

*Brief Report***Engaging homeless service providers in educational efforts during a tuberculosis outbreak in Atlanta**

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**ABSTRACT**

**Background:** During an outbreak of tuberculosis (TB) in the homeless population of metropolitan Atlanta, education of homeless service providers (HSPs) about the implementation of local infection control measures was imperative to limiting the spread of TB and to preventing future outbreaks.

**Methods:** By use of educational sessions and teaching posters, two interventions were designed to focus educational efforts from November 2014 to August 2015: 1) a spatially-targeted approach that identified HSPs within an area of Fulton County, GA (which includes downtown Atlanta) with high TB case density (cases per square mile) from 2009 – 2014, and 2) an organizational meeting approach that included scheduled meetings of professionals who had regular contact with homeless individuals at risk of TB infection.

**Results:** Of the 18 HSPs targeted in the identified high-TB density area, 9 engaged in educational activities, and 9 were closed at time of contact or unreachable by email or phone. Through organizational meetings, 36 additional facilities were reached.

**Conclusions:** The HSPs with successful contact were amenable to educational efforts, and a combination of spatially targeted and organizational meeting approaches with teaching aids was feasible in developing sustainable TB educational programs in the homeless community.

**Key words:** tuberculosis, tuberculosis outbreak, homeless, community outreach, public health

**Statement of Student-Mentor Relationship:** The lead author for this report, Preetha Nandi, a medical student, completed this work during the first two years of medical school to learn how to apply clinical interests in a setting for disease prevention in a disadvantaged community. Dr. Neela D. Goswami, the senior author, served as her mentor.

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**INTRODUCTION**

From 1994 to 2010, there was a ten-fold increase in tuberculosis (TB) incidence among homeless populations in the U.S. (Bamrah et. al., 2013). Among other interventions, TB training of shelter staff has been recommended as an effective measure during a TB outbreak (Azevedo et. al., 2015). In response to a TB outbreak among the homeless populations in Atlanta in 2014, state and local facilities initiated efforts to limit the spread of TB in this

community. With limited resources, educational sessions were conducted and teaching posters were distributed through spatially-targeted efforts and organizational meetings to engage homeless service providers (HSPs) in Atlanta.

**METHODS**

Between November 2014 and August 2015, the staff of HSPs in metropolitan Atlanta were offered teaching posters and educational sessions to assess the feasibility of engaging them in TB

educational efforts. Posters were created with support from the Atlanta TB Task Force, a collaboration between the Georgia Department of Public Health (GDPH), Mercy Care (a federally qualified health center focused on the homeless population), and HSPs. With the challenge of staff turnover at HSPs, a goal of these posters was to serve as teaching aids for future staff and volunteers at HSP trainings and to be used for future educational sessions conducted by our program or by the GDPH. A team of trained medical students from the local university led educational sessions within shelters to answer questions and to give shelter-specific feedback on TB prevention protocols. HSPs were contacted through two methods – a spatially-targeted approach and organizational meeting approach.

### Spatially-Targeted Approach

Previous studies have shown the efficacy of geographically targeting public health efforts during an epidemic (Keeling et. al., 2010; Cromley et. al., 2011). Residential locations of persons diagnosed with TB in 2009 – 2014 in Fulton County, GA, were geocoded and TB case density was mapped using kernel density estimation in ArcGIS 10.3 (Redlands, CA: ESRI 2010). Locations of HSPs were overlaid on the map. HSPs were contacted, when possible, by email, telephone, or in-person.

### Organizational Meetings

To supplement the spatially-targeted method, educational efforts were extended to a broader audience through meetings with representatives from providers for populations at risk of TB. These meetings included: 1) a monthly Atlanta TB Task Force meeting, 2) a caseworker training meeting for individuals providing social services for homeless clients, and 3) a monthly meeting for nurses involved in infection control in local emergency rooms and hospitals.

## RESULTS

Attendees of educational sessions included shelter staff, clinical staff, and social workers. Sessions lasted approximately 1 hour, with an additional 15 minutes for questions. Each trained volunteer leading an educational session contributed, on average, 3 hours to this effort. Educational sessions were well received, and staff commented that the sessions were informative and useful. In addition, more than 100 teaching posters were printed and distributed to homeless shelters and treatment centers; larger centers received multiple posters.

A heterogeneous group of facilities was reached through the spatially and epidemiologically targeted approaches (Table 1). In the high-TB density area, 13 HSPs were identified to target public health educational efforts (Figure 1). Also, in this area, attempts were made to contact 5 organizations that served clients at high risk for TB infection, i.e., homeless clients with HIV/AIDS diagnoses. Of these 18 identified HSPs, GDPH had already engaged 5 facilities in educational activities, including local educational sessions and community-based tuberculin skin testing. Two facilities were closed during the contact period, and contact could not be established with 7 facilities. Contact was made with the remaining 4 HSPs, including 2 facilities that served homeless individuals with HIV/AIDS, and educational sessions were conducted and posters were distributed.

Through organizational meetings, 36 additional HSPs were reached; these included 18 emergency rooms and hospital systems serving homeless individuals at risk of TB infection in metropolitan Atlanta and nearby areas. Educational sessions were also provided to caseworkers and clinicians representing 20 HSPs.

**Table 1. Characteristics of HSPs contacted for educational interventions in Atlanta, GA, November 2014 – August 2015**

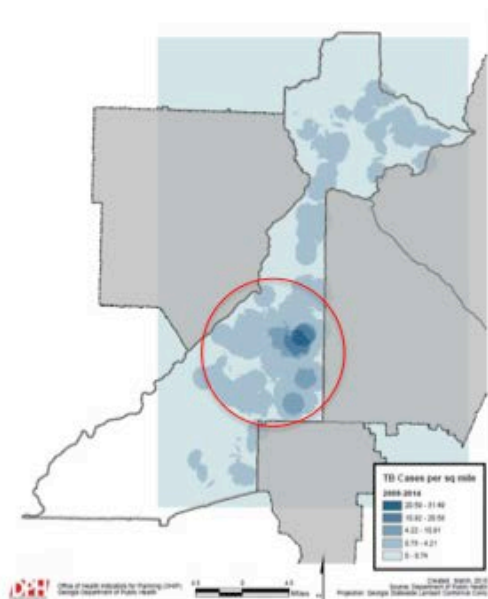
Characteristic	Spatially-targeted approach	Large organizational approach	Total N (%)
<b>Total facilities contacted</b>	18	36	54 (100)
<b>Type of facility</b>			
Homeless shelter	5	3	8 (15)
Low-income or transitional housing	3	1	4 (7)
Ministry-based homeless services	2	2	4 (7)
Social services (e.g. legal services, career counseling, food assistance)	3	12	15 (28)

Characteristic	Spatially-targeted approach	Large organizational approach	Total N (%)
Treatment centers (including emergency rooms)	--	18	18 (34)
HIV-specific facility	5	--	5 (9)
<b>Intervention</b>			
Education session only	--	20	20 (37)
Already connected to GDPH education program	5	--	5 (9)
Poster only	1	16	17 (31)
Education session and poster	3	--	3 (6)
No successful contact made or facility closed	9	--	9 (17)

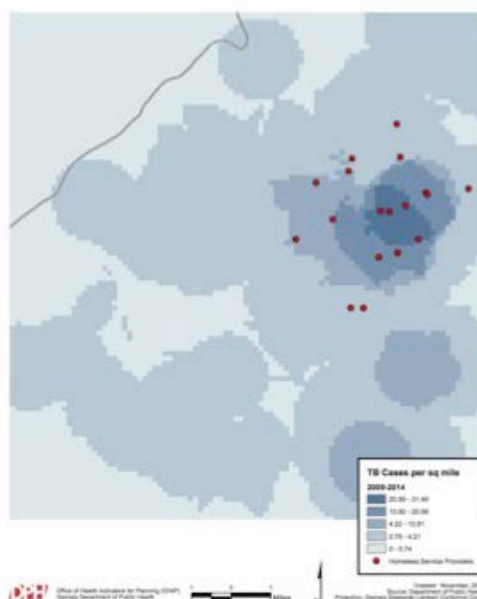
**GDPH = Georgia Department of Public Health**

**Figure 1. HSPs contacted via spatially-targeted approach for educational efforts overlaid on TB Cases, 2009 – 2014, Fulton County, GA**

a.



b.



- a. Map of Fulton County, GA, of TB cases per square mile, 2009 – 2014.
- b. Area of highest TB case density in Fulton County, GA, (marked with red circle in Figure 1a.) in 2009 – 2014 with 18 HSPs located in this area.

**DISCUSSION/CONCLUSIONS**

Spatially-targeted and organizational meeting approaches to provide TB education for community providers were effective for conducting a large, low-resource educational effort. Through the interventions, a diversity of HSPs, including shelters, treatment centers, and social service providers, were reached. Among HSP staff, educational sessions and teaching posters increased awareness of the TB outbreak in the Atlanta homeless population and helped to

engage staff in efforts to identify and prevent TB spread.

Although we were able to assess the extent of outreach using these approaches, we did not formally quantify their efficacy. Using a survey method to measure effectiveness would broaden the conclusions from this exercise. Another limitation was poor contact rates with HSPs, particularly due to staff turnover and inconsistent contact information. Integrating TB education into trainings specific for shelter staff may

increase the contact rate in the future. In addition, most local health departments have limited funding and must focus on active TB disease without addressing latent infections in the homeless (Gupta et. al., 2015). Education of shelter staff can empower a health department to use all resources available to identify active and latent TB cases and encourage additional steps of seeking treatment without its direct involvement. These educational sessions could be more sustainable with active buy-in from HSPs through peer educators, a tool that has been underutilized in TB education (Croft et. al., 2013). In addition, given the association of HIV infection and substance use with TB-infected homeless individuals, incorporating TB education in other educational programs may prove efficient (Haddad et. al., 2005).

Although HSPs have high staff turnover, financial limitations, and few health training opportunities, our teaching efforts should facilitate integration of educational sessions into HSP trainings and organizational meetings, and the posters should serve as teaching aids for future staff and volunteers.

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