

A photograph of a family in a modern kitchen. A man in a white shirt is smiling and looking down at a young child in a green sweater. A woman in a black and white striped shirt is holding a dark mug and looking at the child. The kitchen has large windows, a concrete pillar, and various kitchen items on the counter.

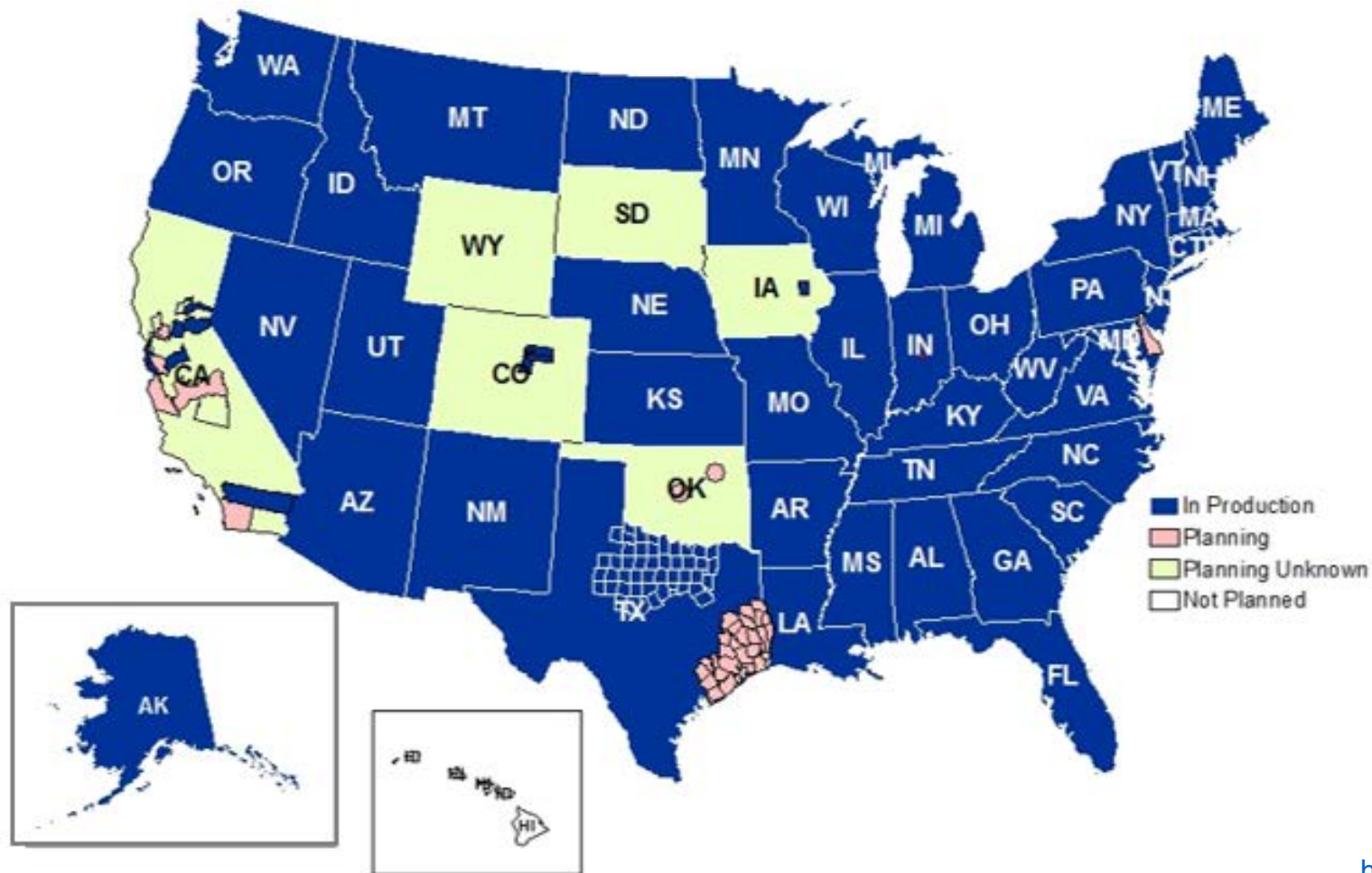
Syndromic Surveillance: Filling Gaps in Agriculture Injury Data

Zachary Stein, MPH: WestON Sept. 13, 2018

Syndromic Surveillance Background

- Providing Interoperability (Meaningful Use)
- National Syndromic Surveillance Program (NSSP)
- Kansas Syndromic Surveillance Program (KSSP)
 - Emergency Department visits as fast as possible
- ESSENCE

Current Syndromic Surveillance Coverage



<https://www.cdc.gov/nssp/news.html>

Syndromic Surveillance Benefits

- Geographic representation
- Fills gaps in data
- Preliminary research
- Timely data
- Timely analysis
- Data Accessibility (LHDs)

Filling Gaps in Data

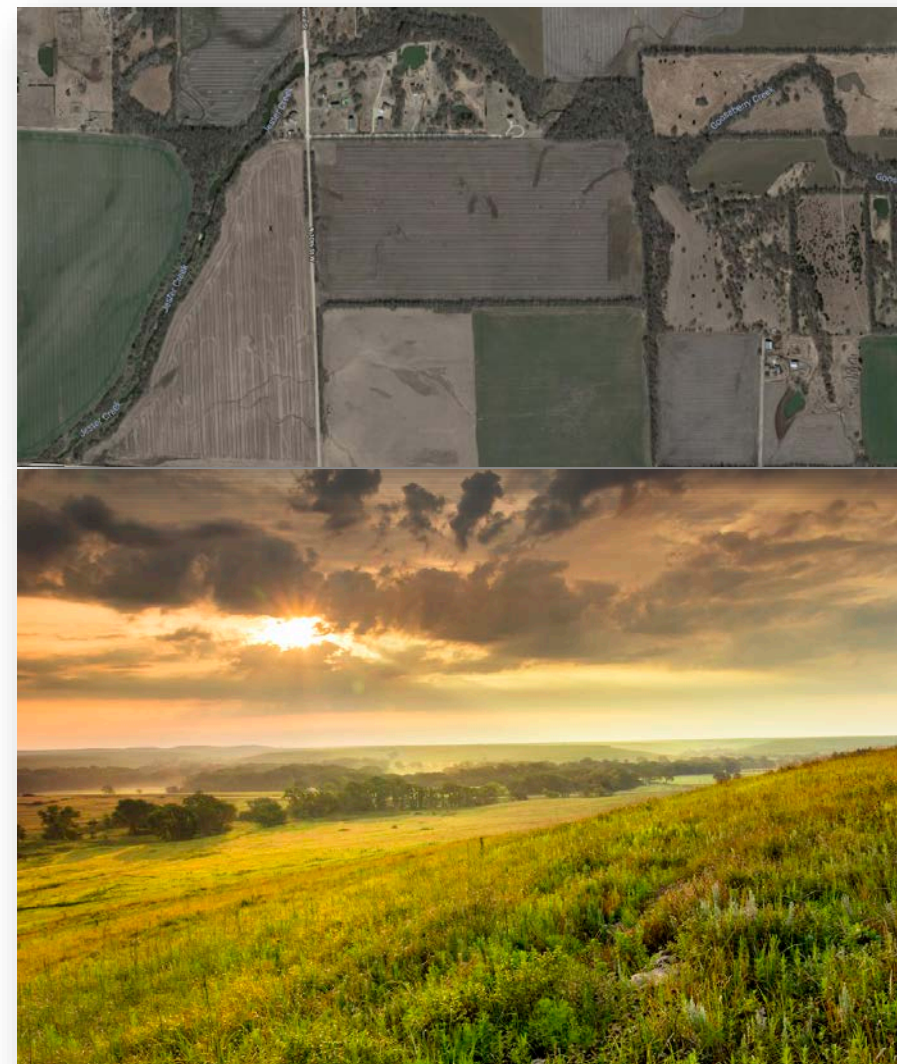
- Emergency Preparedness needs fast data
- Trauma Registry is quarterly data
- Kansas does not have a state-level occupational health surveillance program¹

¹Source: KDHE “Occupational Health Indicators in Kansas”

http://www.kdheks.gov/epi/download/Occupational_Health_Indicators_in_Kansas.pdf

Agriculture in Kansas²

- Agriculture is the largest economic driver in Kansas
 - Valued at \$67.5 billion
 - Accounts for 44.5% of Kansas's total economy
- 88% of all Kansas land is farmland (46 million acres)
- 13% of the state's workforce is employed directly, indirectly, or through induced effect careers related to agriculture



²Source: Kansas Department of Agriculture, "Learn About Kansas Agriculture" <http://agriculture.ks.gov/about-kda/kansas-agriculture>

Agriculture Injuries

- Each day in the United States, about 100 agricultural workers suffer a lost-work-time injury³



Heavy Equipment, Hazardous Materials, Environmental Exposures,
Child Employment, Aging Workforce, Migrant and Seasonal Workers,
Animal Exposure

³Source: National Institute for Occupational Safety and Health (NIOSH), "Agricultural Safety" <https://www.cdc.gov/niosh/topics/aginjury/default.html>

Query: Key Terms

- Started with casual collection of agriculture-related terms from coworkers
- Since “agriculture” encompasses such a broad spectrum of working conditions and exposures, collection resulted in 150 terms
- Terms were run on Kansas Syndromic Surveillance Program (KSSP) ED visit chief complaints August 2016 – August 2017

Query: ICD-10-CM

- An ICD-10-CM query was created to search for the following codes:⁴
 - W30 – Contact with agricultural machinery
 - Y92.7 – Farm as the place of occurrence
 - V84 – Occupant of special vehicle mainly used in agriculture
 - J67.0 – Farmer's lung
 - Z57.4 – Occupational exposure to toxic agents in agriculture
 - Y93.K9 – Activity involving animal care

⁴Source: ICD10Data.com - <https://www.icd10data.com/>

CC query yielded 6,069 unique ED visits

- Of these, only 127 (2%) contained a relevant ICD-10-CM code
 - Diagnosis Code and Chief Complaint agreement isn't critical, but it's reasonable to expect >2% agreement
- Even the very farm-specific terms had few cases
 - Combine – 11 visits
 - Plow – 3 visits
 - Grain – 5 visits

ICD-10-CM query
yielded 836 unique
ED visits, including
the 127 captured by
the CC query

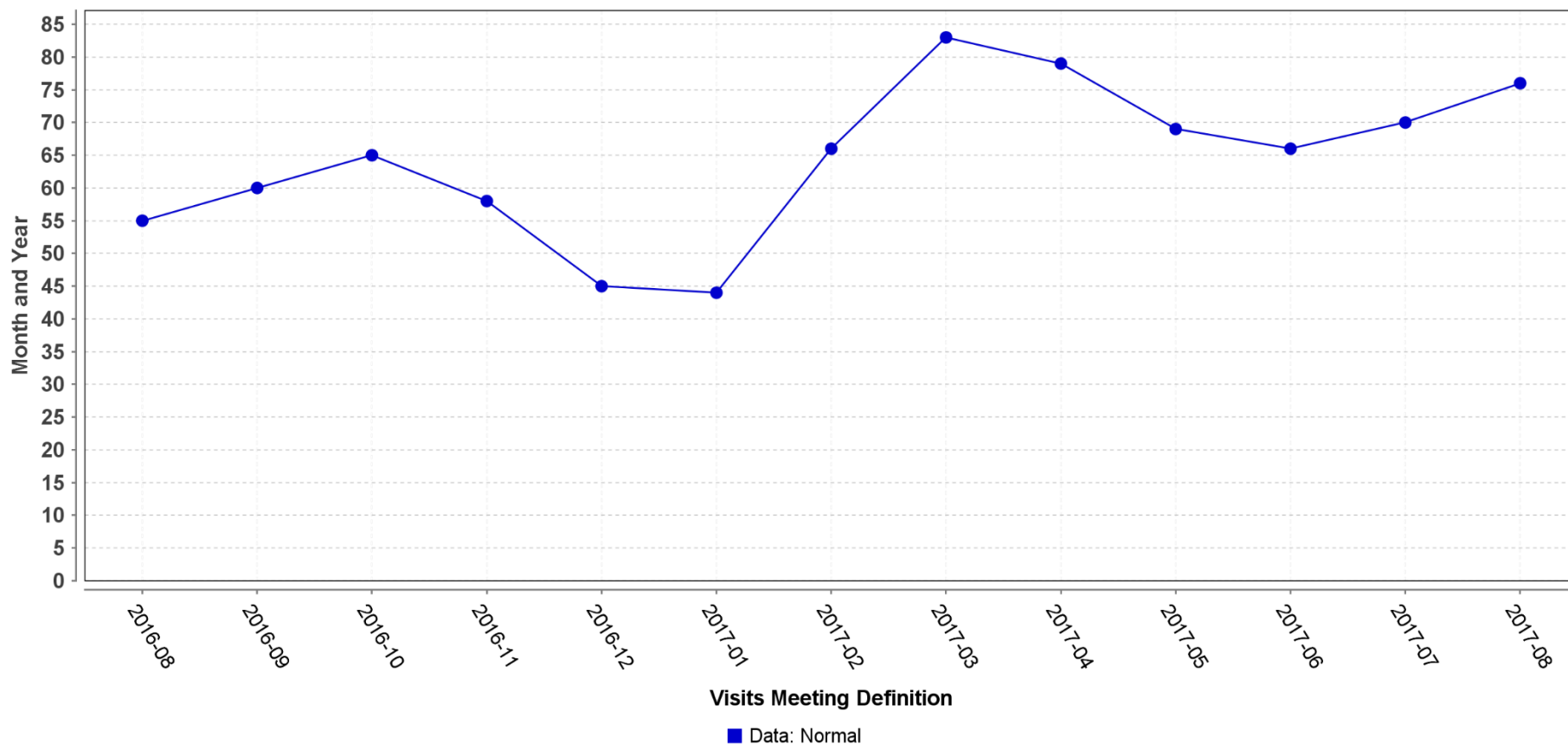
Code	Frequency
Z57.4 (ag toxic agent exposure)	2
J67.0 (farmer's lung)	3
W30 (ag machinery contact)	84
Y92.7 (farm place code)	539
V84 (transport, ag vehicle)	50
Y93.K9 (animal care involved)	298

ICD-10-CM Case Review

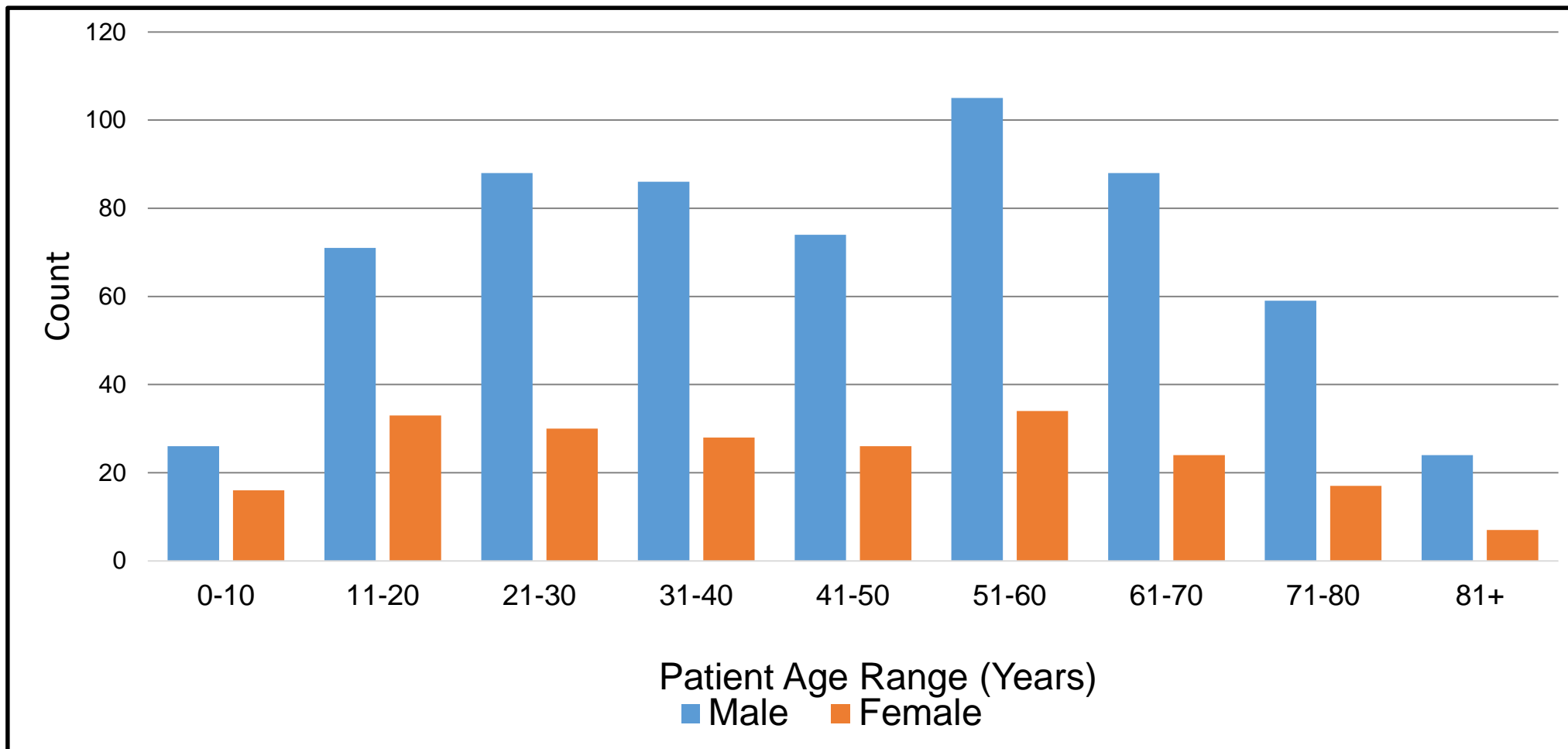
- Most had very vague chief complaints
 - (Very little to incorporate into future CC queries)

Code	Frequency	Farm or Work-Related Chief Complaint Term, Count and Percent of Code Category	
Z57.4 (ag toxic agent exposure)	2	0	.
J67.0 (farmer's lung)	3	0	.
W30 (ag machinery contact)	84	21	(25%)
Y92.7 (farm place code)	539	104	(19%)
V84 (transport, ag vehicle)	50	23	(46%)
Y93.K9 (animal care involved)	298	52	(17%)
All Visits	836	161	(19%)

Monthly Kansas ICD-10-CM Query Aug. 2016 – Aug. 2017



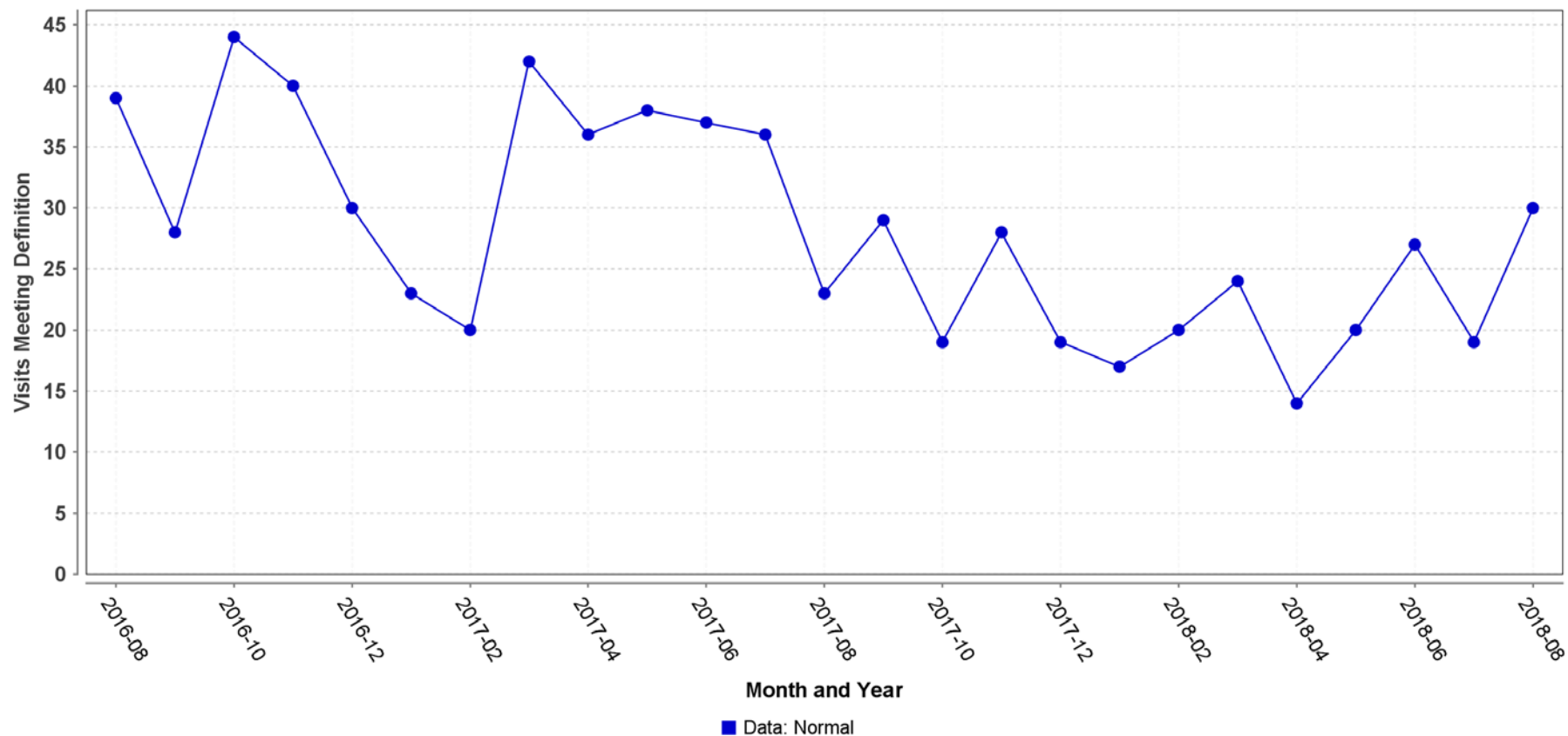
Age Range and Sex, ICD-10-CM Query



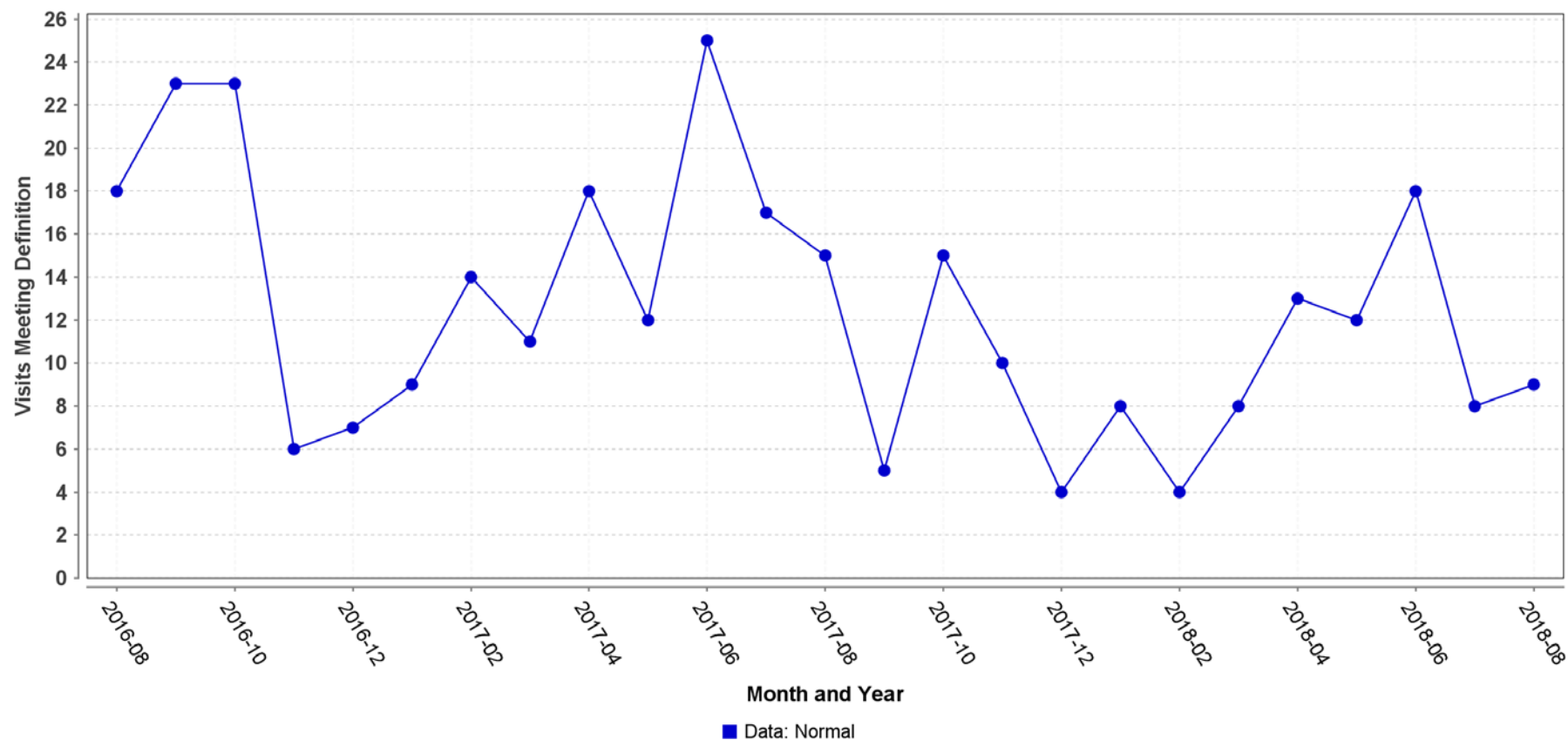
Revisiting Free-Text Queries

- Let's try narrower!
- Location
 - Ranch, Farm, Field, Barn, Shed, Paddock, Corral, Pasture, Stockyard, and Feedlot
- Equipment
 - Tractor, Combine, Baler, Swather, and Planter
- Cattle
 - Cattle, Cow, Bull, Steer, Heifer, Yearlings, Holstein, Angus, Short Horn, Long Horn, Charolais, and Hereford
- Horses
 - Horse, Mare, Gelding, Colt, Foal, Saddle, Donkey, Mule

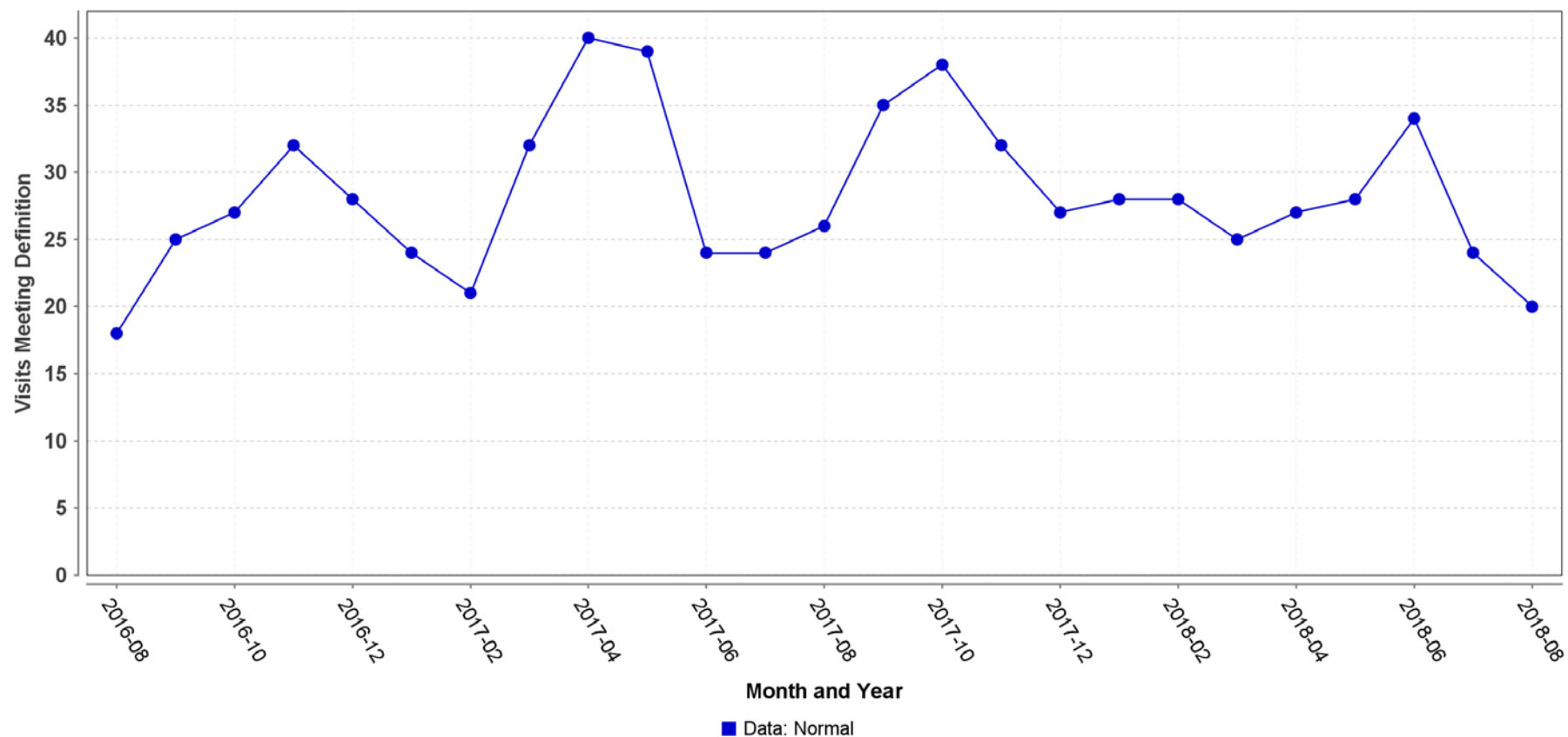
Location: Aug 2016 – Aug 2018, Kansas



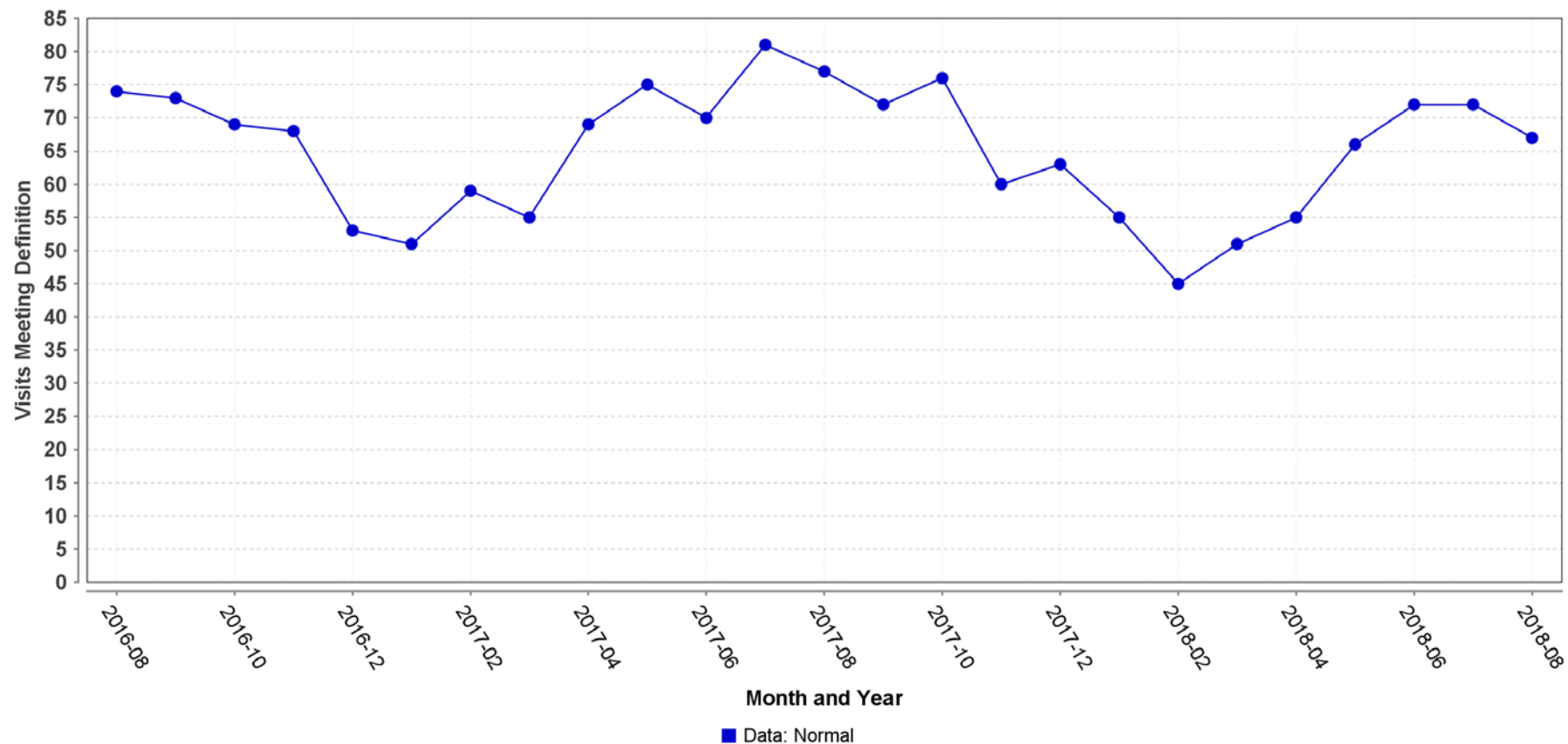
Equipment: Aug 2016 – Aug 2018, Kansas



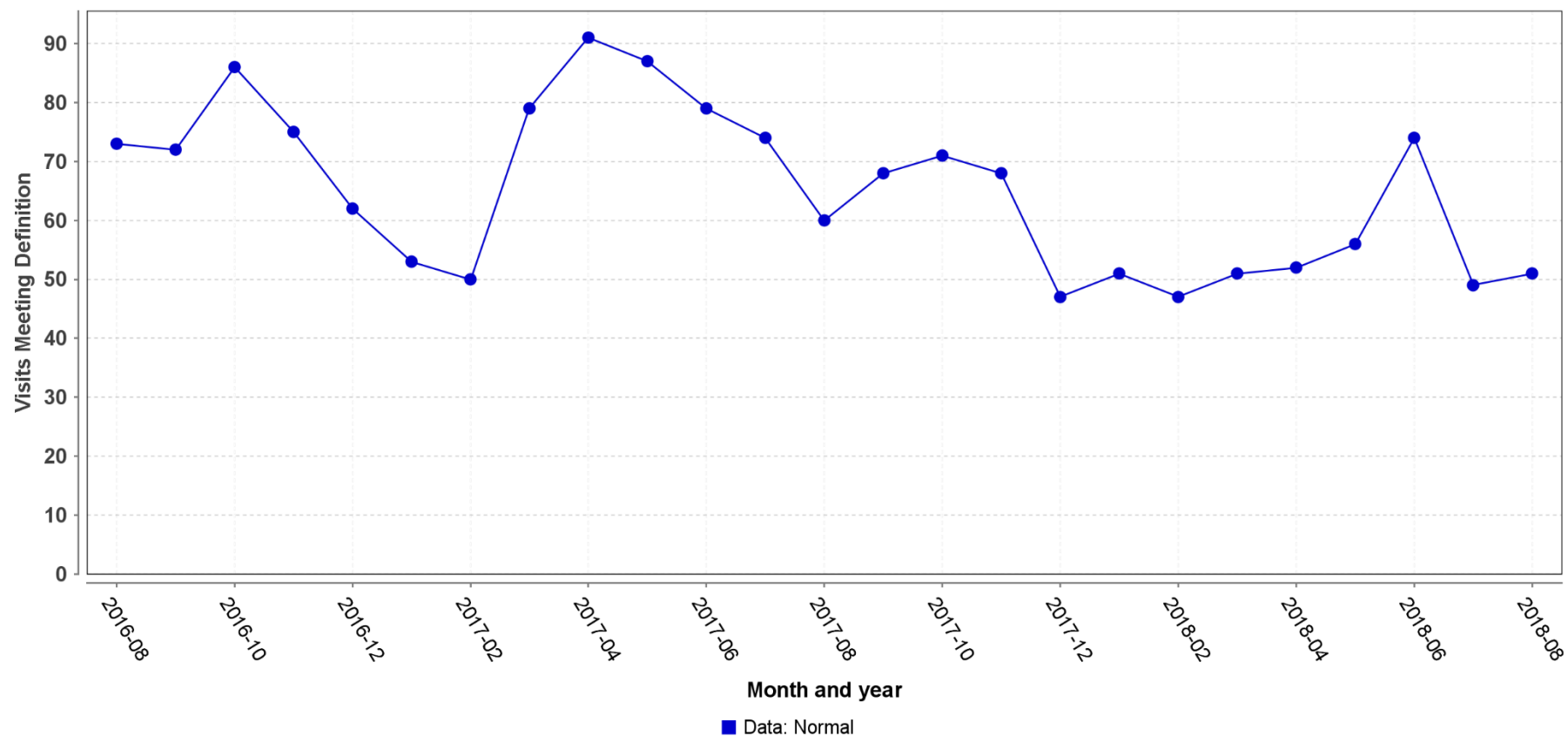
Cattle: Aug 2016 – Aug 2018, Kansas



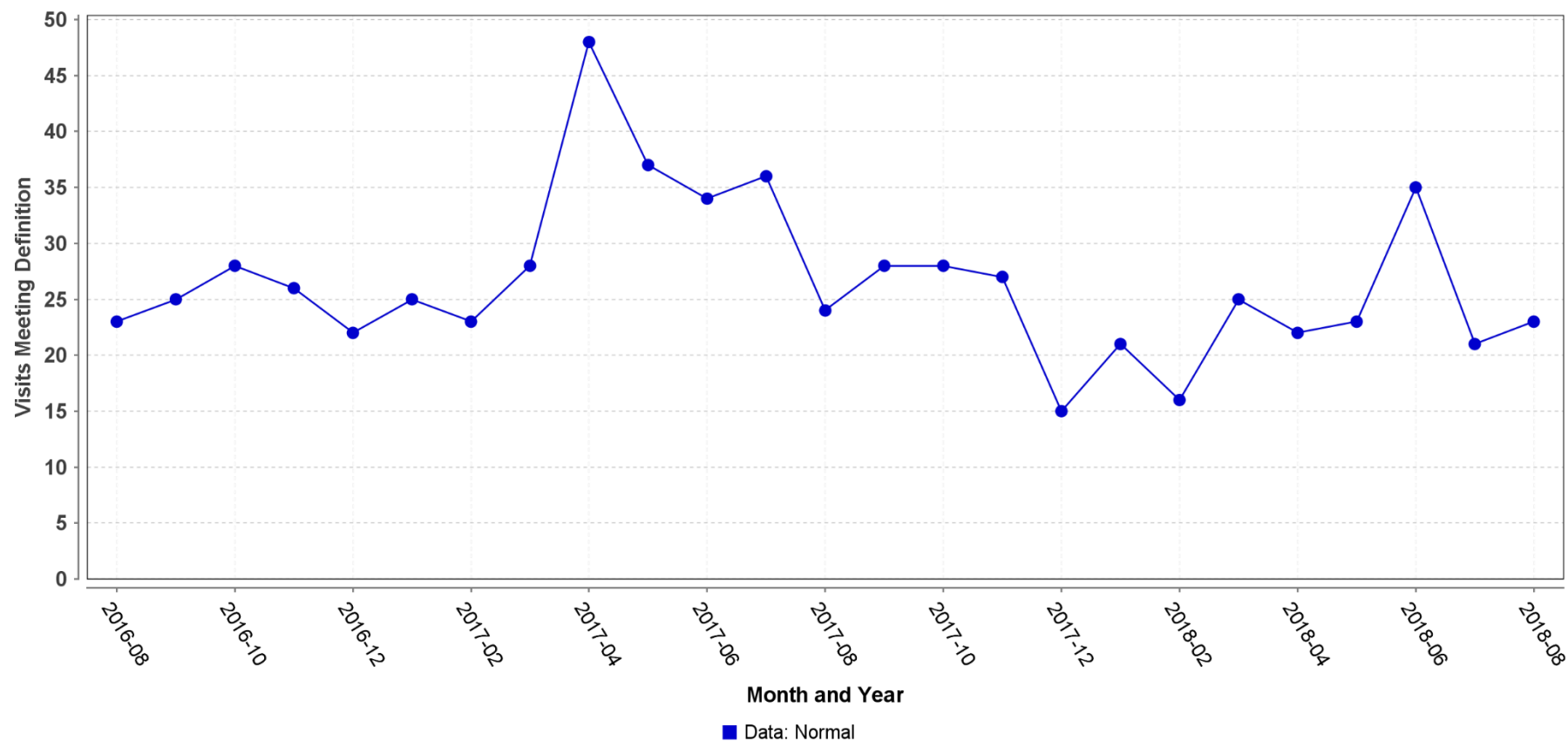
Horses: Aug 2016 – Aug 2018, Kansas



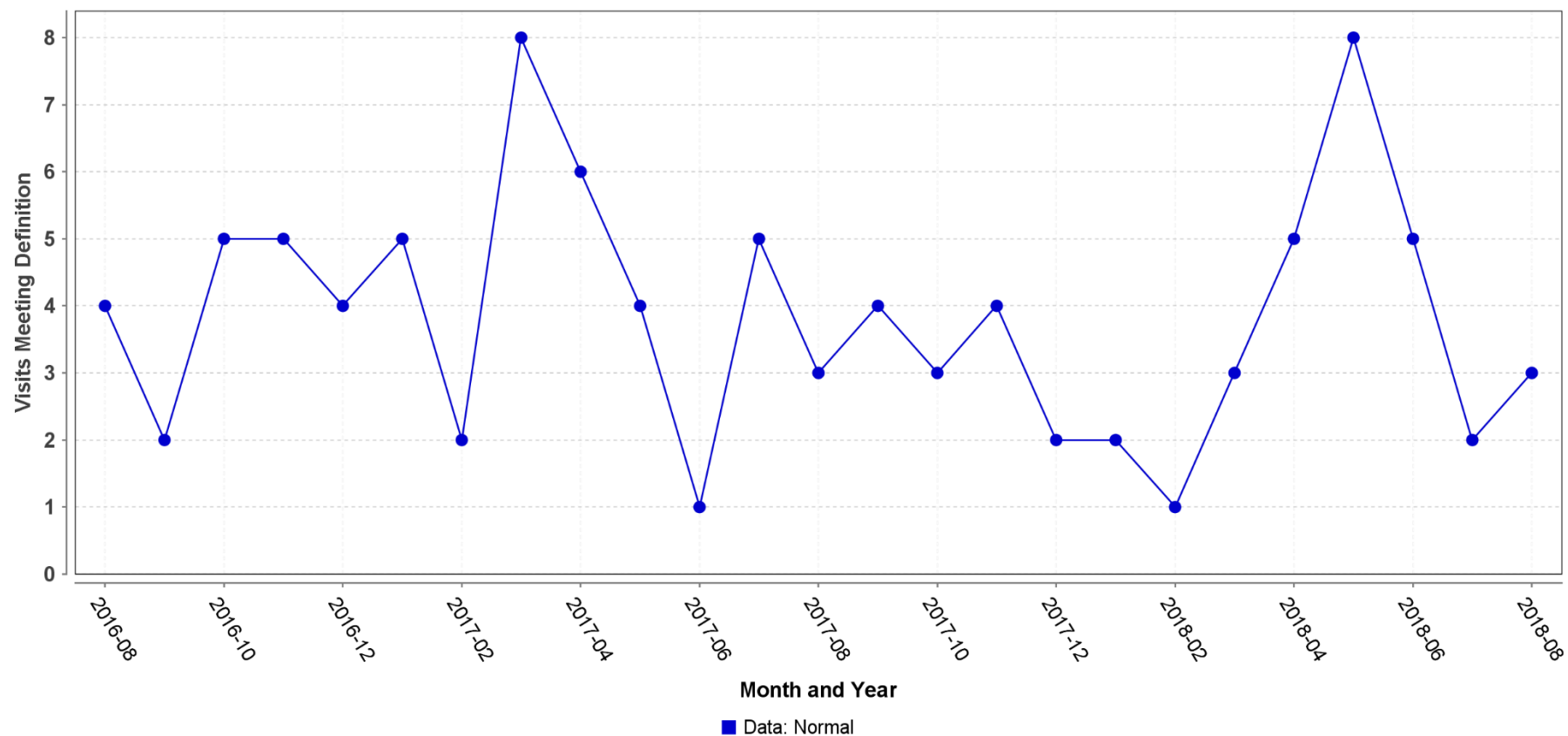
Location, Equipment, and Cattle Aug 2016 – Aug 2018, Kansas



Location, Equipment, and Cattle Crossed with ESSENCE Injury SubSyndrome



Location, Equipment, and Cattle Crossed with New Jersey Work Syndrome



Discussion

- Why did the CC query return only 2% ICD 10-positive cases while the ICD 10 query returned 19% CC-positive cases?
- When a Chief Complaint query underperforms, ICD-10-CM can provide a wealth of knowledge
- Using ICD-10-CM, while useful, negates the rapid nature of syndromic surveillance data
- ICD-10-CM code use
 - Z57 and Z04.2

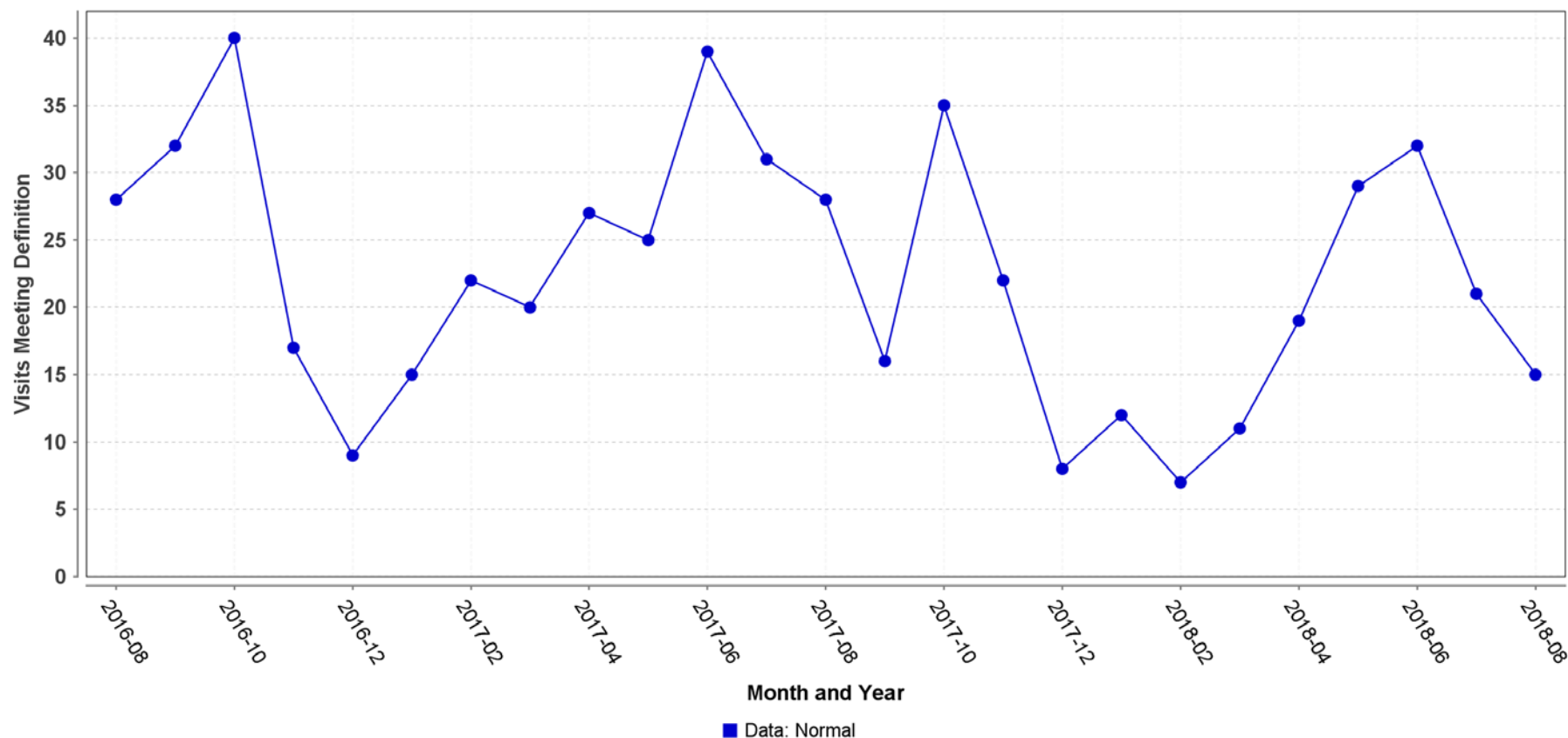
Discussion

- Why Syndromic Surveillance?
- Without using Free-Text language, Syndromic data isn't any better than cleaner data
- Ability to gain insight into the Free-Text fields when available
- Fast data analysis means fast outcome measures
- Accessibility

Next Steps

- Partnerships
- Continue surveillance
- Noise Reduction and Validation
- Revisit CC queries
 - Review other free-text fields:
 - Combine the free-text and ICD-10-CM into one query

Complete Queries? Farm Equipment! Incorporating ICD-10-CM, Free Text, and SNOMED

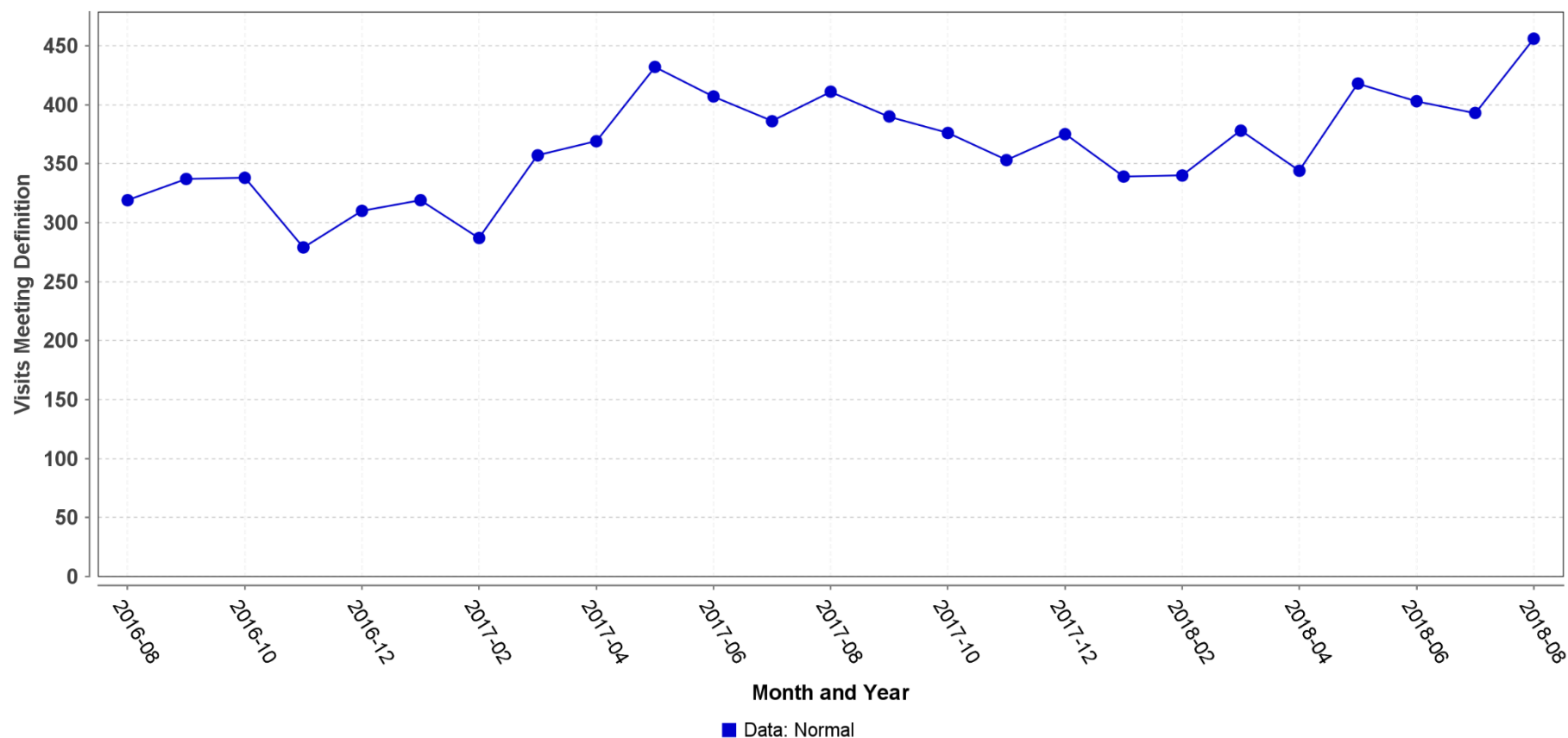


^;W30^,or,^;V84^,or,tractor^,or,^[
::]Tractor^,or, ^combine[
::]^,or,^baler^,or,^baling^,or,^swath_
_^,or,^grain^,AND,(^truck^,or,^Semi
^,or,^trailer^),or,^995006^,or,^19966
008^,or,^41378009^,or,^49980008^,
or,^105800004^,or,^106397007^,or,^
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21412007^,or,^221489007^,or,^2219
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07^,or,^242723002^,or,^308229006^

Final Plug

- Syndromic Surveillance – Relatively new to explore
- Hazardous Materials – Maricopa County
 - <https://www.surveillancerepository.org/hazardous-materials-hazmat-maricopa-county-department-public-health>
- Occupational Tree Related – New Jersey
 - <https://www.surveillancerepository.org/occupational-tree-related-injuries-new-jersey-department-health>
- Occupational Related Injuries – New Jersey
 - <https://www.surveillancerepository.org/occupational-related-injuries-new-jersey-department-health>
- School-Related Visits – CSTE Environmental Health in School WG
 - <https://www.surveillancerepository.org/school-related-visits-cste-environmental-health-school-workgroup>

New Jersey Work-Related Syndrome Definition Aug 2016 – Aug 2018, Kansas



Acknowledgements

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Thank you/Questions

