

## **TB and Elephants: The Real Elephant in the Room**

### **Abstract**

**Background:** The term “zoonotic,” is not usually used to describe *Mycobacterium tuberculosis* (M.TB); yet it is one of the most historical examples of reverse zoonosis (2). Reverse zoonosis are diseases that are spread from humans to animals (2). The first reported case of zoonotic transmission of M.TB occurred between a total of four Asian elephants and twenty-two elephant handlers between 1994 and 1996 (21). The subsequent requirement for annual M.TB testing in elephants as published by the National Tuberculosis Working Group for Zoo & Wildlife Species has revealed an additional fifty cases (4). A mixture of lacking research and frenzied media coverage have created discrepancies in a true point prevalence and incidence density of M.TB in elephants – basic information needed in order to assess the risk of zoonotic transmission between humans and elephants.

**Objective:** To evaluate the efficacy of current occupational guidelines that attempt to minimize zoonotic transmission of M.TB between human elephant handlers and their elephants by calculating an accurate point prevalence and incidence density of M.TB in elephants to assess the current occupational risk of zoonotic transmission.

**Methods:** This project was divided into four main parts. The first was an epidemiological analysis to conduct the point prevalence and incidence density of M.TB in the US population of elephants using the 2011 Species Survival Plan North American Regional Studbook published by the Association of Zoos & Aquariums and TB-reported data collected by the National Tuberculosis Working Group for Zoo & Wildlife Species. The second part of the project was a policy analysis conducted to evaluate the efficacy of current occupational safety guidelines for elephant handlers that attempt to minimize zoonotic transmission of M.TB through comparison of traditional occupations with a known association of TB exposure measured by comparative incidence densities. The third part of the project was an international webinar hosted by the Southeastern National Tuberculosis Center to educate the professional public about the significance of M.TB as a zoonotic disease. The fourth part of the project was the development of an educational pamphlet communicating basic information on M.TB and the potential risk of zoonotic exposure intended for dissemination to elephant handlers.

**Results:** The epidemiological analysis yielded a point prevalence of 5.8% in 2011 with an incidence density of 7.2 per 1000 years. The policy analysis yielded two results. The first is that the guidelines are effective at minimizing TB transmission but are lacking practicality as pertained to elephant handlers. The second is that elephant handlers meet the criteria for an “at risk” occupation population. The webinar was the largest ever hosted by the SNTC with 580 registrants. The educational pamphlet was drafted but more research is needed on the best method of dissemination.

**Discussion/Conclusions:** Elephant handlers are a unique occupation population at risk for M.TB, yet have missed the TB Control radar. As a result, TB has found its way into elephant populations throughout the US highlighting the need for further surveillance and research in the significance of TB as a zoonotic disease. Established guidelines require amendments that meet the unique needs of the elephant handler population including incorporating TB control administrative programs, beginning annual TB testing on elephant handlers, and removing ineffective guidelines. This project took the initial steps toward effective policy change by empowering public health professionals and preparing resources for educating “at-risk” populations.