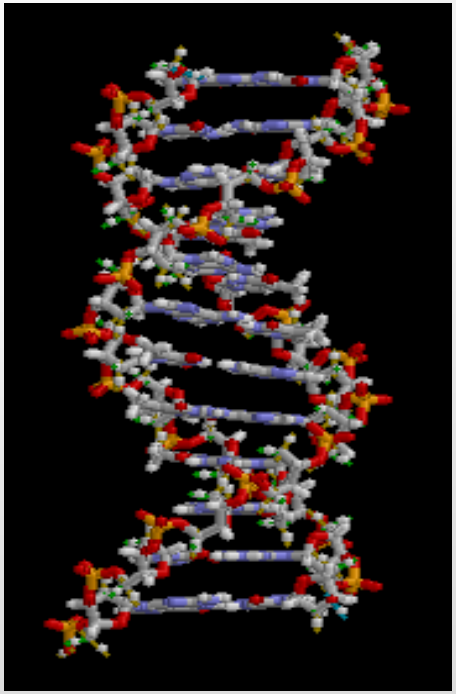
New Technologies in Laboratory Testing

- Angie Schooley, MT (ASCP)
- Laurel Vibber, MS



MDHHS
Michigan Department of Health & Human Services
Bureau of Laboratories

◦ Prevent Disease ◦ Promote Wellness ◦ Improve Quality of Life ◦

Learning objectives

- What do all the words mean?
- Identify new laboratory techniques and methods for detection of M. tuberculosis
- The advantages and disadvantages of new techniques as compared to more commonly used tests
- Timelines for testing and results

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What do all the words mean?

NAA

Amplification

MGIT

MTD

PCR

Pyrosequencing

Molecular

mutation

HPLC

MALDI-Tof

Gene Xpert

MDDR

NAAT

Genotyping

WGS

16 S Sequencing

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MTB Identification by molecular methods

- Next step after Smear Results
- Nucleic Acid Amplification Test (NAAT) - Test that amplifies the Genetic Material of an organism for identification.
- Amplify = make copies of a certain area of the nucleic acid using an enzyme.
- Polymerase Chain Reaction (PCR) – Used to detect target DNA in a sample or to amplify DNA for Sequencing.
- NAAT yields RAPID results!

MDHHS Michigan Department of Health & Human Services Bureau of Laboratories

MTD-Hologic and Gene Xpert-Cepheid are the only FDA approved methods

MTD

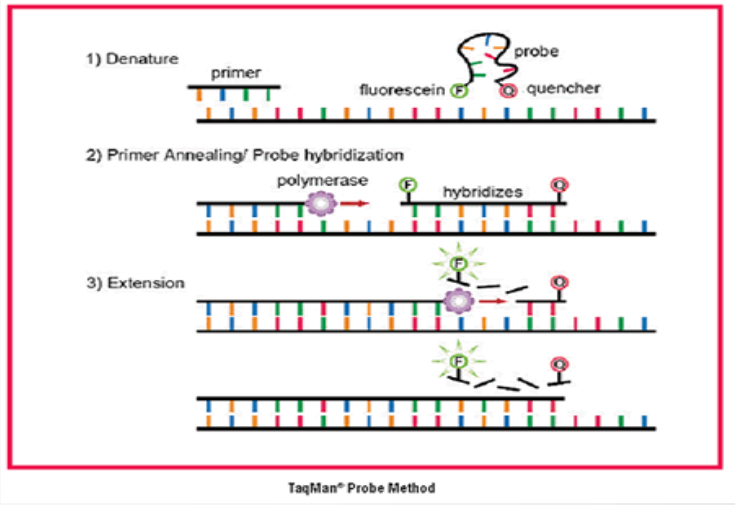
Mycobacterium tuberculosis Direct (MTD) Test
-Transcription Mediated Amplification
-Amplifies rRNA from decontaminated sediment (sputum, bronchial wash, tracheal aspirates)
-Detection method is a complimentary strand DNA probe specific to MTBC
-Bound probe gives off signal that is read in a luminometer
-3 hour hands on time, approximately $23/sample

Gene XPERT

-PCR based assay in a cartridge
-Amplifies DNA from sputum (FDA) samples
-Detection method is fluorescent probe bound to DNA
-Also detects Rifampicin resistance
-Less than one minute hands on time, results in 90 min
-cost could be up to $50/cartridge

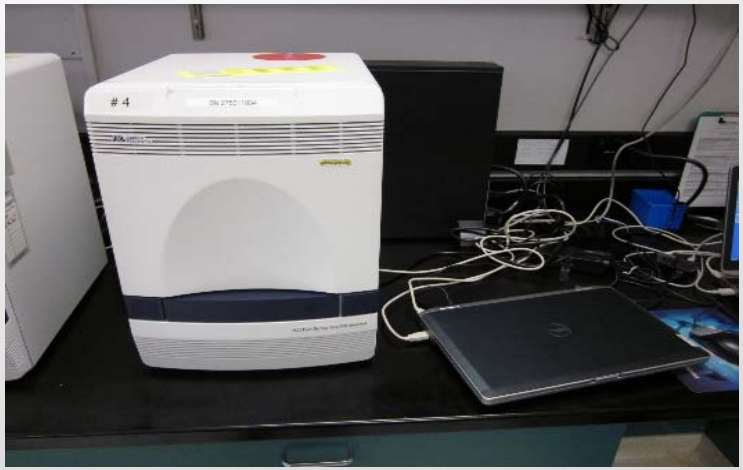
NAA tests are available that are not FDA approved, such as real time PCR assays

- Amplifies target DNA in real time
- Uses probes with fluorescent labels
- Each probe fluoresces at a different wavelength
- Multiplex Real-Time PCR - multiple probes and primes in one reaction tube
- Half an hour to 1 hour of hands on time, 1 hour on instrument.
- Approximately $7 /sample



TaqMan® Probe Method

MDHHS performs a real time lab developed PCR test to detect MTBC and MAC using the ABI 7500 Fast DX


ABI 7500 Fast DX

Limitations of NAAT

- NAA tests that are used to for identification of MTBC are usually only validated for respiratory specimens
- Cannot differentiate among members of MTBC
- NAAT results may be affected by specimen processing conditions/storage or shipping conditions
- Inhibitors may be present that affect amplification.
- A positive result does not indicate active disease.
- A negative test does not exclude the possibility of culturing MTBC

Molecular Detection of TB Drug Resistance (MDDR)

- Testing performed by CDC
- Rapid testing for DNA sequences associated with 1st and 2nd line drug resistance
- NAAT (+) sputum sediment or growth based culture isolates
- 3-4 day turn-around-time
- Only requested by state health lab
- Submission criteria :
  - Known Rifampin resistance
  - Known MDR
  - High risk of Rifampin resistance or MDR-TB (e.g. previous TB, MDR-TB contact, foreign born)
  - High profile patient (e.g. daycare worker, nurse)
  - Mixed or non-viable culture
  - Adverse reaction (e.g. RIF allergy)

CDC MDDR

Mutations that CDC testing detects

- **First-line** MDDR to detect MDR-TB-Pyrosequencing
- *rpoB* (Rifampin)
- *inhA* and *katG* (Isoniazid)
- **Second-line** MDDR to detect XDR-TB-Sanger sequencing
- *gyrA* (Fluoroquinolones)
- *rrs* (Kanamycin, Amikacin, Capreomycin)
- *eis* (Kanamycin)
- *tlyA* (Capreomycin)
- *pncA* (Pyrazinamide)
- *embB*(Ethambutol)

What do the results mean

When a mutation is DETECTED, the report will read:

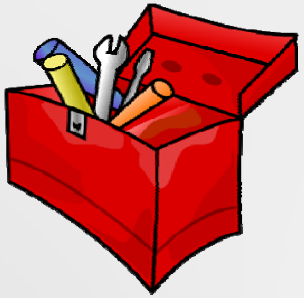
rpoB-Mutation Rifampin resistant (100% of our in house evaluation of 550 clinical isolates with this mutation are rifampin resistant)

When a mutation is NOT DETECTED, the report will read:

rpoB-No Mutation Probably rifampin susceptible (97% of our rifampin resistant isolates in our in-house evaluation of 550 clinical isolates have a mutation at this locus)

A negative result (e.g., No Mutation) **DOES NOT RULE OUT** out contributory mutations present elsewhere in the genome

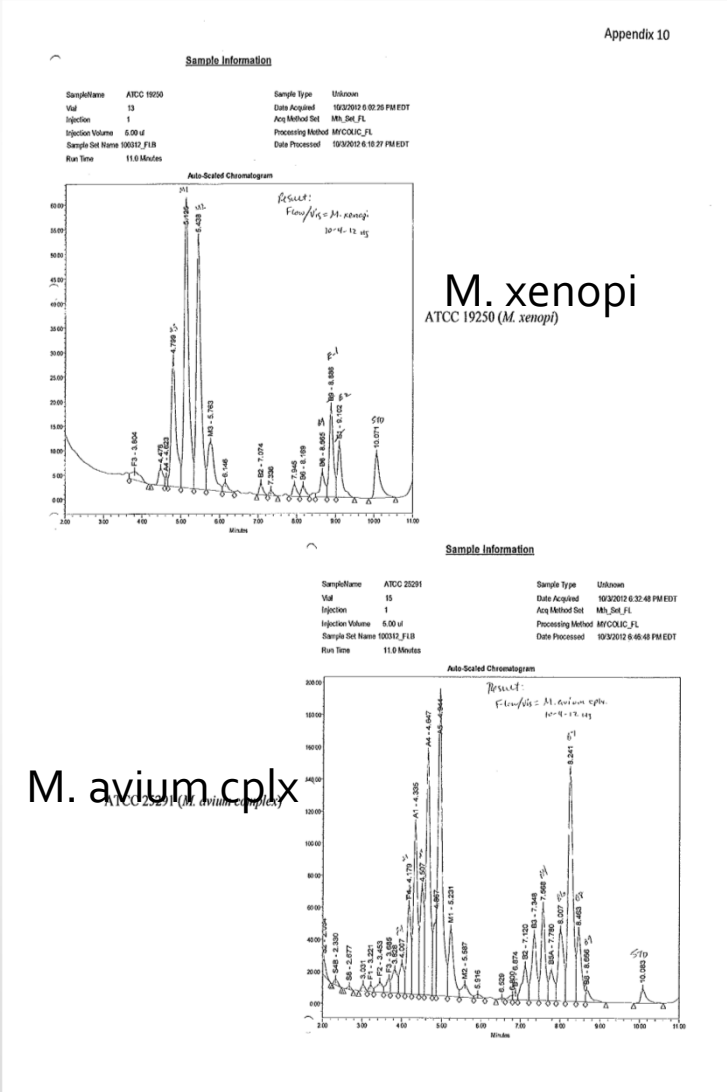
Mycobacterium identification by culture based methods (Which tools to use)



- HPLC-high performance liquid chromatography
- Maldi-Tof-Matrix-assisted laser desorption/ionisation Time of Flight
- Accuprobe-M. tb cplx., M.avium cplx., M. kansasii, M. gordonae
- Conventional biochemical testing

HPLC

HPLC-High Performance Liquid Chromatography
Mycobacteria contain mycolic acids
These mycolic acids are extracted and produce a profile by (HPLC)The profiles are identified by an HPLC library
Run time per specimen is about 15 minutes



Maldi-Tof

Matrix-Assisted Laser Desorption/Ionization Time of Flight

Extract and Analyze intrinsic proteins by mass spec.

Spectral pattern of protein expression is compared with reference patterns in a database

Run time on the instrument is a minute

Analyte20

BRUKER

Analyte Name:	Ext Ctrl B
Analyte Description:	D:\data\MaldiBiotyperRealTimeClassification\160331-1120-100006248\Ext Ctrl B\0_A4\1\1SLin
Analyte ID:	2c1e06c7-a987-4e81-92f6-cdee44737e61
Analyte Creation Date/Time:	3/31/2016 4:03:03 PM
Applied MSP Library(ies):	
Applied Taxonomy Tree:	Bruker Taxonomy

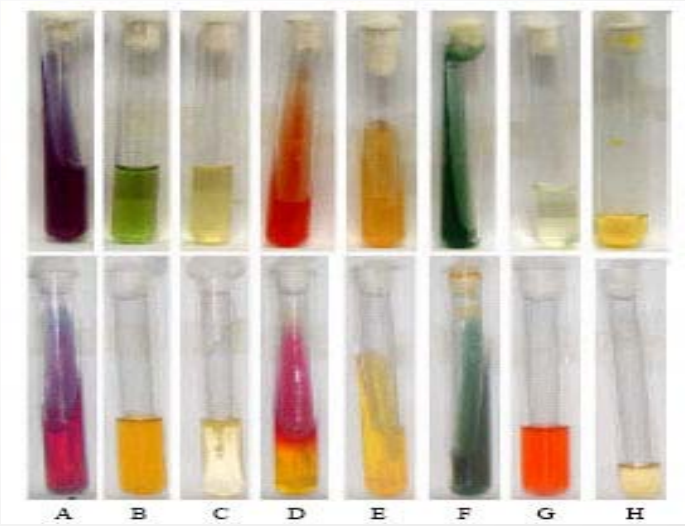
Rank (Quality)	Matched Pattern	Score Value	NCBI Identifier
1 (++)	Mycobacterium avium 08 TWF	2.281	1764
2 (++)	Mycobacterium avium [ssp hominissuis] 142_10 HLG b	2.203	127778581
3 (++)	Mycobacterium avium [ssp hominissuis] 276_04 FZB b M	2.174	127778581
4 (++)	Mycobacterium avium 12029441 MVD b	2.094	127778581
5 (++)	Mycobacterium avium [ssp hominissuis] 7881_10 FZB b	2.02	127778581
6 (++)	Mycobacterium avium ssp avium CCUG 28067 CCUG b	2.02	127778581
7 (++)	Mycobacterium avium ssp avium 212_11 FZB b	2.012	127778581
8 (++)	Mycobacterium avium [ssp hominissuis] 1840_09 FZB b	2.001	127778581
9 (+)	Mycobacterium avium 22_027242 MML b	1.976	127778581
10 (+)	Mycobacterium avium NO1578 LIG b	1.975	127778581

Accuprobe and Biochemical Tests

Accuprobe

M. *tuberculosis* complex
M. *avium* complex
M. *kansasii*
M. *gordonae*
Solid or broth cultures, results in about 2 hours

Biochemicals



Biochemicals are used for identification confirmation when the identification by other methods failed to produce a clear result

Primary TB Antibiotics

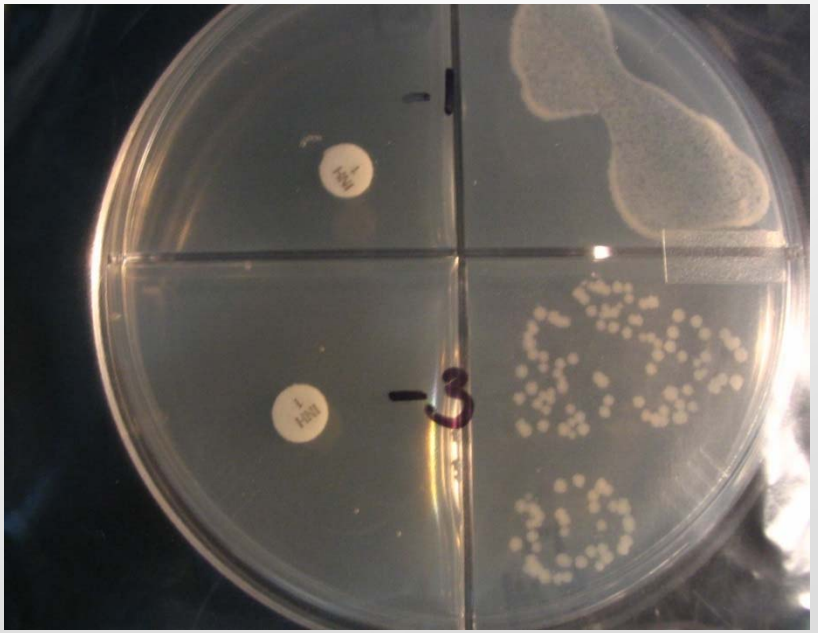
Most results are available within 7-14 days of *M. tuberculosis* complex Identification

- Isoniazid
- Rifampin
- Ethambutol
- Pyrazinamide

Secondary Antibiotics

Results available about 3 weeks after resistance is detected

- Fluoroquinolone (ciprofloxacin, ofloxacin, levofloxacin or moxifloxacin)
- Ethionamide
- Cycloserine
- Capreomycin
- Amikacin
- Kanamycin
- Streptomycin
- PAS



TB DNA Genotyping Universally Offered by CDC

Genotyping provides a fingerprint of each isolate

Michigan performs MIRU-VNTR testing within 2 days , CDC performs the Spoligo testing:

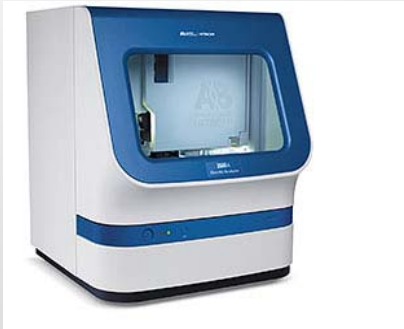
Spoligo-000000000003771 / MIRU-223325173533 / 445644423328

State Cluster: MI_0016 State Cluster Name2: MI_0016_003

GENType: G00012 Genotyping Lineage: East Asian (L2)

Used with traditional investigations, genotyping has

- Identified outbreaks not previously recognized
- Confirmed/detected transmission
- Identified risk factors for recent infection
- Demonstrated re-infection with different strains
- Documented lab cross-contamination



Used alone, Molecular testing and culture growth based testing are imperfect, used together, the accuracy and speed of detection of *Mycobacterium tuberculosis* and drug resistance is greatly improved

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3HP

MICHIGAN WORLD TB DAY CONFERENCE APRIL 8, 2016

DANA G KISSNER, MD

MEDICAL DIRECTOR WSUPG TB PROGRAM

TB CONSULTANT WASHTENAW COUNTY

WHAT IS 3HP?

- **12 weekly doses of INH & Rifapentine (RPT) given by directly observed therapy to prevent TB in individuals with latent *Mycobacterium tuberculosis* infection**
- **For a person ≥ 50 kg. dose is 900 mg. INH & 900 mg. RPT**
- **3 300 mg. INH tablets per dose – 36 total tablets**
- **6 150 mg. RPT tablets per dose – 72 total tablets**

Sterling TR, et al. N Engl J Med 2011
(PREVENT TB Trial
1 of 3 studies done then

3HP

3 per dose / 36 total*

6 per dose / 72 total*

*For person ≥ 50 kg.

PREVENT TB TRIAL

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 DECEMBER 8, 2011 VOL. 365 NO. 23

Three Months of Rifapentine and Isoniazid for Latent Tuberculosis Infection

Timothy R. Sterling, M.D., M. Elsa Villarino, M.D., M.P.H., Andrey S. Borisov, M.D., M.P.H., Nong Shang, Ph.D., Fred Gordin, M.D., Erin Bliven-Sizemore, M.P.H., Judith Hackman, R.N., Carol Dukes Hamilton, M.D., Dick Menzies, M.D., Amy Kerrigan, R.N., M.S.N., Stephen E. Weis, D.O., Marc Weiner, M.D., Diane Wing, R.N., Marcus B. Conde, M.D., Lorna Bozeman, M.S., C. Robert Horsburgh, Jr., M.D., Richard E. Chaisson, M.D., for the TB Trials Consortium PREVENT TB Study Team*

PREVENT TB TRIAL

- **Done in Brazil, Canada, Spain, USA**
- **Open label, randomized, prospective**
- **Subjects with high risk of progression from latent *M TB* infection to TB**
- **Enrollment June 2001-February 2008**
  - Followed for 33 months after enrollment
- **Compared 3 HP by DOT to 9 months of INH self supervised**
- **Subjects ≥ 2 years old; 7,731 individuals included in analysis**
  - 161 HIV infected, not on antiretroviral therapy (ART)
- **Was designed as noninferiority trial**
  - Outcome variable TB
  - Was 3HP at least as good as 9 months INH?

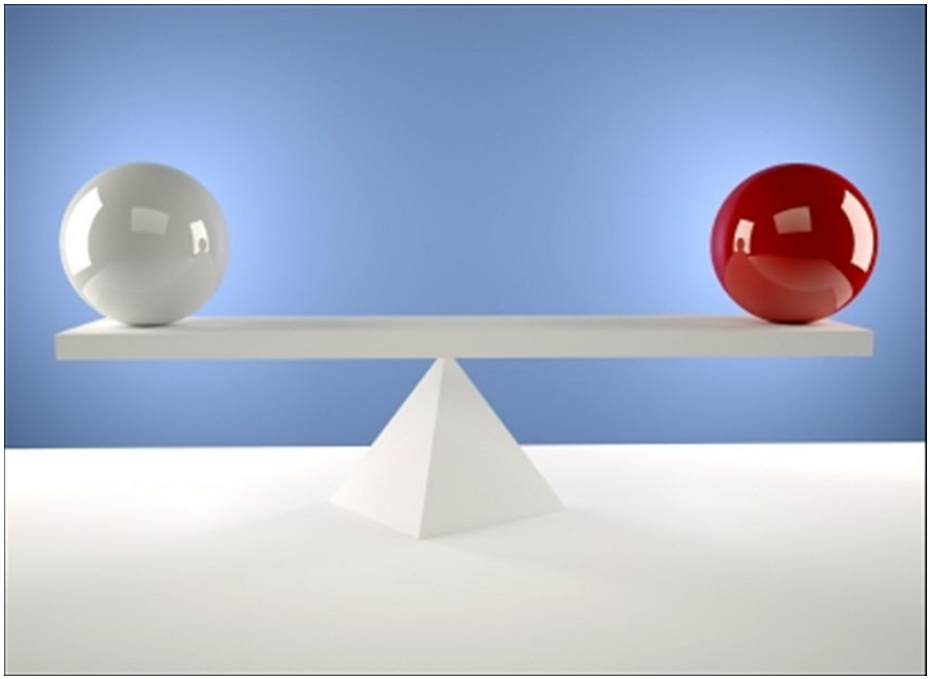
OUTCOME 3HP VS INH

*Permanent discontinuation
** No deaths attributable to study drugs

OUTCOME	3HP	INH	Hazard Ratio / P value
Tuberculosis	7	15	HR 0.38, CI=.15-.99 (adjusted for TB risk factors)
Completion of Regimen	82%	69%	P<0.01
Discontinuation*	18%	31%	P<0.01
Grade 3, 4 adverse effects	1.6%	3.0%	P<0.01
Discontinuation* for adverse effects	4.9%	3.7%	P<0.01
Discontinuation* for possible hypersensitivity	2.9% 6/152 had hypotension	0.4%	P<0.01
Discontinuation* for hepatotoxicity	0.3%	2.0%	P<0.01

WHAT DID PREVENT TB FIND?

- **3HP was noninferior to 9 months self-supervised INH for end point of cases of TB**
- **3HP had a higher completion rate (tolerability)**



CDC RECOMMENDATIONS FOR 3HP*

- **“Healthy” individuals ≥ 12 years old with LTBI**
  - Insufficient data from PREVENT TB & 2 other studies for diseases like diabetes, younger children
  - HIV ok unless on ART
- **3HP NOT recommended for**
  - Children <2 years old because safety & pharmacology of Rifapentine not established
  - HIV-infected individuals on ART because pharmacology unclear and potential drug drug interactions

* Recommendations for 3 HP MMWR Dec 9, 2011

ADD ON TRIALS YOUNG CHILDREN, HIV

- **More pharmacologic data on Rifapentine in children <12 years old became available in 2005**
- **Add-on trial took place after February 16, 2008 for young children & those infected with HIV**
  - Enrollment through December, 2010
  - Follow-up to September, 2013
- **Hong Kong additional site for children**
- **Hong Kong and Peru additional sites for HIV**

RECENT UPDATES CHILDREN ≥ 2 YEARS OLD

- **2005 – data on pharmacokinetics of Rifapentine in children aged 2-11 became known**
  - Enrollment in PREVENT TB was modified to include children
- **This study reported on all children aged 2-17 years enrolled in PREVENT TB & add-on trial– nested cohort**
  - 1,058 participants enrolled June 2001 – December 2010 with follow-up to September, 2013
  - 905 analyzed for efficacy, 1032 for safety

Villarino ME, et al. JAMA Pediatr 2015*

OUTCOME 3HP VS INH IN CHILDREN 2-17 YEARS OLD

OUTCOME	3HP	INH	Hazard Ratio / P value
Tuberculosis	0	3	
Completion of Regimen	88%	80.9%	P=0.003
Grade 3 adverse effects	3 subjects	1 subject	
Discontinuation* for adverse effects	4.9%	3.7%	P<0.01
Grade 4 adverse effect or death	0	0	
Hepatotoxicity	0	0	

RECENT UPDATES HIV-COINFECTED INDIVIDUALS

- **399 HIV-infected individuals with + TB skin tests or who were close contacts of case were analyzed**
- **Median CD4+ ~ 500 cells/mm3**
- **Enrollment required subjects to not start ART within 90 days of enrollment**
  - => Slow enrollment and study ended early
  - Underpowered

Sterling TR, et al. AIDS March, 2016

HIV

Among HIV-infected persons with median CD4+ count of approximately 500 cells/mm3, 3HP was as effective and safe for treatment of latent *M. tuberculosis* infection as 9H, and better tolerated.

RECENT UPDATES HIV

*Permanent discontinuation

OUTCOME	3HP	INH	Hazard Ratio / P value
Tuberculosis Modified Intention to Treat analysis	2 of 206	6 of 193	
Completion of Regimen	89%	64%	P<0.001
Discontinuation* for adverse effects	3.0%	4.0%	NS
Flu-like systemic drug reaction	1.0%	0%	NS
Discontinuation* for hepatotoxicity	1.0%	4.0%	P=0.05

UPDATE: DRUG INTERACTIONS RIFAPENTINE / ART

- Rifapentine, given either once-weekly or daily, has minimal interaction with daily **efavirenz**
- Rifapentine given once-weekly may be given with the integrase strand transfer inhibitor **raltegravir**

REFERENCES FOR INTERACTIONS BETWEEN RIFAPENTINE & ART

15. Farenc C, Doroumian S, Cantalloube C, Perrin L, Esposito V, Cieren-Puiseux I*, et al.* Rifapentine once-weekly dosing effect on efavirenz, emtricitibine and tenofovir PKs. *Conference on Retroviruses and Opportunistic Infections* 2014; **Boston, MA**:Abstract 493.

16. Podany AT, Bao Y, Swindells S, Chaisson RE, Andersen JW, Mwelase T*, et al.* Efavirenz Pharmacokinetics and Pharmacodynamics in HIV-Infected Persons Receiving Rifapentine and Isoniazid for Tuberculosis Prevention. *Clin Infect Dis* 2015; **61(8)**:1322-1327.

17. Weiner M, Egelund EF, Engle M, Kiser M, Prihoda TJ, Gelfond JA*, et al.* Pharmacokinetic interaction of rifapentine and raltegravir in healthy volunteers. *J Antimicrob Chemother* 2014; **69(4)**:1079-1085.

NEW CONCLUSIONS

- **3HP can be safe and effective for children ages 2-17**
- **3HP can be safe and effective for HIV-coinfected individuals with hig CD4+ counts (~ 500 cells/mm3)**
- **We may be moving to being able to use 3HP for HIV-coinfected individuals taking efavirenz or raltegravir**
- **Studies are still needed for effectiveness with efavirenz & raltegravir and HIV-coinfected individuals with lower CD4+ counts**
- **3HP is better tolerated (completion rate is higher) and has less hepatotoxicity in children 2-17 years old and HIV-coinfected individuals not on ART and with good CD4+ counts**

WSUPG TB PROGRAM 3HP DATA 2014, 2015

Program started in mid-2013

53 patients began 3HP in2014

- 44 (83.02%) completed treatment
- 21 (25%) had DOT at home, remainder came to clinic

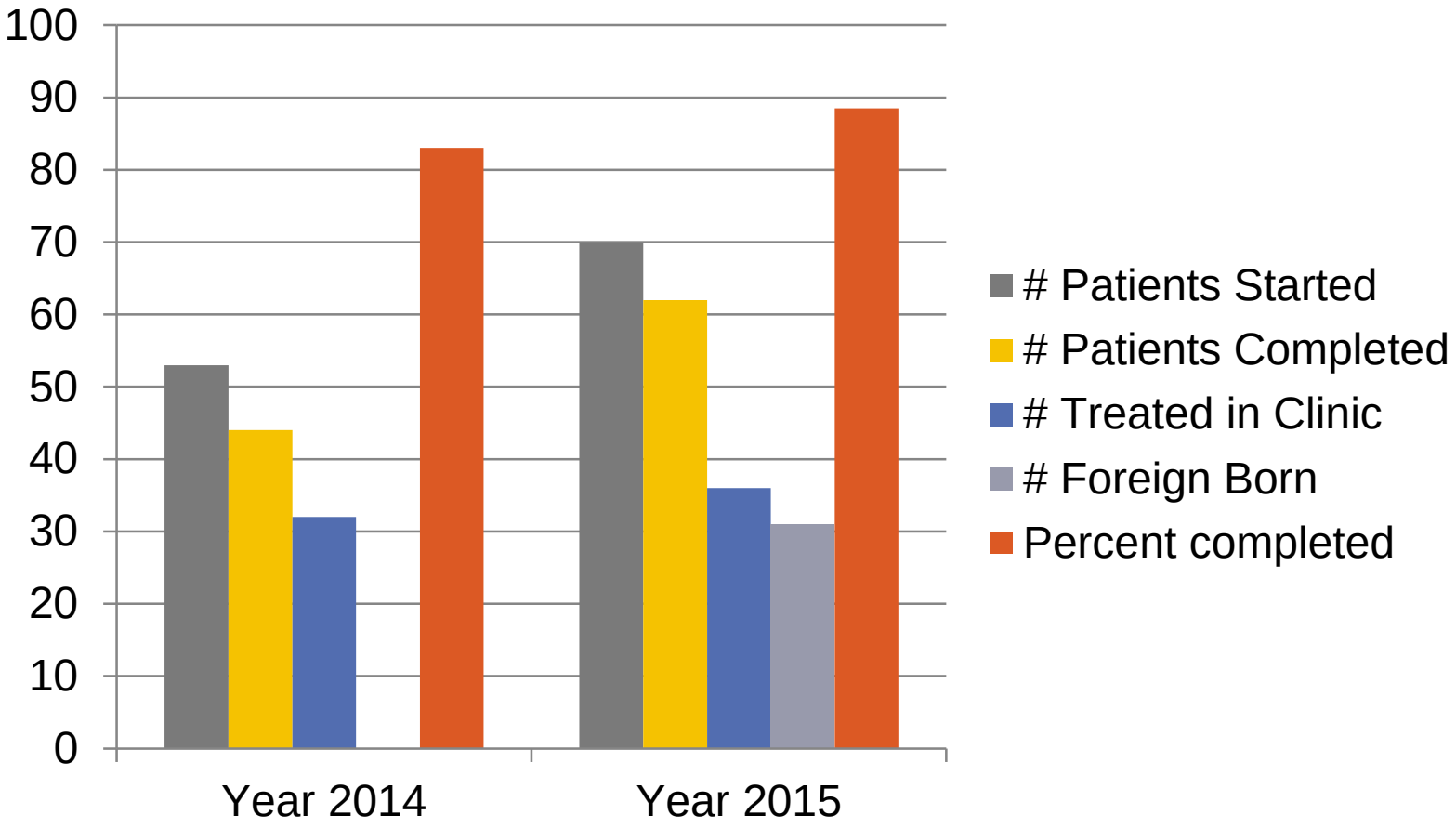
70 patients began 3HP in 2015

- 62 (89.5%) completed treatment
- 36 (51%) had DOT at home, remainder came to clinic

Barriers

- Biggest barrier – lack of access to Rifapentine
  - Manufacturing halted, pharmacy didn't supply it
- Cost is an issue – sometimes can use patient insurance
- More complicated than simply writing prescription

WSUPG TB GROUP
3HP EXPERIENCE 2014 & 2015



PRACTICAL ISSUES WITH 3HP

- **Skipped doses**
  - PREVENT TB definition of completion
    - At least 11 or 12 doses within 16 weeks
    - Doses separated by >72 hours to be counted
    - For children 2-17 at least 11 doses om 10-16 weeks
- **Start – Up**
  - Calendar to record doses, side effects
  - Plan for handling adverse effects
  - Packaging / handling of doses
- **Monitoring**
  - Labs for use only for symptoms, unusual patient issues
  - Careful patient education, symptom monitoring
- **Have a complete medication list**
  - Drug drug interactions a major problem (Rifapentine)

REASONS FOR STOPPING 3HP IN 2015

- **1 developed other serious illness => gap in Rx.**
  - Immunosuppression
  - Restarting Rx
- **1 was found dead at home, likely unrelated**
- **1 stopped, later took Rifampin for 4 months**
- **1 arrested, lost to follow-up**
- **2 lost to follow-up after leaving drug rehab program**
- **2 side effects (1 vague, 1 ongoing nausea)**

- **No hypersensitivity reactions;**
  1 in 2014 severe hives, likely due to INH

Tuberculosis and Diabetes Connections

Michigan World TB Day Conference

April 8, 2016

R. Brostrom, MD-MSPH
Hawaii TB Control Branch Chief
Regional TB Field Medical Officer, CDC-DTBE
CDR USPHS

TB-DM Connections

1) TB-DM Epidemiology
2) Screening for DM in TB Cases
3) Screening for TB in DM Cases
4) Enhanced TB case management
5) Michigan approach?
6) Big Finish!

Global Burden of DM and TB

Diabetes Mellitus: 2013

- **383 million people living with DM**
- **10 million new cases per annum**
- **~5 million people died of DM during the year**

[IDF Diabetes Atlas 2013]

Tuberculosis: 2013

- **11.0 million people living with TB**
- **9.0 million new cases in the year**
- **1.5 million people died of TB during the year**

[WHO- Global TB Control 2014]

From: Prof Tony Harries

Global Distribution of DM and TB

Diabetes Mellitus: 2013

- South East Asia 19%
- Western Pacific 36%
- Africa 4%

80% in LIC and MIC

[IDF Diabetes Atlas 2013]

Tuberculosis: 2013

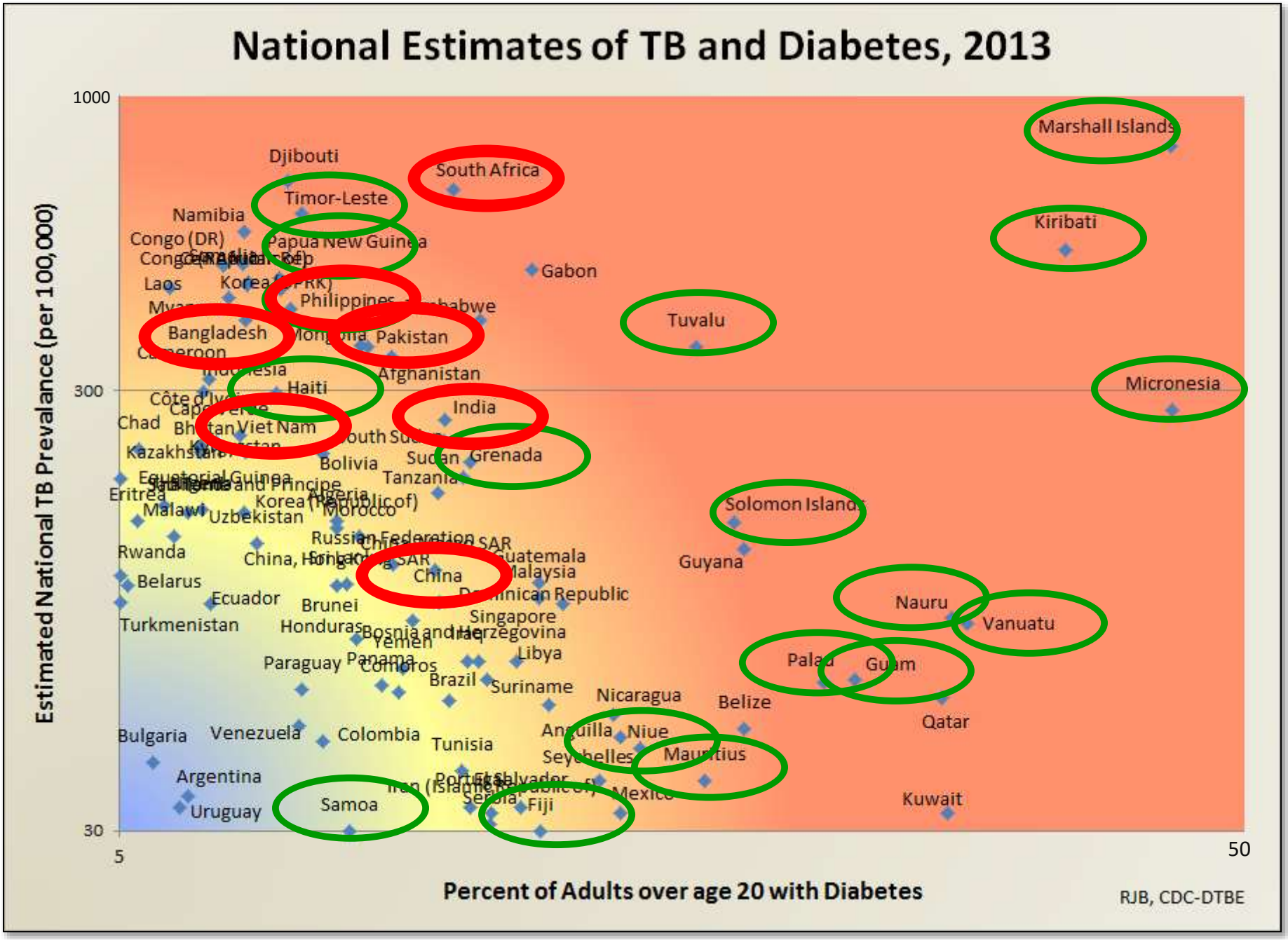
- South East Asia 38%
- Western Pacific 18%
- Africa 29%

95% in LIC and MIC

[WHO- Global TB Control 2014]

From: Prof Tony Harries

National Estimates of TB and Diabetes, 2013



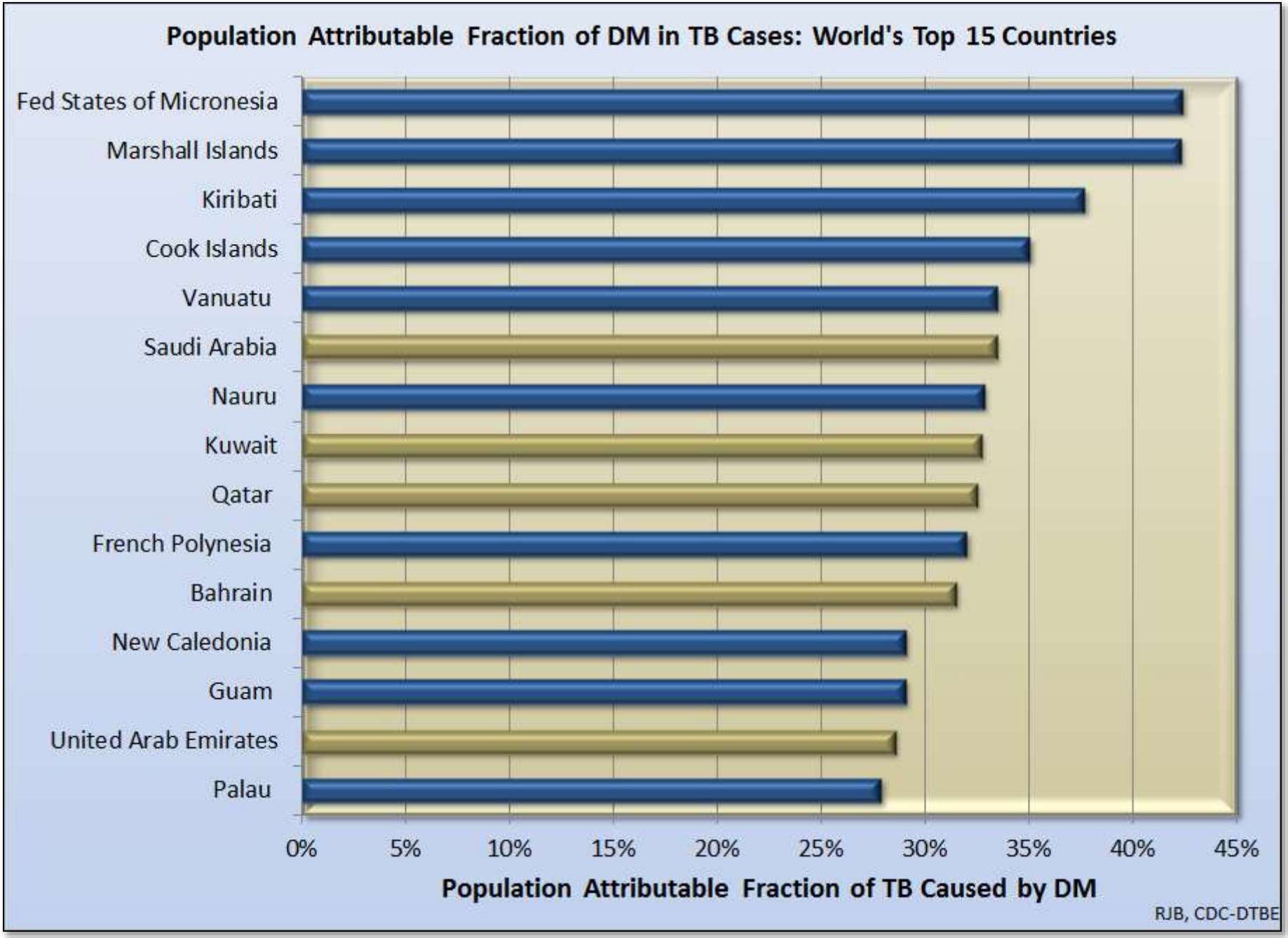

Population Attributable Fraction of DM in TB Cases: World's Top 15 Countries
Fed States of Micronesia
Marshall Islands
Kiribati
Cook Islands
Vanuatu
Saudi Arabia
Nauru
Kuwait
Qatar
French Polynesia
Bahrain
New Caledonia
Guam
United Arab Emirates
Palau
0%
5%
10%
15%
20%
25%
30%
35%
40%
45%
Population Attributable Fraction of TB Caused by DM
RJB, CDC-DTBE

Table 2.3 Undiagnosed diabetes (20-79 years) by IDF Region and income group, 2013

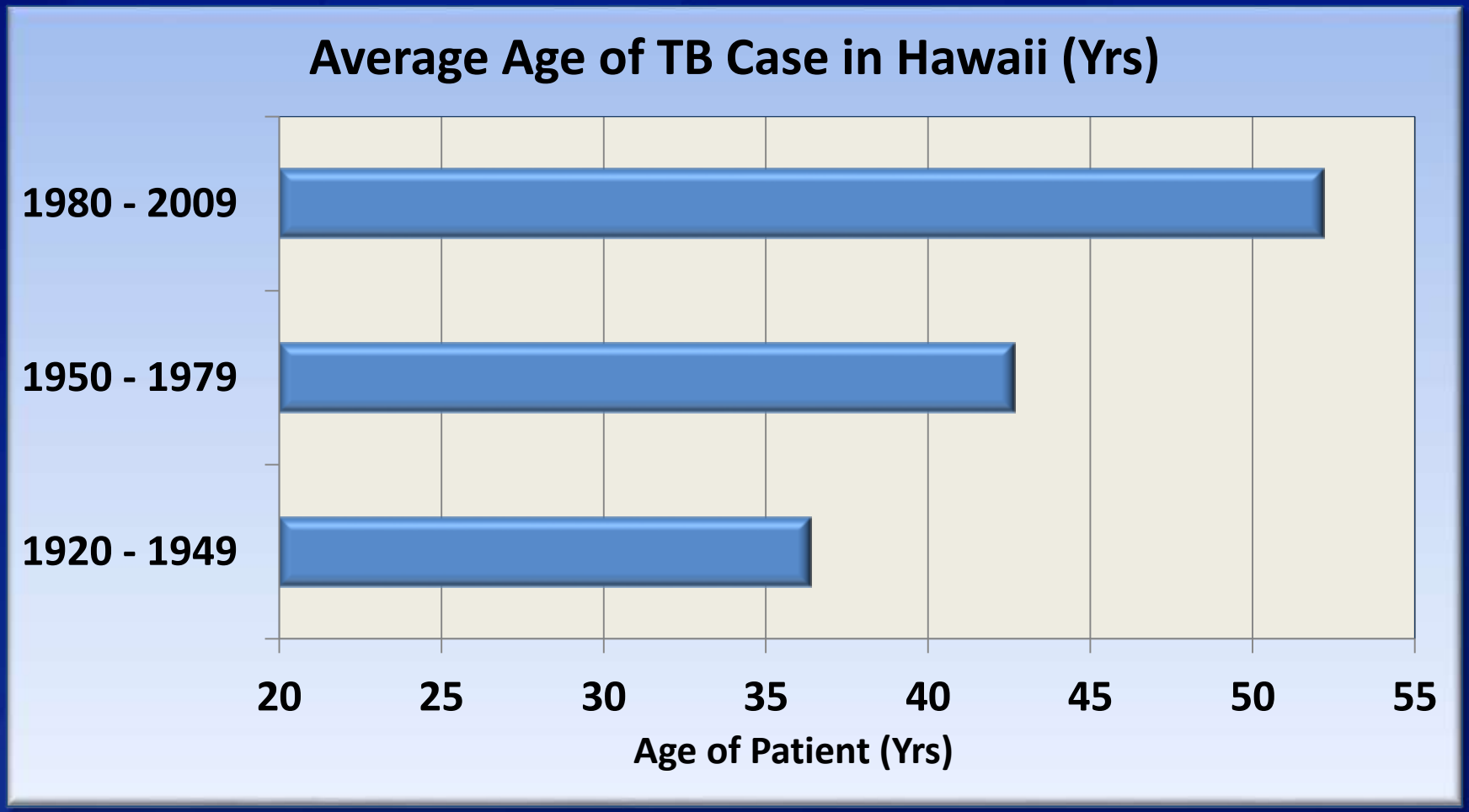
IDF REGION	PROPORTION UNDIAGNOSED %	CASES MILLIONS
Africa		12.4
Low-income countries	75.1	
Middle-income countries	46.0	
Europe		20.1
Low-income countries	29.3	
Middle-income countries	35.1	
North America and Caribbean		
Low-income countries		29.4
Middle-income countries		25.0
High-income countries		27.7
Middle-income countries	25.0	
High-income countries	27.7	
South and Central America		5.8
Middle-income countries	24.1	
South-East Asia		35.1
Low-income countries	43.6	
Middle-income countries	49.1	
Western Pacific		74.7
Low-income countries	63.0	
Middle-income countries	54.1	
High-income countries	49.4	

TUBERCULOSIS Control Program

TB-DM Connections

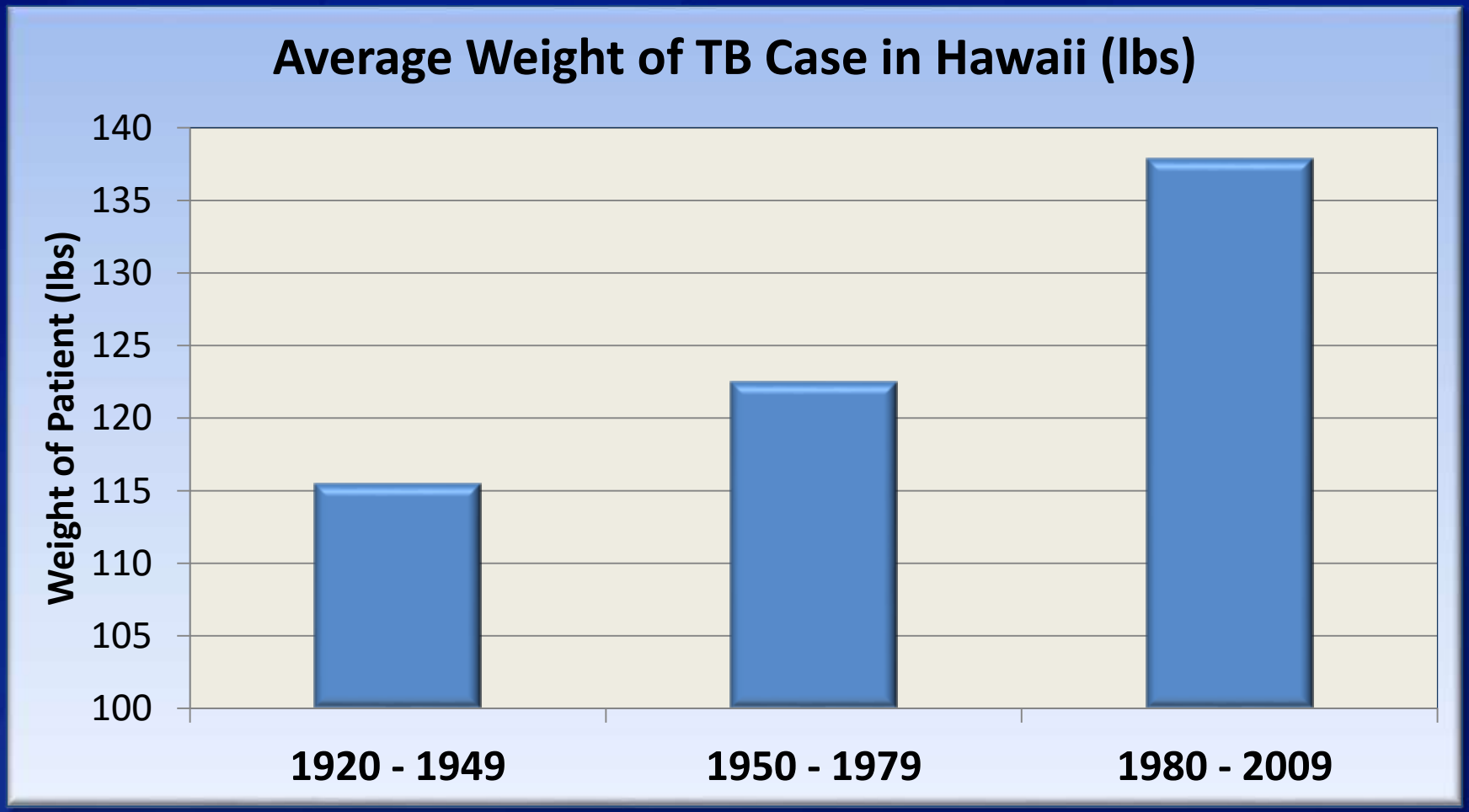
1) TB-DM Epidemiology
2) Screening for DM in TB Cases
3) Screening for TB in DM Cases
4) Enhanced TB case management
5) Michigan approach?
6) Big Finish!

Oh, the good old days……



*Hawaii Case Reports for 1920 – 2014 N=211

Oh, the good old days……



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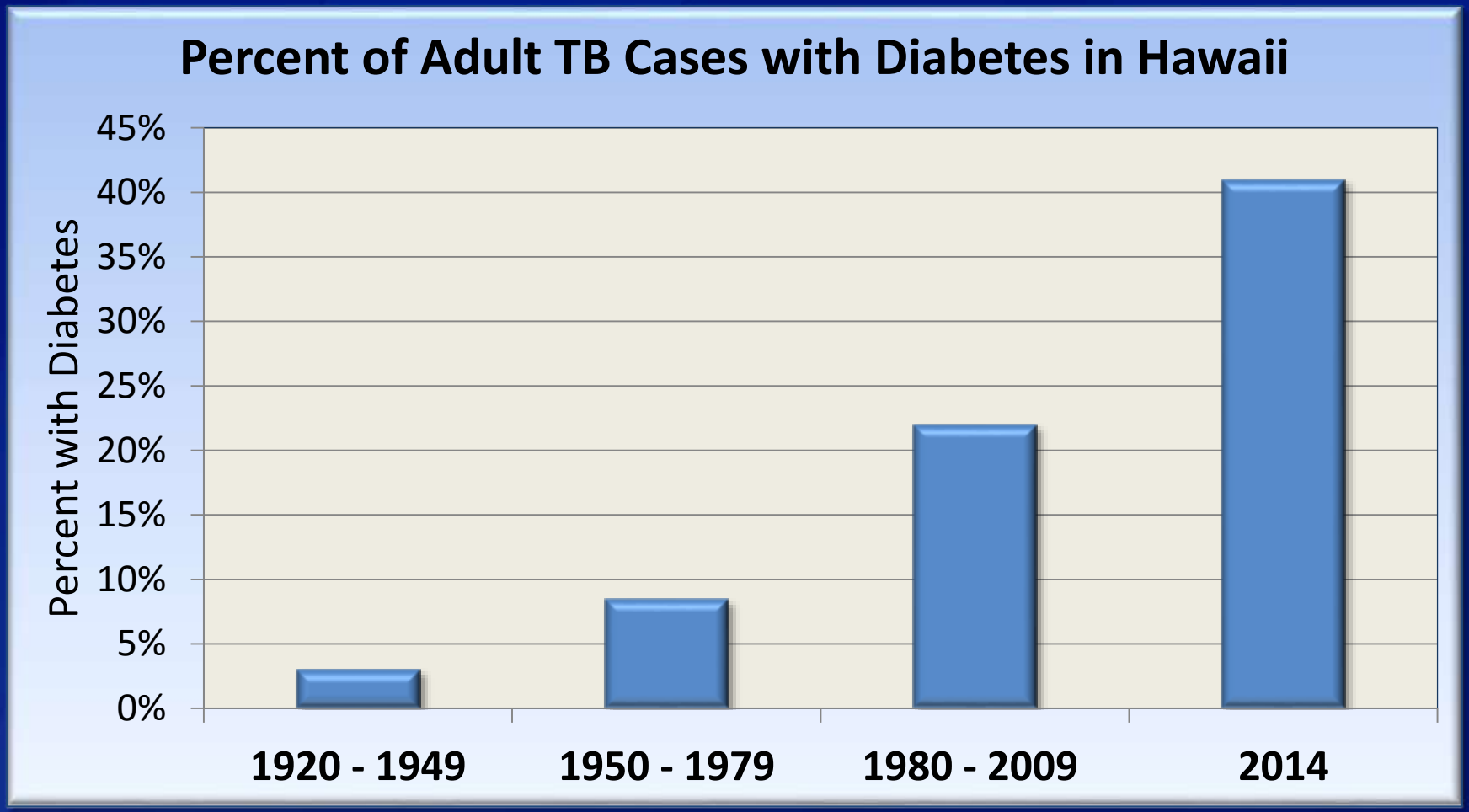
Oh, the good old days……



*Hawaii Case Reports for 1920 – 2014 N=211

EpiAnywhere Data Entry Page

DM: Prior History of Diabetes Before TB Diagnosis?

DM Testing at TB Diagnosis?

Test Date: _/_/__

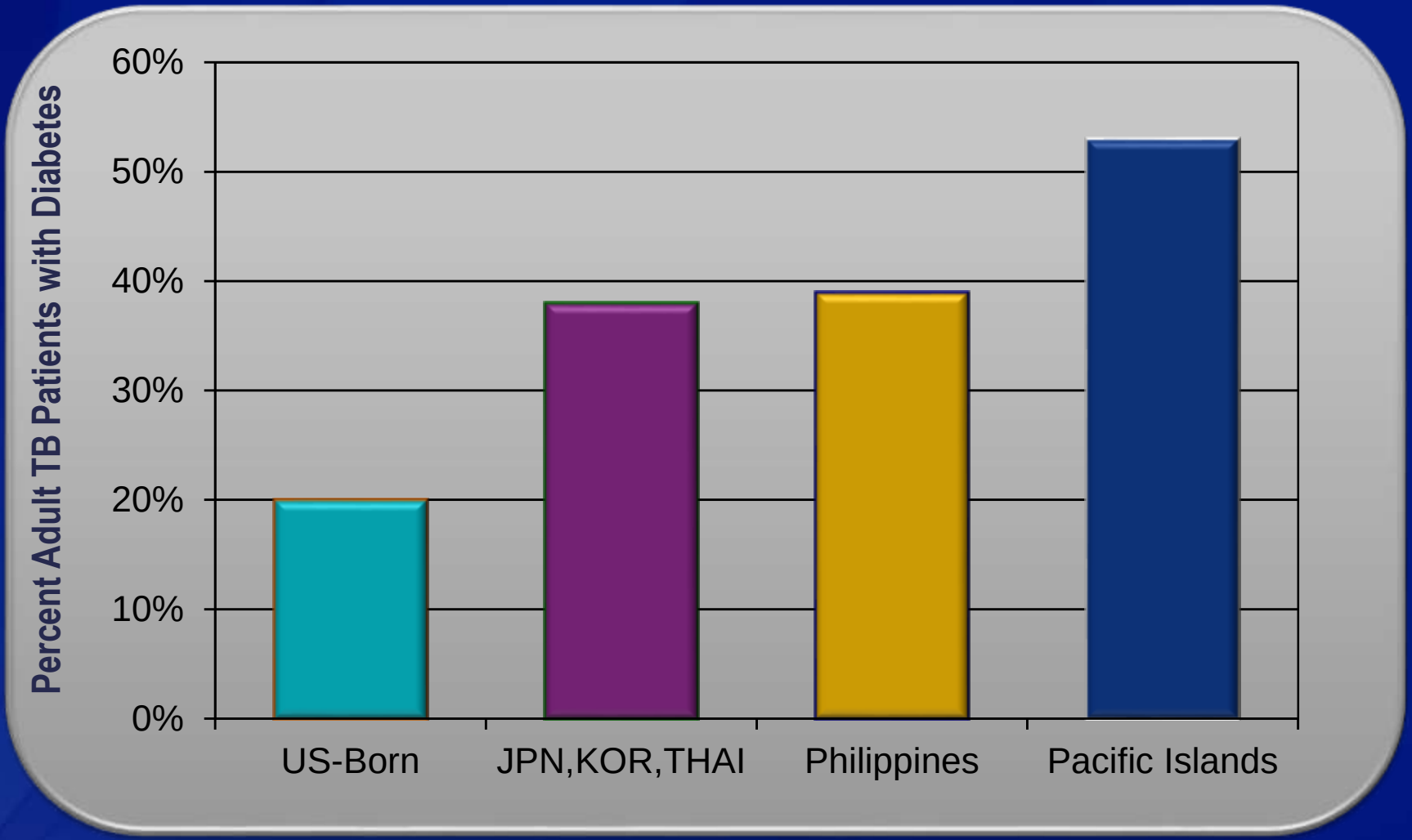
DM Test Type:

DM Test Result: ___.__

Hawaii Adult TB cases with Diabetes

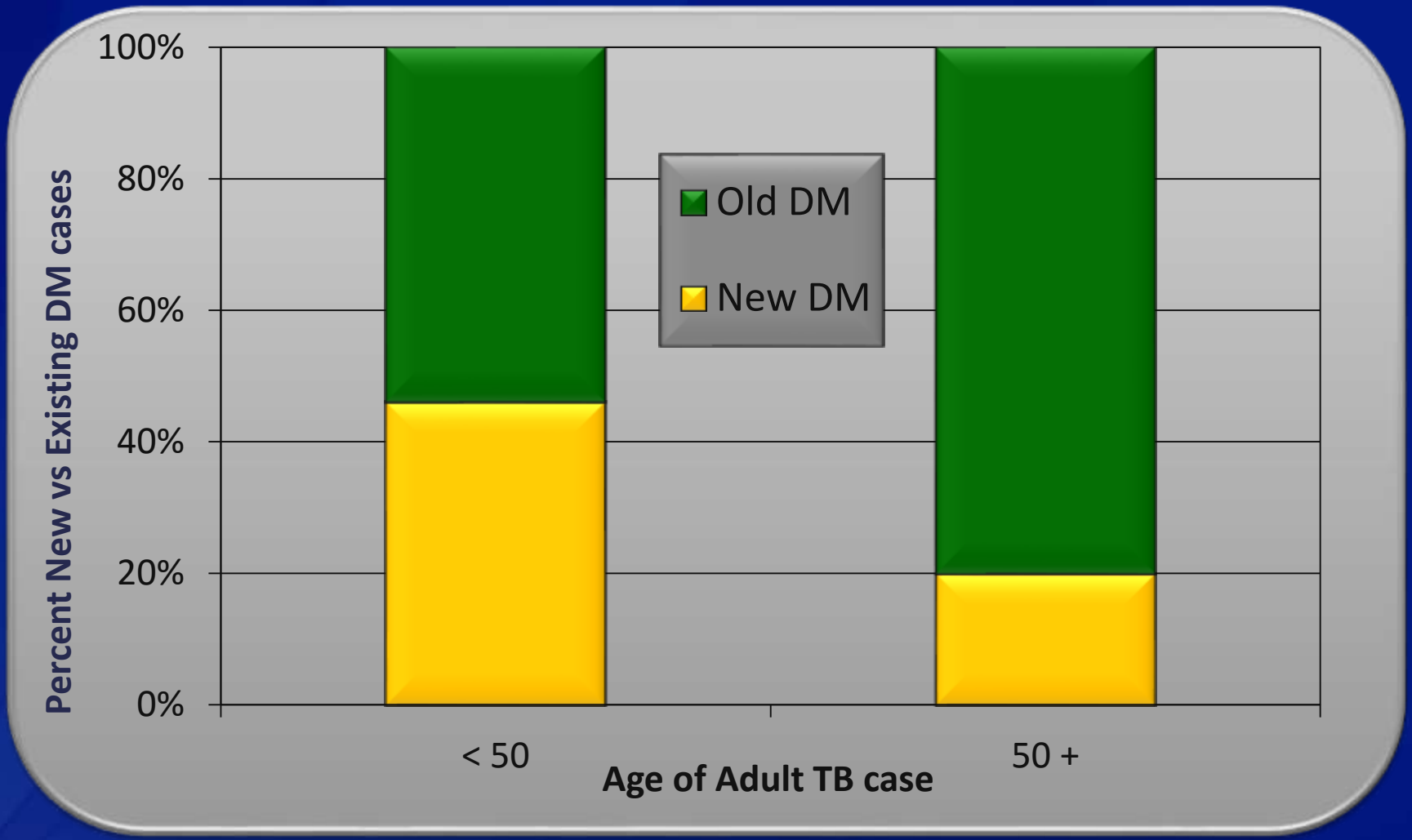
Brostrom, R and Young, B Hawaii TB Control Program 2015

Adult TB cases with DM in Hawaii: 2014



*Hawaii Case Reports for 2014

TB as the “Diabetes Defining Illness”



*Hawaii Case Reports for 2014

DM Screening Methods for TB Programs

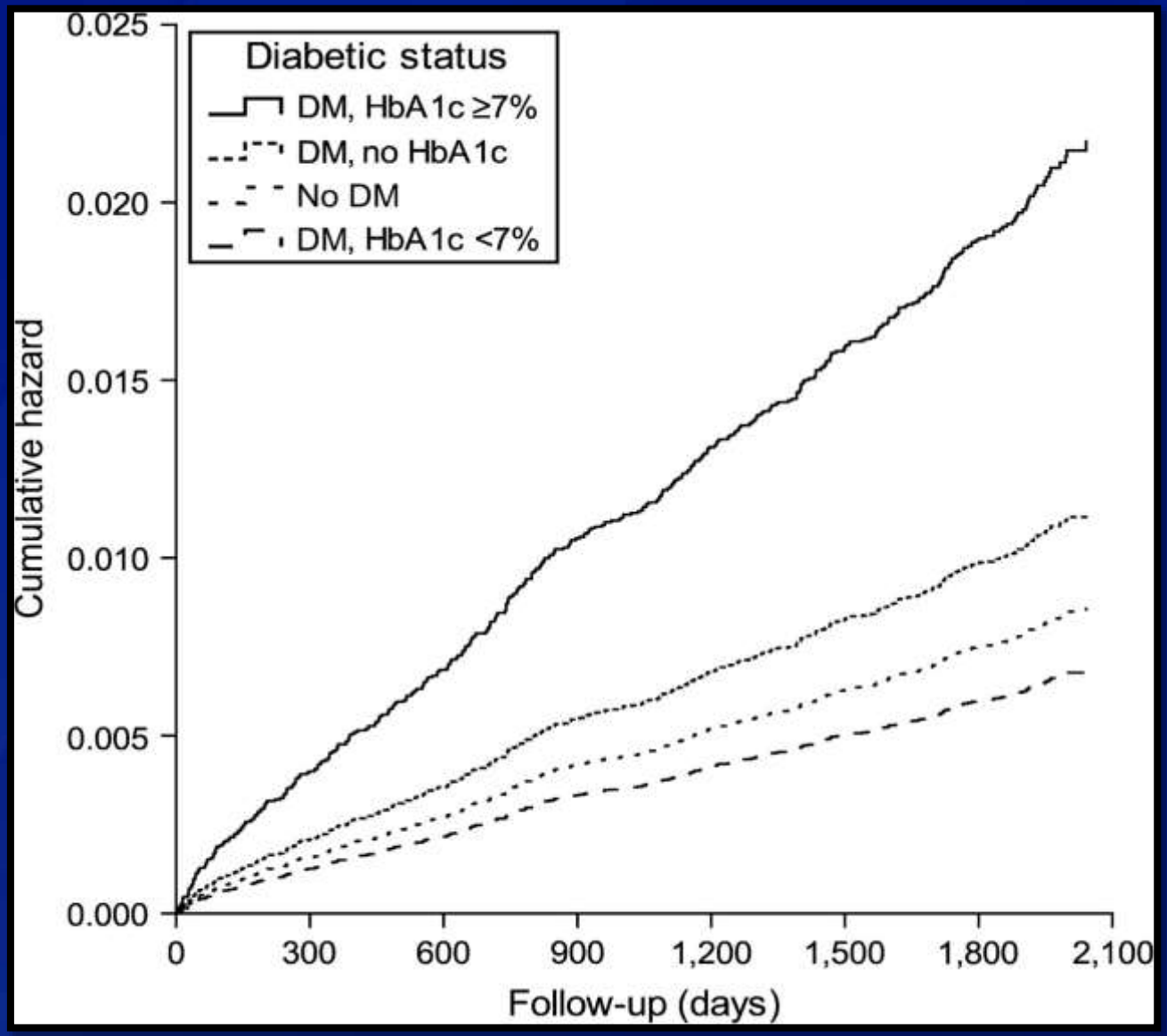
Method	Advantages	Disadvantages	Cost*
Glucose ≥ 200 (random)	Inexpensive. Easily available. Point of care possible. No phleb. required	Many false (-) Some false (+) Poorly reproducible	$750
A1c ≥ 6.5	Most accurate. Point of care possible. Few false (-),(+)	More expensive. Not always avail in rural setting. May require phleb.	$8,000
Random glucose ≥ 140 followed by A1c ≥ 6.5 to confirm	Less expensive than universal A1c. Few false (+)	Some false (-). Requires follow-up.	$3,150

* Cost per 1000 TB cases screened for DM ($8 for A1c, $0.75 for Glucose)

TUBERCULOSIS Control Program

TB-DM Connections

1) TB-DM Epidemiology
2) Screening for DM in TB Cases
3) Screening for TB in DM Cases
4) Enhanced TB case management
5) Michigan approach?
6) Big Finish!


Diabetic status
DM, HbA1c ≥7%
DM, no HbA1c
No DM
DM, HbA1c <7%
Cumulative hazard
0.025
0.020
0.015
0.010
0.005
0.000
0
300
600
900
1,200
1,500
1,800
2,100
Follow-up (days)

TB-DM: Younger DM Cases at Risk

Table 2—*Incidence rates (per 100,000 person-years) among diabetic and nondiabetic populations (clustering within 1 year of diagnosis)*

Age-group (years)	TB patients with diabetes (*n*)	Incidence rate of TB among diabetic population	TB patients without diabetes (*n*)	Incidence rate of TB among nondiabetic population	Ratio of rates (95% CI)	*P*	Population attributable risk (%)
Clustered cases							
20–44	18	127.3	62	6.9	18.6 (10.3–31.8)	<0.0001	21
45–64	15	39.3	25	8.0	4.9 (2.4–9.6)	<0.0001	29
65–89	9	30.2	12	10.1	3.0 (1.1–7.8)	0.01	28
Total	42	51.2	99	7.4	6.9 (4.7–9.9)	<0.0001	25
Reactivated cases							
20–44	25	176.8	192	21.2	8.3 (5.3–12.7)	<0.0001	10
45–64	78	204.1	75	24.1	8.5 (6.0–11.8)	<0.0001	44
65–89	27	90.7	43	36.1	2.5 (1.5- 4.2)	0.0004	23
Total	130	158.3	310	23.2	6.8 (5.5–8.4)	<0.0001	25

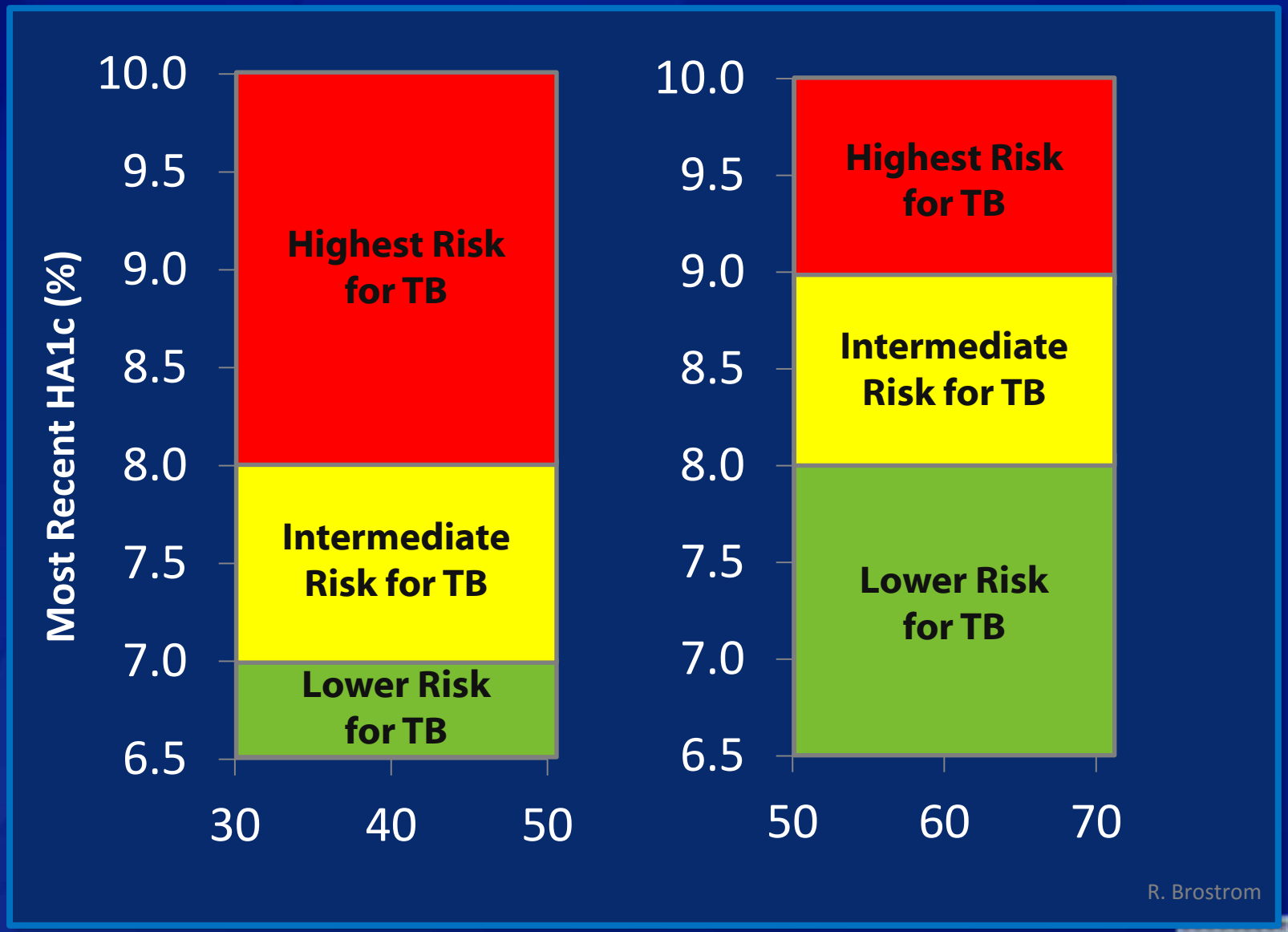
Ponce De-Leon, A. Tuberculosis and Diabetes in Southern Mexico, Diabetes Care 27:1584–1590, 2004

TUBERCULOSIS Control Program

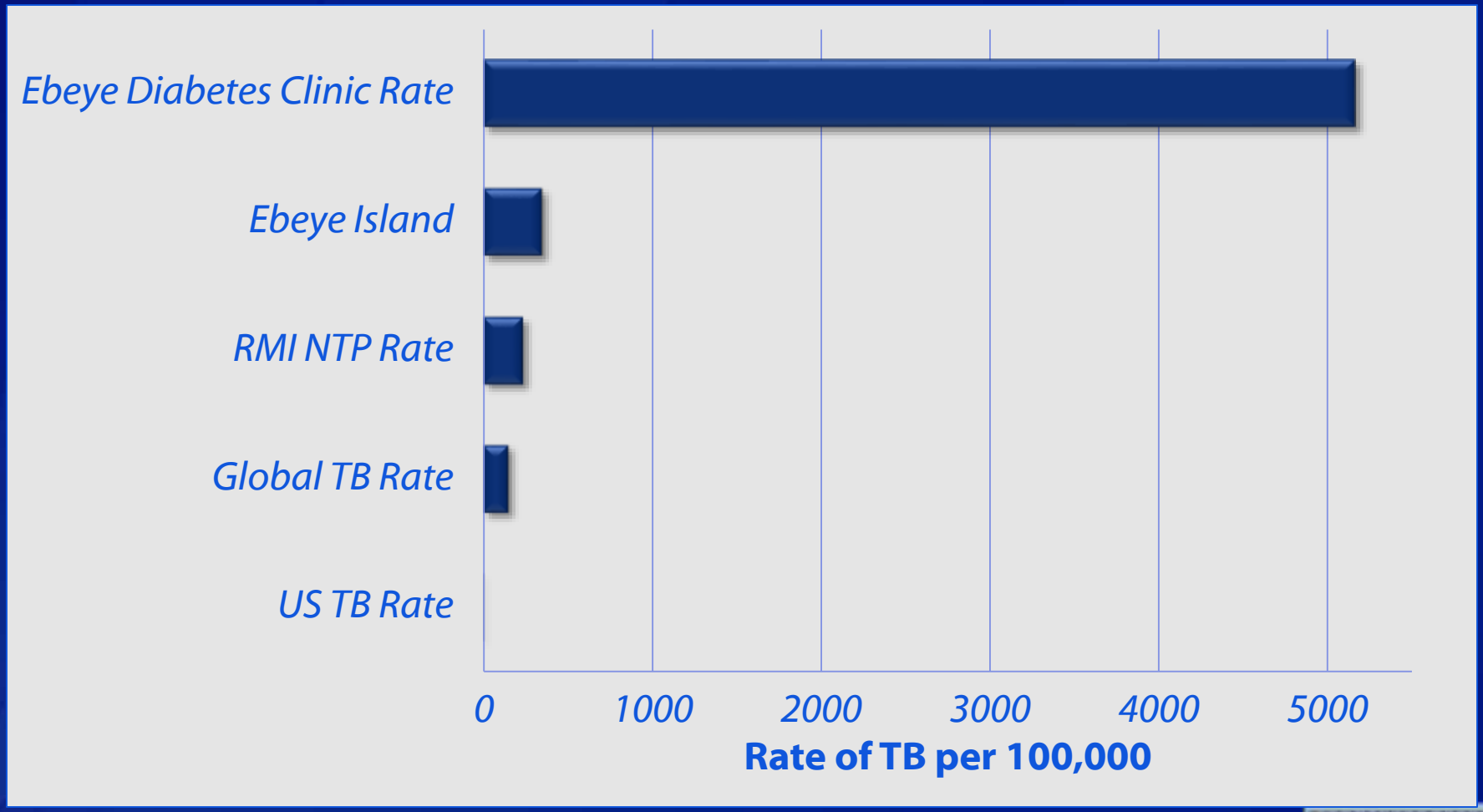
Testing and Treating TB infection for DM Cases

1) Younger DM cases seem to be at a higher relative risk of TB.
   - ? Younger DM cases may be closer to their initial TB exposure
2) Younger DM cases tolerate preventive treatment better
3) Younger DM cases will realize more long-term benefit from preventive treatment

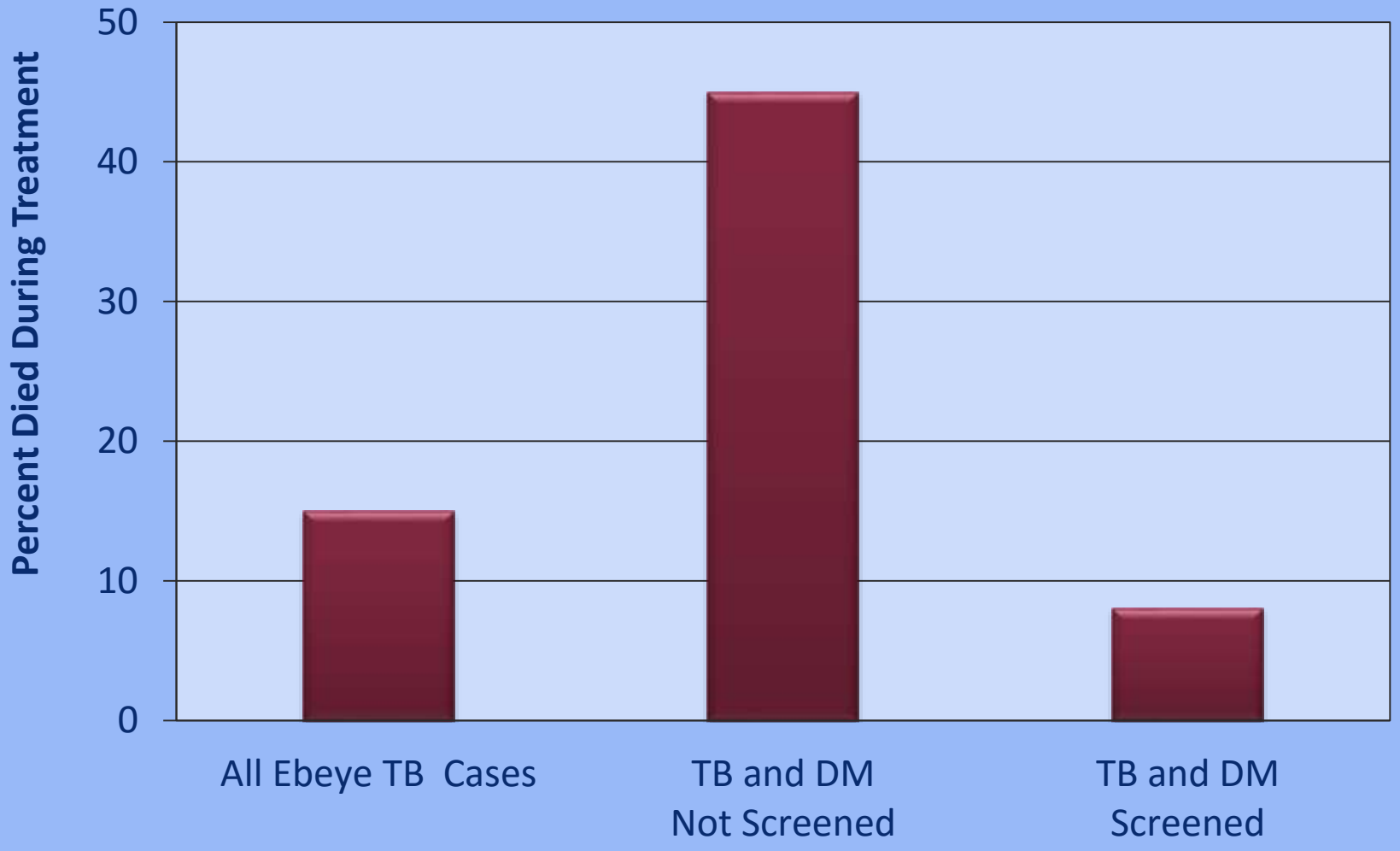
Possible Risk Profile for TB Prevention in Persons with DM



TB Screening in Diabetes Clinic: Finding TB



Death During TB Treatment in Ebeye (2010 – 2012, n=23)



Screening for TB Disease in DM Clinic

Method	Advantages	Disadvantages	Cost*
Symptom Screen every 6 months to 1 year	No cost. Should minimize exposure in DM Clinic. Raises awareness in DM Clinic.	False (-), (+) Will miss early TB.	$ 0
Chest x-ray every 1 to 5 years	Most accurate, especially when baseline CXR known. Sensitive for TB.	Most expensive. Not always avail in rural setting.	$10,000

* Cost per 1000 DM cases screened for TB ($50 for CXR divided by 5years)

TUBERCULOSIS Control Program

TB-DM Connections

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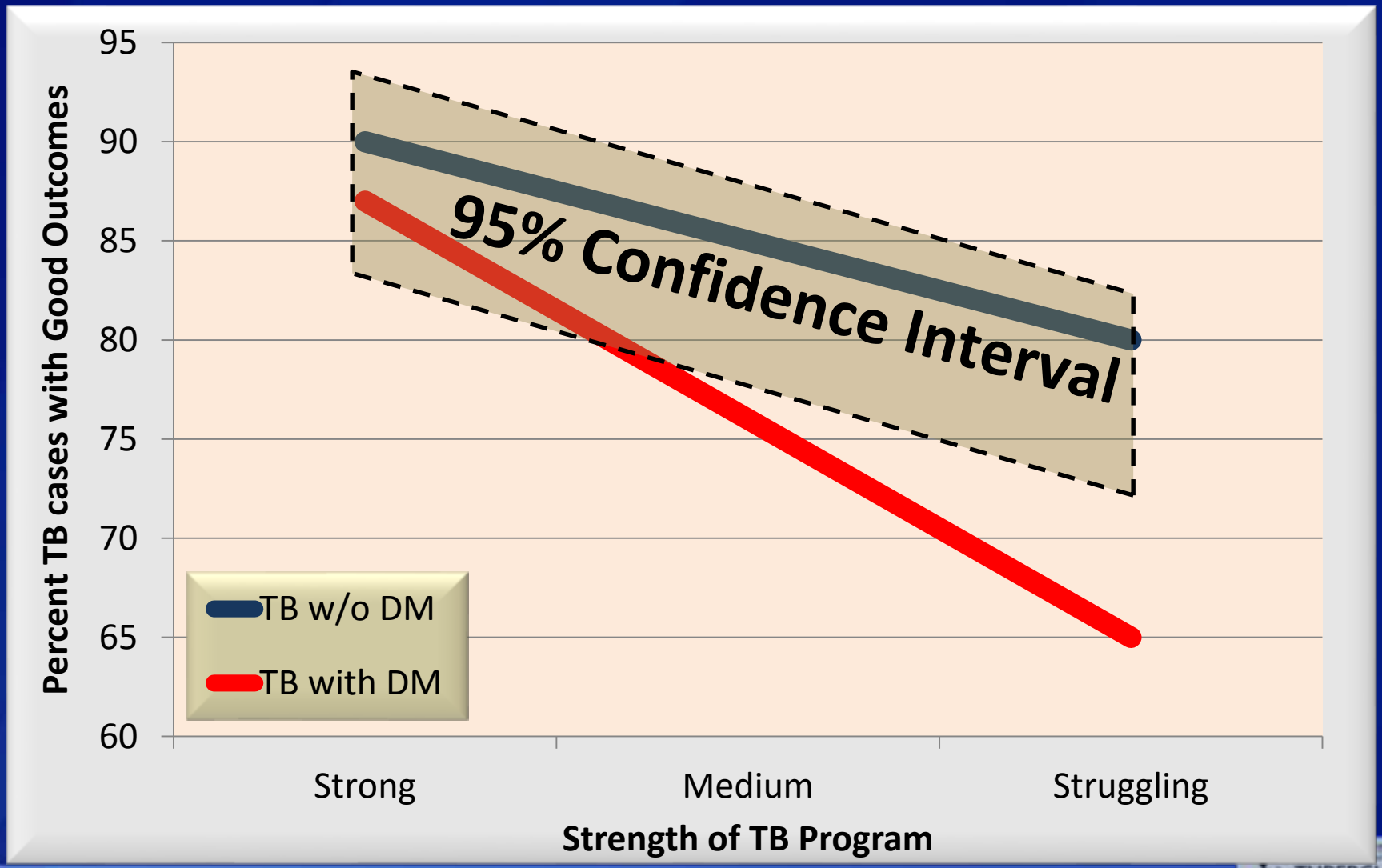
TB-DM: Strength of Association

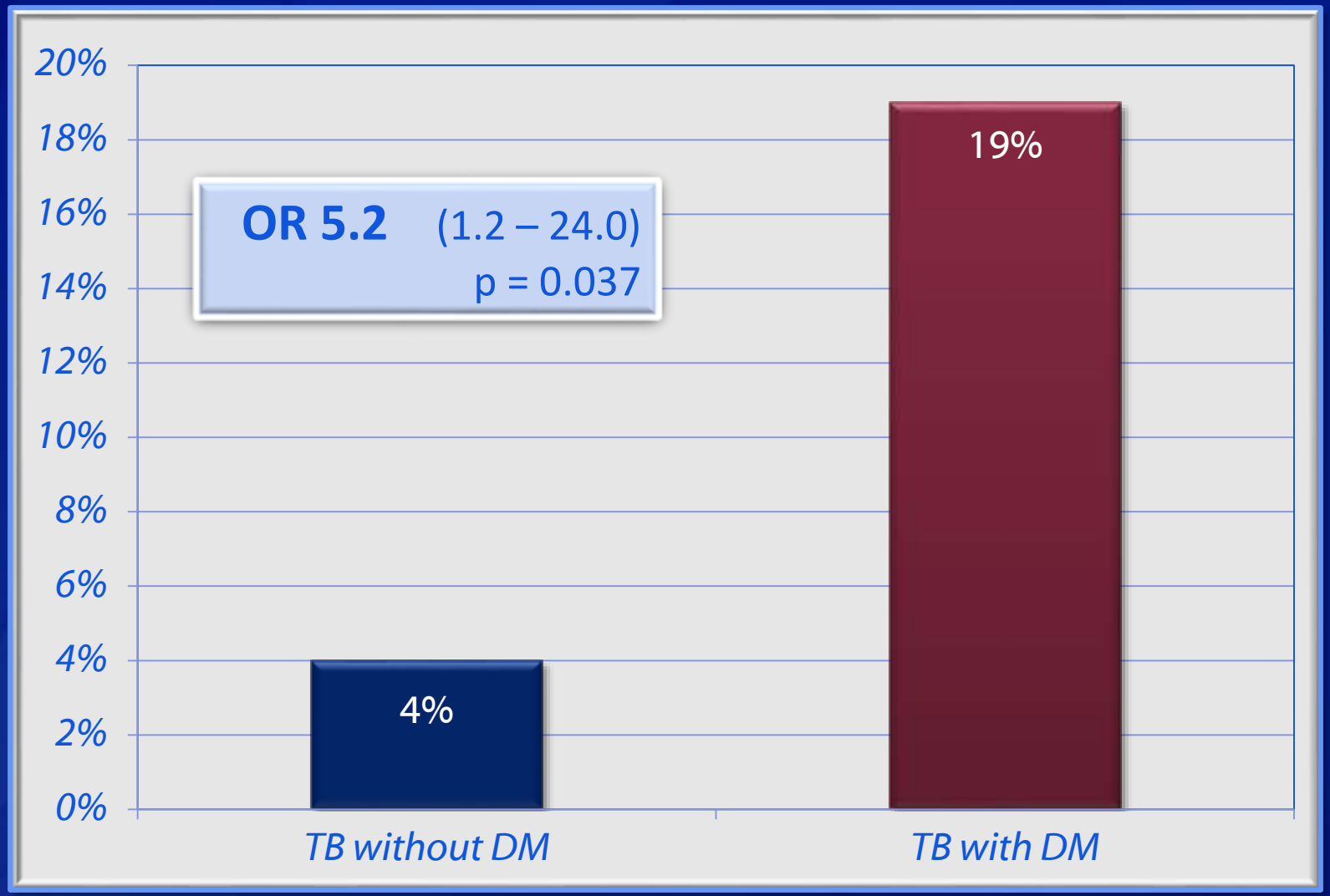


TB and Diabetes Summary: 2-3-4-5

People with DM and TB have….

- 2x risk of remaining culture positive
- 3x risk of progression to TB disease
- 4x risk of relapse after standard tx
- 5x risk of death during TB treatment

All-Cause Mortality During TB Treatment*



* Pacific Islands TB Cases, 40 – 60 years old, 2010–2012, n=129
Data excludes "lost", "discontinued", "moved", "unknown"

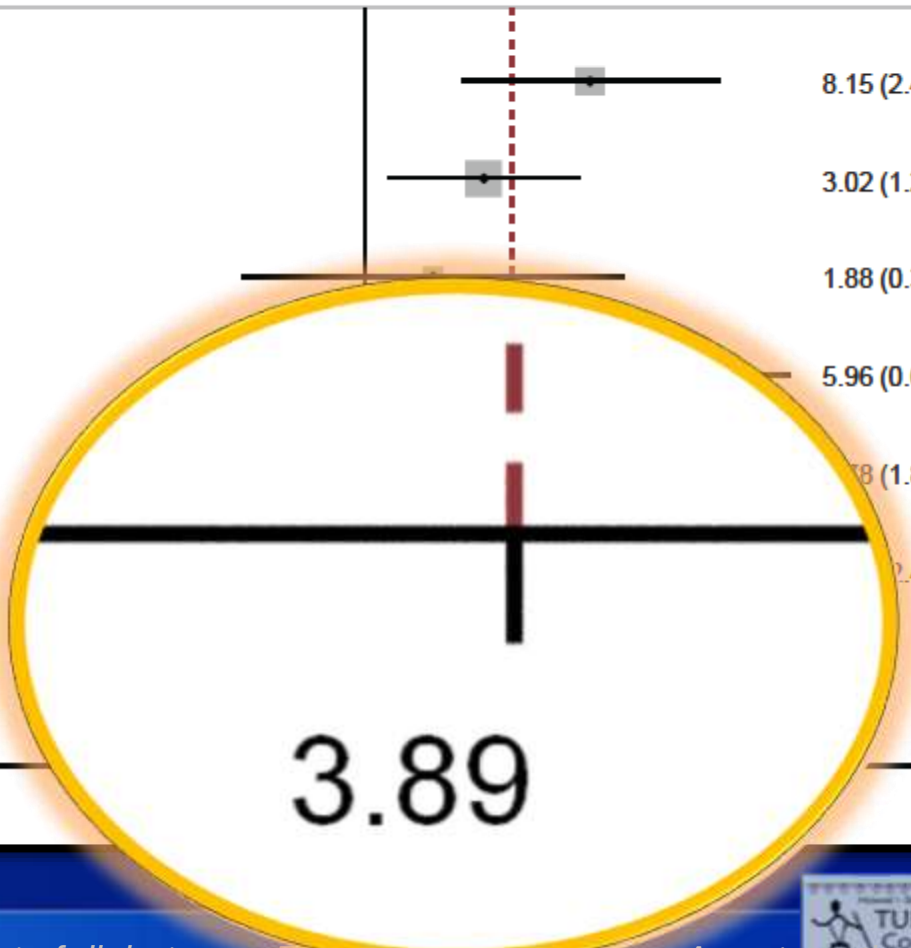
R.Brostrom

TB-DM Outcomes: Relapse

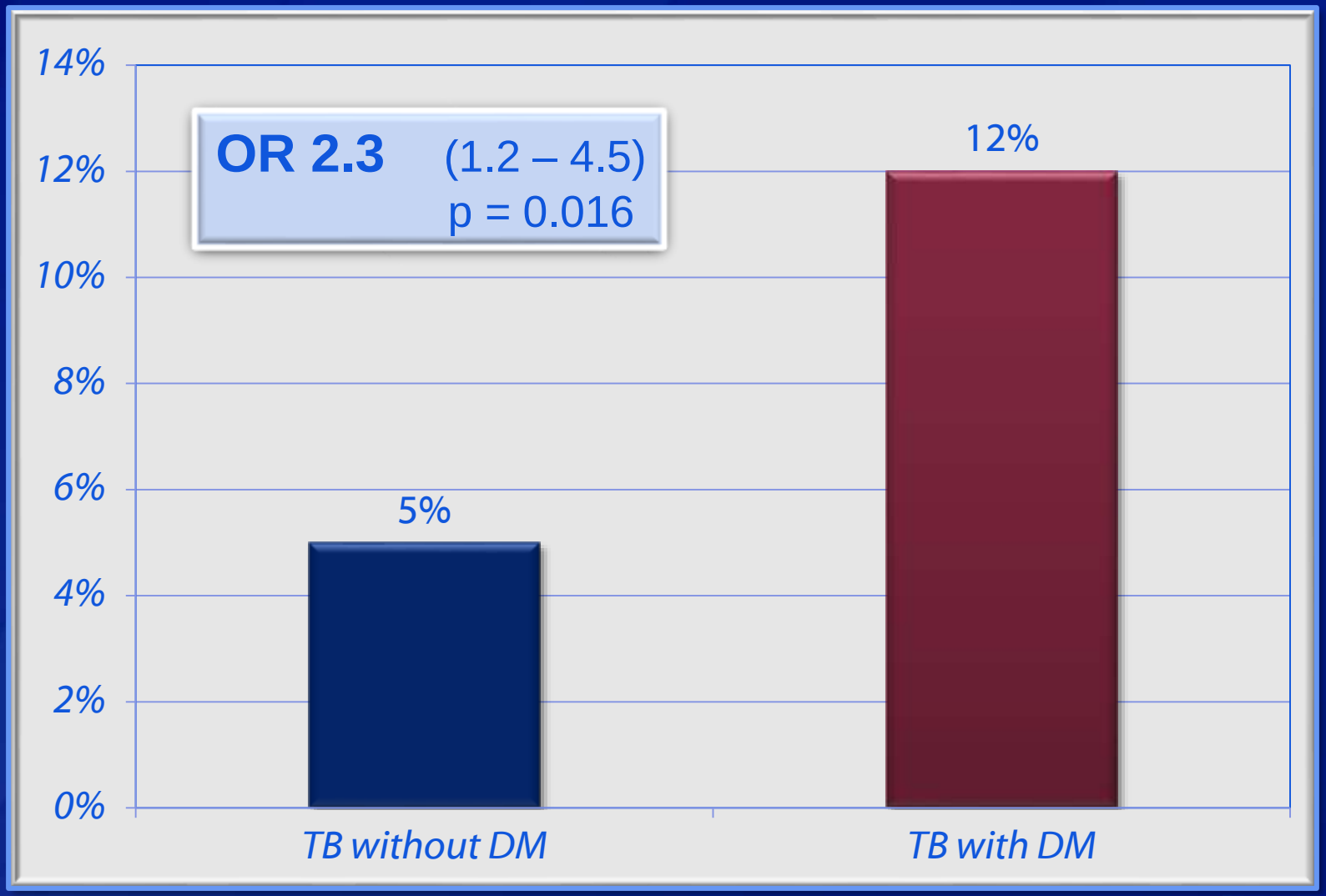
Study	Country	Population with DM Relapse/ Total	Population without DM Relapse/ Total	RR (95% CI)
Wada, 2000 [54]	Japan	7/61 (11%)	4/284 (1%)	8.15 (2.46, 26.97)
Mboussa, 2003 [47]	Congo	6/17 (35%)	9/77 (12%)	3.02 (1.24, 7.35)
Singla, 2006 [50]	Saudi Arabia	2/130 (2%)	3/367 (1%)	1.88 (0.32, 11.14)
Maalej, 2009 [46]	Tunisia	4/55 (7%)	1/82 (1%)	5.96 (0.68, 51.95)
Zhang, 2009 [57]	China	33/165 (20%)	9/170 (5%)	3.78 (1.87, 7.65)
Summary				3.89 (2.43, 6.23)

Heterogeneity I-squared = 0% (0, 79)

Weights are from random effects analysis



History of Prior TB*

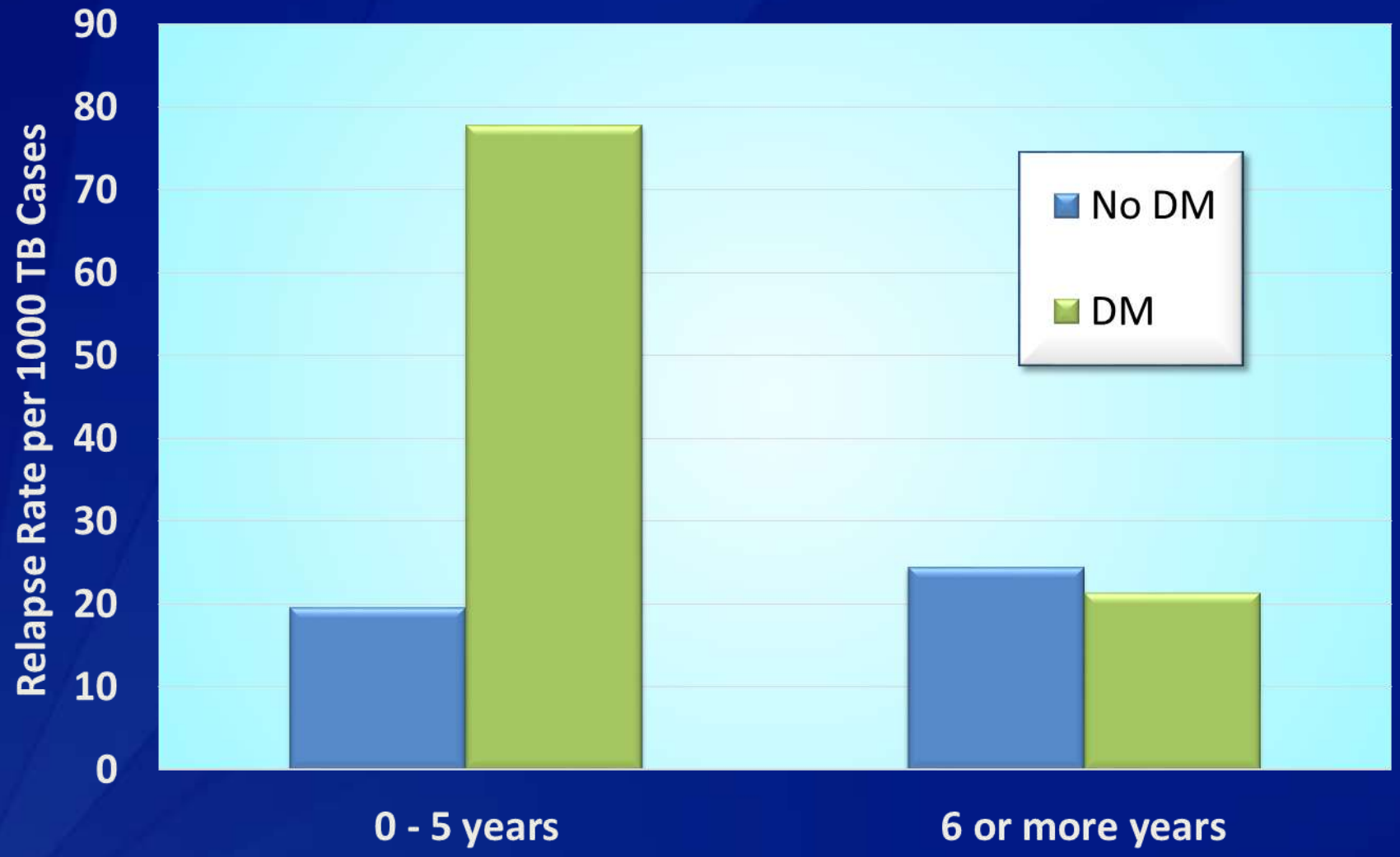


* Adult Pacific Islands TB Cases, 2010 – 2012, n = 511

R.Brostrom

History of Prior TB Treatment

Pacific Island Adults > 30, 2010 - 2014, n=657



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Diabetes complicates TB Care:

- Greatly increases num
- Harder to
-
- of TB recurrance
- Increased risk of death during treatment

Diabetes is the HIV of the Pacific!

TUBERCULOSIS Control Program

Pacific Standards for Management of Tuberculosis and Diabetes

Screening for DM in persons with TB

Standard 1 Every person with tuberculosis (TB) over the age of 18 should be screened for diabetes mellitus (DM)

1.1 The diagnosis of DM may be made using one of the following criteria:

Fasting plasma glucose ≥ 126 mg/dl	(7.0 mmol/l)
Random plasma glucose ≥ 200 mg/dl	(11.1 mmol/l)
Hemoglobin A1c ≥ 6.5 %	(48 mmol/mol)

1.2 Abnormal glucose values should be verified in patients who have no symptoms of DM.

1.3 Rifampin can elevate blood glucose in TB patients. Glucose testing may be repeated after 2-4 weeks of TB treatment, or if symptoms of hyperglycemia develop during TB treatment.

Screening for TB in persons with DM

Standard 2 Every person with DM should be screened for TB disease and TB infection

2.1 Persons with TB symptoms or TB disease should be referred to the local TB Program for TB management.

2.2 A test for TB infection should be done at the time of DM diagnosis.

2.3 Screening should be repeated as often as the local TB epidemiology may warrant.

Standard 3 Persons with DM and TB infection should be encouraged to take preventive therapy

3.1 Persons with DM are at increased risk of peripheral neuropathy. If INH is used for prevention, give B6 to prevent neuropathy (10 – 25 mg/day).

3.2 Monitor for adherence and side effects of preventive treatment.

Treating TB in persons with DM

Standard 4 Clinicians may need to adjust TB treatment in persons with DM

4.1 Make sure that TB medications are properly dosed.
Check creatinine for diabetic nephropathy, and if present, adjust the frequency of PZA and EMB according to ATS-CDC guidelines.*
Administer B6 to prevent INH-induced neuropathy (10 – 25 mg/day).

4.2 Observe closely for TB treatment failure in persons with DM.
Be aware of poor absorption of some TB meds in DM.
Manage the many interactions between TB and DM meds.
Some programs follow INH or RIF levels in persons with DM.

4.3 "Assure the Cure"
Consider extending treatment to 9 months for persons with DM, especially persons with cavitary disease or delayed sputum clearance.*
Upon completion of therapy, obtain sputum for AFB smear and culture.
Evaluate at one year after treatment for evidence of relapse.

*Treatment of Tuberculosis, American Thoracic Society, CDC, and Infectious Diseases Society, MMWR 2003;52

Managing DM in persons with TB

Standard 5 Use TB clinic visits to help persons manage their DM

5.1 There should be a glucometer in every TB clinic for monitoring glucose.

5.2 TB patients with DM should have their glucose checked at least weekly for the first 4 weeks, and less frequently thereafter if diabetes is controlled.
Monthly glucose testing during treatment is recommended.

5.3 All clinic staff should reinforce lifestyle changes at TB clinic visits.

5.4 If available, refer persons with DM to the Diabetes Clinic for diabetes care.
Ensure DM clinician is aware of TB diagnosis and TB medications.

Standard 6 Use DOT visits to help persons manage their DM

6.1 DOT workers should encourage lifestyle changes at every encounter.
DOT workers should use structured and culturally-appropriate diabetes educational materials.*
Dietary changes and physical activity are the most important in this effort.

6.2 Consider delivering DM meds with TB meds via DOT for persons with poorly-controlled DM who have non-adherence to diabetic medications.

* ARC TB and DM Flipchart: http://www.thearc.org.au/TBandDiabetes.aspx
* NDEP, US Dept of Health and Human Services: http://www.yourdiabetesinfo.org/

PITCA

Pacific Chronic Disease Coalition

Basic DM Management for TB Clinic

Treating TB in persons with DM

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TUBERCULOSIS Control Program

Enhanced DM Management for TB Clinic

Managing DM in persons with TB

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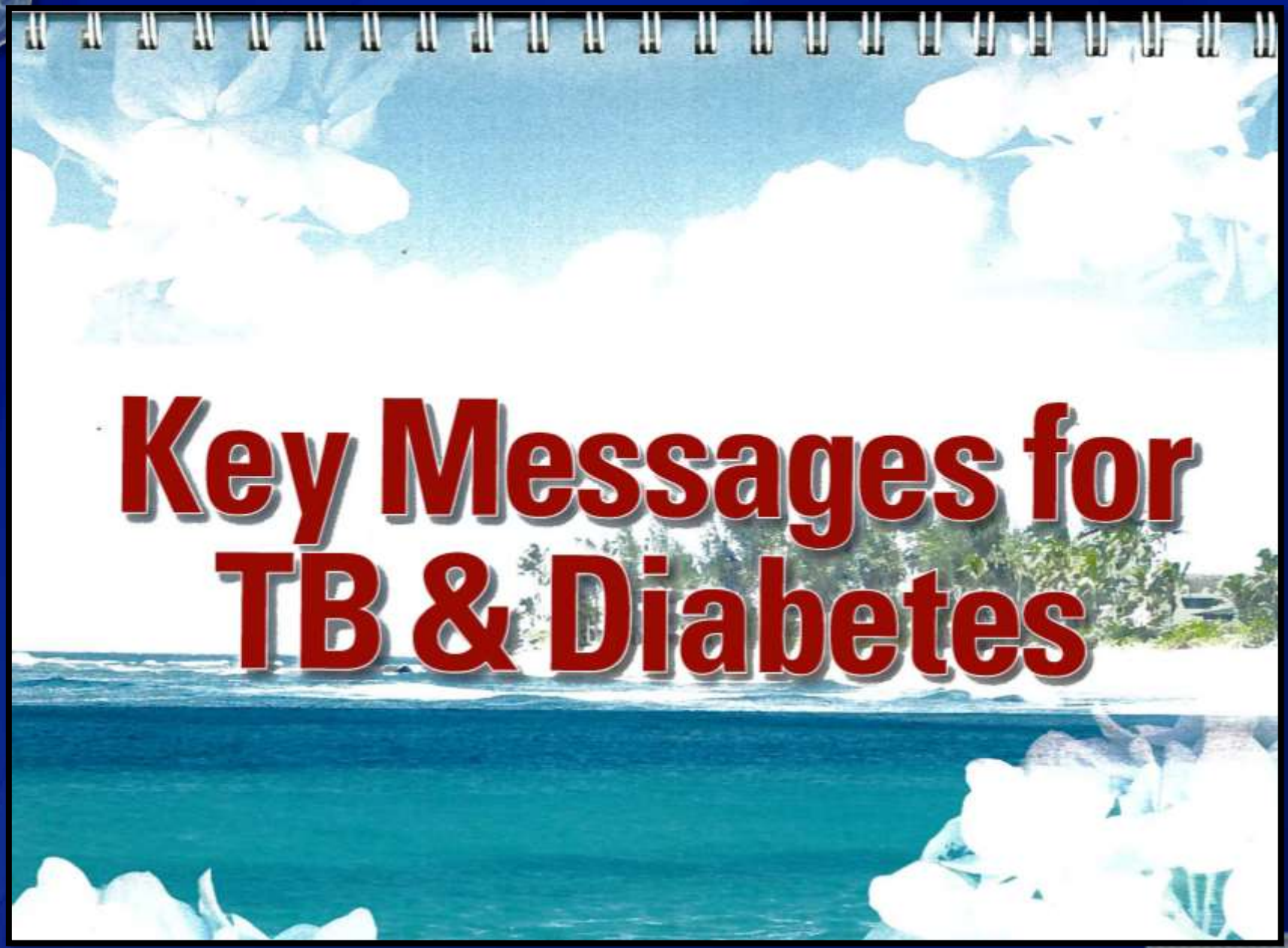
TUBERCULOSIS Control Program

Battle Creek Sanitarium: Exercises, 1911


Key Messages for
TB & Diabetes

Hawaii TB Nurses Documentation

Hawaii TB-Diabetes Patient Care Worksheet

Patient Name: _____ **CC#:** _____

Date and Initials	/ /	/ /	/ /	/ /	/ /
DM education	☐ None ☐ <5 min ☐ 5-10 min ☐ 10-30 min	☐ None ☐ <5 min ☐ 5-10 min ☐ 10-30 min	☐ None ☐ <5 min ☐ 5-10 min ☐ 10-30 min	☐ None ☐ <5 min ☐ 5-10 min ☐ 10-30 min	☐ None ☐ <5 min ☐ 5-10 min ☐ 10-30 min
DM test results	Gluc: ____mg/dL A1c: _____%	Gluc: ____mg/dL A1c: _____%	Gluc: ____mg/dL A1c: _____%	Gluc: ____mg/dL A1c: _____%	Gluc: ____mg/dL A1c: _____%
Seeing DM provider?	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Taking DM medications?	☐ Yes ☐ No ☐ None needed	☐ Yes ☐ No ☐ None needed	☐ Yes ☐ No ☐ None needed	☐ Yes ☐ No ☐ None needed	☐ Yes ☐ No ☐ None needed
Comments:					

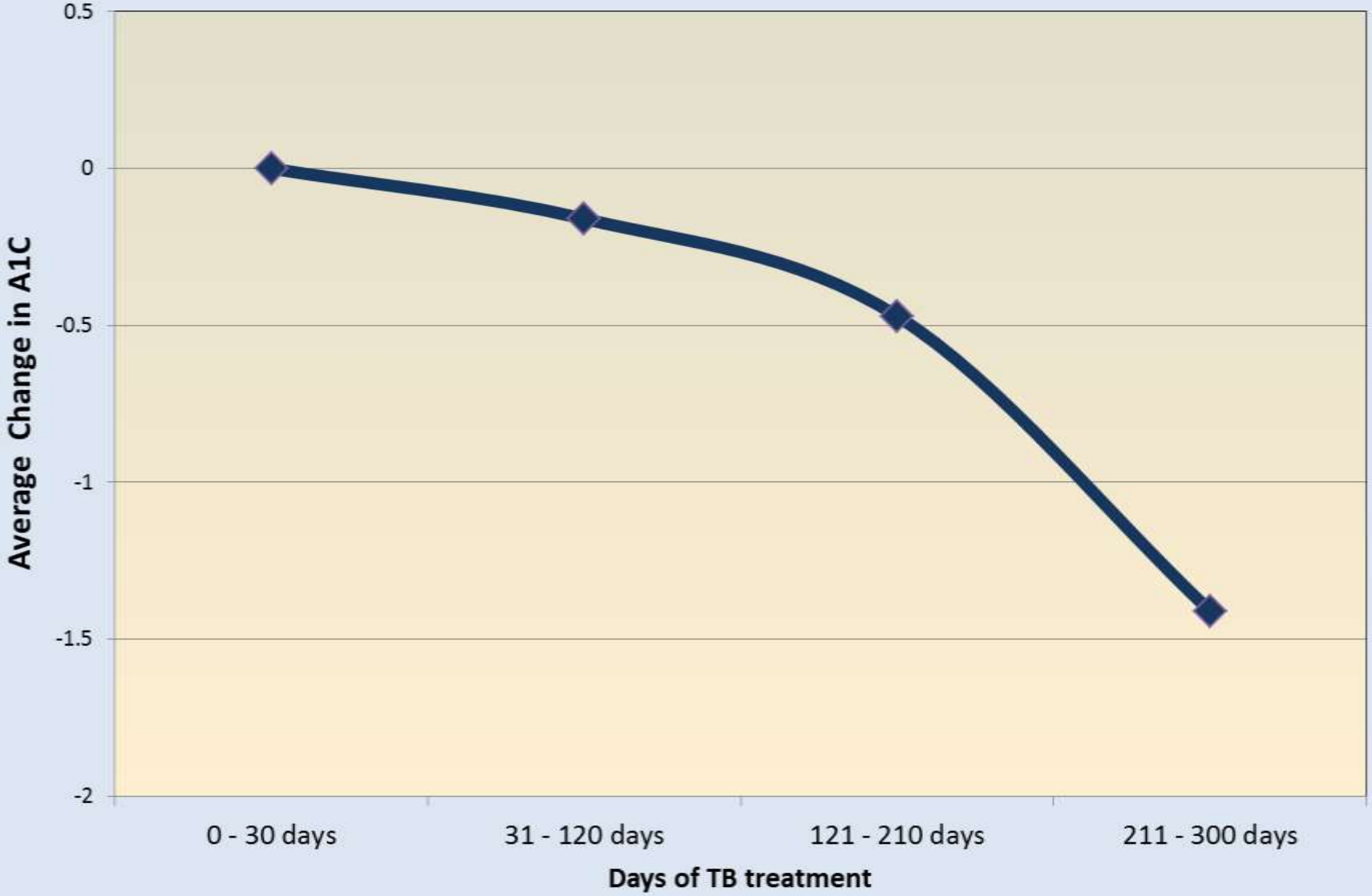
TUBERCULOSIS Control Program

Can the TB clinic help with glucose control?

- A1c data collection (586 tests)
- Initial (intake package)
- For follow-up, standing order for every 3 months (ADA standard)
- 55 patients with 2 or more results
    - 154 A1c tests in this cohort

Average A1C during TB treatment in Hawaii

(at least 2 measurements, 2011 - 2013, Cases=55, A1C's=154)



Can the TB Program take credit for this?

What is the natural change in A1c during TB treatment?	
A1c should drop during treatment	***A1c should rise during treatment***
Infections usually elevate blood glucose. Glucose is an "acute phase reactant".	Rifampin (and INH) will elevate blood glucose throughout treatment and can interfere with some DM medications.
Patients may use this as an opportunity to address multiple health problems.	Almost all patients gain weight during TB treatment

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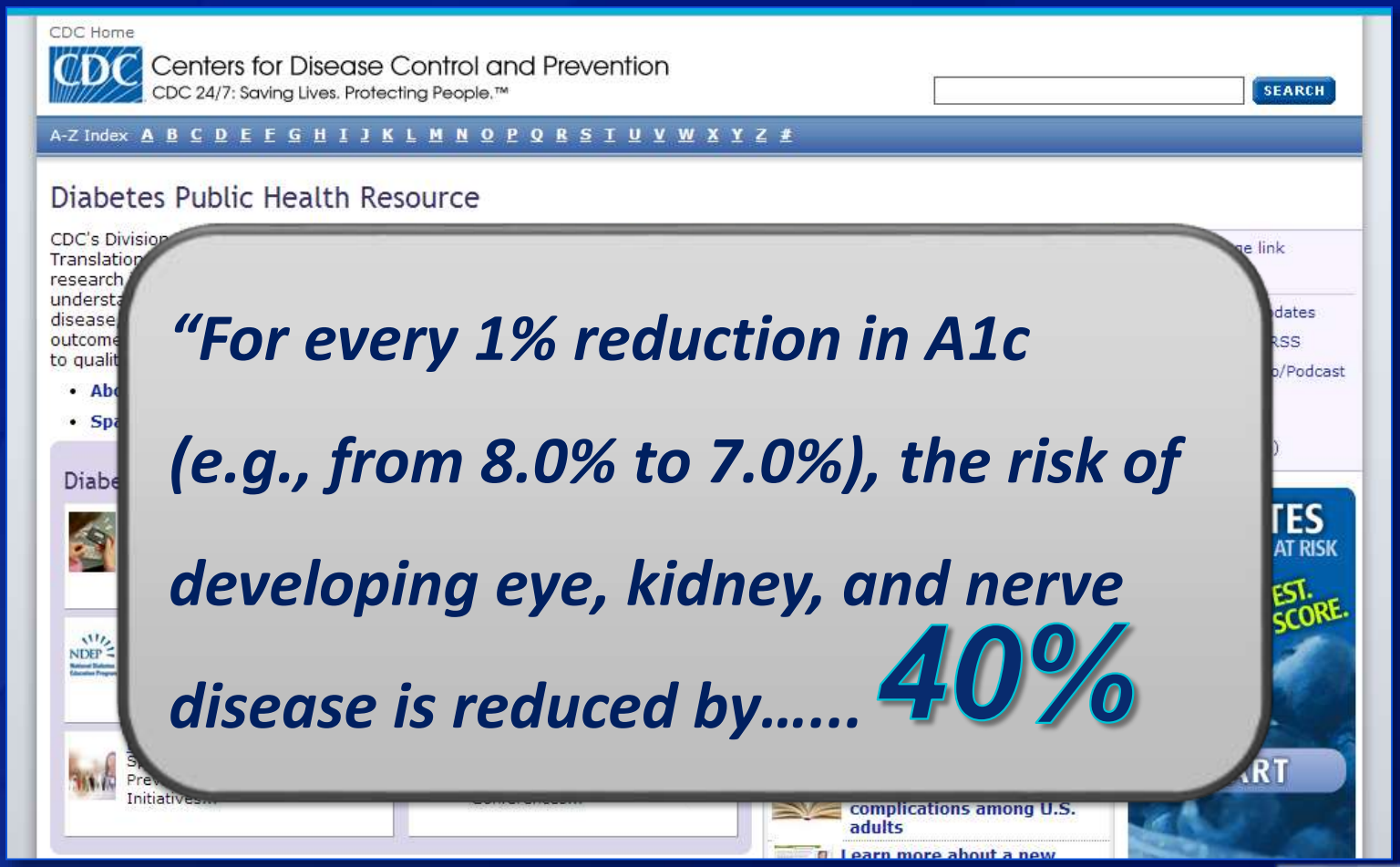
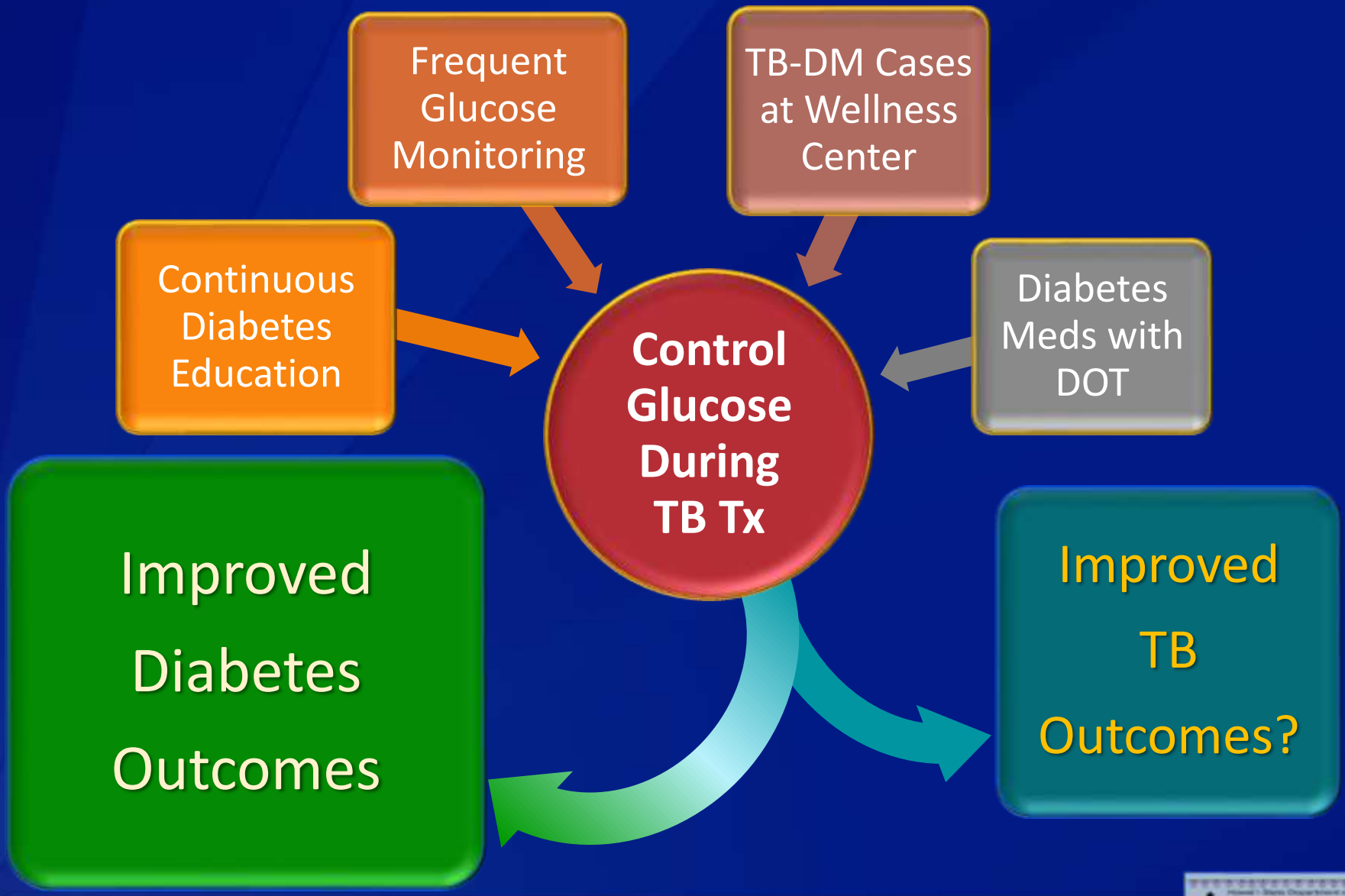
The 1% Solution……



TB-DM Program Integration Efforts



TB-DM Connections

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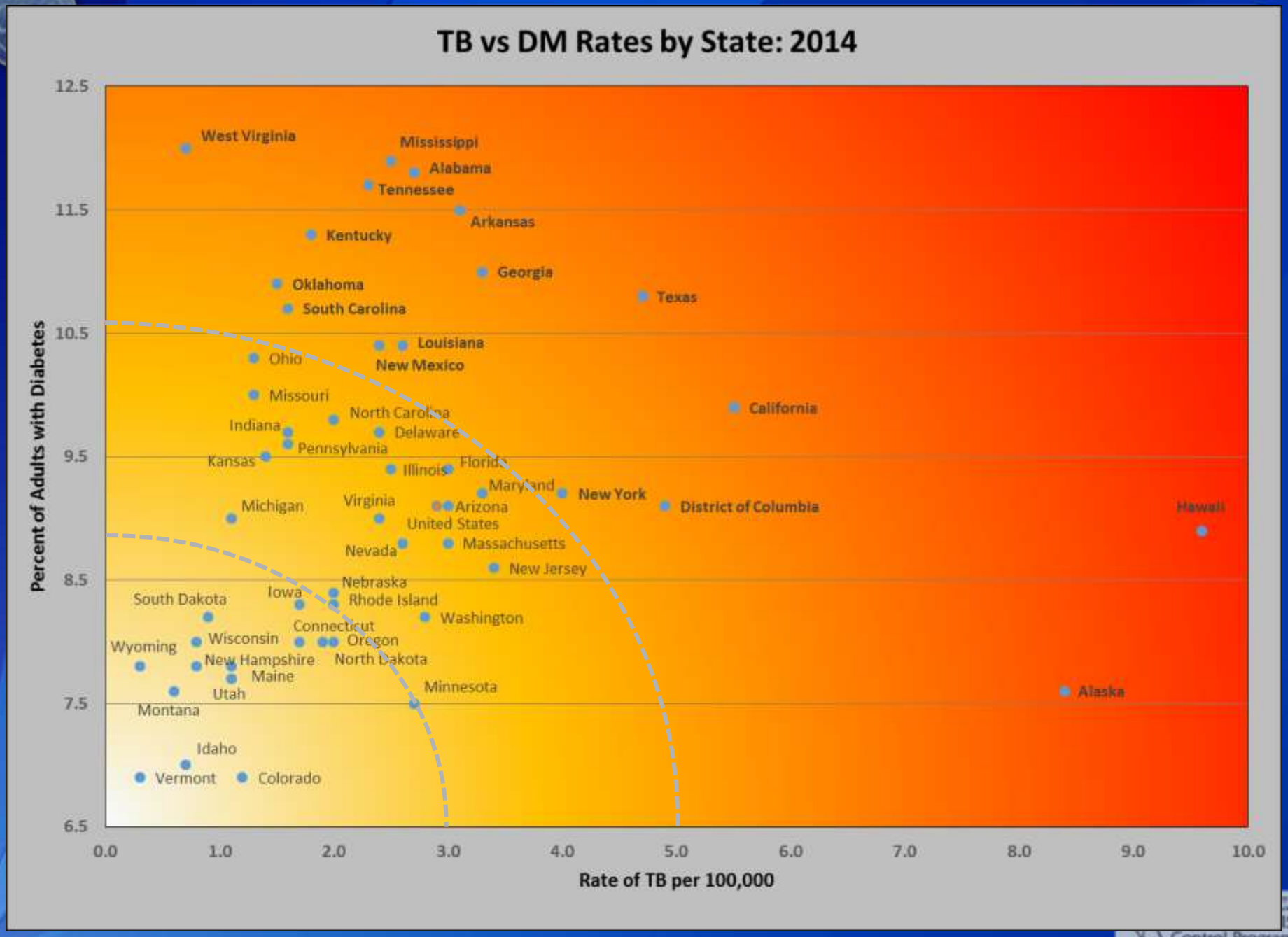
TB vs DM Rates by State: 2014



Screening for DM in TB cases in Michigan

Who? Every adult TB case, regardless of age or country of birth

When? At time of diagnosis for TB

How? A1c as a routine panel test, or RBG > 140 with A1c (reflex pos)

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Screening for TB in DM cases in Michigan

Who? All DM who are FB
All DM with poor glucose control under age 50

When? At time of diagnosis for DM, repeat eval every 5 years

How? TST ok, unless poorly controlled

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TB-DM Enhanced Case Management in Michigan

- Limit interventions to just those with poorly controlled DM (A1c > 8.5)
- Refer all DM for DM management
- Provide DM education in clinic
- Consider A1c or glucose in clinic

TUBERCULOSIS Control Program

Other advanced possibilities for TB-DM in Michigan

- Routine RIF/INH levels for TB cases with DM?
- Provide DM meds with DOT?
- Joint TB-DM Meeting

Enhanced TB-DM Program Collaboration

- Seek out and meet with your DM program
  - Choose a pilot DM clinic serving high-risk cases.
  - Decide together which DM cases need to be screened for TB?
  - Who is going to perform the TB screening?
  - Who is going to pay for the TB screening?
  - How are the screening results going to be recorded and communicated?

TB-DM Connections

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It's not my Job!

1) A three year-old for immuni
   Drinking Kool-aid
2) Prenatal ca OB smoking
3) A with laceration: Drinking
   Grandpa in clinic with poor
   appetite: Daughter obese

EVERY HEALTHCARE VISIT IS AN NCD VISIT

TUBERCULOSIS Control Program

Resources

Collaborative framework for care and control of tuberculosis and diabetes:

http://www.who.int/diabetes/publications/tb_diabetes2011/en/index.html

Pacific Standards for Management of TB and DM:

http://www.spc.int/tb/component/content/article/75-pacific-standards-for-management-of-tb-and-diabetes

Key Messages for TB and DM:

http://www.thearc.org.au/TBandDiabetes.aspx

EPIDEMIOLOGY OF TUBERCULOSIS

…the Who, the Where, and (perhaps) the Why

Shona Smith, MPH
Epidemiologist
MDHHS TB Control Unit

Disclosures

- None of the speakers or planners involved in this activity has any relevant conflict of interest.
- Approval status does not imply endorsement by the provider, ONA, MSMS, or any products displayed in conjunction with an activity.
- The use of trade names and commercial sources during this presentation is for identification only, and does not imply endorsement.
- No commercial support has been received for this program.

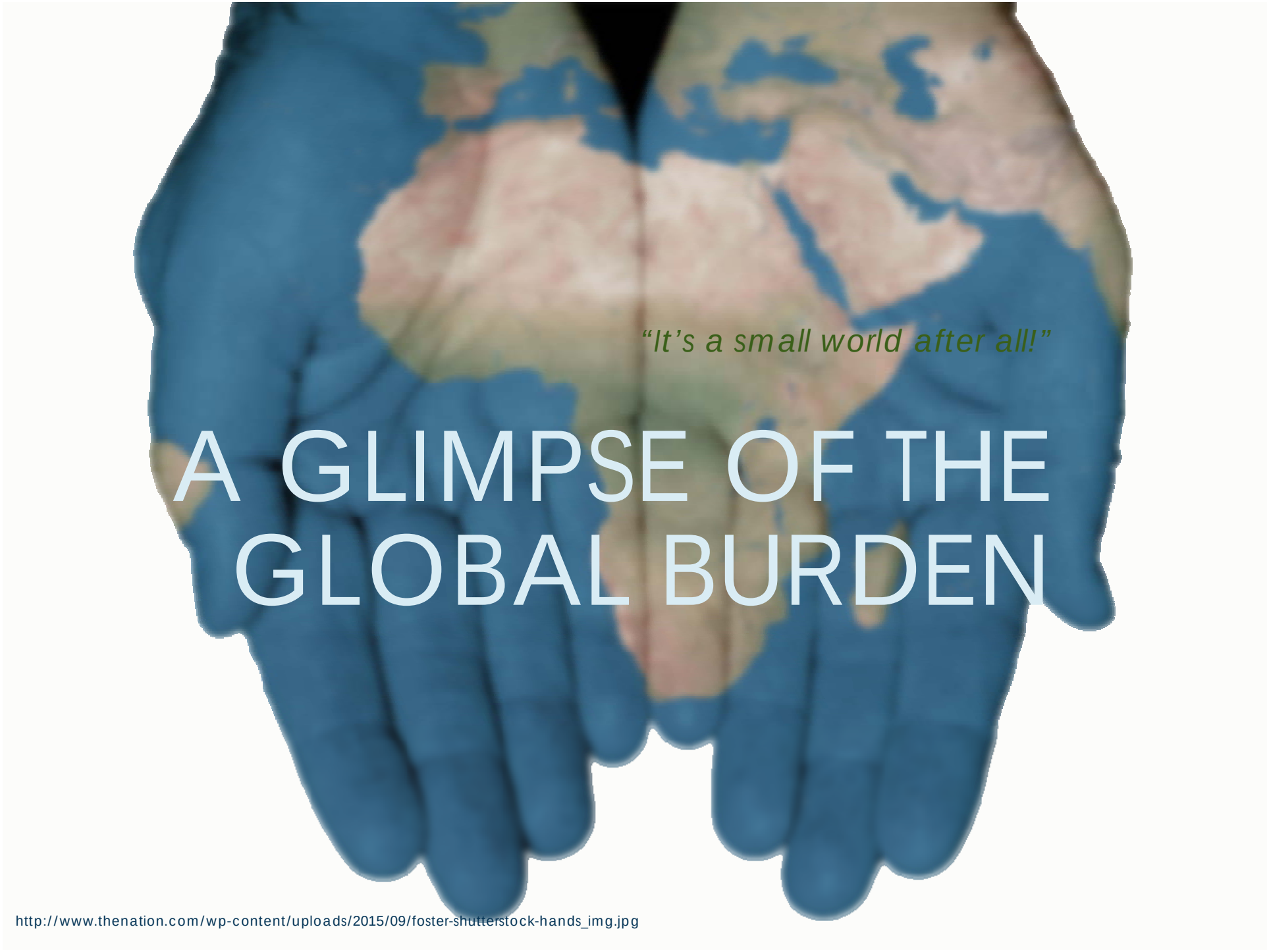
Objectives

- Identify trends in global, national, and Michigan TB epidemiology that have contributed to the number of TB cases in 2015

- Identify important risk-factors that have contributed to the number of TB cases in 2015

Main Topics

- Epidemiologic trends in TB Disease across the world, the United States, and Michigan
- Characteristics of high-risk "moving" TB populations in the US and Michigan including:
  - Foreign Born
  - Homeless
  - Those who moved during therapy
- Immigrant and Refugee TB screening



"It's a small world after all!"

A GLIMPSE OF THE GLOBAL BURDEN

http://www.thenation.com/wp-content/uploads/2015/09/foster-shutterstock-hands_img.jpg

How many new cases of TB were reported globally to WHO in 2014?

A. 4.1 Million

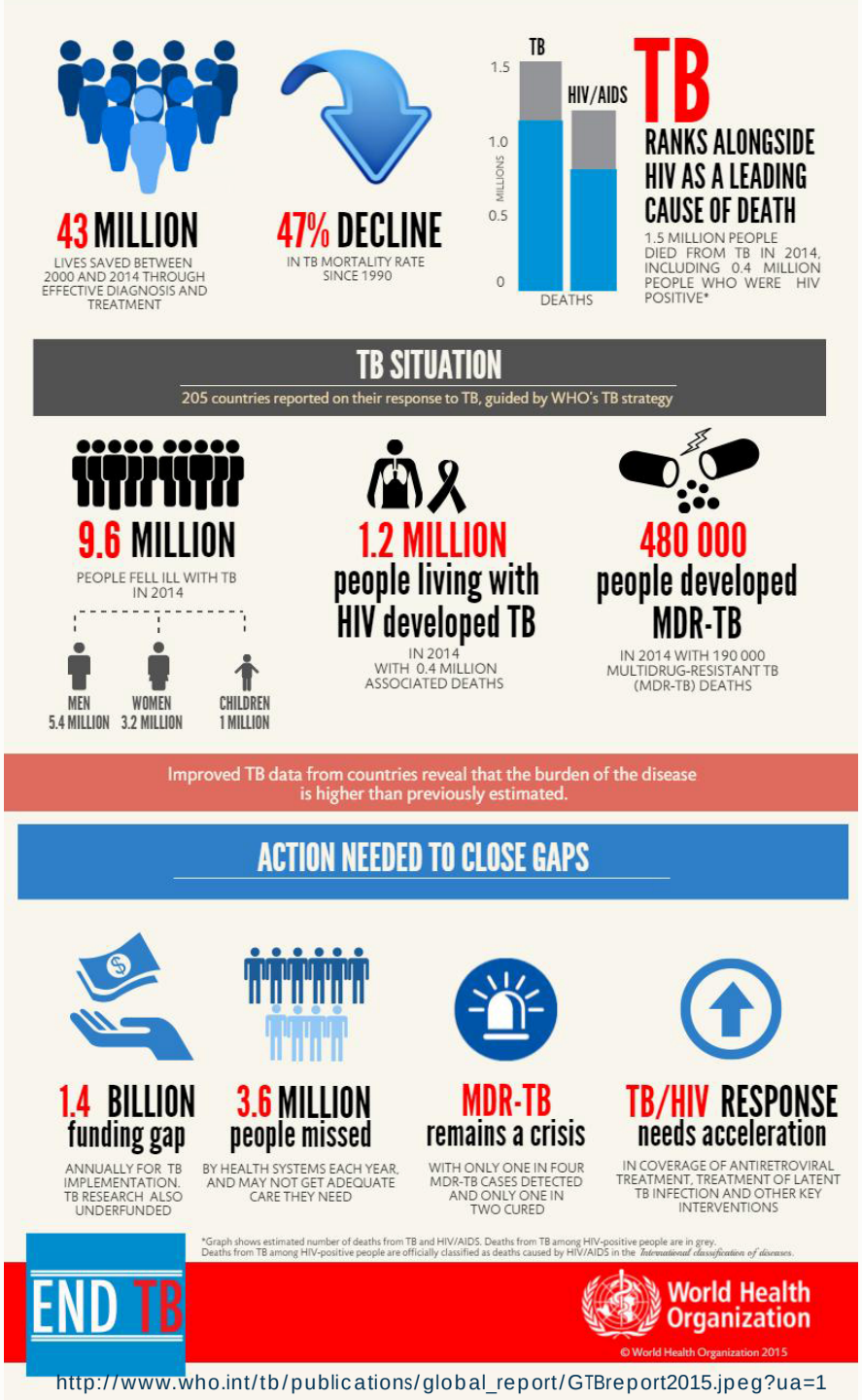
B. 6.3 Million

C. 9.8 Million

D.12.4 Million

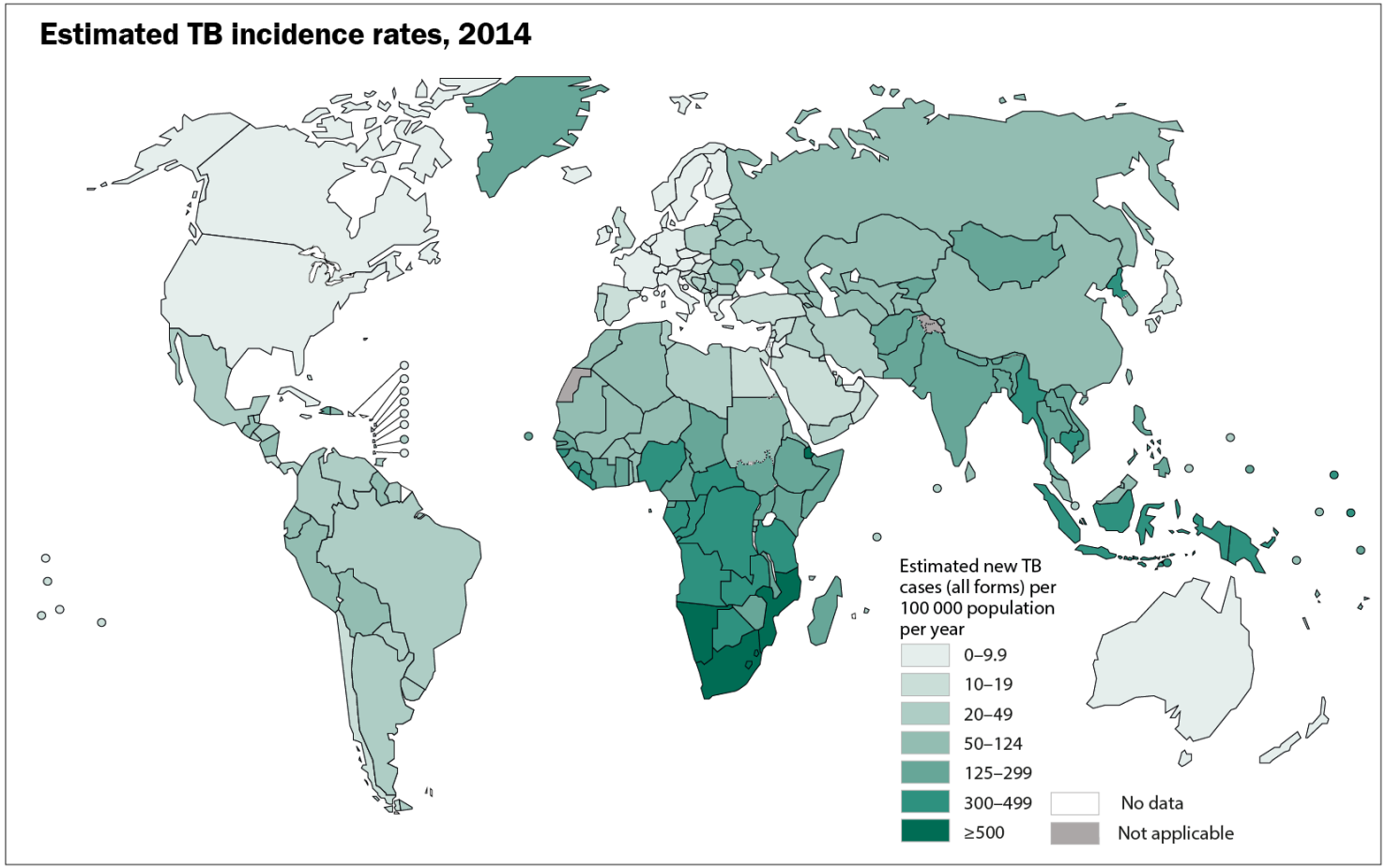
Status of the Global TB Epidemic and Response –

Global Tuberculosis Report 2015



http://www.who.int/tb/publications/global_report/GTBreport2015.jpeg?ua=1

Global TB Incidence 2014



The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

Data Source: *Global Tuberculosis Report 2015*. WHO, 2015.

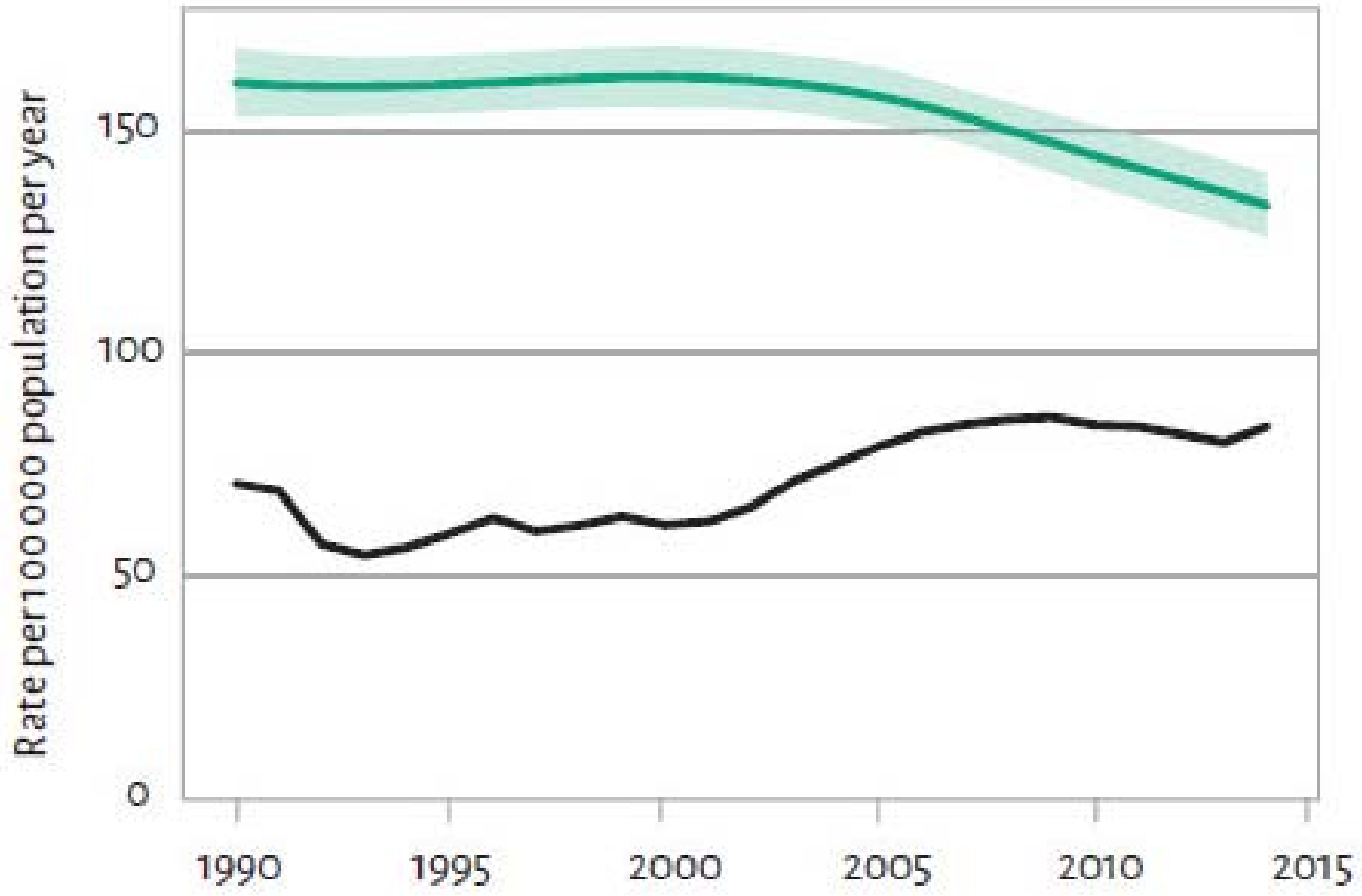
World Health Organization

http://www.who.int/gho/map_gallery/en/

Global TB Notifications,1990 -2014

FIGURE 3.1

Global trends in absolute number of notified TB cases (black) and estimated TB incidence (green), 1990–2014.
Case notifications include new and relapse cases (all forms).



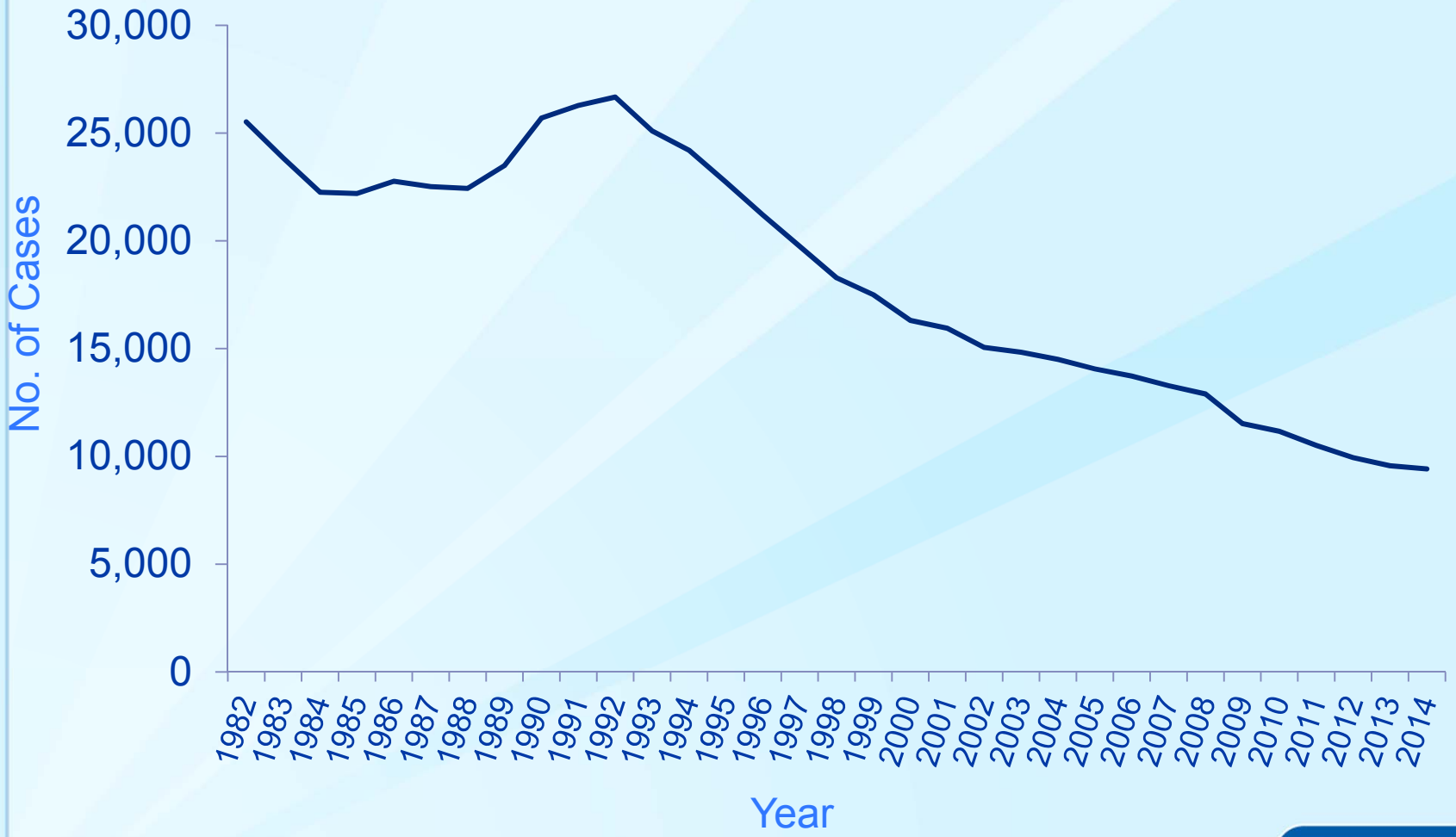
http://www.who.int/tb/publications/global_report/en/

"Think Global. Act Local."

A DOMESTIC DISTRIBUTION OF BURDEN

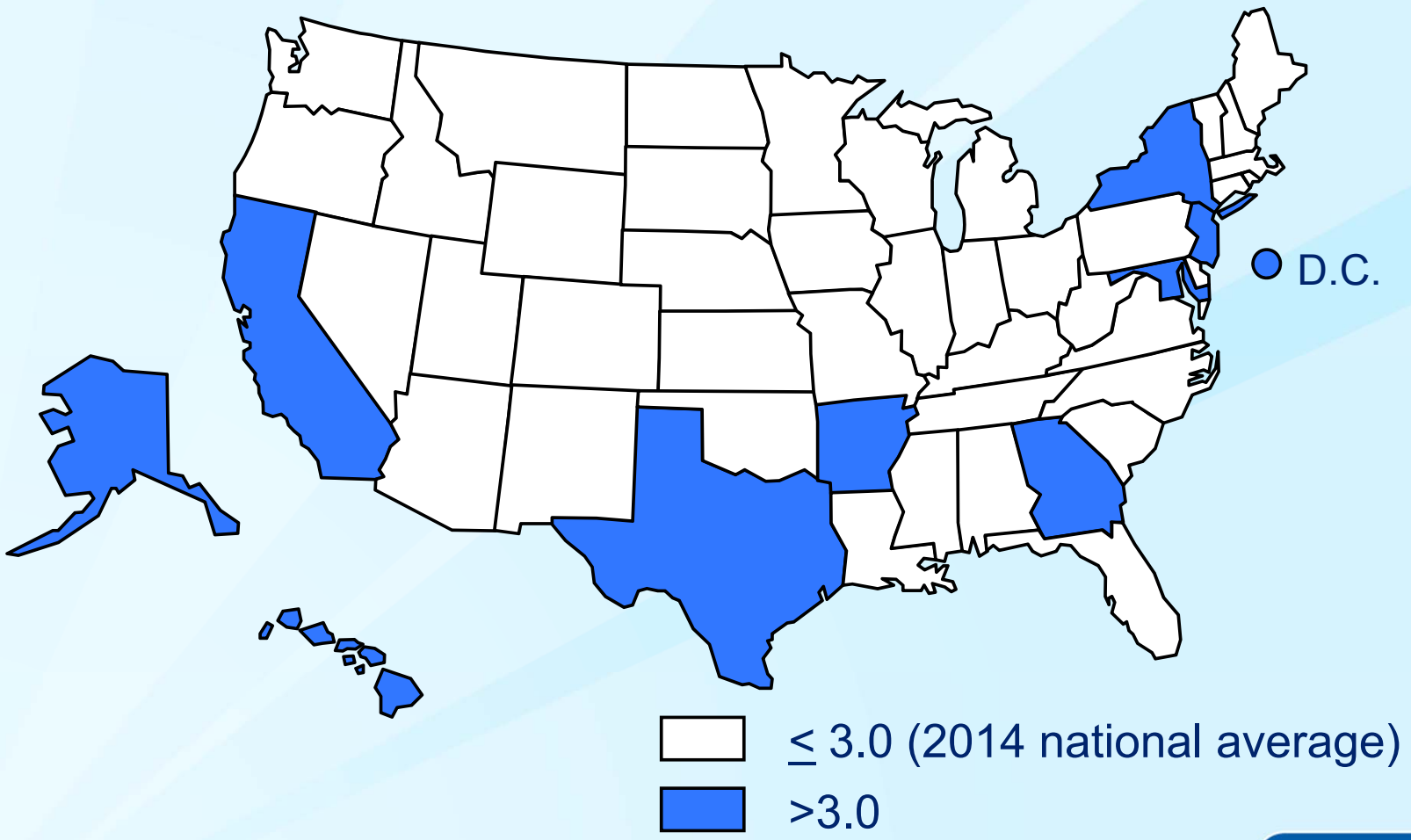
http://www.cdc.gov/tb/publications/infographic/takeontbinfographic.htm

Reported TB Cases
United States, 1982–2014*



*Updated as of June 5, 2015.

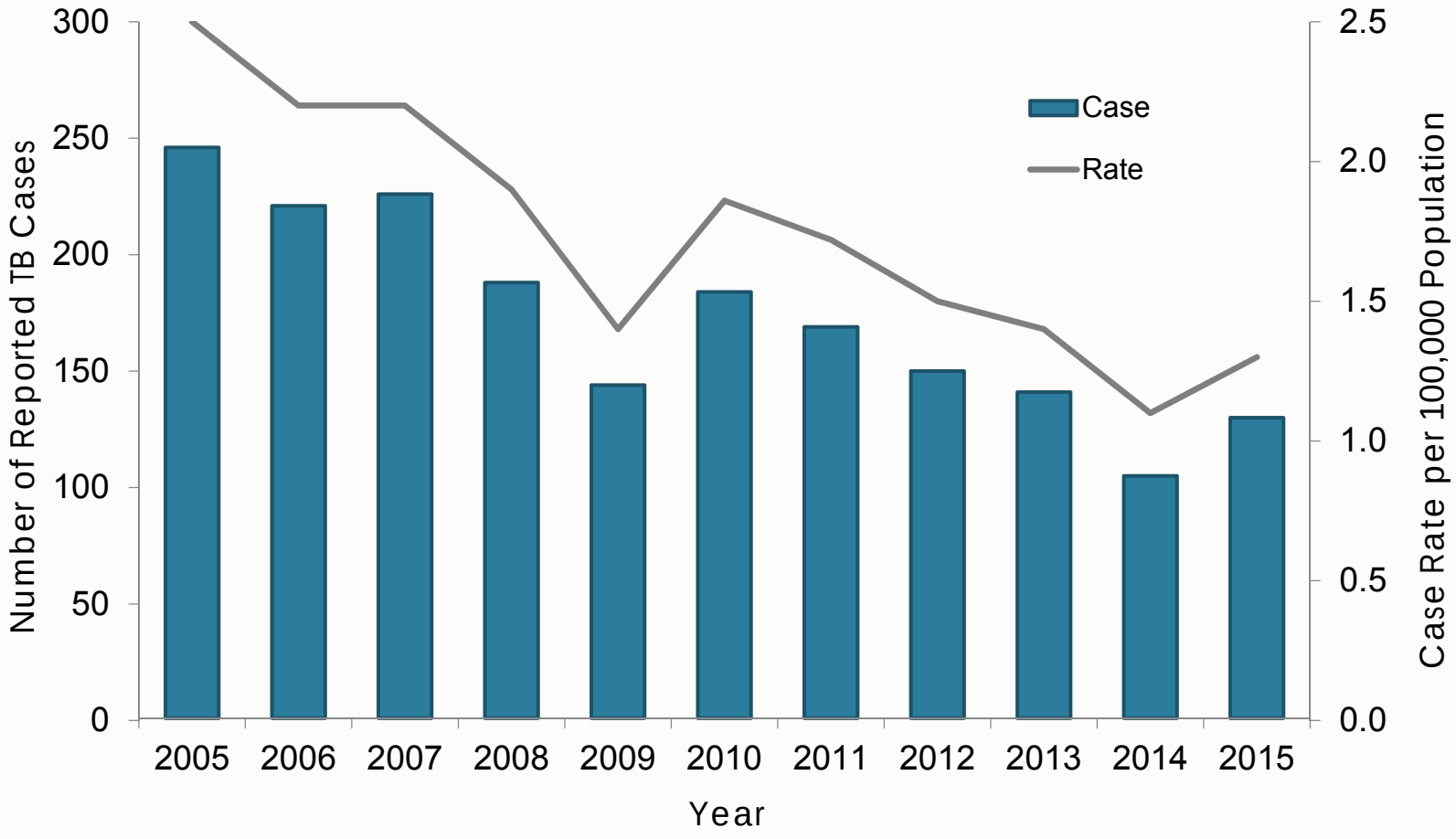
TB Case Rates,* United States, 2014



*Cases per 100,000.

Reported Tuberculosis Cases and Rates

Michigan, 2005-2015

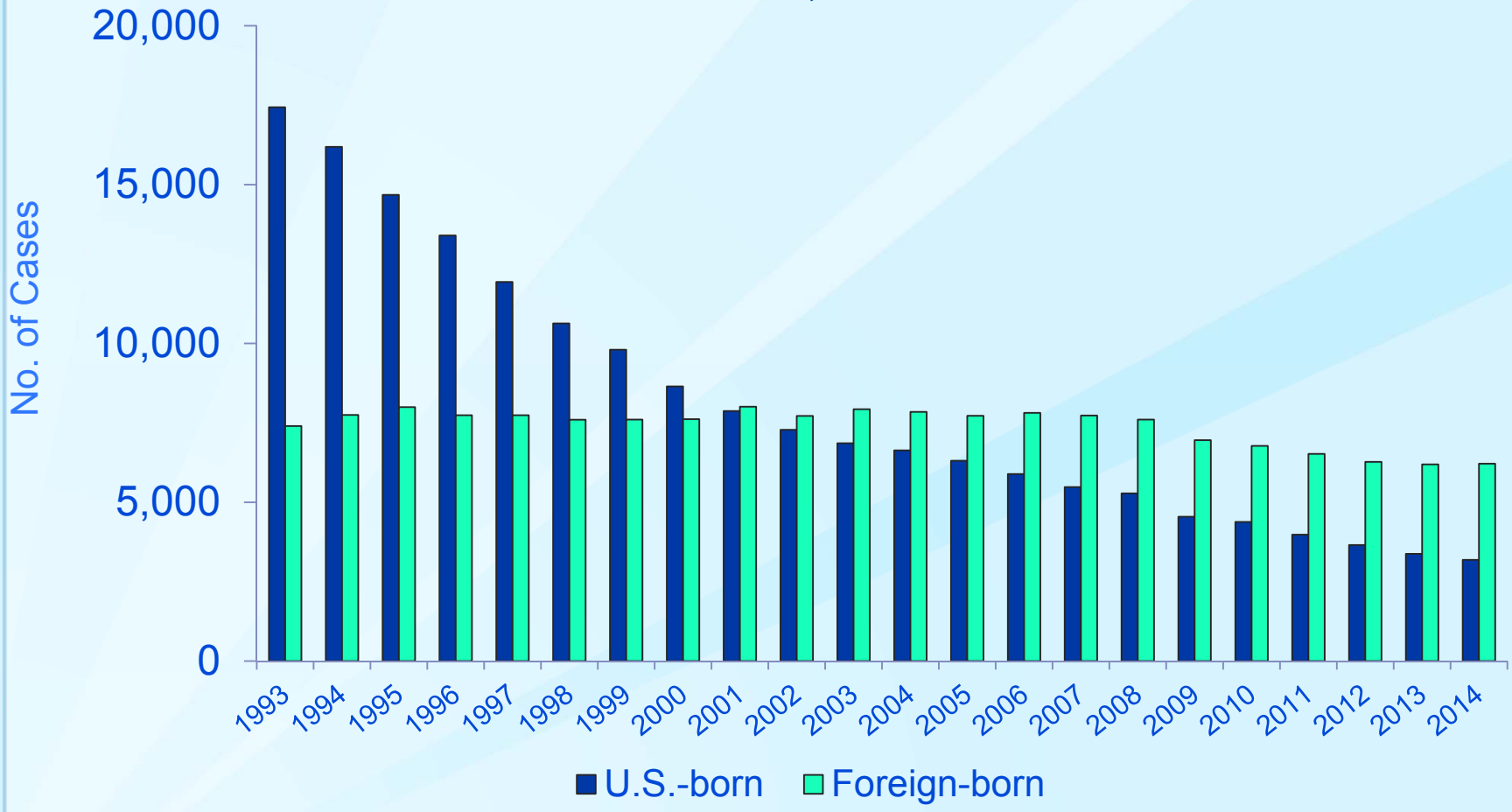


Clinical Characteristics of TB Cases, Michigan, 2015

- Verification Criteria:
  - 71% Culture Positive
  - <1% NAAT Positive (no culture)
  - 24% Clinical
  - 5% Provider Diagnosed
- Site of TB Disease:
  - 55% Pulmonary
  - 33% Extrapulmonary
    - 25% Ocular
  - 12% Concurrent

- 100% of culture positive cases were genotyped
- 15% in a genotype cluster

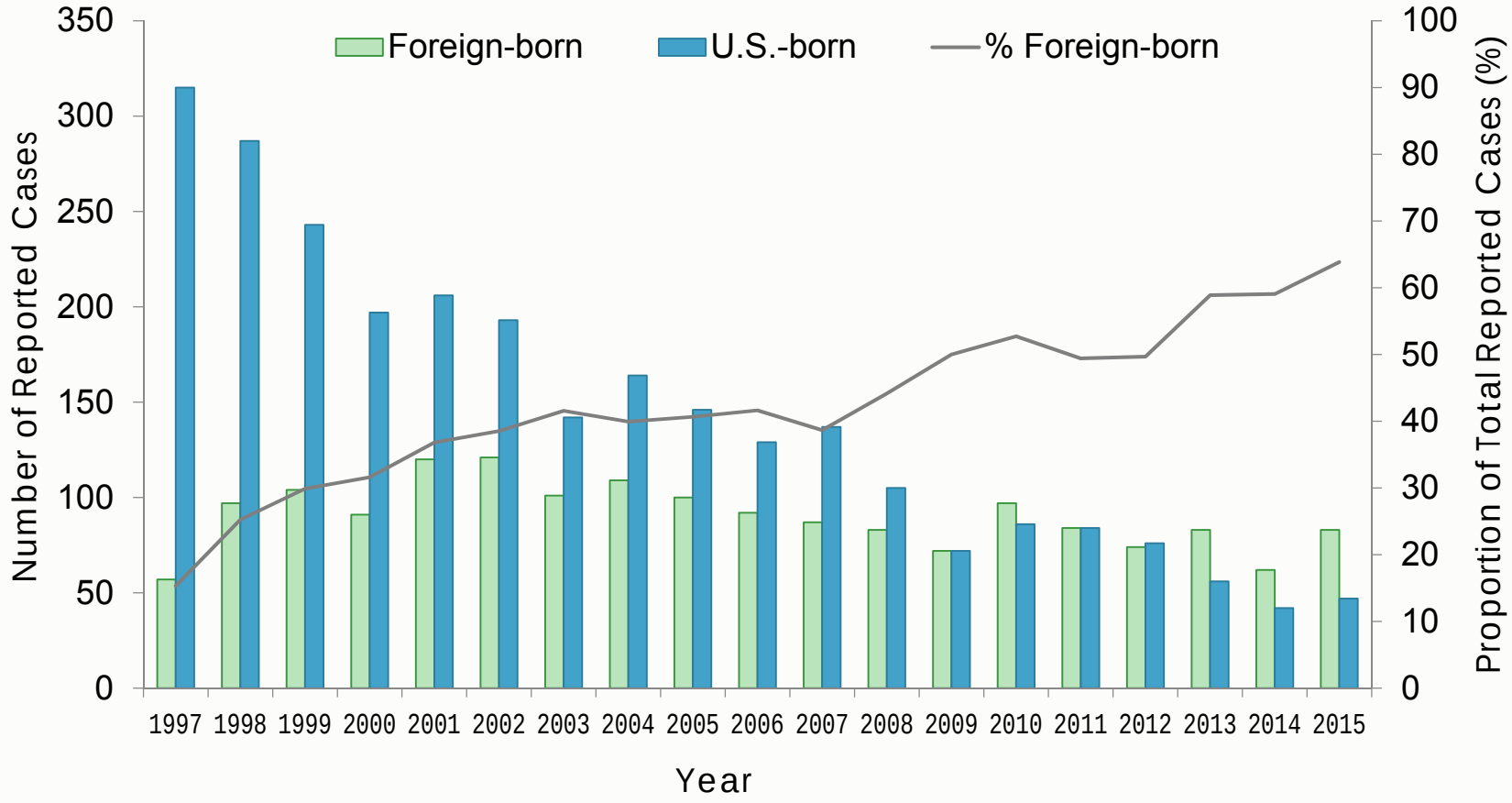
Number of TB Cases in U.S.-born vs. Foreign-born Persons, United States, 1993–2014*



*Updated as of June 5, 2015

Number and Proportion of U.S. vs. Foreign-born TB Cases

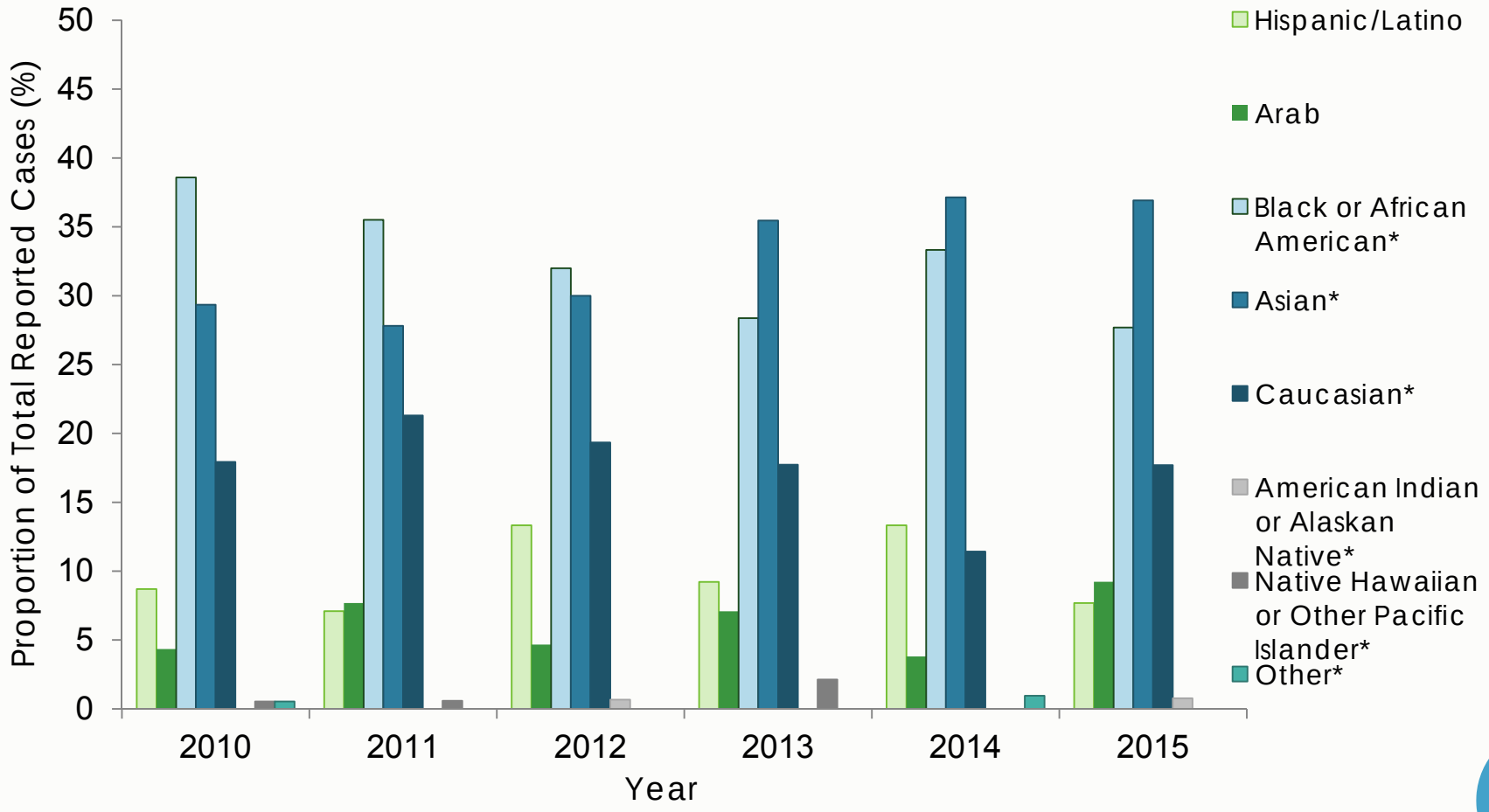
Michigan, 1997–2015




India
Mexico
Philippines
China
Vietnam
Bangladesh
Nepal
Bosnia and Herzegovina
Ukraine
Ethiopia
Congo
Nigeria
Guatemala
Pakistan
South Korea
Yemen
Laos
Somalia
Myanmar
Iraq
Saudi Arabia
Albania

Proportion of TB Cases by Race/ Ethnicity

Michigan, 2010–2015

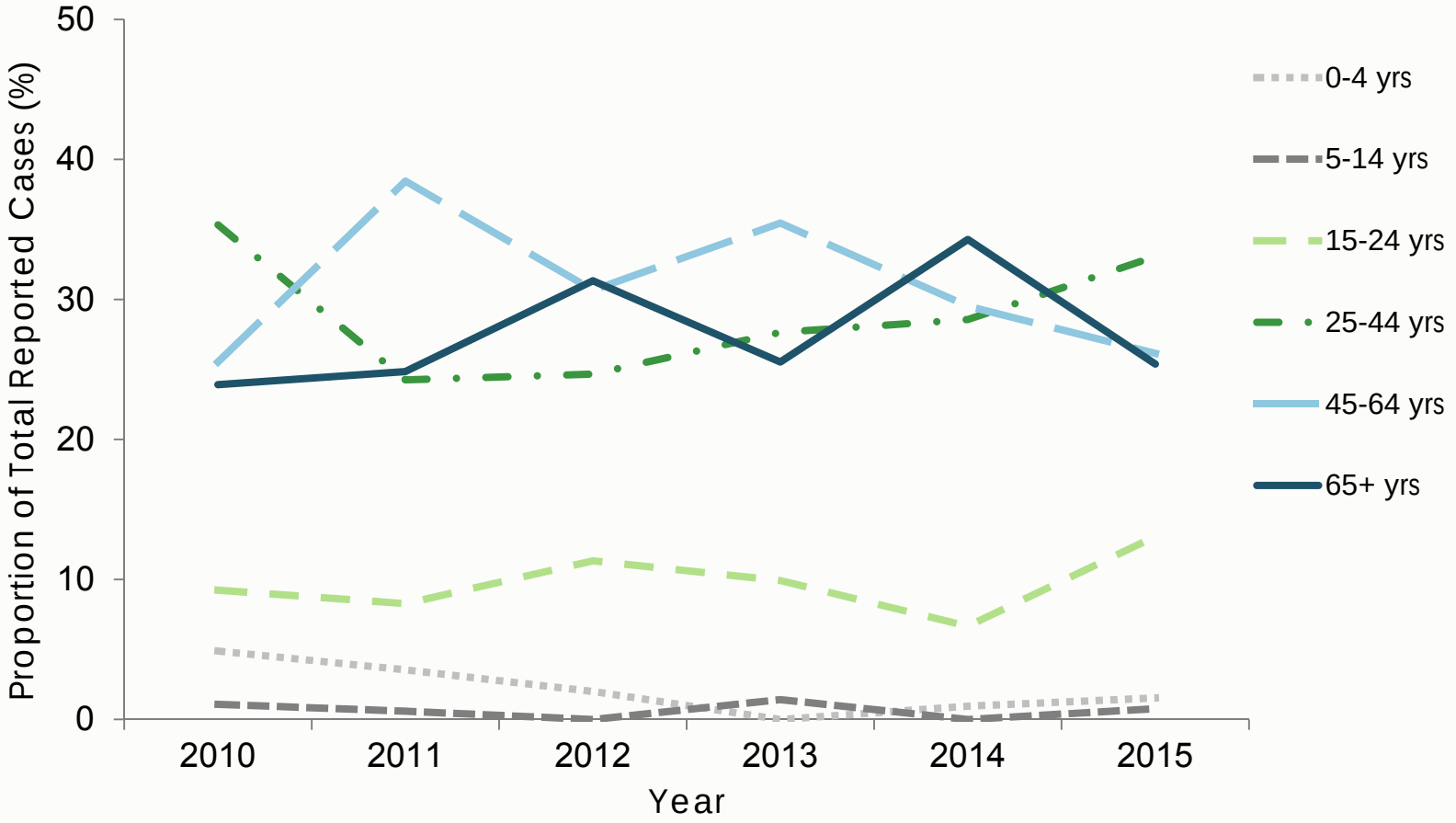


U.S-born: 62% Black or African American

Foreign-born: 58% Asian

Proportion of TB Cases by Age

Michigan, 2010–2015

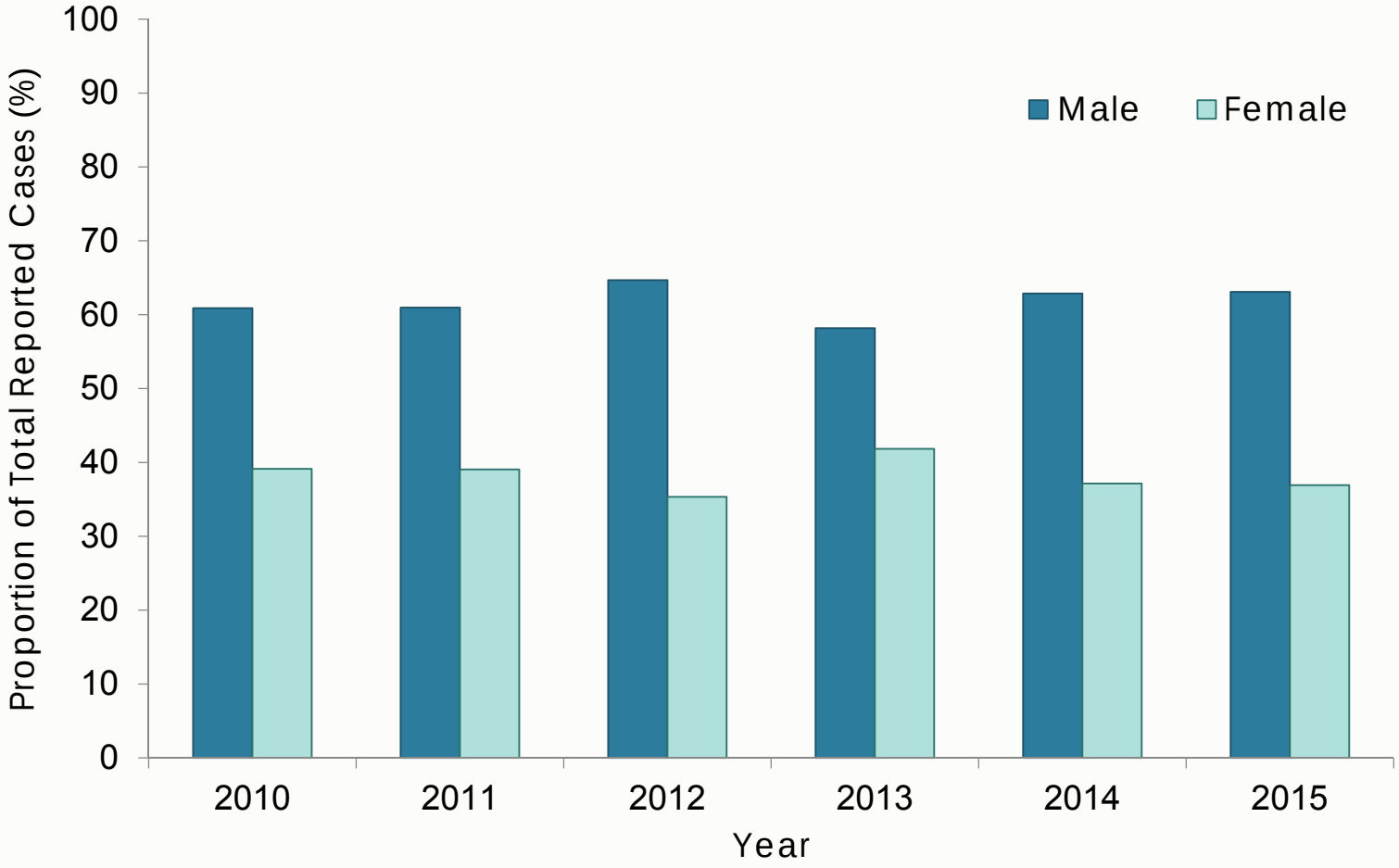


U.S-born: 37% 45-64 year olds

Foreign-born: 38% 25-44 year olds

Proportion of TB Cases by Gender

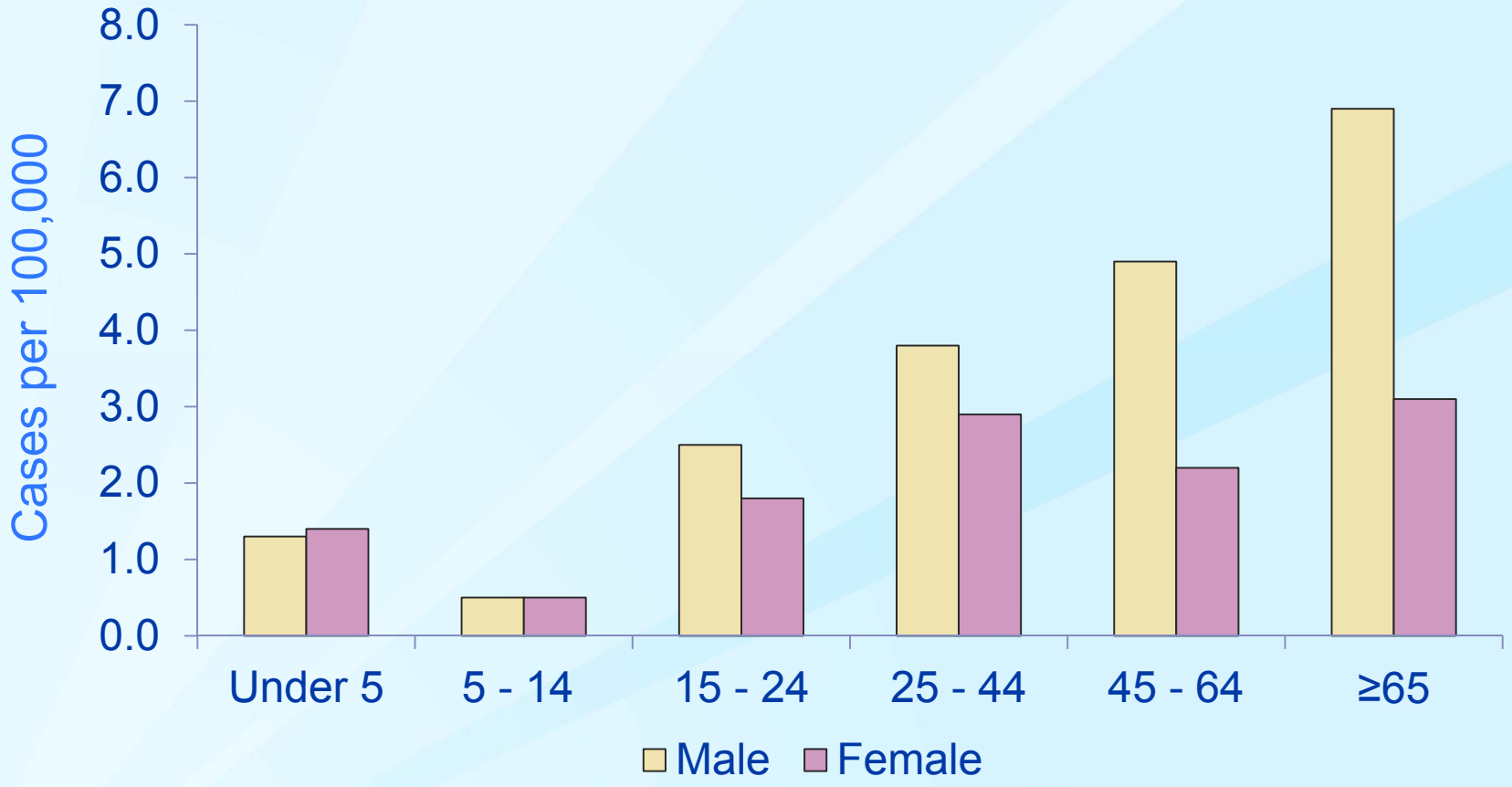
Michigan, 2010–2015



U.S-born: 67% Male

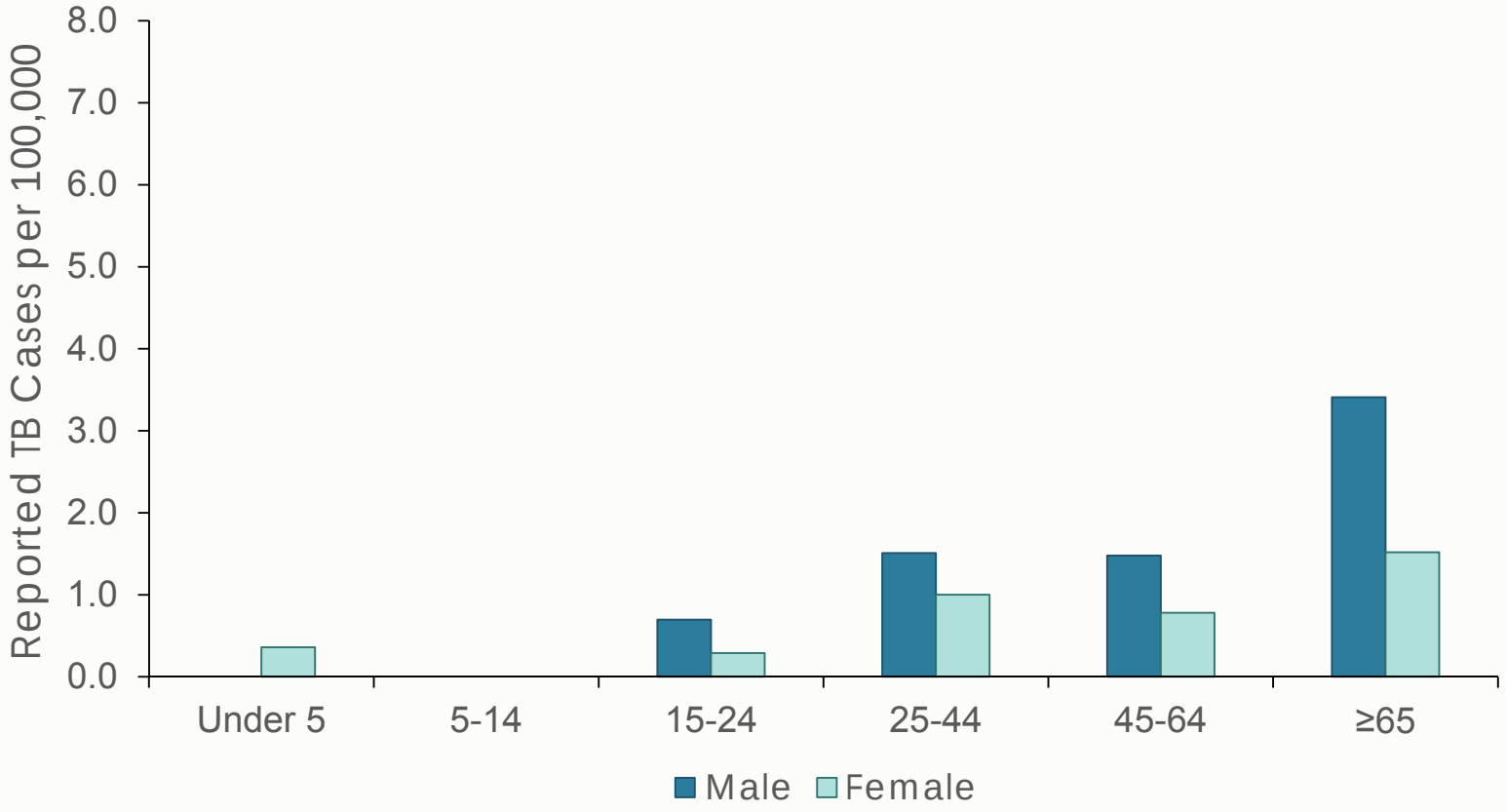
Foreign-born: 57% Male

TB Case Rates by Age Group and Sex, United States, 2014

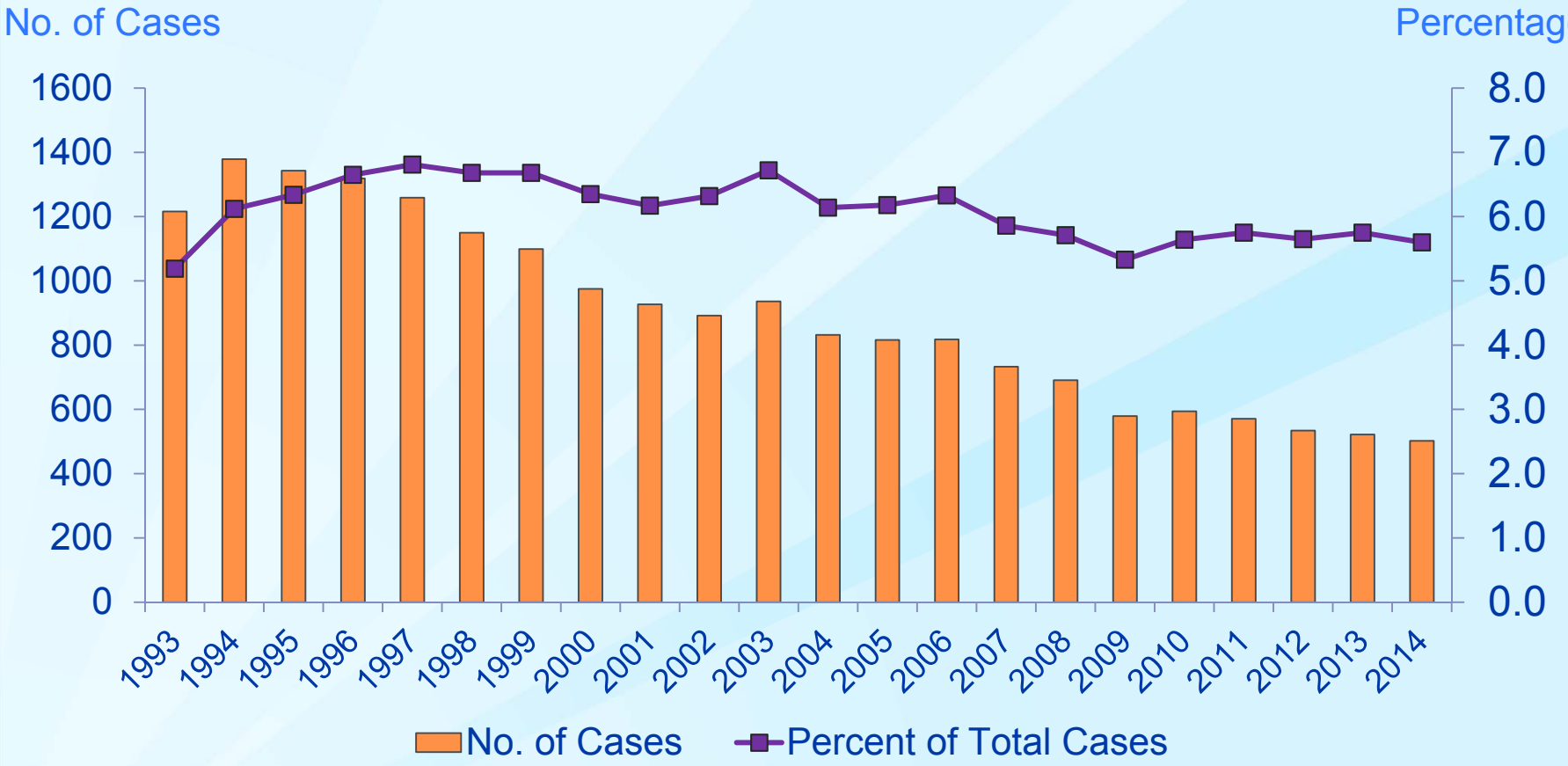


TB Case Rates by Age Group and Sex

Michigan, 2014



TB Cases Reported as Homeless in the 12 Months Prior to Diagnosis, Age ≥15, United States, 1993-2014*

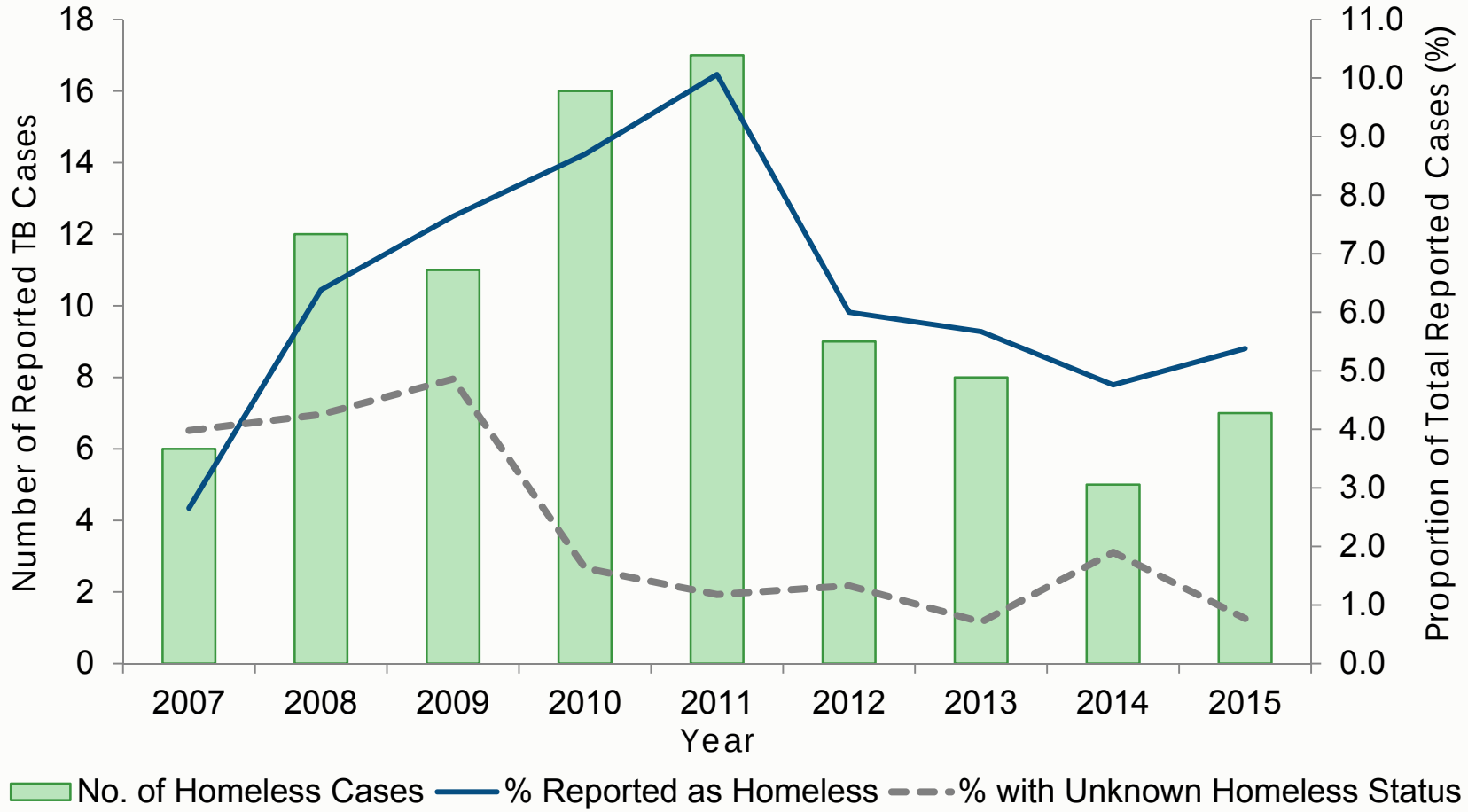


*Updated as of June 5, 2015.

Note: Homeless within past 12 months of TB diagnosis.

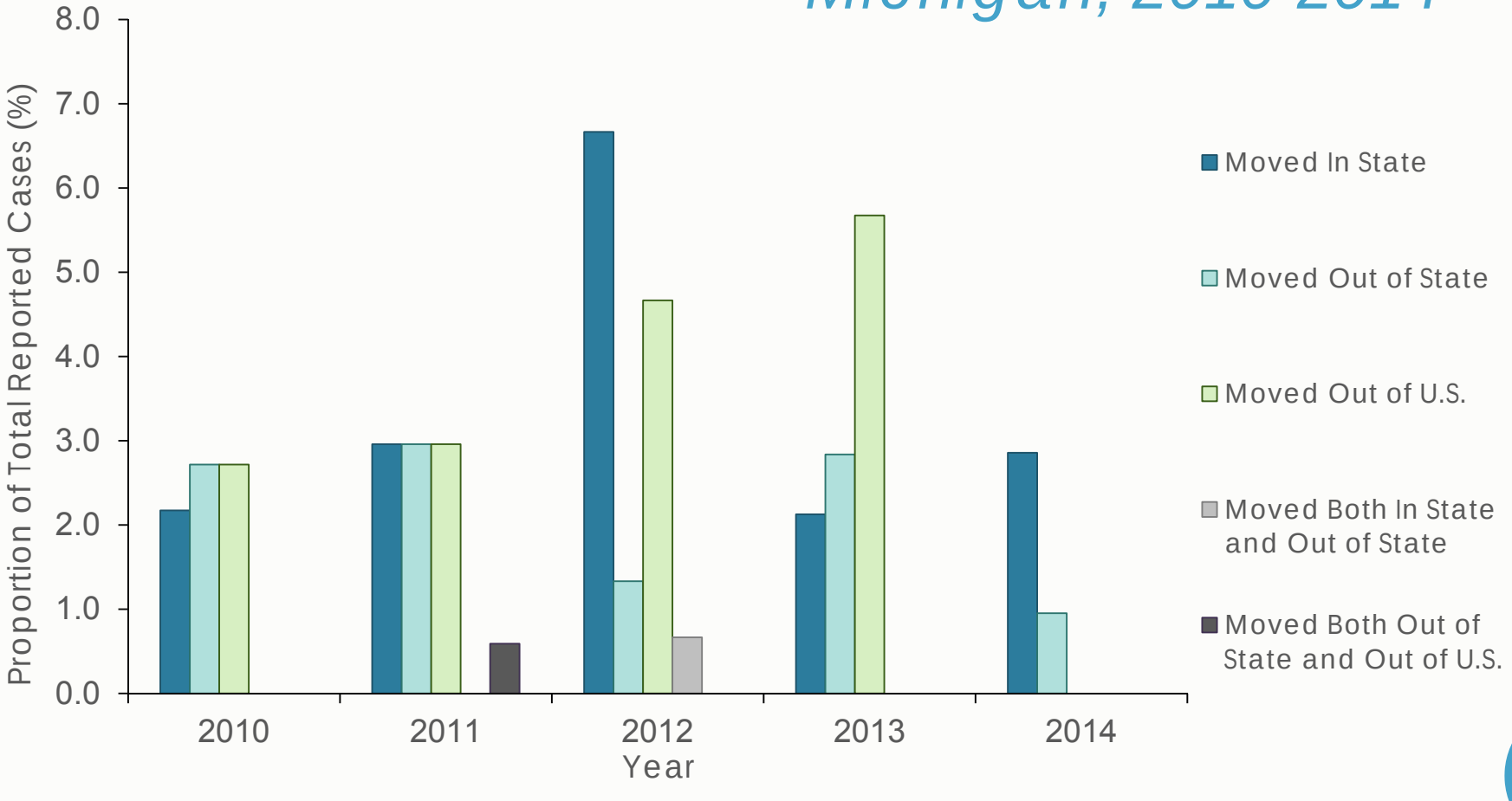
TB Cases Reported as Homeless in the 12 Months Prior to Diagnosis

Michigan, 2007 - 2015



Proportion of TB Cases Reported as Moved During Treatment

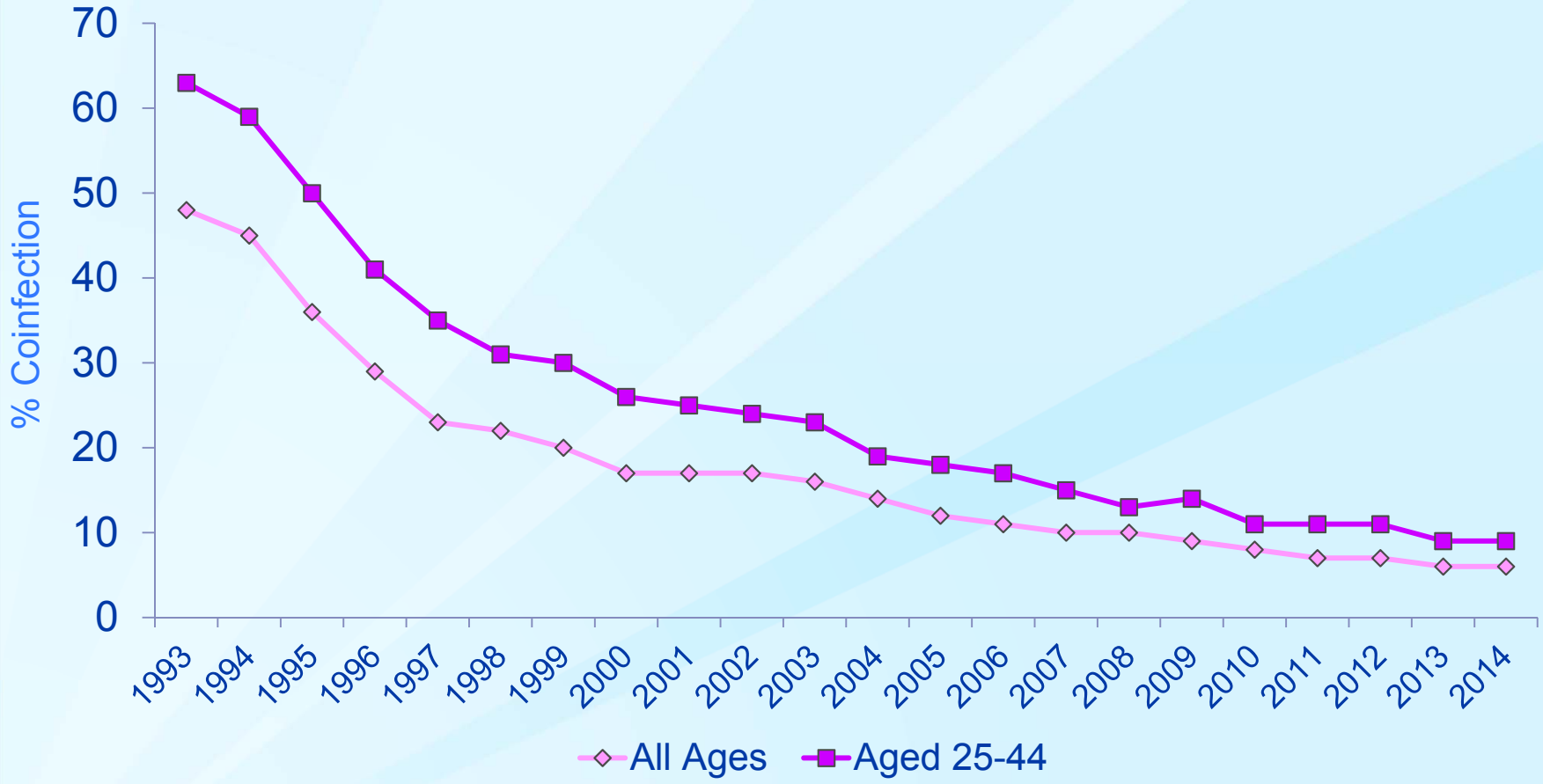
Michigan, 2010-2014



U.S-born: 6.9%

Foreign-born: 14.0%

Estimated HIV Coinfection in Persons Reported with TB, United States, 1993 – 2014*

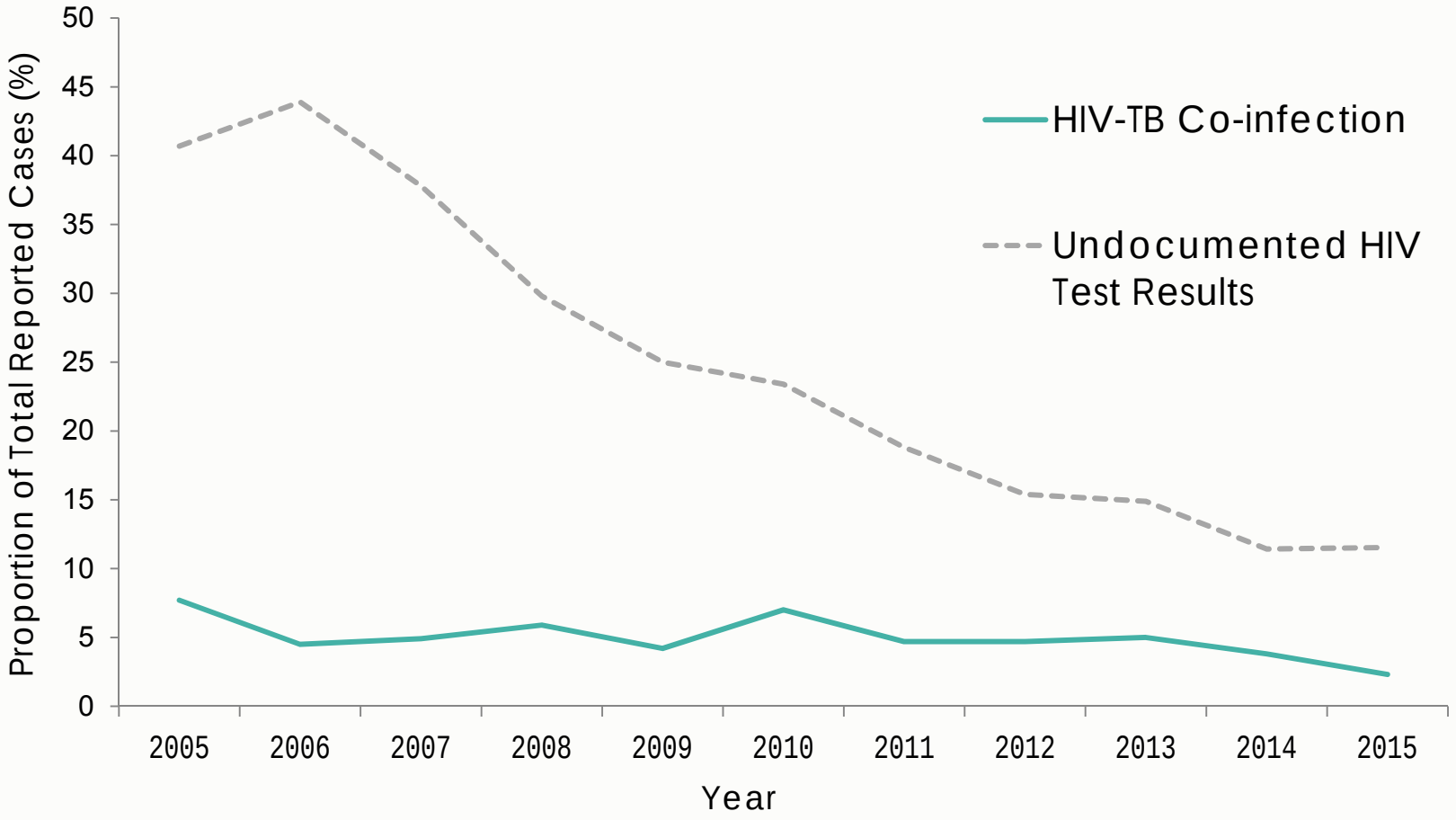


*Updated as of June 5, 2015.

Note: Minimum estimates based on reported HIV-positive status among all TB cases in the age group.

TB-HIV Coinfection and Undocumented HIV Test Result in TB Cases

Michigan, 2005 - 2015



Additional Characteristics and TB Risk Factors among U.S-born Vs. Foreign-born Cases, Michigan, 2005-2015

Characteristic	U.S.-born	Foreign-born	Total
Previous Diagnosis of TB	4.3%	6.0%	5.2%
Student	4.1%	8.1%	6.3%
Resident of Correctional Facility at Diagnosis	2.3%	0.6%	1.4%
Resident of a Long-term Care Facility at Diagnosis	7.6%	1.4%	4.2%
Injecting Drug Use	4.8%	0.6%	2.5%
Non-Injecting Drug Use	18.3%	0.6%	8.5%
Excess Alcohol Use	20.4%	3.9%	11.3%
Diabetes	11.7%	15.8%	14.2%

"Don't Tell Me What I Can't Do – Tell Me How To Do It!"

SCREENING OF IMMIGRANT AND REFUGEES

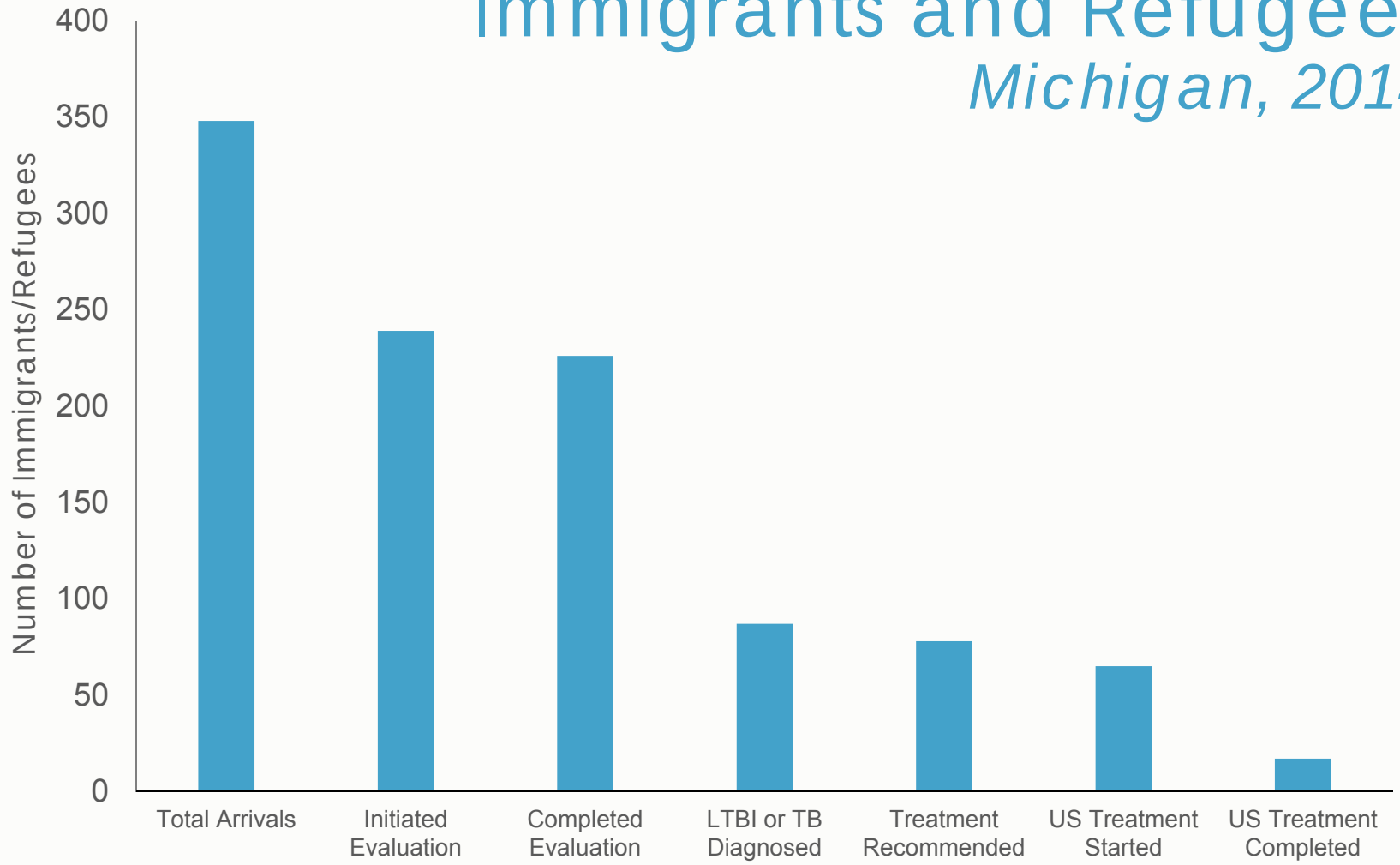
http://science-all.com/image.php?pic=/images/iceberg/iceberg-02.jpg

Immigrant and Refugee Arrivals to Michigan

- Immigrant and Refugee Classifications Requiring TB Screening:
  - Class A – active TB disease
  - **Class B1 – suspect TB disease**
  - **Class B2 – suspect LTBI**
  - Class B3 – TB Contact
- 2015: 353 arrivals requiring screening
- 2014: 348 arrivals requiring screening

TB Evaluation and Treatment of Immigrants and Refugees

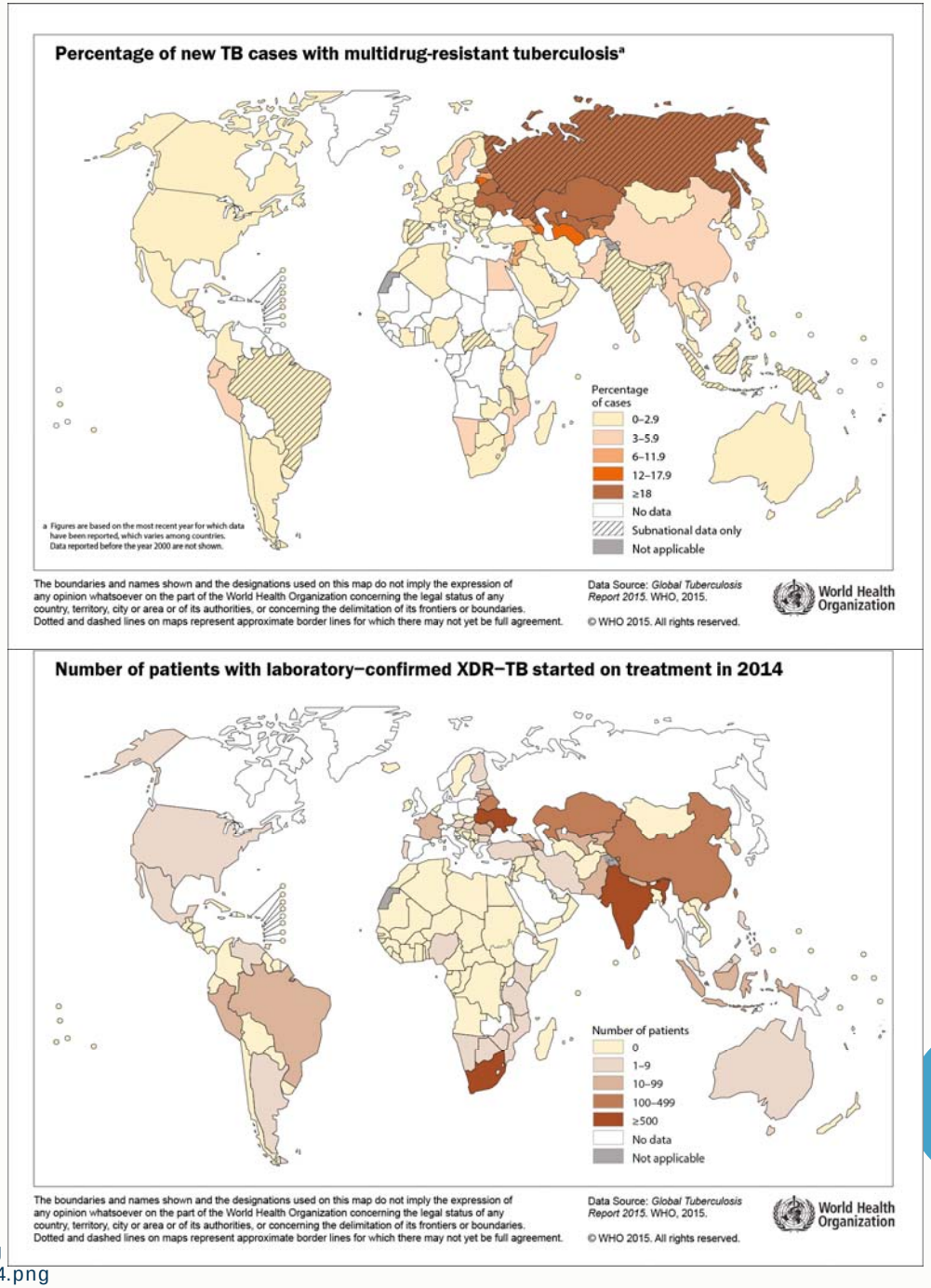
Michigan, 2014



Drug – Resistant Tuberculosis

Multi-Drug and Isoniazid Resistance, U.S., 2010-2015

	U.S.		Michigan	
	MDR	INH	MDR	INH
2010	1.1%	8.0%	1.1%	4.9%
2011	1.3%	9.1%	0.6%	5.9%
2012	1.0%	8.9%	1.3%	1.3%
2013	1.3%	9.2%	0.0%	2.1%
2014	1.3%	9.8%	0.0%	6.7%
2015	--	--	0.0%	3.8%



http://gamapserver.who.int/mapLibrary/Files/Maps/Global_TB_MDRcases.png
http://gamapserver.who.int/mapLibrary/Files/Maps/Global_TB_cases_xdr_2014.png

Thank you!

Acknowledgements:

- Local Health Department TB Nurses and Staff
- MDHHS TB Control Unit

Contact Information:

smiths79@michigan.gov

References:

1. World Health Organization. Global tuberculosis report 2015. Geneva, Switzerland: World Health Organization; 2015. http://apps.who.int/iris/bitstream/10665/191102/1/9789241565059_eng.pdf?ua=1
2. CDC. Reported tuberculosis in the United State, 2014. Atlanta, GA: US Department of Health and Human Services, CDC; 2015. http://www.cdc.gov/tb/statistics/reports/2014/default.htm
3. Salinas JL, Mindra G, Haddad MB, Pratt R, Price SF, Langer AJ. Leveling of Tuberculosis Incidence – United States, 2013-2015. MMWR Morb Mortal Wkly Rep 2016;65:273–278. DOI: http://dx.doi.org/10.15585/mmwr.mm6511a2
4. US Census Bureau. Current estimates data. Washington, DC: US Census Bureau; 2014. http://www.census.gov/popest/data/state/asrh/2014/index.html

CULTURAL COMPETENCIES PANEL

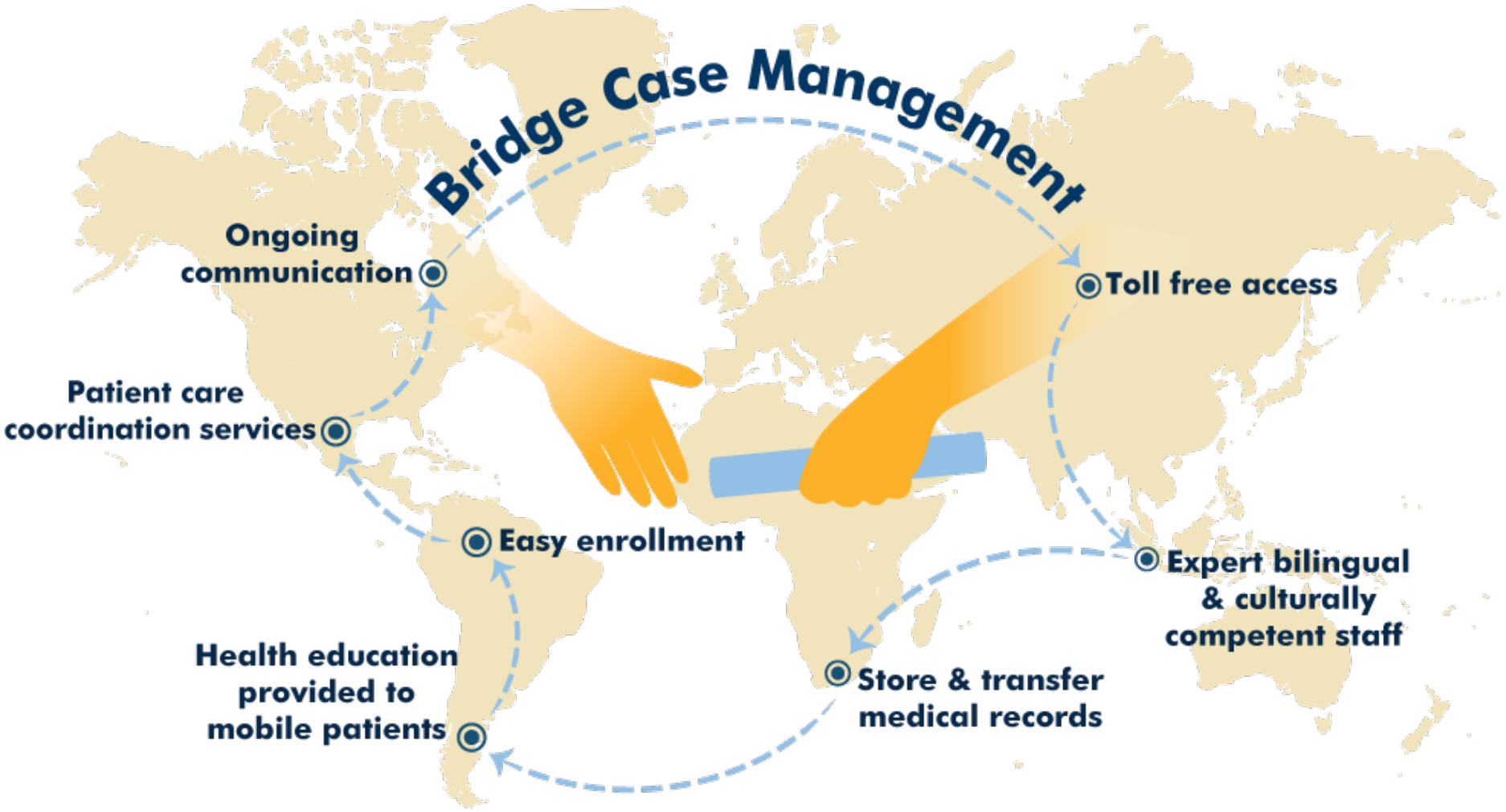
Ricardo Garay, BBA
Erika Brown-Binion, MA
Aimmee Mullendore, RN

MIGRANT CLINICIANS NETWORK

Photo © Alan Pogue

- 10,000 constituents
- Founded in 1984
- Oldest clinical network serving the mobile poor
- MCN's primary constituents
  - Federally funded Migrant & Community Health Centers
  - State and local health departments

MCN's Health Network provides continuity of care to mobile patients and their providers



Health Network

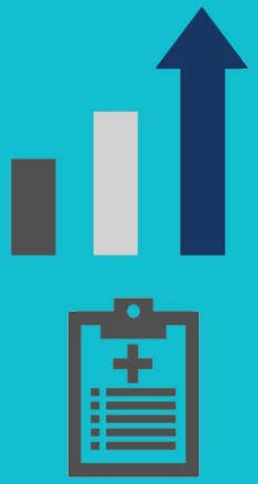
MCN's Health Network assures continuity of care and treatment completion by providing comprehensive case management, medical records transfer, and follow-up services for mobile patients.

To date, we have worked with patients from

111 engaged partner countries

This year, we had

46% increased communication with Health Centers



and additionally

33% increased need and usage by Health Departments

Refugee Development Center

History and Mission:

The Refugee Development Center started in 2002 with the mission of providing the educational and social support refugees need to become self-sufficient members of society.

RDC Programs

Youth: After-school tutoring and mentoring, GLOBE Camp, Newcomers Soccer Program, Nutrition and Health Education, Girls Group

Adult: ESOL Classes, Home Visits, Parent Nights, Parent/Teacher Conference Support, Women's Sewing Circle, Nutrition Education.

Outreach: Advocacy, resource matching, community partnerships and education



BRANCH-HILLSDALE-ST. JOSEPH COMMUNITY HEALTH AGENCY

Aimmee Mullendore, Clinic Coordinator and CD Nurse St. Joseph County

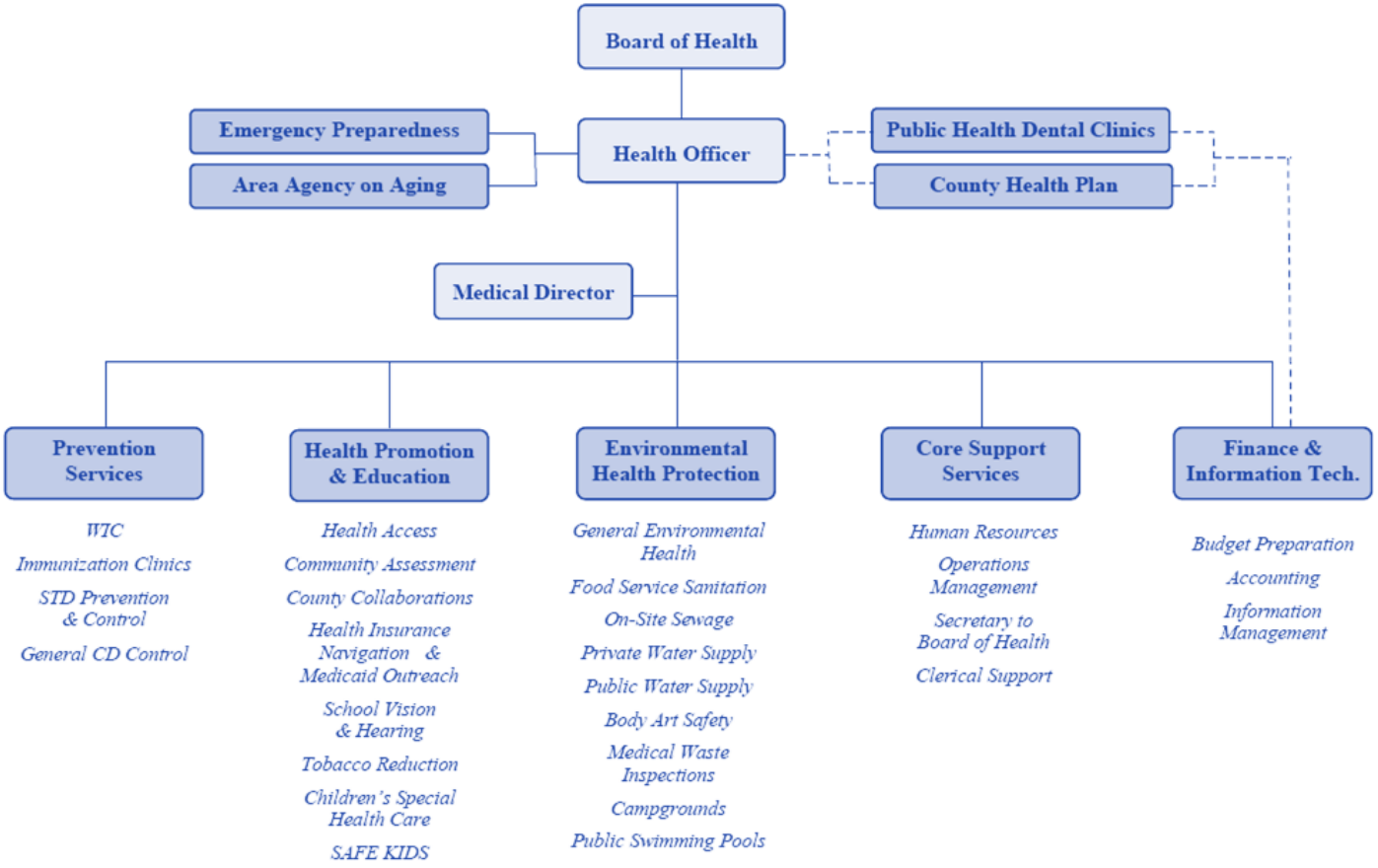
BRANCH-HILLSDALE-ST. JOSEPH
COMMUNITY HEALTH AGENCY

www.bhsj.org

WHERE WE ARE & WHO WE ARE.....

BRANCH-HILLSDALE-ST. JOSEPH
COMMUNITY HEALTH AGENCY

BHSJ CHA ORGANIZATIONAL CHART



OUR MISSION…

We promote optimal health to prolong life by

preventing disease
and assuring the protection
of the public's health
in our community and environment

OUR VISION…

We envision positively impacting

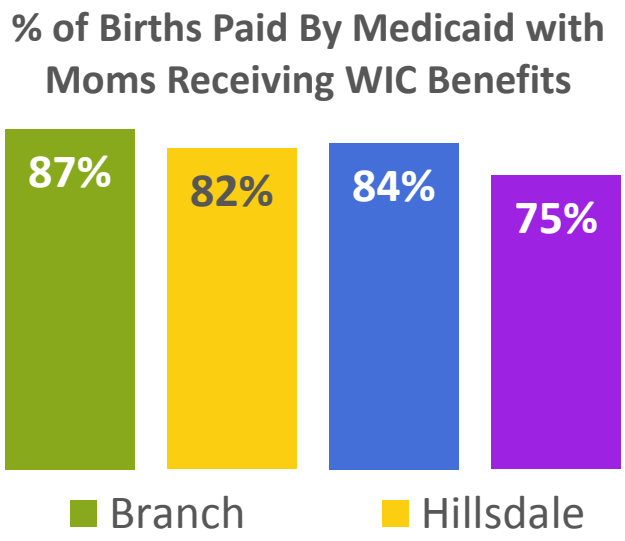
the health of individuals, families, communities and the environment through

responsiveness, competence and collaboration

PREVENTION SERVICES…

BRANCH-HILLSDALE-ST. JOSEPH
COMMUNITY HEALTH AGENCY

- **Monthly Food Package:**
  - Fresh fruits and vegetables
  - Whole grain cereals, breads, brown rice, and tortillas
  - Low fat dairy products, including milk, cheeses, and eggs
  - Formula, baby foods, including cereal, fruits, vegetables, and meats
  - Canned fish, peanut butter and juices
- **Project Fresh**
  - Provides coupon booklet that has ten $2 coupons
    - Must be used at an approved Michigan's Farmer Market or similar venue
    - Must be used between June 1 and October 31
- **WIC Peer Breastfeeding Support**



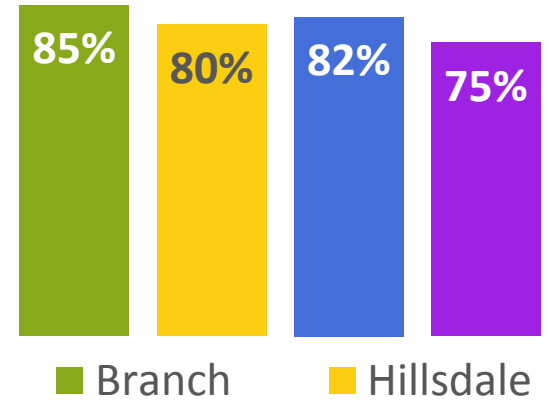
WIC PROGRAM

Women, Infants & Children

IMMUNIZATIONS

Infants to Adult

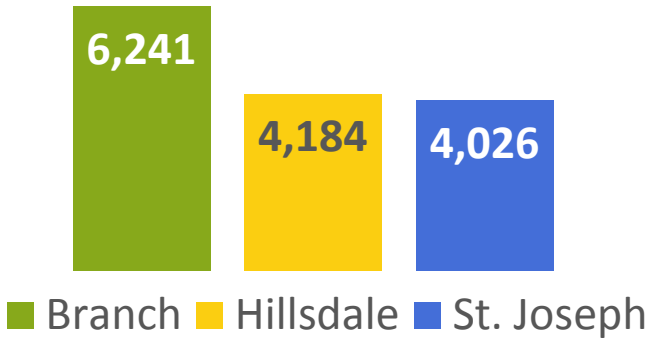
- **Provide Immunizations from Birth through Adult:**
  - Childhood Immunizations
    - Required for school entry
  - Travel Immunizations
  - Flu Shots
- **Vaccine for Children Program**
  - Medicaid
  - Uninsured
  - Children who lack vaccine coverage
- **Provider Education**
- **Immunization Recalls**
- **Work with Schools to assure adequate immunization status**
- **Issue Waivers**



COMMUNICABLE DISEASES

Infants to Adult

- **Disease Surveillance:**
  - Michigan Disease Surveillance System
  - MI HAN (Michigan's Health Alert Network)
  - Local Reporting
    - Providers
    - Online CD Reporting - Schools
  - Health Alert Team
- **Tuberculosis**
- **STD Testing and Contact Follow-up**
- **HIV/AIDS Testing and Contact Follow-up**
- **Emerging Diseases**



HEALTH EDUCATION SERVICES…

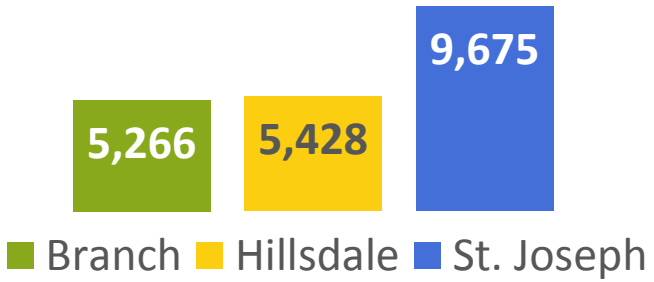
BRANCH-HILLSDALE-ST. JOSEPH
COMMUNITY HEALTH AGENCY

HEARING & VISION SCREENINGS

Preschool to High School

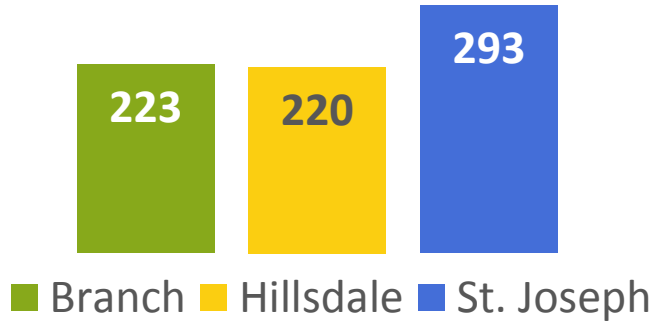
- **Vision Screening:**
  - Preschool & Kindergarten
  - 1st , 3rd, 5th, 7th & 9th Grades
- **Hearing Screening:**
  - Preschool & Kindergarten
  - 2nd and 4th Grades
- **Screen Children in**
  - Public/Privates Schools,
  - Daycares and Head Starts
- **Performs Rescreens**
- **Follow-ups with Parents Whose Children Did Not Pass**

Total # of Hearing & Vision Screens, 2014



- **Diagnosis-based Program**
  - More than 2,600 eligible diagnoses
    - Asthma
    - Blood Disorders
    - Cancers
    - Congenital Anomalies
    - Metabolic Diseases
    - And many more
  - Not Income-based
- **Children up to age 21 years**
  - Some adults who have certain eligible conditions such as hemophilia or cystic fibrosis

Total # of CSHCS Enrollees, 2015



CSHCS

Children's Special Health Care Services

- Pays for specialty medical bills
- Helps find specialty services
- Helps family with language and cultural services
- Connects families to community-based services
- 2/3rds of our enrollees receive Medicaid Insurance

"[CSHCS] …is better than what I had originally thought… the more I learned about it, the more I couldn't believe there was something so fabulous."

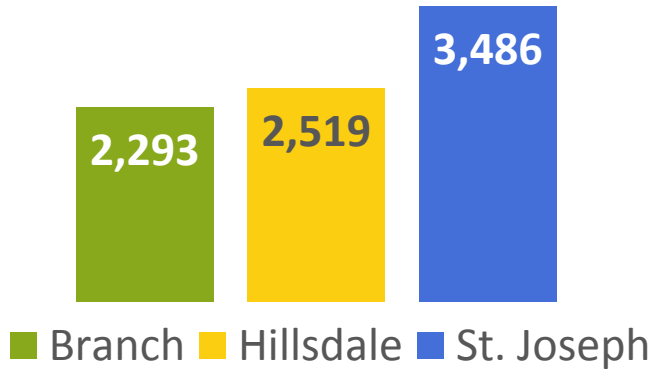
2014 Focus Group Participant

CSHCS

Children's Special Health Care Services

- **Certified Navigators**
- **Marketplace**
  - Answering questions
  - Establishing an electronic account & completing application
  - Assistance in understanding their healthcare needs
  - Assistance with filing grievances and/or appeals
  - Assistance in understanding the penalties
- **MDHHS Bundled Benefits**
  - Medicaid
  - State Emergency Relief (SER)
  - Food Stamps
  - Cash Assistance
  - Child Care

Total # of Healthy Michigan Plan Enrollees, 2015



IN-PERSON ASSISTERS

Individuals, Families & Small Businesses

OTHER HEALTH EDUCATION SERVICES

- **Tobacco Reduction Coalition**
- **SAFE KIDS**
  - Car Seat Checks/Installations
  - Safe Sleep
- **Health Demography & Performance Indicators**
- **Wellness Presentations**
- **School Presentations**
  - STD/AIDS/HIV
  - Reproductive Health
- **Health Fairs**
- **Pamphlets & Newsletters**
- **Program & Administration Support**
  - Customer Satisfaction
  - Quality Improvement
  - Accreditation
  - Strategic Planning
  - Grant/Report Writing

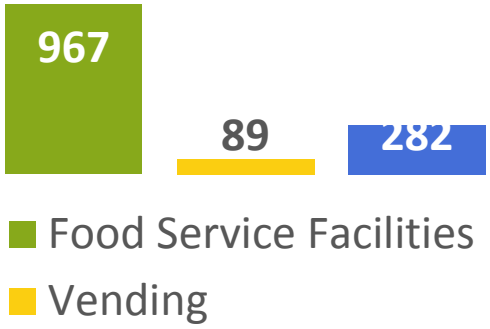
ENVIRONMENTAL HEALTH SERVICES…

BRANCH-HILLSDALE-ST. JOSEPH

COMMUNITY HEALTH AGENCY

- Inspect Food Facilities Twice a Year per Michigan Food Law
- Conduct Food Service Plan Reviews
- Inspect and Issue Temporary Food Permits
- Provide Food Manager/Employee Classes
- Issue Certificates of Excellence Awards
- Publish & Distributes Annual 'Food for Thought' Newsletter
- Work Collaboratively with Prevention Services and Emergency Preparedness on Foodborne Illness Complaints/Investigations

Total # of Food Inspections, 2014



FOOD PROTECTION

Individuals, Families & Communities

OTHER ENVIRONMENTAL HEALTH SERVICES

- Well and Septic Permits
- Septage truck and disposal site inspections
- Free Radon Test Kits
- Nuisance Complaints
- Campground Inspections
- Swimming Pool Inspections
- Body Art Facility Inspections
- Medical Waste Inspections
- Meth Lab Clean-up Oversight
- Housing Complaint Investigations

AREA AGENCY ON AGING SERVICES…

BRANCH-HILLSDALE-ST. JOSEPH
COMMUNITY HEALTH AGENCY

AREA AGENCY ON AGING SERVICES…

- **Assessing Community Needs & Funding Services**
  - Options Counseling
  - In-Home Services
  - Nutrition Services
  - Community-based Services
  - Assistive Devices & Technology
  - Legal Assistance
  - Transportation
  - Medicare/Medicaid Assistance Program
  - Grandparents Raising Grandchildren
  - Housing Options & Guides
  - Benefits & Services for Veterans
  - Senior Centers & Volunteer Opportunities
- **Advocacy**
- **Information & Assistance**
- **Community Living Program**
- **Health & Wellness Programs**

MY COMMUNITY DENTAL CENTERS

BRANCH-HILLSDALE-ST. JOSEPH
COMMUNITY HEALTH AGENCY

MY COMMUNITY DENTAL CENTERS

- **Contracted through Michigan Community Dental Clinics, Inc.**
- **Provides:**
  - Oral Exam/Cleaning
  - Fillings
  - Tooth Removal
  - Teeth Replacements including dentures and partials
  - Emergency Treatment
  - Fluoride Treatment
- **2 Dental Clinics**
  - **Hillsdale:** 20 Care Drive, Suite D
  - **Three Rivers:** 721 6th Avenue, Suite B
- **Accepts:**
  - Children on Medicaid (including Healthy Kids Dental and MI Child)
  - Adults on Medicaid and Healthy Michigan Plan
  - Low income, uninsured adults with incomes below 200% of the Federal Poverty Line
- **Fees reduced for eligible uninsured**


Trust
Humility
TRUST
Empathy
Empathy
Learning
Humility
Humility
Trust
Lifelong
TRUST
CAPITAL
FICTIO
Cultural
Humility
Open-mindedness
Empathy
Humility
TRUST
Trust
Trust
Cultural
TRUST
ENGAGE
EMPATHY
Cultural Competency
Cultural
Cultural
UNITED
LEAD
UNITED
TRUST
Curiosity
Humility
Lifelong
TRAINING
INFORMATION
Cultural
trust
TRUST
IMPROVE
Humility
Empathy
Cultural
Humility
Lifelong
TRAINING
INFORMATION
NETWORK
Trust
STUDY
Cultural
Empathy
Learning
Lifelong
DATA
SOCIAL
Humility
Empathy
Curiosity
Humility
Curiosity
Open-mindedness
RISK
TALENT
Curiosity
DIVERSE
TRUST
TRAINING
Open
Curiosity
Humility
Curiosity
Curiosity
Humility
Lifelong Learning
Humility
Empathy
Open-mindedness
Humility
ENGAGE
Inquiry
Cultural
Lifelong
Learning