

# Expanding Access to picoCTF

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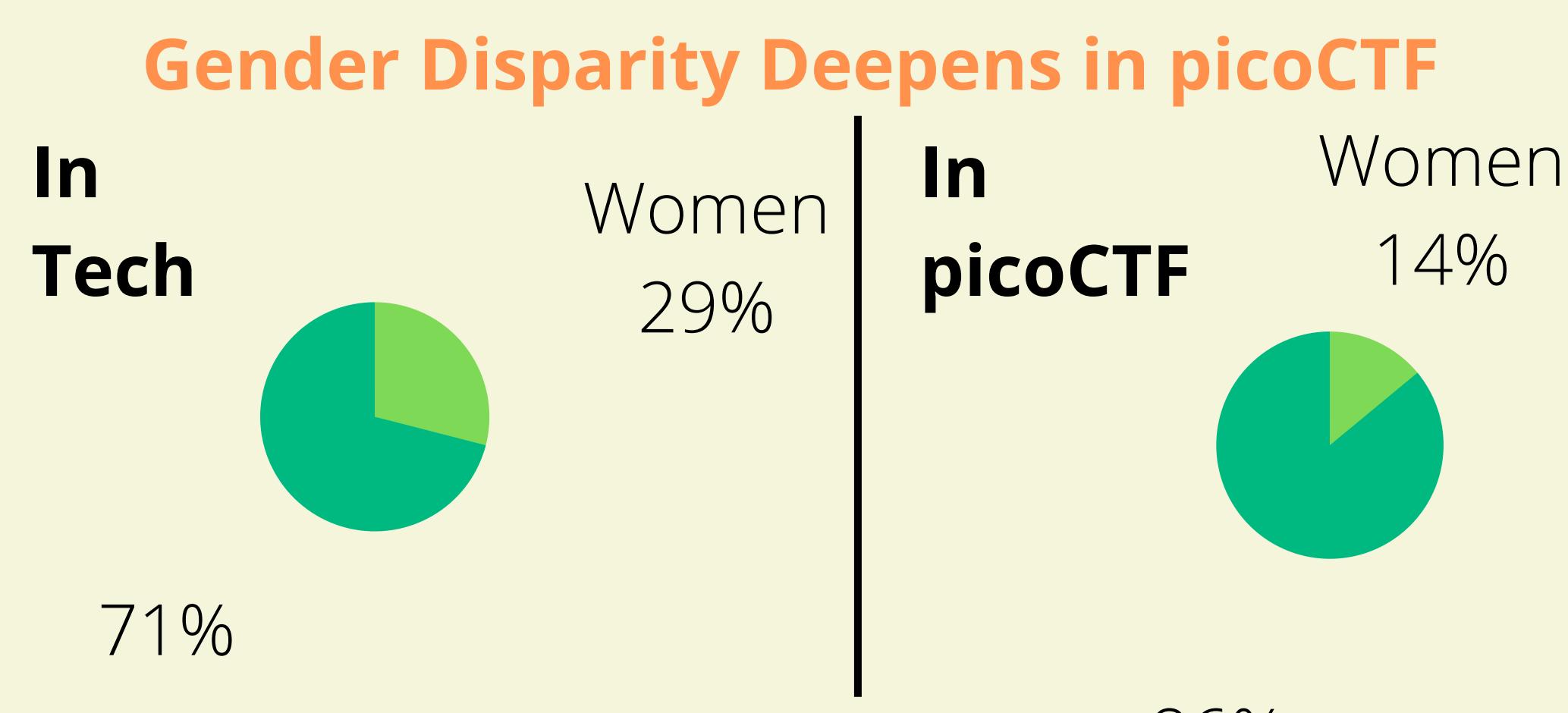
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**What is picoCTF?** an online Capture the Flag (CTF) educational platform that introduces cybersecurity concepts to middle and high school students who have varying experience levels in computer security and computer science.

## For Women

Do women in picoCTF face issues in terms of participation? If so, how can the team make the experience more inclusive?



### Existing Dataset

Qualitatively coded interviews from a 2021 Women in Cybersecurity picoCTF event.

### Methods

As a 2nd coder, I qualitatively tagged the data. 95% of the dataset had agreement values greater than 0.8, indicating reliability.

### Gender Stereotypes are the Root Problem

Common tags encountered in interviews.

The tag "bias" was seen frequently, usually in the context of this preconception.

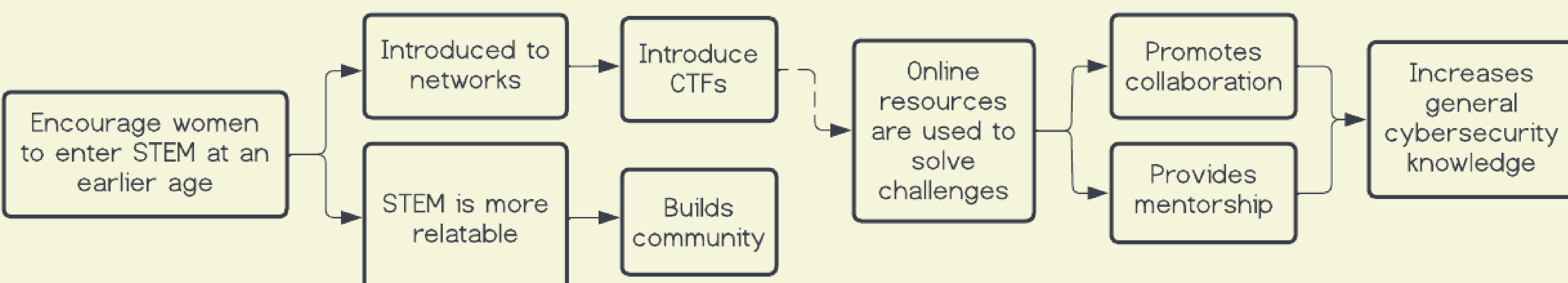
Belief that women are relegated to non-STEM jobs

Lack of human resources

Lack of opportunities

Women who do enter STEM find the field challenging

### Making CTFs Inclusive: Early Intervention and Online Resources



## For Rural Communities

Internet is needed for picoCTF but what can be done if you lack the basic resources needed for this competition?

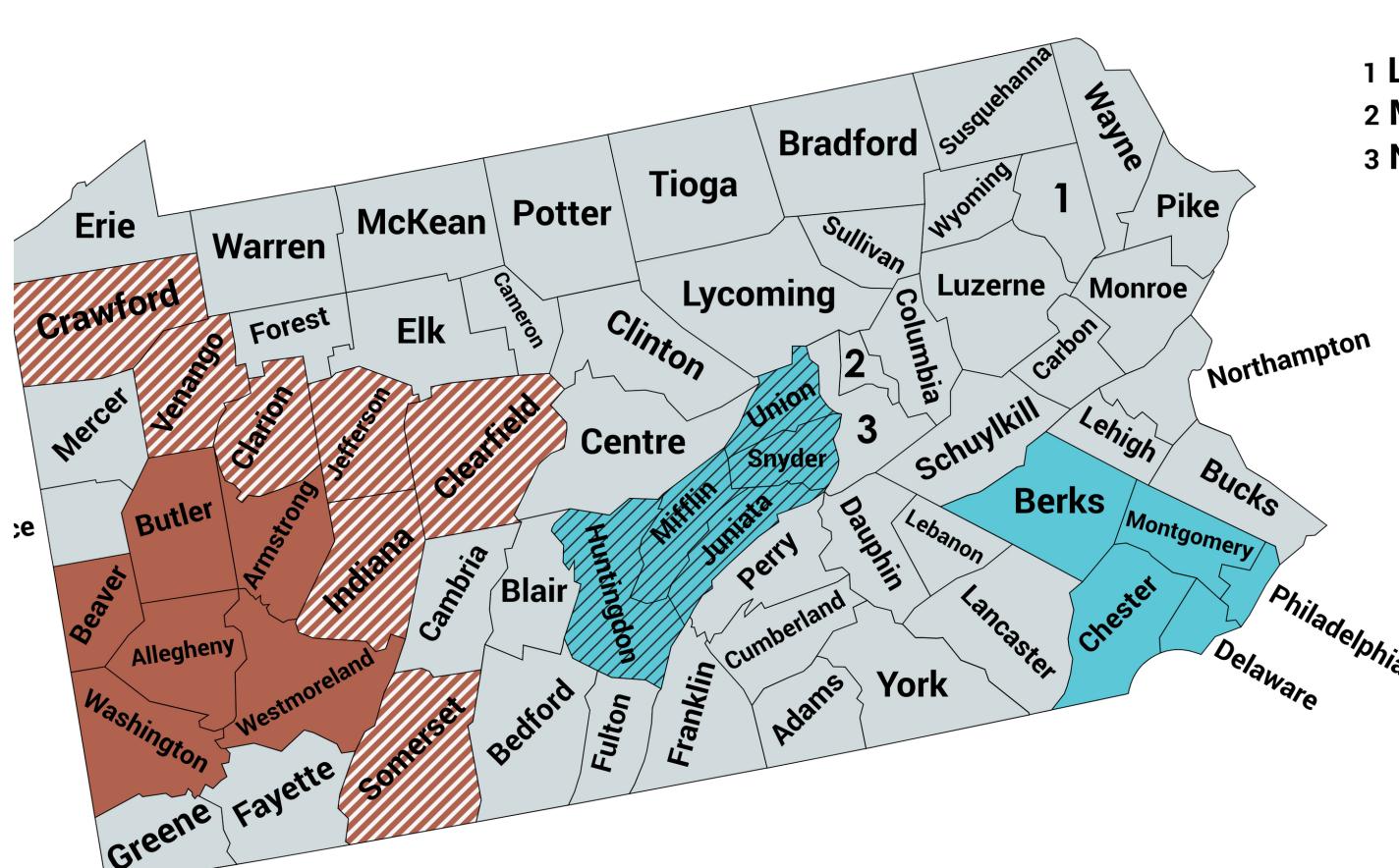
### Background

Internet companies pander to urban areas to raise profits, marginalizing rural regions. When COVID forced this issue to the forefront of US policy efforts, policymakers built off of pre-existing infrastructure. This raises the question:

**Did federal efforts expand access to picoCTF especially among rural communities?**

### Sample Area

- Pittsburgh Metropolitan
- Pittsburgh Rural
- Philadelphia Metropolitan
- Philadelphia Rural



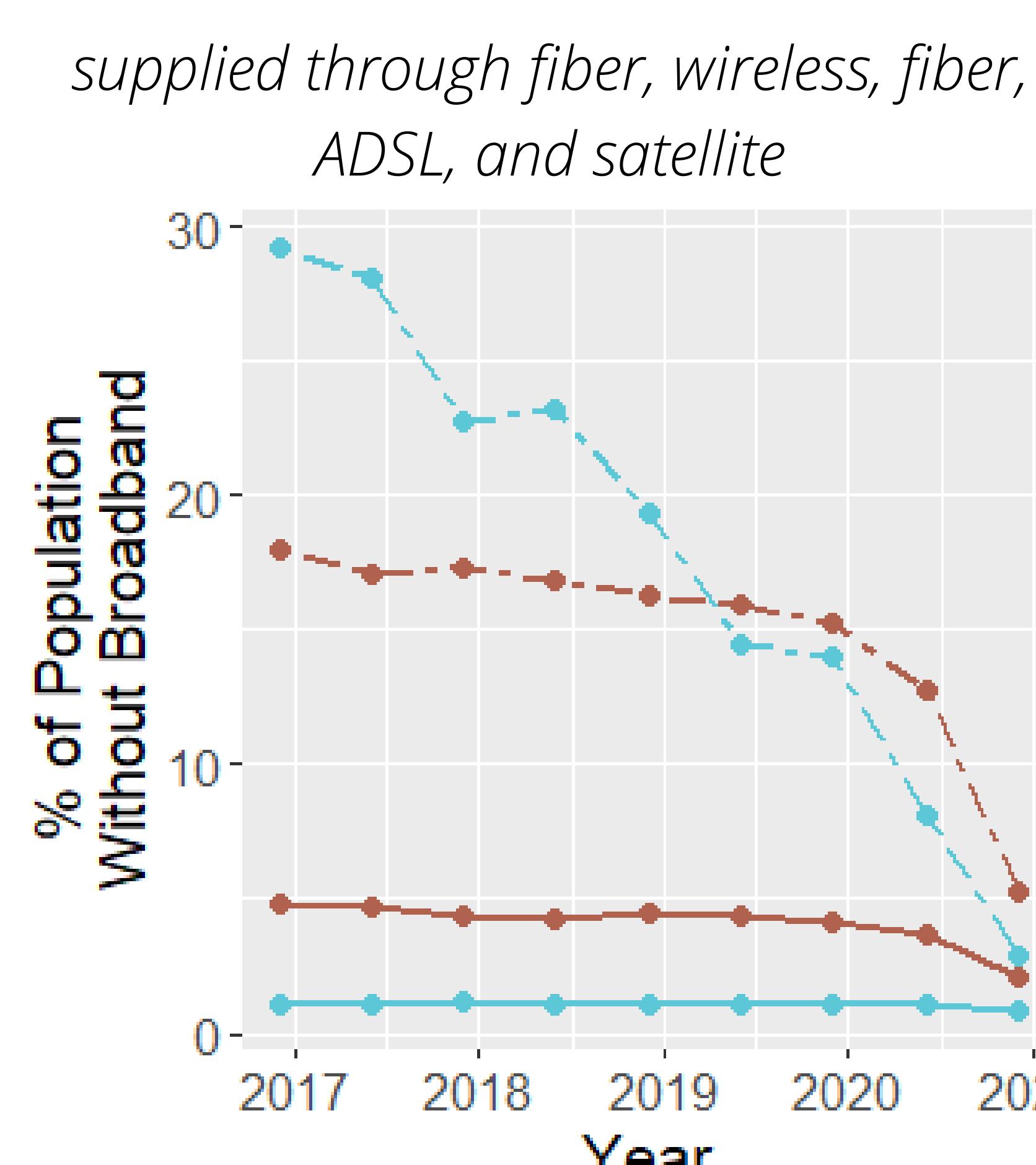
### Dataset Used

Because the picoCTF dataset was too sparse, I used the Federal Communication Commission's (FCC) Area Tables.

### FCC Dataset Limitations

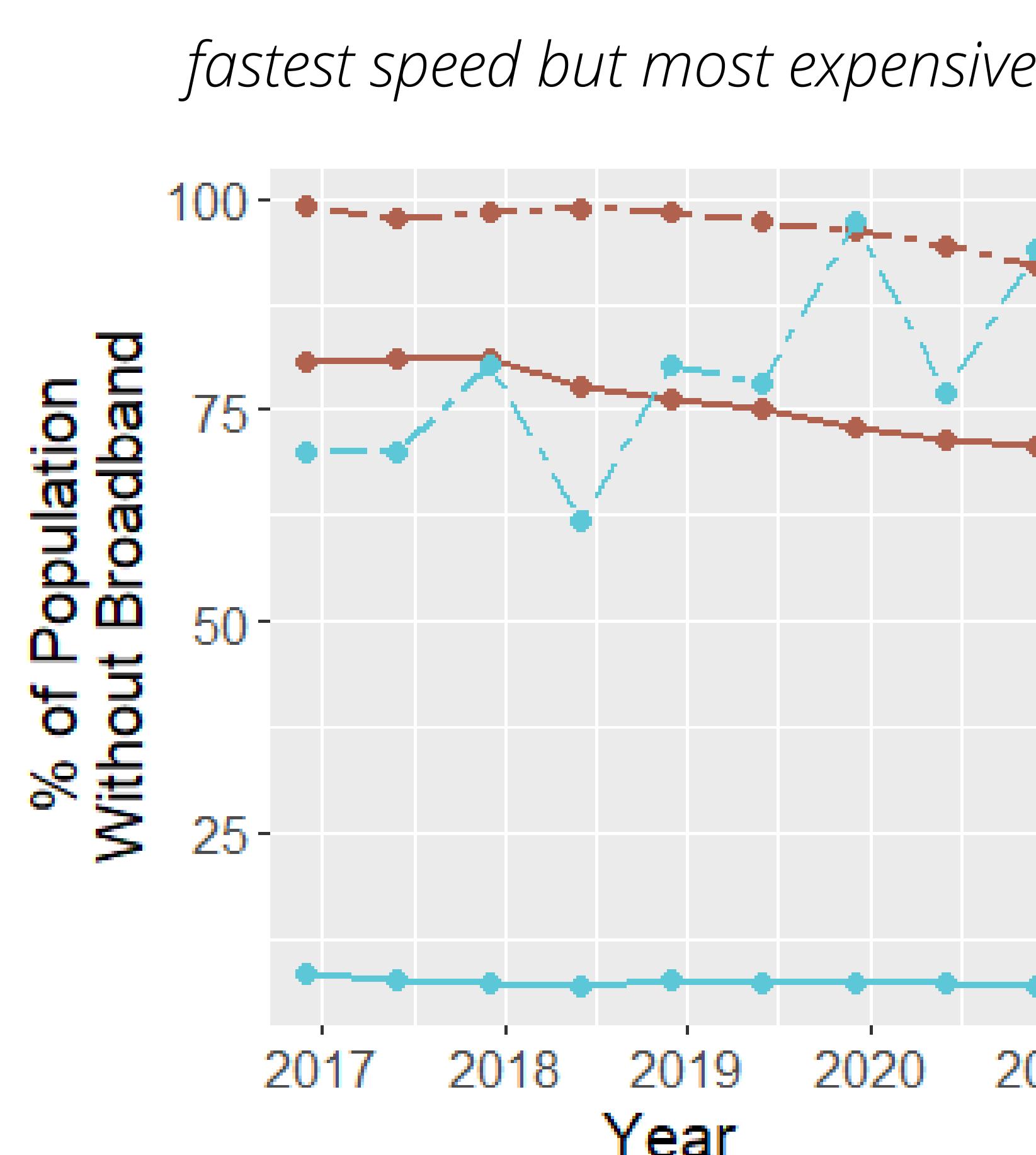
- Companies **self-report data**. No mechanism checks for validity.
- Microsoft reports that the FCC **undercounts the number of people without Internet access**.

### General Broadband



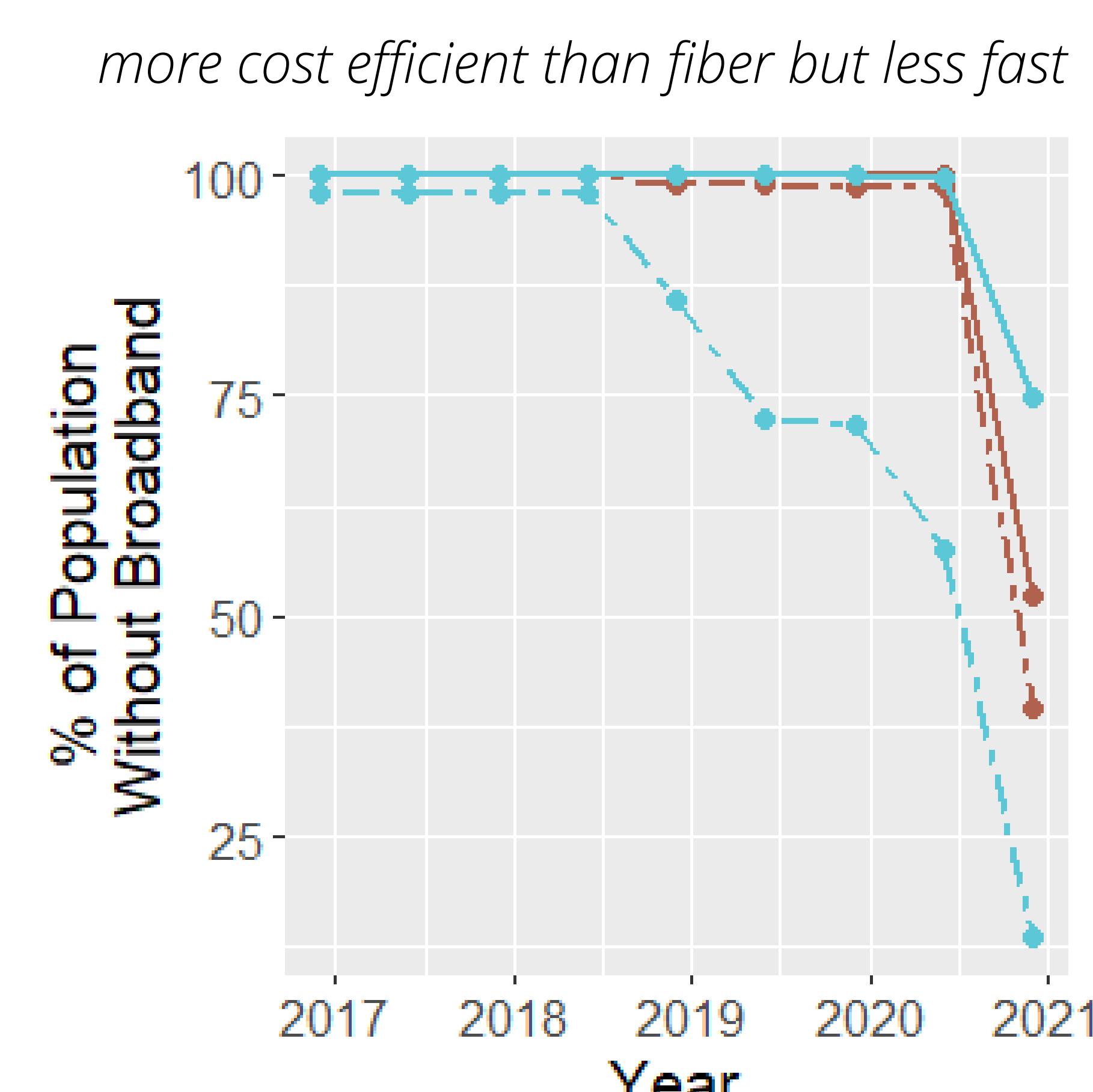
The number of available Internet providers appears to increase. picoCTF might gradually enter rural communities.

### Fiber Broadband



While this option offers the highest quality of Internet, its poor rural penetration might minimize picoCTF usage if solely relied on.

### Wireless Broadband



The rapid availability of wireless providers makes it a potentially good candidate for expanding picoCTF rural usage.

### Future Work

This study suggests that federal policies could play a role in picoCTF access. To ascertain policy impact, we need:

**Better data collection**  
FCC develops an accurate data collection system.  
picoCTF encourages users to provide ZIP codes.

**Reliable data**  
Microsoft uses reliable methods. Its database could be used as more data is accumulated.

**Qualitative studies**  
Surveys could be sent to local Internet companies.



Works Cited