



**Building Opportunities for Cleveland
Residents: Aligning Demand and Supply
of Professional and Technical Education**

**COMMISSIONED BY THE CLEVELAND FOUNDATION
SEPTEMBER 2014**



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Dear friend of the foundation:

The imperative to address local workforce preparation merges two community priorities: education and economic development. In public education, we, in partnership with the George Gund Foundation, have led the way these past eight years in supporting new, innovative schools that offer Cleveland's students a challenging alternative to their traditional neighborhood schools. We have also championed *The Cleveland Plan for Transforming Schools*, introduced by Mayor Frank Jackson and Cleveland school district CEO Eric Gordon in 2012.

In economic development, we have invested more than \$85 million in the past decade to revitalize our region, with noteworthy gains toward stabilizing and diversifying our economy and rebuilding a culture of entrepreneurship and innovation. But stubborn gaps remain in the core city, where poverty and unemployment rates are three times higher than in the region as a whole. We can do better for our young people.

But the news is not uniformly bleak. Good local jobs are available; for example, in manufacturing, health care and information technology. Not all these jobs require a college degree, but all do require strong skill sets, and some post-secondary credential. Today, every employer needs workers capable of thinking critically.

To analyze the job demand and supply picture in Greater Cleveland, the Cleveland Foundation commissioned the nationally respected consulting firm FutureWorks. The resulting analysis clearly documents the need for bringing demand and supply into closer alignment, for the well being of our young people and for our city as a whole. This study makes the case for strengthening professional and career technical education in both our secondary and post-secondary education institutions, with an ultimate goal of creating multiple career pathways aligned with workforce needs and student interest.

The initial steps suggested in this report will require time and effort but, if executed successfully, they can launch our community toward a coherent system of career-based learning that will create a pathway to prosperity for Cleveland and its residents.

The Cleveland Foundation, September 10, 2014

Building Opportunities for Cleveland Residents

Earlier this year, the Cleveland Foundation commissioned FutureWorks to conduct a job demand and supply analysis to help inform the development of strategies to better connect Cleveland residents, particularly underserved youth, to current and future career opportunities. We focused our research on the five industry clusters in the region that have been identified locally as potentially high wealth producing: biosciences and health care; advanced manufacturing; energy production; information technology and financial and business services (back office). We specifically targeted occupational groups that pay family sustaining wages within these sectors using The Living Wage Calculator developed by MIT.

To conduct this analysis, we used data from multiple sources including the Bureau of Labor Statistics (BLS) job projection and demand data; Burning Glass Labor insight, for current “real time” job openings; and student enrollment and completion data from the U.S. Department of Education, the Ohio Department of Education and the Ohio Board of Regents. The data are primarily drawn from the five-county (Cuyahoga, Geauga, Lake, Lorain, Medina) Metropolitan Statistical Area (MSA), but in a few cases includes data from Portage and Summit counties as well.

At the beginning of the process, we interviewed a broad group of economic development specialists and educators to better understand the local context and build on existing work. We reviewed a draft of our findings with some members of this group prior to the report’s release.

The final report includes five sections, outlined below, and appendices with sources and notes, and expanded information on the 18 occupations which we have identified.

Section	Focus	Major Takeaway
1) Labor Trends Pages 8 - 14	Provides local workforce data - job related education requirements, education attainment levels, commuting patterns, and employment distribution across occupation and industry.	By 2020, 64 percent of Ohio jobs will require a postsecondary credential. Currently, only 43 percent of Cleveland residents, 25 years and older, have some college or earned a bachelor's or associate degree.
2) Job Demand Pages 16 - 22	Evaluates 41 key professional and technical occupations using four key variables: level of demand; earning potential; share of total jobs and projected growth.	Eighteen of the 41 professional and technical occupations reviewed meet all or the majority of criteria. Most require some post secondary credential.
3) Talent Supply Pages 24 - 37	Reviews student enrollment and completion data at the secondary level (9-12 career and technical education [CTE]) and the post secondary level (sub-baccalaureate, baccalaureate and graduate).	Local secondary and post secondary institutions are producing too few students with the credentials (i.e. certificates and degrees) needed in many high-demand technical fields (e.g. only 108 of a total of 4,334 associate degrees awarded in 2012 were in IT).
4) Demand/Supply Alignment Pages 40 - 52	Aligns data produced on demand across key occupational areas (section 2) with data on credential output from postsecondary institutions in the region (section 3).	There is substantial misalignment between the demand for workers and the supply of appropriately credentialed workers in key areas including IT, advanced manufacturing and health.
5) Implications Pages 54 - 55	Implications of the research are listed at the conclusion of the report.	Although there are significant opportunities to better align supply and demand, it will require a systemic effort.

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A black and white, long-exposure photograph of a multi-lane highway with heavy traffic. The cars are blurred into streaks, creating a sense of rapid movement and speed. The perspective is from an elevated position looking down the road towards a city skyline in the distance.

SECTION 1

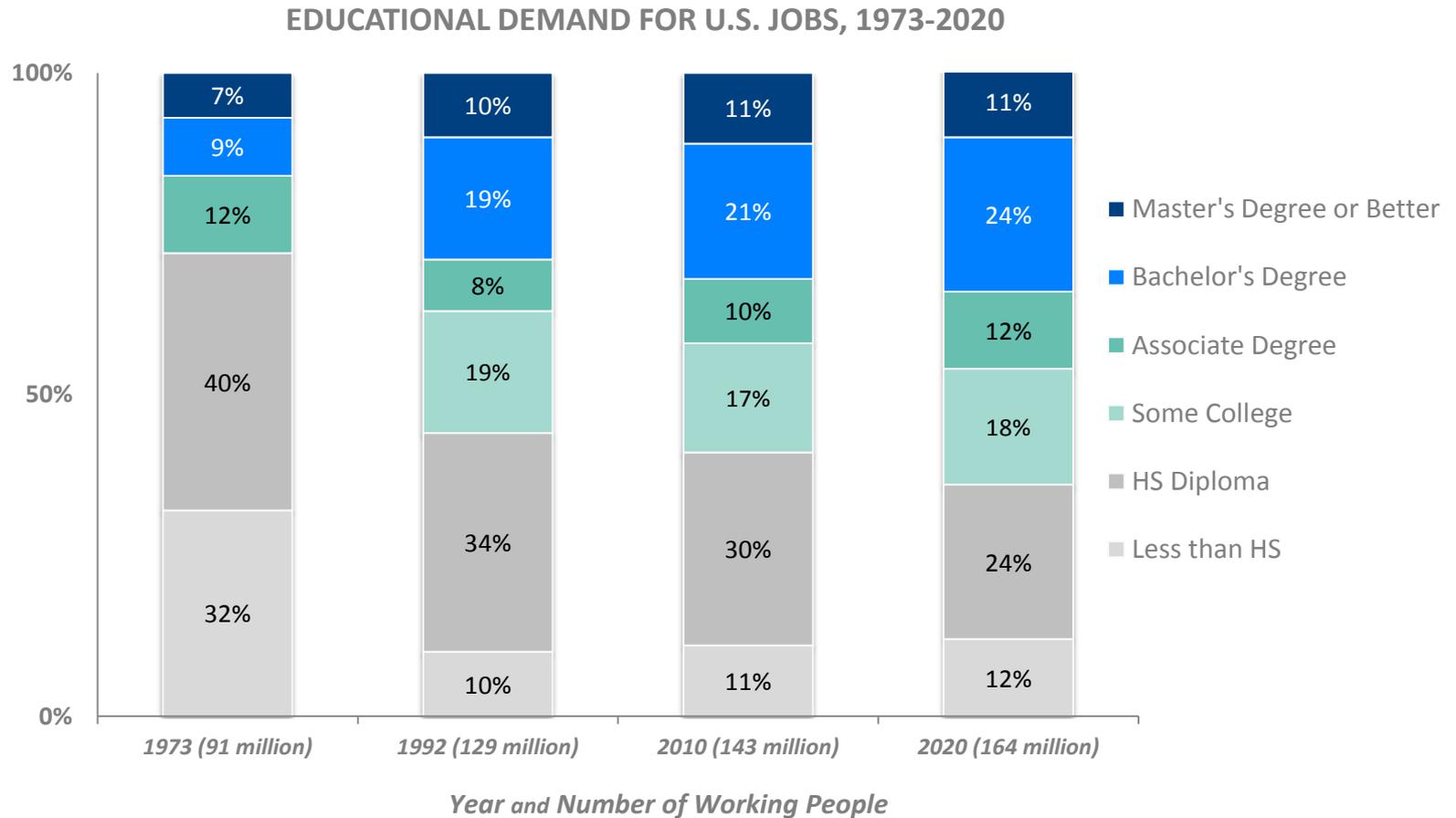
Labor Force Trends



This section provides data related to the Cleveland area workforce including: job-related educational demand, education attainment levels, commuting patterns, and industry and occupational employment data. Key observations include:

- » *The demand for skilled and educated talent is increasing. By 2020, the majority of jobs in Ohio will require some type of postsecondary credential.*
- » *Only 43% of city residents today have the required education or skill level to meet the demand predicted by 2020.*
- » *Data show that residents with higher levels of education – from a one-year credential to a two-year degree to a baccalaureate degree – are more likely to be employed and earn more money.*
- » *There are significant opportunities for work and income inside city and county borders – right now less than one-quarter of city jobs are taken by city residents.*
- » *Employment is spread across many occupational groupings and industry sector.*

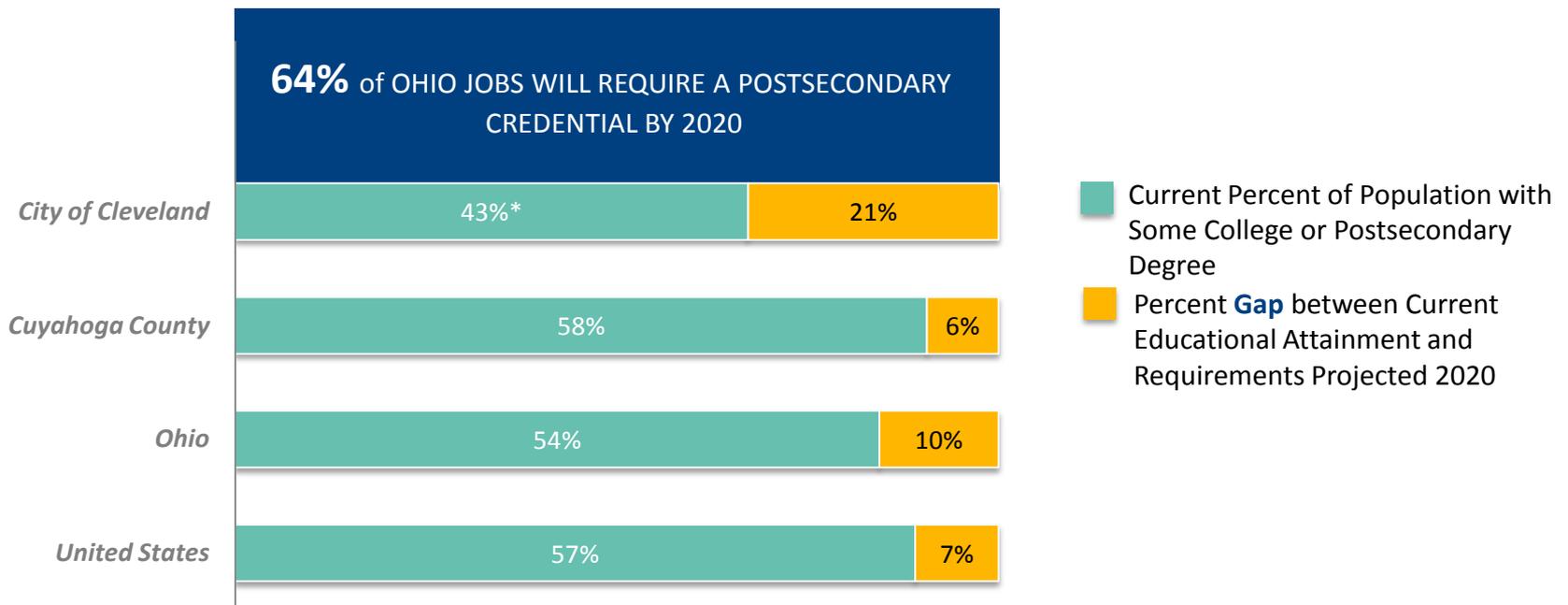
There is growing demand for educational credentials. Since 1973, jobs have required increasing levels of educational attainment across the United States.



Source: Anthony Carnevale, et. al., "Recovery: Projections of Jobs and Education Requirements Through 2020," June 2013.

The gap is significant between what is projected for demand (64 percent of Ohio jobs will require a postsecondary credential by 2020) and current levels of educational attainment in the City of Cleveland.

GAP BETWEEN EDUCATION REQUIRED BY 2020 AND EDUCATIONAL ATTAINMENT OF POPULATION 2012

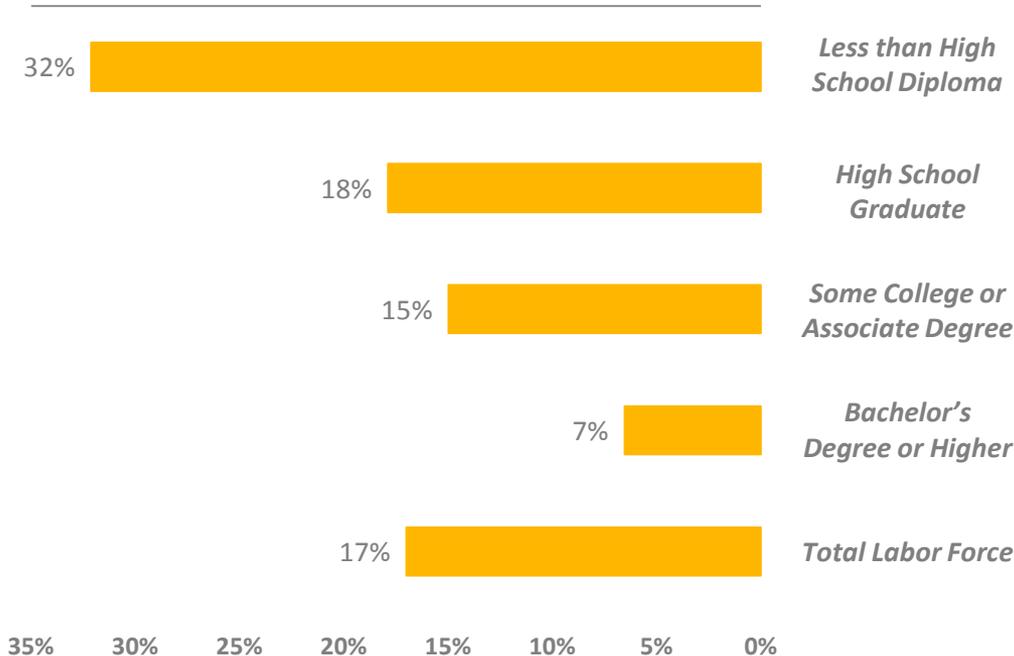


**Note: Of the 43%, 6% of city residents have an Associate's degree and 14% have a Bachelor's degree or higher. The remaining 23% have taken some college courses which could include industry certificates.*

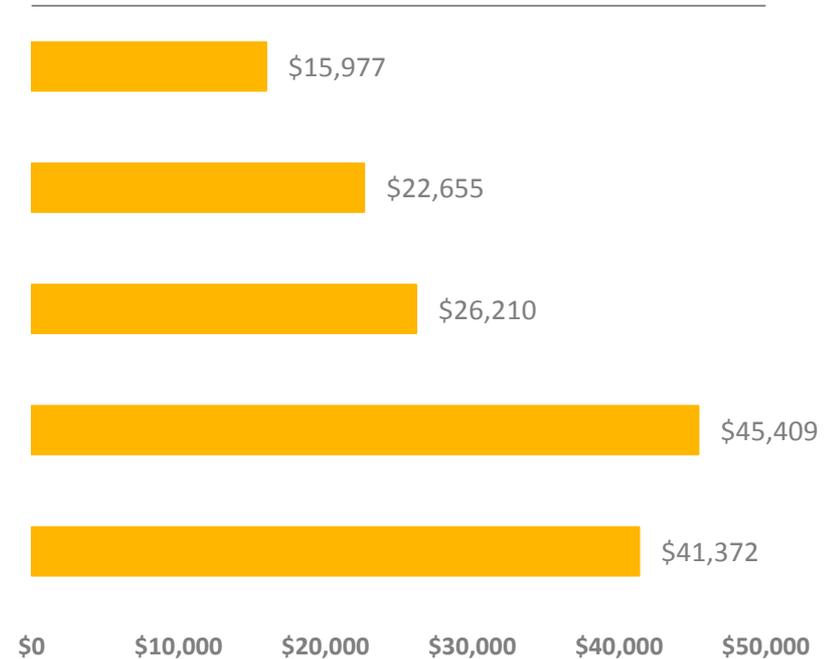
Source: U.S. Census, 2008-2012 American Community Survey 5-Year Estimates; N=249,359 for City of Cleveland Population 25 years and over; Anthony Carnevale, et. al., "Recovery: Projections of Jobs and Education Requirements Through 2020," June 2013.

Educational attainment is tied to jobs and income. City residents with higher levels of education have lower unemployment rates and greater incomes.

UNEMPLOYMENT RATE OF CLEVELAND LABOR FORCE BY EDUCATION, 2012



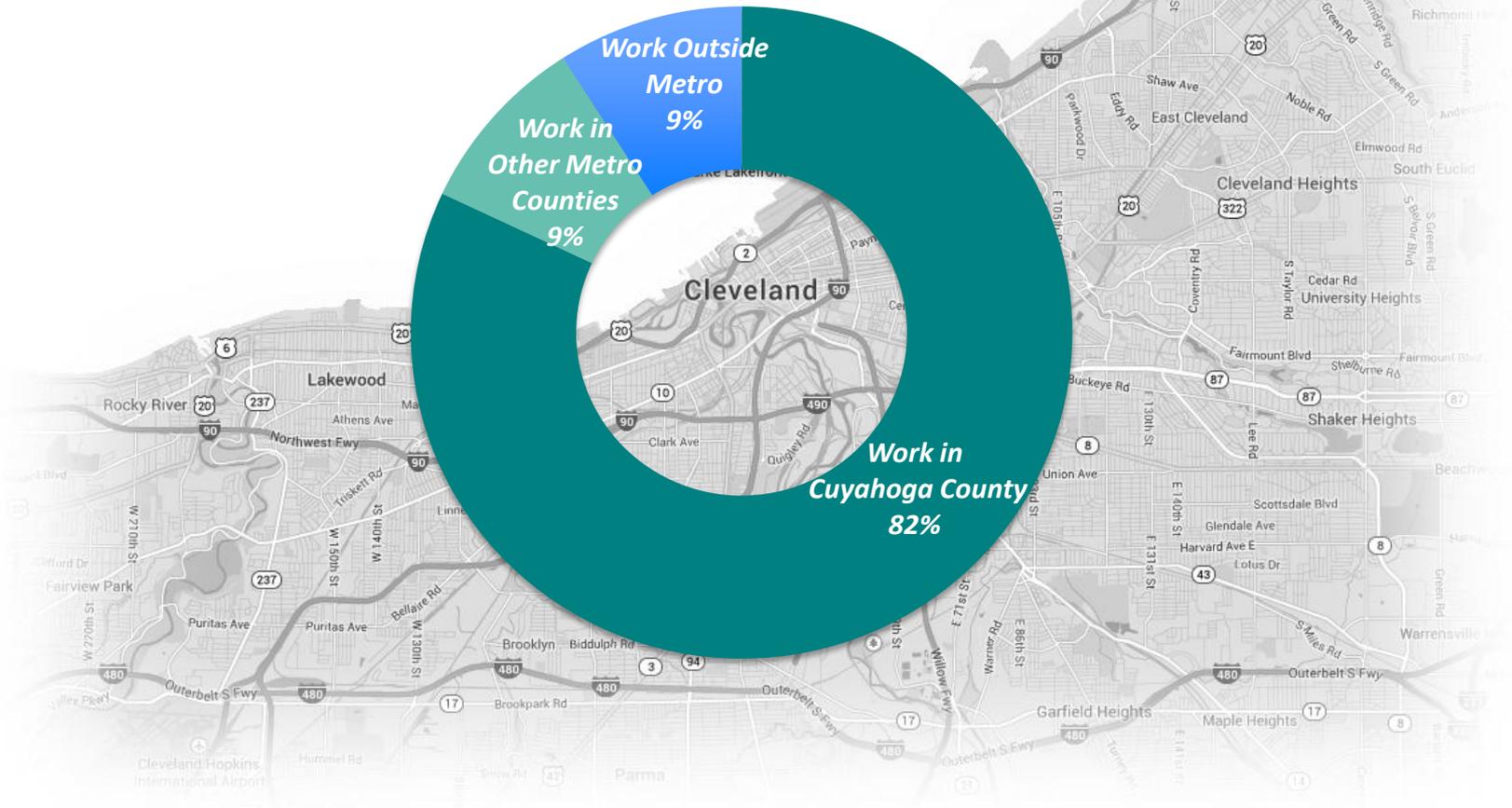
MEDIAN SALARY OF CLEVELAND LABOR FORCE BY EDUCATION, 2012



Source: U.S. Census Bureau, 2008-2012 American Community Survey 5-Year Estimates, N=149,175 for Total Labor Force of City of Cleveland.

The overwhelming majority of employed Clevelanders work in Cuyahoga County.

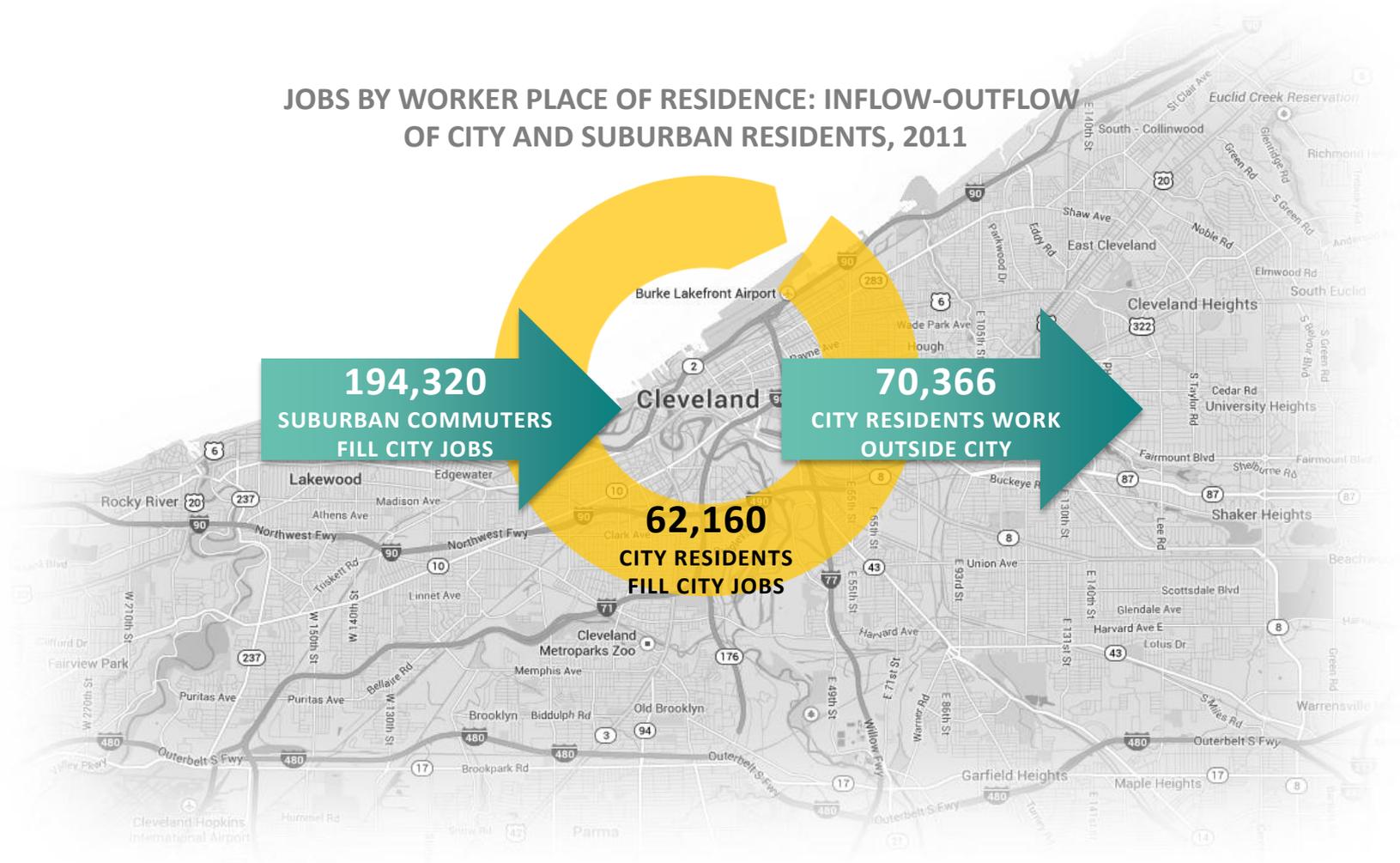
EMPLOYED CLEVELAND RESIDENTS BY PLACE OF WORK, 2011



Source: U.S. Census Bureau, OnTheMap Application and LEHD Origin-Destination Employment Statistics, Beginning of Quarter Employment, 2nd Quarter 2011.

Less than one-quarter of city jobs, 24 percent, are filled by city residents.

JOBS BY WORKER PLACE OF RESIDENCE: INFLOW-OUTFLOW OF CITY AND SUBURBAN RESIDENTS, 2011



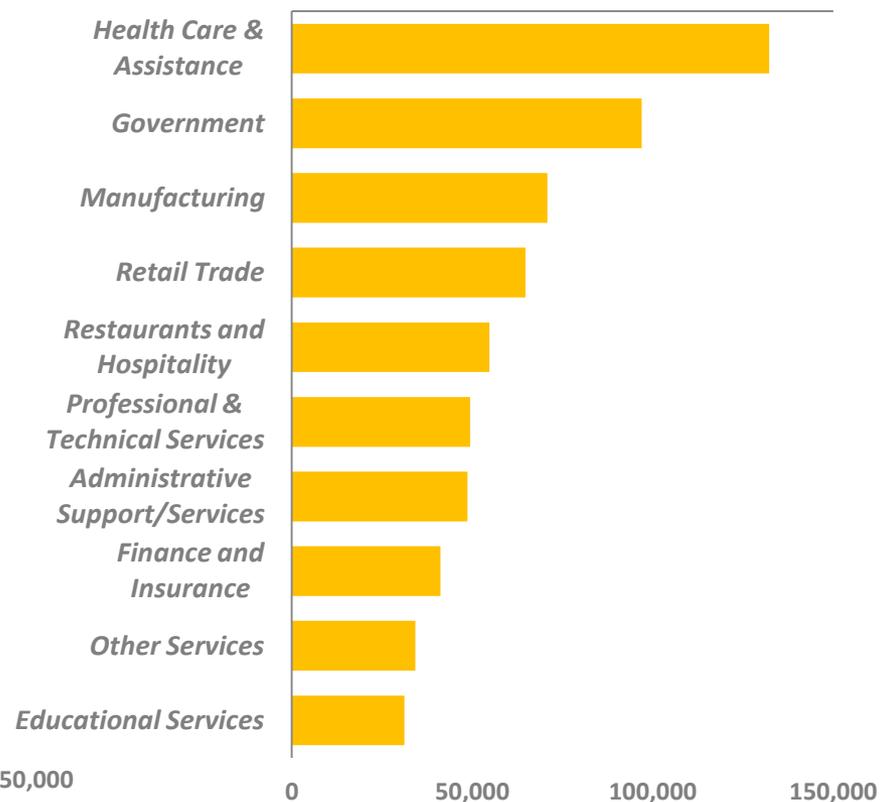
Source: U.S. Census Bureau, OnTheMap Application and LEHD Origin-Destination Employment Statistics,
(Beginning of Quarter Employment, 2nd Quarter of 2011.)

Employment opportunity is spread across occupation and industry in Cuyahoga County, a similar pattern to employment opportunity in the Metropolitan Statistical Area (MSA).

TOP JOBS BY OCCUPATION, CUYAHOGA COUNTY, 2013



TOP JOBS BY SECTOR, CUYAHOGA COUNTY, 2013



Source: U.S. Bureau of Labor Statistics (BLS), Quarterly Census of Employment and Wages (QCEW) Employees, Non-QCEW Employees & Self-Employed - EMSI 2014.2 Class of Worker, Data are for Cuyahoga County.

A black and white, long-exposure photograph of a multi-lane highway with heavy traffic. The cars are blurred into streaks, creating a sense of rapid movement and congestion. The perspective is from an elevated position looking down the road towards a city skyline in the distance.

SECTION 2

Job Demand

This section focuses on job demand within the following five industry clusters identified by recent research as potentially high wealth.

FIVE ECONOMIC CLUSTERS OF OPPORTUNITY			
Identified Clusters	Regional Economic Competitiveness Strategy ¹	Northeast Ohio Regional Business Plan ²	Globalizing Cleveland: A Path Forward ³
Biosciences and Health Care	+	+	+
Advanced Manufacturing*	+	+	+
Energy Production**	+	+	
Information Technology	+	+	+
Financial & Business Services/Back Office	+		

* *Advanced manufacturing includes polymers, flexible electronics, medical devices, machinery and metal working, and automotive industries.*

***Energy production includes clean technology and advanced energy.*

(1) *Regional Competitiveness Council for a Regional Economic Competitiveness Strategy for Northeast Ohio commissioned analysis prepared by Edward (Ned) Hill, "Economic Performance of Northeast Ohio 2000 to 2010," Center for Economic Development, Levin College of Urban Affairs, Cleveland State University, July 2012.*

(2) *Brookings Institution, "Northeast Ohio Regional Business Plan," prepared by the Fund for Our Economic Future with input from partners in Advance Northeast Ohio, April 2011.*

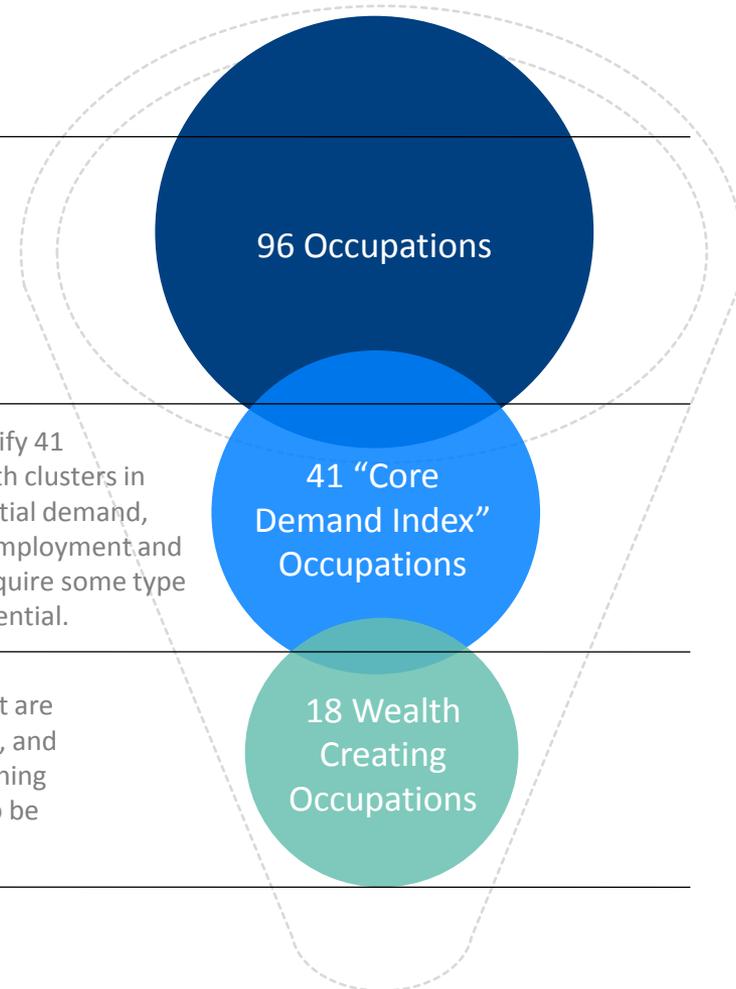
(3) *Richey Piiparinen and Jim Russell, "Globalizing Cleveland: A Path Forward," The Center for Population Dynamics at the Maxine Goodman Levin College of Urban Affairs, Cleveland State University, May 2014.*

FutureWorks developed a weighted “Core Demand Index” to identify key professional and technical occupational groups tied to these five wealth clusters.

There are 96 occupational groups that categorize all workers and professions in the economy.

Within this universe, we use a “core demand index” to identify 41 professional and technical occupations tied to growing wealth clusters in the regional economy. These occupations also show substantial demand, offer family sustaining wages, and hold promise for future employment and income for city residents. Almost all of these occupations require some type of professional and technical training or postsecondary credential.

We combine some related key occupations, select those that are more closely aligned to core functions in the wealth clusters, and select those most relevant to professional and technical training and education to arrive at 18 wealth creating occupations to be part of our analysis of demand-supply alignment.



FutureWorks' weighted "Core Demand Index" identifies 41 key professional and technical occupational groups tied to these five wealth clusters. In the tables that follow, we analyzed these groups using the following key variables:

- » *Demand.* Demand is a calculation of projected annual job openings (Bureau of Labor Statistics) and real-time job postings (Burning Glass Labor Insight) for occupations in the Metropolitan Statistical Area (MSA).
- » *Family Sustaining Wage.* According to a national Living Wage Calculator developed by Amy K. Glasmeier at Massachusetts Institute of Technology, the hourly wage that an individual in Cuyahoga County must earn to support his/her family of four is \$17.62. FutureWorks' index calculates if the mean wage of each occupational group "meets" the family sustaining wage standard (within 10 percent of the county average), is "below" the county wage standard (more than 10 percent below the county average), or is "above" the county wage standard (more than 10 percent above the county average).
- » *Total Jobs.* This is a 2018 calculation of the total number of jobs in the MSA from EMSI's model of projected jobs from the U.S. Bureau of Labor Statistics using data from the Quarterly Census on Employment and Wages (QCEW). FutureWorks' index calculates if the share of total jobs in the occupational group is in the "top," "middle," or "bottom" third of total jobs in the economy of the MSA.
- » *Projected growth.* FutureWorks uses EMSI's BLS projections of job growth from 2013 to 2018 to calculate if each occupational group is projected to have "high" growth (above 2 percent), "moderate" growth (0-2 percent), or "low" growth (less than 0 percent).

Note: the projections in the analysis of the "Core Demand Index" and throughout the report are dependent on the forecast for job creation and real-time demand in each occupational group. The forecasts and measures of demand are from EMSI's model of U.S. Bureau of Labor Statistics data and Burning Glass Labor Insight real-time job postings. These projections should be supplemented by locally available analyses of the occupations when appropriate. Full results from the "Core Demand Index" analysis, including data variables for 96 3-digit Standard Occupational Classification (SOC) groups, are in Appendix C.

Job Demand In High Wealth Sectors

KEY OCCUPATIONS TIED TO WEALTH CLUSTERS USING CORE DEMAND INDEX

Occupational Group	Demand 2013	Family Sustaining Wage 2013	Total Jobs 2018 by Thirds	Projected Growth 2013-2018
Computer and IT Workers	11,204	Above	Top	High
Health Diagnosing and Treating Practitioners	8,517	Above	Top	High
Other Management Occupations	5,412	Above	Top	Moderate
Business Operations Specialists	4,806	Above	Top	High
Information and Record Clerks	4,616	Below	Top	Moderate
Sales Representatives, Wholesale and Manufacturing	3,874	Above	Top	Low
Financial Specialists	3,792	Above	Top	Moderate
Health Technologists and Technicians	3,527	Above	Top	High
Advertising, Marketing, Promotions, Public Relations, and Sales Managers	3,398	Above	Middle	Moderate
Engineers	3,048	Above	Middle	Moderate
Secretaries and Administrative Assistants	2,708	Meets	Top	High
Operations Specialties Managers	2,680	Above	Top	Moderate
Financial Clerks	2,599	Meets	Top	Moderate
Installation, Maintenance, and Repair Workers	2,350	Meets	Top	High

KEY OCCUPATIONS TIED TO WEALTH CLUSTERS USING CORE DEMAND INDEX

Occupational Group	Demand 2013	Family Sustaining Wage 2013	Total Jobs 2018 by Thirds	Projected Growth 2013-2018
Nursing and Home Health Aides	2,069	Below	Top	High
Metal and Plastic Workers	1,888	Meets	Top	Low
Other Office and Administrative Support Workers	1,545	Below	Top	Moderate
Other Production Occupations	1,529	Below	Top	Low
Other Health Care Support Occupations	1,157	Below	Top	High
Construction Trade Workers	1,031	Above	Top	Moderate
Art and Design Workers	962	Meets	Middle	Low
Top Executives	936	Above	Top	Moderate
Supervisors of Office and Administrative Support Workers	875	Above	Middle	Moderate
Drafters, Engineering Technicians, and Mapping Technicians	762	Above	Middle	Moderate
Media and Communications Workers	628	Above	Middle	Low
Supervisors of Production Workers	598	Above	Middle	Low
Assemblers and Fabricators	589	Below	Top	Low
Electrical and Electronic Equipment Mechanics, Installers, and Repairers	477	Above	Middle	Moderate

KEY OCCUPATIONS TIED TO WEALTH CLUSTERS USING CORE DEMAND INDEX

Occupational Group	Demand 2013	Family Sustaining Wage 2013	Total Jobs 2018 by Thirds	Projected Growth 2013-2018
Life, Physical, and Social Science Technicians	426	Above	Bottom	Moderate
Physical Scientists	379	Above	Bottom	Moderate
Supervisors of Installation, Maintenance, and Repair Workers	313	Above	Middle	Moderate
Occupational Therapy and Physical Therapist Assistants and Aides	311	Above	Bottom	High
Life Scientists	309	Above	Bottom	High
Mathematical Science Occupations	252	Above	Bottom	High
Social Scientists and Related Workers	191	Above	Bottom	Moderate
Other Health Care Practitioners and Technical Occupations	163	Above	Bottom	High
Plant and System Operators	145	Above	Bottom	Moderate
Architects, Surveyors, and Cartographers	142	Above	Bottom	High
Media and Communication Equipment Workers	129	Meets	Bottom	High
Supervisors of Construction and Extraction Workers	76	Above	Middle	Moderate
Extraction Workers	19	Above	Bottom	High

Job Demand in High Wealth Sectors

We have identified 18 professional and technical occupations from these clusters that show substantial demand, offer family sustaining wages, and hold promise for future employment and income for city residents (some combine related key occupations from the previous tables into a single occupation). Almost all require some type of professional and technical training or postsecondary credential.

1. *Computer and IT Workers*
2. *Metal and Plastic Workers*
3. *Installation, Maintenance, and Repair Workers*
4. *Skilled Production Workers (combines several key occupations)*
5. *Construction Trade Workers**
6. *Health Diagnosing and Treating Practitioners*
7. *Health Technologists and Technicians*
8. *Health Therapist Aides and Support Workers (combines several key occupations)*
9. *Nursing and Home Health Aides*
10. *Engineers*
11. *Architects, Engineers, and Technicians (combines several key occupations)*
12. *Life Science Workers (combines several key occupations)*
13. *Financial Specialists*
14. *Financial Clerks*
15. *Secretaries and Administrative Assistants*
16. *Information and Record Clerks*
17. *Front-line Supervisors of Skilled Workers (combines several key occupations)*
18. *Managers , Professional and Health (combines several key occupations)*

*Note: Other local analyses should be used to supplement our analysis and help characterize the type and scale of demand for each occupational group. One such analysis is the “Demand Study for Construction Employees” prepared by Mohr Partners Cleveland, W.E. Upjohn Institute for Employment Research, and Weber Murphy Fox for The Construction Diversity Committee, Commission on Economic Inclusion, Greater Cleveland Partnership.

A black and white, long-exposure photograph of a multi-lane highway with heavy traffic. The cars are blurred into streaks, creating a sense of rapid movement and speed. The perspective is from an elevated position looking down the road towards a city skyline in the distance.

SECTION 3

Talent Supply

The most significant sources of technically skilled talent are educational institutions at the secondary level (grades 9-12 career and technical education [CTE]) and postsecondary level (sub-baccalaureate, baccalaureate and graduate). While other sources of talent (e.g. workforce training and education programs and in-migration to the area by skilled individuals) may also be important, the educational institutions that serve area residents and educate large numbers of new and experienced workers comprise, by far, the largest components of a talent supply system.



In examining talent supply at the secondary level, we focused on the Career Technical Planning Districts within the Cleveland Metropolitan Statistical Area and selected districts in Portage and Summit counties. Our data source for the following charts and tables was the Ohio Department of Education (ODOE). We followed the definitions generated by ODOE as well:

- CTE Participant:** Any student who successfully takes a CTE course in a pathway.
- CTE Concentrator:** Any student who has completed at least 50 percent of the credits in a pathway.
- CTE Pathway:** A group of courses related to a technology or occupational field that is approved by the US Department of Education and also by states as meeting requirements for providing education in the skills appropriate for the technology or field. A pathway may have several different *programs* within in it related to specific job skills. For example, the Transportation pathway contains programs in automotive technology, logistics and supply chain management, heavy equipment operations, etc.

We have several observations based on the secondary career and technical education data:

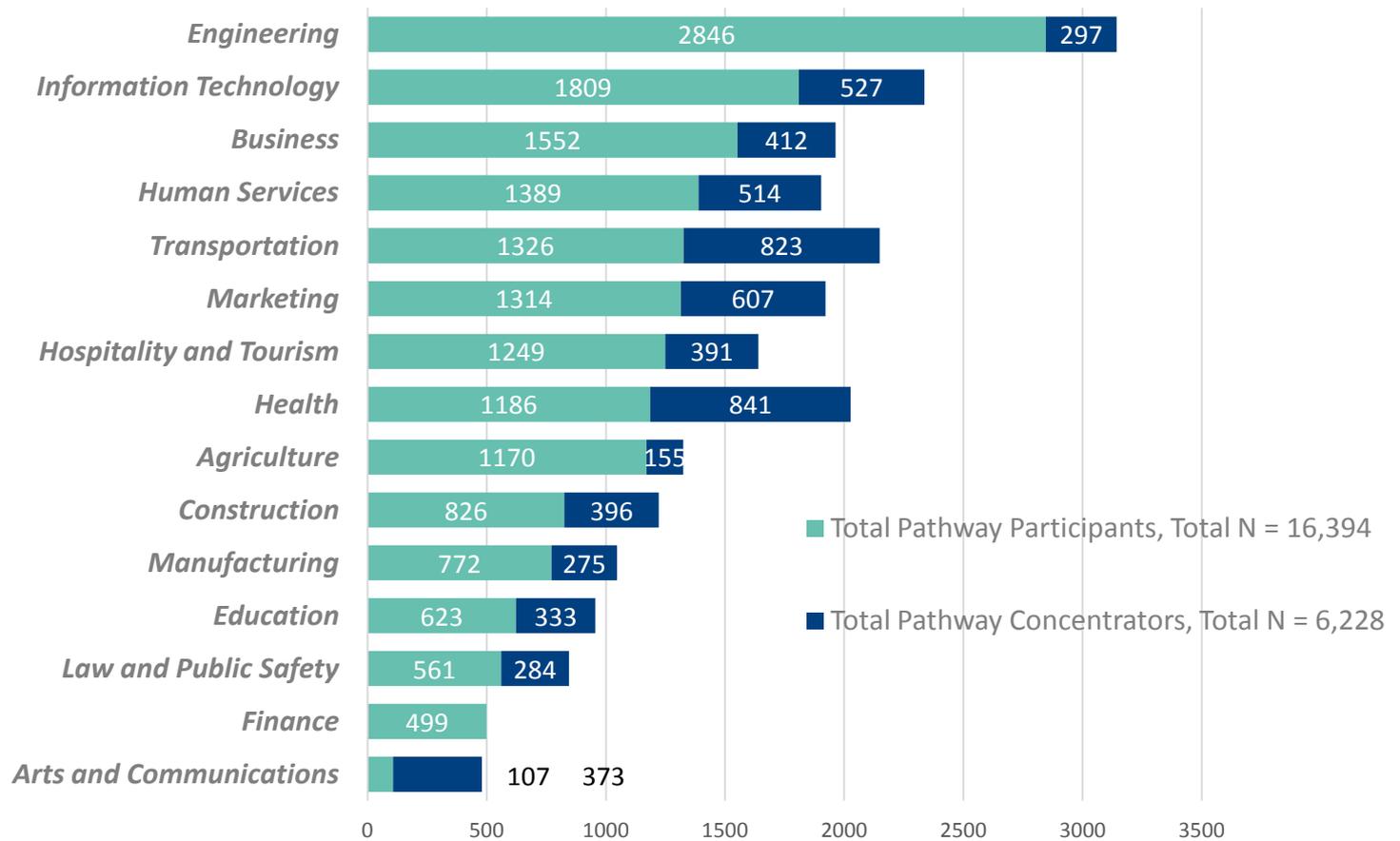
- » *In 2012, in our geographic area of focus, over 16,000 participants took courses in CTE fields yielding about 6,300 concentrators. The proportion of concentrators as a percentage of participants in districts varies widely. Districts with a dedicated CTE facility (identified as Joint Vocational School Districts) tend to have higher proportions of concentrators.*
- » *Cleveland Municipal School District (CMSD) CTE programs have the largest number of participants of all Career and Technical Planning Districts in the region. At the same time, CMSD has the second lowest absolute number and the lowest proportion of students concentrating in a career field.*
- » *In some high demand fields in the Cleveland area, such as engineering or information technology, CTE pathways across all the districts show significant numbers of participants. However, with a few exceptions, these participants do not become concentrators. It appears that many students are taking one or two courses, but not enough to qualify as a concentrator.*
- » *In CMSD, the small numbers of concentrators in practically all the pathways are especially striking. With the exception of the health, agriculture (landscaping program) and construction pathways, no other pathway has more than 20 percent of concentrators as a proportion of participants.*

SECONDARY CTE PARTICIPANTS AND CONCENTRATORS IN CLEVELAND AREA CAREER TECHNICAL PLANNING DISTRICTS (2012)

<i>Career Technical Planning District Name</i>	<i>Unduplicated Student Participants in CTE Courses</i>	<i>CTE Concentrators</i>	<i>Concentrators as Percent of Participants</i>
<i>Cleveland Municipal</i>	2,006	250	12.4%
<i>Polaris (JVSD)</i>	1,727	525	30.4%
<i>Medina County (JVSD)</i>	1,445	568	39.3%
<i>Six District Voc Ed Compact</i>	1,375	512	37.2%
<i>Parma</i>	1,341	544	40.6%
<i>Lorain County (JVSD)</i>	1,209	585	48.4%
<i>Cuyahoga Valley</i>	1,204	455	37.8%
<i>Mayfield Excel TECC</i>	1,029	498	48.4%
<i>Lorain City (JVSD)</i>	1,007	378	37.5%
<i>Maple Heights-Bedford</i>	956	217	22.7%
<i>Four City Compact</i>	810	440	54.3%
<i>Auburn (JVSD)</i>	672	316	47.0%
<i>Lakewood City</i>	506	351	69.4%
<i>Tri-Heights Career Prep Consortium</i>	410	140	34.1%
<i>East Cleveland</i>	369	294	80.0%
<i>Lake Shore Compact</i>	328	419	127.7%
TOTALS	16,394	6,529	39.8%

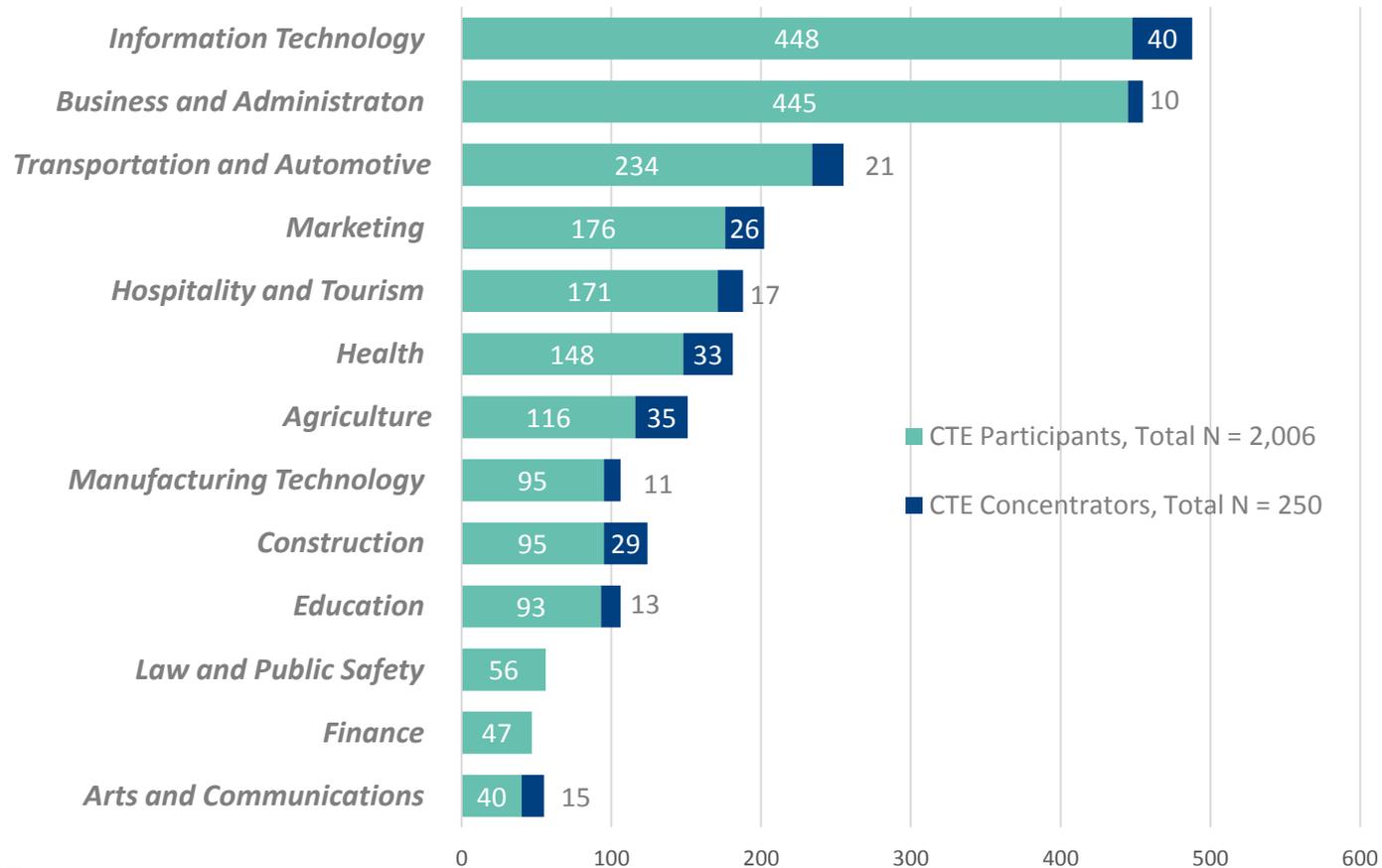
Source: Ohio Department of Education, 2014. (JVSD-Joint Vocational School District, indicates a dedicated facility for CTE offerings.)

CLEVELAND AREA SECONDARY CTE PARTICIPANTS AND CONCENTRATORS BY PATHWAY
(2012)



Source: Ohio DOE, 2014, data supplied. Note: Not all pathways offered at all schools.

CLEVELAND MUNICIPAL SCHOOL DISTRICT SECONDARY CTE PARTICIPANTS AND CONCENTRATORS BY PATHWAY (2012)



Source: Ohio DOE, 2014, data supplied. Absence of bar values indicates 0 in category.

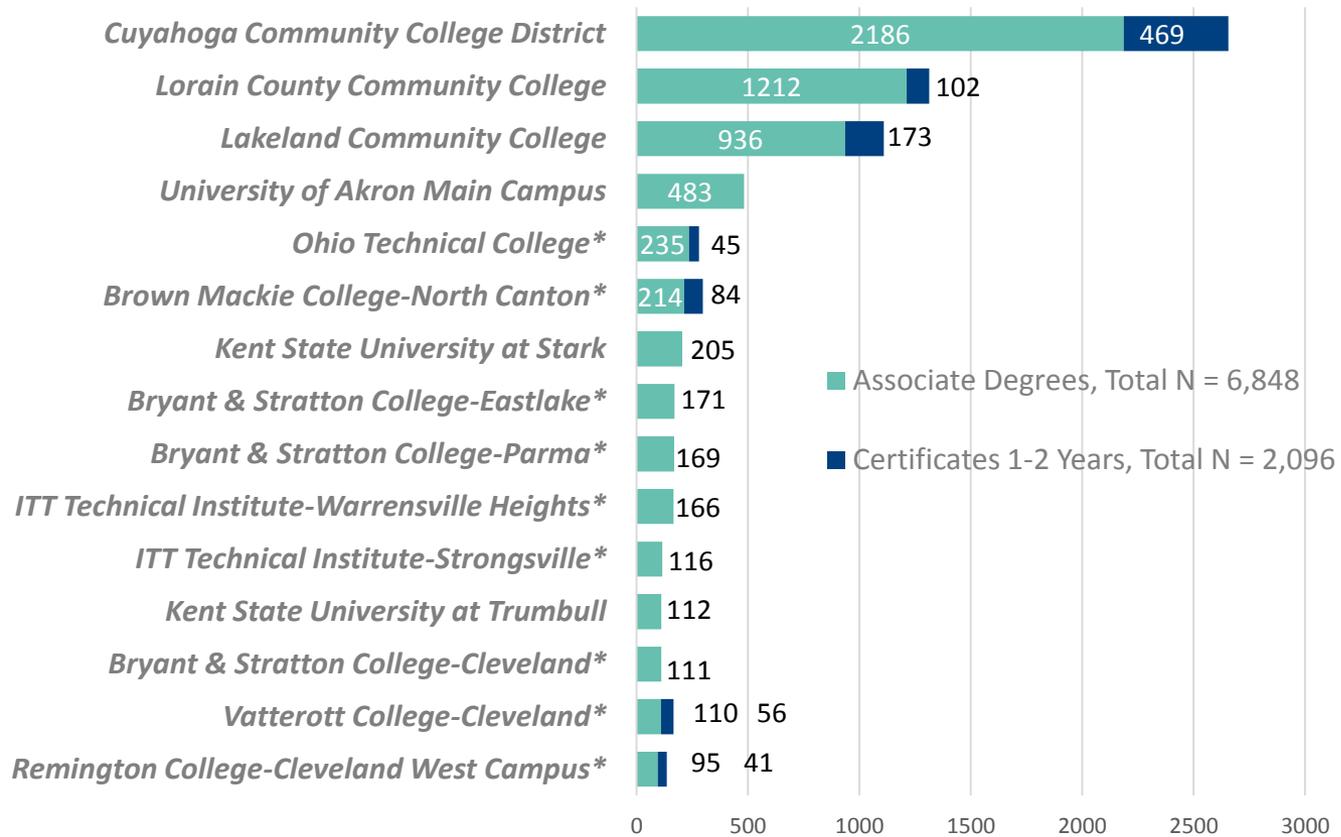
Nearly 50,000 students are currently enrolled in area institutions that offer sub-baccalaureate programs leading to potential Associate Degrees or academic certificates (representing more than one but less than two program years). The following tables and charts present enrollment, field of study and completion data provided by the Ohio Board of Regents and federal education data sources for institutions within a 20 mile radius of downtown Cleveland. Our key observations include:

- » *The completion ratio for either an associate degree or certificate is about 10 percent for the public community colleges in the region. These proportions vary considerably by programs of study and there are many reasons why ratios could be at this level.*

- » *In terms of both enrollments and completions, students at community colleges in the Cleveland area focus on a just a few program areas—general studies, health programs, and business and management. Ninety percent of all associate degrees from public community colleges in the region were awarded in just five program areas in 2012.*

- » *Private for-profit colleges play a significant roles in sub-baccalaureate education in the region, accounting for 35 percent of Associate Degrees and Certificates awarded in the region compared to about 17 percent across the country. It appears that students are deciding that these types of institutions fit with their educational goals.*

ASSOCIATE DEGREE AND CERTIFICATE PRODUCTION BY INSTITUTION (2012)



Source: National Center for Educational Statistics, Integrated Postsecondary Data System (IPEDS), Completions, 2014. * Private, for-profit colleges. Absence of bar value indicates value of less than 10 awards.

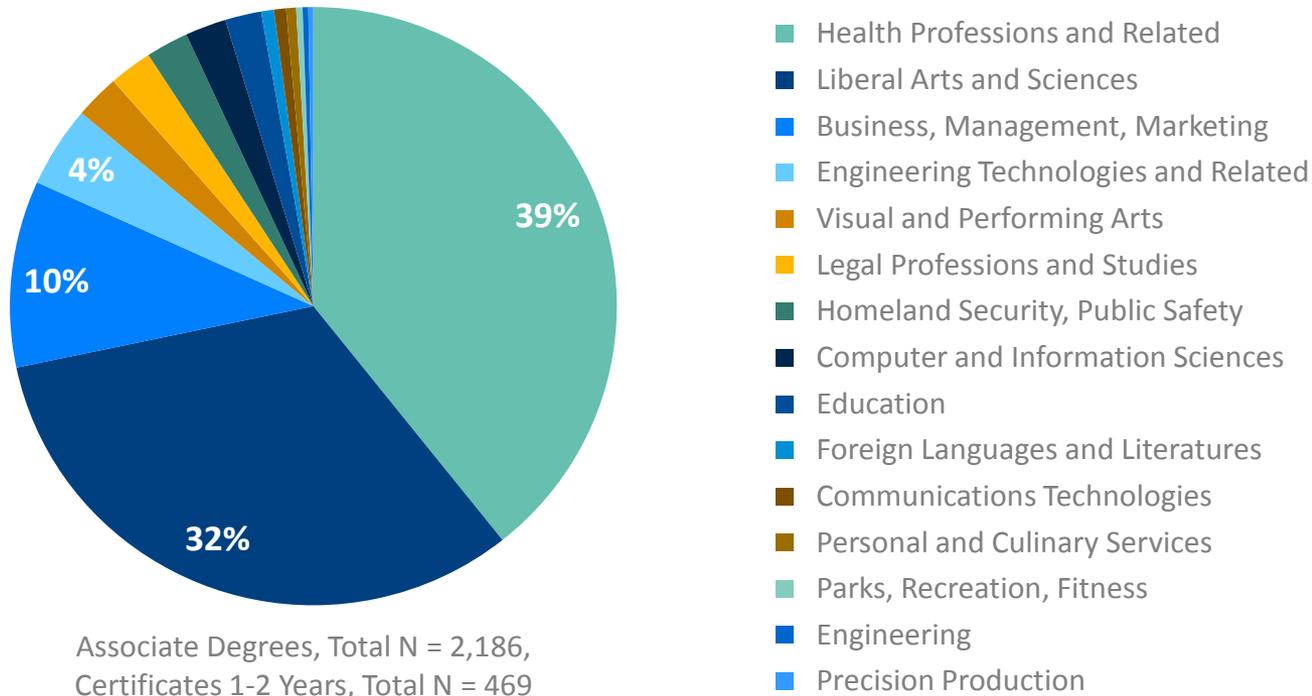
**ENROLLMENT AND CREDENTIALS AWARDED BY FIELD OF STUDY
(Cuyahoga, Lakeland And Lorain Community Colleges, 2012)**

<i>Field of Study</i>	<i>Total Enrollments</i>	<i>Total Associate Awards</i>	<i>Total Certificate Awards*</i>	<i>Completions as Percent of Enrollment</i>
<i>Health Professions and Clinical Sciences</i>	15,180	1,292	500	11.8%
<i>Liberal Arts and Sciences</i>	14,776	1,766	-	12.0%
<i>Business, Management, Marketing</i>	6,900	466	60	7.6%
<i>Engineering Technologies and Related</i>	2,399	195	71	11.1%
<i>Security and Protective Services</i>	1,638	178	2	11.0%
<i>Education</i>	1,467	63	-	4.3%
<i>Visual and Performing Arts</i>	1,347	69	17	6.4%
<i>Computer and Information Sciences</i>	1,245	108	12	9.6%
<i>Precision Production</i>	1,063	9	1	0.9%
<i>Public Administration, Social Services</i>	570	26	5	5.4%
<i>Legal Professions</i>	531	39	63	19.2%
<i>Engineering</i>	453	24	2	5.7%
<i>Parks, Recreation, Fitness</i>	405	23	-	5.7%
<i>Family and Consumer Sciences</i>	244	17	-	7.0%
<i>Foreign Languages and Literature</i>	162	20	-	12.3%
<i>Totals All Programs, All Colleges</i>	49,143	4,334	744	10.3%

Source: Enrollments, Ohio Board of Regents, 2014, data supplied; IPEDS, Completions 2014.

*Certificates of more than one but less than 2 years study. **Columns do not add to totals

ASSOCIATE DEGREES AND CERTIFICATES, BY FIELD
(CUYAHOGA COMMUNITY COLLEGE, 2012)



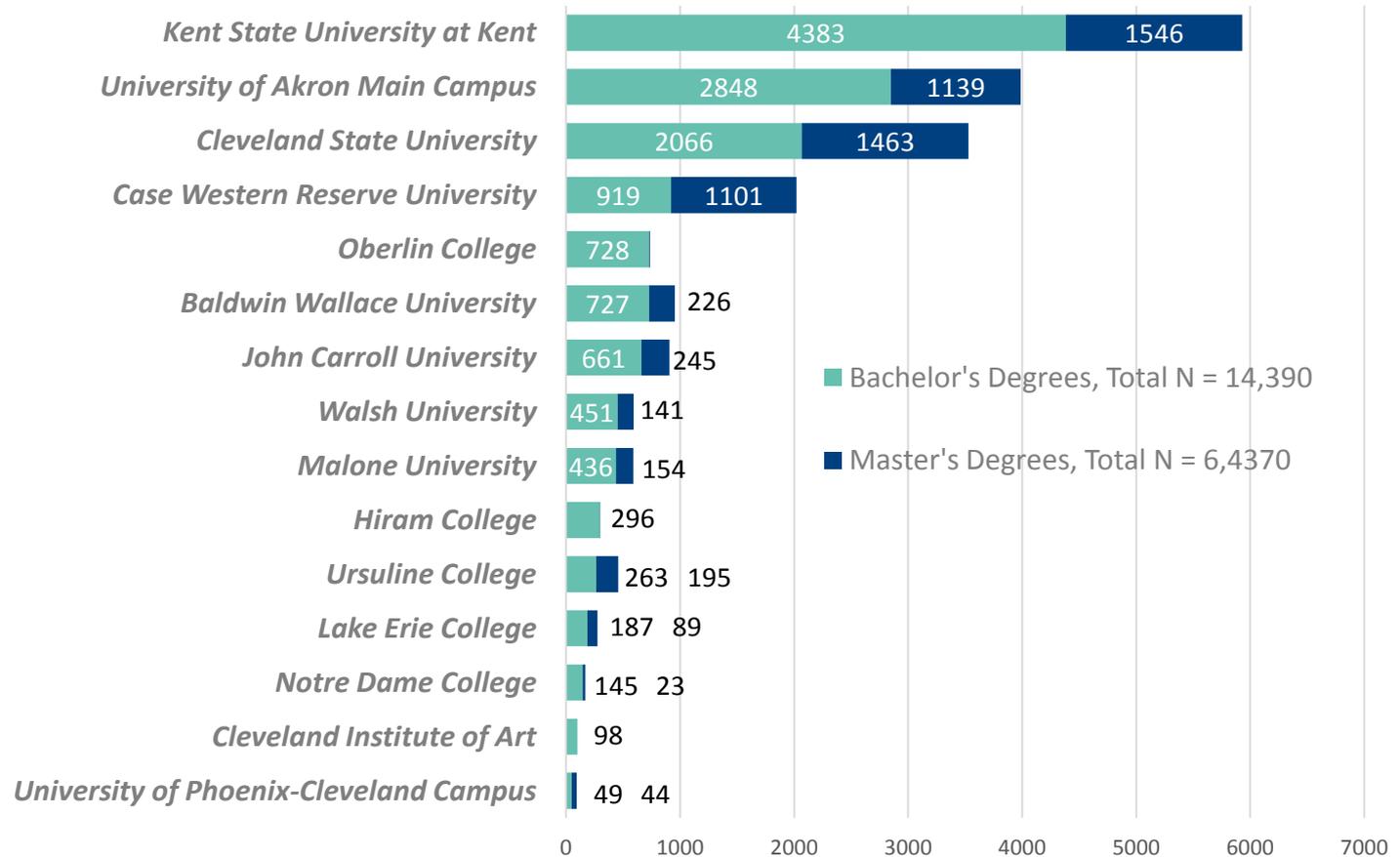
Source: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions, 2014.

Over 80,000 students are currently enrolled in area institutions that offer baccalaureate or graduate degrees programs across a wide variety of fields. The following tables and charts present enrollment, field of study and completion data for colleges and universities within a 50 mile radius of downtown Cleveland. Data was drawn from the Ohio Board of Regents and the federal Integrated Post Education Data System (IPEDS). Our key observations include:

- » *Among baccalaureate institutions there is a more dispersed distribution of students in various programs than among community colleges but there is still a relatively high concentration among a handful of programs. Many of the more technical fields, such as information technology and engineering, produce very small numbers of Bachelor's and Master's degrees compared to those in health, business, education and liberal arts.*

- » *At Cleveland State University, about 65 percent of Bachelor's Degree awards are in five fields including: Business, Management and Marketing; Health Professions and Related; Social Sciences, Psychology and Education.*

BACHELOR'S AND MASTER'S DEGREE PRODUCTION BY INSTITUTION (2012)



Source: IPEDS, Completions, 2014. Absence of bar value indicates value of less than 10 awards.

ENROLLMENT AND COMPLETION DATA BY FIELD OF STUDY

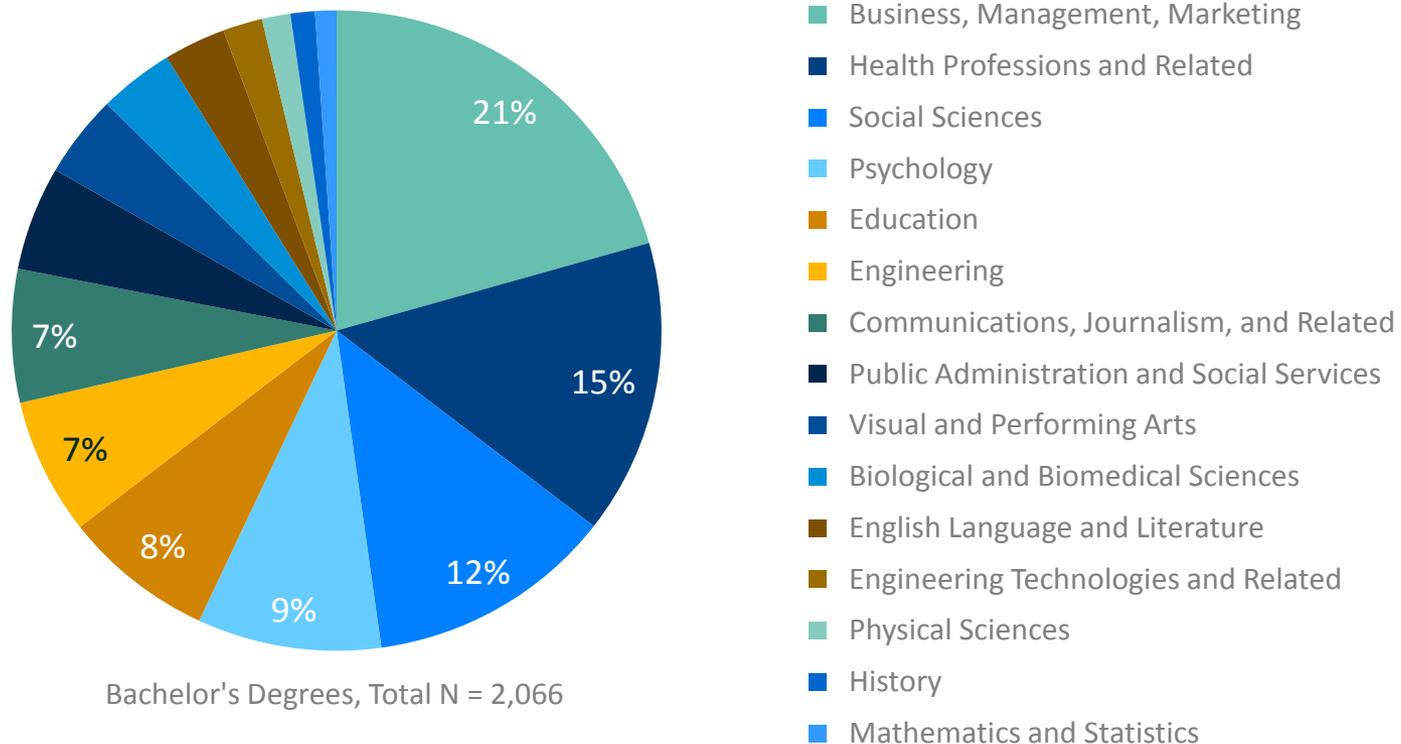
(Kent State University and Selected Branches, Cleveland State University and University Of Akron, 2012)

<i>Field of Study</i>	<i>Total Program Enrollments</i>	<i>Bachelor's</i>	<i>Master's</i>	<i>Total Awards as Percent of Program Enrollments</i>
<i>Health Professions and Clinical Sciences</i>	12,043	1,359	469	15.9%
<i>Business, Management, Marketing</i>	11,455	1,737	788	22.7%
<i>Liberal Arts and Sciences*</i>	9,050	153	0	1.8%
<i>Education</i>	8,618	878	1,176	23.9%
<i>Engineering</i>	4,673	376	227	12.9%
<i>Visual and Performing Arts</i>	3,723	465	94	15.0%
<i>Communications and Journalism</i>	3,607	739	50	21.9%
<i>Psychology</i>	3,311	575	144	21.7%
<i>Biological and Biomedical Sciences</i>	2,900	363	48	14.2%
<i>Social Sciences</i>	2,708	509	105	22.8%
<i>Computer and Information Sciences</i>	2,251	205	97	17.9%
<i>Architecture and Related Services</i>	1,924	90	55	7.5%
<i>Security and Protective Services</i>	1,849	247	1	19.5%
<i>Physical Sciences</i>	1,603	95	59	9.6%
<i>Public Administration and Social Services</i>	1,592	191	257	28.6%
<i>Engineering Technologies and Related Fields</i>	1,378	284	31	29.1%
<i>Totals All Programs, All Colleges*</i>	81,316	9,306	4,148	16.5%

Source: Enrollments, Ohio Board of Regents, 2014, data supplied; IPEDS, Completions, 2014.

*Note: many students enroll in Liberal Arts, but end up with majors in other fields, accounting for the low degree award totals.

BACHELOR'S DEGREE AWARDS BY FIELD
(Cleveland State University (2012))



Source: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions, 2014.

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A black and white, long-exposure photograph of a multi-lane highway with heavy traffic. The cars are blurred into streaks, creating a sense of rapid movement. In the background, city buildings are visible under a bright sky.

SECTION 4

Demand Supply Alignment

Our analysis of demand-supply alignment took the data produced on demand across key occupational areas and aligned them with data on credential output from postsecondary institutions in the region. We present a “Summary Chart of Alignment” of our analysis of demand-supply alignment in this section. Major observations from this analysis of demand-supply alignment include:

- » *In many areas there is substantial misalignment between demand for key occupations and supply of appropriately credentialed workers. In some cases there are hundreds of job openings above what is being produced in relevant fields from area educational institutions.*
- » *The biggest misalignment between demand and supply is for computer and IT workers. There appears to be far more employer demand for workers in this occupational field than there is supply of matching credentials.*
- » *The annual demand for manufacturing and production workers is also more than the supply of credentials produced by area educational institutions; this type of misalignment also occurs for construction trades.*
- » *There are many occupations in health care that are misaligned. Demand for treating practitioners (such as nurses and nurse practitioners) is more than the supply produced. On the other hand, there is more supply of credentialed health therapist aides and support workers than there is demand from employers.*
- » *The alignment is more mixed for engineers and life sciences and some occupations in financial and business and back office support are misaligned, in particular for information and record clerks.*

The summary chart on the next page shows a high-level picture of demand supply alignment across a number of key occupational areas and is a useful starting point for discussion with residents, institutions, philanthropic, and civic leaders in the Greater Cleveland area.

The data included in the chart come from multiple sources:

- » *The first area is annual demand. Demand data are for 2013 based on FutureWorks calculations of EMSI's projected job openings from the US Bureau of Labor Statistics in 2013 and Burning Glass Labor Insight's 2013 real-time job postings. All demand data are for the Cleveland Metropolitan Statistical Area with the addition of Summit County.*
- » *The second area is credentials awarded from Cleveland area postsecondary institutions. These are credentials awarded from two-year postsecondary institutions within a 20-mile radius of Cleveland and four-year postsecondary institutions within a 50-mile radius. All data on credentials are from the U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS) for 2012.*

Our demand supply model does not capture every pathway to employment, i.e., apprenticeships, temp agencies, etc. The academic pathway has been our focus. The connection to some jobs we have selected, like construction, include many non-academic pathways. This is changing, in part, because community colleges are now attempting to link apprenticeships to degrees. Additional information on construction can be found in the “Demand Study for Construction Employees” prepared by Mohr Partners Cleveland, W.E. Upjohn Institute for Employment Research, and Weber Murphy Fox for The Construction Diversity Committee, Commission on Economic Inclusion, Greater Cleveland Partnership.

SECTION 4

Demand Supply Alignment



There is more demand than supply of credentials.



Demand and supply appear in relative balance.



There is more supply of credentials than demand.

SUMMARY CHART OF ALIGNMENT

		Demand 2013	Credentials Awarded 2012	Alignment
IT	Computer and IT Workers	11,204	1,301	
	Metal and Plastic Workers	1,888	587	
Manufacturing & Construction	Installation, Maintenance and Repair Workers	2,350	593	
	Skilled Production Workers	2,739	1,270	
	Construction Trade Workers	1,031	203	
	Health Diagnosing and Treating Practitioners	8,517	4,188	
Health	Health Technologists and Technicians	3,527	2,763	
	Health Therapist Aides and Support Workers	474	1,597	
	Nursing and Home Health Aides	2,069	510	

SUMMARY CHART OF ALIGNMENT

		Demand 2013	Credentials Awarded 2012	Alignment
Life Sciences/Engineering	Engineers	3,048	1,259	
	Architects and Engineering Technicians	904	847	
	Life Science Workers	1,304	5,006	
Finance & Business Services	Financial Specialists	3,792	2,439	
	Financial Clerks	2,559	2,571	
	Secretaries and Administrative Assistants	2,708	419	
Management	Information and Record Clerks	4,616	859	
	Front-line Supervisors of Skilled Workers	1,862	3,201	
	Managers, Professional and Health	5,412	15,238	

Sample Analysis of Selected Occupations

As part of the analysis of alignment, we also researched the wage characteristics and educational requirements of the key occupational areas. A complete analysis of the credentials by type, wage characteristics of the occupations, and educational requirements for each occupation is contained in Appendix C. We have selected three examples from the Appendix and include them here, after the Summary Chart of Alignment. These are:

- Computer and IT Workers
- Metal and Plastic Workers
- Health Diagnosing and Treating Practitioners

Each of these analyses consists of a broad Overview, a “Numbers at a Glance” section, and a data breakdown.

Description

Computer and IT Workers span sectors and fulfill critical roles in many of the employment and wealth-generating economic sectors (biosciences and health care, advanced manufacturing, information technology, and financial, business services, and back office support).

Workers in this occupation provide technical assistance to computer users; analyze data processing problems to implement and improve computer systems or develop IT solutions; create, modify, and test the code, forms, and script that allow computer applications to run; monitor and ensure network and perform maintenance to support network availability.

There are good entry points and mobility for workers in the field. The occupation and industry has clear career pathways marked by widely recognized industry credentials at all levels of the educational spectrum.

Knowledge Needed

- » Engineering and Technology: computers and electronics
- » Math and Science: arithmetic, algebra, geometry, calculus, or statistics
- » Product and Service Development

Technical Skills in Demand

- » SQL, Oracle, .NET Programming, Microsoft C#, JAVA

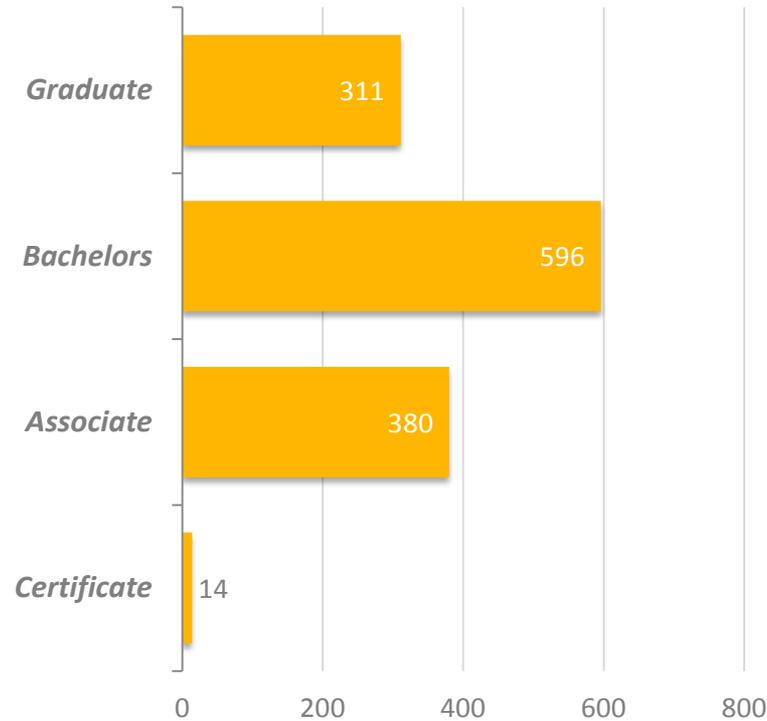
Top Employers Hiring

- » Cleveland Clinic
- » Progressive Insurance
- » Exodus Integrity Services
- » Sherwin Williams
- » Rockwell Automation Incorporated
- » Keycorp

DEMAND & SUPPLY



CREDENTIALS AWARDED



MEDIAN HOURLY WAGE



Computer and IT Workers : Data Breakdown

OCCUPATIONAL GROUP (3-DIGIT SOC)*	LABOR MARKET DEMAND		CREDENTIALS AWARDED			
	<i>Annual Demand</i>	<i>Median Hourly Wage</i>	<i>Certificate</i>	<i>Associate</i>	<i>Bachelors</i>	<i>Graduate</i>
All Computer and IT Workers	11,204	\$33.03	14	380	596	311

KEY OCCUPATIONS WITHIN GROUP (6-DIGIT SOC)*	LABOR MARKET DEMAND		CREDENTIALS REQUIRED		
	<i>Annual Demand</i>	<i>Median Hourly Wage</i>	<i>HS or less</i>	<i>Some College or Associate</i>	<i>Bachelor or Higher</i>
Software Developers, Applications	2,745	\$37.35	3%	15%	82%
Computer Workers General	2,432	\$38.32	13%	42%	45%
Computer Systems Analysts	1,755	\$34.72	6%	24%	70%
Computer User Support Specialists	1,108	\$20.43	13%	48%	39%
Network and Computer Systems Administrators	683	\$32.64	8%	46%	46%
Computer Programmers	665	\$31.27	7%	25%	69%
Database Administrators	620	\$31.33	7%	27%	66%
Web Developers	423	\$25.08	8%	32%	61%

**The "Occupational Group" in the first table is a 3-digit occupational group as categorized by the Standard Occupational Classification (SOC) system. The "Key Occupations Within Group" in the second table is a sub-set of occupations within this group, identified by the SOC system as 6-digit occupations. Key occupations listed in the second table are selected to show those 6-digit occupations within the group with the greatest demand and do not include all occupations within the group.*

Description

Metal and Plastic Workers is a subgroup of Production and Manufacturing Workers.

Workers in this occupation set up and operate a variety of machine tools to produce precision parts and instruments; lay out, machine, fit, and assemble castings and parts to metal or plastic foundry patterns, core boxes, or match plates; develop programs to control machining or processing of metal or plastic; use hand-held equipment to join or cut metal or plastic components.

There is good career mobility within the industry with entry points that require a postsecondary credential less than a Bachelor's Degree.

Knowledge Needed

- » **Engineering and Technology:** mechanical, design
- » **Math and Science:** arithmetic, algebra, geometry, calculus, or statistics, physics
- » **Manufactured Goods:** manufacture and distribution of products

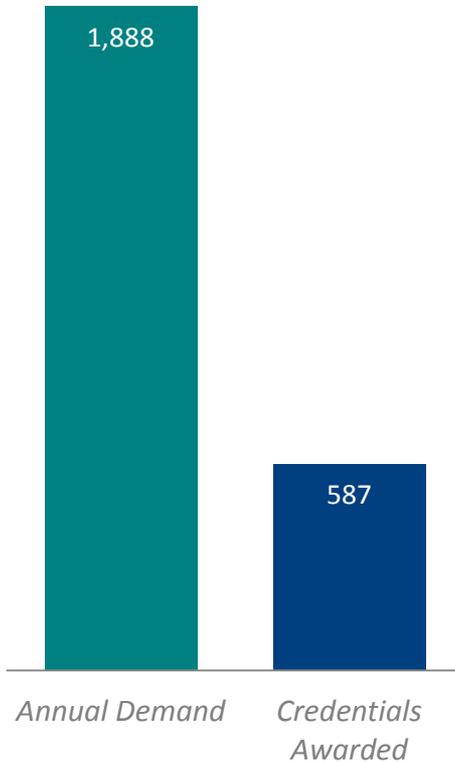
Technical Skills in Demand

- » **Machining, Computer Numerical Control (CNC), Blueprints, Lathes, Calipers, Micrometer Measuring**

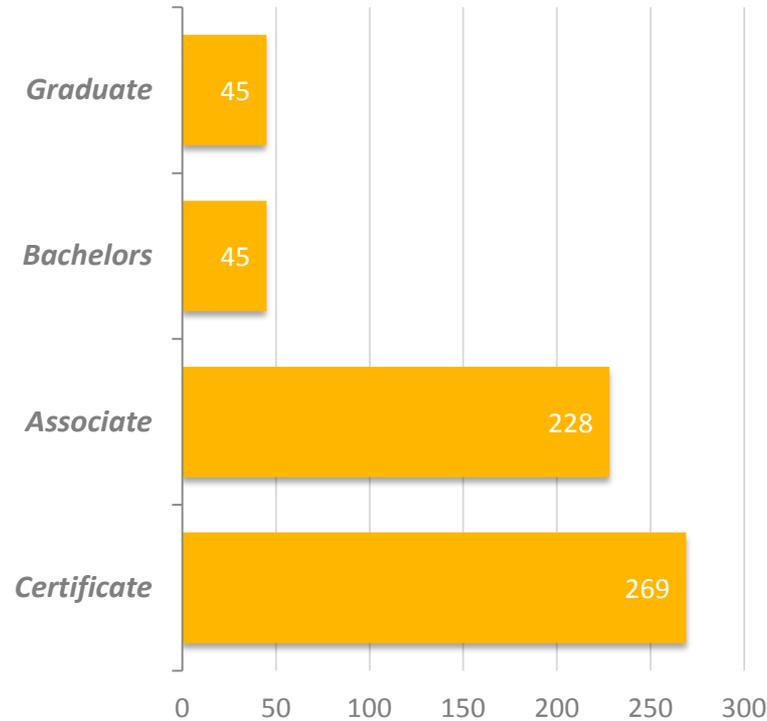
Top Employers Hiring

- » **The Babcock & Wilcox Company**
- » **Amotec Incorporated**
- » **Clark Reliance Corporation**
- » **Snap Rite Manufacturing**
- » **Parker Hannifin**

DEMAND & SUPPLY



CREDENTIALS AWARDED



MEDIAN HOURLY WAGE



OCCUPATIONAL GROUP (3-DIGIT SOC)*	LABOR MARKET DEMAND		CREDENTIALS AWARDED			
	<i>Annual Demand</i>	<i>Median Hourly Wage</i>	<i>Certificate</i>	<i>Associate</i>	<i>Bachelors</i>	<i>Graduate</i>
All Metal and Plastic Workers	1,888	\$17.36	269	228	45	45

KEY OCCUPATIONS WITHIN GROUP (6-DIGIT SOC)*	LABOR MARKET DEMAND		CREDENTIALS REQUIRED		
	<i>Annual Demand</i>	<i>Median Hourly Wage</i>	<i>HS or less</i>	<i>Some College or Associate</i>	<i>Bachelor or Higher</i>
Computer-Controlled Machine Tool Operators	589	\$17.15	50%	43%	7%
Machinists	316	\$17.94	57%	40%	3%
Welders, Cutters, Solderers, and Brazers	280	\$17.23	73%	26%	2%
Press Machine Setters, Operators, and Tenders	137	\$14.71	78%	20%	2%
Machine Tool Setters, Operators, and Tenders	72	\$15.52	80%	18%	2%
Tool and Die Makers	68	\$28.17	49%	46%	4%

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Description

Health Diagnosing and Treating Practitioners are a subgroup of the large set of health care-related occupations in the region. They are the highest trained group of workers in health care (e.g. doctors, nurses, nurse practitioners, pharmacists).

Workers in this occupation diagnose and treat acute, episodic, or chronic illness, independently or as part of a health care team; order, perform, or interpret the results of diagnostic tests; prescribe medication.

The industry is highly regulated, which sets up established educational pathways and credentials needed. Most of the positions in this group of health care workers require a Bachelor's or advanced degree.

Knowledge Needed

- » Health: medicine, therapy and counseling
- » Math and Science: psychology and biology
- » Business: customer service

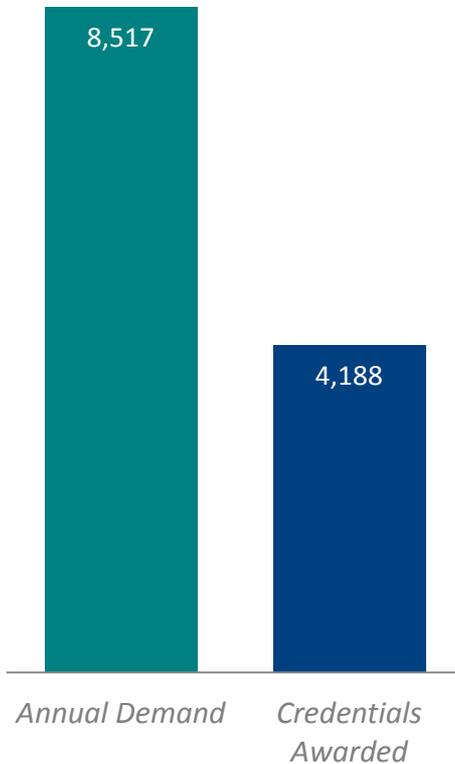
Technical Skills in Demand

- » Treatment Planning and Diagnosis, Advanced Cardiac Life Support, Medical PDAs, Electronic Medical Records (EMR)

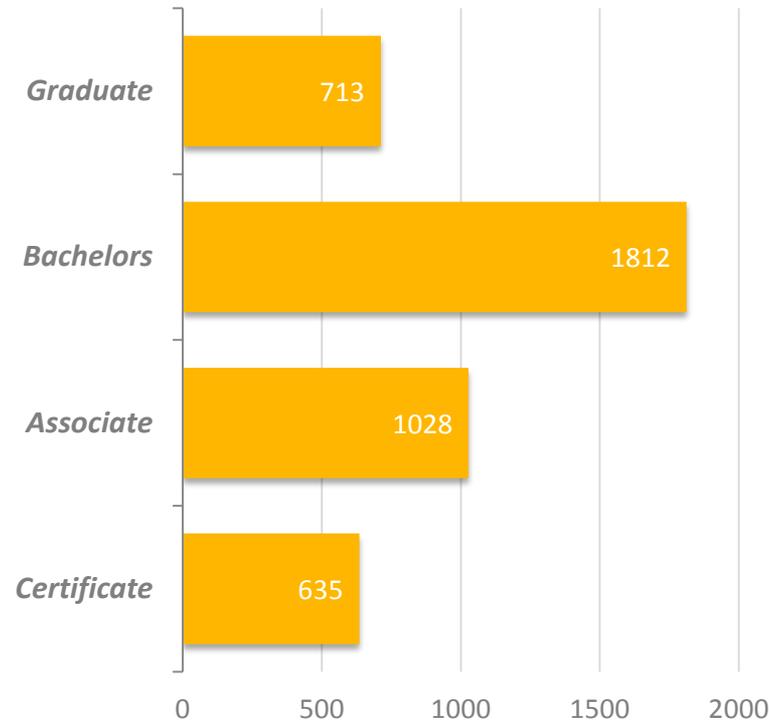
Top Employers Hiring

- » Cleveland Clinic
- » Southwest General Health Center
- » Akron Childrens Hospital
- » University Hospitals
- » Kindred Healthcare Incorporated
- » Metrohealth System

DEMAND & SUPPLY



CREDENTIALS AWARDED



MEDIAN HOURLY WAGE



OCCUPATIONAL GROUP (3-DIGIT SOC)*	LABOR MARKET DEMAND		CREDENTIALS AWARDED			
	<i>Annual Demand</i>	<i>Median Hourly Wage</i>	<i>Certificate</i>	<i>Associate</i>	<i>Bachelors</i>	<i>Graduate</i>
All Health Diagnosing and Treating Practitioners	8,517	\$42.85	635	1,028	1,812	713

KEY OCCUPATIONS WITHIN GROUP (6-DIGIT SOC)*	LABOR MARKET DEMAND		CREDENTIALS REQUIRED		
	<i>Annual Demand</i>	<i>Median Hourly Wage</i>	<i>HS or less</i>	<i>Some College or Associate</i>	<i>Bachelor or Higher</i>
Registered Nurses	4,729	\$31.37	1%	44%	55%
Nurse Practitioners	680	\$42.28	0%	3%	97%
Physician Assistants	416	\$44.11	5%	21%	74%
Occupational Therapists	374	\$39.70	1%	10%	89%
Physical Therapists	344	\$39.93	2%	8%	90%
Pharmacists	277	\$57.65	0%	5%	95%

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A black and white, long-exposure photograph of a multi-lane highway with heavy traffic. The cars are blurred into streaks, creating a sense of rapid movement. In the background, city buildings are visible under a bright sky.

SECTION 5

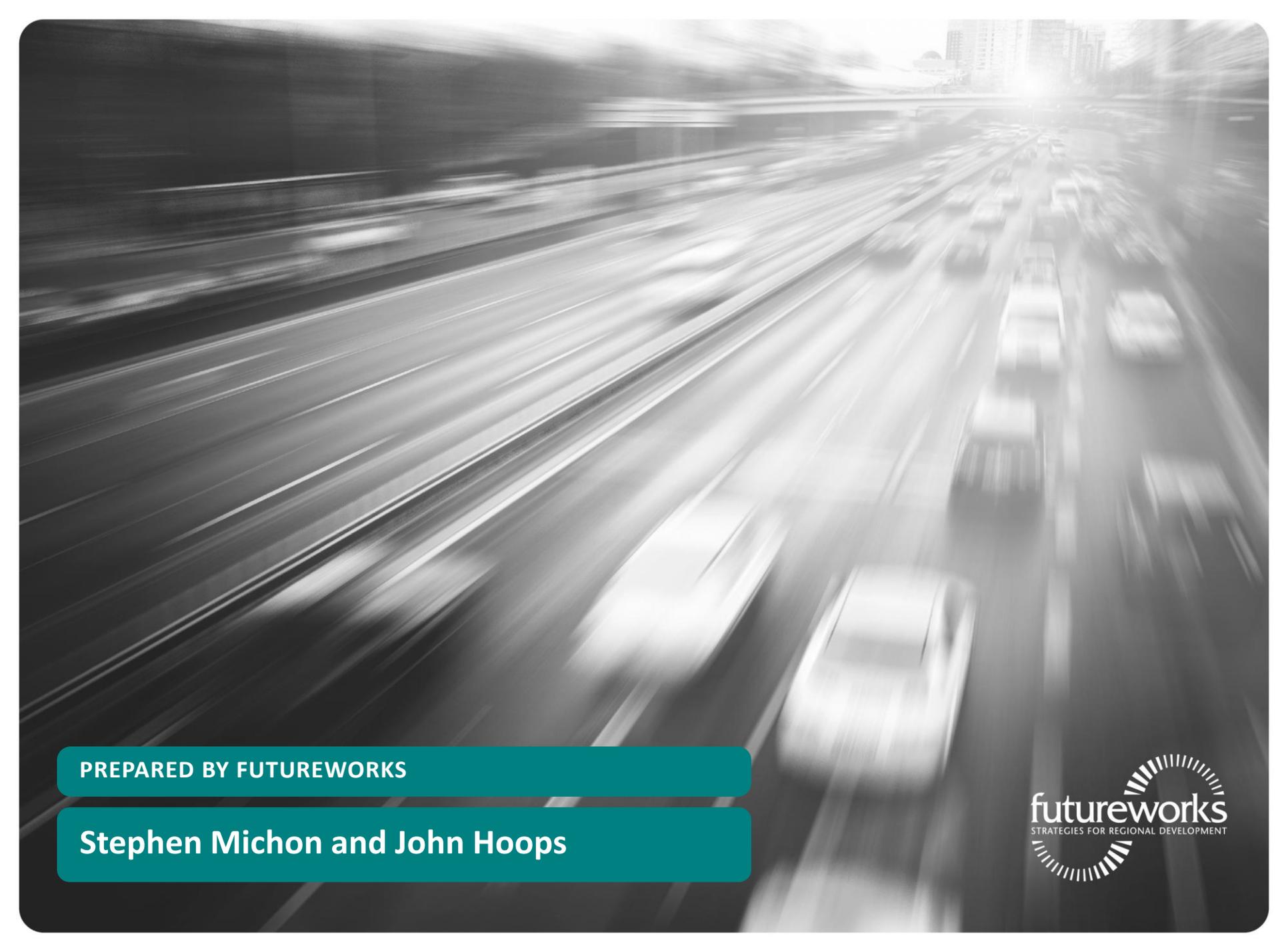
Implications

The purpose of our research and analysis is to inform and help accelerate talent development policy in the city and region. That policy should provide skilled talent critical to growing key wealth generating sectors in the economy and, at the same time, provide opportunities for good careers and incomes for Cleveland residents.

Our research and analysis leads to a number of high-level implications for talent development policy in the city and region. These implications are:

- » *There is significant demand in some sectors of the Cleveland area economy that present opportunity for Cleveland residents. Channels need to be opened into these opportunities, especially those with family sustaining wages.*
- » *Cleveland residents need better access to quality education and training that will help them fill these jobs.*
- » *Given the large numbers of non-residents in many Cleveland jobs now, Cleveland residents – students and adults – need better labor market information about employment and career opportunities among Cleveland employers.*
- » *Employers need assistance finding better ways to access the talent they need. Capturing the latent talent pool in the Cleveland labor force will help grow the economy.*
- » *Younger students, secondary and postsecondary students, and adults should have better and more accurate information about the possible choices to enter professional and technical fields of study.*

- » *The region should understand why so few students complete technical programs (at the secondary and postsecondary levels), and then shore up and improve the education pipeline to increase the flow of local talent into employment in Cleveland.*
- » *The current low levels of output in some programs offer an opportunity to reshape the delivery and organization of technical education in Cleveland; this could be through rapid adoption of innovative models and practices, such as developing exemplar schools for Career and Technical Education focused on key economic sectors or adopting innovations such as work-based learning and deep, sustained employer engagement across the system.*
- » *Education at the secondary and postsecondary level needs to increase the output of students with credentials in high demand sectors with family sustaining wages. In particular, local districts and postsecondary institutions need to define ways to improve and offer programs in technical fields of study that attract students and get them to complete their degrees.*
- » *Deeper employer engagement in postsecondary education is critical to improving the quality and relevancy of educational programs.*
- » *The sharp misalignment between demand and supply in some fields is an indicator that educational institutions—at both the leadership and faculty levels--- may not have full information to understand nearby opportunities.*
- » *Educators and civic leadership could use better labor market information to drive programming investments in and identify employer partnerships with educational institutions.*



PREPARED BY FUTUREWORKS

Stephen Michon and John Hoops

