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Pesticide Exposure Surveillance in Texas: Enhancing surveillance data quality through automated real-time quality assurance and control

**Western States Occupational Network
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Disclaimer

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Background

DSHS Pesticide Exposure Surveillance in Texas (PEST)

- Acute Occupational Pesticide Poisoning (AOPP) is a reportable condition in Texas
(Title 25, Texas Administrative Code, Rule §99.1)
- 1986 – present
- Laboratories & physicians required to report



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Background

DSHS PEST program

- Conducts follow-up interviews
- If necessary, requests medical records
- Staff uses NIOSH guidelines for coding different variables and case ascertainment



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Background

DSHS PEST program

- Maintains an in-house database for data management
 - SPIDER (until mid-2016)
 - MS ACCESS, SAS (mid-2016 to present)
 - MS SQL (anticipated 2019 onward)*



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Background

DSHS Pest program

- Historically, DSHS conducted manual data quality assurance and quality checks (QA/QC) once a year
 - QA/QC for data entry and coding errors only
- Submits de-identified data to SENSOR-pesticide program at NIOSH annually



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Case for Action

- Manual QA/AC on an annual basis is not efficient and effective
- QA/QC did not assess data completeness and timeliness
- Need to identify issues in reporting, case follow-up and coding processes in a timely fashion



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Objective

- Develop an efficient and effective method for QA/QC in real-time
- Assess data completeness
- Identify areas of improvement in data collection and coding



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Methods: Data aggregation

Step 1:

Import data from an in-house database into SAS

Step 2:

- For selected variables, calculate aggregate count of known
- Create new SAS dataset with year, total counts, percent known values for all selected QA/QC variables



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Methods: Data aggregation

Step 2 example, variable sex:

year	total_cases	sex_unknown	pct sex unknown	sex_known	pct sex known
2006	434	8	0.0184331797	426	0.9815668203
2007	388	6	0.0154639175	382	0.9845360825
2008	346	4	0.0115606936	342	0.9884393064
2009	230	0	0	230	1
2010	180	0	0	180	1
2011	280	8	0.0285714286	272	0.9714285714
2012	392	6	0.0153061224	386	0.9846938776
2013	370	11	0.0297297297	359	0.9702702703
2014	384	3	0.0078125	381	0.9921875
2015	482	11	0.0228215768	471	0.9771784232
2016	94	0	0	94	1



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Methods: Data visualization in Tableau

Step 1: Connect to aggregate SAS dataset from Tableau

Step 2: Create one sheet per selected variable

- Graph percent known (X axis) by year (Y axis)

Methods: Data visualization in Tableau



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Step 3: Create a percent known* goal for each variable

Goal setting:

- At least 60% records should have industry and occupation known
- At least 95% records should have complete info for demographic and exposure-related variables

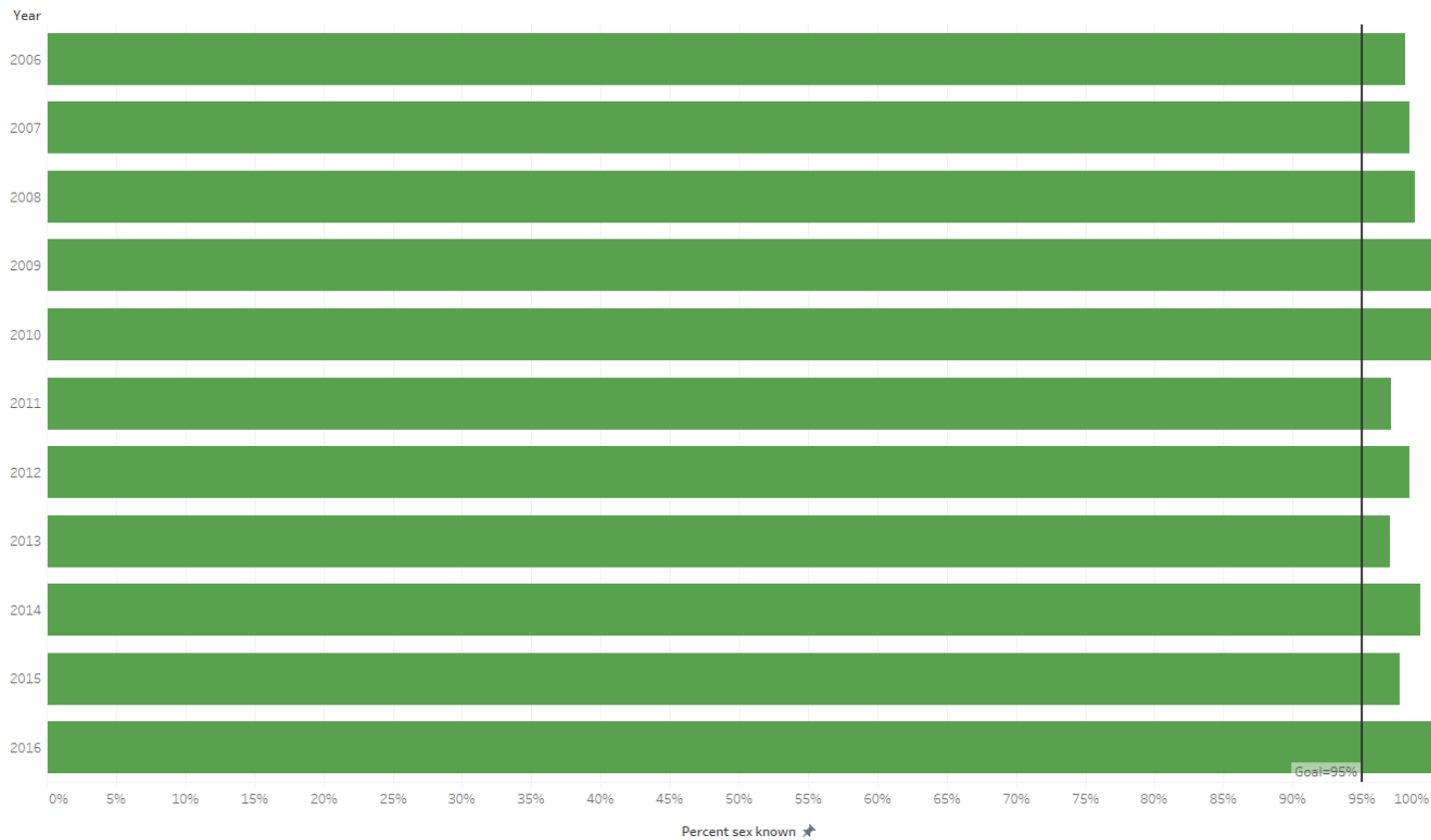


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Percent of AOPP cases with known sex

Percent of PEST cases with known sex





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Methods: Data visualization in Tableau

- **Step 4:** Combine all sheets to create dashboard



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Results

Tableau QA/QC Dashboard:

https://tabexternal.dshs.texas.gov/t/ENV-EP/views/PESTQAQCDashboard/QAQCDASH?iframeSizedToWindow=true&:embed=y&:showAppBanner=false&:display_count=no&:showVizHome=no

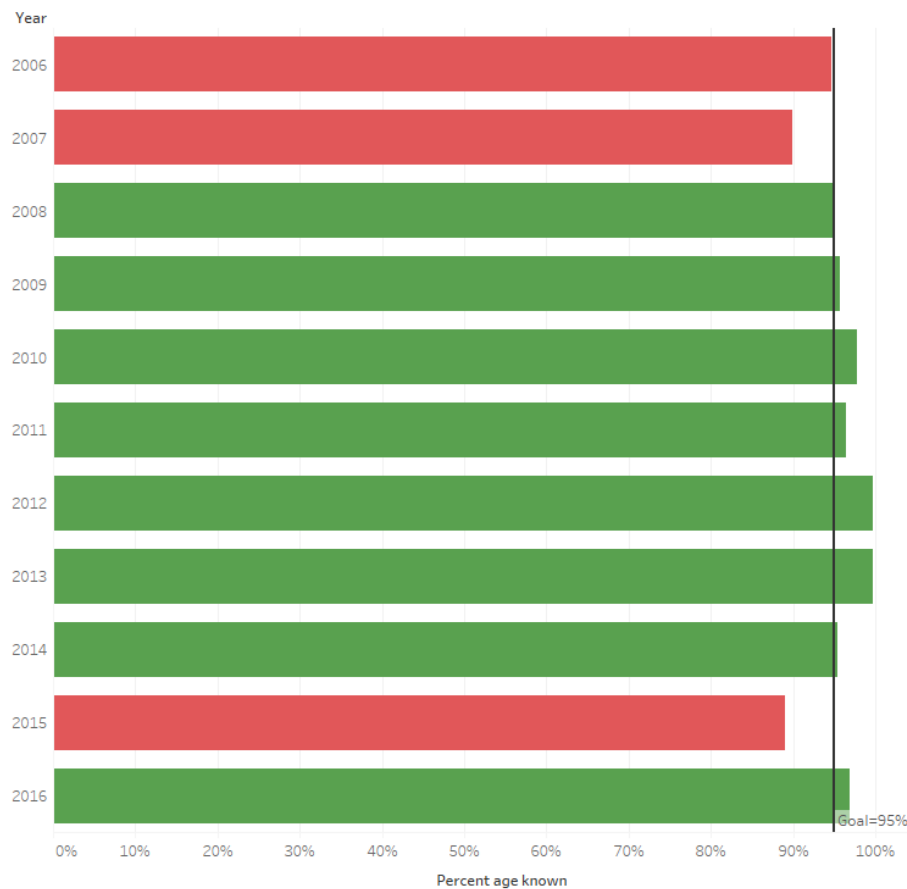


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QA/QC Results: Age

PEST QA/QC Dashboard



Select a variable

- Age known
- Sex known
- Causal sufficient
- County known
- Workrel known
- Effect sufficient
- Expose sufficient
- Userstat sufficient
- Userstat known
- Status sufficient
- Status related
- Userstat related
- CCOC2002 known
- CCIC2002 known

Hover over variable name below to see variable description

Age
Sex
Cour
Caus...
Workrel
Effect
Expose
Userstat
Status
CCOC2002
CCIC2002

Age in years.
"Known" means the age in years is known.

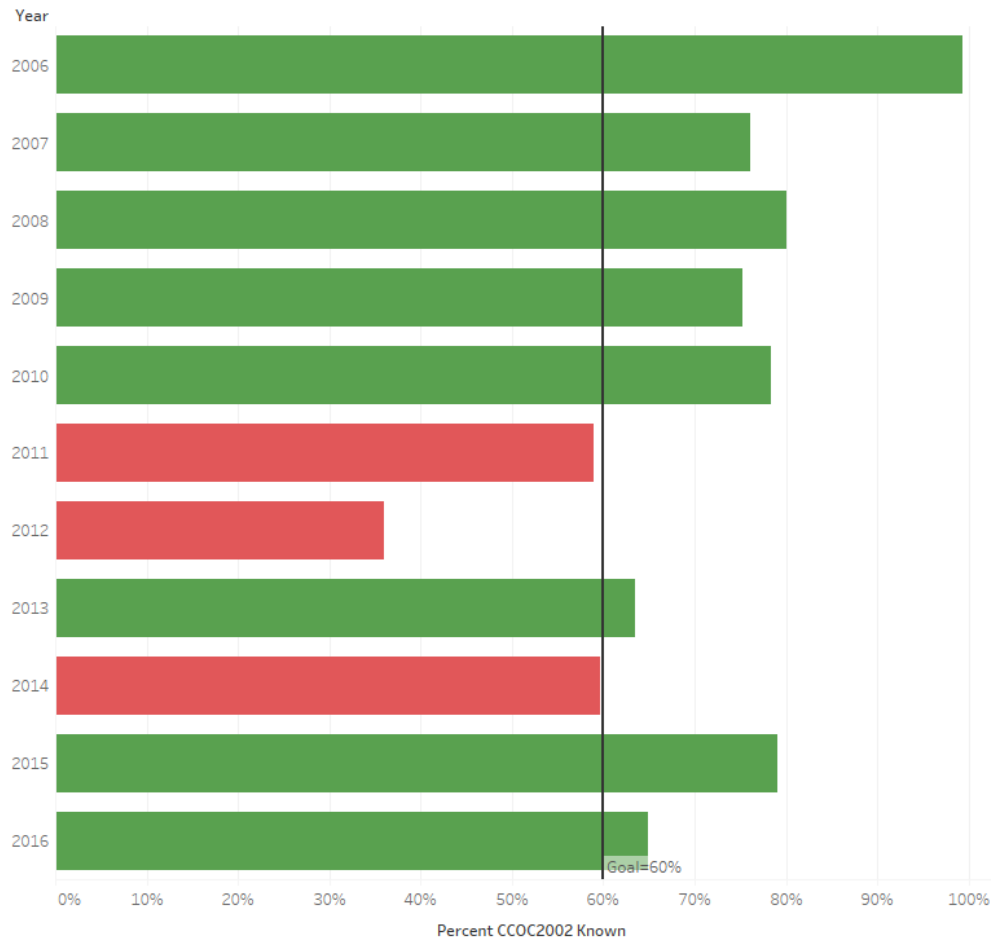


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QA/QC Results: Occupation

PEST QA/QC Dashboard



Select a variable

- Age known
- Sex known
- Causal sufficient
- County known
- Workrel known
- Effect sufficient
- Expose sufficient
- Userstat sufficient
- Userstat known
- Status sufficient
- Status related
- Userstat related
- CCOC2002 known
- CCIC2002 known

Hover over variable name
below to see variable
description

- Age
- Sex
- County
- Causal
- Workrel
- Effect
- Expose
- Userstat
- Status
- CCOC2002**
- CCIC2002

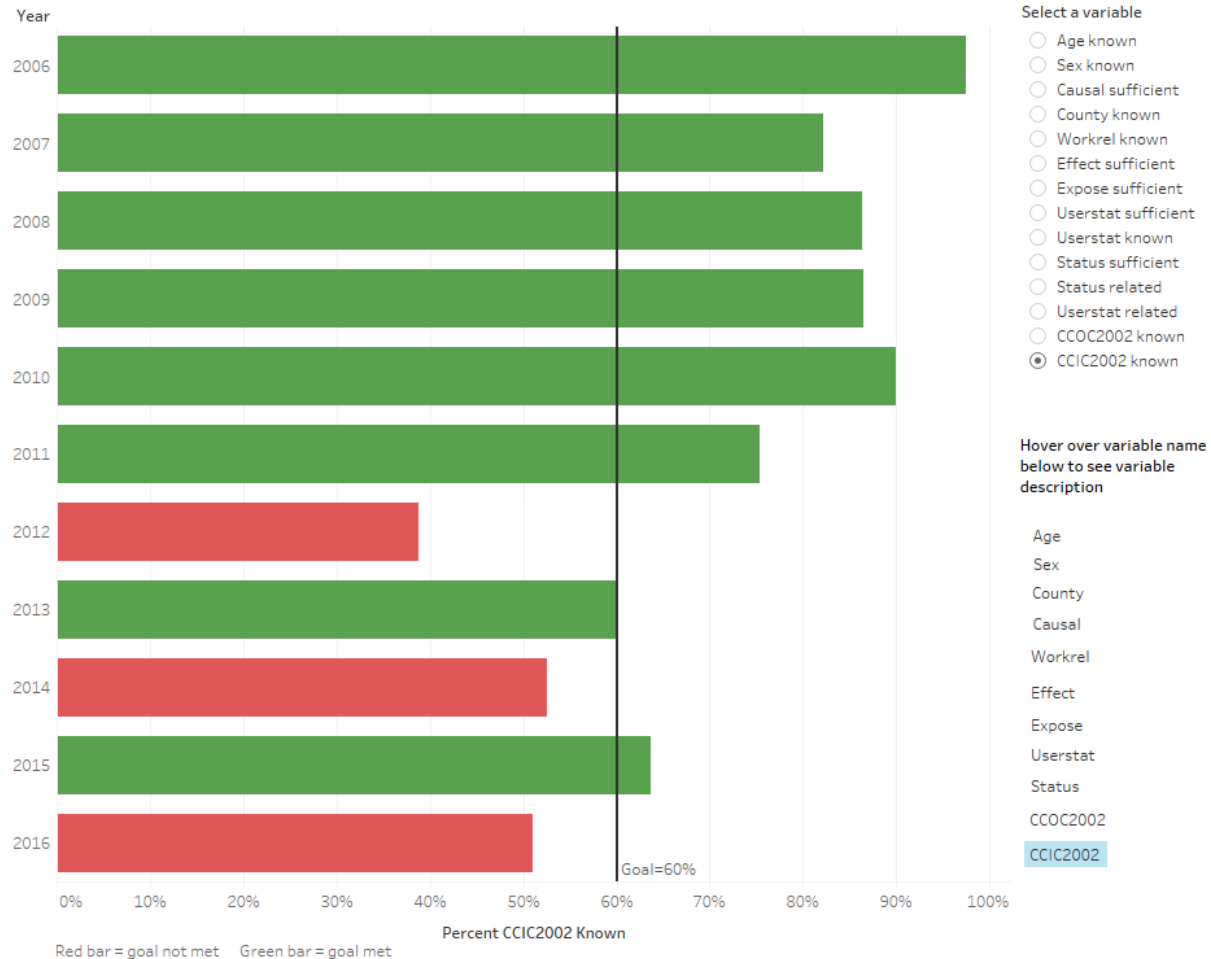


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QA/QC Results: Industry

PEST QA/QC Dashboard





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Conclusions

- DSHS developed a method for automated QA/QC in real time using Tableau
- This unique, simple, and timely method of QA/QC using Tableau helps address the challenges of manual QA/QC process.



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Thank you

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