

NAAT Testing for TB and NTM in Florida

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Introduction

Tuberculosis (TB) can take several weeks for a culture to demonstrate growth, and with the emergence of multi- and extensively-drug-resistant TB, laboratories are under more pressure to improve tools for rapid diagnosis and antimicrobial susceptibility testing. The use of a commercial nucleic acid amplification test (NAAT) for TB performed directly on respiratory specimens was first approved by FDA in 1995, and CDC recommended universal use of NAAT for patients with suspected pulmonary TB in 2009. This has led to improvements in the rapid diagnosis of TB. However, to increase the proportion of culture-confirmed TB patients with a positive NAAT result reported within 2 days of specimen collection from 32% to 77% by 2020, an objective of Healthy People 2020, clinicians and infection preventionists must work together with stake-holders to identify barriers that are preventing wider implementation of NAAT [1].

Tuberculosis Cases - FL, 1998-2017

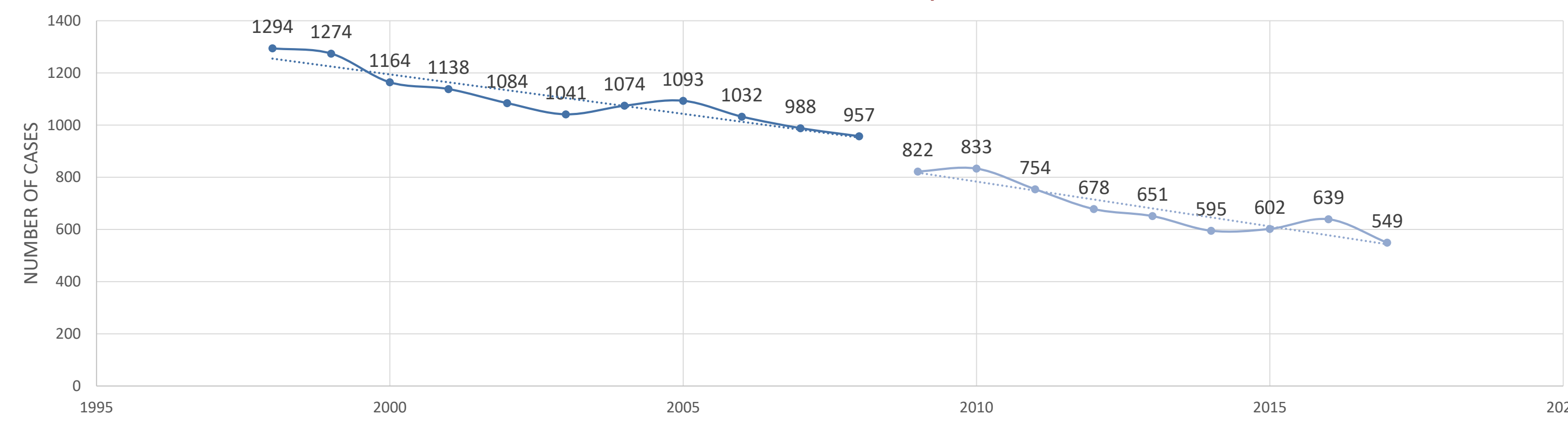


Figure 1. Tuberculosis Cases, FL, 1998-2017. (Adapted from FDOH, Tuberculosis Control Section, 2017). Data current as of 12/18/18.

Over two decades, reported TB cases from Florida continue to decline, 33% decrease between 2009 and 2017 (Fig. 1)[2]. Nevertheless, improved NAAT utilization and rapid diagnosis are required to continue to identify TB and ensure that the *Mycobacterium tuberculosis* complex is ruled out as quick as possible and that nontuberculous mycobacteria (NTM) can be identified to determine if they are clinically significant.

Methods

De-identified TB case reports from 2009 through 2017 obtained from Florida Department of Health (FDOH), Bureau of Communicable Diseases, TB Control Section, and de-identified TB and NTM laboratory records obtained from FDOH, Bureau of Public Health Laboratories (BPHL)-Jacksonville were retrospectively analyzed. Software utilized included SPSS and Microsoft Excel. Reported cases in the original datasets were categorized by year prior to the analysis.

Results

Positive sputum culture for TB cases FL, 2009-2017

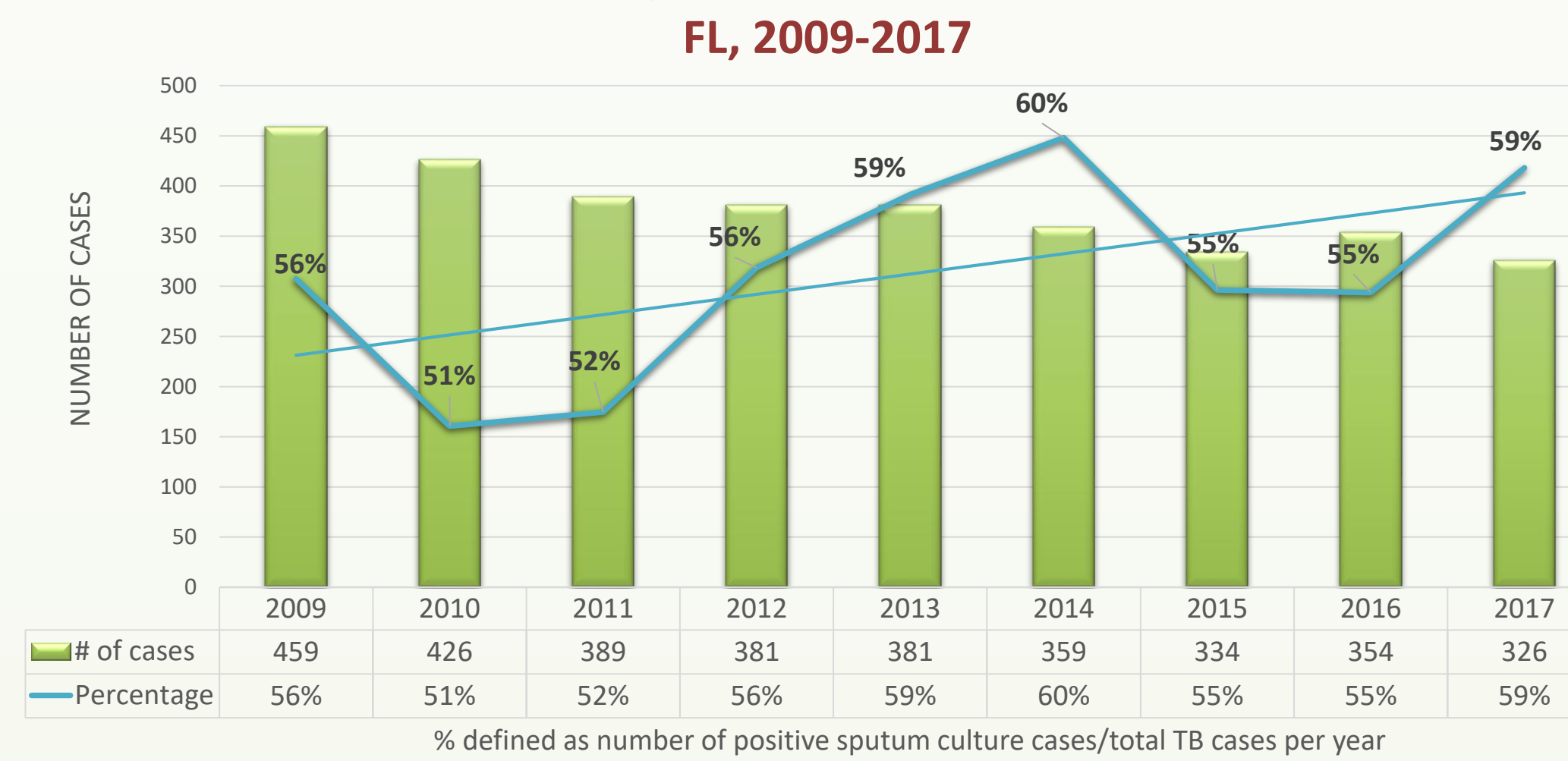


Figure 2. Positive sputum culture for TB cases, FL, 2009-2017. (FDOH, Tuberculosis Control Section, 2017). Data current as of 12/18/18.

In 2009, there were 822 reported cases; 459 (56%) of which had positive sputum culture. In 2017, there were 549 reported TB cases; 326 (59%) of which had positive sputum culture (Fig. 2). A NAAT result was available in 2,770 out of 3,409 (81.2%) TB cases with positive sputum culture reported between 2009 and 2017 (Fig. 3). The % NAAT results available increased from 74.6% (2009-2011), to 84% (2012-2014), to 87% (2015-2017). Among cases with positive AFB smear result, NAAT was performed on 1,942 out of 2,156 (90%). In the three-year intervals, the % NAAT results increased from 83.4%, 93.1%, to 94.6%, respectively.

Positive AFB smear case - FL, 2009-2017

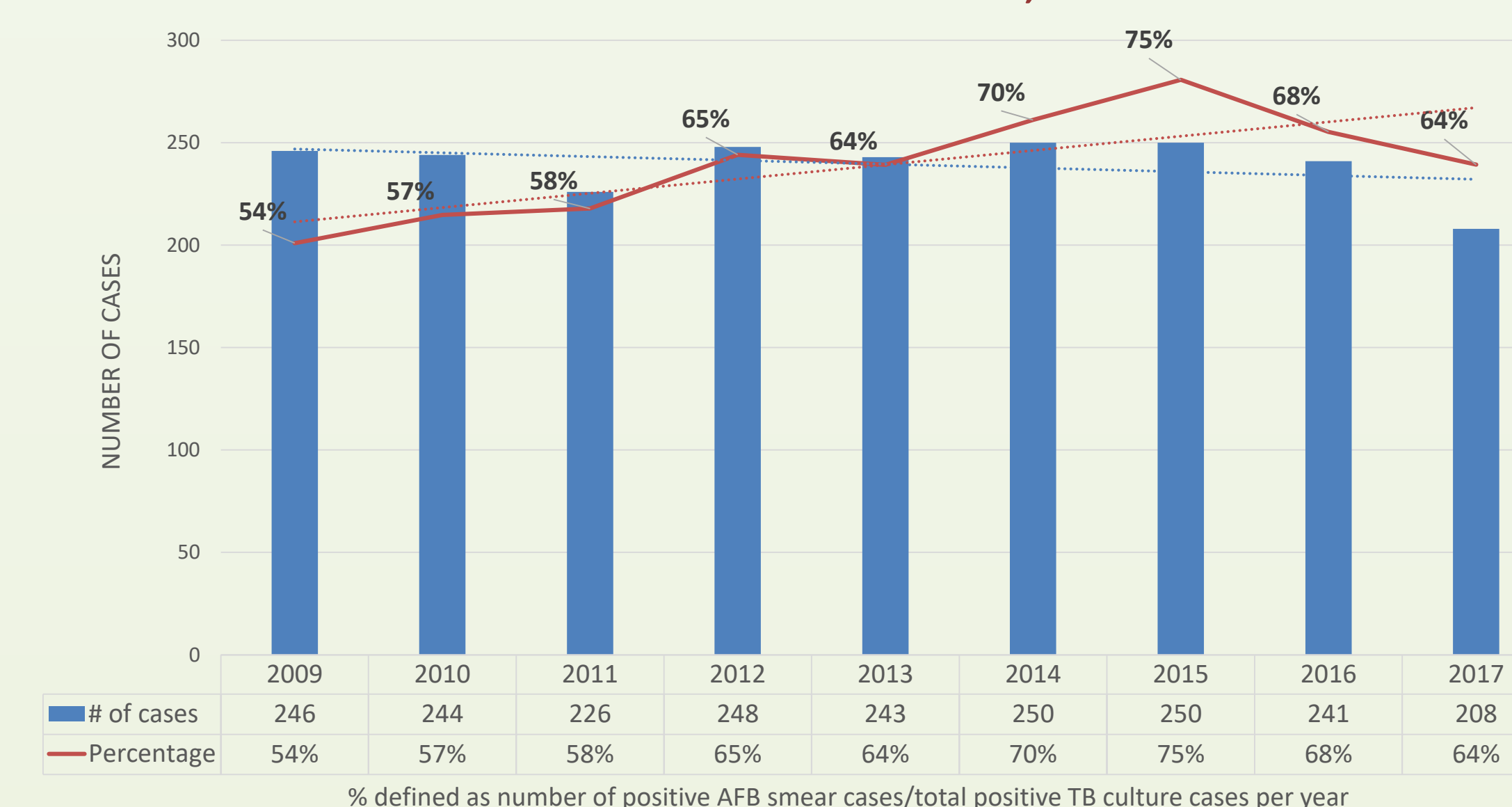


Figure 4. Positive AFB smear cases, FL, 2009-2017. (FDOH, Tuberculosis Control Section, 2017). Data current as of 12/18/18.

Statewide, among 3,409 cases of positive sputum culture for TB, there was an increase of positive AFB smear cases from 56% (2009-2011), to 66% (2012-2014), to 69% (2015-2017) (Fig. 4). Based on data obtained from BPHL, there were a total of 2,102 positive *M. tuberculosis* complex culture cases and 2,079 positive NTM culture cases among those with positive AFB smear between 2009 and 2017. In 2009, out of total 474 positive acid-fast bacilli (AFB) smear cases, 240 (51%) cases were positive for NTM. By the end of 2017, out of 424 positive AFB smear cases, 223 (53%) were positive for NTM (Fig. 5). In the three-year intervals, the % of AFB positive NTM cases out of all AFB positive cases were 48%, 48%, and 53%, respectively.

NAAT performed on TB cases with positive sputum culture FL, 2009-2017

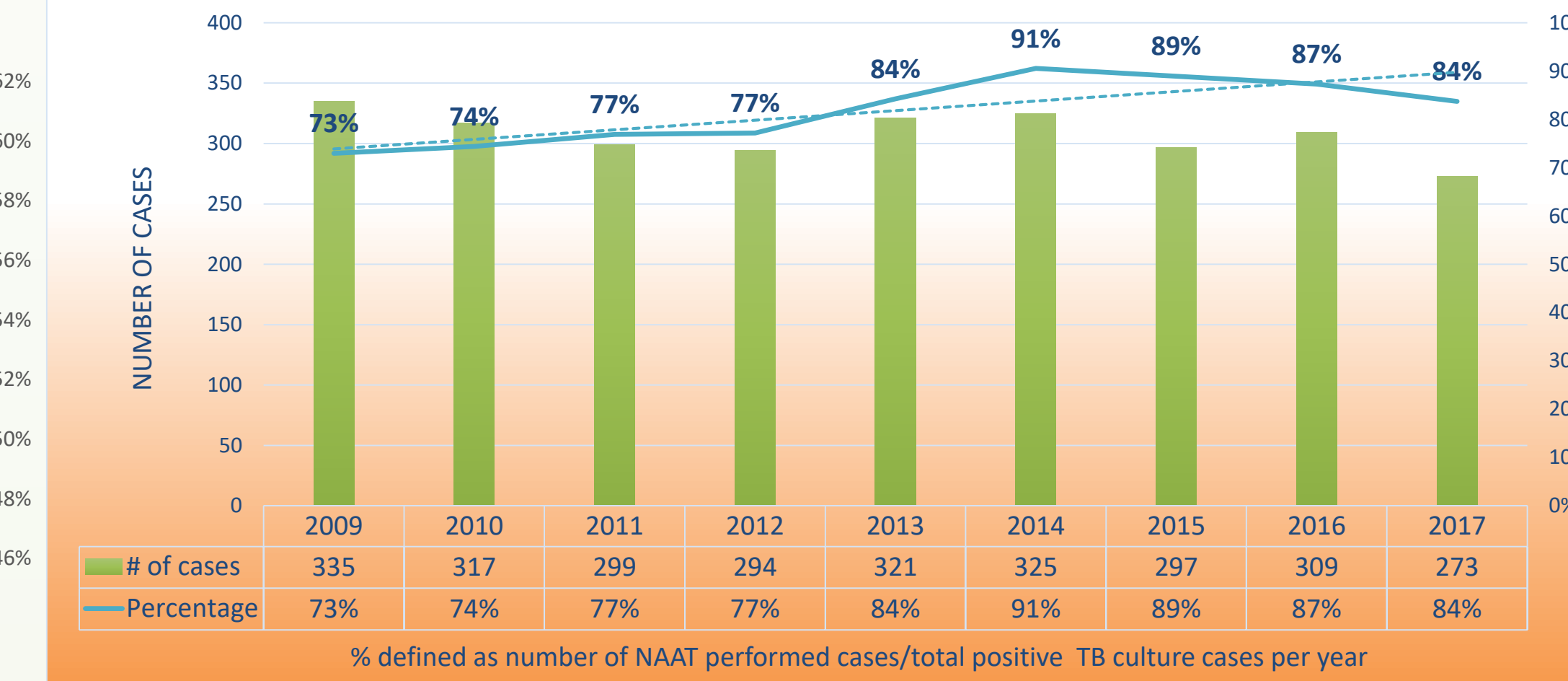


Figure 3. NAAT performed on TB cases with positive sputum culture, FL, 2009-2017. (FDOH, Tuberculosis Control Section, 2017). Data current as of 12/18/18.

Positive AFB smear and culture for mycobacteria - FL, 2009-2017

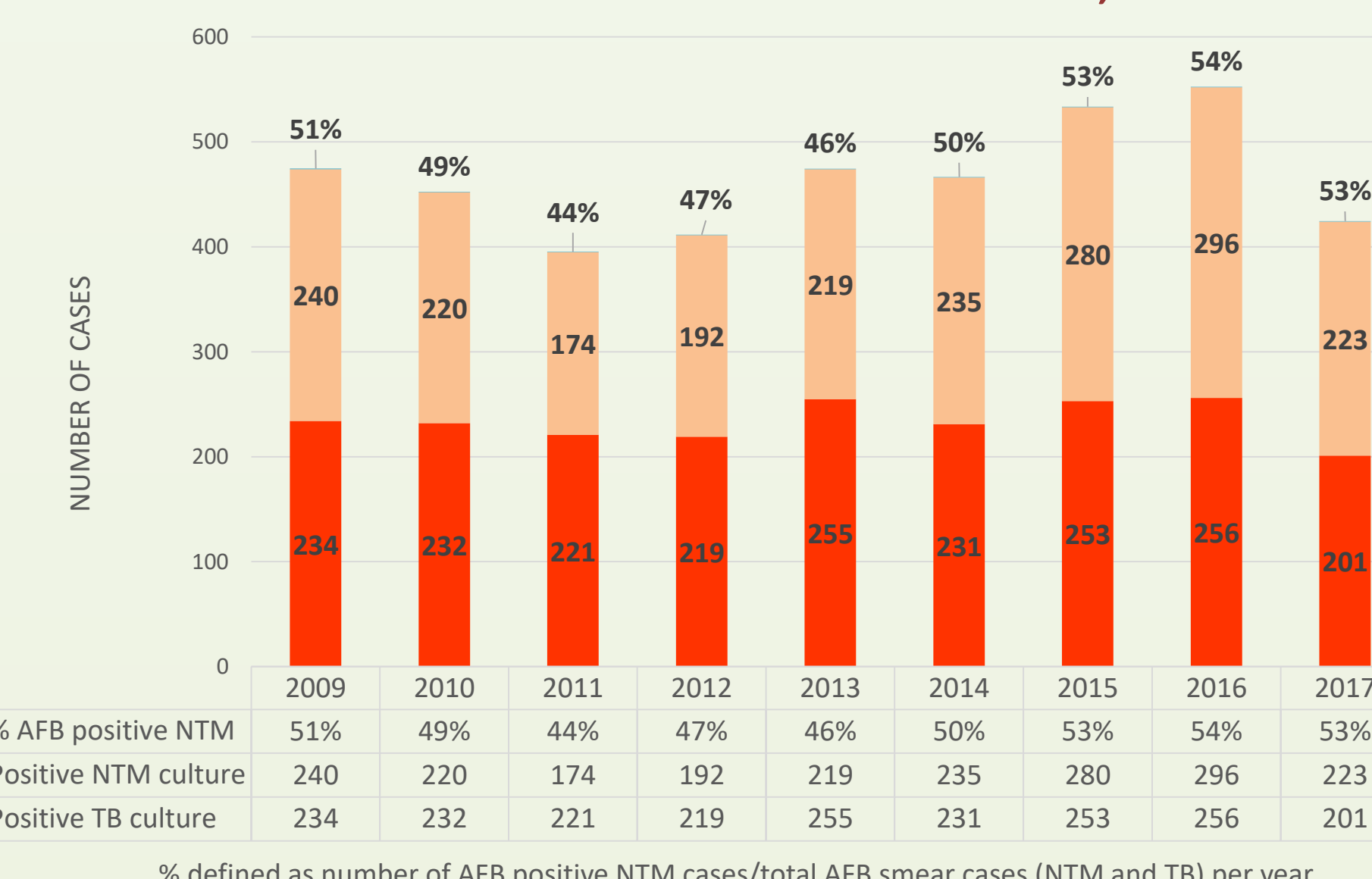


Figure 5. Positive AFB smear and culture for mycobacteria, FL, 2009-2017. (FDOH, Bureau of Public Health Laboratories, 2017).

Positive NTM culture with positive AFB smear cases

NTM species ID	2009-2011	2012-2014	2015-2017
<i>M. abscessus</i>	132	116	187
<i>M. chelonae</i>	1	2	4
<i>M. fortuitum</i>	16	14	34
<i>M. avium</i> complex	356	379	427
<i>M. goodii</i>	29	8	30
<i>M. kansasii</i>	37	45	38
Other NTM species	7	9	26
NTM, NOT <i>M. tuberculosis</i> complex (no further ID)	126	107	148
Rhodococcus species	0	0	1

Table 1. Laboratory records obtained from BPHL were analyzed to compare number of cases by NTM species with positive AFB smear results between 2009 and 2017.

Conclusions

- From 2009 to 2017, TB cases in Florida decreased by 33% and the utilization of NAAT, while already at a high level, further increased. A state-wide Fast-Track programs enables this accomplishment. NTM proportion of sputum with positive AFB smear results ranged from 44% to 54%. Among known NTM species, *M. avium* complex contributed to the highest number of cases in Florida between 2009 and 2017 (Table 1).
- NAAT helps to RULE IN TB as well as RULE OUT TB in a rapid manner.

Citations

- [1] Salfinger, M. (2018). *JAMA Intern Med*, 2018;178(10):1388-1389. doi:10.1001/jamainternmed.2018.3628
 [2] Florida Department of Health, Tuberculosis Control Section. (2017). Tuberculosis cases, Florida.

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