INDIANA EMERGENCY MEDICAL SERVICES WORKFORCE

2023 INDIANA EMS WORKFORCE ASSESSMENT

SCHOOL OF MEDICINE
BOWEN CENTER FOR HEALTH
WORKFORCE RESEARCH & POLICY

TABLE OF CONTENTS

ACKNOWLEDGEMENTS

Developed by the Bowen Center for Health Workforce Research & Policy in partnership with the Indiana Department of Homeland Security and Indiana Department of Health.

COPYRIGHT

Department of Family Medicine
Indiana University School of Medicine
1110 W. Michigan Street, Suite 200
Indianapolis, IN 46202

RECOMMENDED CITATION

2023 Indiana EMS Workforce Assessment (2024). Bowen Center for Healthcare Workforce Research & Policy. Indiana University School of Medicine.

AUTHORED BY

Mykayla Tobin, Special Projects Policy Analyst
Becky Boustani, Senior Policy Analyst
Courtney Medlock, Assistant Director of Policy and Strategy
Sierra Vaughn, Assistant Director of Data and Research
Hannah L. Maxey, Director

CONTRIBUTIONS BY

Yan Ge, Research Data Assistant
Cleveland Dietz, State Project Coordinator

DESIGNED BY

Devan Gannon

Please address any correspondence regarding this document to the Bowen Center via email at bowenctr@iu.edu or by phone at 317.278.4818.

REPORT IN BRIEF

As the first responders to medical emergencies, emergency medical services (EMS) personnel such as paramedics and emergency medical technicians (EMTs) play a critical role in the health and safety of Hoosiers. Shortages of EMS personnel are reported as a top challenge to ensuring access to emergency medical services within the United States[1,2,3]. Several key issues have been identified as threatening recruitment and retention of EMS personnel nationally and in Indiana, including long shifts, low wages and high physical and mental stress, which have led to a decreasing workforce[4,5]. Addressing these workforce challenges requires a comprehensive planning approach, beginning with a workforce assessment.

INDIANA GOVERNOR PRIORITY

Recognizing the importance of a strong and stable EMS workforce, the Indiana Governor's Public Health Commission (GPHC) published recommendations for enhancing and sustaining the workforce[6]. Recommendation 23 called to "ensure local level EMS readiness through expansion and sustainability of EMS workforce." The action items included in the GPHC recommendations are as follows:

- "Indiana Department of Health (IDOH) in conjunction with the EMS Commission, will conduct a needs assessment of specific EMS gaps in local jurisdictions.
- Ensure funding for prioritized recruitment to address EMS workforce shortages and provide mechanisms for cost-sharing related to equipment purchases, particularly in underserved and geographically remote areas of the State.
- Establish long-term promotional and retention plans for EMS personnel.
- Enhance ongoing higher-level EMS training and expansion of community paramedicine programs.
- Improve health outcomes related to preventable injuries and other trauma through enhanced analysis and educational initiatives, increased access to EMS, and other efforts to strengthen the trauma system."

WHAT ARE THE LEVELS OF EMS CERTIFICATION IN INDIANA?

Emergency Medical Responder (EMR)

Emergency Medical Technician (EMT)

Advanced Emergency Medical Technician (AEMT)

Paramedic

EXECUTIVE BRANCH CHAMPIONS

The GPHC recommendations set forth a goal of assessing and measuring the EMS workforce in Indiana to inform future opportunities for targeted workforce development. This work was put into action by the Indiana Department of Homeland Security (IDHS) and Indiana Department of Health (IDOH) through the co-sponsorship of a comprehensive assessment of Indiana's EMS workforce in 2023. Both agencies champion EMS service-related initiatives within the state of Indiana. IDOH houses the Trauma Commission, which focuses on developing Indiana's trauma care system while also managing public health and hospital preparedness federal grants[7,8]. The EMS Commission is housed within IDHS and focuses on developing Indiana's EMS system. IDHS is also primarily responsible for Federal Emergency Management Agency (FEMA) emergency preparedness grants[8,9]. The Bowen Center for Health Workforce Research and Policy (Bowen Center), at the Indiana University School of Medicine, partnered with IDHS and IDOH to plan and execute this assessment during calendar year 2023. The interconnectedness of trauma, emergency services, and associated federal funding sources requires an ongoing collaborative relationship between IDOH and IDHS which led to the unique co-sponsorship of this assessment.

1 Combatting the EMS Shortage with Data. Available at https://www.jems.com/administration-and-leadership/combatting-the-ems-shortage-with-data/
2 EMS Services in Rural America. Available at https://www.ruralhealth.us/NRHA/media/Emerge_NRHA/Advocacy/Policy%20documents/05-11-18-NRHA-Policy-EMS.pdf
3 Ambulance services face national paramedic shortage. Available at https://www.ems1.com/paramedic-jobs-and-careers/articles/ambulance-services-face-national-paramedic-shortage-QAINB7yNEngfu5ID/
4 Indiana EMS Workforce Shortage. Available at https://www.in.gov/dhs/files/Indiana-EMS-Workforce-Shortage-2022.pdf
5 Evaluating changes in the emergency medical services workforce. Available at https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10211462/
6 Indiana Governor's Public Health Commission Report 2022. Available at https://www.in.gov/health/files/GPHC-Report-FINAL-2022-08-01.pdf
7 Senate Enrolled Act No 4. Available at https://iga.in.gov/pdf-documents/123/2023/senate/bills/SB0004/SB0004.08.ENRH.pdf
8 Indiana Governor's Public Health Commission Report 2022. Available at https://www.in.gov/health/files/GPHC-Report-FINAL-2022-08-01.pdf
9 IC 16-31-2-7. Available at https://iga.in.gov/laws/2022/ic/titles/16#16-31-2

2023 INDIANA EMS WORKFORCE ASSESSMENT

Prior to 2023, there had not been an assessment of Indiana's EMS workforce. A comprehensive assessment of the workforce was planned and included 1) identification of existing sources of workforce and training pipeline data, 2) development of tools (surveys) to collect information not currently available, and 3) preparation of strategies to support future workforce assessments. The final assessment includes four key sections:

- Sustainable Workforce Tracking
- Needs Assessment
- Pipeline Assessment
- Retention Assessment

ASSESSMENT SUMMARY IN BRIEF

SUSTAINABLE WORKFORCE TRACKING

Assessment of available information on Indiana's EMS workforce completed early in this project identified that no mechanism existed to support the collection of EMS workforce supply data. At the time this assessment was performed, Indiana was unable to identify how many certified/licensed EMS personnel were actively engaged in providing EMS services, performing traditional ambulance response, or even providing services to Hoosiers. Original estimates revealed that as few as 30% of the actively licensed/certified EMS personnel may be actively providing services, but these estimates were based on data that may be considered unreliable[10]. This gap in workforce data was identified as threatening Indiana's ability to assess the workforce, identify shortages, and develop an informed plan for workforce development activities.

While workforce supply data do not exist for licensed/certified EMS personnel, the state of Indiana does have a robust mechanism for workforce data collection at the time of biennial license renewal for physicians, registered nurses, and various other health professions[11]. The regular collection of data from these professions informs workforce planning, recruitment, and retention efforts and allows for the precise tracking of workforce trends. Workforce information for these professions can be accessed in the Bowen Portal Library.

To ensure workforce data are available for future assessments, a state strategy for the collection of EMS workforce data at the time of biennial license/certification renewal was developed and implemented as part of this project. As of October 2, 2023, Indiana has begun the collection of EMS workforce data. At the time of publishing, almost 1,100 EMS personnel have provided information. Opportunity now exists for the state to regularly report on and track longitudinal trends in demographics, training, employment, and education plans. Details on this activity are presented in Section 1 of this report.

NEEDS ASSESSMENT

A needs assessment to understand the needs of local EMS jurisdictions was specifically outlined in the GPHC Recommendations. The most recent state-wide assessment of EMS workforce needs occurred in 2007 and was not county specific. To support current workforce planning initiatives, a county-level needs assessment was prepared using existing data sources.

The EMS Workforce Needs Assessment strategy was modeled after the Robert Wood Johnson County Health Rankings, which assigns each county a "ranking" based on how it compares to the state average on various population health statistics, workforce supply statistics, and workforce resources.

EMS subject matter expertise was used to identify relevant parameters for the County-Level EMS Workforce Needs Assessment. These parameters included EMS workforce capacity and related indicators, and several key population health parameters identified as indictors for EMS demand. Data for the identified parameters were obtained from IDOH, IDHS, and the Department of Workforce Development (DWD):

10 Indiana EMS Workforce Shortage. Available at https://www.in.gov/dhs/files/Indiana-EMS-Workforce-Shortage-2022.pdf
11 Information on Senate Enrolled Act 223. Available at https://hdl.handle.net/1805/20352

Domain	Data Element	Data Source
Population Estimates	Uninsured Prevalence	Robert Wood Johnson County Health Rankings, 2020
	Asthma Rates	Indiana Department of Health, Office of Data Analytics, Data Analysis Team, Indiana Hospital Association, 2020
	Rates of Seizures	Indiana Department of Health, Division of Trauma and Injury Prevention, 2021
	Rates of Opioid Overdose	Indiana Department of Health, Division of Trauma and Injury Prevention, Indiana Hospital Association, 2021
	Emergency Department Utilization Rate	Indiana Department of Health, Division of Trauma and Injury Prevention, Indiana Hospital Association, 2021
Workforce Estimates	EMS Workforce Capacity	Indiana Department of Workforce Development, 2020
	Incident Capacity	Indiana Department of Homeland Security, 2022
	Average Run Distance	Management and Performance Hub, 2023
	Average Run Time	Management and Performance Hub, 2023

It is important to note, the county-level needs assessment prepared for this project was developed using readily available secondary data from Indiana state agencies. Future assessments may leverage the more robust, longitudinal EMS workforce data now being collected due to the workforce tracking strategy implemented during this assessment. Also, as is the case with all analyses prepared using secondary data, caution should be taken with interpreting results. Rather **findings from the 2023 County-Level Indiana EMS Workforce Needs Assessment should be used to inform discussions and aid in targeting EMS workforce planning activities to areas of greatest need.**

Based on results from the 2023 County-level Indiana EMS Workforce Needs Assessment, the following Indiana counties were identified to have the least EMS workforce resources to address potential population demand for EMS:

- St. Joseph
- Noble
- Jay
- Vanderburgh
- Daviess

The full ranking and considerations for future workforce planning are in Section 2 of this report.

TRAINING PIPELINE ASSESSMENT

Indiana's training pipeline for EMS professionals is critically important to developing its workforce. This pipeline includes the EMS training institutions across the state that prepare individuals with the skills necessary to become EMS professionals. Although decreases in the number of certified EMS training institutions have been previously reported [12,13], prior to this assessment the State did not have a deep understanding of the EMS training pipeline or where opportunities exist to strengthen it.
The EMS training pipeline assessment explored three foundational areas:

- The number, distribution, and outcomes of Indiana EMS training institutions.
- Perspective student knowledge and awareness of EMS training opportunities and careers.
- Trends and opportunities reported by training institution leaders.

As part of this assessment, Indiana's first complete inventory of EMS training institutions and associated Indiana maps was created. **These resources can be used to identify geographies that may be considered EMS training deserts (areas that lack training programs), inform training pipeline expansion initiatives, and increase awareness of EMS training opportunities among**

12 IDHS 2022 Annual Report. Available at https://www.in.gov/dhs/files/IDHS-EMS-Section-Annual-Report-2022.pdf
13 IDHS 2021 Annual Report. Available at https://www.in.gov/dhs/files/IDHS-EMS-Section-Annual-Report-2021.pdf

prospective students. Additionally, maps presenting by program pass rates for the National Registry of Emergency Medical Technician (NREMT) examination were prepared to inform planning and programming related to quality improvement of training institutions.

Engagement with perspective students highlighted gaps in knowledge and awareness of EMS training opportunities and costs and EMS career specifics (example: wage). **New informational resources were developed as part of this project to promote EMS careers among perspective students. These resources can be shared with organizations and individuals that engage with perspective students in the secondary education and adult education space.**

Training institution leaders reported that their programs have greater capacity to train than they have students enrolled. Training institutions also reported training costs as a top barrier to student entry into and completion of EMS training programs. These **findings suggest that opportunities exist to recruit a greater number of students into Indiana's existing EMS training pipeline and highlight the need for increased awareness of the grants and scholarships currently available to support training cost reduction.**

Additional details regarding the pipeline assessment can be found in Section 3.

RETENTION ASSESSMENT

Retention of Indiana EMS students into the state workforce and overall retention of EMS personnel within the state is important to ensuring a robust workforce. This assessment explored retention in three areas:

- Retention of EMS graduates – Training institution-reported percent of Indiana EMS graduates who successfully entered EMS occupations within the state.
- Health sector retention – Percent of EMS personnel who matched to another health occupation regulated by the state of Indiana.
- Factors threatening retention – Perspectives reported by former Indiana EMS personnel.

Indiana EMS training institutions reported that more than 55% of their graduates go on to successfully enter Indiana's EMS workforce. Among those who do not, passage of the NREMT exam was reported as a top barrier. This finding, coupled with training institution-level NREMT passage rates , suggests opportunities may exist to align training with the national exam.

To assess health sector retention, EMS certifications were matched to other health professional licenses at the individual level by a state government entity. The process identified more than 12,000 current or previously certified EMS personnel who matched to another health professional license. **More than 41% of these licenses were associated with health professions generally working in long-term care, including certified nurse aides, home health aides, and qualified medication aides. Approximately 37% matched to nursing professions, including licensed practical nurse, registered nurse, and advanced practice registered nurse.** Other health professional licenses that EMS personnel matched to (at lower percentages) include, among others, pharmacy professions, medicine, and behavioral health. Future, more robust analyses examining time periods of licensure/certification may be performed to identify specific health sector career pathways into and out of EMS professions.

To assess factors that might be influencing retention within Indiana's EMS workforce, a survey was administered to individuals with expired certifications/licenses. More than 1,000 people completed the survey by ranking the factors influencing their decision to leave the field, and more than 400 of these individuals provided additional perspective and context in an open text field. **Pay was the top ranked factor reported to influence decisions to leave the field. Quality of agency leadership and lack of retirement benefits were also highly ranked.** Of the more than 400 people that provided additional perspective, **issues with continuing education requirements were the top cited challenge. Low wages and health issues, including work-related health conditions were also frequently cited challenges.** Of note, **another 32 people, although no longer certified, indicated how much they "loved" EMS, with some even citing how grateful they are that EMS now has its own division**. Opportunities may exist to explore new compensation strategies, review continuing education requirements, including associated costs and resources, and provide targeted leadership development within Indiana's EMS system in order to support workforce retention.

More detailed information on the retention assessment is presented in Section 4.

THE 2023 INDIANA EMS WORKFORCE ASSESSMENT

The remainder of this document presents a more detailed summary of each component of the 2023 Indiana EMS Workforce Assessment. Additional details, resources, and assets prepared as part of this assessment are linked within the appropriate sections:

- Sustainable Workforce Tracking
- Needs Assessment
- Pipeline Assessment
- Retention Assessment

SECTION 1: SUSTAINABLE EMS WORKFORCE TRACKING FOR INDIANA

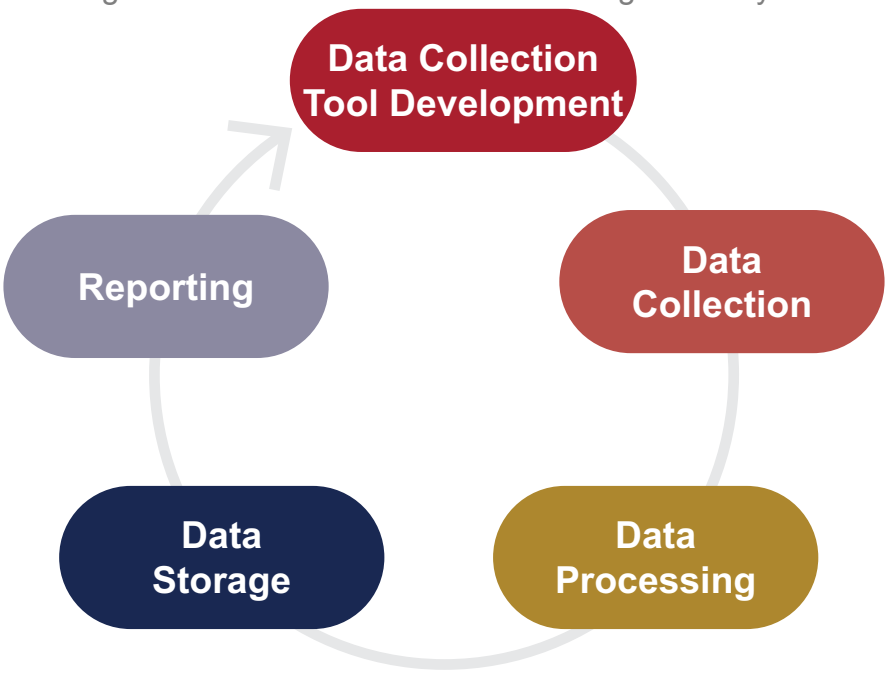
KEY SUMMARY

- As of January 2023, Indiana did not have a strategy in place to collect supply information on the emergency medical services (EMS) workforce.
- An Indiana EMS professional survey was developed, informed by subject matter experts.
- The Indiana EMS survey was embedded into the renewal system for EMS personnel on October 2, 2023. Almost 1,100 personnel have responded.
- Indiana will be able to identify and keep a finger on the pulse of the number of EMS personnel actively working in EMS services, better determine shortages, and plan for the workforce of the future.

OVERVIEW AND PURPOSE

Before 2023, Indiana did not have a strategy for sustainable and ongoing collection and management of EMS workforce data. Such strategies are crucial to ensure data are available for workforce planning, recruitment, and tracking workforce trends. Since 2015, the Bowen Center for Health Workforce Research and Policy (Bowen Center) has worked with the Indiana Department of Health (IDOH) in the development of sustainable tracking for licensed health professionals. This includes physicians, registered nurses, dentists, dental hygienists, behavioral health professionals, and many others. Under the contract with the Indiana Department of Homeland Security (IDHS) and IDOH, the Bowen Center has proposed a similar data management strategy for ongoing tracking of EMS professionals authorized to practice in Indiana.

Figure 1: Health Workforce Data Management Cycle



The process of health workforce data collection, management, and reporting (Health Workforce Data Management Cycle) occurs in an ongoing cycle with five separate steps, including: 1) Data Collection (Survey) Tool Development, 2) Data Collection, 3) Data Processing, 4) Data Storage, and 5) Reporting. See Figure 1 above for a visual of this cycle.

At the end of the cycle, the Bowen Center and collaborators review the process and identify opportunities for improvement. These methods are crucial to ensuring that data collected are timely in addressing state and community needs. This document outlines

the existing data management strategy for ongoing tracking of Indiana's EMS workforce that has been prepared as part of the 2023 Indiana EMS Workforce Assessment

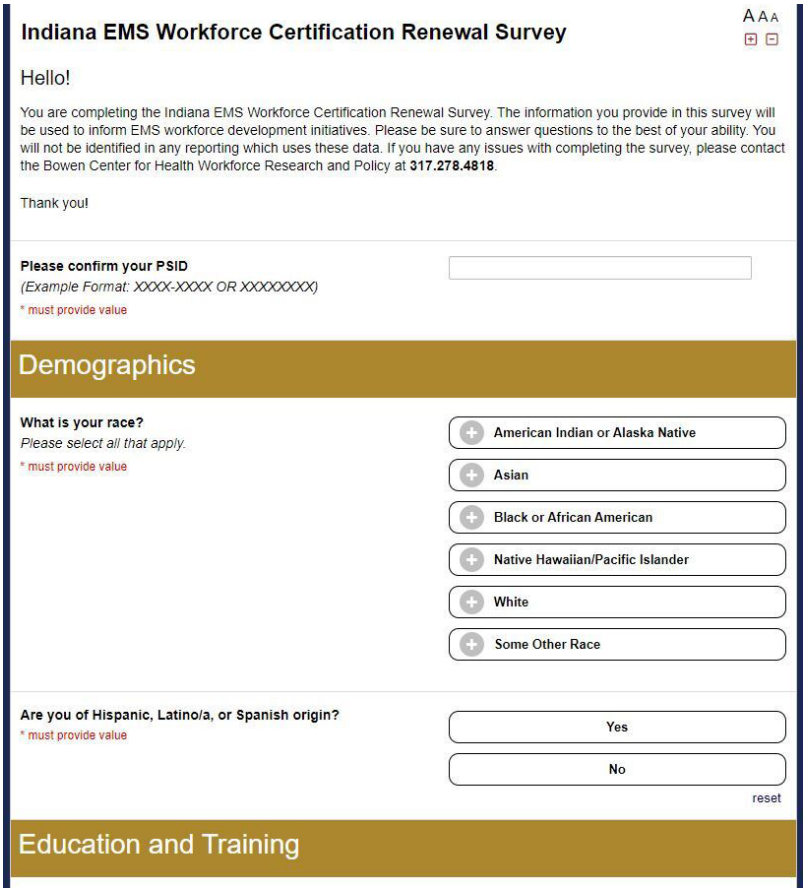
DATA COLLECTION TOOL DEVELOPMENT

RESEARCH AND ALIGNMENT

Because no health workforce survey for EMS professionals has previously existed in Indiana, research was performed to identify and review existing EMS workforce surveys, both state and national. The Bowen Center reviewed the Indiana Minimum Dataset for health professions survey and the National Registry of Emergency Medical Technicians survey to prepare an initial draft survey. This draft survey was then reviewed by subject matter experts from IDHS, IDOH and the EMS field. Feedback from subject matter experts ensured that questions and response options were appropriate for EMS professionals and the state of Indiana. After incorporating all recommended modifications, the EMS survey was then finalized.

The final Indiana EMS Workforce survey has 33 questions which collect information in three key workforce data categories: demographics, education/training, and employment information.

DELIVERABLES



SURVEY IMPLEMENTATION

The Bowen Center developed an electronic version of the survey in REDCap, and the link to this survey was embedded into the ACADIS certification management system, which is maintained by the IDHS. When EMS professionals sign in to the ACADIS system to renew their certification, the embedded survey will be shown as part of the renewal process. EMS professionals are required to submit an attestation that they have completed all necessary parts of the renewal process, including the completion of the EMS workforce survey. This strategy was identified by the IDHS, IDOH and the Bowen Center as the most feasible and appropriate given the ACADIS system specifications.

DELIVERABLE: EMS WORKFORCE DATA REPORT

The EMS Workforce survey was embedded into ACADIS on October 2, 2023. A template for a workforce data report was developed for approval by IDHS and IDOH and will be used by the Bowen Center in future workforce reporting. Future data reports will include four sections:

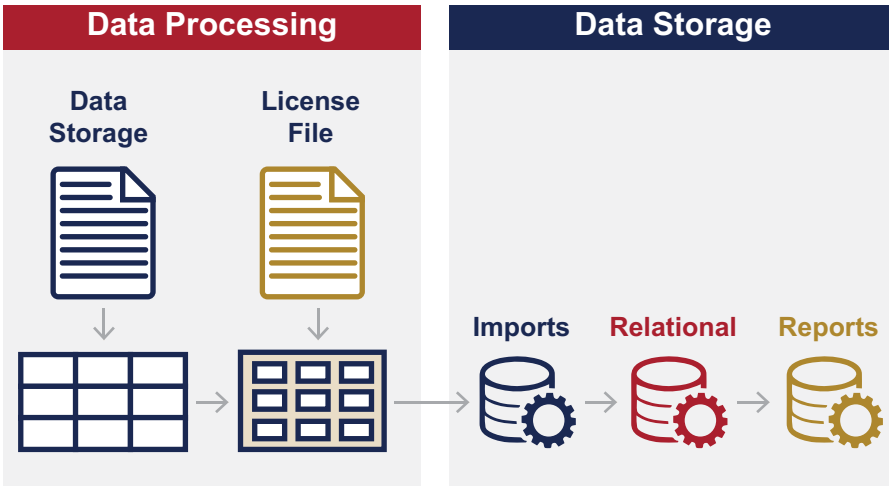
- 1) Overall License Renewals
- 2) Actively Practicing Paramedics
- 3) Actively Practicing EMTs
- 4) Geographic Distribution

Because EMS professionals have a rolling renewal cycle, data from the re-certification survey will be extracted from REDCap every year for regular reporting. At the end of every two years (starting from the date on which the survey was administered), a full report on the EMS workforce will be drafted for IDHS.

NEXT STEPS

Moving into 2024, the state of Indiana will begin to have EMS workforce data. This data will require processing and storage to ensure that they are accessible for reporting. The following outlines a proposed approach for these next steps. Management for Indiana health professions data consists of two phases: 1) Processing of raw data files, and 2) Storage of cleaned and coded data in a longitudinal database. This workflow is outlined below in Figure 2. This section will describe the anticipated activities for ongoing management of the EMS certification and survey data.

Figure 2. Health Workforce Data Management Workflow



DATA PROCESSING: CLEANING AND CODING

After certification and survey data are extracted, it is necessary to format and code data in preparation for storage in the longitudinal relational database – the Indiana Health Professions Database (IHPD). The cleaning and coding of health professions data is typically done in SAS 9.4 at the Bowen Center. The coding procedures will include standard coding for cross professions data elements (such as demographics). After data elements have been coded, this dataset will be merged with the administrative data included in the license file to create a master file.

DATA STORAGE: INDIANA HEALTH PROFESSIONS DATABASE

Once a master file has been finalized for the given renewal year of a health profession, this file is transferred to the secure folder that the Bowen Center shares with the database manager of the IHPD. Once the database manager has received the data with the

corresponding codebook, the data will then be imported into the development – or imports – database for examination and build-out of the database to house the new workforce data.

After the coding schemas for the EMS professions data have been verified, the data will then be finalized and stored in the relational database. This database will serve as the "source of truth" for Indiana EMS workforce data and will be the first source of workforce reporting.

For the purposes of regular reporting, a subset of health professionals is created that includes individuals who: 1) have an active license status, 2) reported actively practicing in their respective field, and 3) have a practice/employment agency located in Indiana. This will be designated as the actively practicing EMS workforce and will be stored in the Reports database. This database will be used for regular reporting.

DATA REPORTING

Based on the tables included in the approved report template, the database manager and Bowen Center research analyst will export these statistics and crosstabs into separate copies. Both will then compare and verify their exported tables for quality assurance. Once both have consensus on each table, the research analyst will begin the development of the data report.

Health workforce data reports developed by the Bowen Center include at least three sections: 1) total license/certification renewals, 2) total actively practicing professionals, and 3) geographic distribution. Each section of the report is reviewed by the Bowen Center leadership before publication on IU Indy ScholarWorks. It is anticipated that the first EMS workforce data report will be published in the summer of 2024.

SECTION 2: EMS WORKFORCE COUNTY-LEVEL NEEDS ASSESSMENT

KEY SUMMARY

- The status of emergency medical services (EMS) workforce supply and demand at a county level was not previously known.
- Indiana EMS subject matter experts worked with the Bowen Center to identify relevant and readily available workforce and population parameters.
- Each county in Indiana was ranked based on their EMS workforce indicators and population characteristics as compared to the state average.
- St. Joseph, Noble, Jay, Vanderburgh, and Daviess counties were identified as having the least EMS workforce resources to address potential population demand for emergency medical services.

INTRODUCTION

Information is needed to target strategies to strengthen the workforce that provides emergency medical services in Indiana. As part of the 2023 EMS Workforce Assessment, the Bowen Center prepared a county-level needs assessment using existing data to examine the current supply of EMS professionals – that is, emergency medical technicians (EMTs) and paramedics – in the context of population health outcomes and accessibility to emergency resources.

The following presents a summary of the strategy for this assessment and the results from this assessment. It's important to note that this assessment provides a cross-sectional snapshot of Indiana's EMS workforce and the state's need. This information should only be used to inform future initiatives for EMS workforce development. Future assessments may leverage more robust EMS workforce supply data collected at the time of state license/certification renewal.

METHODOLOGY

DATA COLLECTION

Data points used in this assessment fell under three major domains: 1) Population Health Statistics, 2) Workforce Supply Statistics, and 3) Workforce Resources. Population health statistics included data points that are typically used to determine the likelihood of utilizing EMS services. Workforce supply statistics included supply estimates and projections and average response times. Although Department of Workforce Development (DWD) supply estimates and projections were the most accurately available data source, the State does not have the ability to delineate these data for emergency medical responders (EMRs) or advanced emergency medical technicians (AEMTs) due to a lack of granularity in SOC codes, thus they are not included in the workforce estimates. Data on incidents per EMS workforce were also calculated based on active certifications/licenses rather than the number of actively practicing EMS personnel. EMS workforce resources included the total number of EMS agencies in one location and the total number of non-urgent transfers. All data were collected at the county level. See Table 1 on the next page for more information on the data points and their sources.

Table 1. Summary of data points included in the EMS Workforce Needs Assessment

Domain	Data Element	Description	Data Source
Population Estimates	Uninsured Prevalence	Percent of population estimated to be uninsured	Robert Wood Johnson County Health Rankings, 2020
	Asthma Rates	Estimated number of emergency department (ED) visits for Asthma per 1,000 persons	Indiana Department of Health, Office of Data Analytics, Data Analysis Team, Indiana Hospital Association, 2020
	Rates of Seizures	Total number of events related to seizures per 1,000 persons	Indiana Department of Health, Division of Trauma and Injury Prevention, 2021
	Rates of Opioid Overdose	Total number of ED visits for non-fatal opioid overdoses per 1,000 persons	Indiana Department of Health, Division of Trauma and Injury Prevention, Indiana Hospital Association, 2021
	ED Utilization Rate	Total number of ED visits per 100,000 persons	Indiana Department of Health, Division of Trauma and Injury Prevention, Indiana Hospital Association, 2021
Workforce Estimates	EMS Workforce Capacity	Total number of EMS professionals per 100,000 persons	Indiana Department of Workforce Development, 2020
	Incident Capacity	Total reported 911 incidents per EMS professionals	Indiana Department of Homeland Security, 2022
	Average Run Distance	Average of total distance for one incident (in miles)	Management and Performance Hub, 2023
	Average Run Time	Average of total time for one incident (in minutes)	Management and Performance Hub, 2023

SCORING

The scoring strategy used for this needs assessment was derived from the Robert Wood Johnson County Health Ranking methodology[1]. Each county's data point was given a z-score. This strategy calculates the total standard deviations the county-level data point is from the state average. See below for the formula used.

$$\frac{\textit{County Level Estimate} - \textit{State Average}}{\textit{Standard Deviation}}$$

In cases where values greater than the state average indicated a high prevalence of negative outcomes, the formula was multiplied by -1. Additionally, instances in which a county had insufficient data for a data point (such as workforce projections), the state average was applied so that the z-score for that county would be calculated as zero. After z-scores were calculated for each indicator, these scores were first summed by their overall domain (Population Characteristic and Workforce Capacity) before being summed to an overall county score. Based on the total score counties were ranked from the highest positive z-score to the lowest negative z-score.

DELIVERABLES: RESULTS/KEY FINDINGS

POPULATION ESTIMATES

Table 2 provides a summary of the Indiana counties with the highest and lowest z-scoring for population characteristics. The counties with the best population health outcomes include Hamilton (z = 4.541), Posey (z = 3.695), Dubois (z = 3.689), Switzerland (z = 3.352), and Hendricks (z = 3.254). It is worth noting that Hamilton County had the lowest percent of the population that were uninsured (4.6%), Dubois County had the second lowest opioid overdose rate (14.0 per 100K persons).

Indiana counties with the lowest z-scores for population characteristics include Wayne (z = -3,903), Fountain (z = -3.975), Marion (z = -4.760), and Jay (z = -6.603), and St. Joseph (z = -12.184). Jay County was found to have the highest opioid overdose rate in Indiana (249.6 per 100K persons), while Marion County had the highest percent of the population that reported having a diagnosis of asthma (51.4%). Moreover, St. Joseph was found to have an extremely high ED utilization rate (90,357.61).

Table 2. Indiana Counties with the Highest and Lowest z-score for Population Characteristics

Location	% Uninsured	Opioid Overdose Rate	Asthma Rate	Seizure Rate	ED Utilization Rate
State Average	9.5%	71.3	23.0%	21.9	8,156.1
Highest Ranked Counties					
Hamilton	4.6%	30.5	12.1%	19.3	3,788.3
Posey	6.4%	35.4	10.8%	21.8	3,742.6
Dubois	9.2%	14.0	17.2%	8.0	5.674.1
Switzerland	10.8%	71.3	2.4%	6.2	5,219.6
Hendricks	6.3%	57.0	15.8%	14.3	4,772.7
Lowest Ranked Counties					
Wayne	9.5%	183.7	15.3%	31.0	6,589.2
Fountain	9.7%	55.1	40.0%	39.8	6,675.5
Marion	9.4%	131.4	51.4%	20.4	6,219.1
Jay	9.9%	249.6	28.9%	7.2	5,132.8
St. Joseph	8.4%	73.9	30.5%	49.4	90,357.61

WORKFORCE ESTIMATES

A summary of the Indiana Counties with the highest and lowest scores for workforce estimates is provided in Table 3. The Indiana Counties with the highest scores for workforce estimates included Tippecanoe (z = 2.711), Adams (z = 2.611), LaPorte (z = 2.376), Knox (z = 2.369), and Porter (z = 2.341). Knox County had an EMS professional –to-100K-persons rate (228.057) only second to Wayne County (230.23 EMS professions per 100K persons). Similarly, Porter had the second lowest average run distance (7.00 mi.) while LaPorte had the lowest average run time (50.74 min.)

Counties that ranked the lowest in workforce estimates included Daviess (z = -4.624), Vanderburgh (z = -5.020), DeKalb (z = -5.396), Steuben (z = -6.789), and Noble (z = -10.407). Noble County had the highest rate of total incidents per EMS professional (776.36) while Steuben County had the highest run distance (232.76 miles). Vanderburgh County had the highest average run time (301.88 minutes).

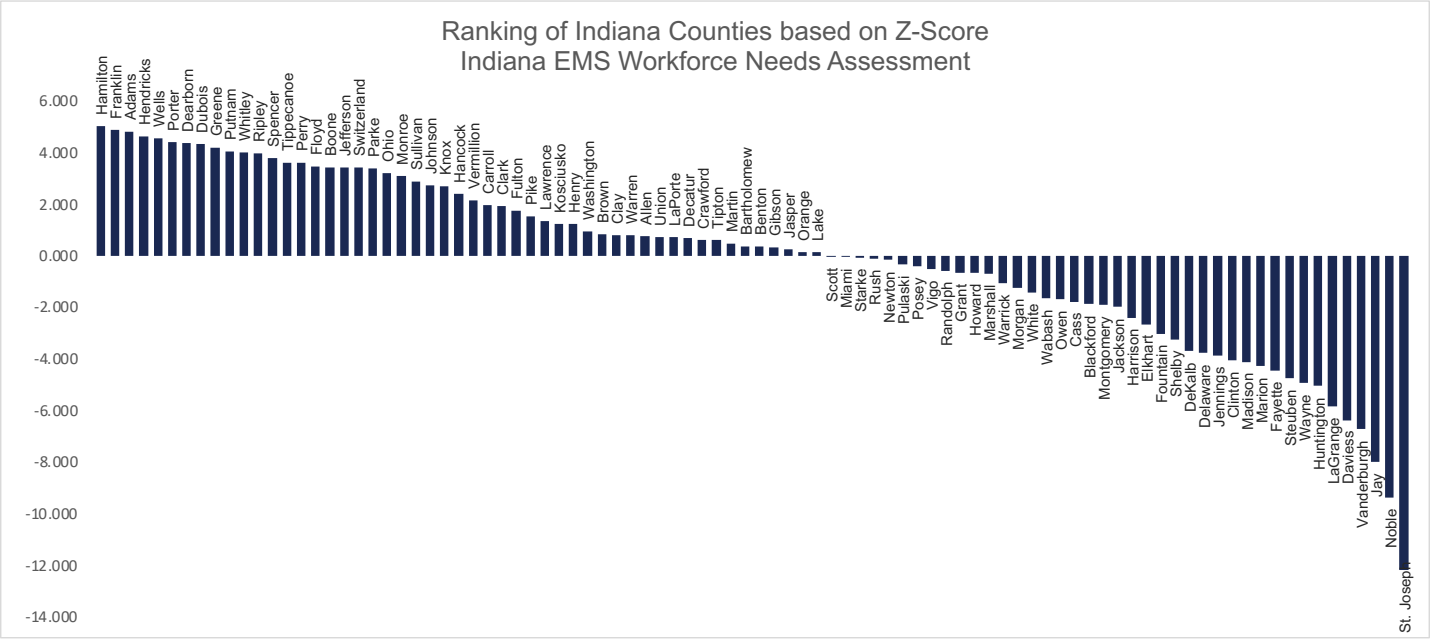
Table 3. Indiana Counties with the Highest and Lowest z-score for Population Characteristics

Location	EMS Workforce Capacity	Incident Capacity	Average Run Distance (miles)	Average Run Time (minutes)
State Average	67.69	186.88	45.4	126.7
Highest Ranked Counties				
Tippecanoe	144.86	111.07	7.96	59.55
Adams	111.23	63.83	15.97	73.63
LaPorte	64.06	164.24	11.68	50.74
Knox	228.06	66.21	18.08	83.20
Porter	163.57	65.63	7.00	100.66
Lowest Ranked Counties				
Daviess	89.83	143.87	137.38	273.90
Vanderburgh	125.57	130.04	137.39	301.88
DeKalb	60.00	249.85	155.58	247.00
Steuben	83.738	125.172	232.76	268.34
Noble	23.292	776.36	177.63	275.77

COUNTY RANKINGS

Overall, the Indiana counties that ranked highest in the county rankings included Hamilton (z = 5.048), Franklin (z = 4.888), Adams (z = 4.810), Hendricks (z = 4.630), and Wells (z = 4.557). On the other hand, the counties that ranked lowest included Daviess (z = -6.361), Vanderburgh (z = -6.707), Jay (z = -7.975), Noble (z = -9.386), and St. Joseph (z = -12.184). **See Figure 3 and Table 8, included in the Appendix, for more information on the ranking of all Indiana counties.**

Figure 3. Ranking of Indiana Counties based on Z-Score Indiana EMS Workforce Needs Assessment



CONSIDERATIONS

When utilizing this needs assessment, it is important to consider the implications from related population indicators in addition to workforce estimates. For instance, it may be worth considering the factors contributing to high ED utilization or opioid overdose rates and the appropriate social services that could help in reducing these outcomes. The workforce estimates from this assessment can be complemented with other workforce landscape analyses to identify the resources needed to improve workforce capacity. Future county-level needs assessments may leverage new EMS workforce information collected at the time of biennial license/certification renewal.

It is important to note that this county-level needs assessment serves only to inform workforce policy and planning for Indiana's EMS professionals. These findings are based on cross-sectional data, and estimates were included based on the guidance of representatives of subject matter experts. These scores are subject to change as the population and workforce characteristics change for individual counties over time. Furthermore, scoring may change based on the population and workforce characteristics that are included in the assessment.

SECTION 3: PIPELINE ASSESSMENT

KEY SUMMARY

- No inventory of Indiana emergency medical services (EMS) training institutions existed prior to this assessment.
- An accurate list of certified training institutions has been created as part of this project to inform planning, policy, and programming.
- Five-year training institution National Registry of Emergency Medical Technicians (NREMT) pass rates have been organized to increase transparency and inform quality improvement.
- Program cost was cited as a barrier for student class completion, but numerous training cost reduction programs exist. Marketing and organization of this information may promote access to and completion of training.
- Time commitment for training was cited as a reason for pipeline or workforce attrition. Opportunities may exist for exploration of flexible training schedules, alternate training approaches, or other types of supports.

OVERVIEW

The term "workforce pipeline" refers to the continuous flow of individuals entering, progressing through, and exiting the workforce. Workforce pipeline assessments are conducted to understand and improve the efficiency, sustainability, and quality of services. Indiana's EMS workforce pipeline analysis involves a comprehensive examination of the various components related to the recruitment, education, training, and post-training retention of EMS personnel.

The goal of the training pipeline is to ensure a steady and qualified workforce to meet the demands of all Hoosiers. This pipeline assessment can support strategic planning and workforce improvement policies and ensure the continued delivery of high-quality emergency medical services for all Hoosiers.

This EMS Pipeline Assessment utilizes information that was already readily available in addition to information that was collected directly through surveys. A summary of the EMS Pipeline Assessment data sources can be found below in Figure 4.

Figure 4. Overview of Indiana EMS Pipeline Assessment Strategies

Pipeline Assessment Sources		Definition	Population(s) of Interest
• Survey to high school students	Early Pipeline	The time period prior to beginning Indiana EMS training	High school students, College students, Adult education
• Current EMS Training Program Inventory • EMS Training Institution Survey • EMS Student Survey (Coming in 2024)	Mid-Pipeline	Time from Indiana EMS training program enrollment through graduation	Current Indiana EMS trainees
• NREMT Pass Rates • EMS Training Institution Survey	Late Pipeline	After Indiana EMS training program graduation	Indiana EMS graduates

EARLY PIPELINE – PROSPECTIVE INDIANA EMS STUDENTS

The development of a healthy EMS educational pipeline starts by engaging with prospective EMS students as early as middle and high school. Connecting with potential students as they explore their career options is an opportunity to provide information and garner interest in the field. In 2023, at the Indiana chapter of Health Occupations Students of America (HOSA) state conference, whose mission is "to empower future health professionals to become leaders in the global health community[14]," the Bowen Center administered a survey to 108 student (7th grade thru high school seniors) attendees, to gauge their knowledge and perceptions of a career in EMS. A full report on survey results can be found at EMS HOSA Survey and Results but an important highlight learned from these career-focused students is that while nearly all (97.3%) where aware of EMS careers, few (22.9%) had knowledge of the training requirements or where to go to find more information. As a part of this project, EMS career flyers were developed for each EMS occupation to enhance awareness of EMS training requirements.

New high school graduation requirements from the Indiana Department of Education[15] require students to obtain employability skills, which can be demonstrated through a work-based learning experience including employment in EMS, and demonstrate postsecondary-ready competencies, which could be achieved through completion of a career-technical education concentrator in EMS. Only 6% of respondents planned to pursue EMS training to fulfill graduation requirements, but 18.5% of respondents reported being interested in a career in EMS.

It is important to note that adult education is another critical population for early pipeline strategies. Information was collected from high school students because it was readily accessible for survey distribution. Understanding perceptions of adult learners would also be an important factor for consideration. Whereas strategies to enhance awareness among high school students may primarily target high school-based marketing, strategies to reach adult learners would likely occur through local career centers (WorkOne sites[16]) and information available on both the Indiana Department of Homeland Security (IDHS) and Indiana Department of Workforce Development (DWD) websites.

Early Pipeline Takeaways: Most high school student respondents were aware of EMS careers, but few understand specifics related to training requirements or accessible trainings.

14 HOSA Future Health Professionals. Available at: https://hosa.org/what-is-hosa/
15 Indiana State Board of Education. Graduation Pathways Panel. Available at: https://www.in.gov/doe/files/graduation-requirements.pdf
16 More information about WorkOnes and the services they provide can be found at: https://www.in.gov/dwd/WorkOne/locations.html

MID-PIPELINE – CURRENT INDIANA EMS STUDENTS

An assessment of the mid-EMS pipeline period focuses on the availability and effectiveness of EMS education in the state. An adequate training capacity is needed to ensure the workforce continues to grow and thrive. This report examines the educational pipeline from both sides, looking first at the certification process, availability, and geographic distribution of the training institutions, and then analyzing the student's experience on their road to a career in EMS.

BACKGROUND ON EMS TRAINING AND CERTIFICATION REQUIREMENTS

In general, individuals must complete a certified EMS training course and other experiential requirements like internships and hospital/clinical experience[17], pass a state standardized exam, and pass the appropriate level of the NREMT exam before applying for Indiana EMS certification/licensure. Once certified, EMS personnel must meet continuing education requirements in order to renew their state certification but do not need to maintain national certification beyond the initial certification.

TRAINING INSTITUTIONS

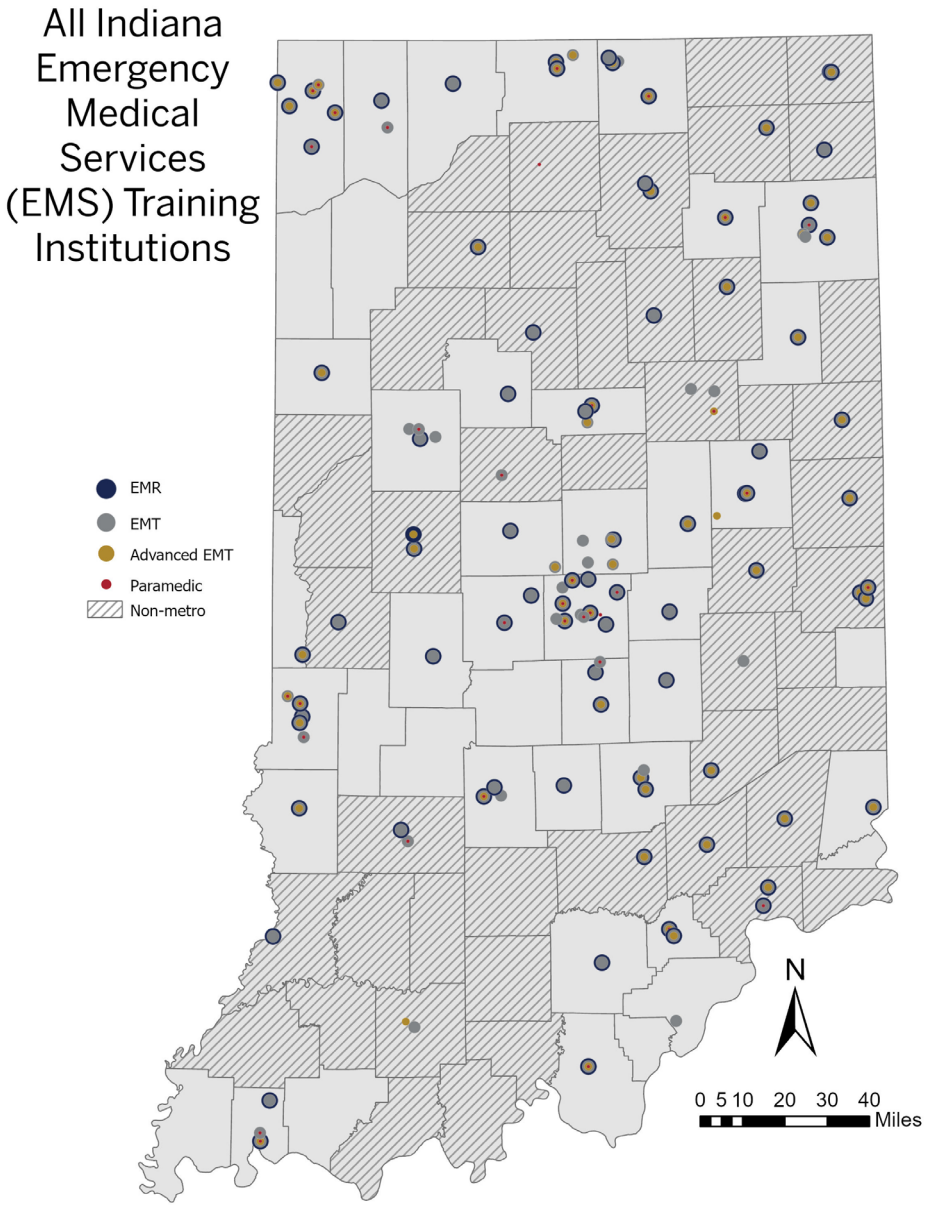
The health of the EMS mid-pipeline rests largely on the quality, capacity, and availability of training institutions. A variety of institutions/organizations offer EMS courses, including EMS service providers, fire departments, hospitals, colleges and private organizations, or a program can become licensed by the state as having comparable education standards. Additional information about the Indiana EMS training certification process, including certification levels, required training hours, and staffing can be found in the accompanying document, Overview of EMS Training Certification.

A landscape inventory of Indiana's EMS training institutions was prepared for this project. A list of currently certified institutions was obtained from the Indiana Department of Homeland Security and was used to generate a map which plots program location. A county-level metro/ non-metro layer was sourced from USDA Economic Research Service Rural-Urban Continuum codes. The map presented in Figure 5 on page 20 demonstrates all current Indiana EMS training programs as of October 2023. Additional maps are available by EMS personnel certification level in the accompanying document, Indiana EMS Training Institutions by Certification Level. The full inventory of Indiana EMS training programs, including program name and location, can be found in the Indiana EMS Training Program Inventory.

In total, 125 organizations currently operate training programs within 61 of Indiana's 92 counties. Many training programs offer courses for more than one EMS credential, and the following table illustrates a breakdown of program course level offerings across the state (Table 4 on page 20).

17 IN EMS Commission – Levels of EMS Personnel Certification. Available at: https://www.in.gov/dhs/files/Indiana-EMS-Commission-Levels-of-EMS-Personnel-Certification6-2019-c.pdf

Figure 5. Indiana EMS Training Institutions (2023)



Source: Indiana Department of Homeland Security Certification Data 2023. Indiana Department of Homeland Security DFBS Data 2023.
Note: Symbol size does not reflect the size of the training institution, rather it represents the type of training opportunities offered within each training institution.

Table 4. Overview of Indiana EMS Training Programs

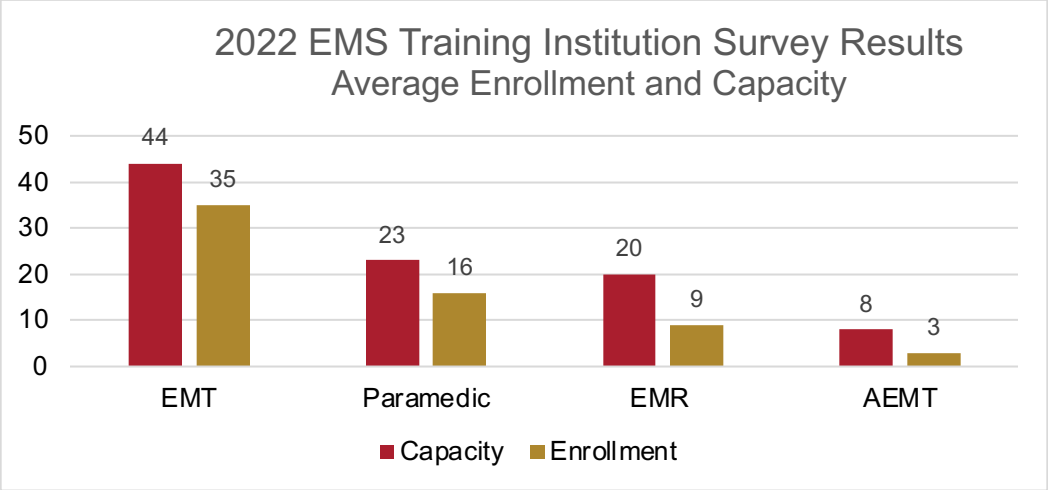
Certification Level	Number of Programs in Indiana
EMR	87
EMT	119
Advanced EMT	63
Paramedic	36
Total Unique Programs	125
Note: Data as of 12/08/2023. As indicated by the map, many programs offer more than one credential. As such, counts presented above do not represent unique programs.	

TRAINING INSTITUTION SURVEY

In order to gather more information about the experience of training institutions, a 2023 EMS Training Institution Pulse Check survey was developed and delivered to each of the 125 training institutions' day-to-day business contacts to request their perspective on Indiana EMS Training. Forty-three training institutions from across the state responded to the survey, providing some insight into program capacity and program outcomes. A summary of top findings is found within this report below. However, additional details about this survey and the findings can be found in the accompanying technical report, Perceptions of Indiana EMS Training Institutions.

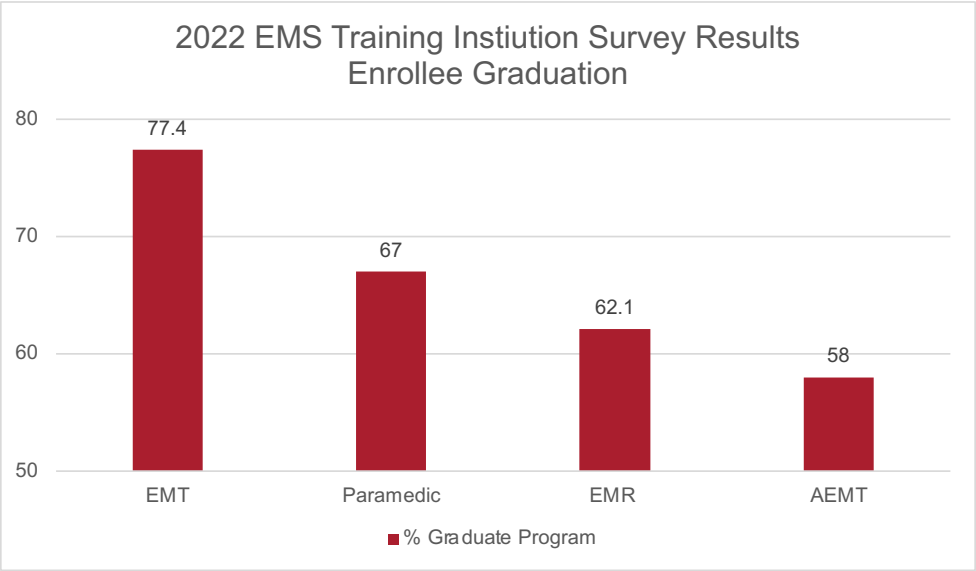
- **Program Capacity – Most training institutions reported unfilled training seats.** Training institutions were asked for their 2022 actual student enrollment as well as the number of new students their program could accept for each EMS level. The following graph (Figure 6) indicates the average enrollment and capacity for each EMS level, based on the survey responses received, showing that training institutions have the space to educate more students each year. Most institutions saw no meaningful change in their enrollments over the last three years, but those that did reported increases in student interest and enrollment. Institutions were evenly split on whether they were planning changes within the next two years; those with planned changes intend to start new classes or expand their teaching capacity.

Figure 6. Training Institution Capacity vs. Enrollment



- **Program Outcomes – Training staff perceive only about 2/3 of students end up completing their training program.** Program staff reported that not all students who enroll in a training program ultimately graduate (Figure 7 on page 22). Survey results show that most programs experience some attrition, not only between enrollment and certification

Figure 7. Perceived Graduation Rates



- **Program Costs – Training costs may be a roadblock to student interest and training completion.** Costs can pose a barrier to some students in the pipeline. Based on the responses received from the training institution staff, the average cost of emergency medical technician (EMT) and advanced emergency medical technician (AEMT) courses in Indiana is around $1,500 and paramedic programs can run over $8,000 per student. Training program staff reported that cost played a factor in the student experience; 26% of students were unable to receive training due to their inability to pay for the training costs, and about a third of training program staff respondents felt program costs were a top reason a student does not complete the course after admission.

The state of Indiana does offer programs that can assist EMS students with training program costs. Just over half (56%) of training institution respondents promoted these programs or scholarships to students (including programs such as the Workforce Ready Grant offered through the DWD) or leveraged these programs to support training (such as the IDHS Training Grants to training institutions and provider-trainers). The Workforce Ready Grant is a Next Level Jobs initiative and covers the cost for qualified students to get their EMT certification for free via Ivy Tech Community College. Employer training institutions may also be hiring students as employees and providing training at a discounted rate through the reimbursements offered to employers under the Employer Training Grant; however, to leverage this opportunity, the student/employee would need to be retained for at least six months. Finally, a legislative appropriation in the 2023 session provided the opportunity for IDHS to offer a need-based training grant opportunity for FY 2024 that can reimburse eligible programs up to $45,000 for paramedic students and up to $5,000 for EMTs.

STUDENT PERSPECTIVE

In 2023, a survey was developed, designed to assess the perspective of students as they are actively engaged in EMS training and certification process. The survey, which went live in December 2023, will collect data on demographics, their experience with their training program, career goals, and other influencing factors. While the data from this survey has only begun to trickle in, future analysis will provide IDHS with a better understanding of this aspect of the pipeline.

Mid-Pipeline Takeaways

- **There are certain areas throughout the state that could be classified as an "EMS training desert"; very few programs exist in the central southwestern and central northwestern regions.**
- **Training costs may be a barrier to student recruitment and program completion.**
- **More information will be available about EMS students' perspective on Training and EMS careers in 2024.**

LATE PIPELINE

ASSESSING THE STUDENT EXPERIENCE

A robust outcomes assessment of the late EMS pipeline would track students after training completion; this includes monitoring Indiana graduates that complete NREMT and those who go on to Indiana state certification or licensure. NREMT pass rates were readily available from 2018-2022, which provides insight into the effectiveness of training programs as compared to the national averages. Additionally, training institution program staff perspective was obtained on the retention of graduates in Indiana for state certification or licensure; these findings are explored further in the final section of the report – Indiana EMS Retention Assessment.

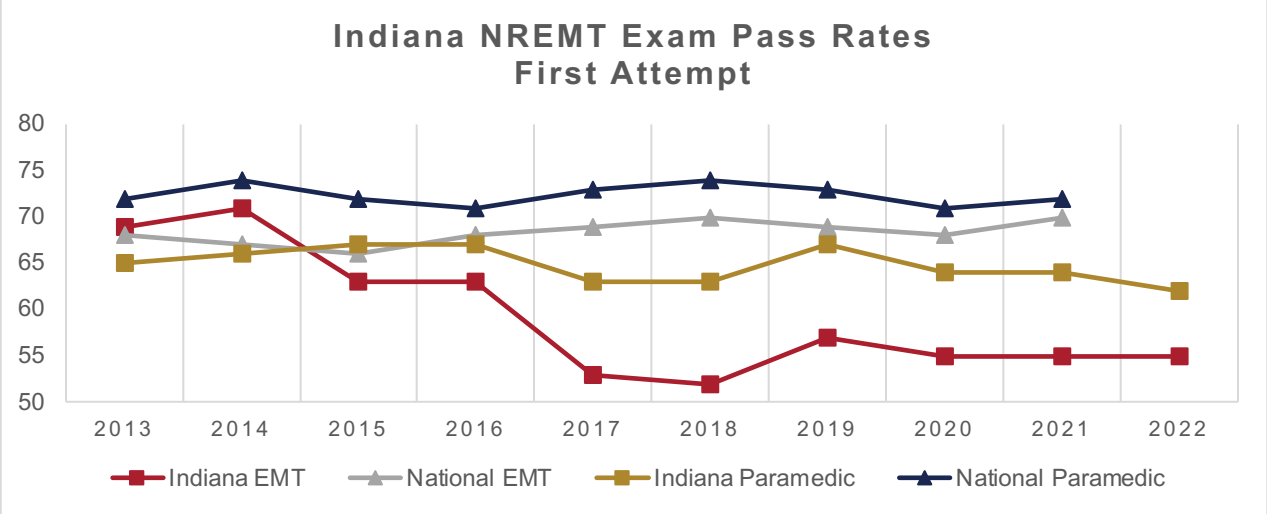
NREMT PASS RATES

Successful completion of the NREMT exam is a requirement for first-time EMTs, AEMTs, and paramedics. The majority of students who ultimately pass the exam do so on their first attempt. Students may retake the NREMT exam, up to six attempts within two years, with remediation available after the third attempt. Comparing Indiana pass rates with national averages provides a glimpse into the outcomes of Indiana training programs. On average, national pass rates exceed Indiana's, although Indiana paramedics are within 2 percentage points of the national average for multi-attempt cumulative pass rates (Table 5). However, Indiana has consistently scored below the national average on both EMS careers since 2015 (Figure 8). There is a distinct downward trend in Indiana EMT pass rates from a high of 71% in 2014 to a low of 52% in 2018 and evening out around 70% for the last few years. At the same time, Indiana paramedic pass rates have held fairly steady, ranging from 62-67 percent over the last 10 years. Multiple training institution staff reported that NREMT passage was a top challenge to student success.

Table 5. NREMT Pass Rates Aggregated from 2018-2023

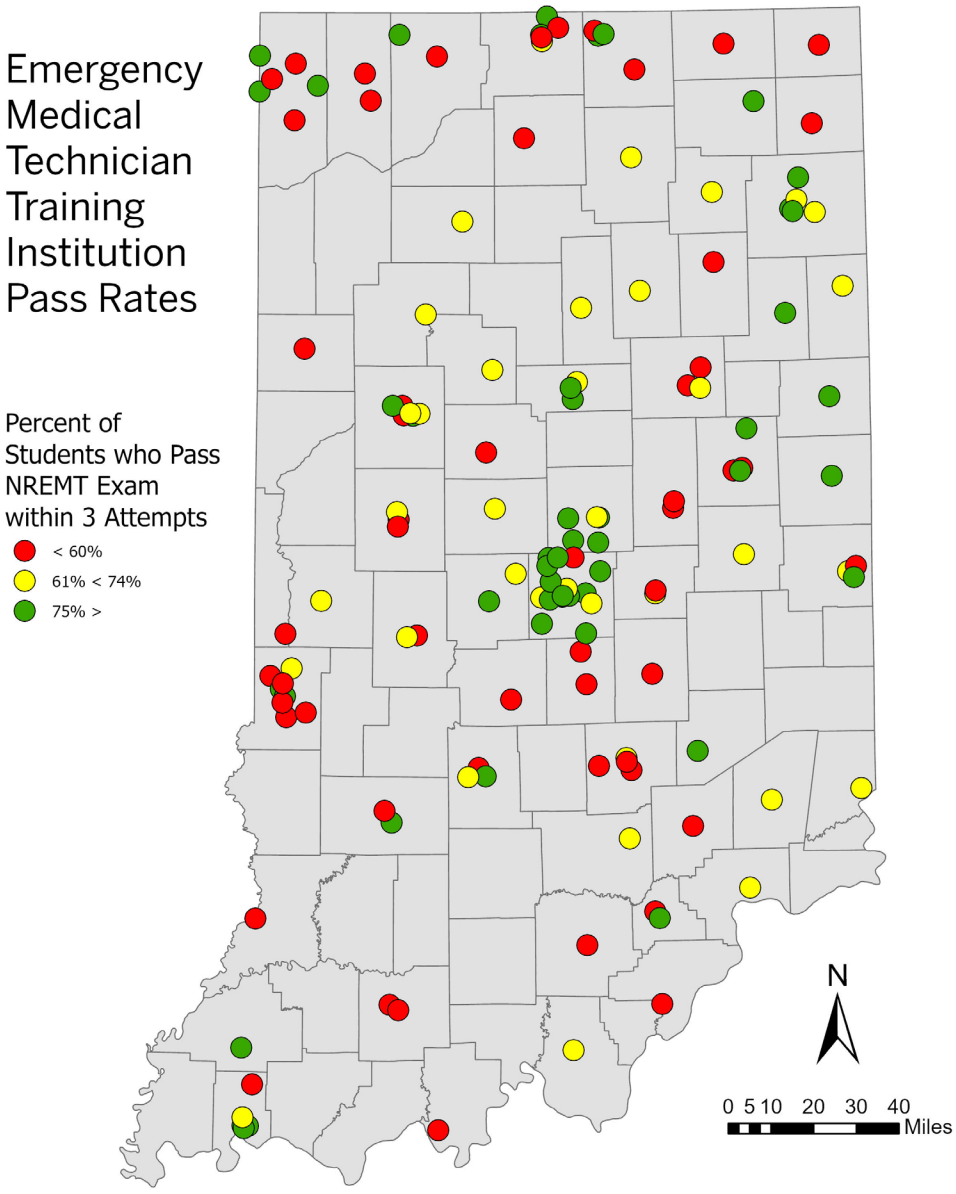
	First Attempt Pass	Cumulative Pass Within 3 Attempts	Cumulative Pass Within 6 Attempts	Did Not Complete Within 2 Years
Indiana – EMT	56%	70%	72%	18%
National – EMT	68%	80%	81%	12%
Indiana – Advanced EMT	56%	72%	74%	14%
National – Advanced EMT	68%	80%	81%	12%
Indiana – Paramedic	66%	84%	88%	6%
National - Paramedic	71%	86%	89%	5%

Figure 8. Indiana vs. National NREMT Pass Rates by Year



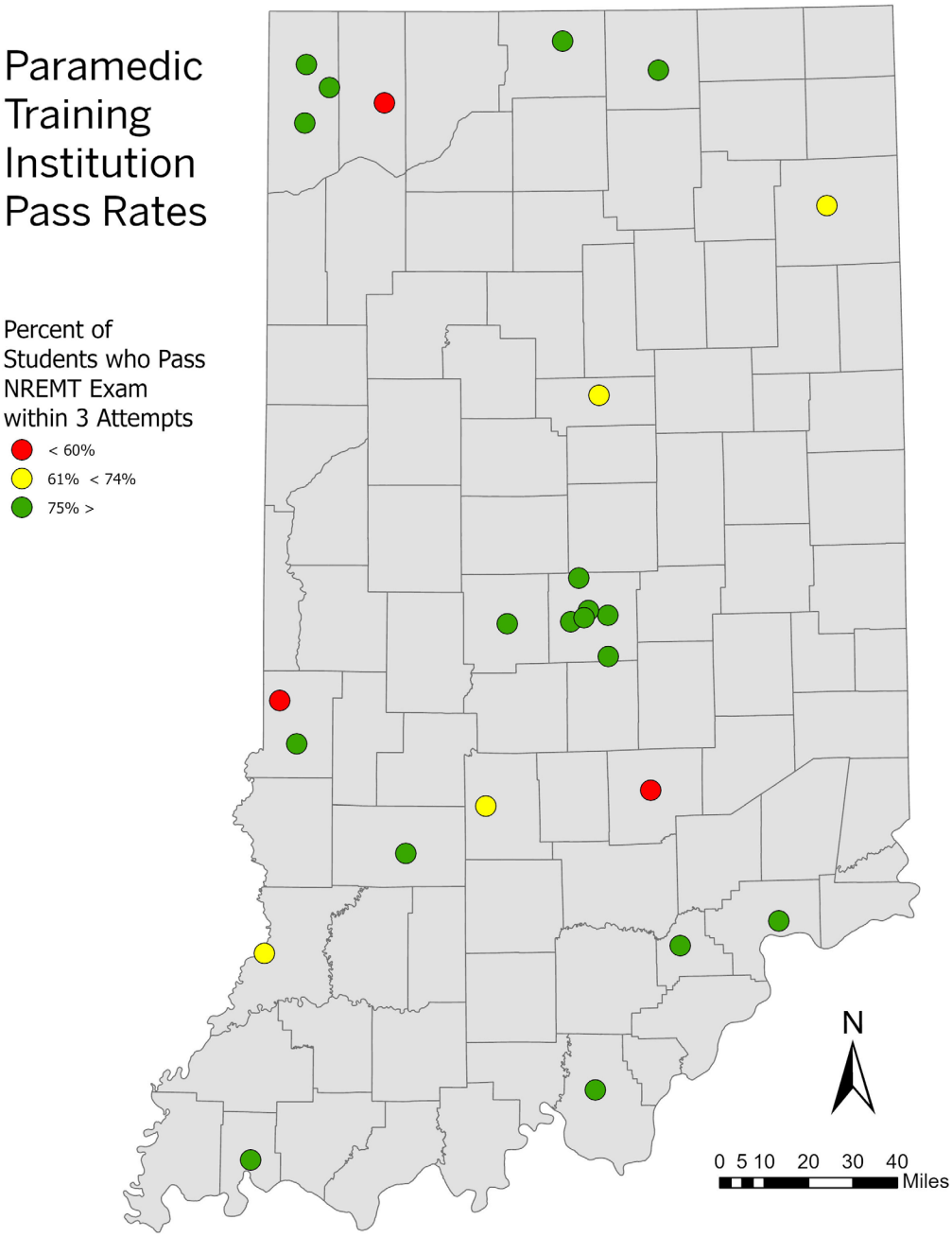
In addition to reviewing overall state pass rates by certification level, EMS training program-level pass rates were also compiled and reviewed. The accompanying document, Maps of Indiana NREMT Pass Rates by Program and Certification Level, provide an in-depth look at average pass rates from January 1, 2018, through November 22, 2023. In general, there were wide variations in pass rates by program and by certification level. In a single county there could be some programs with pass rates higher than the state average and some programs with significantly lower pass rates. Additionally, although the state pass rates after third attempt for paramedics is generally on par with the national average, the geographic display of these programs demonstrates some programs that are well above and others that fall well below the national average.

Figure 9. Map of EMT Training Institution Pass Rates



Source: Indiana Department of Homeland Security NREMT Pass Rate Data 1/1/18 - 11/22/23.

Figure 10. Map of Paramedic Training Institution Pass Rates



Source: Indiana Department of Homeland Security NREMT Pass Rate Data 1/1/18 - 11/22/23.

Late Pipeline Takeaways:

- **Although program pass rates vary significantly, Indiana's average NREMT pass rates have consistently fallen below the national average.**
- **Organization of pass rate data into geographic (county) groupings provides insight into regions that may have high or low performing programs.**

FUTURE CONSIDERATIONS

- **Enhancing training institution visibility.** The training institution inventory that was developed as a part of this project was the first of its kind in Indiana. Maintaining an updated and publicly accessible training inventory could enhance awareness of training locations among prospective EMS students and facilitate connections between these individuals and the training institution. An accurate list of all available certified training institutions in the state and their contact details should be maintained and made publicly available.
- **Monitor training quality and highlight "shining star" institutions.** NREMT exam passage was indicated as a top barrier to student success. Indiana has consistently lower pass rates than the national average. Monitoring NREMT pass rate data on an annual basis would provide early insights into an institution's performance and facilitate early interventions. For example, the NREMT pass rate maps and table data could be used to identify "shining star" institutions with high pass rates. These high-performing institutions could be asked to share successful strategies, and IDHS could facilitate local peer learning opportunities for lower performing institutions.
- **Identifying and promoting training cost support opportunities.** While several training cost reduction programs exist, respondents to the training institution survey still cited cost concerns as a barrier to enrollment in and completion of EMS courses. Numerous programs and strategies exist to reduce cost as a barrier to training. Organization of this information and marketing to training institutions and prospective students could promote access to and completion of training in this high-demand occupation.
- **Transition to electronic data collection for training reports.** Indiana Administrative Code (836 IAC 4-2-4[18]) states that each training institution must provide IDHS with a final report on each course within 15 days following the completion of the course. This report is currently submitted though a fillable pdf and collects details on student performance in the course before a student is authorized to take the state EMS exams. If this information were submitted through an electronic form, it may allow for easier assessment of student outcomes (class size, percent graduating or withdrawing, etc.).
- **Expanding EMS career awareness through information availability and marketing.** Many EMS training institutions are interested in expanding their classes, but also report persistent open seats and lack of interest from prospective students. Any state funding or support for training institution expansion should accompany enhanced marketing and recruitment efforts. Additionally, making EMS career and training data more available (through publication of training program inventory and career flyers) may assist with increasing statewide awareness of these careers and where to access training.
- **Offering flexible training schedule and other training institution supports.** EMS training institution respondents perceive that most of Indiana's EMS trainees graduate. However, among those students who do not complete the program, training institutions feel that time commitment for training and NREMT passage is the greatest student hurdle. In response, training institutions should explore opportunities for alternate training approaches (such as part-time training, evening classes, etc.) that could accommodate students with other commitments (such as jobs, family responsibilities, etc.). Other types of supports, such as test taking strategies, job placement, reading remediation, etc., may also support students to program completion and workforce entrance.

18 IAC 836 Article 4. Available at: http://www.iac.iga.in.gov/iac//title836.html

SECTION 4: RETENTION ASSESSMENT

KEY FINDINGS

- More than 55% of emergency medical services (EMS) graduates go on to successfully obtain certification/licensure and enter Indiana's EMS workforce.
- More than 12,600 EMS certifications matched to another Indiana health professional license suggesting the need for further research into EMS career pathways.
- Pay is the top cited reason for leaving EMS occupations in Indiana. Quality of agency leadership and lack of retirement/pension benefits were the second and third most reported factors.
- When asked to further expand on their reason for leaving the workforce in an open text box, issues with continuing education was the top reported reason.
- Although no longer certified, 32 people reported in the open text box that they "loved" their time in EMS.

OVERVIEW

Although decreases in both the EMS workforce and EMS pipeline have been documented both nationally and within Indiana[19,20,21], Indiana had no concrete data on the number of EMS graduates that enter the workforce or the motivations behind EMS personnel's decision to exit the workforce. Additionally, anecdotal information suggests EMS occupations may be part of career pathways in the health sector, but this has not been formally explored.

Understanding EMS workforce retention and the factors that may be influencing retention is necessary for the development of targeted workforce retention strategies, specifically outlined by the Governor's Public Health Commission (GPHC). The findings of this retention assessment will be integral for informing specific areas of intervention for the state of Indiana's EMS retention planning in three key areas:

- Retention of Indiana EMS graduates in the workforce.
- Retention in the health sector.
- Factors threatening retention of the existing workforce.

RETENTION OF EMS GRADUATES IN THE WORKFORCE

Increasing the number of certified/licensed EMS workers in Indiana starts with ensuring graduates pass the National Registry of Emergency Medical Technicians (NREMT) exam and go on to obtain licensure or certification. Indiana must have a firm understanding on the retention of EMS professionals trained in state to ensure training grants are supporting training institutions that are supporting the goal of increasing the workforce. This section of the assessment gives Indiana a start towards this deeper understanding from the perspective of training institution officials.

METHODOLOGY

A survey was developed to understand the experience of training institution staff regarding their EMS training program, students, and (where applicable) employees (Indiana EMS Training Institution Survey). The Indiana EMS Training Institution Survey was administered to 125 EMS certified training institutions, identified by the Indiana Department of Homeland Security (IDHS), utilizing the email address on file for the person responsible for the institution's day-to-day business. Data collection occurred from October 18 to November 10, 2023. Additional findings from the training institution survey can be found in the Perceptions of Indiana EMS Training Institutions document.

RESULTS

A total of 43 training institution contacts responded to the survey (34.1% response rate). When asked about retention of graduates into the workforce, institution officials reported that 55-60% of emergency medical responder (EMR) and advanced emergency medical technician (AEMT) students and 70-75% of emergency medical technician (EMT) and paramedic students who complete their

19 Exploring New EMS Workforce Challenges. Available at https://www.cpsm.us/exploring-new-ems-workforce-challenges-matt-zavadasky/
20 2007 Indiana EMS Needs Assessment. Available at https://docs.lib.purdue.edu/rche_rep/22/
21 Indiana EMS Workforce Shortage. Available at https://www.in.gov/dhs/files/Indiana-EMS-Workforce-Shortage-2022.pdf

programs go on to ultimately obtain licensure. This would indicate a significant level of attrition (25-40%) between graduation from the program and obtaining certification or licensure.

Institution officials were asked about challenges new graduates face that may impact their ability to become licensed and work in the field. In Indiana, EMS providers are required to pass the NREMT exam to obtain initial Indiana certification. Several institutions mentioned issues with the exam, including the difficulty of the exam and students waiting too long to take the exam. Other institutions mentioned that new graduates often struggle with a lack of self-confidence, which could play a role in attrition at this point in the pipeline.

About half of the training institutions surveyed were also EMS provider organizations. A median of 78% of these institutions' graduates got a job at their agency immediately upon graduation. Graduate employees tended to stay at their agency for at least one year (80%). Reported retention remained high among these individuals with a reported 55% of employees remaining after five years. This finding suggests that in-house training may encourage retention. When asked about challenges to retention for these individuals, training institutions reported the main challenges as low pay, competition from other sectors and a lack of career opportunities.

RETENTION IN THE HEALTH SECTOR

In some instances, EMS professions may be part of an individual's career pathway. Career pathways within state-licensed occupations can be evaluated by matching individuals to all licenses they hold/have held. The robust health workforce data system in Indiana allows for this matching process. Information on common career pathways can be helpful to understand what licensed health occupations EMS professionals may come from or go on to and may inform future EMS workforce initiatives.

METHODOLOGY

The Management and Performance Hub (MPH) is a state agency that provides data support for other state agencies including the IDHS. The MPH obtained all EMS certification/licensure information stored in the IDHS-managed ACADIS system to support this project. MPH concurrently worked closely with the Indiana Professional Licensing Agency (PLA) to link the EMS certification records to all PLA licensure records based on individual social security numbers. The results from this linkage were securely transferred to the Bowen Center, including only the unique ID from the ACADIS system, PLA license type descriptor, PLA license issue date, and PLA license expiration date. The format of the data file transferred to the Bowen Center for Health Workforce Research and Policy included one row per license held by each individual. Data were transformed to include only the licenses with latest expiration date then transposed to have one row per individual. This process was determined to be the most feasible and appropriate avenue forward for the collection of individual-level data. A descriptive analysis was performed and results are included below.

KEY FINDINGS

Around 33,400 individuals who obtained an EMS professional certification were identified as having obtained a license regulated by the PLA. Of these, almost 40% had also obtained another occupational license related to healthcare. A full breakdown is included in Table 6. By far, the most commonly held other healthcare license category was long-term care with 41% of individuals matching to a Certified Nurse Aide, Home Health Aide, or Qualified Medication Aide license. This was closely followed by 36% of individuals who went on to obtain a nursing license (Registered Nurse, Licensed Practical Nurse, or Advanced Practice Registered Nurse prescriptive authority license). The next most common license categories were Medicine (3.9%), Pharmacy (3.8%), and Behavioral Health (3.2%).

Table 6: EMS personnel holding other healthcare licenses

	N	%
Long Term Care	5,209	41.4
Certified Nurse Aide	3,681	29.22
Home Health Aide	1,247	9.9
Qualified Medication Aide	281	2.23
Nursing	4,594	36.5
Registered Nurse - Including Compact	4,025	31.95
Licensed Practical Nurse - Including Compact	548	4.35
APRN Prescriptive Authority	17	0.13
Nursing Student	2	0.02
APRN - Compact RN	1	0.01
Temporary LPN Permit	1	0.01
Pharmacy	788	6.3
Pharmacy Technician	714	5.7
Pharmacist	55	0.44
Pharmacy Intern	19	0.15
Medicine	498	3.9
Physician	274	2.17
Physician Assistant	212	1.68
Podiatric Radiographer	8	0.06
Medical Student	4	0.03
Behavioral Health	395	3.2
Clinical Social Worker	122	0.97
Social Worker	99	0.79
Mental Health Counselor	55	0.44
Health Service Provider	33	0.26
Mental Health Associate	16	0.13
Temp Social Worker	16	0.13
Psychologist	11	0.09
Marriage & Family Therapist	10	0.08
Addiction Counselor	7	0.06
Bachelor Social Worker	7	0.06
Clinical Addiction Counselor	8	0.06
Temp Mental Health Counselor	4	0.03
Marriage & Family Associate	3	0.02
Temporary Psychologist Permit	2	0.02
Addiction Counselor Associate	1	0.01
Temp Bachelor Social Worker	1	0.01
Oral Health	169	1.3
Dental Radiographer	118	0.94
Dental Hygienist	27	0.21
Dentist	23	0.18
Dental Hygiene Anesthesia Per	1	0.01
Veterinary Medicine	82	0.7

Veterinarian	43	0.34
Registered Vet Tech	39	0.31
Other License Types	863	6.84
Respiratory Care Practitioner	221	1.75
Radiologic Technologist	137	1.09
Massage Therapist	119	0.94
Radiology Provisional Permit	110	0.87
Radiology Student Permit	80	0.64
Physical Therapist Assistant	48	0.38
Physical Therapist	39	0.31
Occupational Therapy Assistant	27	0.21
Nuclear Medicine Technologist	16	0.13
Occupational Therapist	15	0.12
Hearing Aid Dealer	9	0.07
Optometrist	8	0.06
Cardiac Catheterization Certificate	8	0.06
Student Permit	6	0.05
Radiation Therapist	5	0.04
Speech Pathologist	5	0.04
Audiologist	3	0.02
Respiratory Care Temporary RCP Permit	2	0.02
Speech Language Pathologist Support Personnel	3	0.02
Temporary Occ Therapist Permit	1	0.01
Temporary Physical Therapy Assistant Permit	1	0.01
Total	12,598	100.0

FACTORS THREATENING RETENTION OF INDIANA EMS PROFESSIONALS

Indiana EMS professionals are required to renew their credentials every two years to stay in good standing with the state. Each year, a percentage of certified individuals choose not to go through the renewal process and allow their credentials to expire. This project provided the opportunity for Indiana to better understand the factors associated with EMS workers' decisions to leave the EMS field. Additional details and findings can be found in the accompanying report, Influences on Retention in the Indiana EMS Workforce.

METHODOLOGY

A retention survey was developed to better understand the factors influencing previously certified personnel to leave EMS. Many other states are experiencing and working to address EMS workforce shortages. Minnesota recently developed and deployed a concise retention survey that asked some of the same questions of interest to Indiana [22]. Using their excellent survey tool as a base, Indiana made slight modifications to allow for additional response options and provide an opportunity for open-ended feedback [23].

IDHS identified all EMR, EMT, AEMT, and paramedic licenses that expired from January 1, 2018, through September 30, 2023. After de-duplication, this resulted in 11,824 unique individuals who allowed their Indiana EMS license to expire during this time. The survey was developed utilizing REDCap, a survey administration software. A link to the retention survey was emailed to these individuals and one reminder email was sent to request completion from non-respondents during the survey's open period (November 30 - December 8, 2023). Responses were collected from 1,048 former EMS personnel (8.9% response).

22 Findings from the Minnesota EMS Retention Survey can be found in their recent report, Influencers of Retention in the Minnesota EMS Workforce, which is available at: https://mn.gov/emsrb/assets/Influencers%20of%20Retention%20in%20the%20EMS%20Workforce--Fianl%20for%20Publication_tcm1116-548644.pdf

23 Indiana's EMS Retention Survey can be found at: https://scholarworks.iupui.edu/bitstreams/7e6dadde-9967-4786-ac2d-ab83fae88f16/download

Quantitative data were cleaned and prepared for descriptive analysis. The qualitative data were then prepared for coding and analysis. Coding of qualitative data occurred in three phases. In the initial phase, responses were labeled based on their inherent meaning, allowing for the identification of content and trends through assumptions. In the second phase, members of the Bowen Center convened to review results of individual coding, identify incidents of discordance between individual results, and discuss recoding strategy for any such incidents. Recoding of discordant responses was accomplished once consensus was achieved within the research team. The coding system employed was comprehensive, with codes carefully defined and designed to be mutually exclusive.

Once all codes were finalized, they were methodically organized into overarching themes, with related codes being grouped together. The thematic analysis served to distill the essence of the data, providing a comprehensive understanding of the underlying patterns and insights. With the completion of the theming process, the qualitative data were then succinctly summarized in a table format.

RESULTS

Quantitative:

Pay was the primary factor influencing retention; it was reported as an important or moderate influence on nearly half of the EMS workers who left the field, although its importance lessened with experience. This conflicts somewhat with current research suggesting that pay may not be the main driving factor behind EMS workforce attrition as it was pre-pandemic[24]. The quality of agency leadership and the lack of or quality of retirement/pension benefits were the second and third most cited influences.

Agency leadership was the top influence on rural EMS workers but relatively unimportant to workers with less than one year of experience and those who were in law enforcement agencies. Burnout/mental health was another important influence (cited by nearly 20% of overall respondents, but especially pronounced for those who were both career and volunteer EMS workers and those who worked for ambulance or medical/first response services). Educational requirements were the top influence on volunteer EMS workers leaving. Another important influence was a desire to pursue other healthcare opportunities, a reason that was of great importance to those with less than one year of experience in EMS. Respondents cited moving out of Indiana and their relationship and interaction with crew members as the least important factors related to their decision to leave EMS.

Qualitative:

Survey respondents were given the opportunity to provide additional thoughts and feedback in an open text box. Themes from these responses are provided in Table 7 on the next page. Out of those individuals who provided open text feedback, 20% of the responses were centered around issues with continuing education. These issues took a variety of forms including that the requirements are too high to complete for volunteers/part time EMS workers or those who may be unaffiliated with an agency, that the cost of CEU was too expensive compared to the pay, or that there were issues obtaining this training during the COVID-19 pandemic. The second most frequent theme (n-=73) was that individuals left the EMS workforce due to their desire to retire. Another 10% of the responses were in alignment with the quantitative survey findings that indicated low wages were a driving factor in their decision to leave the workforce. Of note, 32 individuals mentioned that they “loved” working in EMS even though they made the difficult decision to exit the workforce. These individuals exited the workforce for a variety of different reasons but still made time to note how much they enjoyed working in EMS.

24 Research Abstracts from the 2023 National Association of EMS Physicians. Available at https://www.tandfonline.com/doi/full/10.1080/10903127.2022.2138658

Table 7: Commonly reported factors/themes influencing an EMS workers decision to exit the workforce.

Themes	Count of Theme	Percent	Selected Responses
Issues with continuing education	93	19.8	"… help out a volunteer department from time to time but state requires too much CEU and time to keep up."
			"The continuing education was more expensive than my certification"
			"The main reason for not renewing my license was due to the fact you needed a supervisor signature to sign off on skills and [continuing] educational requirements. I was not employed with a company at the time, and I was not aware of any alternatives to getting signed off."
Retired	73	15.6	" I retired after 40 years of service"
Low wages	44	9.4	"I needed a higher paying job to support [my husband]"
Physical and Mental health issues	40	8.5	"My experience was great as an EMT for many years. I simply decided at my age and health issues it was time to step aside and let others carry on. I appreciate the opportunity I had to serve my community. My department was awesome"
			"After several spine surgeries and chronic pain from 25 years of service I was unable to continue in patient care"
			"PTSD is a real health issue. I served for 43 years from High School until I retired because of PTSD."
Loved Working in EMS	32	6.8	"Kudos to Joel Thacker and staff on creating EMS division separate from Fire division"
			"I loved being a first responder and the people I worked with"
Pursued opportunity in another healthcare field	27	5.8	"I decided to advance my career by becoming an Emergency Room Nurse"
Transitioned out of field	26	5.5	"Indiana's EMS system is great! I loved my career and only left to become a Commissioned Naval Officer."
			"I retired from the fire department and became a full-time police officer, so I did not keep my EMR certification."
			"I slowly took on work elsewhere, not in the medical field. I left primarily due to the career change."
Issues with renewal	24	5.1	"I just missed the deadline to renew mine and was confused on the process with no one to guide me on how to renew it."
			"I thought I had clicked submit to renew but I either didn't or it didn't go through for some reason. This is the only reason I am no longer certified."
			"I could not renew my Indiana license due to their requirements for out-of-state licensure."

Issues with agency leadership	19	4.1	"I really enjoyed the work, but lack of appreciation and guidance from management made me not want to do the work anymore. Changing employers was also considered, but after talking to peers and hearing many of the same concerns and complaints, I decided to just let the certifications expire."
			"There is way too much politics and who knew who, rather than based on quality of individual performance."
			"My experience with a profit based corporate agenda and poor leadership led me to leave the industry altogether."
Moved out of state	18	3.8	"If anything comes up in the future for something in Indiana, I will renew my Indiana license"
Requirements to re-certify after lapse are too high	16	3.4	"I do wish I could continue but I do not want to have to sit through 6 months or more of training again. I would renew it if I could just take a remedial class and retest."
			"I was a volunteer, allowed EMT to expire due to having child around time of expiration date. I would have loved to keep it, just didn't have the time at the moment for recertification. More than likely won't get it again since I'd have to go through class again and don't have that time available at the moment."
			"I let my paramedic go due to health issues, but I have been given the chance to get it back if I took a refresher class. The problem is the lack of an available class."
Transitioned to Other EMS Role	12	2.6	"…deciding to drop back to EMT basic."
Dissatisfaction with EMS system	10	2.1	"The amount of people abusing the 911 system is also a big influence on my decision to quit EMS"
			"The current EMS frame of mind seems to be that intervention is necessary and the responsibility of a person's health is taken by the state, rather than the individual."
			"The reason I quit is because the healthcare system leaves people who need it behind"
Poor overall experience	9	1.9	"I realized I just don't have the temperament"
Family concerns	7	1.5	"… my kids became my priority"
Unable to fulfill certification requirements	5	1.1	"Having to be affiliated with an agency to renew at the time wasn't possible"
Issues with crewmembers	4	0.9	"… a crew that caused me to question if there would always be someone there to have my back"
Lack of respect	4	0.9	"Paramedics are looked down upon by other medical professionals"
Unable to balance work/life	3	0.6	
Unable to find a position	2	0.4	
Planning to re-certify	1	0.2	

Note: Selected responses are not provided for themes with less than 4 associated responses to maintain anonymity.

CONSIDERATIONS

- **Developing data strategies to strengthen future talent retention assessments.** A future assessment linking individual-level class completion records with certification/licensure records could provide insight into specific program outcomes and inform educational initiatives.
- **Addressing exam as a barrier to EMS graduate retention.** Training institutions report issues with students passing the NREMT exam as potential barriers to the retention of graduates into licensure/certification. Opportunities may exist to offer exam preparation mini courses for students or provide exam preparation materials to training institutions to better prepare students.
- **Expanding successful models.** Training institutions who are also providers report retaining 50% of EMS students trained in house five years later. Expanding training capacity among employers may promote workforce development and retention within Indiana's EMS workforce.
- **Consider new compensation strategies.** Generally, wages and benefits for EMS workers are a top challenge and the top driving factor for those exiting the field. Respondents who worked in metro and mixed metro/rural areas were significantly more influenced by low wages than those in exclusively rural areas, and those working in fire departments or law enforcement were less influenced by pay compared to workers in other agency types (ambulance and medical response). Differences in pay prioritization by rurality may be due to the difference in the amount of downtime per shift in less populated areas, which could contribute to overall employee satisfaction and wellbeing. In response to those who prioritized pay, EMS organizations may consider exploring salary adjustments or additional compensation measures to recognize and reward professionals in new ways, such as stipends (referral, sign-on, or retention bonuses), paying for training, or implementing earn-and-learn strategies (hiring untrained and inexperienced individuals in a non-licensed role, providing training, and promoting to a licensed role after training completion).
- **Strengthen agency leadership.** The quality of agency leadership was an important influence among over one-fourth of respondents, higher among more experienced professionals and those working in ambulance service or first response. To strengthen EMS leadership development, policymakers may consider investing in training courses for personnel who move into leadership positions or implementing mentorship programs that pair more experienced staff with newer team members to nurture leadership skills in younger or less experienced staff leaders.
- **Encourage a positive workplace culture.** Organizational culture findings (such as relationships with crew members and shift/workweek scheduling) did not rise as one of the most important influences of remaining in EMS but were ranked higher among those EMS workers who had less than one year of experience. As such, these factors may be especially important to retaining early career EMS workers within the field. To support a positive workplace culture, organizational leaders should consider developing a culture where employees feel seen and heard, including scheduling preferences or working with certain colleagues. Agencies could consider developing both top-down and bottom-up feedback mechanisms as an alternative to a linear chain of command. Organizational policies that encourage transparency, communication, and employee engagement between leadership and their staff both encourage trust and contribute to employee satisfaction.
- **Address burnout.** Nearly 20% of respondents indicated burnout as an important influence in their decision to leave EMS. EMS leaders should consider additional research into other state approaches and consider supporting pilot projects that reduce EMS provider burnout. Strategies to reduce burnout may include establishing flexible shift schedule options, targeted resiliency training,[25] or retaining a wellness coordinator.[26] Additionally, as a part of employer benefit packages, organizations should consider ensuring that benefits offerings include access to confidential, high-quality behavioral health and substance use care.
- **Explore healthcare career pathways for EMS personnel.** Many former EMS workers reported their pursuit of other healthcare opportunities was an important or moderate influence in their reasons for leaving EMS. Although it may seem counterintuitive to long-term retention, formal acknowledgement of the role of EMS as a stepping stone to health sector careers through the development of formal career pathways or bridge programs may support short-term recruitment of EMS workers to fill critical workforce gaps. Future assessment of EMS career pathways within the health sector may also be helpful to inform related policy and planning.

25 SAMHSA Disaster Technical Assistance Center Supplemental Research Bulletin First Responders: Behavioral Health Concerns, Emergency Response, and Trauma. 2018. Available at: https://www.samhsa.gov/sites/default/files/dtac/supplementalresearchbulletin-firstresponders-may2018.pdf

26 Governor DeWine Announces Wellness Support for Dozens of First Responder Agencies. 2022. Available at: https://governor.ohio.gov/media/news-and-media/Governor-DeWine-Announces-Wellness-Support-for-Dozens-of-First-Responder-Agencies-11032022

APPENDIX

Table 8. Summary of Population Statistics, Workforce Estimates, and County Rankings.

	Population Characteristics						Workforce Characteristics					Score and Ranking	
County	% Uninsured	Opioid OD Rate	Asthma Rates	Seizures Rates	Overall ED Utilization Rate	Population Characteristics Z Score	EMS Professionals per 100K	Incidents per EMS Workforce	Average Run Distance	Average Run Time	Workforce Estimates Z-Score	Total Score	Rank
Adams	12.31	36.30	13.20	11.25	4855.26	2.20	111.23	63.83	15.97	73.63	2.61	**4.81**	3
Allen	9.19	70.90	24.00	24.90	5396.96	0.02	84.66	141.18	34.78	119.53	0.74	**0.75**	39
Bartholomew	8.84	100.30	20.80	20.89	6803.27	-0.08	185.51	93.78	46.98	137.78	0.46	**0.38**	46
Benton	10.83	71.26	16.70	26.82	5496.90	-0.03	0.00	186.88	28.46	128.95	0.39	**0.36**	47
Blackford	8.74	119.10	36.70	25.72	10760.07	-3.00	0.00	186.88	35.06	76.98	1.15	**-1.85**	70
Boone	6.92	56.00	17.20	20.48	6322.89	2.18	57.49	176.79	23.28	91.58	1.26	**3.44**	17
Brown	9.62	71.26	32.30	10.09	7555.30	0.15	0.00	186.88	23.25	119.24	0.69	**0.84**	36
Carroll	9.98	34.60	21.70	14.17	5390.33	1.88	0.00	186.88	25.00	150.00	0.10	**1.98**	28
Cass	12.05	50.40	43.60	19.41	8987.57	-2.32	122.46	19.41	51.74	157.15	0.55	**-1.77**	69
Clark	8.96	128.50	14.60	12.05	5643.73	0.73	74.14	224.33	25.84	71.35	1.20	**1.93**	29
Clay	8.59	22.90	25.30	25.64	8481.64	0.90	0.00	186.88	63.48	106.47	-0.09	**0.81**	37
Clinton	12.25	77.20	36.70	14.33	9200.06	-1.94	36.29	386.25	57.77	143.97	-2.11	**-4.05**	80
Crawford	11.64	66.20	13.30	23.29	5849.34	0.44	0.00	186.88	37.98	126.35	0.19	**0.63**	43
Daviess	19.69	36.00	16.70	20.42	6219.12	-1.74	89.83	143.87	137.38	273.90	-4.62	**-6.36**	88
Dearborn	7.75	78.90	7.10	13.08	4693.40	3.17	53.13	234.48	21.71	73.52	1.19	**4.37**	7
Decatur	8.68	79.10	39.00	17.49	10307.75	-1.38	136.78	72.19	25.01	87.37	2.08	**0.70**	42
DeKalb	8.05	52.90	29.50	7.17	7735.44	1.70	60.00	249.85	155.58	247.00	-5.40	**-3.69**	77
Delaware	8.46	181.40	28.30	33.54	6388.61	-3.88	172.52	119.09	49.17	142.50	0.13	**-3.75**	78
Dubois	9.15	14.00	17.20	7.98	5674.07	3.69	103.33	172.93	29.93	117.63	0.66	**4.35**	8
Elkhart	16.63	29.10	27.80	39.76	6675.49	-3.43	85.06	110.85	19.65	151.04	0.78	**-2.65**	74
Fayette	8.76	73.60	24.90	31.07	6716.61	-0.71	55.65	510.62	67.03	169.50	-3.73	**-4.44**	83
Floyd	7.38	107.00	9.90	23.89	5518.68	1.22	108.14	140.91	12.75	65.58	2.26	**3.48**	16
Fountain	9.72	55.10	40.00	47.58	9995.74	-3.98	0.00	186.88	24.32	103.48	0.95	**-3.03**	75
Franklin	8.95	22.00	19.10	10.79	8020.31	2.85	0.00	186.88	11.94	59.56	2.04	**4.89**	2
Fulton	10.45	75.10	19.00	26.00	8770.73	-0.52	132.44	110.96	14.24	75.83	2.26	**1.75**	30
Gibson	6.72	26.70	25.00	11.18	7678.29	2.92	0.00	186.88	98.32	196.59	-2.58	**0.34**	48
Grant	8.25	82.10	39.80	33.36	9131.79	-2.72	156.95	105.69	14.80	88.17	2.07	**-0.65**	61
Greene	8.61	31.30	17.40	12.49	10205.94	2.49	74.71	198.09	18.38	65.90	1.68	**4.18**	9
Hamilton	4.61	30.50	12.10	19.31	3788.31	4.54	51.03	143.58	37.08	128.25	0.51	**5.05**	1

	Population Characteristics						Workforce Characteristics					Score and Ranking	
County	% Uninsured	Opioid OD Rate	Asthma Rates	Seizures Rates	Overall ED Utilization Rate	Population Characteristics Z Score	EMS Professionals per 100K	Incidents per EMS Workforce	Average Run Distance	Average Run Time	Workforce Estimates Z-Score	Total Score	Rank
Hancock	6.67	74.20	18.30	16.41	6348.04	2.06	119.82	80.12	58.57	133.49	0.35	**2.41**	26
Harrison	8.59	93.80	20.00	12.18	7079.80	1.03	27.67	612.64	47.60	137.27	-3.43	**-2.40**	73
Hendricks	6.28	57.00	15.80	14.34	4772.66	3.25	39.59	285.90	8.61	60.09	1.38	**4.63**	4
Henry	8.29	39.60	21.90	24.46	8092.37	1.08	77.65	267.87	42.86	88.21	0.15	**1.22**	34
Howard	8.08	55.70	49.30	26.97	8744.49	-2.30	126.66	162.57	16.73	85.05	1.65	**-0.65**	62
Huntington	8.42	120.50	24.60	22.60	7928.21	-1.11	29.96	743.82	13.44	158.47	-3.93	**-5.04**	86
Jackson	10.09	65.60	23.30	11.69	8196.76	0.81	93.34	160.02	101.29	214.54	-2.78	**-1.96**	72
Jasper	10.00	53.60	22.10	16.85	7101.63	0.91	0.00	186.88	64.76	136.66	-0.67	**0.25**	49
Jay	9.88	249.60	28.90	34.06	9709.60	-6.60	0.00	186.88	68.08	171.54	-1.37	**-7.97**	90
Jefferson	9.01	46.40	15.00	9.20	8020.28	2.76	63.37	321.86	15.33	75.29	0.67	**3.42**	18
Jennings	8.43	93.70	38.40	36.73	9730.38	-3.31	0.00	186.88	57.96	139.24	-0.54	**-3.85**	79
Johnson	7.25	74.00	15.10	12.20	5408.47	2.68	39.56	180.06	42.58	130.23	0.06	**2.74**	24
Knox	9.95	35.50	15.20	31.57	10426.63	0.35	228.06	66.21	18.08	83.20	2.37	**2.72**	25
Kosciusko	12.82	45.30	20.00	31.86	6678.65	-1.00	121.09	125.69	14.89	69.68	2.25	**1.25**	33
LaGrange	28.58	12.60	8.70	7.21	5132.76	-2.13	0.00	186.88	96.13	261.82	-3.69	**-5.82**	87
Lake	8.07	70.00	40.40	18.54	5718.29	-0.65	64.99	138.02	6.57	157.11	0.80	**0.15**	51
LaPorte	8.29	89.20	31.80	30.48	7406.35	-1.65	64.06	164.24	11.68	50.74	2.38	**0.72**	41
Lawrence	8.85	70.50	35.20	8.74	10614.60	-0.06	55.47	4.76	32.30	142.97	1.40	**1.34**	32
Madison	9.25	73.30	38.60	42.43	8475.94	-3.49	97.11	164.64	63.11	146.40	-0.63	**-4.12**	81
Marion	9.39	131.40	51.40	27.86	6778.38	-4.76	111.11	280.12	25.20	88.06	0.50	**-4.26**	82
Marshall	12.99	51.90	19.80	31.05	6589.19	-1.12	60.71	141.82	46.58	119.43	0.44	**-0.68**	63
Martin	9.19	71.26	13.30	38.80	8282.21	-0.54	0.00	186.88	27.41	94.67	1.03	**0.49**	45
Miami	9.65	45.10	25.10	31.06	8311.85	-0.50	0.00	186.88	11.93	148.38	0.46	**-0.04**	53
Monroe	9.46	53.90	15.10	23.94	5428.42	1.33	80.79	4.49	28.53	127.36	1.78	**3.11**	22
Montgomery	10.48	106.90	28.90	34.35	8241.60	-3.04	112.97	170.63	29.85	91.01	1.15	**-1.88**	71
Morgan	8.46	113.50	31.90	8.18	9709.72	-0.54	38.78	374.00	30.72	108.12	-0.70	**-1.24**	65
Newton	11.93	64.40	17.50	7.85	4482.91	1.54	0.00	186.88	82.66	169.29	-1.70	**-0.16**	56
Noble	11.51	33.50	21.80	15.28	7531.71	1.02	23.29	776.36	177.63	275.77	-10.41	**-9.39**	91
Ohio	9.39	71.26	0.00	23.29	5068.58	2.52	0.00	186.88	34.76	103.01	0.69	**3.21**	21
Orange	10.93	45.80	23.80	23.29	11346.44	-0.46	126.07	3.04	51.44	161.18	0.61	**0.15**	50

	Population Characteristics						Workforce Characteristics					Score and Ranking	
County	% Uninsured	Opioid OD Rate	Asthma Rates	Seizures Rates	Overall ED Utilization Rate	Population Characteristics Z Score	EMS Professionals per 100K	Incidents per EMS Workforce	Average Run Distance	Average Run Time	Workforce Estimates Z-Score	Total Score	Rank
Owen	11.08	57.70	15.80	44.07	8794.18	-1.65	0.00	186.88	56.17	114.11	-0.05	**-1.69**	68
Parke	11.61	71.26	10.20	8.50	5741.45	2.01	0.00	186.88	36.17	62.19	1.39	**3.39**	20
Perry	6.82	71.26	25.50	10.62	6735.35	1.86	113.90	110.18	24.73	89.98	1.75	**3.61**	15
Pike	10.47	71.26	21.50	4.55	6661.73	1.54	0.00	186.88			0.00	**1.54**	31
Porter	6.32	61.60	20.30	18.93	6491.51	2.06	163.56	65.63	7.00	100.66	2.34	**4.40**	6
Posey	6.40	35.40	10.80	21.76	3742.63	3.69	0.00	186.88	149.00	210.00	-4.10	**-0.40**	58
Pulaski	9.59	145.70	31.20	4.45	9587.49	-1.33	194.51	65.96	49.52	115.76	1.00	**-0.33**	57
Putnam	7.90	71.90	10.00	21.80	7890.97	1.85	118.99	107.14	15.90	79.20	2.19	**4.04**	10
Randolph	9.89	109.50	28.10	17.36	8549.64	-1.28	0.00	186.88	49.32	81.83	0.70	**-0.58**	60
Ripley	9.24	67.10	17.60	4.86	6344.35	2.48	130.67	139.50	27.64	87.31	1.51	**3.98**	12
Rush	9.86	71.26	35.60	23.01	10796.55	-1.82	209.93	61.06	39.64	91.29	1.72	**-0.10**	55
Scott	8.59	146.60	31.80	17.57	811.13	-1.29	0.00	186.88	23.53	86.26	1.27	**-0.02**	52
Shelby	8.99	87.20	29.80	32.19	15257.65	-2.69	88.81	164.58	55.89	153.39	-0.57	**-3.26**	76
Spencer	8.77	71.26	14.70	22.80	2222.52	1.63	161.63	112.78	17.93	74.73	2.18	**3.81**	13
St. Joseph	8.39	73.90	30.50	49.45	90357.61	-12.21	60.61	199.24	34.14	136.11	0.02	**-12.18**	92
Starke	9.52	182.60	25.90	6.04	7637.34	-1.65	0.00	186.88	17.87	77.08	1.58	**-0.07**	54
Steuben	8.94	17.30	25.20	14.86	7521.95	2.04	83.74	125.17	232.76	268.34	-6.79	**-4.75**	84
Sullivan	8.43	71.26	16.90	19.82	7669.33	1.20	0.00	186.88	23.97	62.54	1.69	**2.88**	23
Switzerland	10.78	71.26	2.40	6.15	5219.61	3.35	0.00	186.88	47.07	121.05	0.06	**3.41**	19
Tippecanoe	8.00	60.80	24.40	22.43	5144.97	0.91	144.86	111.07	7.96	59.55	2.71	**3.62**	14
Tipton	8.58	71.26	23.30	7.63	8001.56	1.60	0.00	186.88	50.38	173.73	-0.96	**0.63**	44
Union	10.34	71.26	0.00	23.34	2313.04	2.48	0.00	186.88	83.80	170.25	-1.74	**0.74**	40
Vanderburgh	8.64	47.90	31.30	42.56	6476.02	-1.69	125.56	130.04	137.39	301.88	-5.02	**-6.71**	89
Vermillion	8.60	71.26	24.10	23.38	8552.25	-0.01	91.26	152.07	14.51	63.40	2.17	**2.16**	27
Vigo	9.77	39.20	24.90	30.99	7779.69	-0.30	221.71	83.93	53.77	169.52	-0.20	**-0.50**	59
Wabash	9.20	61.30	15.30	19.94	8362.54	1.25	32.45	660.80	27.10	115.70	-2.89	**-1.64**	67
Warren	7.35	71.26	20.40	35.97	6867.26	-0.17	0.00	186.88	27.87	97.13	0.97	**0.80**	38
Warrick	6.68	41.30	14.10	30.23	5053.17	2.18	82.15	162.23	80.60	267.95	-3.22	**-1.04**	64
Washington	9.67	60.60	29.60	18.05	7924.70	-0.10	0.00	186.88	23.93	98.96	1.04	**0.94**	35
Wayne	9.54	183.70	15.30	44.37	5274.17	-3.90	230.23	93.83	79.17	175.05	-1.02	**-4.92**	85

	Population Characteristics						Workforce Characteristics					Score and Ranking	
County	% Uninsured	Opioid OD Rate	Asthma Rates	Seizures Rates	Overall ED Utilization Rate	Population Characteristics Z Score	EMS Professionals per 100K	Incidents per EMS Workforce	Average Run Distance	Average Run Time	Workforce Estimates Z-Score	Total Score	Rank
Wells	7.72	49.50	19.00	8.46	7128.42	2.90	138.31	78.21	15.00	122.41	1.66	**4.56**	5
White	10.56	49.80	32.80	14.76	10717.62	-0.47	81.13	128.50	78.95	157.52	-0.96	**-1.43**	66
Whitley	8.30	32.40	22.60	16.06	7115.89	2.07	0.00	186.88	12.10	66.00	1.92	**4.00**	11