

Density of high-speed broadband connections by census tract level persistent poverty status and metro designation

Theresa A. Hastert¹, Julie J. Ruterbusch¹, Nora Akcasu¹, Zachary Cichon¹,
Lauren M. Hamel¹, Eliza W. Beal¹, Hayley S. Thompson¹
¹ Karmanos Cancer Institute, Wayne State University School of Medicine, Detroit, MI

Introduction

- Digital tools and resources (e.g., patient portals, online support groups) can expand access to clinical care and supportive services for people with cancer
- Access to digital tools and resources is limited among individuals with low levels of digital inclusion
- Access, or the availability of high-speed, reliable internet and related equipment, is an important component of digital inclusion
- Residents of persistent poverty (PP) and non-metro areas may have lower access to high-speed broadband, limiting their ability to engage with digital resources supporting high-quality cancer care

Objective

- Describe the density of high-speed broadband connections and average download speeds in the catchment area of the Karmanos Cancer Institute (KCI) in Michigan overall and stratified by persistent poverty status and metro/non-metro areas

Methods

- Broadband connection density and average download speed data are from the Federal Communications Commission maps of fixed connections by census tract and included in the National Neighborhood Data Archive (NaNDA) Internet Access by Census Tract file for the United States (2015-2019).
- **Average download speeds** (in kilobits per second or kbps) are derived from the average of the maximum committed information rates of all providers in all block groups of each census tract.
- **High speed connections** are those with an average download or upload speed of at least 200 kbps; high speed connection density was analyzed categorically (<400, 400-599, 600-799, 800+ connections per 1000 households)
- **Persistent poverty census tracts** are those where at least 20% of the population has reported incomes below the federal poverty level for 30+ years
- **Metropolitan census tracts** are those defined as metropolitan areas by rural-urban commuting area (RUCA) codes 1-3



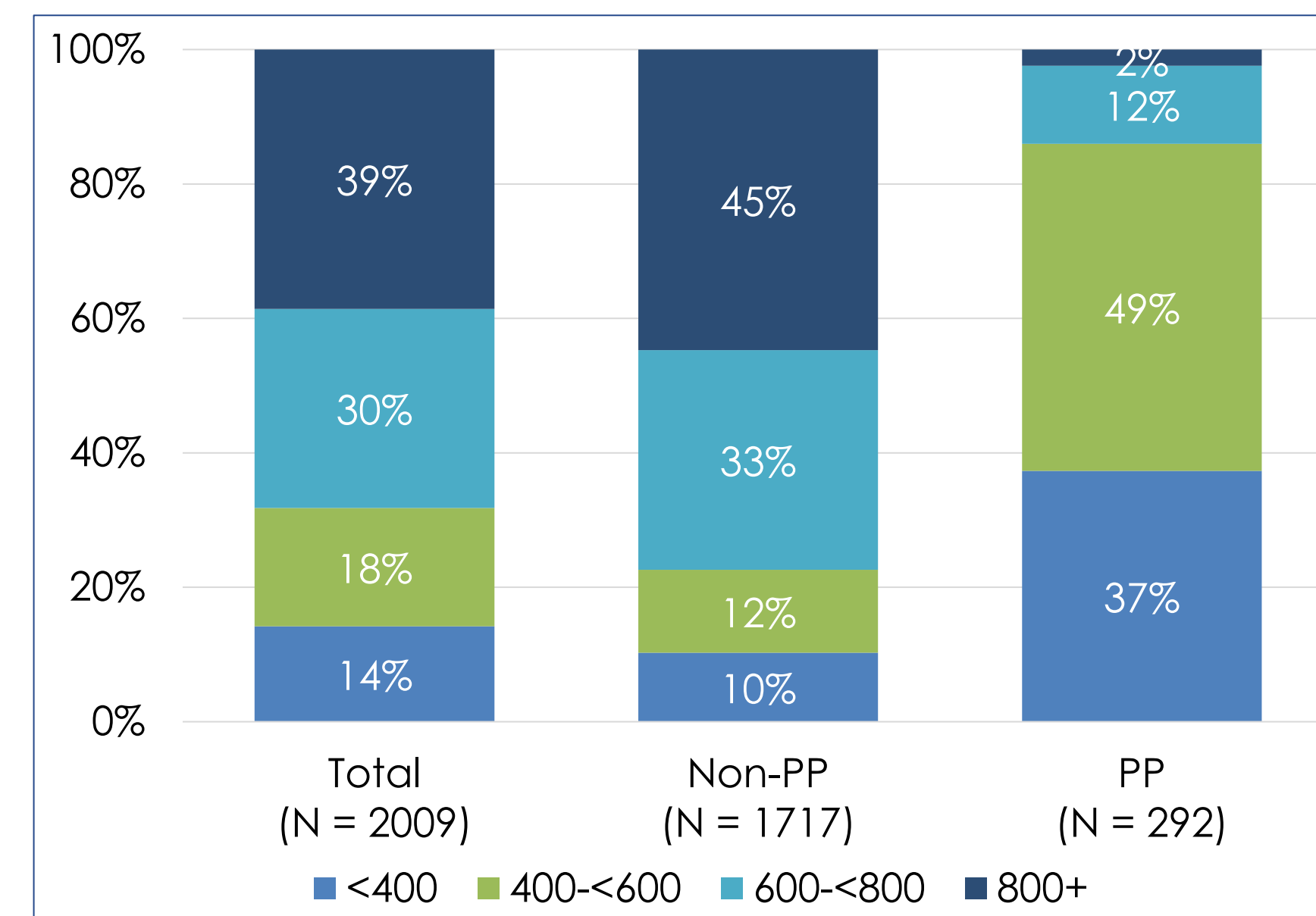
Results

- The KCI catchment area includes 46 counties and 2,009 census tracts with data on broadband availability
- 14.5% of census tracts in the KCI catchment area experienced persistent poverty; 85.5% of tracts were in metro areas
- Residents of persistent poverty tracts were younger, a higher proportion were Hispanic or Black, and had incomes below \$40,000, and a lower proportion completed college than those living in non-persistent poverty tracts (**Table 1**)
- Overall, a plurality (39%) of census tracts had the highest density of high-speed connections (800+ per 1000 households), followed by 600-799 (30%), 400-599 (18%), and <400 connections per 1000 households (14%) (**Figure 1**)
- Density of high-speed connections varied significantly by poverty status—in non-PP tracts, 45% were in the highest category of high-speed connection density (800+ per 1,000), compared with only 2% of PP tracts (**Figure 1**)
- The lowest broadband densities were most common in PP vs. non-PP tracts (37% vs. 10%; **Figure 1**)

Table 1: Census tract characteristics by persistent poverty status for the Karmanos Cancer Institute catchment area

	Total	Non-PP	PP
Sex			
Male	49.0%	49.0%	48.7%
Female	51.0%	51.0%	51.3%
Age			
<20 years	24.2%	23.7%	28.7%
20 - 64 years	58.9%	58.9%	59.3%
≥65 years	16.9%	17.4%	12.1%
Race / Ethnicity			
Non-Hispanic White	72.4%	77.4%	26.8%
Non-Hispanic Black	16.8%	12.5%	56.8%
Hispanic	4.4%	3.8%	10.1%
Non-Hispanic Asian	3.4%	3.5%	2.8%
All Others	3.0%	2.9%	3.5%
Education (among those 25 years and older)			
Less than high school	9.5%	8.4%	21.5%
High school or equivalent	28.7%	28.2%	34.3%
Some college or college degree	61.8%	63.4%	44.2%
Household Income			
Less than \$10,000	7.0%	5.5%	21.4%
\$10,000 to <\$20,000	9.1%	8.2%	18.4%
\$20,000 to <\$40,000	19.4%	18.6%	26.6%
\$40,000 to <\$100,000	39.0%	40.3%	27.1%
\$100,000 or greater	25.5%	27.5%	6.5%

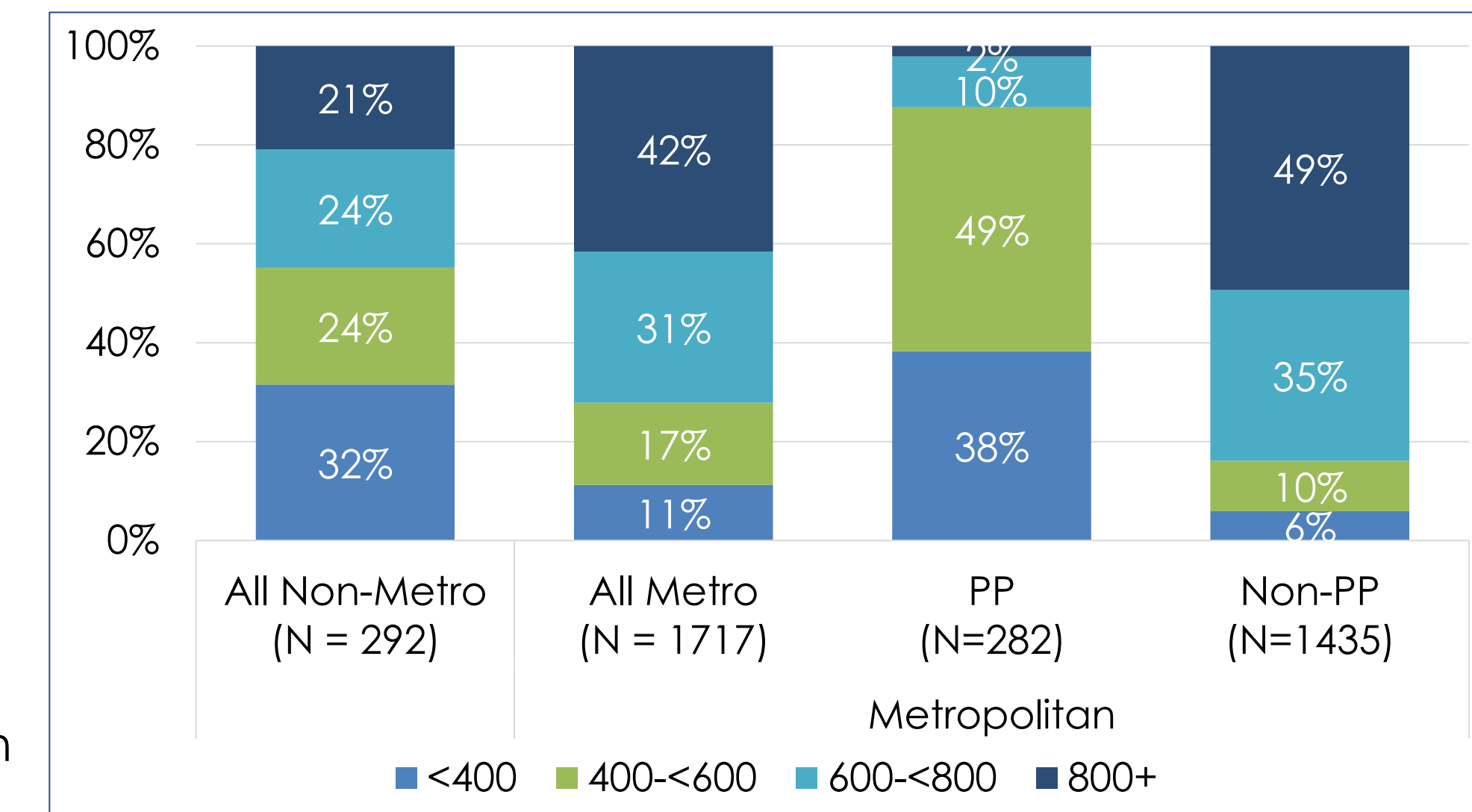
Figure 1: Density of high-speed broadband availability (per 1,000 households) by census tract persistent poverty (PP) status



Results (continued)

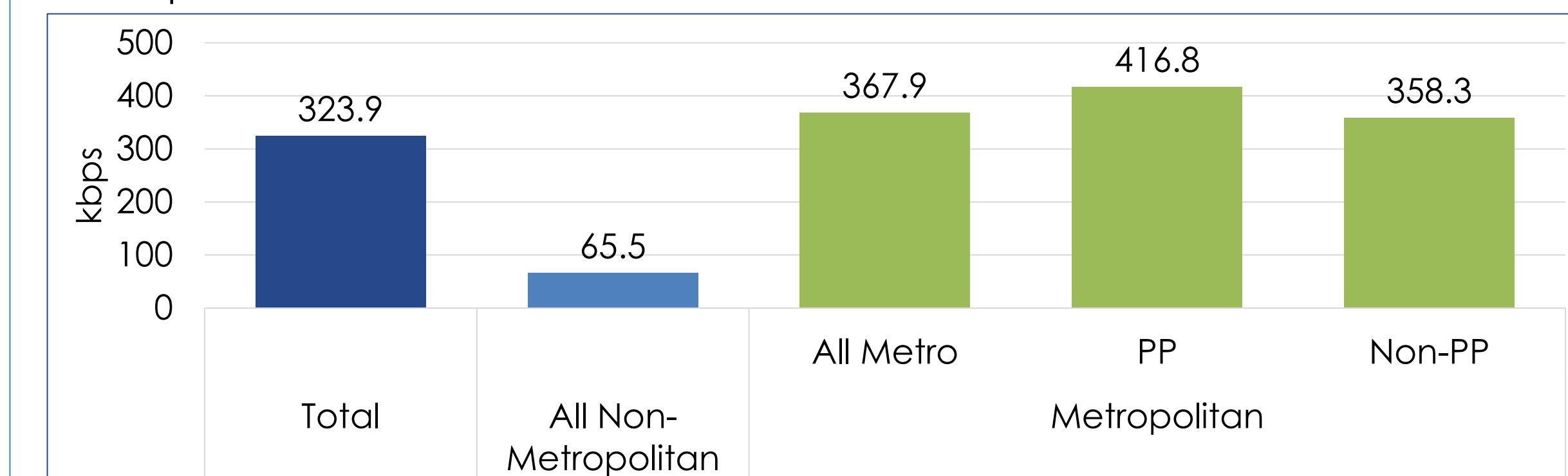
- Density of high-speed connections varied by metropolitan status (**Figure 2**)
- The proportion of tracts with the highest broadband density was twice as high in metro compared with non-metro areas (42% vs. 21% **Figure 2**)
- Within metropolitan areas, only 2% of persistent poverty tracts had the highest density of broadband, compared with nearly half (49%) of tracts not in persistent poverty (**Figure 2**)

Figure 2: Density of high-speed broadband availability (per 1,000 households) by census tract persistent poverty (PP) and metropolitan status



- Download speeds also varied by poverty and metro status (**Figure 3**)
- Average download speeds were 6 times as fast in metro compared with non-metro tracts and were faster in persistent compared with non-persistent poverty tracts within metro areas (**Figure 3**)

Figure 3: Average download speeds by census tract persistent poverty and metropolitan status



Summary and Conclusions

- Broadband density was higher and average download speeds were faster in metro compared with non-metro areas
- Persistent poverty tracts had higher download speeds but lower broadband density than non-persistent poverty areas, suggesting many residents do not benefit from those fast connections
- Structural factors may limit the ability of residents in under-resourced settings to fully access and benefit from digital tools supporting high-quality cancer care