Ohio was statistically significantly lower than in the United States in both high-tech and non-high-tech growth cluster industries. Minority participation in high-tech growth clusters in Northeast Ohio (9.4%,  $\pm 1.9\%$  with a range from 7.5% to 11.3%) and the state of Ohio (7.5%,  $\pm 1.2\%$  with a range from 6.3% to 8.7%) had a statistically significant lower participation share than the United States (15.9%,  $\pm 0.3\%$ , with a range from 15.6% to 16.2%). Similarly, the United States (20.9%,  $\pm 0.4\%$ ) had a statistically significant higher share of minority participation in non-high-tech growth clusters than Northeast Ohio (10.5%,  $\pm 1.9\%$ ) and the state of Ohio (9.0%,  $\pm 1.4\%$ ).

Occupational analysis of minorities in Northeast Ohio indicated that minorities had a lower participation rate in math and science occupations. Minorities accounted for only 22.2% of all employees in these occupations while non-minorities accounted for 34.9%. Minorities had statistically significant lower participation rates than non-minorities in three occupational categories: Management; Computer and Mathematical; and Architecture and Engineering.

Examining educational attainment by racial category and industry category shows that minorities working in high-tech-related fields have a higher educational attainment than those working in non-high-tech fields. Of minorities working in high-tech growth clusters, 30.9% or 2,731 ( $\pm 1,657$ ) had bachelor’s degrees or higher, while only 4.0% or 487 ( $\pm 554$ ) of all minorities working in non-high-tech industries had at least a bachelor’s degree. This may suggest that minorities with bachelor’s degrees or higher tend to work more often in high-tech industries.

In comparison to the United States, the Northeast Ohio region also has significant ground to cover to increase minority participation rates in growth clusters, science and engineering occupations, and educational attainment in general and in STEM disciplines in particular. The leadership of the region has had the foresight to address these problematic trends by tasking regional economic development organizations with increasing minority participation in growth clusters. If successful, minorities would be better able to participate in and benefit from the future growth of the regional economy.

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<sup>10</sup> The Northeast Ohio region is defined for this study as the 12-county region that includes Ashtabula, Carroll, Cuyahoga, Geauga, Lake, Lorain, Mahoning, Medina, Portage, Stark, Summit, and Trumbull counties. These counties were selected because at least 5% of their residents are minorities. Other Northeast Ohio counties whose minority population accounted for less than 5% were excluded from this study. This study includes Carroll County because the PUMS data include Stark and Carroll counties as one unit.

## METHODOLOGY

For this analysis, data were gathered from the American Community Survey Public Use Microdata Sample (PUMS), 2010 1-year data set. All data points from the PUMS database are self-reported (including industry classification and racial and ethnic designation). It is also important to note that PUMS data provide estimates as a component of the American Community Survey. This report uses the PUMS data to analyze minority participation in technology-based growth industries. The PUMS counts differ significantly from other databases used specifically to collect administrative data on employment and wages (such as the Quarterly Census of Employment and Wages) because of the sample size and purpose of the database.

Since PUMS data are generated from a survey, margins of error (MOE) are provided to show the variability of the estimates. The MOE is used to estimate the range of possible values in which the estimate can lie, via low and high values (as marked as  $\pm$ ). In a hypothetical example, if the estimate is listed as 250 employees  $\pm 25$ , the actual value lies within a range of values from 225 (250-25) to 275 (225+25); this can be applied to percentages as well. On average, the MOE will be larger for smaller geographies than larger geographies; therefore, the MOE for Northeast Ohio will be larger than that of the United States. When examining minority participation rates across geographic regions, it is important to remember the margin of error rates. If the MOE rates do not overlap between different categories then the percentages are statistically different and the comparison is valid. (In this report, this occurrence can be seen in bar charts that feature error bars.)

The data for the examination of Minority Participation in Technology Based Growth Industries were derived from establishments classified at the 6-digit level by the North American Industry Classification System (NAICS). This represents the finest level of industry detail achievable in the NAICS database. The Center for Economic Development, in conjunction with NorTech and other Northeast Ohio economic development intermediaries, identified NAICS codes for the following clusters: (1) Bioscience; (2) Instruments, Control, and Electronics; (3) Power and Propulsion; (4) Advanced Materials; and (5) Advanced/Alternative Energy.

Following the identification of NAICS codes in these five clusters, it was determined that, due to disclosure limitations, reporting issues, and measurement error of databases used for this project, data for these clusters would be aggregated to a cluster-level designation of either selected high-tech,<sup>11</sup> selected non-high-tech,<sup>12</sup> and all other industries. The selected high-tech industries were chosen from the Northeast Ohio High-Technology Economy Report prepared for NorTech,<sup>13</sup> and the selected non-high-tech industries were the remainder of cluster industries not identified as high-tech industries in that report. All other industries include NAICS industries not designated as high-tech or non-high-tech industries.

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<sup>11</sup> For a listing of industries selected as high-tech, see Appendix A.6.

<sup>12</sup> For a listing of industries selected as non-high-tech, see Appendix A.7.

<sup>13</sup> Iryna Lendel, Ph.D. and Sunjoo Park, "Northeast Ohio High-Technology Economy Report" February 10, 2011



## ANALYSIS OF TECHNOLOGY-BASED GROWTH INDUSTRIES

### EMPLOYMENT ESTIMATES

**Table 8. Technology-Based Growth Industries: Employment Estimates for Selected High-Tech, Selected Non-High-Tech, and All Other Industries, 2010**

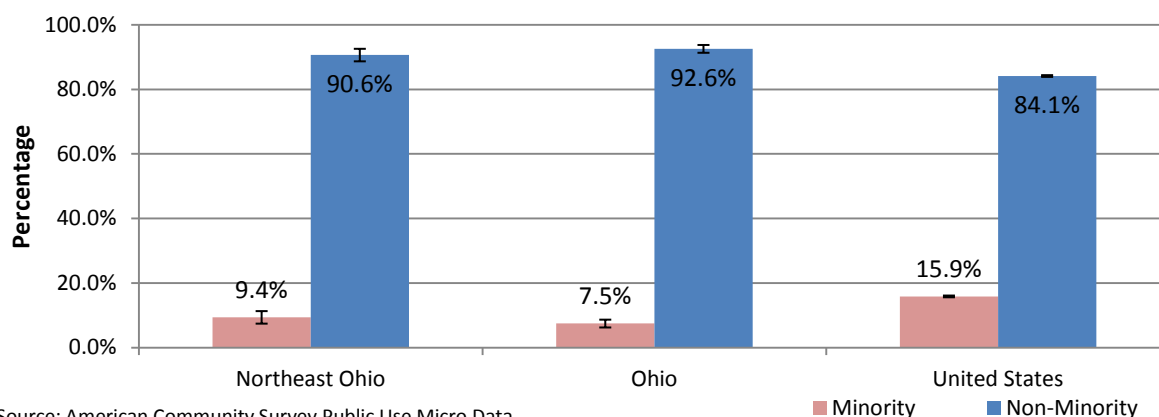
	Northeast Ohio				Ohio		United States	
	2010 Employment Count	2010 Estimate MOE	2010 Percent of Total	2010 Percent MOE	2010 Percent of Total	2010 Percent MOE	2010 Percent of Total	2010 Percent MOE
<b>High-Tech</b>								
<b>Minority</b>	8,833	2,066	9.4%	1.9%	7.5%	1.2%	15.9%	0.3%
<b>Non-Minority</b>	85,453	5,683	90.6%	1.9%	92.6%	1.2%	84.1%	0.3%
<b>Total</b>	94,286	-	100.0%	-	100.0%	-	100.0%	-
<b>Non-High-Tech</b>								
<b>Minority</b>	12,243	2,260	10.5%	1.9%	9.0%	1.4%	20.9%	0.4%
<b>Non-Minority</b>	104,497	6,283	89.5%	1.9%	91.0%	1.4%	79.1%	0.4%
<b>Total</b>	116,740	-	100.0%	-	100.0%	-	100.0%	-
<b>All Other Industries</b>								
<b>Minority</b>	237,764	7,496	16.1%	0.4%	11.9%	0.3%	26.6%	0.1%
<b>Non-Minority</b>	1,241,778	13,850	83.9%	0.4%	88.1%	0.3%	73.4%	0.1%
<b>Total</b>	1,479,542	-	100.0%	-	100.0%	-	100.0%	-

Note: Employment estimates are for workers 16-years and older.

Source: American Community Survey Public Use Microdata Sample

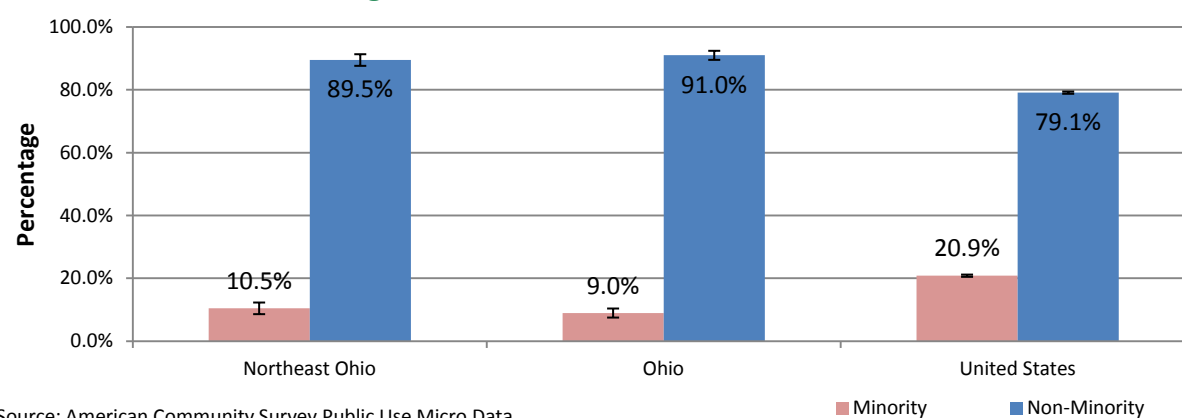
- In 2010, 94,286 workers were employed in high-tech industries in Northeast Ohio. Of those workers, 8,833 were minorities ( $\pm 2,066$ ). This suggests that minority employment in selected high-tech industries could be between 6,767 and 10,899. Minorities accounted for 9.37% ( $\pm 1.9\%$ , a range of 7.47% to 11.27%) of employees in high-tech growth industries (Table 8).
- In the non-high-tech industries, 116,740 workers were employed overall, of which 12,243 were minorities ( $\pm 2,260$ ). This suggests that minority employment in selected non-high-tech industries could range between 9,983 and 14,503, or 10.5% of all employees non-high-tech industries ( $\pm 1.9\%$ , a range of 8.6% to 12.4%).
- It is interesting to note that the minority participation rate was higher for all other industries (those not classified as high-tech or non-high-tech). Within this category, there are 237,764 minorities ( $\pm 7,496$ , a range of 230,268 to 245,260), which represented 16.1% ( $\pm 0.4\%$ , a range of 15.7% to 16.5%) of all minority employees.

**Figure 5. Percentage of Employment Estimates by Minority and Non-Minority Workers for Selected High-Tech Industries in NEO, Ohio, and the U.S., 2010**



- Northeast Ohio (9.4%,  $\pm 1.9\%$ )<sup>14</sup> and the state of Ohio (7.5%,  $\pm 1.2\%$ )<sup>15</sup> did not have statistically different shares of minority employment in the high-tech industries (Figure 5).
- The United States (15.9%,  $\pm 0.3\%$ , with a range from 15.6% to 16.2%) had a statistically significant share of minority participation in high-tech industries that was larger than Northeast Ohio and the state of Ohio.

**Figure 6. Percentage of Employment Estimates by Minority and Non-Minority Workers for Selected Non High-Tech Industries in NEO, Ohio, and the U.S., 2010**



- Northeast Ohio (10.5%,  $\pm 1.9\%$ )<sup>16</sup> and the state of Ohio (9.0%,  $\pm 1.4\%$ )<sup>17</sup> did not have statistically different shares of minority employment in the non-high-tech industries (Figure 6).
- The United States (20.9%,  $\pm 0.4\%$ ) had a statistically significant share of minority participation in non-high-tech industries that was larger than Northeast Ohio and the state of Ohio.

<sup>14</sup> This percentage can range from 7.5% to 11.3%.

<sup>15</sup> This percentage can range from 6.3% to 8.7%.

<sup>16</sup> This percentage can range from 8.6% to 12.4%.

<sup>17</sup> The actual percentage can range from 7.6% to 10.4%.

**Table 9. Northeast Ohio Employment by Class of Worker and Type of Industry, 2010**

	2010 Employment Count	2010 Estimate MOE	2010 Percent of Total	2010 Percent MOE
<b>High-Tech</b>				
<b>Minority</b>				
Self-employed	148	182	1.7%	2.0%
Works for wages	8,685	2,032	98.3%	2.0%
<b>Non-Minority</b>				
Self-employed	5,150	1,367	6.0%	1.5%
Works for wages	80,303	5,361	94.0%	1.5%
<b>Non-High-Tech</b>				
<b>Minority</b>				
Self-employed	93	155	0.8%	1.3%
Works for wages	12,150	2,271	99.2%	1.3%
<b>Non-Minority</b>				
Self-employed	3,321	897	3.2%	0.9%
Works for wages	101,176	6,378	96.8%	0.9%
<b>All Other Industries</b>				
<b>Minority</b>				
Self-employed	12,438	2,176	5.2%	0.9%
Works for wages	225,326	7,513	94.8%	0.9%
<b>Non-Minority</b>				
Self-employed	114,214	6,152	9.2%	0.5%
Works for wages	1,127,564	14,470	90.8%	0.5%

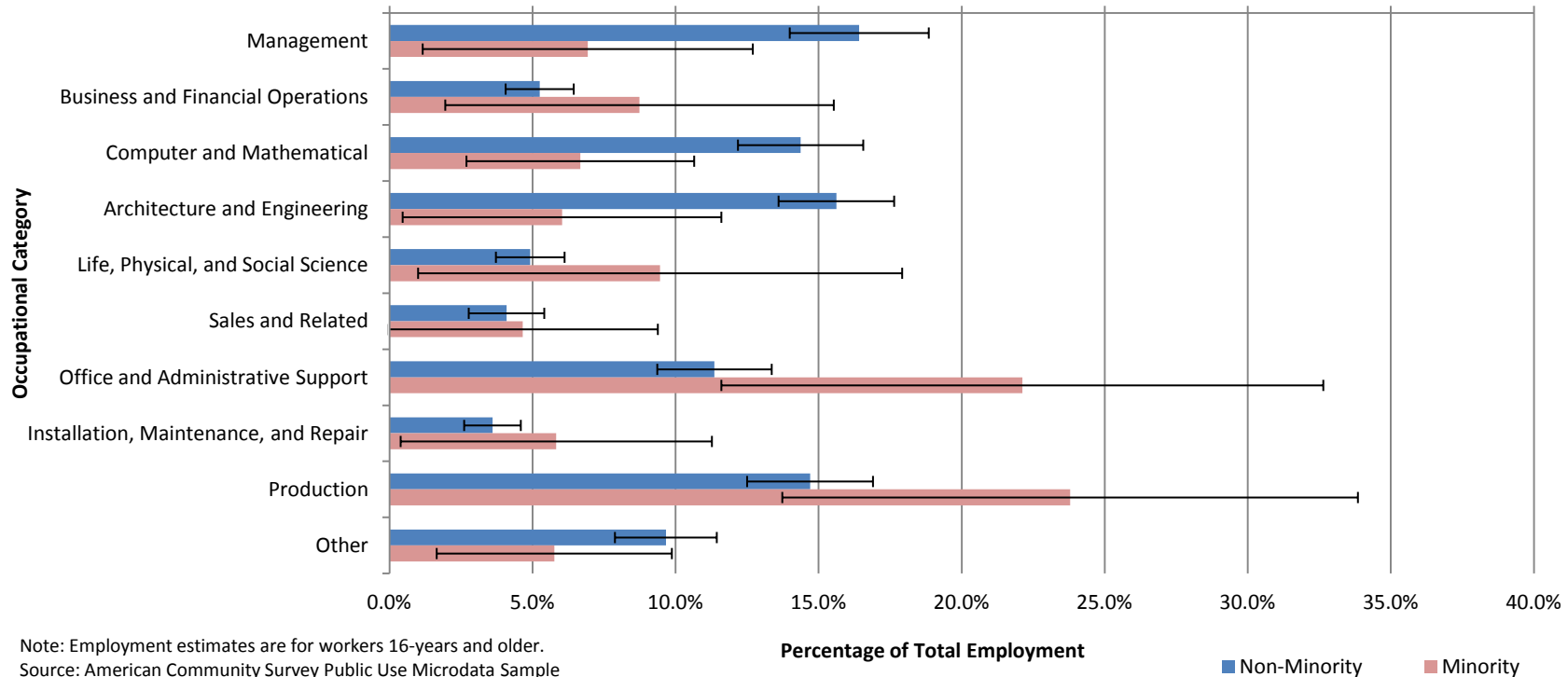
Note: Employment estimates are for workers 16-years and older.

Source: American Community Survey Public Use Microdata Sample

- Table 9 displays the class of worker (self-employed versus works for wages) for the Northeast Ohio region by industry type (high-tech, non-high-tech, and all other) and race (minority and non-minority).
- In the high-tech industries, self-employed minorities accounted for 1.7% ( $\pm 2.0\%$ ) of 8,833 minority workers. This was much lower than the percent of non-minorities who were self-employed 6.0% ( $\pm 1.5\%$ ).
- In the non-high-tech industries, only 0.8% ( $\pm 1.3$ ) of minorities were self-employed in comparison to 3.2% ( $\pm 0.9\%$ ) of non-minorities.
- In all three types of industries, the percent of minorities who were self-employed was smaller than the percent of non-minorities who were self-employed.

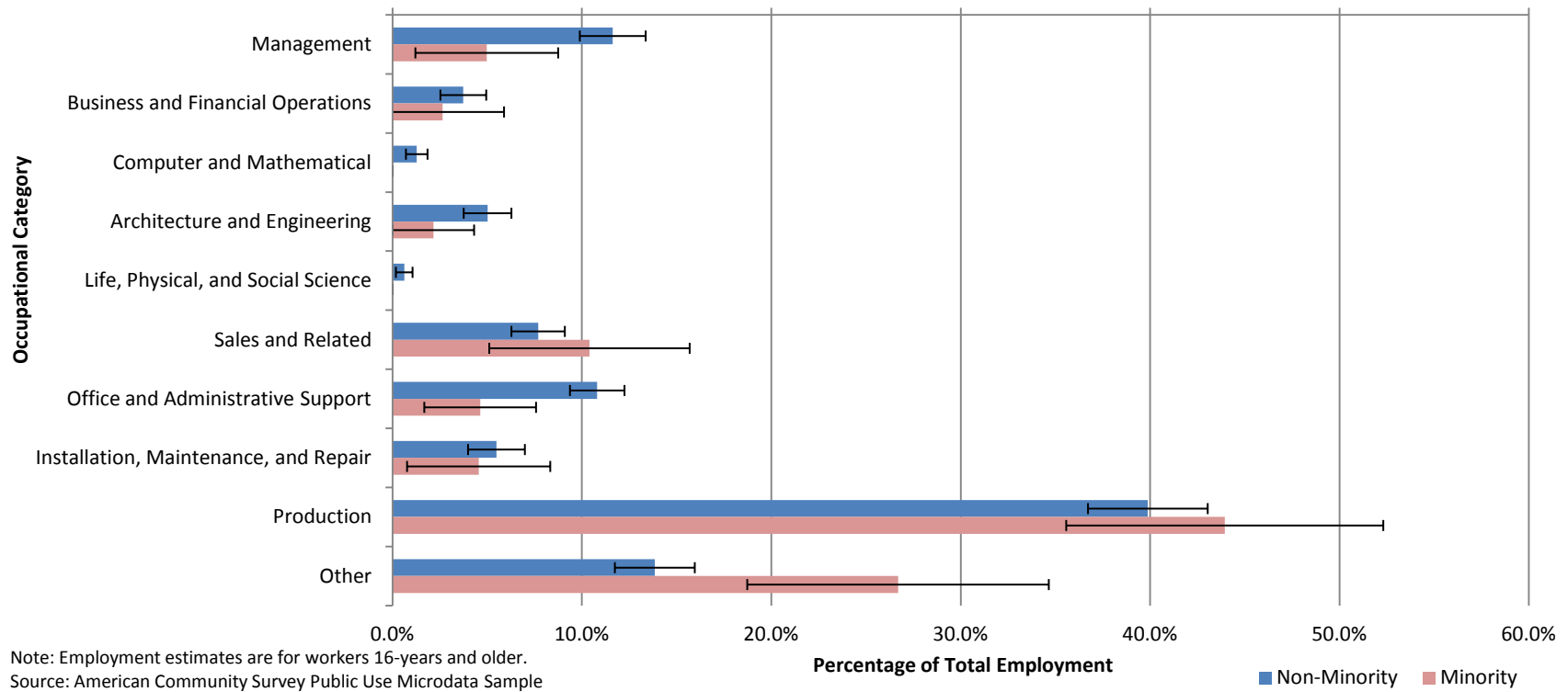
## OCCUPATION ESTIMATES

Figure 7. Major Occupations in the High-Tech Sector in Northeast Ohio for Minority and Non-Minority Groups, 2010



- Figure 7 displays the percentage of non-minority and minority workers by major occupations for high-tech industries in Northeast Ohio.
- Management occupations accounted for 16.4% ( $\pm 2.4\%$ ) of non-minority workers in Northeast Ohio's high-tech industries, but only 6.9% ( $\pm 5.8\%$ ) of minority workers (612,  $\pm 514$ ). This is a statistically significant difference.
- This lower participation percentage of minorities was similar for math and science occupations; minorities accounted for only 22.2% of all employees in these occupations while non-minorities accounted for 34.9% (not shown in Figure). In 2010, there were 1,958 ( $\pm 1,023$ ) minorities in math and science occupations in Northeast Ohio.
- Three occupational categories featured statistically significant differences between minority and non-minority shares of employment: Management; Computer and Mathematical; and Architecture and Engineering.

Figure 8. Major Occupations in the Non-High-Tech Sector in Northeast Ohio for Minority and Non-Minority Groups, 2010



- Figure 8 illustrates the percentage of major occupations in Northeast Ohio's non-high-tech industries for minority and non-minority employees.
- Only 5.0% ( $\pm 3.8\%$ ) of minorities were in management occupations in 2010. Further, only 2.2% of minorities ( $\pm 2.2\%$ ) were in math and science occupations. As was the case with the high-tech industries, non-minorities in non-high-tech industries had a higher percentage of employees in management occupations (11.6%,  $\pm 1.7\%$ ) as compared to minority workers.
- Two occupational categories had statistically significant differences between minority and non-minority percentages of participation: Management; and Office and Administrative Support.

## EDUCATIONAL ATTAINMENT ESTIMATES

Figure 9. Educational Attainment by Minority Status in the High-Tech Industries, 2010

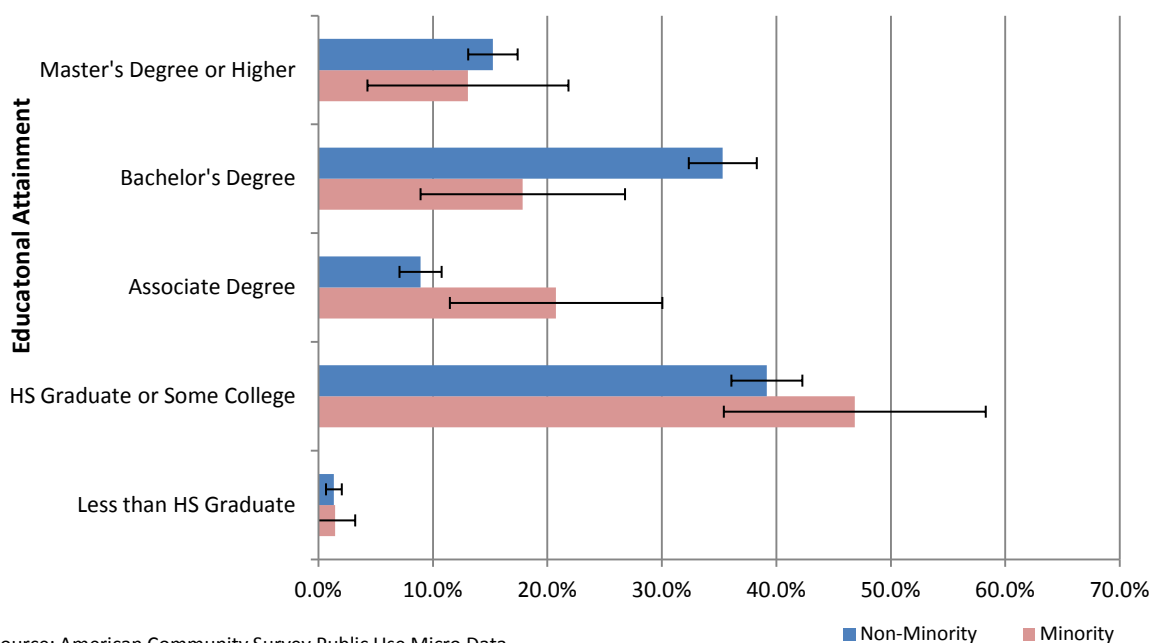
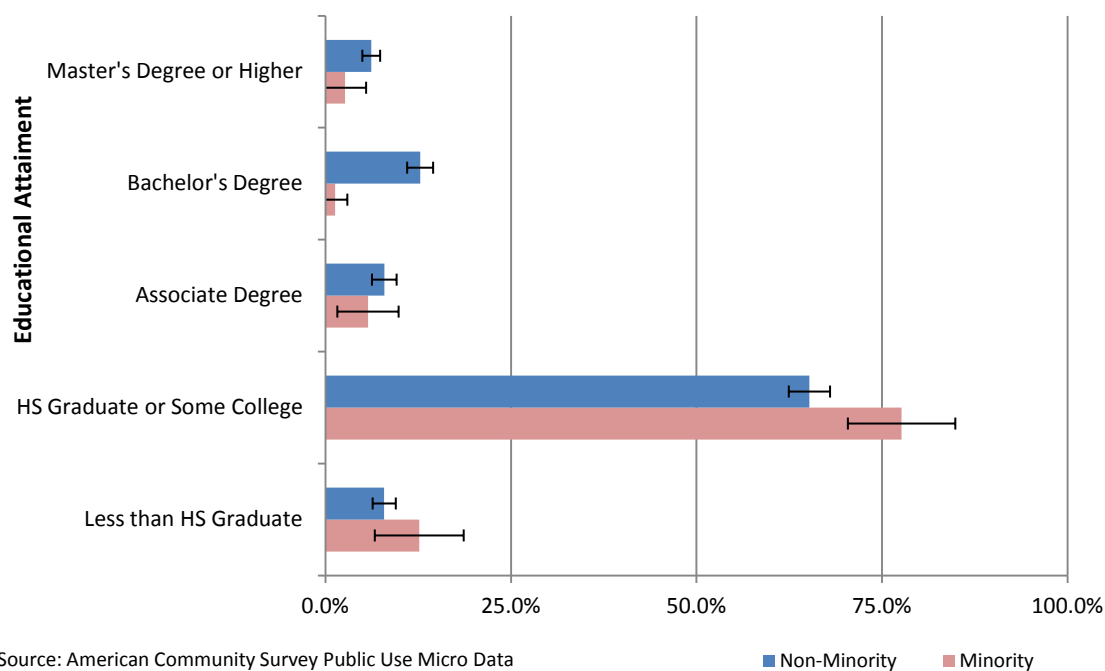


Figure 10. Educational Attainment by Minority Status in the Non-High-Tech Industries, 2010



- Educational attainment by minority status in high-tech industries revealed that a higher, statistically significant percentage of minorities had associate degrees (20.8%) in comparison to non-minorities (8.9%) (Figure 9).
- Educational attainment by minority status in non-high-tech industries revealed that, compared to non-minorities, a higher, statistically significant percentage of minorities graduated from high school or had some college, but had a lower percentage of bachelor's degree attainment (Figure 10).
- Of all minorities working in high-tech industries, 30.9% or 2,731 ( $\pm 1,657$ ) had bachelor's degrees or higher. Of all minorities working in non-high-tech industries, only 4.0% or 487 ( $\pm 554$ ) had at least a bachelor's degree. This may suggest that minorities with bachelor's degrees or higher tend to work more often in high-tech industries.
- For non-minorities employees, 50.6% or 43,201 ( $\pm 5,323$ ) of those working in high-tech industries had bachelor's degrees or higher, while only 18.9% or 19,783 ( $\pm 3,179$ ) of non-minorities working in non-high-tech industries had bachelor's degrees or higher.
- For more information on educational attainment in Northeast Ohio by minority status, see Appendix Table A. 8. Workforce Educational Attainment in Northeast Ohio by Minority Status, 2010.

## CHAPTER 3: MINORITY BUSINESS OWNERSHIP

This report was prepared for PolicyBridge and NorTech by the Center for Economic Development at the Levin College of Urban Affairs at Cleveland State University. The study analyzes minority participation in technology-based growth clusters using secondary data sources. Minority participation in technology-based growth clusters is an overall framework that can be divided into two components: high-tech industries and non-high-tech industries.<sup>18</sup> This study complements research conducted by PolicyBridge that is primarily based on interviews and focus groups; it assists these organizations in drafting policy recommendations on how to increase in the role of minorities in high-tech and non-high-tech industries.

This analysis uses several measures to estimate minority business ownership, including number of firms, employment, payroll, and business receipts for employers and non-employers in the 11-county<sup>19</sup> Northeast Ohio region. The analysis is based on data from the U.S. Census Bureau's Survey of Business Owners (SBO) dataset for 2007, which was purchased and tabulated especially for this study. In order to create a benchmarking system, we compared the Northeast Ohio region, the state of Ohio, and the United States. The SBO data is tabulated by firms in two classifications: employers and non-employers; employers are firms that employ others in their business activities while non-employers are mostly self-employed individuals operating unincorporated businesses.<sup>20</sup> For the purposes of this study, we only analyzed African-American and Hispanic business ownership; the term "minority" refers only to these two groups. In this report, graphics and tables are displayed, followed by bullet points highlighting the observations of data collected and studied.

### MAJOR FINDINGS

Overall, African-American and Hispanic employer ownership in technology-based growth industries accounted for a small percentage of total ownership of all races/ethnicities in these industries. In Northeast Ohio, African-American ownership accounted for 1.04% ( $\pm 0.49\%$ , with a range of 0.55% to 1.53%) of total ownership in technology-based growth industries, while the state of Ohio reported 0.96% ( $\pm 0.26\%$ , with a range of 0.70% to 1.22%) and the United States reported 1.15%. Due to the error rates on these measures, no statistical difference existed between Northeast Ohio, Ohio, and the United States for African-American ownership in technology-based growth industries.

The share of Hispanic business ownership in technology-based growth industries in the United States was much higher than the share in Northeast Ohio and Ohio. Hispanic business ownership in technology-based growth industries in Northeast Ohio accounted for 0.74% ( $\pm 0.46\%$ , with a range of 0.28% to 1.20%) of all technology-based industry employers in comparison to 0.60% ( $\pm 0.23\%$ , with a range of 0.37% to 0.83%) in the state of Ohio and 3.03% in the United States. Taking into consideration the error rates of Hispanic business ownership in technology-based growth industries, a statistically lower share of Hispanic business ownership exists in Northeast Ohio and Ohio in comparison to the United States.

<sup>18</sup> For more information on high-tech and non-high-tech operational definition, see the Methodology section of this report.

<sup>19</sup> The Northeast Ohio region is defined for this study as the 11-county region that includes Ashtabula, Cuyahoga, Geauga, Lake, Lorain, Mahoning, Medina, Portage, Stark, Summit, and Trumbull counties. These counties were selected because at least 5% of their residents are minorities. Other Northeast Ohio counties whose minority population accounted for less than 5% were excluded from this study.

<sup>20</sup> For more information on non-employers, see <http://www.census.gov/econ/nonemployer/>



Examining minority ownership in the **high-tech industries'** component of technology-based growth industries revealed interesting details about this sphere in Northeast Ohio. In regards to African-American-owned businesses in high-tech industries, Northeast Ohio (0.8%,  $\pm 0.4\%$ , with a range from 0.4% to 1.2%), the state of Ohio (1.1%,  $\pm 0.4\%$ , with a range from 0.7% and 1.5%), and the United States (1.5%) did not have statistically different shares. Alternatively, Hispanic employers in the high-tech sector showed that both Northeast Ohio (1.4%,  $\pm 1.1\%$ , with a range from 0.3% and 2.5%) and the state of Ohio (1.1%,  $\pm 0.6\%$ , with a range from 0.5% and 1.7%) had statistically lower shares of ownership than the United States (3.1%).

When comparing Northeast Ohio to the state of Ohio and the United States, it is important to take into consideration the minority share of the population aged 18-years and above that resides within each geographic area. In short, if a locality does not have a large minority population, then it cannot have a high participation rate in business ownership. In order to evaluate this comparison, the employer ownership share of shares calculates minority employer ownership rates in relation to the size of the minority population in a geographic region. If this measure equals one, the minority employer ownership rate equals the relative size of the minority population in that geography. For **high-tech employers**, African-Americans in Northeast Ohio reported a share of shares of 0.06 ( $\pm 0.03$ , with a range from 0.03 to 0.09), which indicates a very low number of African-American business owners in high-tech industries in proportion to their share of the Northeast Ohio population. For Hispanics in Northeast Ohio, the share of shares was 0.56 ( $\pm 0.44$ , with a range from 0.12 to 1.00). The state of Ohio reported a higher share of shares for both demographic groups (Hispanics - 0.50,  $\pm 0.27$ , with a range from 0.23 to 0.77; African-Americans - 0.10  $\pm 0.04$ , with a range from 0.06 to 0.14) as did the United States (Hispanics – 0.24; African-Americans – 0.13). Data for **non-high-tech employers** in Northeast Ohio were suppressed so analysis was not possible, but Hispanics in the state of Ohio reported a share of shares of 0.14 ( $\pm 0.07$ , with a range from 0.07 to 0.21) while African-Americans reported 0.08 ( $\pm 0.04$ , with a range from 0.04 to 0.12). The United States reported 0.22 for Hispanics and 0.14 for African-Americans in non-high-tech industries, which suggests slightly higher national shares of shares in comparison to Ohio.

In general, African-American and Hispanic employer ownership in technology-based growth industries was a small piece of ownership by all races/ethnicities in technology based-growth industries. It is important, however, to foster and grow these sectors, as they are economic drivers of the regional economy. Data show that African-Americans and Hispanics in Northeast Ohio are fairly well represented as non-employer owners in technology-based growth industries, but these businesses do not facilitate job growth because they do not have employees. These findings suggest that new policies are needed to train and incentivize African-Americans and Hispanics to open businesses in these industries that employ others. Such businesses can help to foster economic development, growth, and prosperity in Northeast Ohio.

## METHODOLOGY

For this analysis, data were gathered from the U.S. Census Bureau's Survey of Business Owners (SBO) dataset for 2007. As the data necessary for this report are not publicly available, special tabulations were ordered from the U.S. Census Bureau for the 11-County Northeast Ohio region for all industries as well as selected high-tech and non-high-tech industries. All data points from the SBO database are self-reported (including industry classification and racial and ethnic designation). This report uses the SBO data to analyze minority participation in business ownership in technology-based growth industries.

It is important to note that the U.S. Census Bureau has different designations for racial and ethnic groups. Each individual counted by the U.S. Census Bureau receives a mark under a racial designation and a mark under ethnic designation, meaning an individual can have both a race and an ethnicity. Under these guidelines, classification as an African-American is considered a racial group while classification as a Hispanic is considered an ethnic group. Double counting may be prevalent in this data for individuals who self-identified as both African-American and Hispanic.<sup>21</sup>

Since SBO data are generated from a survey, error rates are provided to show the variability of the estimates. The error rates are used to estimate the range of possible values in which an estimate can lie, via low and high values (as marked as  $\pm$ ). In a hypothetical example, if the estimate is listed as 250 employees  $\pm 25$ , the actual value lies within a range of values from 225 (250-25) to 275 (250+25). This can be applied to percentages as well. On average, the error rates will be larger for smaller geographies than larger geographies; therefore, the error rates for Northeast Ohio will be larger than those of the state of Ohio. Error rates were not calculated for the United States since the sample size for the SBO is largest for the United States. When examining minority participation rates across geographic regions, it is important to remember the error rates. If the error rates do not overlap between different categories then the percentages are statistically different and the comparison is valid. In the report, this occurrence can be seen in bar charts that feature error bars.

In addition, since the U.S. Census Bureau maintains confidentiality of SBO respondents, at times data will not be given, but rather marked with an "S". This "S" denotes that suppression has occurred, and that the U.S. Census Bureau did not release that piece of data because of confidentiality restrictions.

The data for the examination of minority participation in technology-based growth clusters were derived from establishments classified at the 6-digit level by the North American Industry Classification System (NAICS). This represents the finest level of industry detail achievable in the NAICS database. The Center for Economic Development, in conjunction with NorTech and other Northeast Ohio economic development intermediaries, identified NAICS codes for the following clusters: (1) Bioscience; (2) Instruments, Control, and Electronics; (3) Power and Propulsion; (4) Advanced Materials; and (5) Advanced/Alternative Energy.

Following the identification of NAICS codes in these five clusters, it was determined that, due to disclosure limitations, reporting issues, and measurement error of databases used for this project, data for these clusters would be aggregated to a cluster-level designation of either selected high-tech,<sup>22</sup>

<sup>21</sup> For more information, see <http://www.census.gov/econ/sbo/faq.html>

<sup>22</sup> For a listing of industries selected as high-tech, see Appendix A.6.

selected non-high-tech,<sup>23</sup> or all industries. The selected high-tech industries were chosen from the Northeast Ohio High-Technology Economy Report prepared for NorTech,<sup>24</sup> and the selected non-high-tech industries were the remainder of cluster industries not identified as high-tech industries in that report. The all industries classification designates the total from all industries within the NAICS system.

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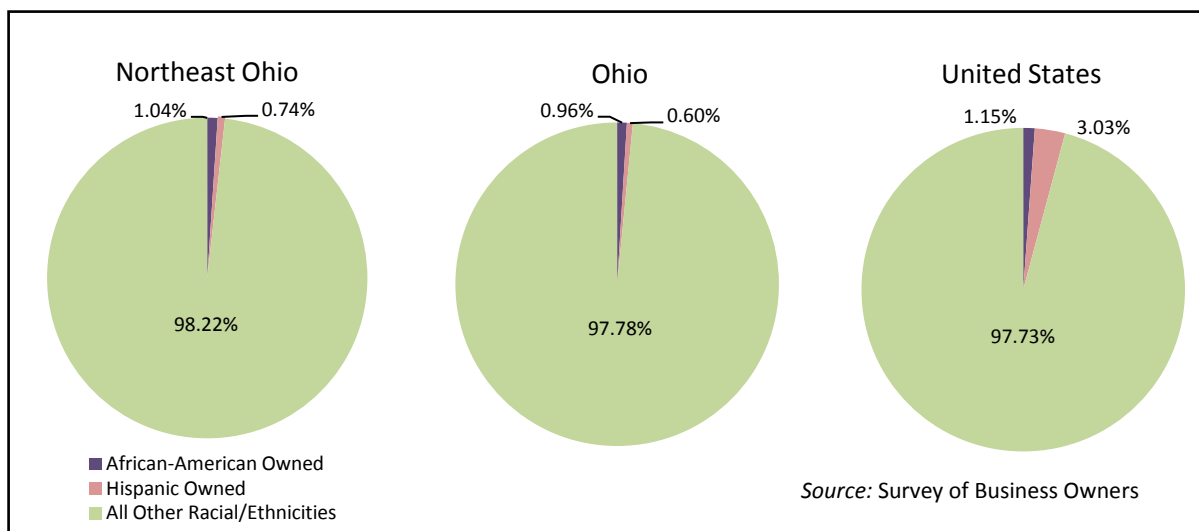
<sup>23</sup> For a listing of industries selected as non-high-tech, see Appendix A.7.

<sup>24</sup> Iryna Lendel, Ph.D. and Sunjoo Park, "Northeast Ohio High-Technology Economy Report" February 10, 2011

## ANALYSIS OF MINORITY BUSINESS OWNERSHIP

### EMPLOYERS

**Figure 11. Employer Ownership by Race/Ethnicity of Technology-Based Growth Industries, 2007**



- Figure 11 examines African-American and Hispanic ownership as a percentage of all firms, regardless of minority or ethnic status in technology-based growth industries.<sup>25</sup> This figure does not take into consideration error rates.
- The figure above paints a salient picture that, overall, African-American and Hispanic business ownership in technology-based growth industries, regardless of geography, is a very small percentage of overall employer ownership rates in these industries.
- In Northeast Ohio, African-American ownership accounted for 1.04% ( $\pm 0.49\%$ , with a range of 0.55% to 1.53%) of all ownership in technology-based growth industries. African-Americans accounted for 0.96% ( $\pm 0.26\%$ , with a range of 0.70% to 1.22%) of all ownership in technology-based growth industries in the state of Ohio and 1.15% in the United States.
- Hispanic business ownership accounted for 0.74% ( $\pm 0.46\%$ , with a range of 0.28% to 1.20%) of total ownership in these industries in Northeast Ohio, 0.60% ( $\pm 0.23\%$ , with a range of 0.37% to 0.83%) in the state of Ohio, and 3.03% in the United States.

<sup>25</sup> The summation of high-tech and non-high-tech industries.

**Table 10. Minority Employers in Northeast Ohio, 2007**

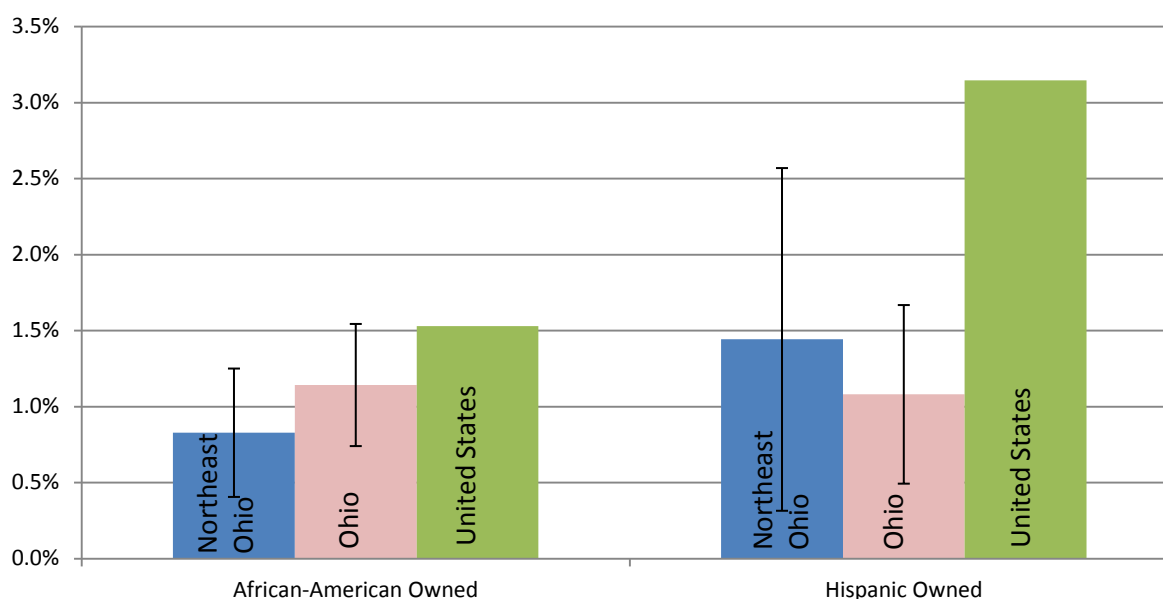
Northeast Ohio Employers (11-County)								
Firms			Receipts (\$Thousands)		Employment		Payroll (\$Thousands)	
Count	Error ±		Count	Error ±	Count	Error ±	Count	Error ±
High-Tech								
African-American Owned	27	14	\$30,159	\$9,168	186	65	\$11,978	2,875
Hispanic Owned	47	37	\$33,847	\$10,289	99	65	\$7,001	6,833
All Firms	3,258	313	\$6,004,819	\$1,056,848	33,181	3,716	\$1,733,692	194,174
Non-High-Tech								
African-American Owned	S	S	S	S	S	S	S	S
Hispanic Owned	S	S	S	S	S	S	S	S
All Firms	4,744	531	\$19,232,878	\$1,846,356	83,307	10,663	\$3,269,479	\$470,805
All Industries								
African-American Owned	1,140	128	\$1,440,214	\$253,478	13,825	2,654	\$313,881	\$55,243
Hispanic Owned	472	53	\$889,635	\$113,873	4,240	407	\$148,705	\$21,414
All Firms	64,101	1,026	\$123,891,954	\$5,946,814	776,821	37,287	\$24,565,087	\$786,083

Note: S denotes a suppression.

Source: U.S. Census Bureau, Survey of Business Owners

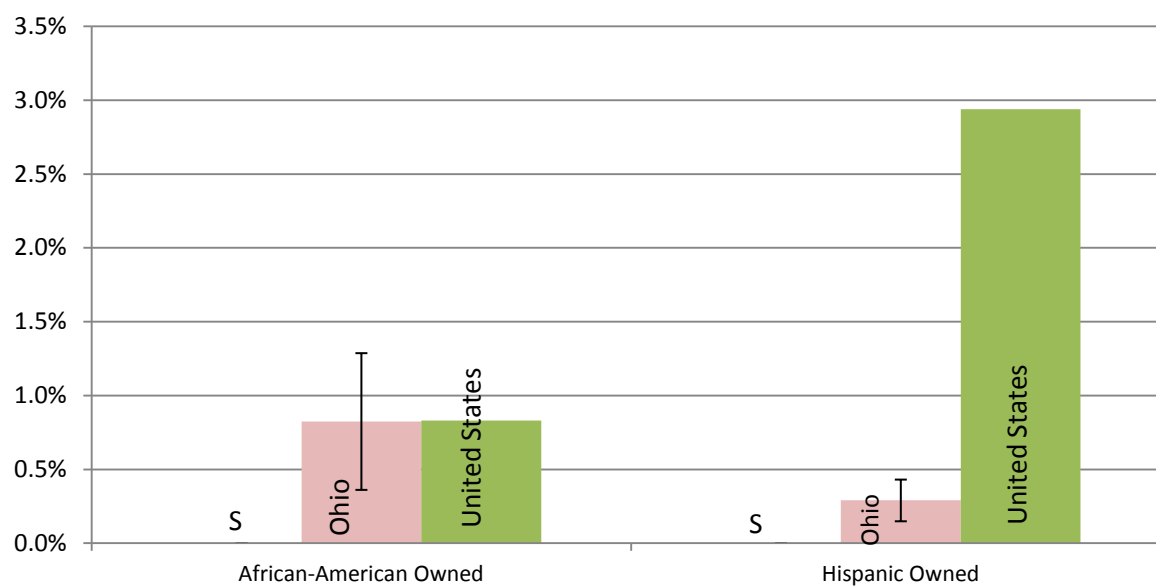
- In 2007, 27 high-tech firms ( $\pm 14$ ) in Northeast Ohio were owned by African-Americans (Table 10). This statistic suggests that the actual number of selected high-tech firms owned by African-Americans in Northeast Ohio could be between 13 and 41. Total employment for African-American-owned firms was 186 ( $\pm 65$ ), signifying total employment could range from 121 employees to 251 employees.
- It was reported that 47 ( $\pm 37$ ) Hispanic-owned high-tech firms existed in Northeast Ohio, which indicates that the actual count could range from 10 to 84. Total employment of Hispanic-owned high-tech firms was 99 ( $\pm 65$ ) in 2007, a ranging of 34 to 164.
- African-American and Hispanic counts for non-high-tech industries were suppressed by the U.S. Census Bureau for unknown confidentiality reasons. These data are marked in Table 10 with an “S”.
- It is interesting to note that minority participation was higher for all industries. Within this category, there are 1,140 African-American firms ( $\pm 128$ , a range of 1,012 to 1,268) and 472 Hispanic firms ( $\pm 53$ , a range of 419 to 525).
- For more information on minority employers in Ohio and the United States, see:
  - Appendix Table A.9. Minority Employers in the state of Ohio for High-Tech, Non-High-Tech and All Industries, 2007
  - Appendix Table A.10. Minority Employers in the United States for High-Tech, Non-High-Tech and All Industries, 2007

**Figure 12. Percentage of Employer Firms by African-American and Hispanic Owners for Selected High-Tech Industries in NEO, Ohio, and the U.S., 2007**



Source: U.S. Census Bureau, Survey of Business Owners

**Figure 13. Percentage of Employer Firms by African-American and Hispanic Owners for Selected Non-High-Tech Industries in NEO, Ohio, and the U.S., 2007**



Note: S denotes a suppression

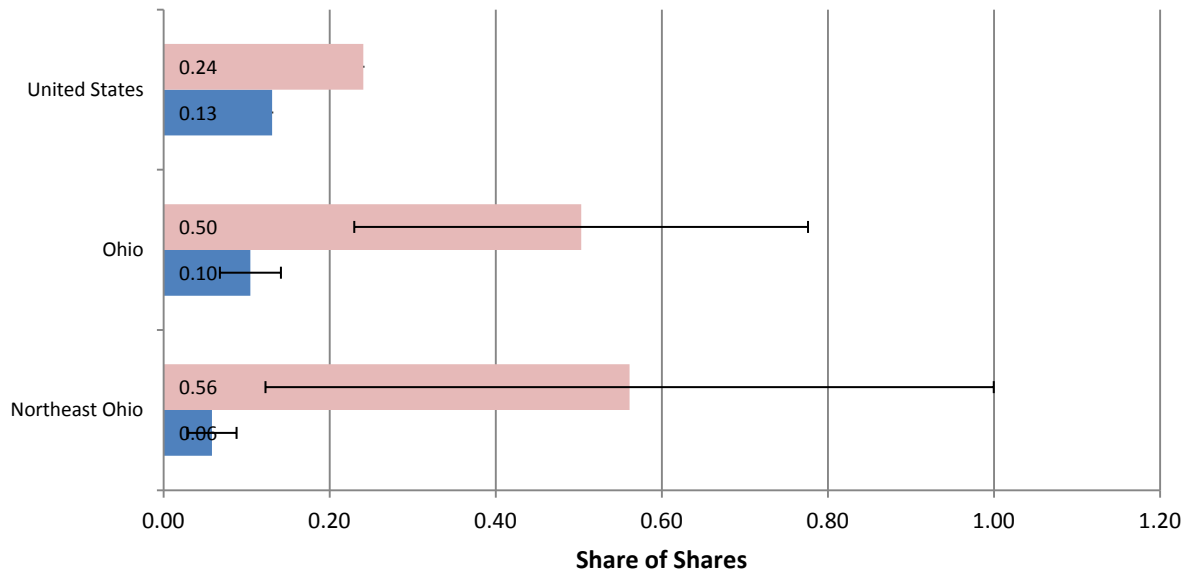
Source: U.S. Census Bureau, Survey of Business Owners

- Figures 12 and 13 examine the percentage of African-American- and Hispanic-owned employer, high-tech firms in Northeast Ohio, Ohio, and the United States.

- Northeast Ohio and Ohio do not have statistically different percentages of African-American-owned businesses in high-tech industries (Figure 12). The share in Northeast Ohio ranges from 0.4% to 1.2% (share of 0.8%) and overlaps with Ohio's share that ranges from 0.7% and 1.5% (value of 1.1%). However, the share in the nation (1.5%) is statistically higher than that in Northeast Ohio.
- Northeast Ohio (1.4%,  $\pm 1.1\%$ , with a range from 0.3% to 2.5%) did not have a statistically different share of the percentage of Hispanic-owned businesses in high-tech industries when compared to the state of Ohio (1.1%,  $\pm 0.6\%$ , with a range from 0.5% and 1.7%). However, both Northeast Ohio and the state of Ohio were statistically lower than the United States (3.1%) (Figure 12).
- For non-high-tech industries, Northeast Ohio data were suppressed and could not be evaluated (Figure 13). These data were marked with an "S".
- The state of Ohio (0.8%,  $\pm 0.5\%$ , with a range from 0.3% and 1.3%) and the United States (0.8%) did not have statistically different shares of the percentage of African-American-owned businesses in non-high-tech industries (Figure 13).
- In regards to Hispanic-owned businesses, the state of Ohio (0.3%,  $\pm 0.1\%$ , with a range from 0.2% and 0.4%) had a statistically lower percentage of Hispanic-owned businesses in non-high-tech industries when compared to the United States (2.9%) (Figure 13).



**Figure 14. Share of Shares of Employer Firms by African-American and Hispanic Owners for Selected High-Tech Industries in NEO, Ohio, and the U.S., 2007**

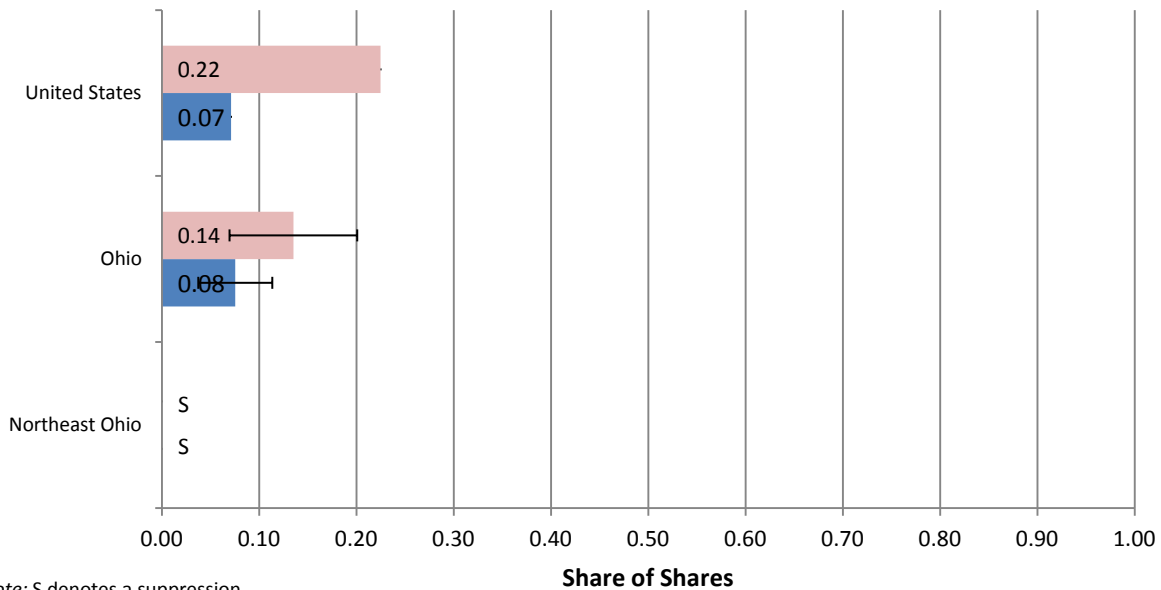


Source: U.S. Census Bureau, Survey of Business Owners

Hispanic Owned

African-American Owned

**Figure 15. Share of Shares of Employer Firms by African-American and Hispanic Owners for Selected Non-High-Tech Industries in NEO, Ohio, and the U.S., 2007**



Note: S denotes a suppression

Source: U.S. Census Bureau, Survey of Business Owners

Hispanic Owned

African-American Owned

- Figures 14 and 15 present minority employer ownership as a percentage of the population by racial/ethnic group in Northeast Ohio, the state of Ohio, and the United States. The share of shares compares the percent of minority employer ownership by racial/ethnic group<sup>26</sup> to the percentage of that racial/ethnic group in the total population over the age of 18.<sup>27</sup> If the share of shares equals one, then the share of minority employer ownership in a racial/ethnic group is equal to the proportion of that group in the respective population.
- The share of shares for Hispanic employer, high-tech firms was statistically larger than that of African-American employer, high-tech firms in all three geographies. Examining the share of shares for Hispanics, however, shows that significant error rates are associated with these shares and should be taken into consideration when evaluating these estimates.
  - For high-tech employers, Hispanics in Northeast Ohio reported a share of shares of 0.56 ( $\pm 0.44$ , with a range from 0.12 to 1.00) while African-Americans reported 0.06 ( $\pm 0.03$ , with a range from 0.03 to 0.09) (Figure 14).
  - In the state of Ohio, the share of shares for Hispanics was 0.50 ( $\pm 0.27$ , with a range from 0.23 to 0.77) while the share was 0.10 for African-Americans ( $\pm 0.04$ , with a range from 0.06 to 0.14).
- No statistical difference existed among Hispanic and African-American high-tech, employer firms across the three geographies (Northeast Ohio, the state of Ohio, and the United States) (Figure 14).
- Since data for non-high-tech industries in Northeast Ohio were suppressed, it was not possible to calculate a share of shares ratio for this geography. Therefore, these data were marked with an “S” in Figure 15.
- Hispanics in the state of Ohio reported a slightly lower statistical share of shares for non-high-tech industries than in the United States. In Northeast Ohio, Hispanics had a share of shares of 0.14 ( $\pm 0.07$ , with a range from 0.07 to 0.21), compared to 0.22 in the United States.
- No statistical difference exists between Ohio and the share of shares in the United States for African-Americans ownership in non-high-tech industries. Ohio reported a share of shares of 0.08 ( $\pm 0.04$ , with a range from 0.04 to 0.12), compared to 0.07 in the U.S. (Figure 15).

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<sup>26</sup> Source: Survey of Business Owners

<sup>27</sup> Source: American Community Survey, 5 year annual estimates, 2005-2009

## NON-EMPLOYERS

Non-employers are mostly self-employed individuals without employees in their business venture. It is not known if these individuals are full- or part-time workers, only that they have non-employer status. This tabulation was created specially by the U.S. Census Bureau for this report.

**Table 11. Minority Non-Employers in Northeast Ohio, 2007**

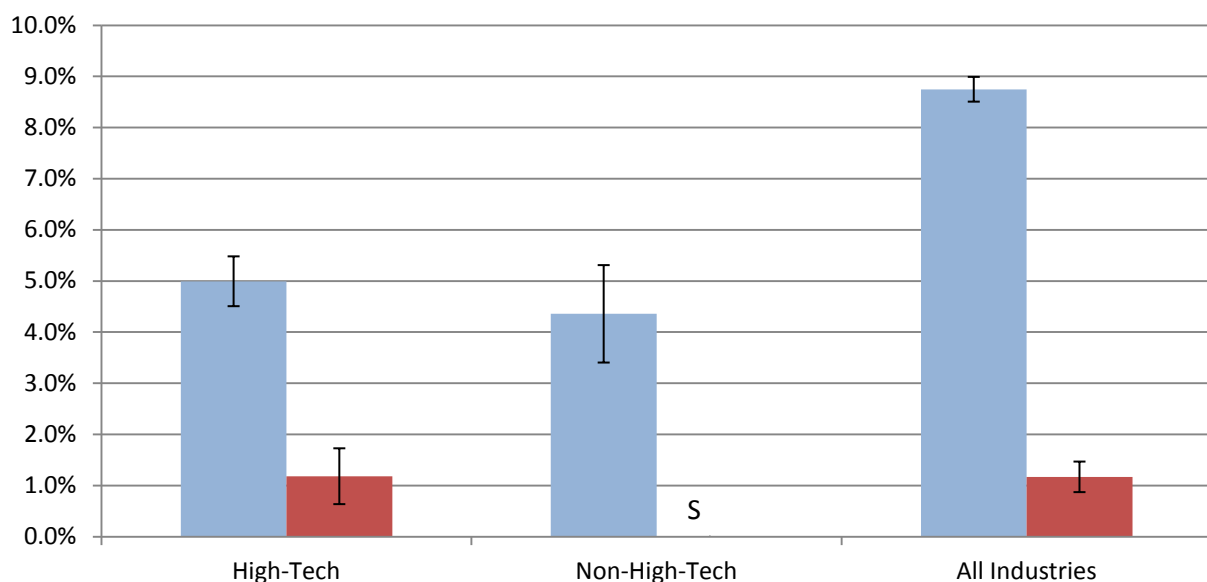
Northeast Ohio Employers (11-County)				
Firms		Receipts (\$Thousands)		
Count	Error ±	Count	Error ±	
High-Tech				
African-American Owned	1,738	389	\$31,446	\$14,591
Hispanic Owned	411	191	\$18,108	\$11,010
All Firms	34,809	1,671	\$1,243,895	\$179,121
Non-High-Tech				
African-American Owned	2,233	500	\$46,659	\$20,157
Hispanic Owned	S	S	S	S
All Firms	51,259	2,460	\$2,286,528	\$365,844
All Industries				
African-American Owned	20,140	644	\$380,822	\$36,559
Hispanic Owned	2,690	689	\$110,848	\$63,848
All Firms	230,225	3,684	\$9,675,540	\$619,235

Note: S denotes a suppression

Source: U.S. Census Bureau, Survey of Business Owners

- The African-American and Hispanic communities in Northeast Ohio accounted for a larger portion of total non-employer firms (Table 11) than they did of employer firms (Table 10).
- Of high-tech non-employers in 2007, there were 1,738 (±389) firms owned by African-Americans. This suggests that the number of non-employer, high-tech firms owned by African-Americans in Northeast Ohio could be between 1,349 and 2,127. In regards to Hispanics, 411 (±191) Hispanic-owned, non-employer, high-tech firms were reported in the region, indicating this count could range from 220 to 602 (Table 11).
- The estimate of African-American non-employers in non-high-tech industries was 2,233 (±500, a range of 1,733 to 2,733). The Hispanic counts for non-employer, non-high-tech industries were suppressed by the U.S. Census Bureau for confidentiality reasons and were marked in Table 2 with an "S".
- Minority participation was considerably higher for all industries. Within this category, there are 20,140 African-American firms (±644, a range of 19,496 to 20,784) and 2,690 Hispanic firms (±689, a range of 2,001 to 3,379).

**Figure 16. Percentage of African-American and Hispanic Non-Employer Firms in Northeast Ohio, 2007**



Note: S denotes a suppression

Source: U.S. Census Bureau, Survey of Business Owners

■ African-American Owned ■ Hispanic Owned

- Figure 16 examines the percentage of African-American- and Hispanic-owned, non-employer firms in Northeast Ohio in 2007. Hispanic counts for non-employer, non-high-tech industries were suppressed and marked in Figure 16 with an “S”.
- In Northeast Ohio, African-American, high-tech non-employers (5.0%,  $\pm 0.5\%$ , with a range from 4.5% to 5.5%) had statistically higher share of ownership than Hispanic, high-tech non-employers (1.2%,  $\pm 0.5\%$ , with a range from 0.7% to 1.7%)
- In addition, African-American non-employers in all industries (8.7%,  $\pm 0.2\%$ , with a range from 8.5% to 8.9%) showed a statistically higher share of ownership than Hispanic non-employers in all industries (1.2%,  $\pm 0.3\%$ , with a range from 0.9% to 1.5%).
- Examining the percentage for African-Americans in non-employer firms indicates that no statistical difference exists between the percentages in the growth clusters’ high-tech and non-high-tech industries. However, the percentage of African-Americans in all industries is much higher statistically than in both the high-tech and non-high-tech growth cluster industries.

**APPENDIX TABLES A.1. – A.10.**

## A. 1. Listing of STEM Academic Disciplines

STEM Academic Disciplines
Aerospace Engineering
Agricultural Sciences
Architecture and Environmental Design
Astronomy
Biological Sciences
Chemical Engineering
Chemistry
Civil Engineering
Computer Science
Earth Sciences
Electrical Engineering
Engineering Technologies
Health Technologies
History of Science
Industrial Engineering
Interdisciplinary or Other Sciences
Materials Engineering
Mathematics and Statistics
Mathematics Education
Mechanical Engineering
Medical Sciences
Other Engineering
Other Life Sciences
Other Science/Technical Education
Physics
Science Education
Science Technologies

Source: National Science Foundation

## A. 2. List of 2- and 4- Year Institutions and Number of STEM Degrees Awarded to Minorities in Northeast Ohio, 2009

Academic Institution	Number of STEM degrees awarded	Academic Institution	Number of STEM degrees awarded
Boheckers Business College	1	Lake Erie College	2
Baldwin-Wallace College	4	Lakeland Community College	17
Bryant & Stratton College	34	Lorain County Community College	36
Case Western Reserve University	72	Malone College	7
Cleveland Institute of Art	-	Mount Union College	1
Cleveland Institute of Electronics	8	Northeastern Ohio Universities College of Med	9
Cleveland State University	63	Notre Dame College (Cleveland, OH)	1
Cuyahoga Community College	112	Ohio College of Podiatric Medicine	16
David N. Myers College	1	Oberlin College	11
ETI Technical College of Niles	11	Stark State College of Theology	29
Hiram College	4	University of Akron, All Campuses	94
ITT Technical Institute (Youngstown, OH)	17	Ursuline College	34
John Carroll University	5	Walsh University	6
Kent State University, All Campuses	77	Youngstown State University	68
Total Number of Degrees Awarded			740

Source: National Science Foundation

**A. 3. STEM Percentage by Degree Type for Each Ethnic/Racial Group, 2009**

		Northeast Ohio	Ohio	United States
	Ethnic/Racial Group	STEM Percentage of Higher Education Degrees	STEM Percentage of Higher Education Degrees	STEM Percentage of Higher Education Degrees
Associate's Degree	African-Americans	29.7%	37.8%	28.4%
	Asians	47.9%	47.6%	31.8%
	Hispanics	39.7%	40.1%	22.3%
	Whites	47.8%	48.9%	32.3%
Bachelor's Degree	African-Americans	21.4%	19.8%	21.9%
	Asians	51.1%	42.2%	37.6%
	Hispanics	26.7%	22.5%	20.7%
	Whites	29.0%	27.1%	25.9%
First Professional Degree	African-Americans	41.9%	45.5%	43.5%
	Asians	72.4%	75.9%	68.0%
	Hispanics	66.7%	44.4%	40.6%
	Whites	39.4%	47.7%	44.6%
Master's Degree	African-Americans	13.2%	12.7%	16.2%
	Asians	37.0%	28.4%	33.4%
	Hispanics	12.8%	12.6%	17.4%
	Whites	20.4%	19.5%	21.6%
Post-Master's Certificate	African-Americans	12.5%	25.0%	6.4%
	Asians	100.0%	66.7%	48.1%
	Hispanics	0.0%	0.0%	16.3%
	Whites	31.3%	29.6%	13.5%
Doctorate Degree	African-Americans	50.0%	20.2%	29.4%
	Asians	68.8%	73.3%	63.1%
	Hispanics	63.6%	44.7%	41.9%
	Whites	59.9%	47.2%	50.6%
Doctorate Degree-Professional Practice	African-Americans	100.0%	48.9%	43.9%
	Asians	100.0%	82.6%	68.8%
	Hispanics	100.0%	50.0%	42.8%
	Whites	95.1%	68.8%	51.4%

Source: National Science Foundation



A. 4. Share of STEM Degrees Awarded to Whites of All Degrees Awarded to Whites, 2009

	Northeast Ohio (11- County)			Ohio			United States		
Level of STEM Degrees	Degrees in All Disciplines Awarded to Whites	STEM Degrees Awarded to Whites	% of Whites Degrees in STEM	Degrees in All Disciplines Awarded to Whites	STEM Degrees Awarded to Whites	% of Whites Degrees in STEM	Degrees in All Disciplines Awarded to Whites	STEM Degrees Awarded to Whites	% of Whites Degrees in STEM
Associate's Degree	5,222	2,498	47.8%	19,032	9,313	48.9%	446,617	144,352	32.3%
Bachelor's Degree	11,900	3,456	29.0%	48,828	13,235	27.1%	1,047,635	270,797	25.9%
First Professional Degree	670	264	39.4%	1,441	687	47.7%	31,678	14,118	44.6%
Master's Degree	4,122	841	20.4%	15,455	3,010	19.5%	365,343	78,957	21.6%
Post-Master's Certificate	48	15	31.3%	125	37	29.6%	11,171	1,502	13.5%
Doctorate Degree	312	187	59.9%	1,159	547	47.2%	31,437	15,898	50.6%
Doctorate Degree-Professional Practice	61	58	95.1%	1,245	857	68.8%	28,809	14,809	51.4%
Total Number of Degrees Awarded	22,335	7,319	32.8%	87,285	27,686	31.7%	1,962,690	540,433	27.5%

Source: National Science Foundation

A. 5. Share of STEM Degrees Awarded to Asians of All Degrees Awarded to Asians, 2009

	Northeast Ohio (11- County)			Ohio			United States		
Level of STEM Degrees	Degrees in All Disciplines Awarded to Asians	STEM Degrees Awarded to Asians	% of Asians Degrees in STEM	Degrees in All Disciplines Awarded to Asians	STEM Degrees Awarded to Asians	% of Asians Degrees in STEM	Degrees in All Disciplines Awarded to Asians	STEM Degrees Awarded to Asians	% of Asians Degrees in STEM
Associate's Degree	71	34	47.9%	273	130	47.6%	34,876	11,093	31.8%
Bachelor's Degree	509	260	51.1%	1,593	672	42.2%	103,273	38,839	37.6%
First Professional Degree	134	97	72.4%	203	154	75.9%	6,109	4,151	68.0%
Master's Degree	146	54	37.0%	532	151	28.4%	32,987	11,025	33.4%
Post-Master's Certificate	1	1	100.0%	3	2	66.7%	482	232	48.1%
Doctorate Degree	16	11	68.8%	75	55	73.3%	3,206	2,024	63.1%
Doctorate Degree-Professional Practice	1	1	100.0%	109	90	82.6%	5,087	3,502	68.8%
Total Number of Degrees Awarded	878	458	52.2%	2,788	1,254	45.0%	186,020	70,866	38.1%

Source: National Science Foundation

## A. 6. Selected High-Tech NAICS Categories

NAICS	NAICS Description
333611	Turbine and Turbine Generator Set Units Manufacturing
333612	Speed Changer, Industrial High-Speed Drive, and Gear Manufacturing
333613	Mechanical Power Transmission Equipment Manufacturing
333618	Other Engine Equipment Manufacturing
333911	Pump and Pumping Equipment Manufacturing
333912	Air and Gas Compressor Manufacturing
333922	Conveyor and Conveying Equipment Manufacturing
333924	Industrial Truck, Tractor, Trailer, and Stacker Machinery Manufacturing
333994	Industrial Process Furnace and Oven Manufacturing
333995	Fluid Power Cylinder and Actuator Manufacturing
333999	All Other Miscellaneous General Purpose Machinery Manufacturing
334111	Electronic Computer Manufacturing
334112	Computer Storage Device Manufacturing
334113	Computer Terminal Manufacturing
334119	Other Computer Peripheral Equipment Manufacturing
334210	Telephone Apparatus Manufacturing
334220	Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing
334290	Other Communications Equipment Manufacturing
334310	Audio and Video Equipment Manufacturing
334411	Electron Tube Manufacturing
334412	Bare Printed Circuit Board Manufacturing
334413	Semiconductor and Related Device Manufacturing
334414	Electronic Capacitor Manufacturing
334415	Electronic Resistor Manufacturing
334416	Electronic Coil, Transformer, and Other Inductor Manufacturing
334417	Electronic Connector Manufacturing
334418	Printed Circuit Assembly (Electronic Assembly) Manufacturing
334419	Other Electronic Component Manufacturing
334510	Electromedical and Electrotherapeutic Apparatus Manufacturing

NAICS	NAICS Description
334511	Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing
334512	Automatic Environmental Control Manufacturing for Residential, Commercial, and Appliance Use
334513	Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables
334514	Totalizing Fluid Meter and Counting Device Manufacturing
334515	Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals
334516	Analytical Laboratory Instrument Manufacturing
334517	Irradiation Apparatus Manufacturing
334518	Watch, Clock, and Part Manufacturing
334519	Other Measuring and Controlling Device Manufacturing
334611	Software Reproducing
334612	Prerecorded Compact Disc (except Software), Tape, and Record Reproducing
334613	Magnetic and Optical Recording Media Manufacturing
335311	Power, Distribution, and Specialty Transformer Manufacturing
335312	Motor and Generator Manufacturing
335313	Switchgear and Switchboard Apparatus Manufacturing
335314	Relay and Industrial Control Manufacturing
336411	Aircraft Manufacturing
336412	Aircraft Engine and Engine Parts Manufacturing
336413	Other Aircraft Parts and Auxiliary Equipment Manufacturing
336414	Guided Missile and Space Vehicle Manufacturing
336415	Guided Missile and Space Vehicle Propulsion Unit and Propulsion Unit Parts Manufacturing
336419	Other Guided Missile and Space Vehicle Parts and Auxiliary Equipment Manufacturing
486110	Pipeline Transportation of Crude Oil
486210	Pipeline Transportation of Natural Gas
486910	Pipeline Transportation of Refined Petroleum Products
486990	All Other Pipeline Transportation
511210	Software Publishers
541219	Other Accounting Services

## A. 6. Selected High-Tech NAICS Categories (Continued)

NAICS	NAICS Description
541310	Architectural Services
541330	Engineering Services
541360	Geophysical Surveying and Mapping Services
541380	Testing Laboratories
541511	Custom Computer Programming Services
541512	Computer Systems Design Services
541614	Process, Physical Distribution, and Logistics Consulting Services
541620	Environmental Consulting Services
541690	Other Scientific and Technical Consulting Services
541711	Research and Development in Biotechnology
541712	Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology)
541720	Research and Development in the Social Sciences and Humanities

### A. 7. Selected Non-High-Tech NAICS Categories

NAICS	NAICS Description	NAICS	NAICS Description
212111	Bituminous Coal and Lignite Surface Mining	322222	Coated and Laminated Paper Manufacturing
212112	Bituminous Coal Underground Mining	322299	All Other Converted Paper Product Manufacturing
212113	Anthracite Mining	325199	All Other Basic Organic Chemical Manufacturing
212234	Copper Ore and Nickel Ore Mining	325611	Soap and Other Detergent Manufacturing
212291	Uranium-Radium-Vanadium Ore Mining	325612	Polish and Other Sanitation Good Manufacturing
212299	All Other Metal Ore Mining	325613	Surface Active Agent Manufacturing
212322	Industrial Sand Mining	325620	Toilet Preparation Manufacturing
212325	Clay and Ceramic and Refractory Minerals Mining	326112	Plastics Packaging Film and Sheet (including Laminated) Manufacturing
212391	Potash, Soda, and Borate Mineral Mining	326113	Unlaminated Plastics Film and Sheet (except Packaging) Manufacturing
213111	Drilling Oil and Gas Wells	326121	Unlaminated Plastics Profile Shape Manufacturing
213112	Support Activities for Oil and Gas Operations	326122	Plastics Pipe and Pipe Fitting Manufacturing
213113	Support Activities for Coal Mining	326140	Polystyrene Foam Product Manufacturing
213114	Support Activities for Metal Mining	326150	Urethane and Other Foam Product (except Polystyrene) Manufacturing
221210	Natural Gas Distribution	326191	Plastics Plumbing Fixture Manufacturing
221330	Steam and Air-Conditioning Supply	326199	All Other Plastics Product Manufacturing
237110	Water and Sewer Line and Related Structures Construction	326220	Rubber and Plastics Hoses and Belting Manufacturing
237120	Oil and Gas Pipeline and Related Structures Construction	326291	Rubber Product Manufacturing for Mechanical Use
237130	Power and Communication Line and Related Structures Construction	326299	All Other Rubber Product Manufacturing
237990	Other Heavy and Civil Engineering Construction (Power plant, hydroelectric, construction)	327112	Vitreous China, Fine Earthenware, and Other Pottery Product Manufacturing
238220	Plumbing, Heating, and Air-Conditioning Contractors (Solar heating equipment installation)	327113	Porcelain Electrical Supply Manufacturing
238290	Other Building Equipment Contractors	327123	Other Structural Clay Product Manufacturing
311221	Wet Corn Milling	327124	Clay Refractory Manufacturing
311222	Soybean Processing	327125	Nonclay Refractory Manufacturing
311223	Other Oilseed Processing	327211	Flat Glass Manufacturing
311999	All Other Miscellaneous Food Manufacturing	327212	Other Pressed and Blown Glass and Glassware Manufacturing
316211	Rubber and Plastics Footwear Manufacturing	327215	Glass Product Manufacturing Made of Purchased Glass
321999	All Other Miscellaneous Wood Product Manufacturing	327390	Other Concrete Product Manufacturing
322221	Coated and Laminated Packaging Paper Manufacturing	327410	Lime Manufacturing
		327420	Gypsum Product Manufacturing
		327910	Abrasive Product Manufacturing

## A. 7. Selected Non-High-Tech NAICS Categories (Continued)

NAICS	NAICS Description
327420	Gypsum Product Manufacturing
327910	Abrasive Product Manufacturing
327992	Ground or Treated Mineral and Earth Manufacturing
327993	Mineral Wool Manufacturing
327999	All Other Miscellaneous Nonmetallic Mineral Product Manufacturing
331111	Iron and Steel Mills
331112	Electrometallurgical Ferroalloy Product Manufacturing
331210	Iron and Steel Pipe and Tube Manufacturing from Purchased Steel
331221	Rolled Steel Shape Manufacturing
331222	Steel Wire Drawing
331311	Alumina Refining
331312	Primary Aluminum Production
331314	Secondary Smelting and Alloying of Aluminum
331315	Aluminum Sheet, Plate, and Foil Manufacturing
331316	Aluminum Extruded Product Manufacturing
331319	Other Aluminum Rolling and Drawing
331411	Primary Smelting and Refining of Copper
331419	Primary Smelting and Refining of Nonferrous Metal (except Copper and Aluminum)
331421	Copper Rolling, Drawing, and Extruding
331422	Copper Wire (except Mechanical) Drawing
331423	Secondary Smelting, Refining, and Alloying of Copper
331491	Nonferrous Metal (except Copper and Aluminum) Rolling, Drawing, and Extruding
331492	Secondary Smelting, Refining, and Alloying of Nonferrous Metal (except Copper and Aluminum)
331511	Iron Foundries

NAICS	NAICS Description
331513	Steel Foundries (except Investment)
331521	Aluminum Die-Casting Foundries
331522	Nonferrous (except Aluminum) Die-Casting Foundries
331524	Aluminum Foundries (except Die-Casting)
331525	Copper Foundries (except Die-Casting)
331528	Other Nonferrous Foundries (except Die-Casting)
332111	Iron and Steel Forging
332114	Custom Roll Forming
332115	Crown and Closure Manufacturing
332116	Metal Stamping
332117	Powder Metallurgy Part Manufacturing
332312	Fabricated Structural Metal Manufacturing
332313	Plate Work Manufacturing
332322	Sheet Metal Work Manufacturing
332410	Power Boiler and Heat Exchanger Manufacturing
332420	Metal Tank (Heavy Gauge) Manufacturing
332431	Metal Can Manufacturing
332439	Other Metal Container Manufacturing
332618	Other Fabricated Wire Product Manufacturing
332710	Machine Shops
332722	Bolt, Nut, Screw, Rivet, and Washer Manufacturing
332812	Metal Coating, Engraving (except Jewelry and Silverware), and Allied Services to Manufacturers
332813	Electroplating, Plating, Polishing, Anodizing, and Coloring
332911	Industrial Valve Manufacturing
332912	Fluid Power Valve and Hose Fitting Manufacturing
332913	Plumbing Fixture Fitting and Trim Manufacturing

### A. 7. Selected Non-High-Tech NAICS Categories (Continued)

NAICS	NAICS Description
332919	Other Metal Valve and Pipe Fitting Manufacturing
332991	Ball and Roller Bearing Manufacturing
332995	Other Ordnance and Accessories Manufacturing
332997	Industrial Pattern Manufacturing
332999	All Other Miscellaneous Fabricated Metal Product Manufacturing
333111	Farm Machinery and Equipment Manufacturing
333120	Construction Machinery Manufacturing
333131	Mining Machinery and Equipment Manufacturing
333132	Oil and Gas Field Machinery and Equipment Manufacturing
333411	Air Purification Equipment Manufacturing
333412	Industrial and Commercial Fan and Blower Manufacturing
333414	Heating Equipment (except Warm Air Furnaces) Manufacturing
333415	Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturing
333511	Industrial Mold Manufacturing
333513	Machine Tool (Metal Forming Types) Manufacturing
333514	Special Die and Tool, Die Set, Jig, and Fixture Manufacturing
333515	Cutting Tool and Machine Tool Accessory Manufacturing
333518	Other Metalworking Machinery Manufacturing
335110	Electric Lamp Bulb and Part Manufacturing
335121	Residential Electric Lighting Fixture Manufacturing
335122	Commercial, Industrial, and Institutional Electric Lighting Fixture Manufacturing
335211	Electric Housewares and Household Fan Manufacturing
335911	Storage Battery Manufacturing
335912	Primary Battery Manufacturing
335921	Fiber Optic Cable Manufacturing
335929	Other Communication and Energy Wire Manufacturing

NAICS	NAICS Description
335931	Current-Carrying Wiring Device Manufacturing
335932	Noncurrent-Carrying Wiring Device Manufacturing
335991	Carbon and Graphite Product Manufacturing
335999	All Other Miscellaneous Electrical Equipment and Component Manufacturing
336311	Carburetor, Piston, Piston Ring, and Valve Manufacturing
336312	Gasoline Engine and Engine Parts Manufacturing
336322	Other Motor Vehicle Electrical and Electronic Equipment Manufacturing
336330	Motor Vehicle Steering and Suspension Components (except Spring) Manufacturing
336340	Motor Vehicle Brake System Manufacturing
336350	Motor Vehicle Transmission and Power Train Parts Manufacturing
336391	Motor Vehicle Air-Conditioning Manufacturing
336399	All Other Motor Vehicle Parts Manufacturing
339112	Surgical and Medical Instrument Manufacturing
339113	Surgical Appliance and Supplies Manufacturing
339114	Dental Equipment and Supplies Manufacturing
339115	Ophthalmic Goods Manufacturing
339116	Dental Laboratories
423520	Coal and Other Mineral and Ore Merchant Wholesalers
424710	Petroleum Bulk Stations and Terminals
424720	Petroleum and Petroleum Products Merchant Wholesalers (except Bulk Stations and Terminals)
447110	Gasoline Stations with Convenience Stores
447190	Other Gasoline Stations
454311	Heating Oil Dealers
454312	Liquefied Petroleum Gas (Bottled Gas) Dealers
454319	Other Fuel Dealers
517410	Satellite Telecommunications
541420	Industrial Design Services
562212	Solid Waste Landfill
562920	Materials Recovery Facilities
811310	Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance

## A. 8. Workforce Educational Attainment in Northeast Ohio by Minority Status, 2010

		Education Level	2010 Estimate	2010 Estimate MOE	2010 Percent	2010 Percent MOE
Minority	High-Tech	Less than HS Graduate	130	148	1.5%	1.7%
		HS Graduate or Some College	4,138	1,379	46.9%	11.4%
		Associate Degree	1,834	973	20.8%	9.3%
		Bachelor's Degree	1,577	782	17.9%	8.9%
		Master's Degree or Higher	1,154	875	13.1%	8.8%
	Non-High-Tech	Less than HS Graduate	1,548	764	12.6%	6.0%
		Graduate or Some College	9,506	1,936	77.6%	7.2%
		Associate Degree	702	529	5.7%	4.1%
		Bachelor's Degree	162	199	1.3%	1.6%
		Master's Degree or Higher	325	355	2.7%	2.8%
	Other Industries	Less than HS Graduate	26,313	3,640	11.1%	1.4%
		HS Graduate or Some College	149,574	6,776	62.9%	2.1%
		Associate Degree	23,915	2,799	10.1%	1.2%
		Bachelor's Degree	23,470	3,557	9.9%	1.5%
		Master's Degree or Higher	14,492	2,543	6.1%	1.1%
Non-Minority	High-Tech	Less than HS Graduate	1,156	602	1.4%	0.7%
		Graduate or Some College	33,472	3,467	39.2%	3.1%
		Associate Degree	7,624	1,597	8.9%	1.8%
		Bachelor's Degree	30,179	3,220	35.3%	3.0%
		Master's Degree or Higher	13,022	2,102	15.2%	2.2%
	Non-High-Tech	Less than HS Graduate	8,276	1,761	7.9%	1.6%
		HS Graduate or Some College	68,151	5,120	65.2%	2.8%
		Associate Degree	8,287	1,813	7.9%	1.7%
		Bachelor's Degree	13,338	1,892	12.8%	1.8%
		Master's Degree or Higher	6,445	1,287	6.2%	1.2%
	Other Industries	Less than HS Graduate	77,086	5,392	6.2%	0.4%
		HS Graduate or Some College	653,397	14,469	52.6%	1.0%
		Associate Degree	115,992	5,624	9.3%	0.5%
		Bachelor's Degree	251,731	11,294	20.3%	0.9%
		Master's Degree or Higher	143,572	6,828	11.6%	0.6%

Note: Employment estimates are for workers 16-years and older.

Source: American Community Survey Public Use Microdata Sample



**A. 9. Minority Employers in the State of Ohio for High-Tech, Non-High-Tech, and All Industries, 2007**

Ohio Employers								
Firms		Receipts (\$Thousands)		Employment		Payroll (\$Thousands)		
Count	Error ±	Count	Error ±	Count	Error ±	Count	Error ±	
High-Tech								
African-American Owned	93	33	\$237,101	\$45,523	1,453	279	\$86,118	\$13,779
Hispanic Owned	88	48	\$139,258	\$13,369	689	66	\$42,709	\$6,833
All Firms	8,139	391	\$18,047,443	\$1,155,036	95,961	6,142	\$5,205,157	\$333,130
Non-High-Tech								
African-American Owned	105	59	\$737,292	\$224,137	2,582	1,487	\$75,458	\$43,464
Hispanic Owned	37	18	\$66,264	\$28,626	390	237	\$17,292	\$14,110
All Firms	12,728	407	\$56,213,151	\$2,698,231	226,817	10,887	\$8,521,269	\$5,453,612
All Industries								
African-American Owned	2,881	230	\$3,729,452	\$298,356	33,298	3,729	\$807,569	\$103,369
Hispanic Owned	1,339	150	\$1,947,951	\$155,836	11,562	2,405	\$371,084	\$47,499
All Firms	170,738	0	\$355,599,669	\$5,689,595	2,164,602	34,634	\$67,624,806	\$1,081,997

Source: U.S. Census Bureau, Survey of Business Owners

**A. 10. Minority Employers in the United States for High-Tech, Non-High-Tech, and All Industries, 2007**

	United States Employers			
	Firms	Receipts (\$Thousands)	Employment	Payroll (\$Thousands)
<b>High-Tech</b>				
<b>African-American Owned</b>	4,092	\$4,607,815	35,919	\$2,028,491
<b>Hispanic Owned</b>	8,412	\$9,108,794	61,923	\$3,424,260
<b>All Firms</b>	267,365	\$525,004,525	2,473,817	\$148,103,834
<b>Non-High-Tech</b>				
<b>African-American Owned</b>	2,657	\$4,181,096	17,840	\$552,626
<b>Hispanic Owned</b>	9,399	\$17,420,188	80,980	\$2,994,587
<b>All Firms</b>	319,817	\$1,267,870,849	4,584,836	\$177,916,508
<b>All Industries</b>				
<b>African-American Owned</b>	1,921,864	\$135,739,834	909,552	\$23,334,792
<b>Hispanic Owned</b>	2,260,269	\$350,661,243	1,908,161	\$54,295,508
<b>All Firms</b>	26,294,860	\$10,949,461,875	56,626,555	\$1,940,572,945

Source: U.S. Census Bureau, Survey of Business Owners