



AMERICAN SOCIETY OF  
**SAFETY PROFESSIONALS**  
Wisconsin Chapter

## **2019 Risk, Health, & Safety For All Conference**

September 30th - October 1st, 2019  
Potawatomi Hotel & Casino

# The Big Picture of Injury Data – An Expert Assessment

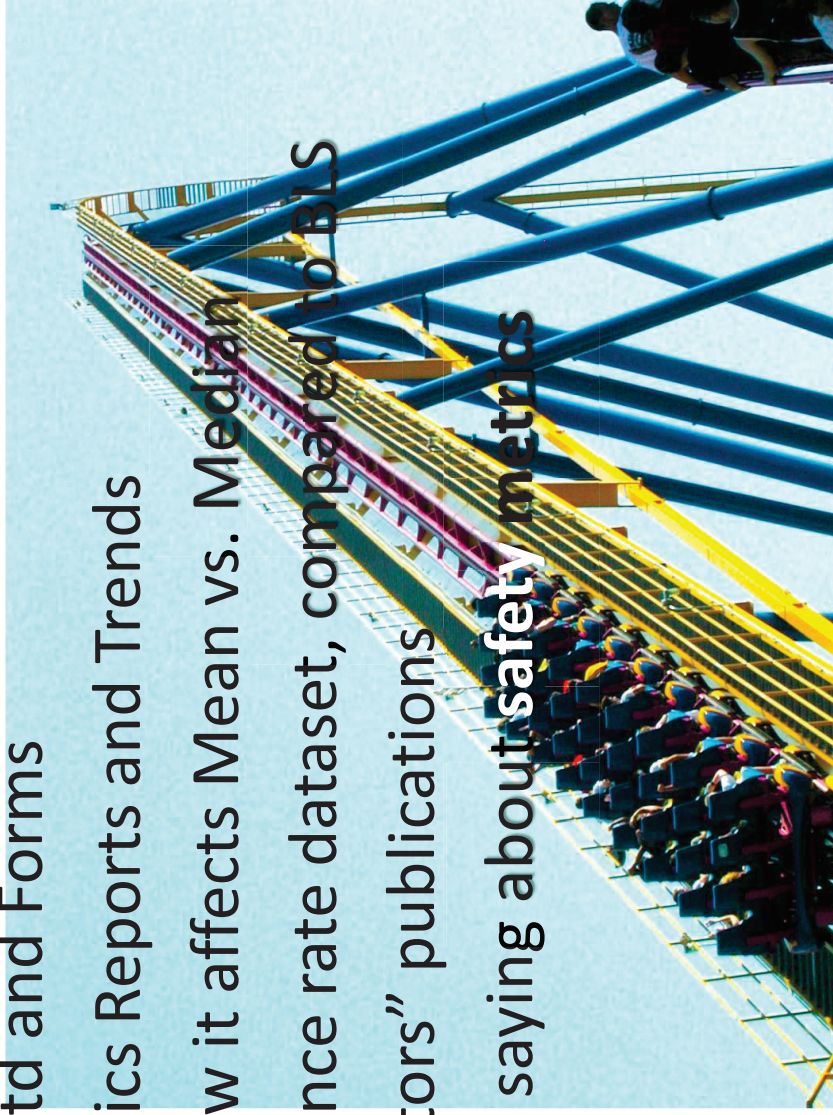
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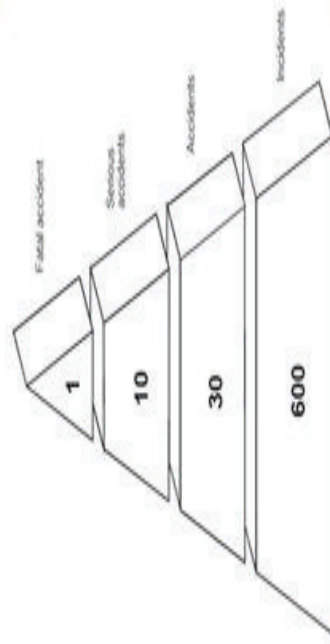
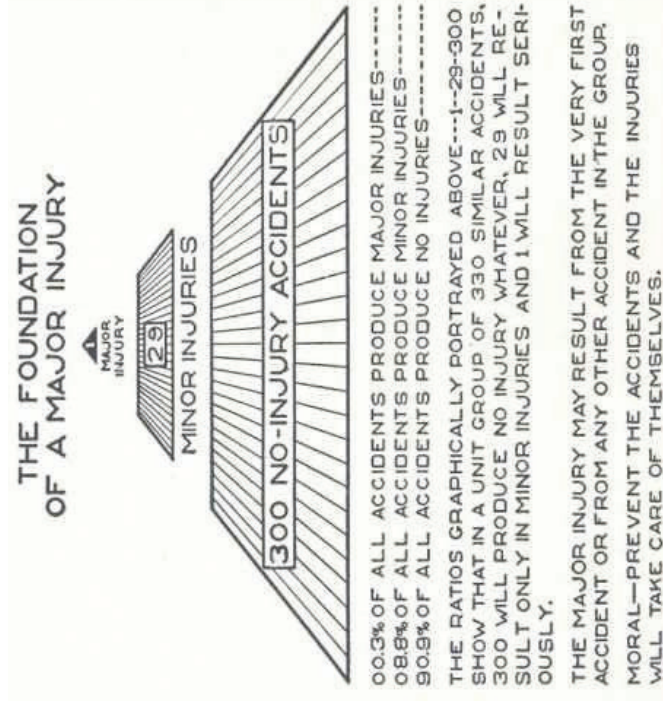
Email: [loushint@uww.edu](mailto:loushint@uww.edu)

# Presentation Summary

- Review Heinrich & Bird's ratios of injury severity
- Review OSHA Recordkeeping Std and Forms
- Review Bureau of Labor Statistics Reports and Trends
- Discuss data normality, and how it affects Mean vs. Median
- Look at sample of OSHA incidence rate dataset, compared to BLS
- Review recent "Leading Indicators" publications
- Discuss what the "experts" are saying about **safety metrics**



# H.W. Heinrich & F.E. Bird Accident Triangle



- SIF folks contend that there is no relationship between near-miss and major injuries
- My contention is that “exposures” need to be investigated and mitigated or accidents will continue
- Equal ratios per 600 near misses
  - Heinrich: 2 major injures + 58 minor injuries
  - Bird: 1 major injury + 10 minor injuries
- If near-misses are not related, likelihood of severity has increased over time
  - Heinrich: 2 major injuries to 58 minor injuries
  - Bird: 1 major injury to 10 minor injuries

# OSHA's Recordkeeping Rule, 29 CFR 1904

- **Subpart A. Purpose.** The purpose of this rule (part 1904) is to require employers to record and report work-related fatalities, injuries, and illnesses. Note: Recording or reporting a work-related injury, illness, or fatality does not mean that the employer or employee was at fault, that an OSHA rule has been violated, or that the employee is eligible for workers' compensation or other benefits.
  - **Preamble** “ ...Although any specific work-related injury or illness may involve some or all of these factors, the record made of that injury or illness on the OSHA recordkeeping forms only shows three things: (1) that an injury or illness has occurred; (2) that the employer has determined that the case is work-related (using OSHA's definition of that term); and (3) that the case is non-minor, *i.e.*, that it meets one or more of the OSHA injury and illness recording criteria...”
- **1904.7(a)Basic requirement.** You must consider an injury or illness to meet the general recording criteria, and therefore to be recordable, if it results in any of the following: death, days away from work, restricted work or transfer to another job, medical treatment beyond first aid, or loss of consciousness. You must also consider a case to meet the general recording criteria if it involves a significant injury or illness diagnosed by a physician or other licensed health care professional, even if it does not result in death, days away from work, restricted work or job transfer, medical treatment beyond first aid, or loss of consciousness.

# Medical Treatment, beyond First Aid

- "Medical treatment" means the management and care of a patient to combat disease or disorder. For the purposes of Part 1904, medical treatment does not include:
  - Visits to a physician or other licensed health care professional solely for observation or counseling;
  - The conduct of diagnostic procedures, such as x-rays and blood tests, including the administration of prescription medications used solely for diagnostic purposes (**e.g.**, eye drops to dilate pupils); or
  - "First aid" as defined in paragraph (b)(5)(ii) of this section.
- 1904.7(b)(5)(ii) **What is "first aid"**? For the purposes of Part 1904, "first aid" means the following:
  - Using a non-prescription medication at nonprescription strength (for medications available in both prescription and non-prescription form, a recommendation by a physician or other licensed health care professional to use a non-prescription medication at prescription strength is considered medical treatment for recordkeeping purposes);
  - Administering tetanus immunizations (other immunizations, such as Hepatitis B vaccine or rabies vaccine, are considered medical treatment);
  - Cleaning, flushing or soaking wounds on the surface of the skin;
  - Using wound coverings such as bandages, Band-Aids™, gauze pads, etc.; or using butterfly bandages or Steri-Strips™ (other wound closing devices such as sutures, staples, etc., are considered medical treatment);
  - Using hot or cold therapy;
  - Using any non-rigid means of support, such as elastic bandages, wraps, non-rigid back belts, etc. (devices with rigid stays or other systems designed to immobilize parts of the body are considered medical treatment for recordkeeping purposes);
  - Using temporary immobilization devices while transporting an accident victim (**e.g.**, splints, slings, neck collars, back boards, etc.);
  - Drilling of a fingernail or toenail to relieve pressure, or draining fluid from a blister;
  - Using eye patches;
  - Removing foreign bodies from the eye using only irrigation or a cotton swab;
  - Removing splinters or foreign material from areas other than the eye by irrigation, tweezers, cotton swabs or other simple means;
  - Using finger guards;
  - Using massages (physical therapy or chiropractic treatment are considered medical treatment for recordkeeping purposes); or
  - Drinking fluids for relief of heat stress.

# Recordkeeping forms & Recording Criteria

- **Basic requirement.** You must use OSHA 300, 300-A, and 301 forms, or equivalent forms, for recordable injuries and illnesses. The OSHA 300 form is called the Log of Work-Related Injuries and Illnesses, the 300-A is the Summary of Work-Related Injuries and Illnesses, and the OSHA 301 form is called the Injury and Illness Incident Report.

## OSHA's Form 301 Injury and Illness Incident Report

This form is to be filled out by the supervisor or other person who first knows you were injured or became ill while working. It should be filled out as soon as possible after the injury or illness. It should be filled out by the supervisor or other person who first knows you were injured or became ill while working. It should be filled out as soon as possible after the injury or illness. It should be filled out by the supervisor or other person who first knows you were injured or became ill while working. It should be filled out as soon as possible after the injury or illness.

- Information about the employee**
- 1) Full Name: \_\_\_\_\_
  - 2) Title: \_\_\_\_\_
  - 3) Job Title: \_\_\_\_\_
  - 4) Department: \_\_\_\_\_
  - 5) Division: \_\_\_\_\_
  - 6) Position: \_\_\_\_\_
  - 7) If employee was given any first aid, when was it given? \_\_\_\_\_

- Information about the case**
- 10) Date of injury or illness: \_\_\_\_\_
  - 11) Date of report: \_\_\_\_\_
  - 12) Time of day: \_\_\_\_\_
  - 13) Location: \_\_\_\_\_
  - 14) Description of injury or illness: \_\_\_\_\_
  - 15) What was the employee doing at the time of the injury or illness? \_\_\_\_\_
  - 16) What was the employee's job title at the time of the injury or illness? \_\_\_\_\_
  - 17) What object or substance directly caused the injury or illness? \_\_\_\_\_
  - 18) If the employee died, when did it occur? \_\_\_\_\_

**OSHA's Form 300 (Rev. 01/2004)**  
U.S. Department of Labor  
Occupational Safety and Health Administration

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Completed by: \_\_\_\_\_  
Title: \_\_\_\_\_  
Phone: \_\_\_\_\_

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Occupational Safety and Health Administration

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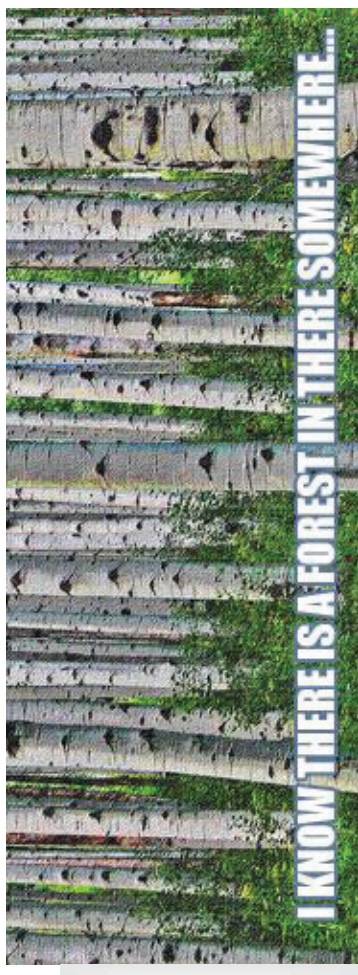
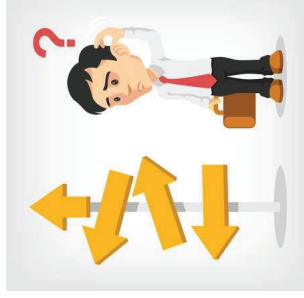
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# Focusing on the wrong aspects of reports

- Whether an incident results in harm requiring medical treatment, first aid, or no harm (near-miss/hit), it needs **investigation and mitigation to prevent future exposures**
- The current OSHA standard focuses too much on documentation and not identifying root causes and implementing change
- Effort/energy put into minimizing the outcome status for recordkeeping should be put into understanding “why” and making change
- Also, the current standard and supplemental documents do very little to divert **BLAMING THE VICTIM**



# How are Incidence Rates Calculated at BLS?

From <https://www.bls.gov/iif/oshval.htm>

How to compute incidence rates

(a) *The number of nonfatal injuries and illnesses.* This number is available several ways:

- From your Log of Work-Related Injuries and Illnesses (Log), OSHA's Form 300—you can count the number of OSHA recordable cases for the year, or
- From your Summary of Work-Related Injuries and Illnesses (Summary), OSHA's Form 300A—you can add the number of recordable cases entered in Column H (cases with days away from work) + Column I (cases with job transfer or restriction) + Column J (other recordable cases),
- From the BLS Survey of Occupational Injuries and Illnesses form, if your company was surveyed for the calendar year for which incidence rates are desired—you can add the number of nonfatal recordable cases entered. Add the entries from Part 1B: Summary of Work-Related Injuries and Illnesses. Only include the entries in Column H (cases with days away from work) + Column I (cases with job transfer or restriction) + Column J (other recordable cases) in your calculation.

(b) *The number of hours all employees actually worked.* "Hours worked" should not include any nonwork time, even though paid, such as vacation, sick leave, holidays, etc. If actual hours worked are not available for employees paid on commission, by salary, or by the mile, etc., hours worked may be estimated on the basis of scheduled hours or 8 hours per workday. This number is also available from several sources:

- From your Summary of Work-Related Injuries and Illnesses,
- From the BLS Survey of Occupational Injuries and Illnesses form, if your company was surveyed for the calendar year for which incidence rates are desired,
- From payroll or other time records.

An incidence rate of injuries and illnesses may be computed from the following formula:

$$\text{(Number of injuries and illnesses X 200,000) / Employee hours worked = Incidence rate}$$

(The 200,000 hours in the formula represents the equivalent of 100 employees working 40 hours per week, 50 weeks per year, and provides the standard base for the incidence rates.) You can use the same formula to compute incidence rates for:

- Injury and illness cases with days away from work (Column H).
- Injury and illness cases with job transfer or restriction (Column I),
- Injury and illness cases with days away from work, or job transfer or restriction, or both (DART) (Column H + Column I),
- Other recordable injury and illness cases (Column J).



# Bureau of Labor Statistics (BLS) Reports

- Companies calculate their own incidence rates and compare them to their industry (NAICS) peers

Days away from work cases and days of job transfer or restriction cases in private industry, 1992–2016

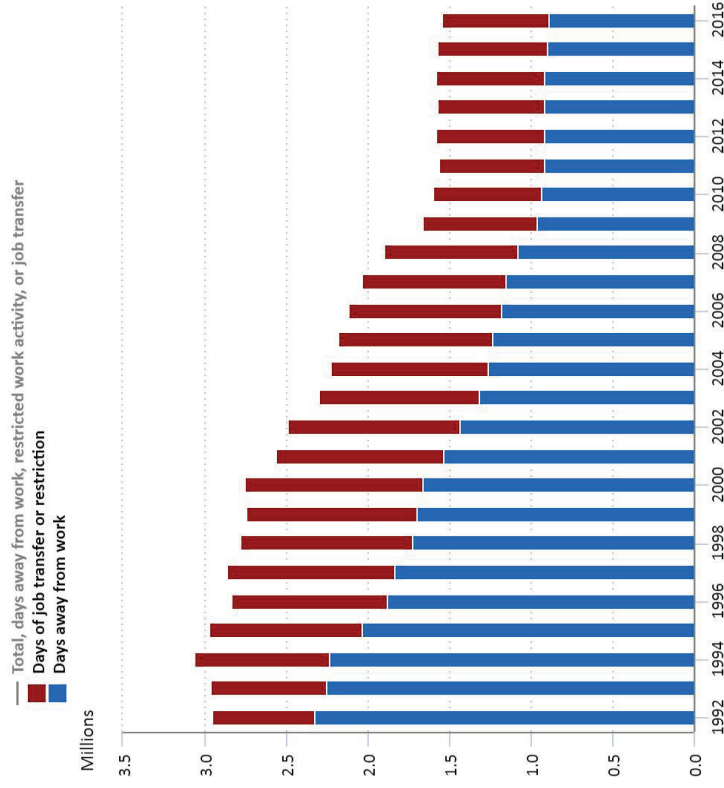
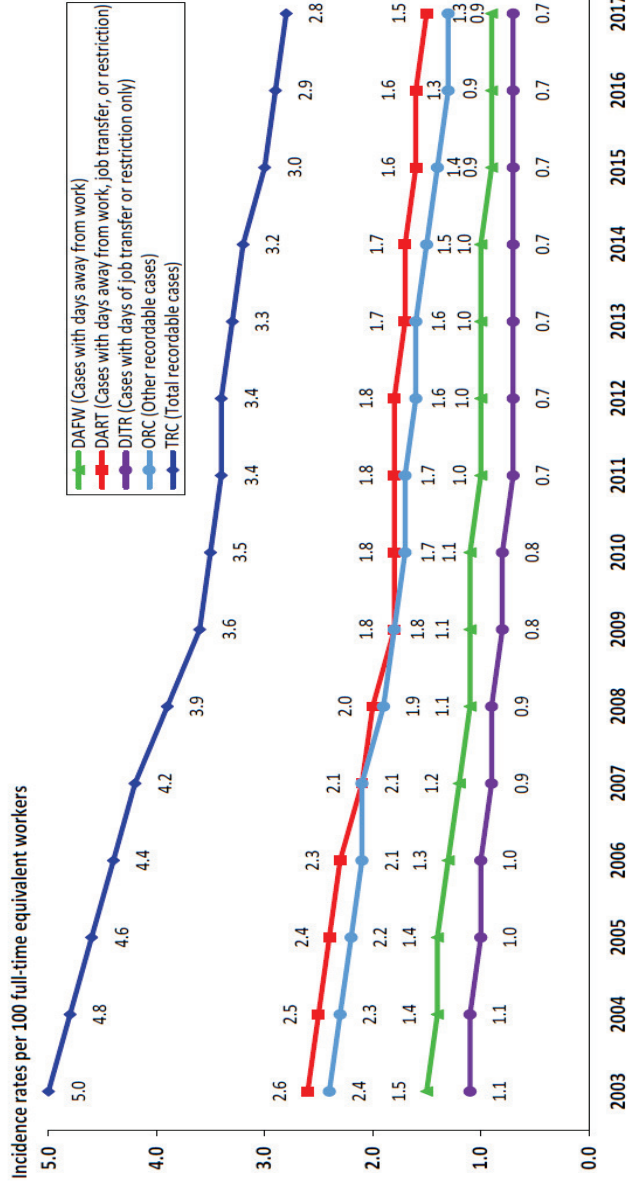


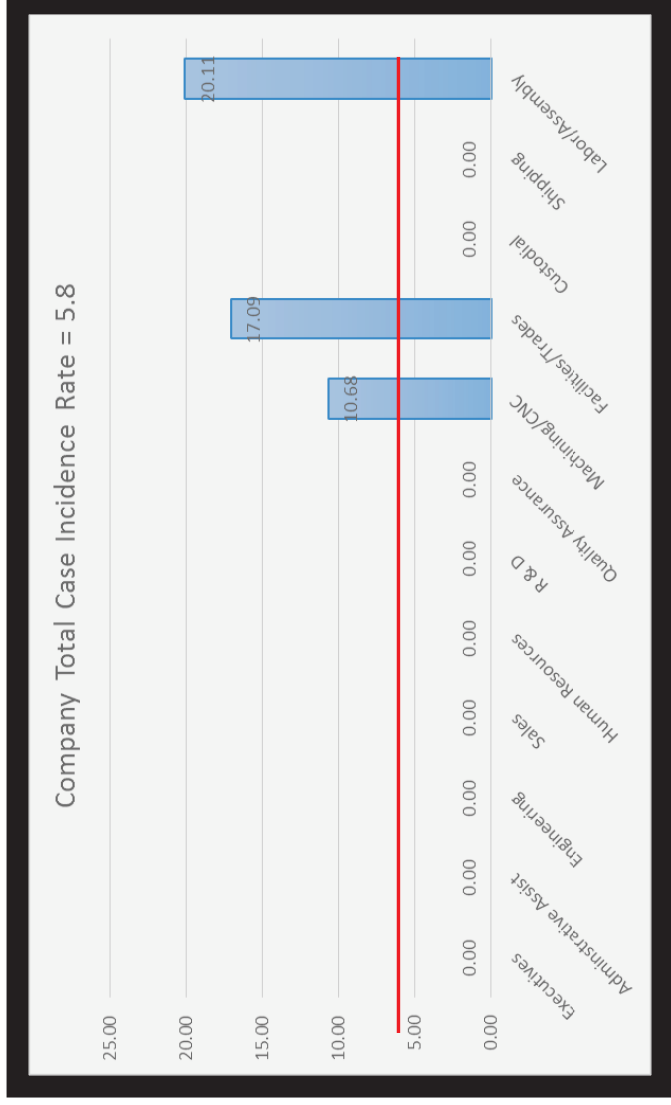
Chart 1. Nonfatal occupational injury and illness incidence rates by case type, private industry, 2003-17



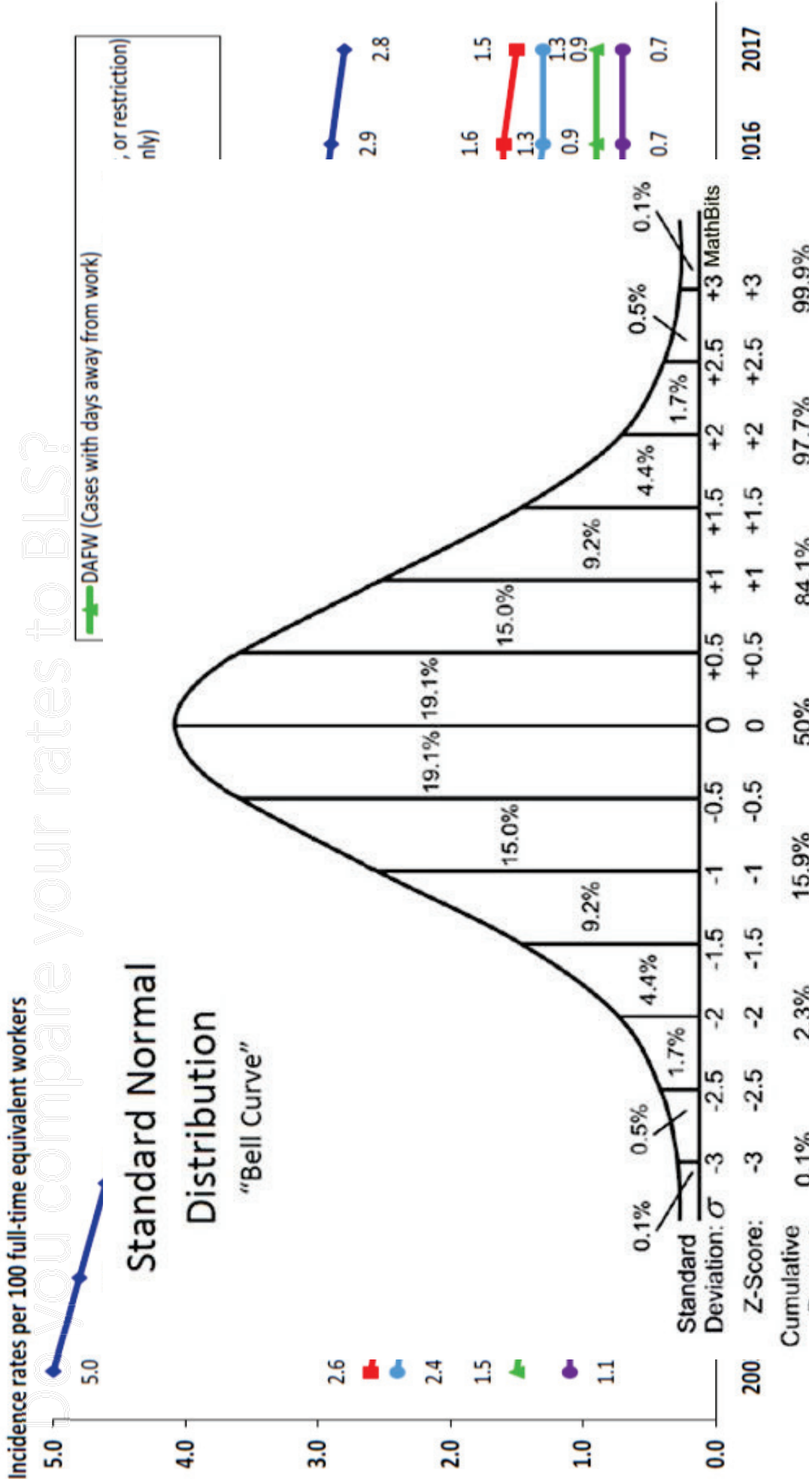
Work-Based Injuries and Illnesses Data Summary: Private Industry, 1992-2016

# Incidence Rates Issues, from start to BLS Report

- Under-recording on 300 logs
- Under-reporting to BLS
- Incidence rate does not account for high-hazard vs. low-hazard hours
- Company-wide does not account for difference between departments, jobs, or tasks
- BLS calculates incidence rates by estimating “total cases” and “total hours worked” **by group, not by averaging by company**



**Chart 1. Nonfatal occupational injury and illness incidence rates by case type, private industry, 2003-17**

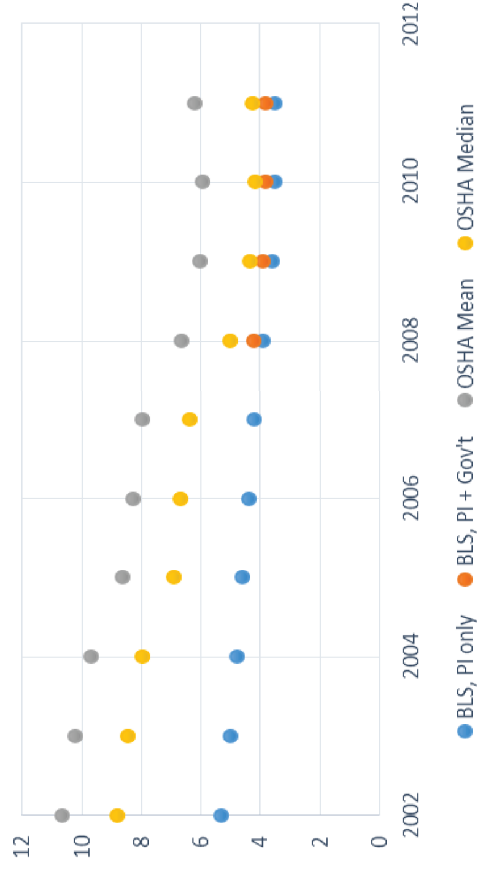




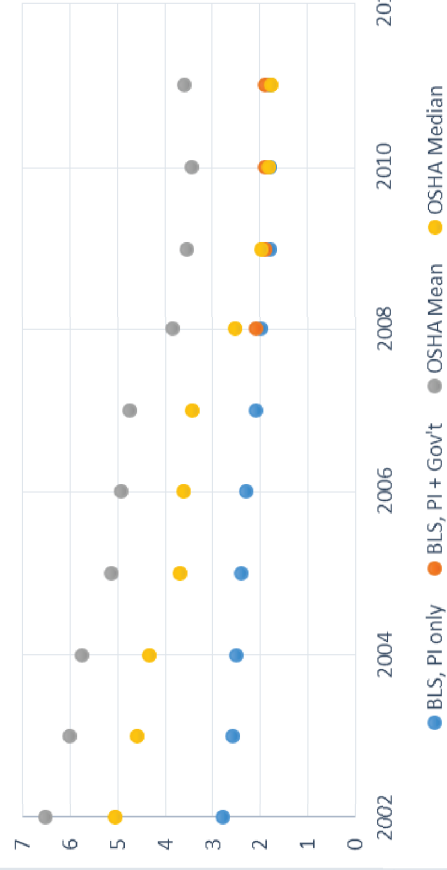
# Data Initiative (2002-2011, adjusted)

Year	N (count)
2002	61646
2003	66604
2004	64382
2005	63496
2006	66750
2007	61519
2008	78516
2009	64198
2010	67424
2011	51814
<b>Total</b>	<b>646,349</b>

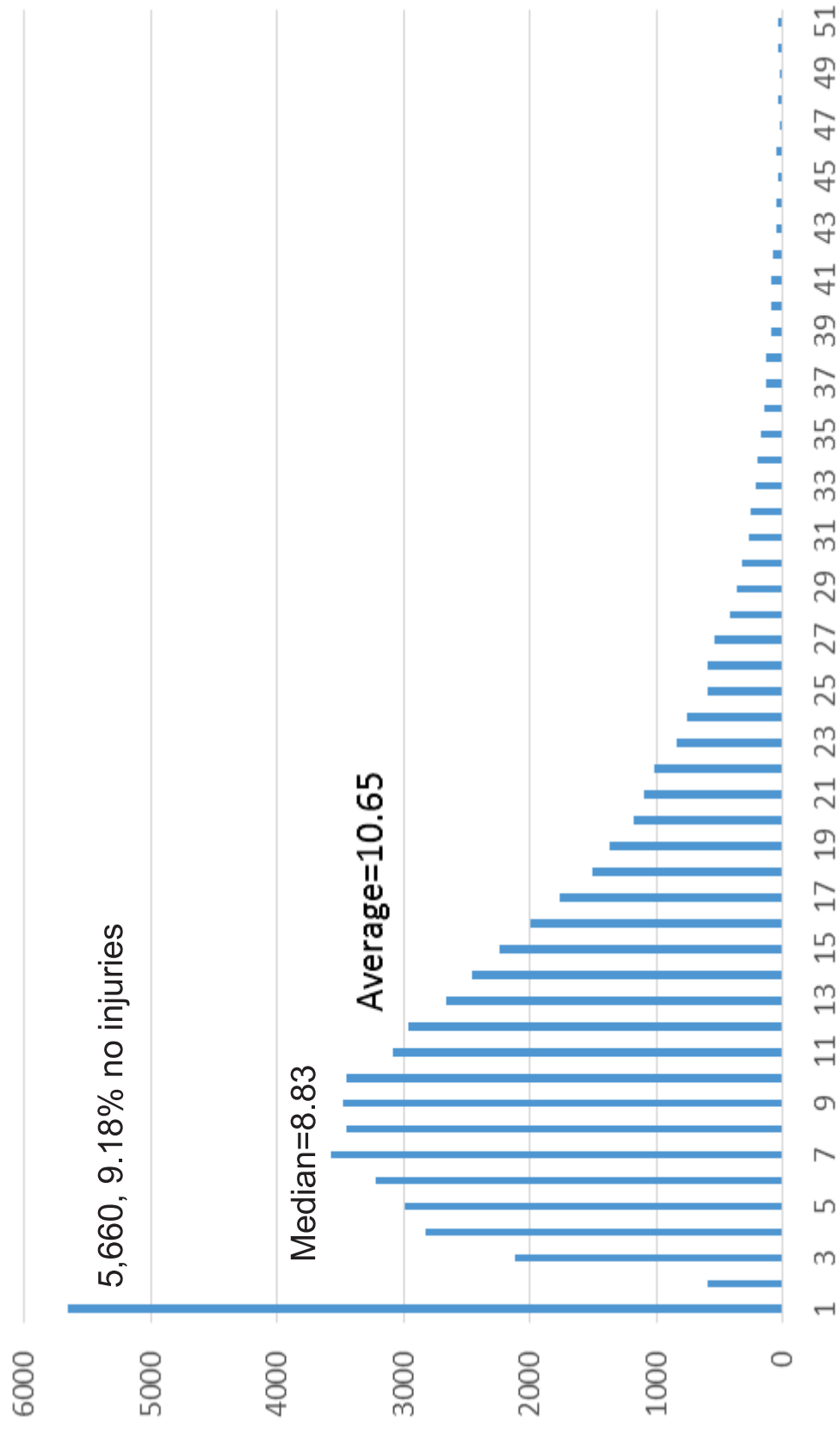
Total Case Incidence Rates, BLS vs OSHA



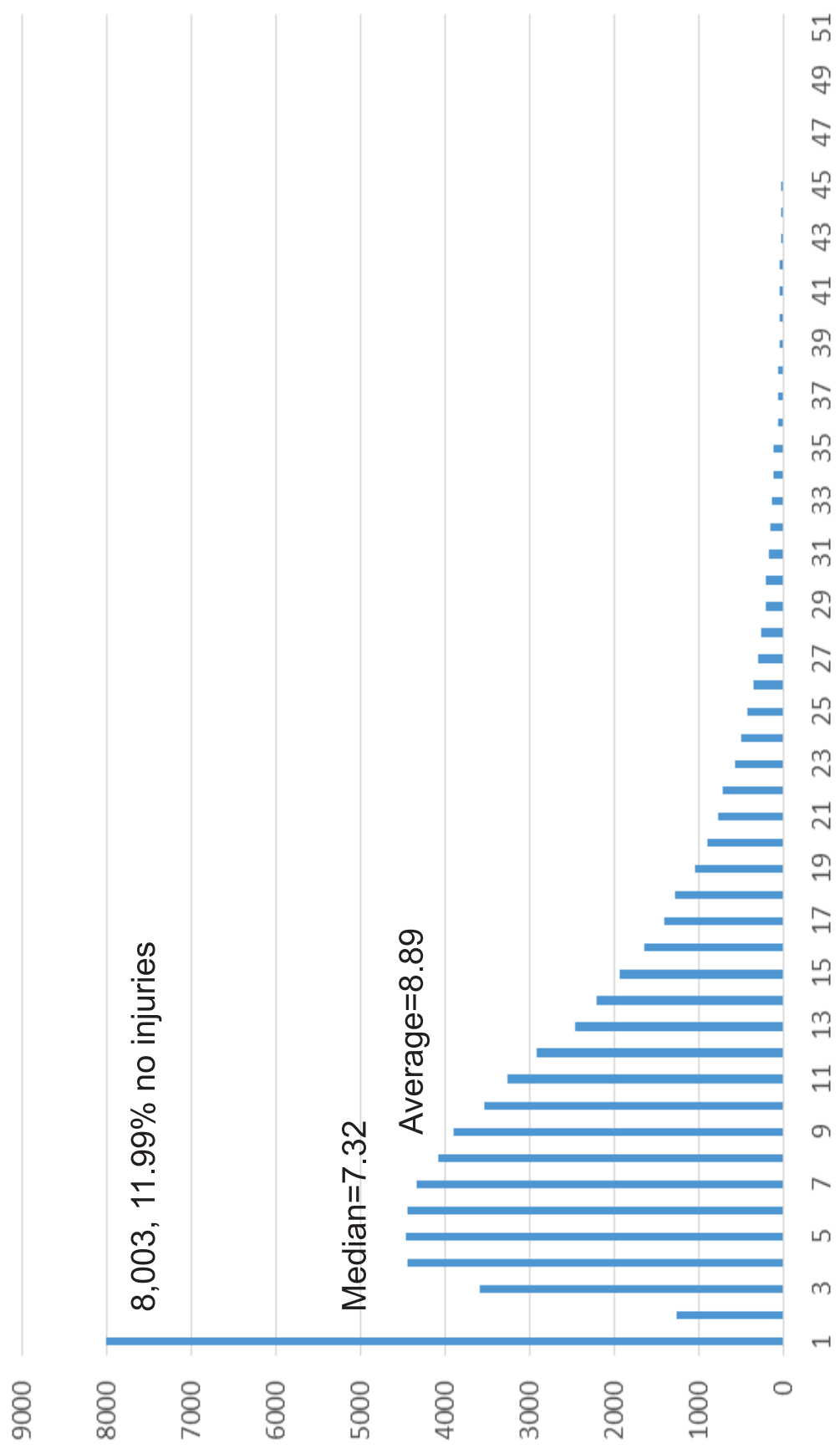
DART Incidence Rates, BLS vs OSHA



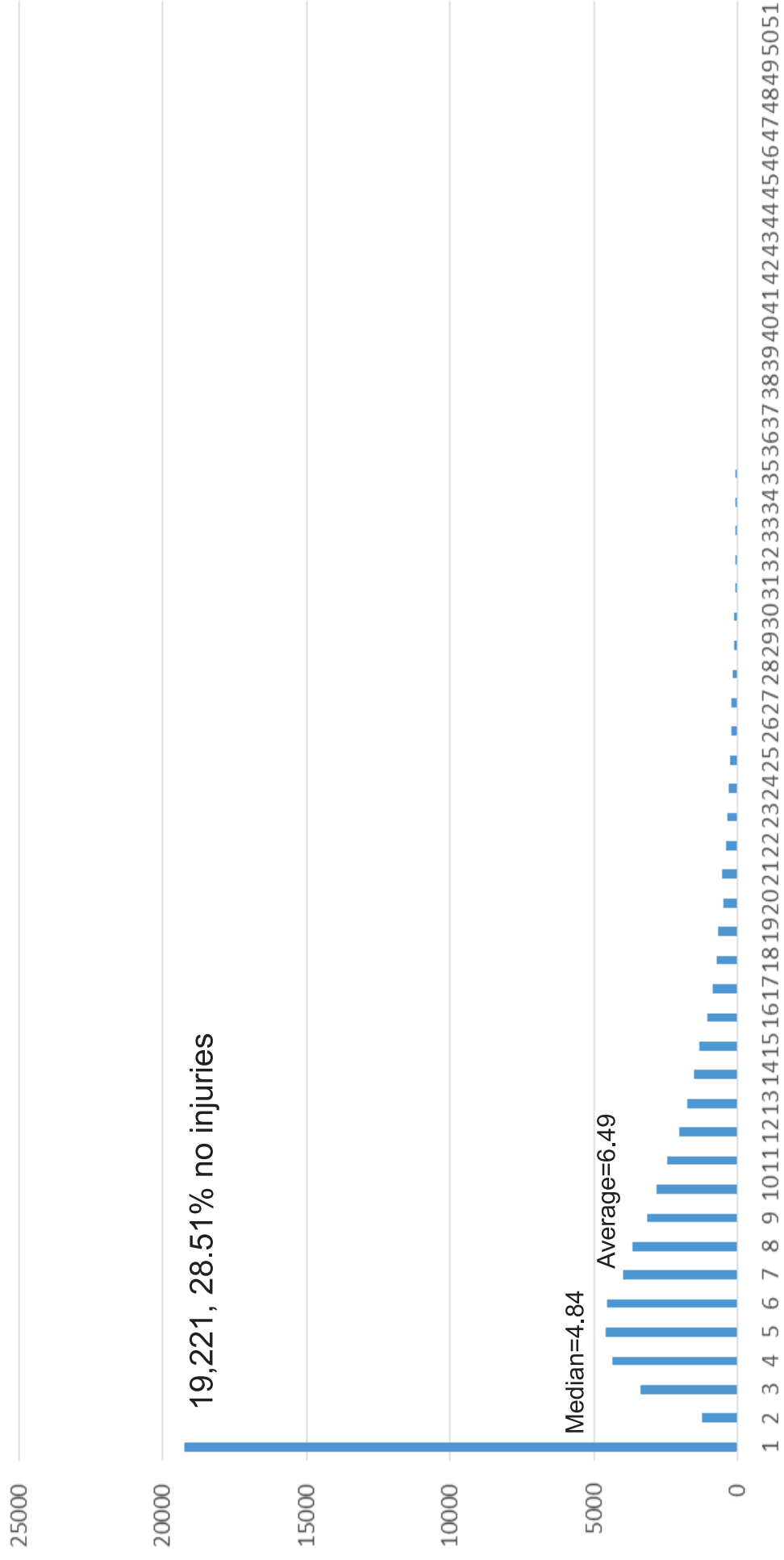
## 2002 TCIR by 1's, n=61,646 (99.60% in chart)



2006 TCIR by 1's, n=66,750 (99.84% in chart)

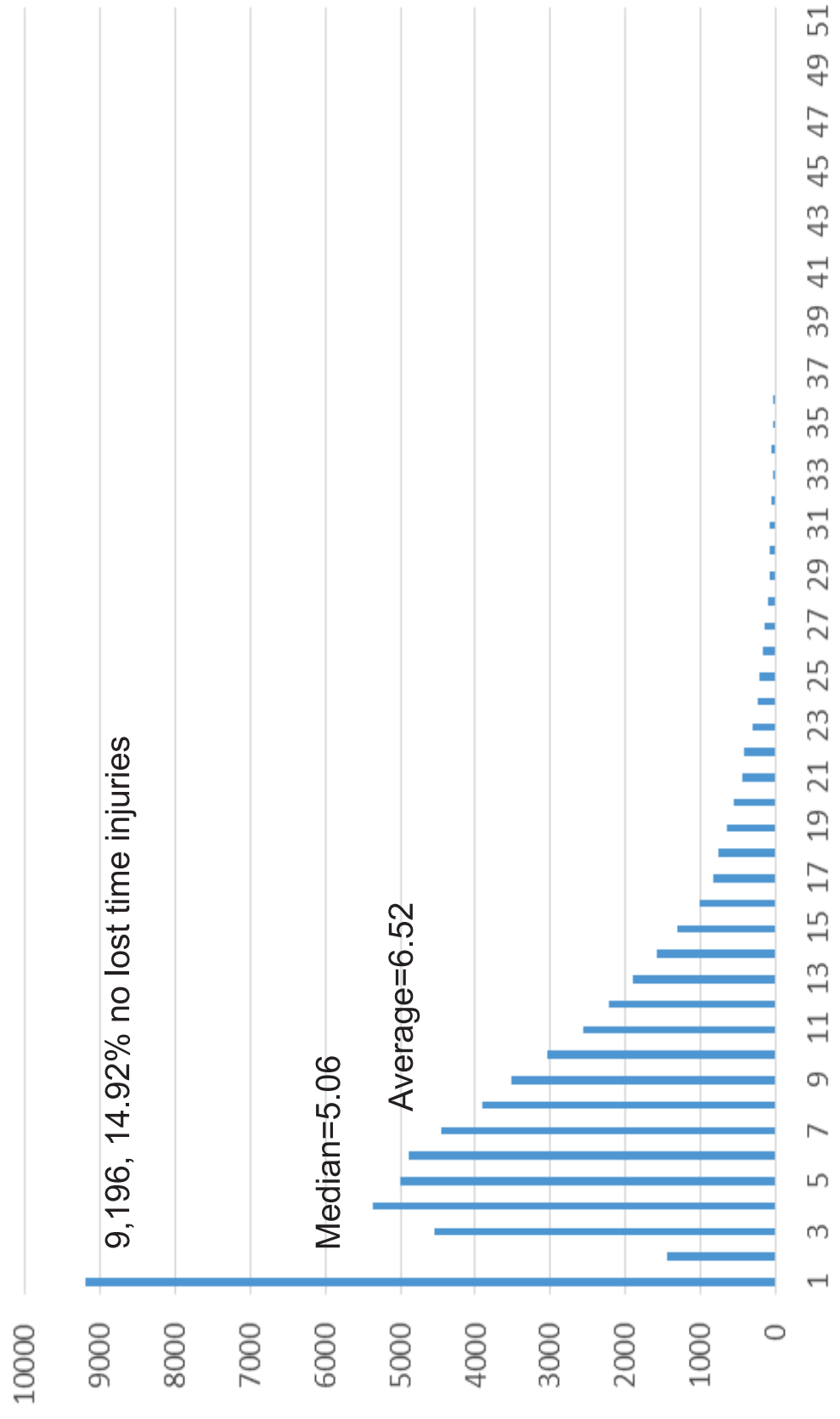


2010 TCIR by 1's, n=67,424 (99.93% in chart)



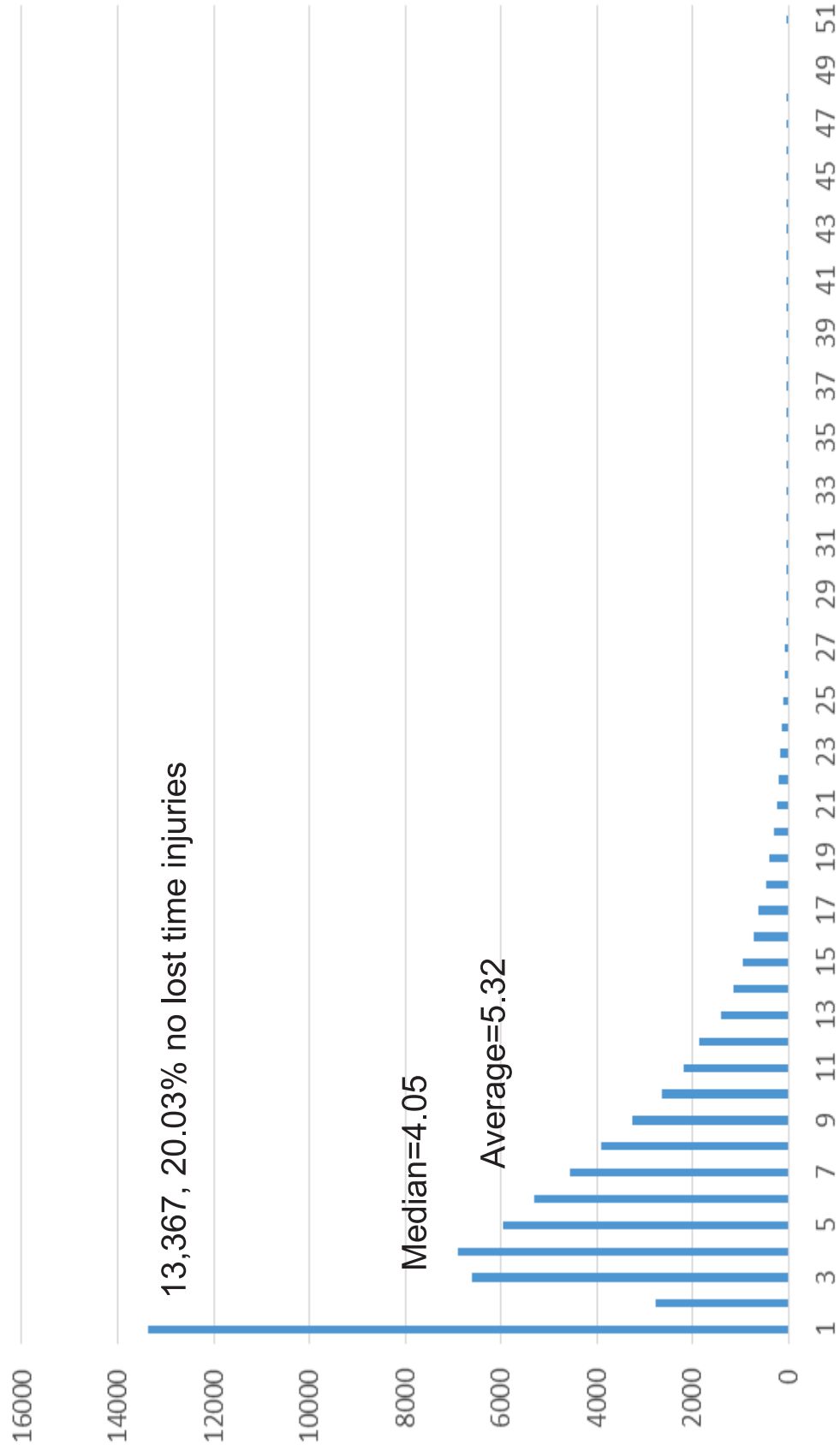
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51

# 2002 DARTIR by 1's, n=61,646 (99.94% in chart)

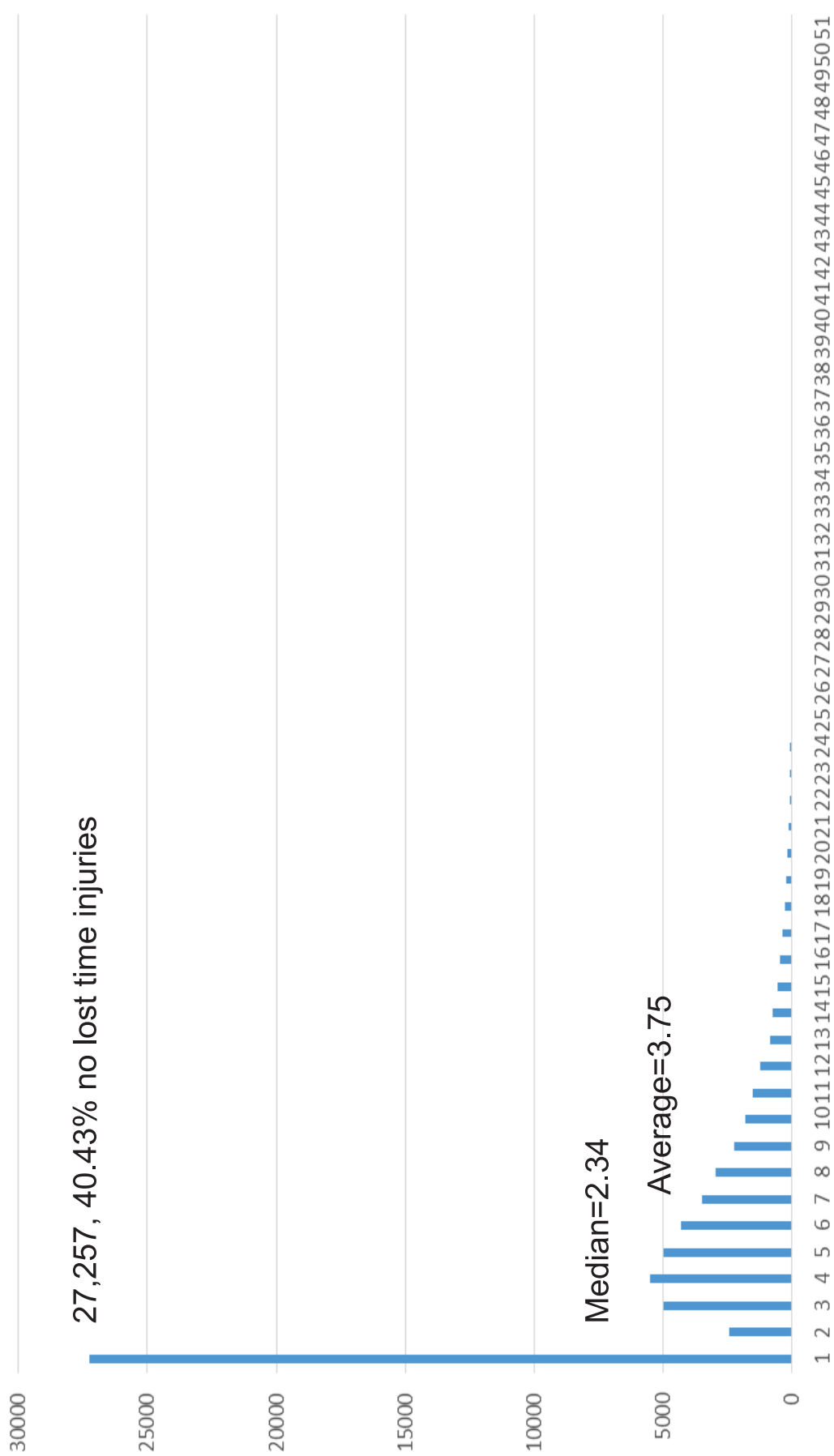




# 2006 DARTIR by 1's, n=66,750 (99.98% in chart)



2010 DARTIR by 1's, n=67,424 (99.99% in chart)



1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51

# Is the IR (by company) Normally Distributed?

Year	TCR			DART		
	*Skewness (SE)	*Kurtosis (SE)	**K-S Stat (Sig)	*Skewness (SE)	*Kurtosis (SE)	**K-S Stat (Sig)
<b>2002</b>	1.765 (.010)	6.184 (.020)	.118 (.000)	1.996 (.010)	8.590 (.020)	.149 (.000)
<b>2003</b>	1.775 (.009)	6.148 (.019)	.123 (.000)	1.999 (.009)	7.995 (.019)	.159 (.000)
<b>2004</b>	1.744 (.010)	5.840 (.019)	.126 (.000)	2.053 (.010)	9.004 (.019)	.163 (.000)
<b>2005</b>	1.756 (.010)	5.670 (.019)	.138 (.000)	1.908 (.010)	6.405 (.019)	.174 (.000)
<b>2006</b>	1.789 (.009)	6.378 (.019)	.135 (.000)	2.038 (.009)	9.097 (.019)	.170 (.000)
<b>2007</b>	1.933 (.010)	7.796 (.020)	.138 (.000)	2.022 (.010)	8.109 (.020)	.171 (.000)
<b>2008</b>	2.136 (.009)	9.528 (.017)	.162 (.000)	2.540 (.009)	14.73 (.017)	.201 (.000)
<b>2009</b>	2.108 (.010)	8.613 (.019)	.189 (.000)	2.468 (.010)	12.05 (.019)	.228 (.000)
<b>2010</b>	2.069 (.009)	7.997 (.019)	.192 (.000)	2.454 (.009)	12.13 (.019)	.232 (.000)
<b>2011</b>	2.174 (.011)	8.738 (.022)	.198 (.000)	2.555 (.011)	13.01 (.022)	.238 (.000)

\*Zim (2013) indicates that for samples > 300, absolute skew value > 2 or a kurtosis > 7 indicate substantial non-normality

\*\*Kolmogorov-Smirnov test, Null hypothesis assumes normal distribution, significance violates null (not normal)

# Using Injury ratios, as percent, per company

	Best condition	Worst condition	Very good	Avg	Bad condition	Good condition
Year	% zero inj	% No NLT	% No LT	% NLT=LT	% Ratio >1	% Ratio <1
2002	9.18%	20.40%	5.74%	2.73%	38.39%	23.57%
2003	10.45%	19.73%	7.37%	3.09%	34.83%	24.53%
2004	11.12%	19.42%	7.46%	3.14%	34.83%	24.03%
2005	12.20%	18.61%	8.21%	3.29%	34.47%	23.22%
2006	11.99%	19.29%	8.04%	3.28%	34.26%	23.14%
2007	11.85%	19.74%	8.01%	3.44%	34.07%	22.89%
2008	16.50%	21.00%	10.33%	3.50%	27.19%	21.48%
2009	27.98%	21.06%	11.38%	3.28%	20.90%	15.40%
2010	28.51%	20.51%	11.92%	3.25%	20.24%	15.57%
2011	29.44%	21.00%	12.16%	3.09%	19.00%	15.31%
<b>% Change 10-yr</b>	<b>320.6%</b>	<b>102.9%</b>	<b>212.0%</b>	<b>113.2%</b>	<b>49.5%</b>	<b>65.0%</b>

## Let's review...

- Stop using incidence rates as a performance measure, especially as a comparison to BLS
- Look at your ratios, Lost time to Near miss
- Remove “blaming the worker” from reporting and investigation
  - Develop trusting relationships with workers
  - Create open and honest communication
  - Focus on positive, or framing safety in a positive/opportunistic way
  - Improve the job or task, first seek to understand then strive to improve
- As injury-related data becomes less frequent, need to find new sources and forms of data

# Free Resources on Leading Safety Indicators



Management Leadership



Using **Leading Indicators**  
to Improve Safety and Health Outcomes



Worker Participation



**Practical Guide to Leading Indicators:**  
Metrics, Case Studies & Strategies

**An Implementation Guide  
to Leading Indicators**



**Beyond Safety:**  
Leading Indicators  
for Health & Wellbeing



## Leading indicators by type

### OPERATIONS-BASED

Indicators that are relevant to the functioning of an organization's infrastructure (e.g. machinery, operations); potentially site-specific.

### SYSTEMS-BASED

Indicators that relate more to the management of an EHS system; can be rolled up from a facility level to a region/business unit or corporate level.

### BEHAVIOR-BASED

Indicators that measure the behavior or actions of individuals or groups in the workplace; people-to-people interactions related to supervision and management; useful at site-specific level through management level.

## Leading Indicator Matrix

### Operations-based

- Compliance
- Risk assessment
- Preventive and corrective actions
- Equipment and preventive maintenance
- Prevention through design
- Training
- Management of change process

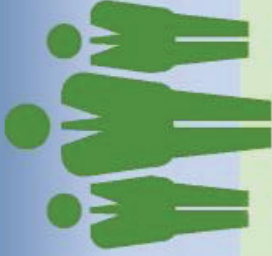
### Systems-based

- Hazard identification and recognition
- Leading indicator component evaluation
- Learning system
- Permit-to-work system
- Safety perception survey
- Communication of safety
- Recognition, disciplinary and reinforcement system
- Hazard analysis
- EHS system component evaluation
- Risk assessment
- Preventive and corrective actions

### Behavior-based

- Leadership engagement
- Employee engagement and participation
- At-risk behaviors and safe behaviors
- Area observations and retrosounds
- Off-the-job safety

# Finding 6: Leading Indicator Matrix



## BEHAVIOR-BASED

Indicators that measure the behavior or actions of individuals or groups in the workplace; people-to-people interactions related to supervision and management; useful at site-specific level through management level.

### ▼ Employee engagement and participation

Employee behaviors and actions that demonstrate their extra effort and commitment to ensuring safety.

#### Metrics

- Participation rate
- Number of on-the-job observations from employees
- Number of off-the-job observations from employees
- Number of employees personally engaged by supervisors in walkarounds
- Percent of coached observations
- Percent of employees documenting observations
- Number and quality of comments
- Percent job turnover
- Number of grievances submitted
- Number of employees leading safety meetings

# Finding 6: Leading Indicator Matrix

## SYSTEMS-BASED

Indicators that relate more to the management of an EHS system; can be rolled up from a facility level to a region/business unit or corporate level.

### ▼ Hazard identification and recognition

Evaluations and reduce assessments (not necessarily audits) through management and employee observations to identify potential hazards.

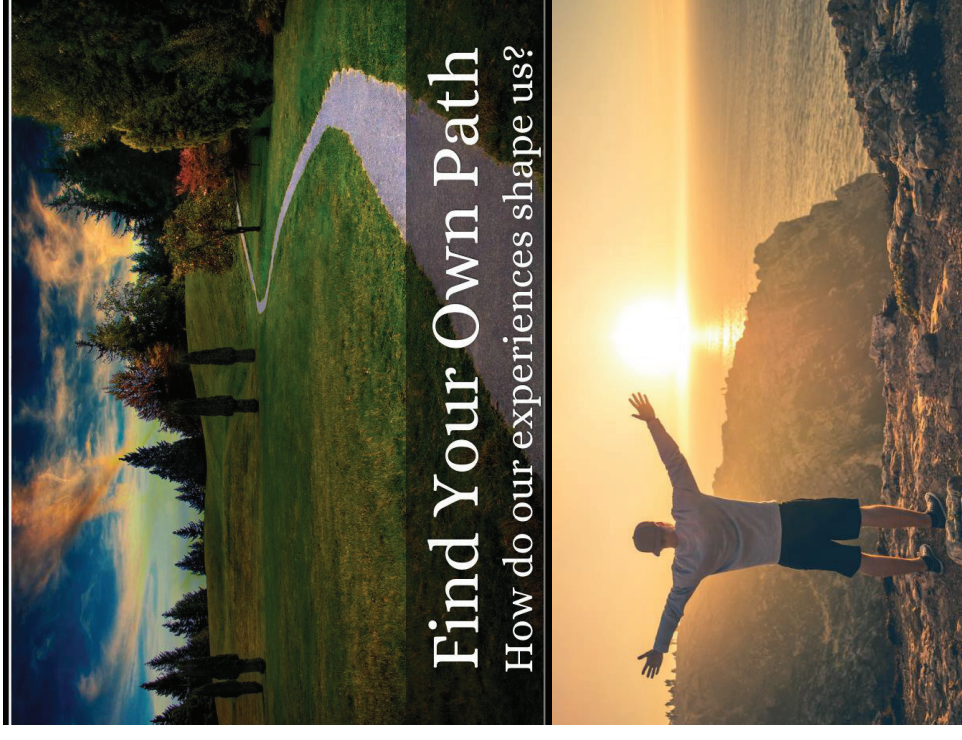
#### Metrics

- Number of near miss reports
- Number of unsafe observations (conditions or behaviors)
- Number of safe observations (conditions or behaviors)
- Number of unsafe observations per inspection
- Number of unsafe observations reported per employee per time period
- Number and percent of previously unknown or uncategorized hazards discovered
- Inspection count (collection of observations)
- Ratio of safe to unsafe observations
- Weighted percent safe observations (using risk matrix)
- Frequency of 100% safe
- Number of checklists filled out
- Number of comments for unsafe observations that clarified nature of the hazard
- Number of people trained in hazard identification
- Number of unsafe observations recorded by a trained person



# Study the work, Engage with workers

- What conditions, approaches, or attitudes tend to minimize risk or hazardous exposures?
- What conditions, approaches, or attitudes tend to foster effective work and work satisfaction?
- What if we measured:
  - % days workers went home satisfied and happy
  - % days workers came work in a good mood
  - # of positive interactions btw mgmt & workers
  - # of smiles you observe on supervisor's faces
  - # times management thanked workers for reporting an issue, or doing a good job



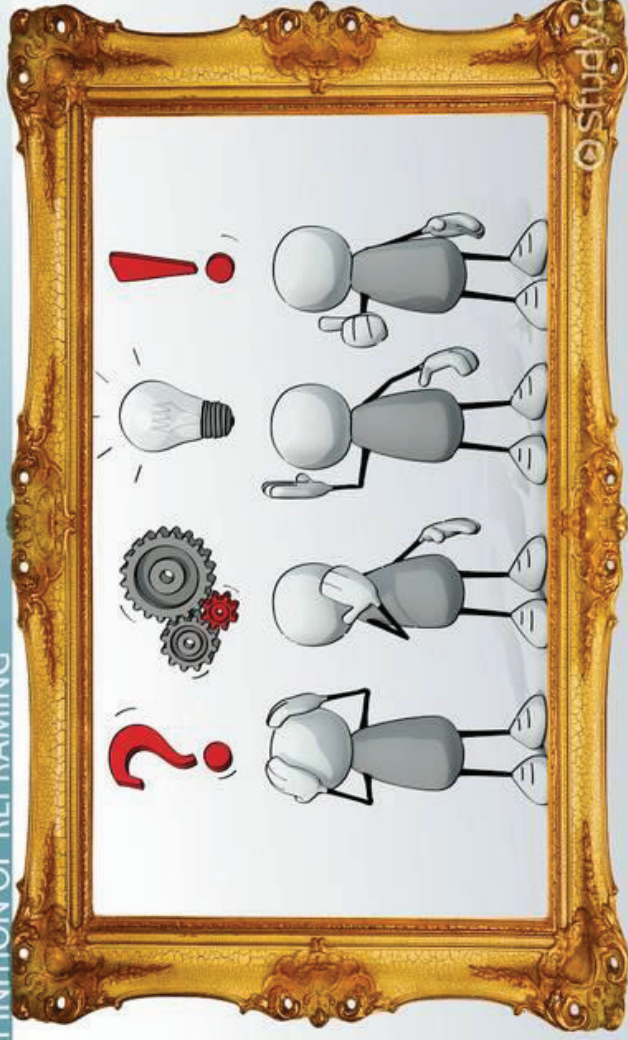
**Find Your Own Path**  
How do our experiences shape us?

# Examples of measures in my everyday work

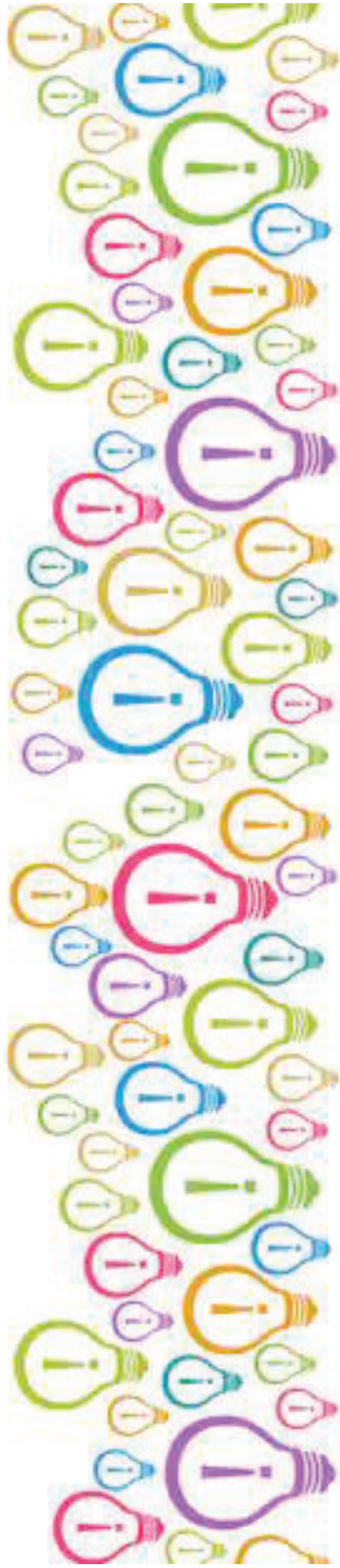
- Monitor course website activity, share on a regular basis to motivate without accusing or singling-out anyone
- Make professional courtesy and hand-written notes a large portion of the course grade, reviewed twice per semester, in a one-on-one meeting with instructor
- Frequent (low credit) quizzes for lesson reviews, and no study exams (bring study sheet to discuss topics)
- Allow students to share their frustrations and issues without correcting or calling them out, but to acknowledge and support them
- Set expectations high, and allow the students to figure it out, forcing them outside their comfort-zone and actually building useful skills
- **Three C's: Curious, Caring, and Commitment to helping**

# Reframe how you perceive and measure safety

## DEFINITION OF REFRAMING



# Any Questions?



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