



Labor of Love

Helping Indiana Reduce Infant Death

Title: Labor of Love: Indiana Infant Mortality study

Category: Data, Information and Knowledge Management

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Project Dates: August 2013 – January 2015

Executive Summary: Reducing infant mortality became the top priority of the Indiana State Department of Health (ISDH) in January 2013. Indiana falls at the bottom 20 percent of all states for this frontline measure of health. In 2011, Indiana's infant mortality rate was 7.7 deaths per 1,000 live births, well below the Healthy People 2010 goal of 6.0 deaths per 1,000 live births and the subsequent Healthy People 2020 goal of 4.5 deaths per 1,000 live births. While the nationwide infant mortality rate declined 12 percent from 2005 through 2011, Indiana was among the states the Centers for Disease Control & Prevention classified as showing "no significant change" during that time.

To address this situation, the state of Indiana commissioned a data-driven analysis centered on infant mortality that unified information from previously unlinked sources across state agencies. The Management and Performance Hub (MPH) team utilized sophisticated machine learning techniques on the available data to identify highly granular at-risk subpopulations and provide actionable insights for stakeholders and policy makers.

Business Problem and Solution Description:

Indiana historically has fallen in the bottom 20 percent of states in infant survival rate. To take a new approach to this problem, the MPH was commissioned to pull in data to examine what factors were causing the state's infant mortality rate to remain higher than the national average. In 2011, Indiana's infant mortality rate was 7.7 deaths per 1,000 live births.

After identifying gaps in existing scientific and clinical research, the analytics team examined variables from 17 integrated data sets from five agencies and four public sources. The research team looked not only at deaths but also at infants born preterm and at low weights – two factors associated with likelihood of death.

- The State utilized sophisticated techniques on available data to identify highly granular at-risk subpopulations and provide actionable insights.
- The analysis found that inadequate prenatal care, Medicaid enrollment and young maternal age were the strongest predictors for adverse birth outcomes.
- It also discovered this startling fact: While the identified high-risk subpopulations account for only 1.6 percent of all Indiana births, they account for nearly 50 percent of infant deaths.

To meet the ambitious goals of Gov. Mike Pence, agencies were required to break down traditional silos and share data for the project. State employees within the Office of Management and Budget (OMB) and the Office of Technology were tasked with managing the project and developing a communication plan targeted to state employees to transform the state's data sharing culture.

To overcome some initial resistance, new security measures were put in place for the infant mortality project because of the sensitivity of the data. All data sets are placed behind multiple firewalls in a protected data row. Analysts that work directly with the privacy data have all undergone background checks, and they work in a secure room. The computers in the secure room do not have access to the Internet, and analysts are unable to bring in cell phones or personal equipment.

To connect the results with the public, a campaign (<http://www.in.gov/laboroflove/>) was launched to create more awareness.

The project cost approximately \$2.1 million – but this cost includes systems developed for data-gathering that can be used on additional projects moving forward.

Indiana used a variety of technologies that state governments have not been able to harness before this project, including SAP HANA, Hadoop and TokuMX. The state also used new problem-solving techniques such as fuzzy logic, advanced machine learning approaches, advanced visualization techniques (geospatially grounded analysis, cluster analysis, graph theory) and NoSQL databases and distributed computing concepts.

Significance: The end goal of this project is to save infants' lives. Besides babies and their families, other beneficiaries include all others across Indiana communities who have any interest in saving the lives of the state's youngest residents.

The goal of this project sets it apart from others. Its purpose is not just to achieve marginal cost savings or improve the efficiency of some process. However, cost savings will eventually be realized by taxpayers because of the reduced numbers of unhealthy babies born to mothers on Medicaid.

After identifying the underlying causes of a majority of cases of infant mortality, project managers used results from the study to create programs that target specific sub-populations. The data was then presented to lawmakers who, during the budget making session, allotted \$13.5 million in funding for a variety of programs.

Key stakeholders include the governor, agency heads, lawmakers and the public.

Benefit of the Project:

Real-world results will be seen in the infant mortality study. Indiana, in the just completed budget, has funded specific programs to target various demographic groups. The study concluded that 15 prenatal visits and a baby weight above 2500 grams are ideal. There are now measures to help mothers on Medicaid, who statistically make up 50 percent of the infant mortality rate, and ensure more positive outcomes.

The state's analysis found:

- Infant mortality risk in Indiana is not randomly distributed but exhibits statistically significant patterns.
- Inadequate prenatal care, Medicaid enrollment and young maternal age were shown to be the strongest predictors for adverse birth outcomes.
- While the identified high-risk subpopulations account for only 1.6 percent of all Indiana births, they account for nearly 50 percent of infant deaths.

The results of the study led directly to an additional \$13.5 million in legislatively-funded programs that will target the identified sub-populations. Programs will no longer be delivered via a one-size-fits-all approach. The specific tailoring of programs to populations, which previously were unknown, will vastly improve the service level of the State Department of Health outreach.

With new programs in place, it is expected that there will be a reduction in the number of babies with mothers participating in Medicaid born underweight.

Additionally, an ancillary benefit not considered at the beginning of the project is a saving to taxpayers. Babies born under 2500 grams cost two to three times more in medical care than babies born over that weight. These programs will result in direct taxpayer savings by producing more healthy deliveries.