

The Opioid Epidemic and HIV Outbreak in Indiana: Epidemiology, Response, and Lessons Learned

Joan M. Duwve, MD, MPH

Associate Dean for Public Health Practice
Indiana University Richard M. Fairbanks School of Public Health

Chief Medical Officer
Indiana State Department of Health



IUPUI

**RICHARD M. FAIRBANKS
SCHOOL OF PUBLIC HEALTH**

INDIANA UNIVERSITY

Indianapolis



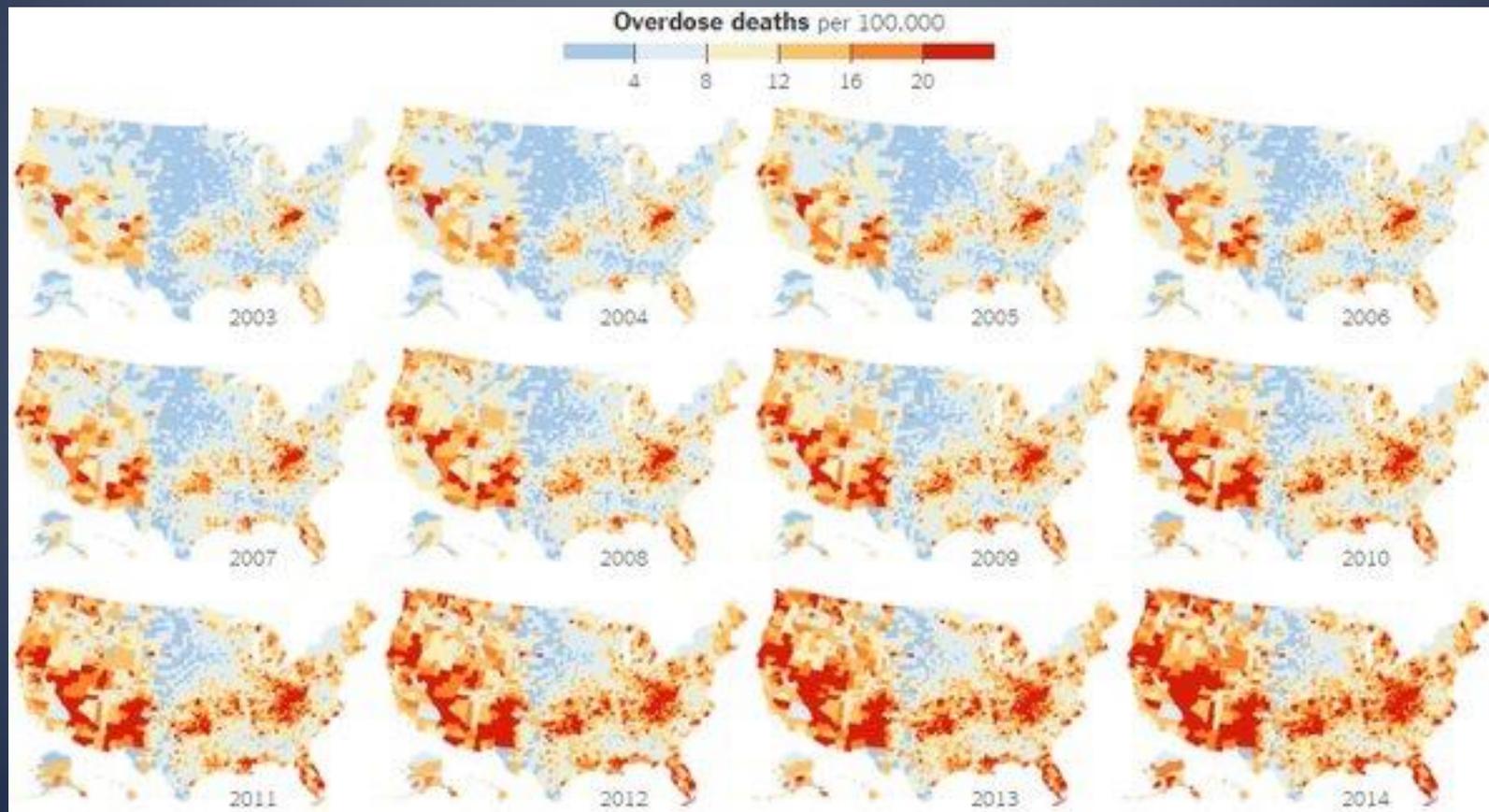
Indiana State
Department of Health
An Equal Opportunity Employer

At the conclusion of this program, participants will be able to:

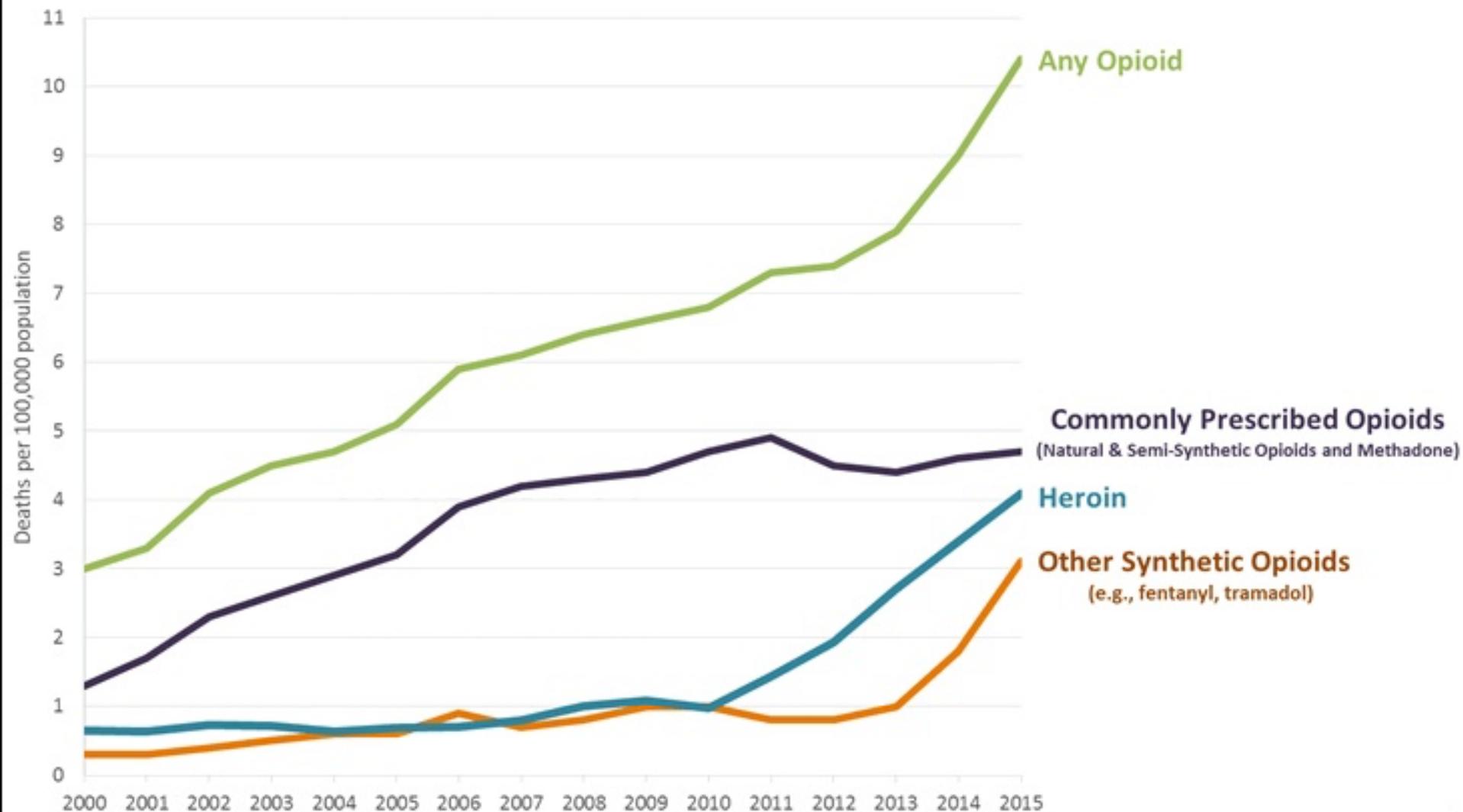
- Understand the Epidemiology of the opioid epidemic and the HIV outbreak linked to injection drug use of prescription opioids in Southeastern Indiana
- Describe the State and community level responses
- Identify lessons learned and priority strategies for responding to the opioid epidemic

How the Epidemic of Drug Overdose Deaths Ripples Across America

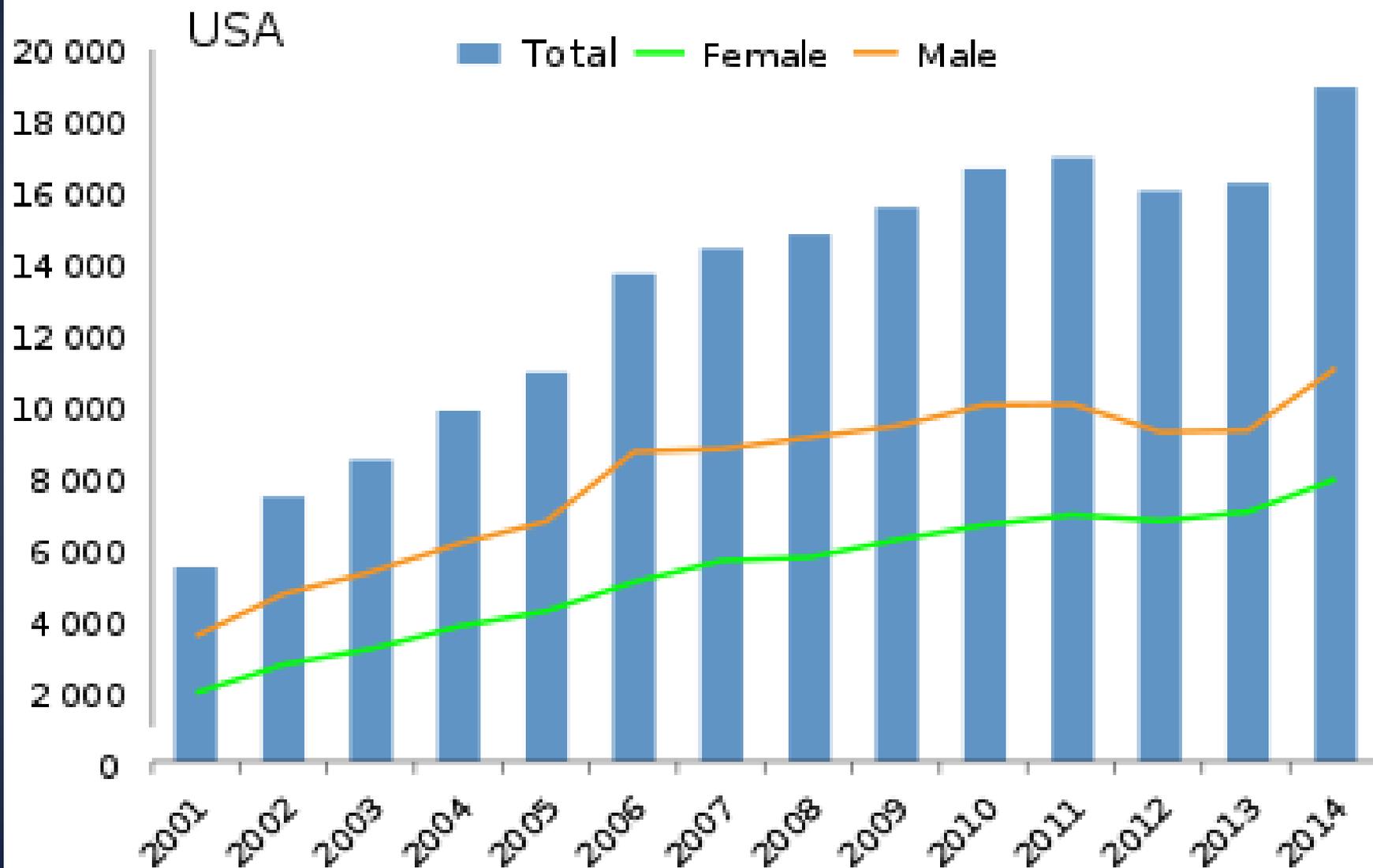
By HAEYOUN PARK and MATTHEW BLOCH JAN. 19, 2016



Overdose Deaths Involving Opioids, United States, 2000-2015

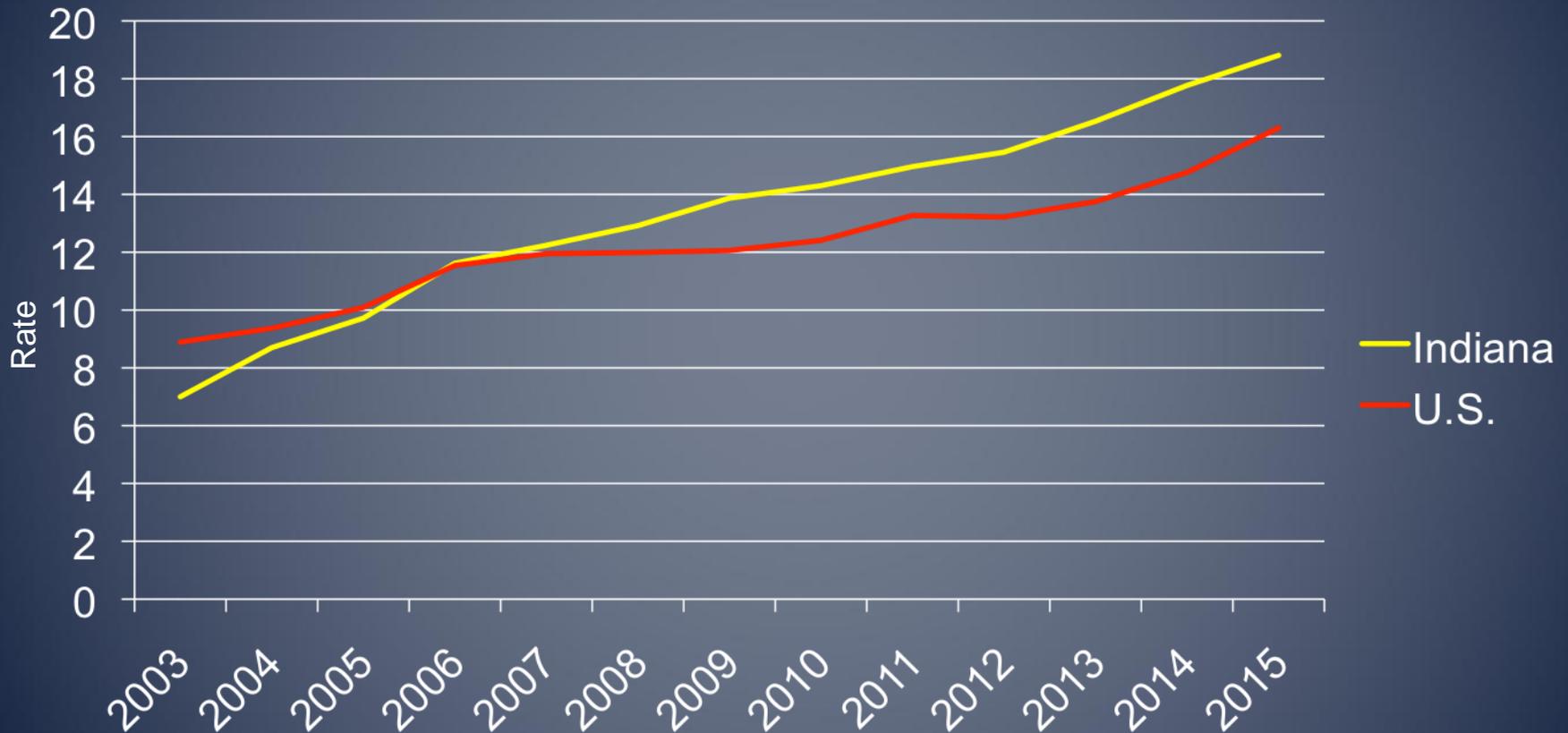


Number of Deaths from Prescription Opioid Pain Relievers



Source: National Center for Health Statistics, CDC Wonder

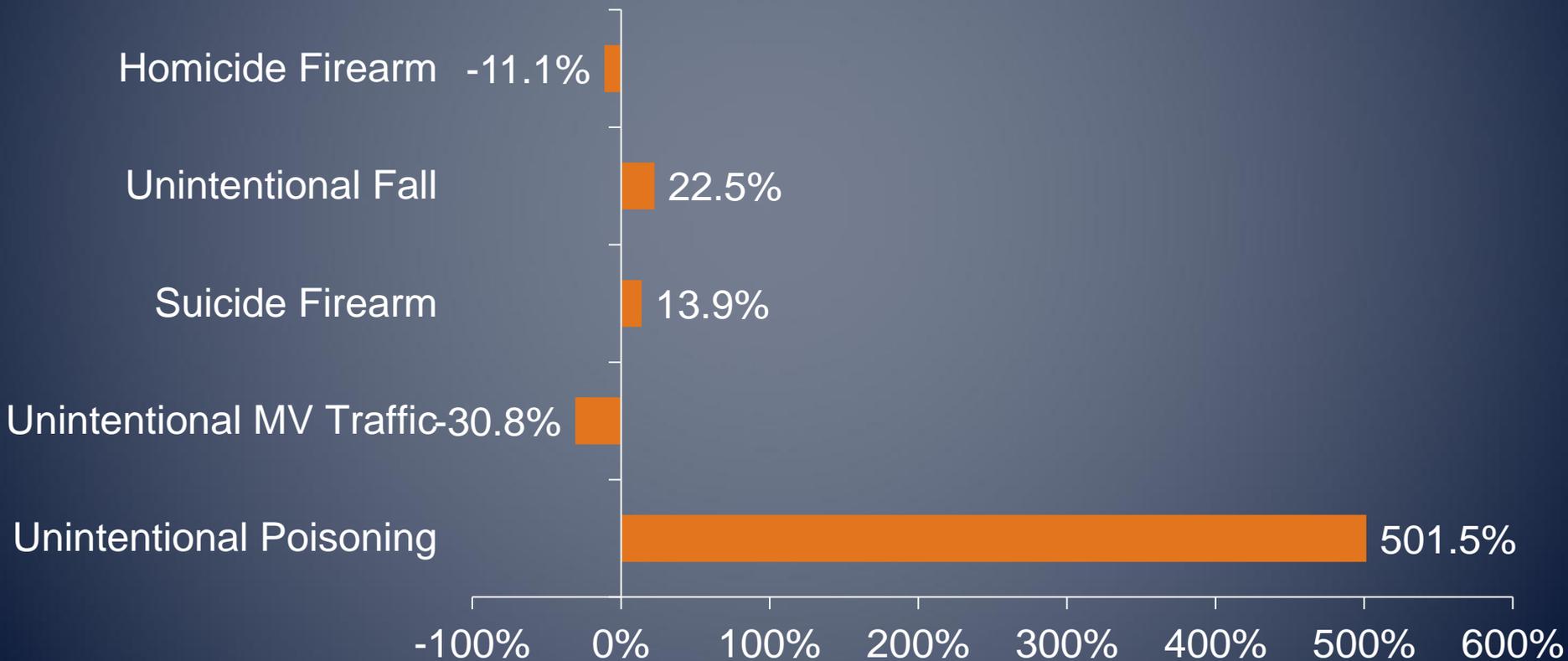
Drug Poisoning Death Rates* per Year Indiana vs. US 2003-2015



Source: CDC/WISQARS

*Crude Rates: per 100,000 people

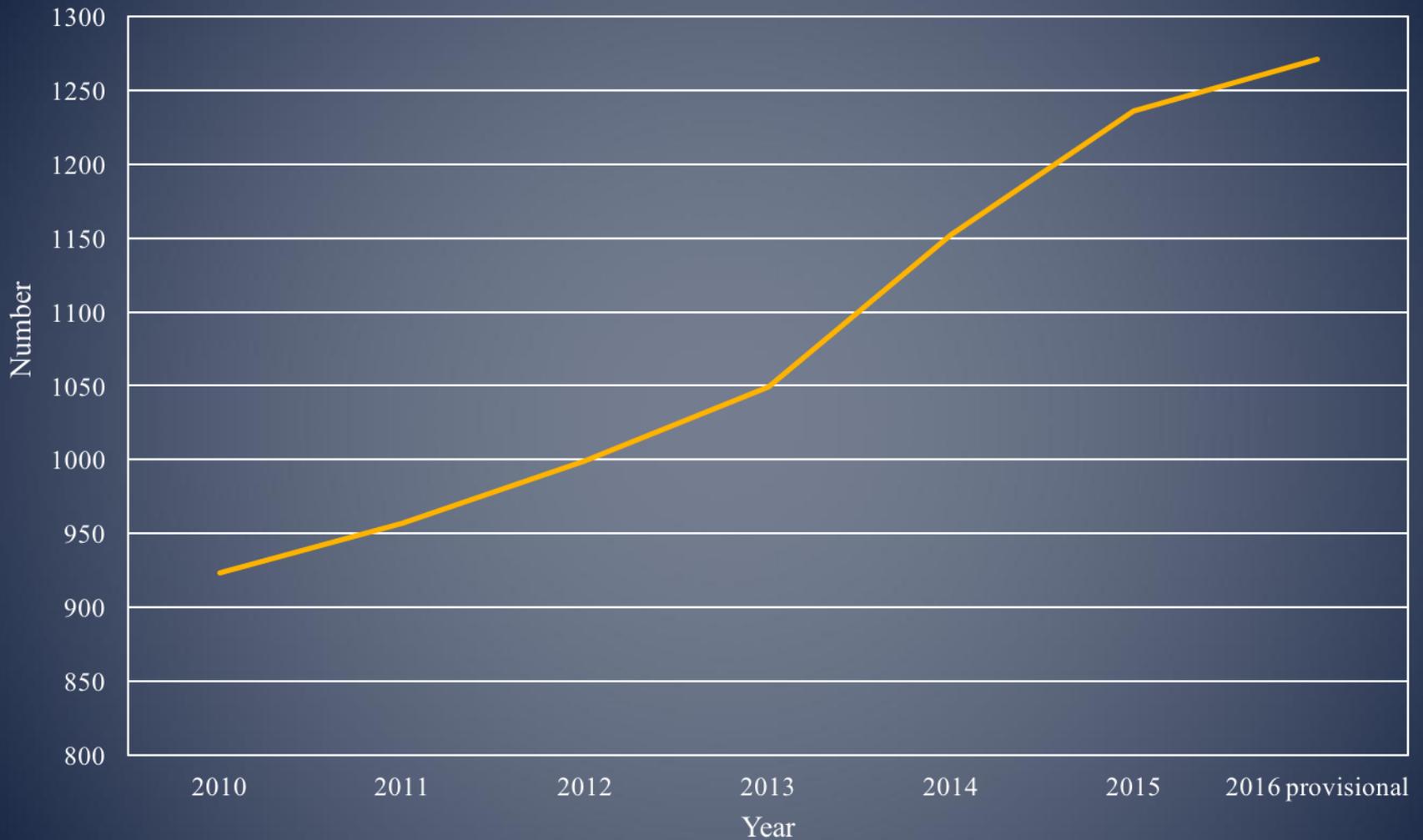
Percent Change in Leading Causes of Injury Death*— Indiana, 1999–2009



*Age-adjusted rates

Source: WISQARS

Drug Overdose Deaths, Indiana 2010 – 2016*



*2016 data is provisional. Provisional data is subject to change.

Source: Indiana State Department of Health, Epidemiology Resource Center, Data Analysis Team

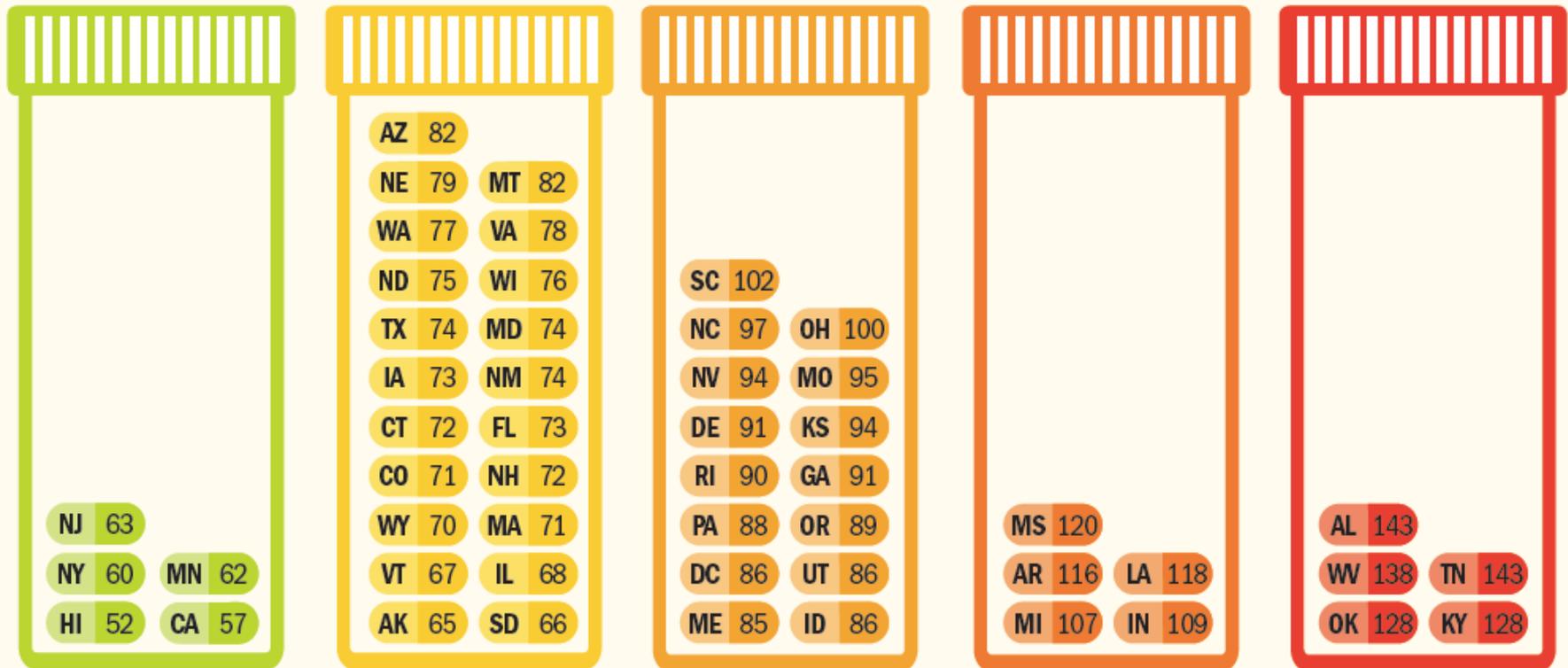
Health care providers in different states prescribe at different levels.

Number of painkiller prescriptions per 100 people

Lowest

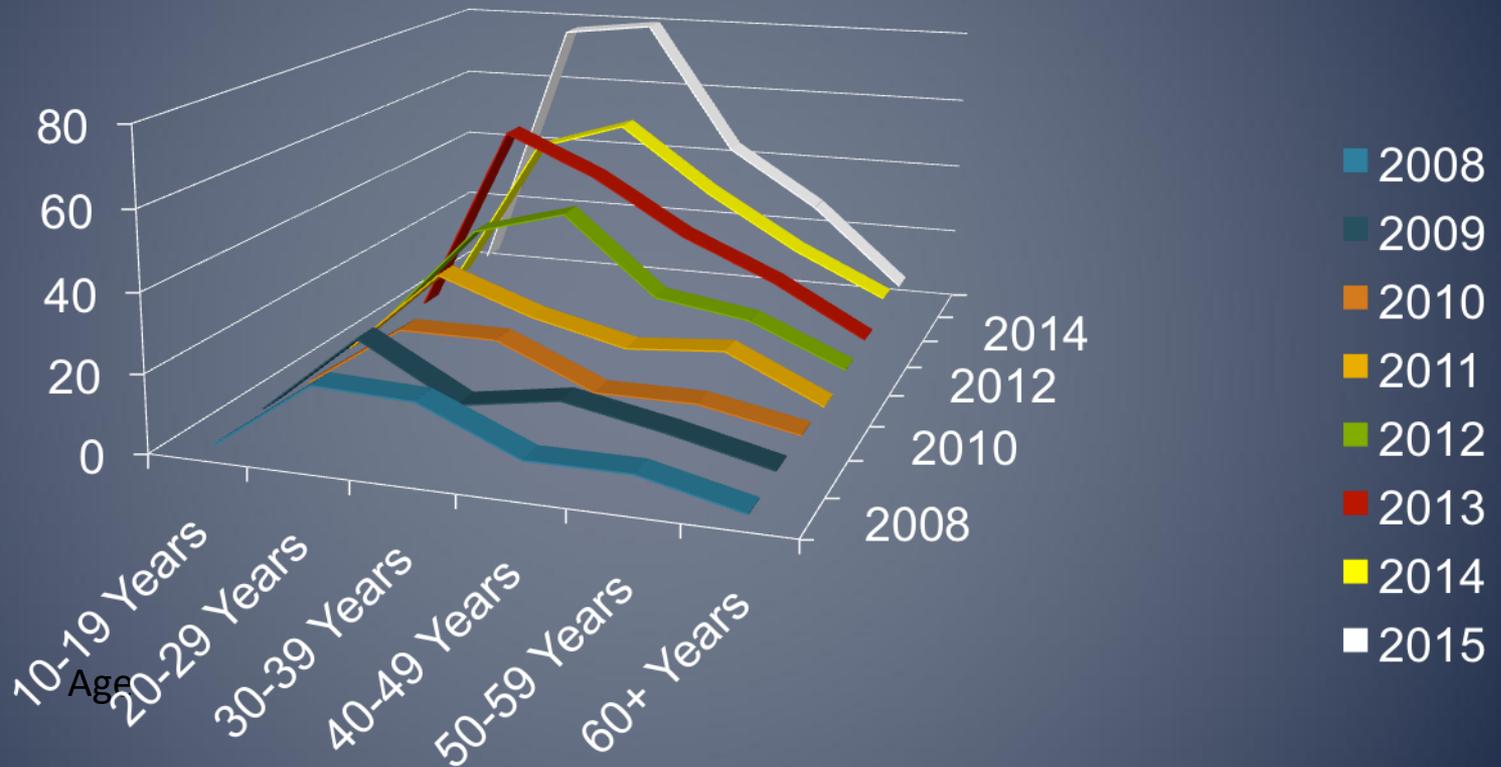
Average

Highest



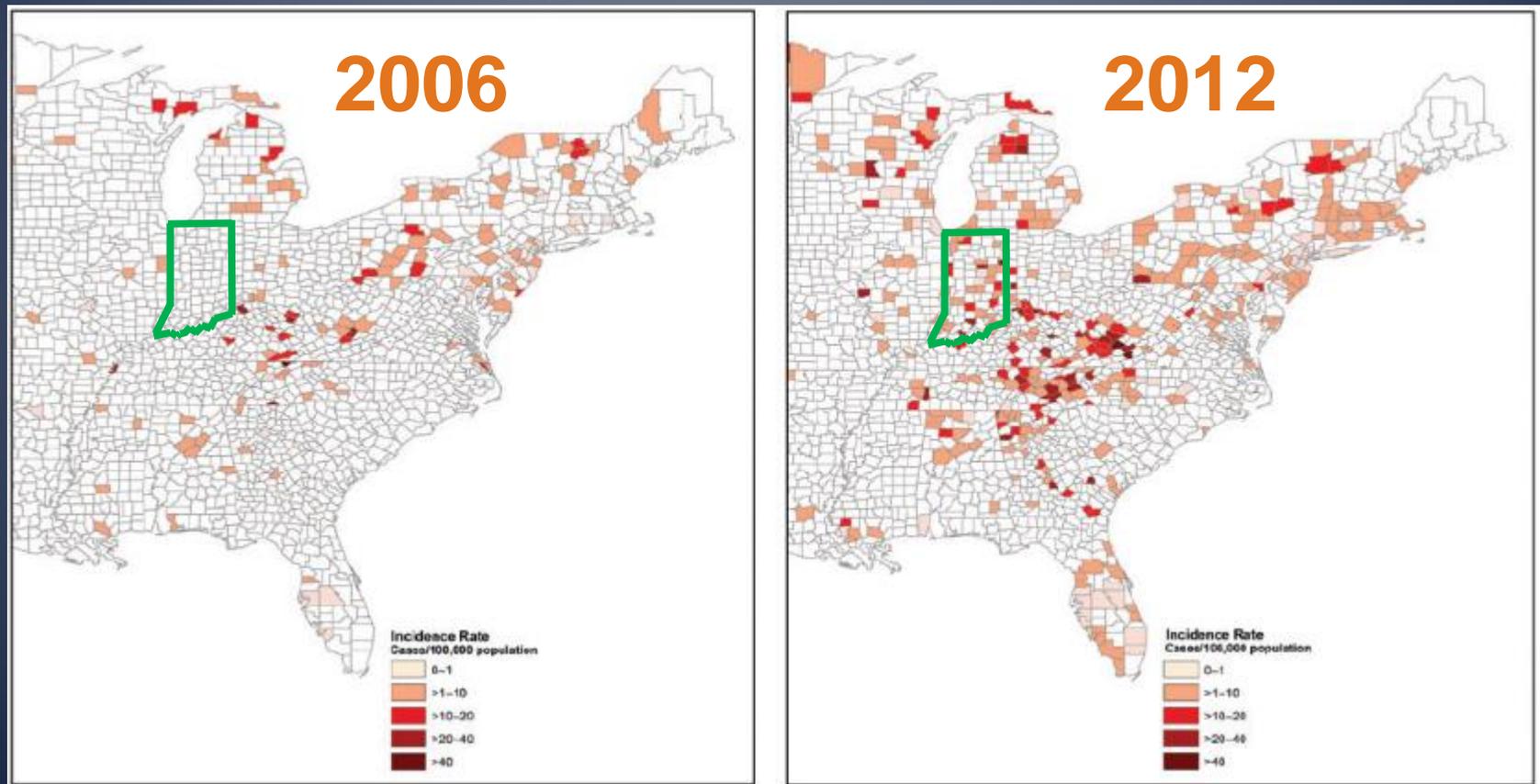
State Abbreviation — **GA** 91 — Number of painkiller prescriptions per 100 people

Drug Poisoning Deaths with Heroin, Indiana 2008-2015



Source: Indiana State Department of Health, Epidemiology Resource Center, Data Analysis Team

Emerging Epidemic of Hepatitis C Virus Infections Among Young Non-Urban Persons who Inject Drugs in the United States, 2006–2012



Heroin use is part of a larger substance abuse problem.

Nearly all people who used heroin also used at least 1 other drug.

Most used at least **3** other drugs.

Heroin is a highly addictive opioid drug with a high risk of overdose and **death** for users.

People who are addicted to...



ALCOHOL

are

2x



MARIJUANA

are

3x



COCAINE

are

15x



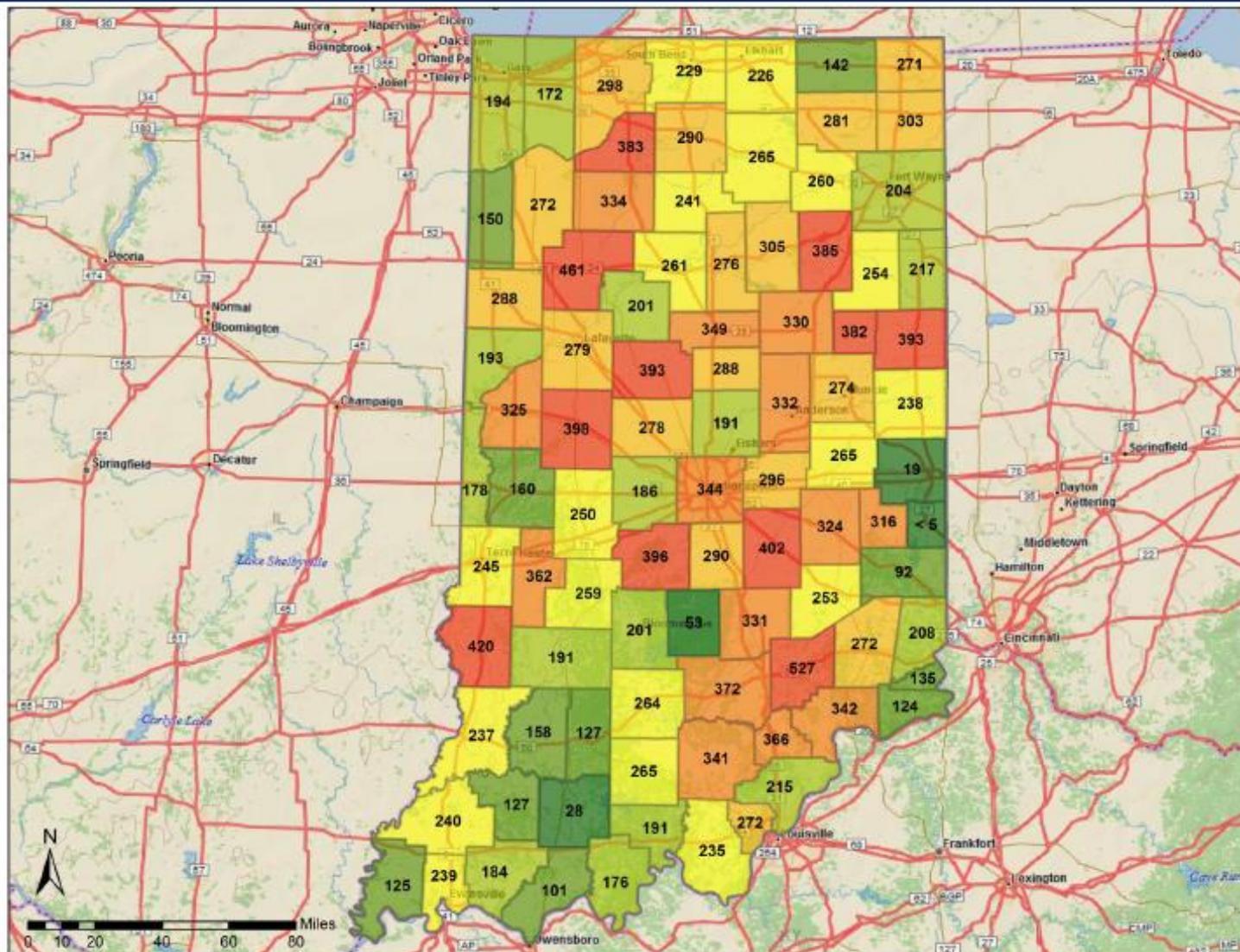
Rx OPIOID PAINKILLERS

are

40x

...more likely to be addicted to heroin.

Non-fatal Emergency Room Visits Due to Drug Overdoses, (Rate per 100,000 Population) 2015



Indiana community's HIV outbreak a warning to rural America

Laura Ungar and Chris Kenning, USA TODAY 7:25 p.m. EDT May 17, 2015



(Photo: Darron Cummings, AP)

1851 CONNECT 382 TWEET 18 LINKEDIN 51 COMMENT EMAIL MORE

AUSTIN, Ind. — This small, close-knit community is a picture of rural America, with stubble-filled cornfields and a Main Street lined by churches, shops and sidewalks. It's also the unlikely epicenter of the largest outbreak of HIV, the [AIDS virus](#), in Indiana's history — and a warning to the rest of the

nation.

Public health experts say rural places everywhere contain the raw ingredients that led to Austin's tragedy. Many struggle with poverty, addiction and doctor shortages, and

The Washington Post

How an HIV outbreak hit rural Indiana — and why we should be paying attention

0

By **Danielle Paquette** March 30

Follow @dpaqreport

RCH

The New York Times

SUBSCRIBE

U.S.

Rural Indiana Struggles to Contend With H.I.V. Outbreak

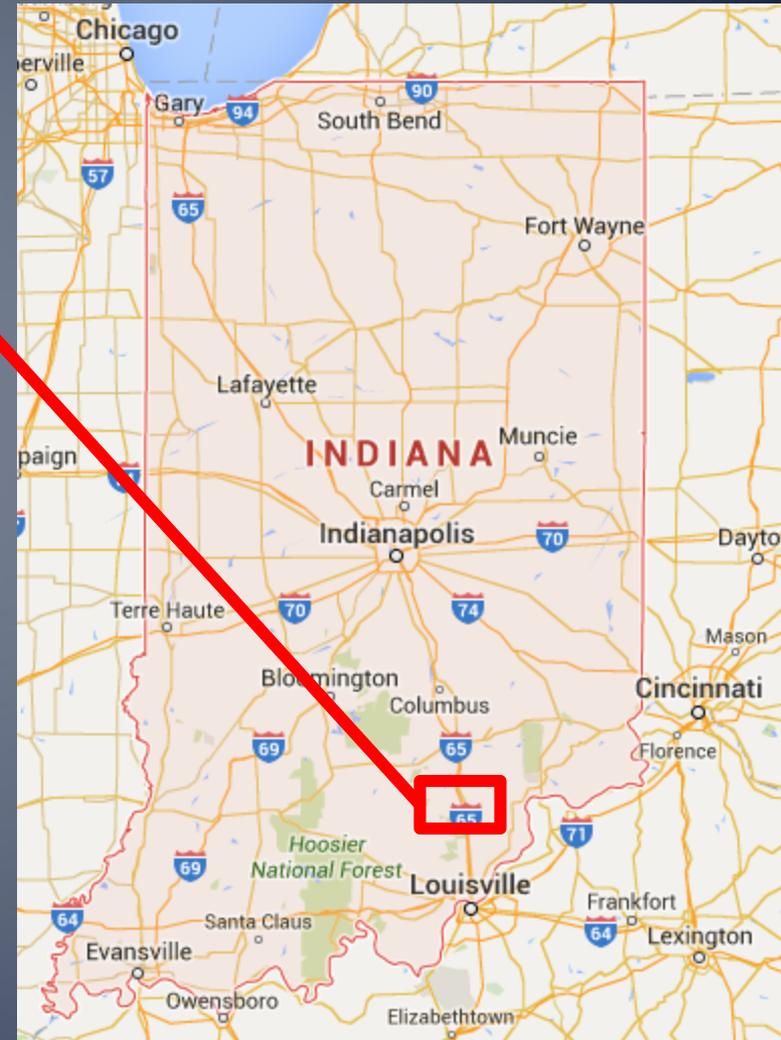
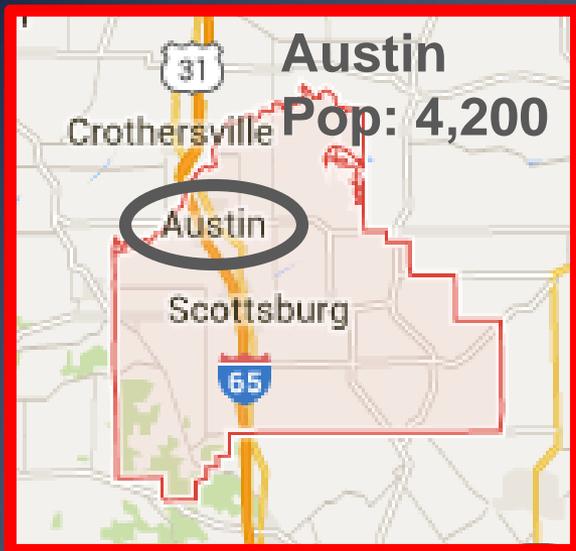
By ABBY GOODNOUGH MAY 5, 2015



Containers holding discarded syringes as part of a needle exchange program in Austin, Ind. Aaren P. Bernstein for The New York Times

Email Share

AUSTIN, Ind. — She became addicted to painkillers over a decade ago, when a car wreck left her with a broken back and doctors prescribed OxyContin during her recovery. Then came a new prescription opiate, Opana, easily obtained on the street and more potent when crushed.



Scott County, Indiana

- Population: 24,000
- High poverty (19.0%)
- High unemployment (8.9%)
- Low educational attainment (21.3% no high school)
- Ranked last among 92 counties in a variety of health and social indicators, including life expectancy

Indiana HIV Outbreak Overview

- **Dec. 2014:** 3 individuals from Austin, IN diagnosed with HIV
 - DIS learned 2 had a common needle-sharing partner
 - Contact tracing → 8 additional infections by January 23
 - Only 5 HIV infections had been reported 2004-2013

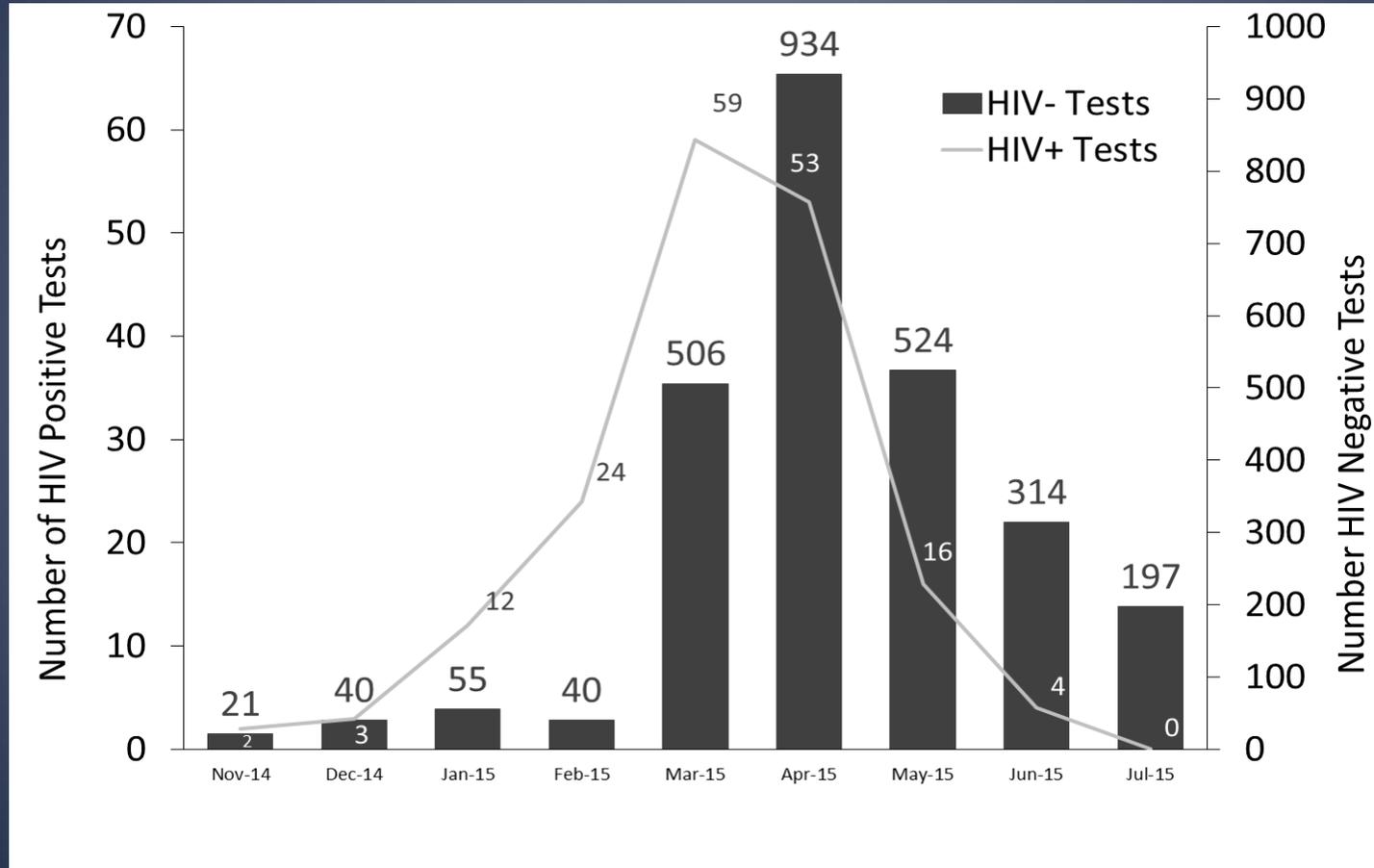
- **March 27, 2017:** 215 individuals diagnosed with HIV
 - Linked to Austin, IN
 - Most are from a single strain of HIV
 - 95% co-infected with Hepatitis C

- **Source of HIV transmission:** injection of the prescription opioid, oxymorphone (**OPANA[®] ER**)

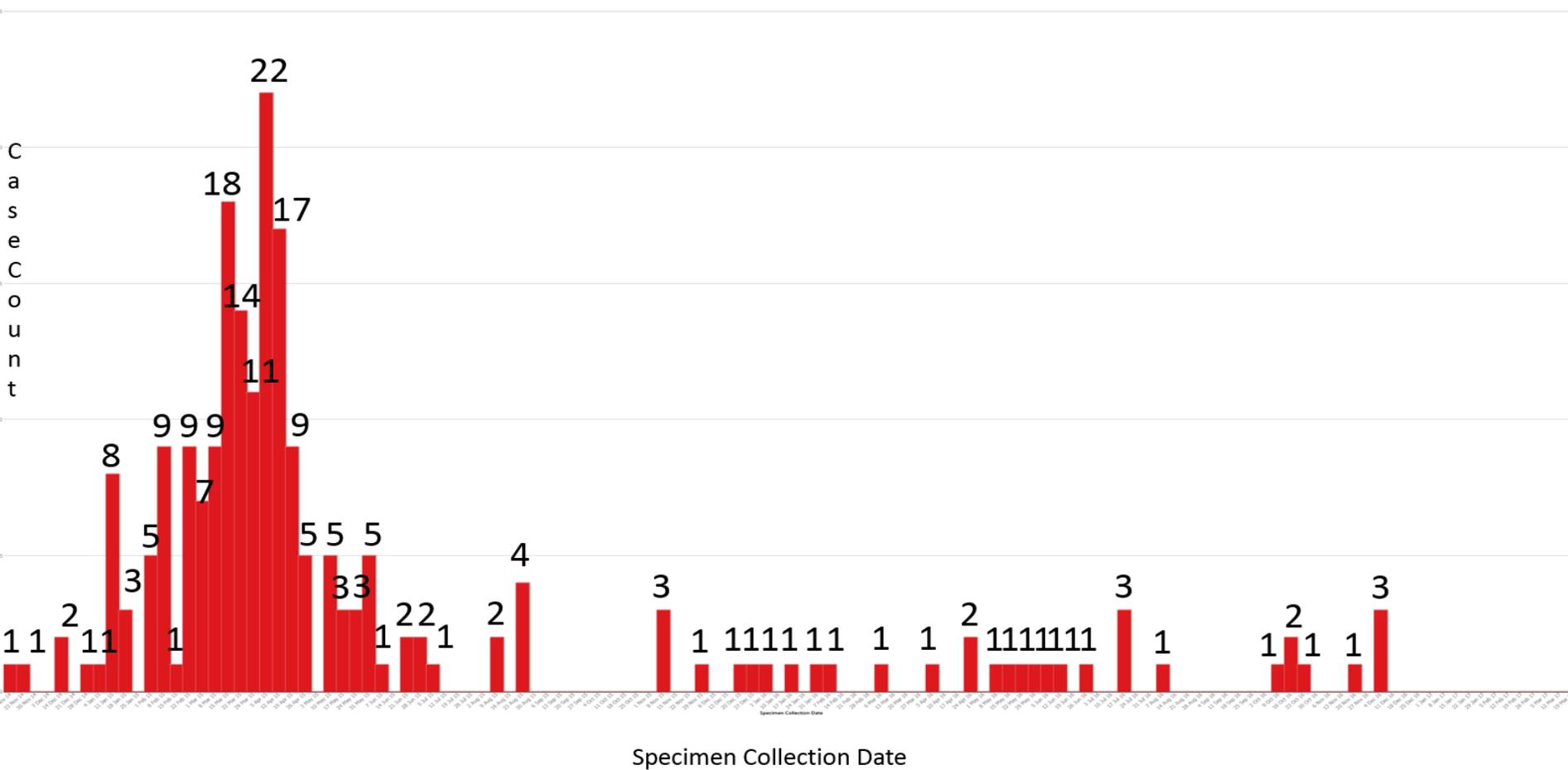
Disease Intervention Specialist (DIS) Investigation

- ❑ **Identify risk factors for HIV infection**
 - Sexual
 - IDU
 - Other
- ❑ **Explore risk behaviors**
 - MSM
 - Syringe sharing
 - Commercial sex work
- ❑ **Elicit information about partners in the past 12 months**
 - Injection partners
 - Sexual
 - Social contacts (who could benefit from an HIV test)

HIV testing performed in response to an HIV-1 outbreak associated with injection of prescription opioid oxymorphone by positivity, by month of test, Southeastern Indiana (n=2,804)



Epidemic Curve 3.27.2017



Contact Tracing and HIV Testing

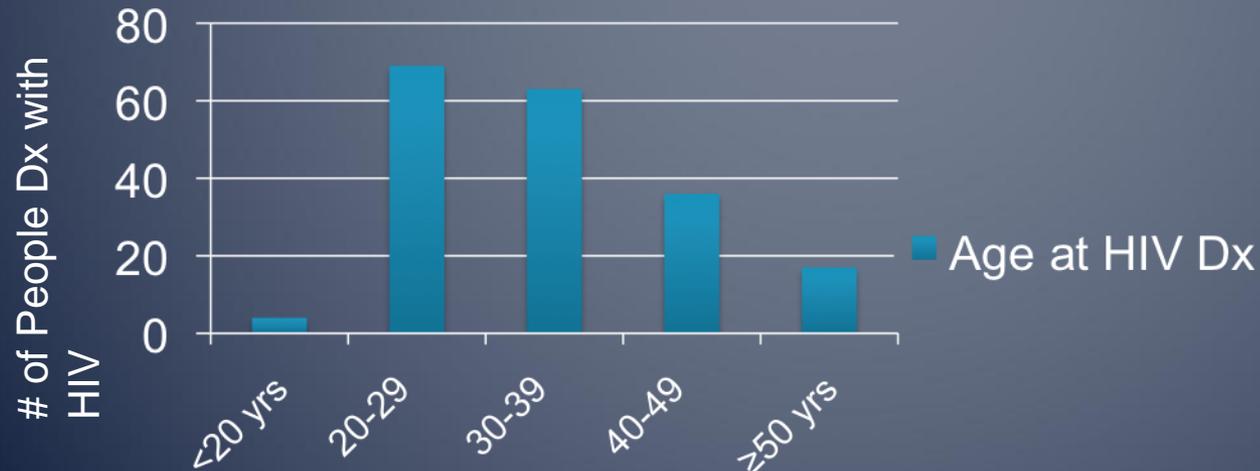
3/27/2017

Named Contacts	538
Tested	479 (89%)
Refused testing	14 (2.6%)
Unable to locate	29 (5.4%)
Other	16 (3.0%)
Other Tested	35
Total Tested	514
HIV positive	215 (42%)

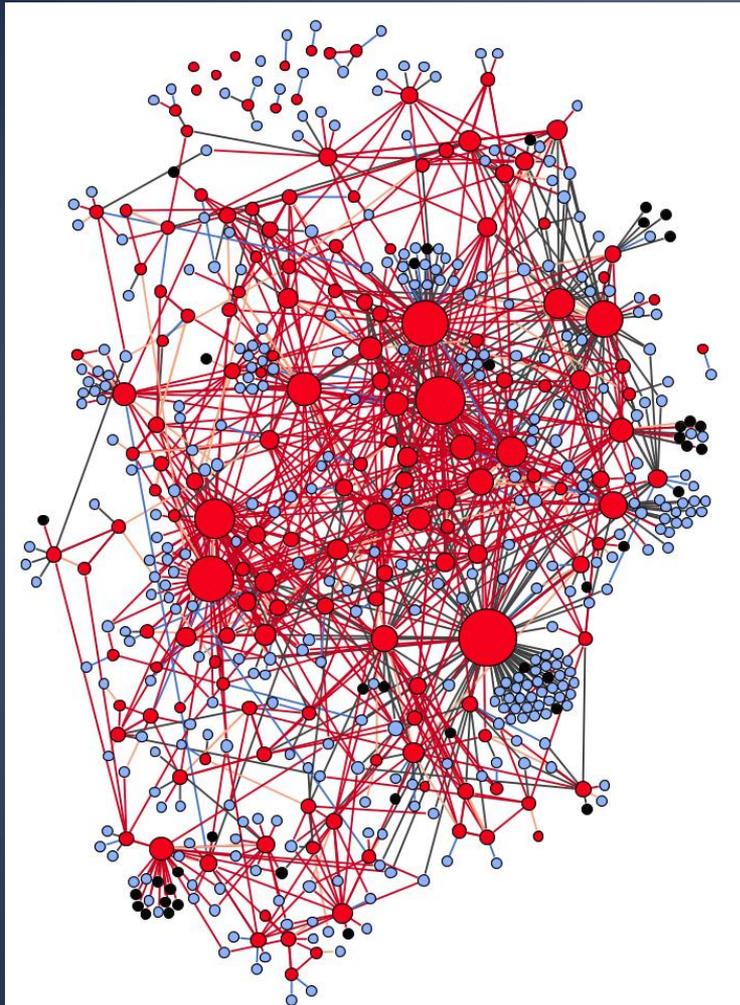
Demographics of individuals infected with HIV

(N=189)

- 58% male
- 98% non-Hispanic white
- Median age 33.5 years
- 94% reported injecting drugs
 - All oxymorphone, some methamphetamine and heroin as well



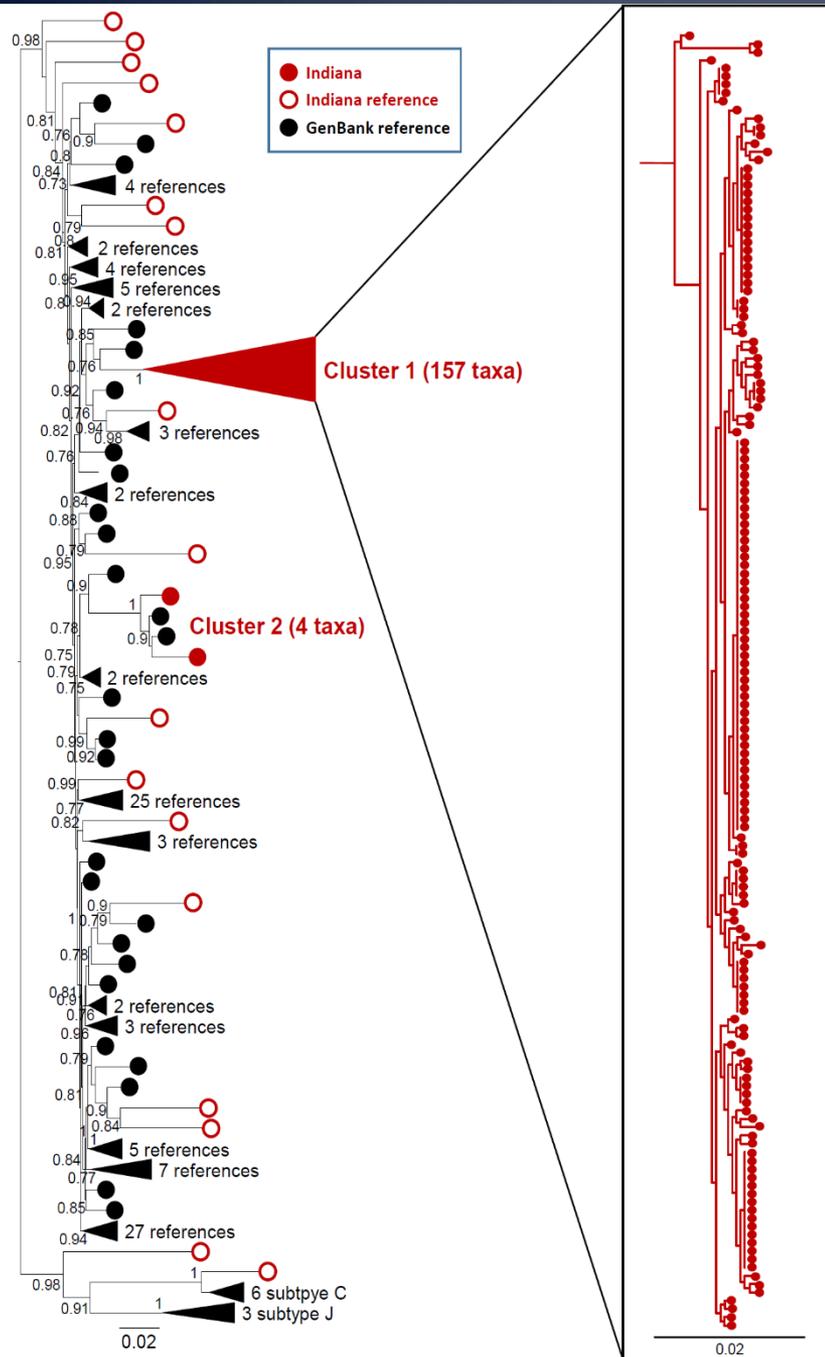
Contact tracing network



Contact Type	Frequency
Needle-sharing	59.7%
Sex	5.7%
Needle-sharing AND sex	9.7%
Social contact	25.0%



Credit: Romeo Galang, MD, MPH; Division of HIV/AIDS Prevention;
National Center for HIV/AIDS, Viral Hepatitis, STD and TB Prevention



Maximum likelihood phylogenetic tree of HIV-1 polymerase sequences – SE Indiana, 11/14 – 7/15

- Molecular analysis of the HIV-1 *pol* gene from 158 case patients with available specimens
- Two unique clusters of HIV-1 subtype B (>97% nucleotide identity)
 - Cluster 1, n= 117
 - Cluster 2, n =2
- Recency testing (N=125)
 - 90.4% infected within past 6 mos
 - 10 older infections
 - 2 invalid results

*Manuscript in development. Not for distribution.

Newly Reported Indiana HIV Cases and AIDS Cases by Mode of Transmission, Reported January 1, 2014 – December 31, 2014

Mode of Transmission (Risk Factors)	HIV at First Diagnosis		AIDS at First Diagnosis	
	Count	%	Count	%
Men who have sex with men (MSM)	211	50%	32	34%
Injection Drug User (IDU)	1	1%	1	1%
MSM & IDU	7	1%	1	1%
Heterosexual	99	23%	27	29%
Mother diagnosed HIV+ or AIDS	1	1%	2	2%
Other (Pediatric Transfusion, IDU Heterosexual, MSM Heterosexual and Adult Transfusion/Hemophilia etc.)	35	8%	6	6%
Not Identified at This Time and/or No Reported Risk	67	16%	25	27%
Total	421	100%	94	100%

Newly Reported Indiana HIV Cases and AIDS Cases by Mode of Transmission, Reported January 1, 2015 – December 31, 2015

Mode of Transmission (Risk Factors)	HIV at First Diagnosis		AIDS at First Diagnosis	
	Count	%	Count	%
Men who have sex with men (MSM)	196	36%	31	40%
Injection Drug User (IDU)	175	32%	2	2%
MSM & IDU	11	2%	1	1%
Heterosexual	75	14%	16	21%
Mother diagnosed HIV+ or AIDS	2	0%	1	1%
Other (Pediatric Transfusion, MSM Heterosexual and Adult Transfusion/Hemophilia etc.)	31	6%	6	8%
Not Identified at This Time and/or No Reported Risk	53	10%	21	27%
Total	543	100%	78	100%

US 2013 PWID
IN 2014 PWID
IN 2015 PWID

6.5% of new HIV diagnoses
2% of new HIV/AIDS diagnoses
34% of new HIV/AIDS diagnoses

Why Austin?

INDIANA

2016

Tweet

G+1 0

Like 0



Overview

Rankings

Measures

Downloads

Compare Counties

Scott (SC)

Print

Help

Back To Map

Select a Ranking:

HEALTH OUTCOMES

LENGTH OF LIFE



Rank County

- 1 Hamilton (HA)
- 2 Hendricks (HD)
- 3 Warrick (WI)
- 4 LaGrange (LA)
- 5 Monroe (MO)
- 6 Boone (BO)
- 7 Johnson (JO)
- 8 Whitley (WL)
- 9 Hancock (HN)
- 10 Porter (PO)
- 11 Wells (WE)
- 12 Adams (AD)

Scott (SC)

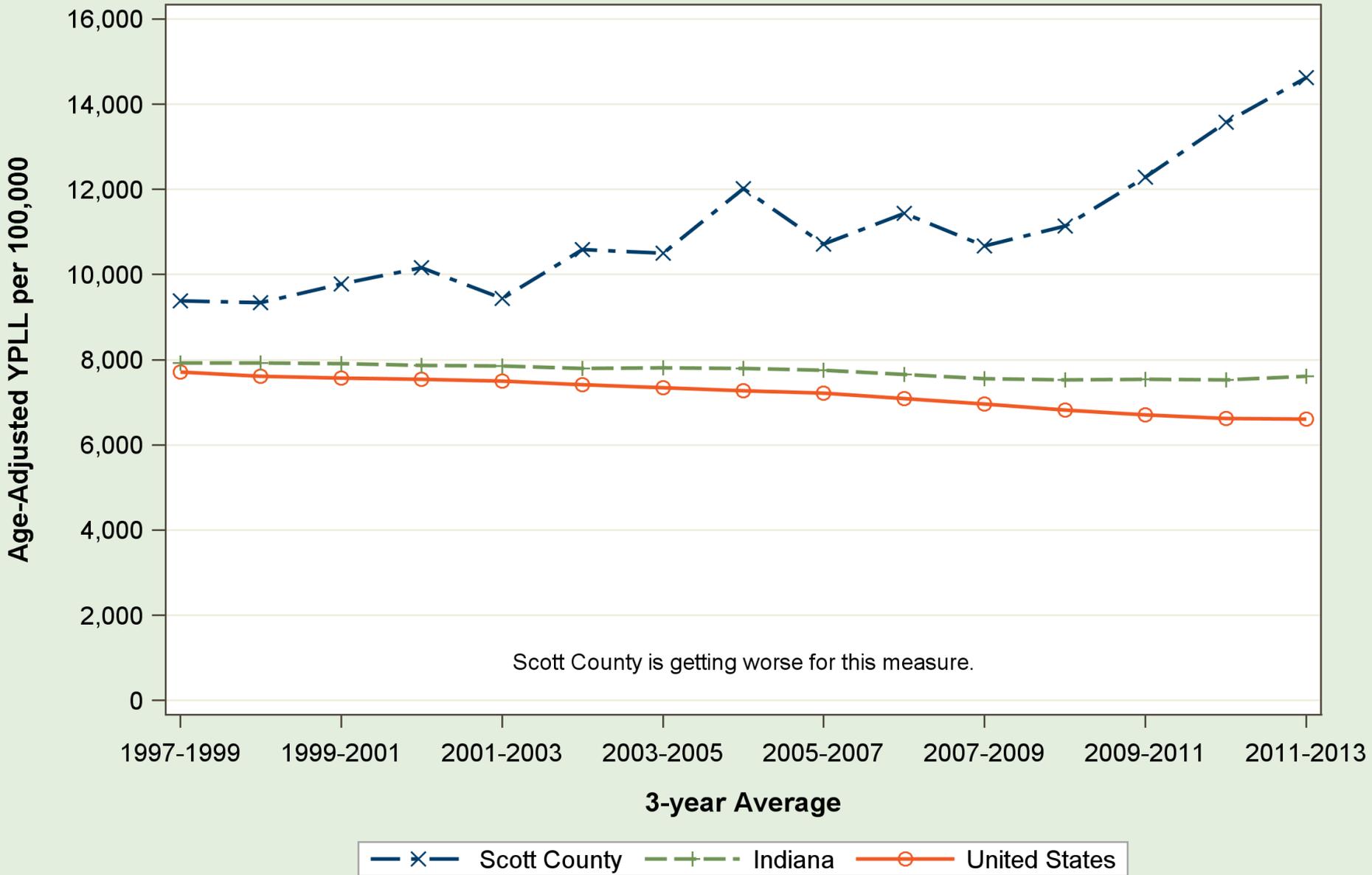
Show areas to explore Show areas of strength

County Demographics +

	Scott County	Trend	Error Margin	Top U.S. Performers^	Indiana	Rank (of 92)
Health Outcomes						92
Length of Life						92
Premature death	14,600		12,800-16,400	5,200	7,600	
Quality of Life						89
Poor or fair health**	18%		17-19%	12%	19%	
Poor physical health days**	4.1		3.9-4.3	2.9	4.1	
Poor mental health days**	4.1		3.9-4.3	2.8	4.3	
Low birthweight	10%		9-11%	6%	8%	

Premature death in Scott County, IN

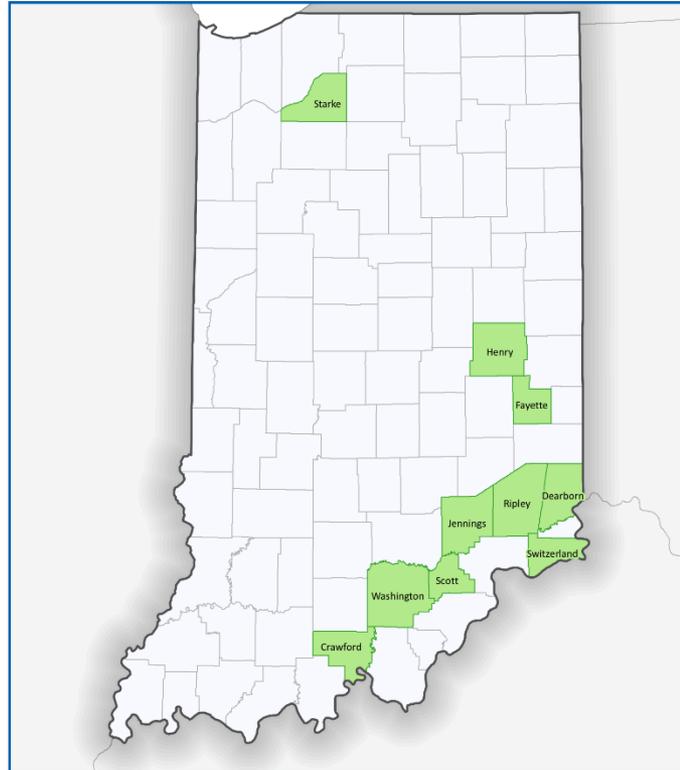
Years of Potential Life Lost (YPLL): County, State and National Trends



Scott County is getting worse for this measure.

Please see Measuring Progress/Rankings Measures for more information on trends

County-level Vulnerability to Rapid Dissemination of HIV/HCV Infection Among Persons Who Inject Drugs



Notes: Map and Analysis provided by the Geospatial Research, Analysis, and Services Program (GRASP), Div of Toxicology and Human Health Sciences, ATSDR (2015). **Data Sources:** American Community Survey 2012-2013; DEA ARCOS 2013; NCHS/NVSS 2012- 2013; SAMHSA DATA 2000 Program Info 2014.

Vulnerable Counties and National Ranks (from 1-220)					
Scott	32	Switzerland	94	Ripley	195
Washington	57	Crawford	112	Dearborn	213
Starke	70	Henry	128		
Fayette	81	Jennings	158		

What is Drug Addiction?

- Addiction is a chronic relapsing brain disease
- Characterized by compulsive drug seeking and use, despite harmful consequences
- Drugs of abuse change the structure and function of the brain
- These brain changes can be long-lasting, and can lead to harmful behaviors

- *"I can't get through that bit as well in the back of my head. I'm a lot stronger. You set it in your mind, but it's always in the back of my head, I can get through that sickness, I can lay down. And, but it's in the back of my head and I taste it. So when I taste it, I mean it could be a year from now and me not doing it, but it brings that bitter taste in my, you know, it's just I'm ready to do it."* (Joey, F1)

Painkiller Opana, new scourge of rural America

AUSTIN, INDIANA | BY MARY WISNIEWSKI

Reuters



Melissa Himmelheber, 43, shows pictures of her son, C. J. Coomer, who died of an Opana overdose last July at the age of 24 in Austin, Indiana, at her home in Scottsburg, Indiana, March 19, 2012.

◀ 1 of 3 ▶

REUTERS/JOHN SOMMERS II

At least nine people have died so far this year from prescription drug overdoses in Scott County, Indiana. Most of the fatalities involved Opana, according to county coroner Kevin Collins.

Why Opana[®] ER ?

- ❑ 2010 - reformulation of Oxycontin[®]
- ❑ Opana[®] quickly replaced Oxycontin[®] - snorted, injected
- ❑ 2012 – Opana[®] ER reformulated, impossible to crush/snort
- ❑ Short half-life 3-4 hours when injected = multiple injections/day
- ❑ Street cost ≈ \$160/40 mg tablet = pill sharing
- ❑ Higher Morphine Equivalent Dose than heroin
- ❑ You know what you're getting

Dosage Strength	OPANA [®] ER with INTAC [®] Tablet Images*	GENERIC oxymorphone ER Global Pharma (Impax) Tablet Images*
40 mg		
30 mg		

"I couldn't find Opanas or any other type of pain medicine to snort. It became almost non-existent. So I was turned on to shooting up. So that's pretty much how that went down. [That was a couple years ago. I hadn't injected before a couple years ago after I couldn't find anything to snort]. I couldn't handle the withdrawals... Opana [was the first drug I injected]... I was doing the OxyContin before, snorting OxyContin....when I was 18. I don't know, it was probably 23, 24 [when I first started snorting Opana] because they had a snortable kind before. " (JDo1)

*But, the Opana don't last near as long as the other stuff...
The feeling of Opana will last 30 minutes...
[It takes 4 or 5 hours with the Opana before you are sick] and then you got to do it again, or you feel really bad again.
If you don't do enough Opana, then in a couple hours, you feel really bad again and... [have to inject].
Inject 6,7,8 times but only like small amounts." (DBo1)*

*"I could not find any of the OxyContin and someone came to me with an Opana,...
I had a lot of people tell me 'Don't do Opana because a lot of people say you do it one time
and you're hooked'...*

*And that's exactly what happened. I did one that night and the next morning I woke up and I
just felt, I felt terrible. And so I had to get another one.*

You get hooked on 'em really fast, the Opanas. Very fast." (DBo8)

And man it was so pure, I'd love to have one right now " (JZo2)

Drug Use among people with HIV (N=108)*

- ❑ Multigenerational
- ❑ Sharing of injection equipment common
- ❑ Daily injections: 4-15
- ❑ Number of partners: 1-6 per injection event
- ❑ Average number of unique contacts per case: 8 (range: 0-80)

*“I was living with my cousins and everybody would use the same needles...
We'd put water in a cup, and everybody would use the same water and can...
my boyfriend, friends, family, cousins, sister.*

*If I was sick, had a pill, and I didn't have a needle, I would use whoever's was there...
I've used needles before that the plungers were broke,
and we'd melt them back together to use” (PI06)^*

*Early Release, MMWR Morb Mortal Wkly Report 2015, April 24, 2015

^IUPUI/ISDH/CDC Focus Groups and Interviews, PWID, Scott County: Unpublished Findings Not for Distribution

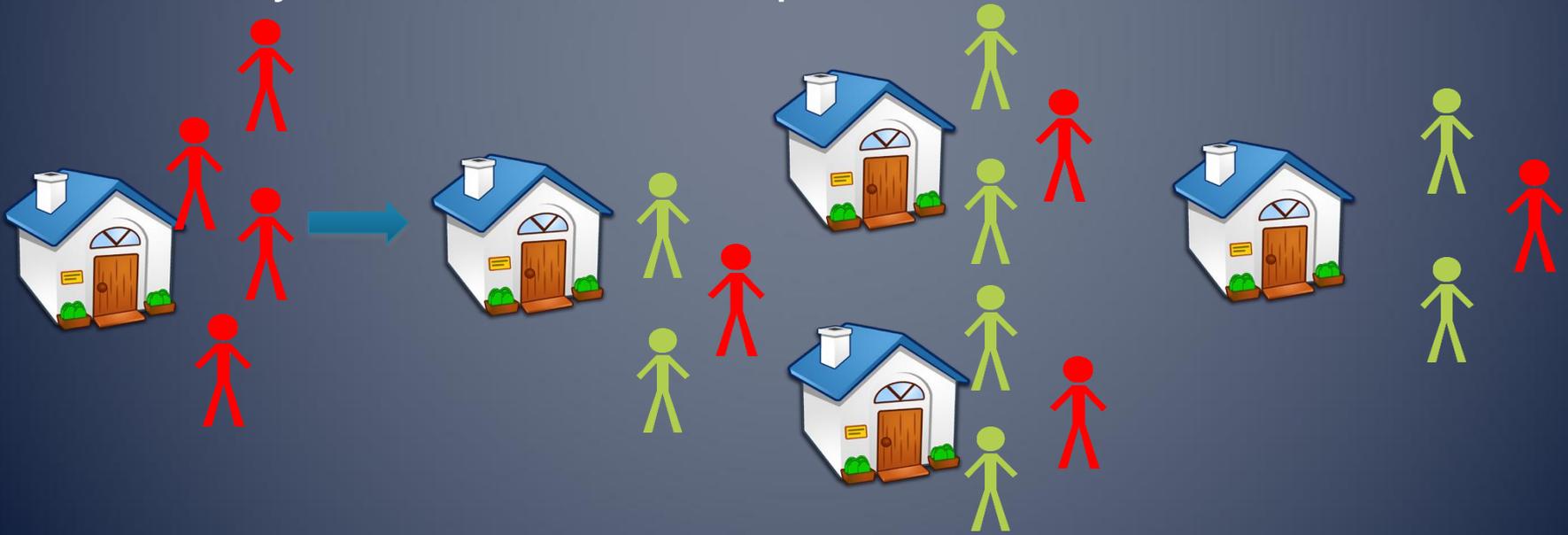
High-Risk Injection Networks

- 89 individuals with HIV were geomapped early in the response
- Nearly half lived within a ½ mile square area
- The estimated infection rate within this hotspot was 34 cases/1,000 people



High-Risk Injection Networks

- Networks related to 'drug houses'
 - 10 to 15 houses in a one square-mile area where people go buy pills and/or to inject
 - ≥ 5 people in each house injecting with each other at any one time could disperse to other house networks



High-Risk Injection Networks

"No one even thought about HIV and then all it took was just one [positive] person to come into the group.

There'd be 5 people in that group that share with that one person.

Each of those shared with each other anyways.

And then, each 5, 1 of them 5 people went to other groups." (Male, 43 yrs)

"There could be different people using different houses.

It doesn't matter what house.

It's not that you would go to the same house all the time.

You would just go to whatever house was available." (Male, 39 yrs)

What We Needed to Control the Outbreak

- ❑ Get individuals with HIV into care and on Antiretroviral meds
- ❑ Expand HIV/HCV testing and capacity for early detection
 - Jails, treatment providers, emergency departments
 - Active outreach and testing
- ❑ Develop systems to keep at-risk individuals uninfected
 - Systematic retesting and education of persons at risk
 - SSP and HIV PrEP
- ❑ Increase addiction treatment services and prevent overdose deaths
 - Medication-assisted treatment, naloxone distribution
- ❑ Decrease the stigma of HIV and Injection Drug Use
- ❑ Long-term solutions to improve public health infrastructure and socioeconomic disparities

Communications

YOU ARE **NOT**
ALONE

If you are HIV+, you are not alone.

HIV Services Hotline **1-866-588-4948**
Addiction Hotline **1-800-662-HELP(4357)**
www.StateHealth.IN.gov



Campaign materials originally developed by the New York State Department of Health, 2010

HELP PREVENT HIV

**DON'T SHARE THESE.
DON'T ABUSE THESE.**

Any drug can be abused. If you or a friend are abusing drugs, get help. Never share needles. It increases your risk of getting HIV.

HIV Services Hotline **1-866-588-4948**
Addiction Hotline **1-800-662-HELP(4357)**
www.StateHealth.IN.gov

YOU ARE **NOT**
ALONE



Campaign materials originally developed by the New York State Department of Health, 2010





Governor declares HIV outbreak in Southern Indiana a public health emergency

by [Local Sources](#) on [March 26, 2015](#) in [NEWS](#)

Governor Mike Pence today declared a public health emergency in Scott County due to an outbreak of HIV that has reached epidemic proportions.

The declaration was issued in Executive Order 15-05, which orders the state to coordinate a multi-agency response, and provides additional resources and tools to tackle the outbreak.

Community Outreach Center: a One-Stop Shop

□ Community Outreach Center

- HIV and HCV/HBV testing
- Care coordination for HIV medical care
- Syringe exchange program
- Substance use disorder treatment services
- Routine immunizations
- Insurance enrollment (e.g., birth certificates, driver's license)
- Job training

□ Relocated to the Scott County Health Department Satellite Office in Austin



Scott County SEP



PrEP

(Pre Exposure Prophylaxis)

What is PrEP?



PrEP means taking medicine to lower your chance of getting HIV. You can only take PrEP if you do not have HIV.

Who may need PrEP?

PrEP may be good for you if:

You are in a relationship with someone who has HIV



You inject drugs

You do not use condoms all the time and you have sex with someone who may have HIV

Where can you get PrEP?



- You can talk to a doctor at the Center Health Clinic (Arlington) (Medicine)
- Open Every Tuesday 10am - 5pm
- For more information call 812-253-1234 at another time, call 812-253-1234

For more information, please call Indiana State Health Department's HIV hotline at 1-866-588-4948.

Find out if you have HIV



- People with HIV may not look sick
- Many people do not know they have HIV
- The only way to know if you have HIV is to get an HIV test
- If you have HIV there are medicines you can take to keep you healthy
- If you do not have HIV, there is medicine to prevent you from getting it
- Talk to your doctor to see if this medicine is right for you

Protect yourself from HIV

If you have sex, use a condom

If you shoot drugs:



- Use new needles each time
- Do not share your works
- NEVER buy needles on the street, even if they look new

For more information, please call Indiana State Health Department's HIV hotline at 1-866-588-4948.

HIV FACTS

ANYONE CAN GET HIV

HIV is the virus that causes AIDS

How you CAN get HIV:

You can get HIV by having sex without a condom with someone who has HIV

That includes:

- Vaginal Sex
- Anal Sex
- Oral Sex



You can get HIV by sharing syringes, needles and other things used to inject drugs, with someone who has HIV



A woman who has HIV can give it to her baby when she is pregnant or breastfeeding



How you CAN NOT get HIV:



Touching



Food



Sneezing



Pets



Water



Hugging



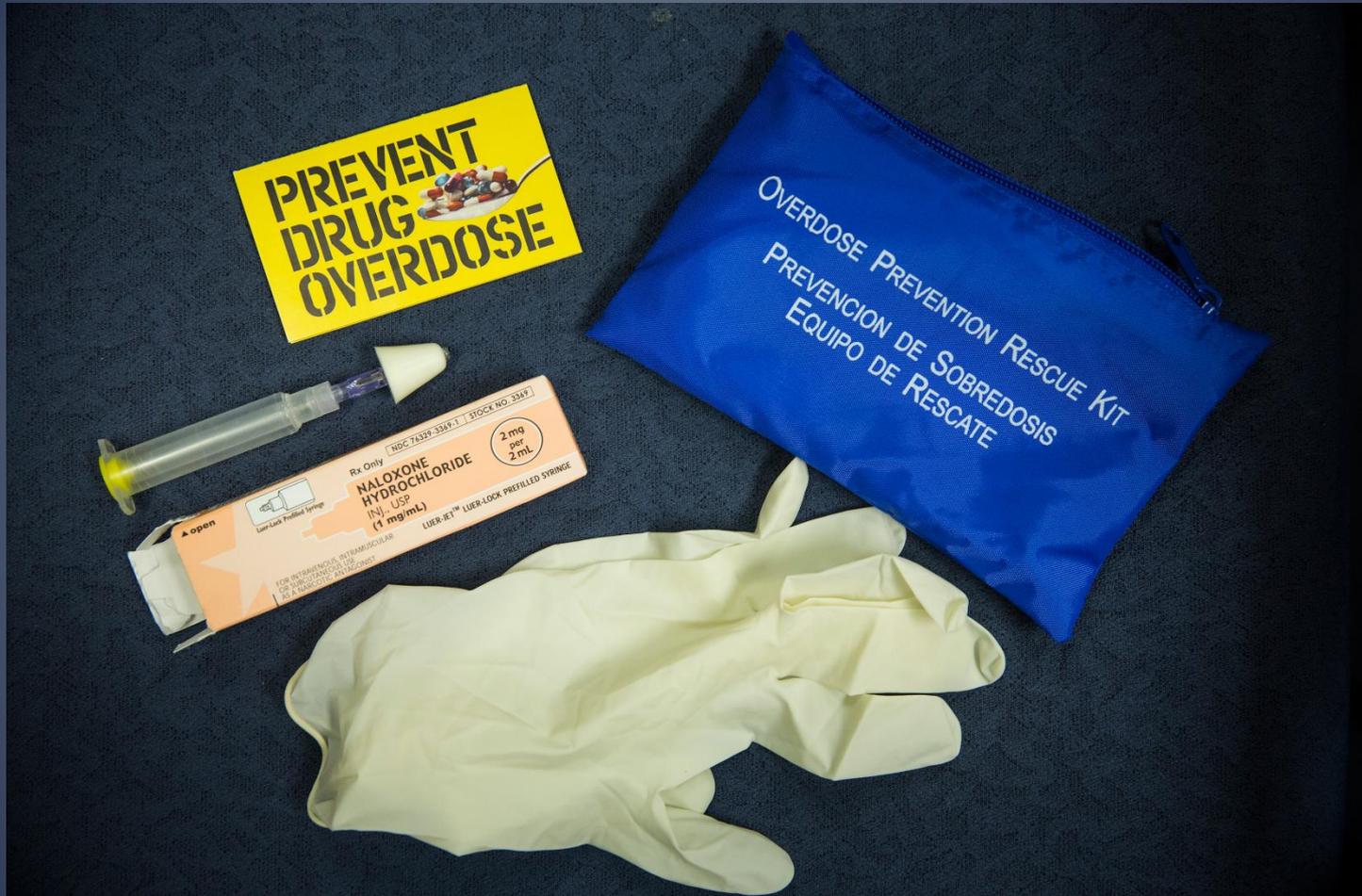
Mosquitoes



Toilets

For more information, please call Indiana State Health Department's HIV hotline at 1-866-588-4948.

Naloxone Training for First Responders



Communications

Mother of Ryan White teen HIV patient, speaks in Austin, Ind.

Karma Dickerson, @WHAS11Karma 12:06 a.m. EDT May 13, 2015



(Photo: WHAS)

 CONNECT

 10 TWEET

 LINKEDIN

 COMMENT

 EMAIL

 MORE

AUSTIN, Ind. (WHAS11) – As Southern Indiana battles and unprecedented HIV outbreak, the mother of a teen who became famous for his fight for equal treatment of those living with HIV and AIDS.

Clinical HIV Prevention Efforts

❑ Collaborative effort

- Academic clinical partners (IU Health Infectious Disease)
- Local, state and federal agencies (Local Public Health, County Sheriff, DMHA, CDC, SAMHSA)
- Private sector (Foundations Family Medicine, LifeSpring, AHF, Centerstone)

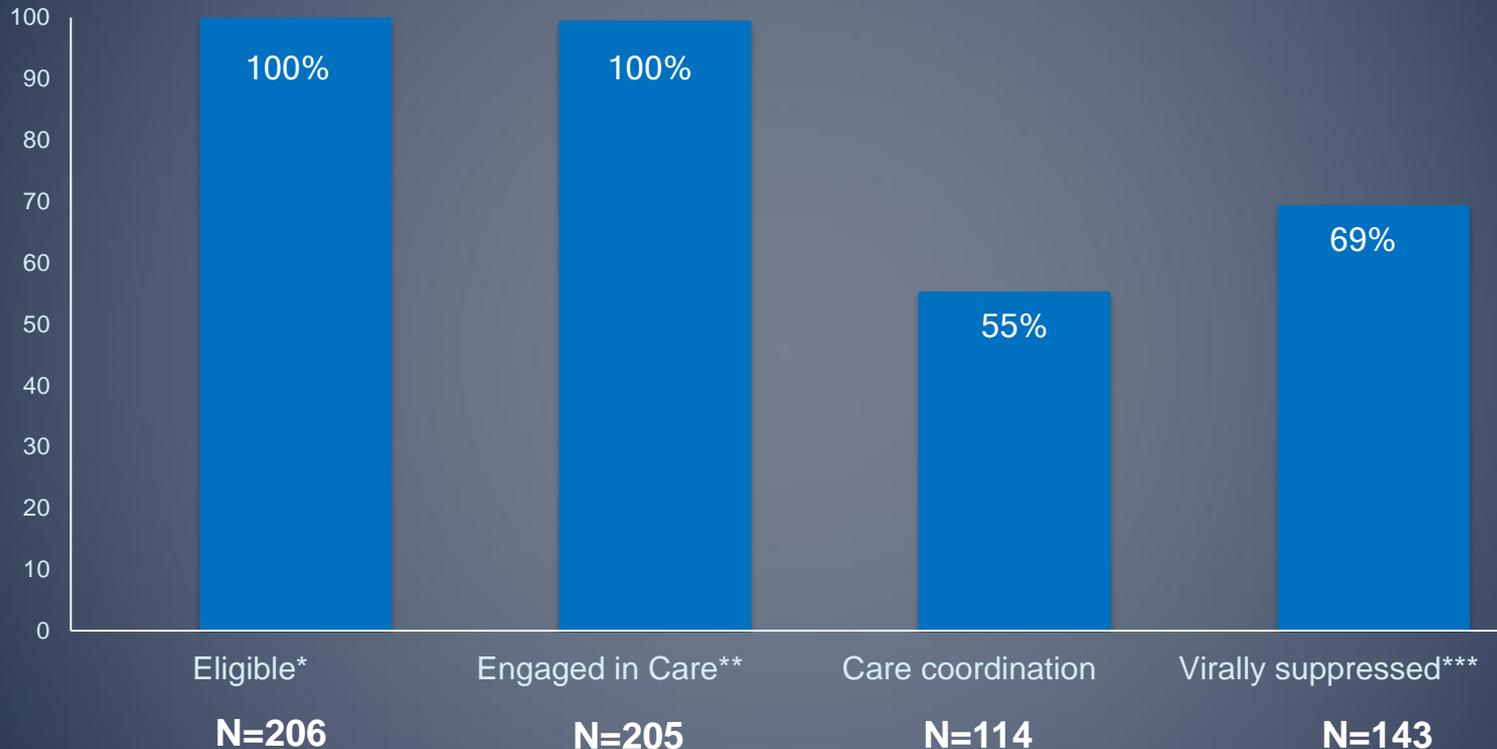
❑ Focused attention on local family practitioner, the jail, CMHC

❑ Increased capacity to provide

- HIV testing (jail, community, ED, other “touchpoints”)
- HIV care (Treat to Prevent)
- PrEP
- Medication-assisted therapy
 - Community discussions re: MAT
 - County jail naltrexone release program
 - Buprenorphine waiver training

Continuum of HIV care in Austin, Indiana

April 13, 2017



Total diagnosed=215 (confirmed).

*Persons were ineligible if deceased (n=6) or outside of the jurisdiction (n=3); estimates are based on the number of eligible persons (n=206);

** Patients engaged in care with at least one VL or CD4

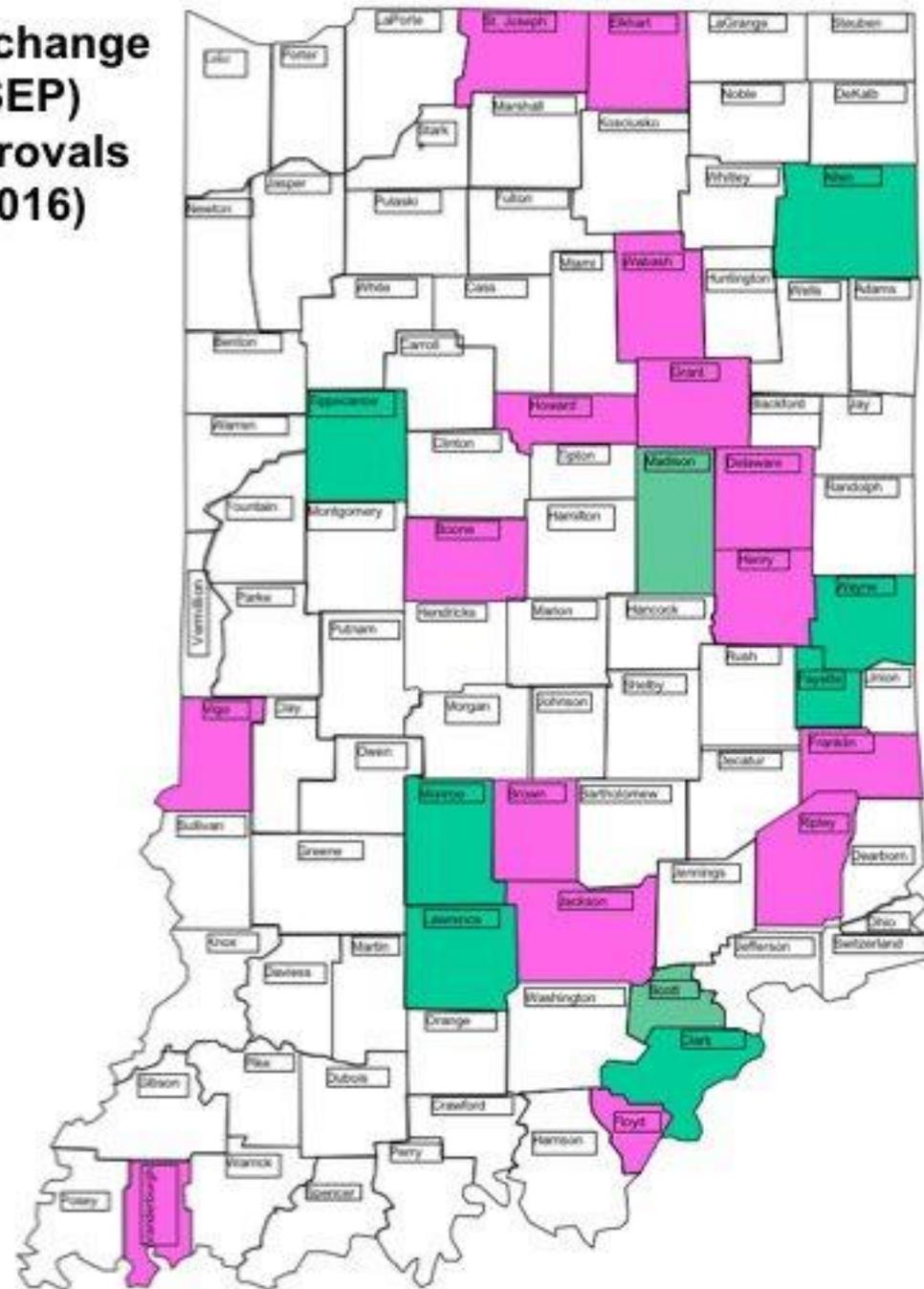
*** Percent virally suppressed increases to 70% when denominator changed to number engaged in care. Clinical services were initiated 3/31/15.

Foundations Family Medicine Mobile Testing Unit



Indiana Syringe Exchange Programming (SEP) Progress and Approvals (December 15, 2016)

- State Approved SEP**
- County Commission approves SEP**
- County health director declares Hepatitis C or HIV epidemic related to injection drug use**
- Community members working toward potential SEP**



Moving Forward

- Continued focus on EVIDENCE-BASED OPIOID PRESCRIBING for acute and chronic pain
- Increase opportunities for evidence-based age appropriate HIV AND SUBSTANCE ABUSE PREVENTION EDUCATION
- Improve ACCESS TO MEANINGFUL DATA, including
 - INSPECT
 - EMS registry
 - Coroner's reports

Moving Forward

- INCREASE TESTING opportunities for HIV and Hep C
 - field testing, EDs, jails, provider offices, health departments
- Increase ACCESS TO TREATMENT for Hep C, and HIV (ECHO)
- Improved access to treatment for SUD, including Medication Assisted Treatment (MAT), Counseling, Behavioral Therapy, and Recovery Support

Access to Treatment

"Well, I tried to get into Turning Point in 2013 and they told me it would take 6-8 weeks to get a bed, and they never called me back. I did their TB test, all that. I called. They never called me."

"That's why we've got to buy it off the street, because they won't give it [Suboxone] to us." (Danny, F2)

One thing you think would be helpful?

"We need somebody to offer like something, like Suboxone or Methadone. It might change their life. Give it a try." (Kay, F3)

"I'd like to see them bring a Methadone clinic this way. If they had a Methadone clinic, they probably wouldn't shoot up all the time. Right here in town, man, half of the people would be able to walk to it. They won't be doing needles. Me, for one, wouldn't. I'd go to the damn clinic if it was a few blocks away from me. You would probably see every bit of 60% drop of needle users here if you put a Methadone clinic in here." (Robert, F3)

"Probably help with the Suboxone and the Methadone." (Steven, F3)

"I was going to say more therapy, and a Suboxone clinic in our area." (Tom, F1)

Moving Forward

- Decrease the STIGMA of addiction and HIV so people will seek care
- Increase ACCESS TO NALOXONE
- LONG-TERM SOLUTIONS to improve public health infrastructure and socioeconomic disparities

Acknowledgements

- **Scott County Health Department**
- **Clark County Health Department**
- **Disease Intervention Specialists (EMAC states)**
- **Foundations Family Medicine**
- **Indiana University, Division of Infectious Diseases**
- **University of Louisville, Division of Infectious Diseases**
- **CDC**
 - **Division of STD Prevention**
 - **Division of HIV/AIDS Prevention (DHAP)**
 - **Division of Viral Hepatitis (DVH)**
 - **Epidemic Intelligence Service (EIS) Program Office**
- **Indiana Department of Mental Health and Addiction (DMHA)**
- **Indiana State Department of Health (ISDH)**

Addictions ... started out like magical pets, pocket monsters.
They did extraordinary tricks, showed you things you hadn't seen,
were fun.

But came, through some gradual dire alchemy,
to make decisions for you.

Eventually, they were making your most crucial life-decisions.
And they were ... less intelligent than goldfish.

WILLIAM GIBSON, *Zero History*

Joan Duwve, MD, MPH

317-278-0754

jduwve@iu.edu