

ACCESS TO BASIC AMENITIES VIA PUBLIC TRANSPORT IN RURAL AREAS IN THE MEDITERRANEAN. IS IT FEASIBLE AND EQUITABLE? WHAT ABOUT FUTURE PERSPECTIVES?

Stefanos Tsigdinos

Postdoctoral Researcher
NTUA

distlp@mail.ntua.gr

Adjunct Lecturer
UniWA

stsigdinos@uniwa.gr

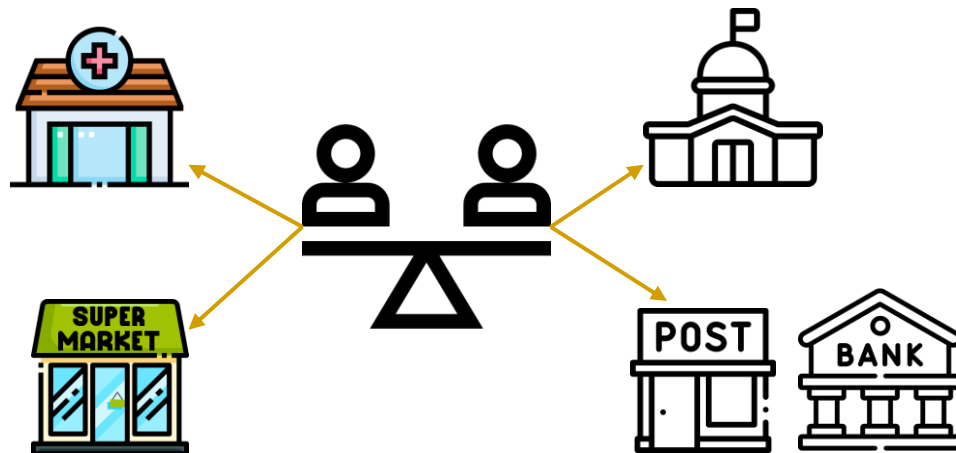


November 2024

Setting the scene



- Sustainable mobility is now at the forefront
- Public transport accessibility is a **fundamental right!**
- Urban areas experience major changes, but what about **rural areas?**
- Rural areas are still highly dependent on private cars (Zhao & Yu, 2020)
- **Public transport** promotion could be a gamechanger
- Equitable access to essential facilities is essential! (Pereira et al., 2017; Martens et al., 2009)



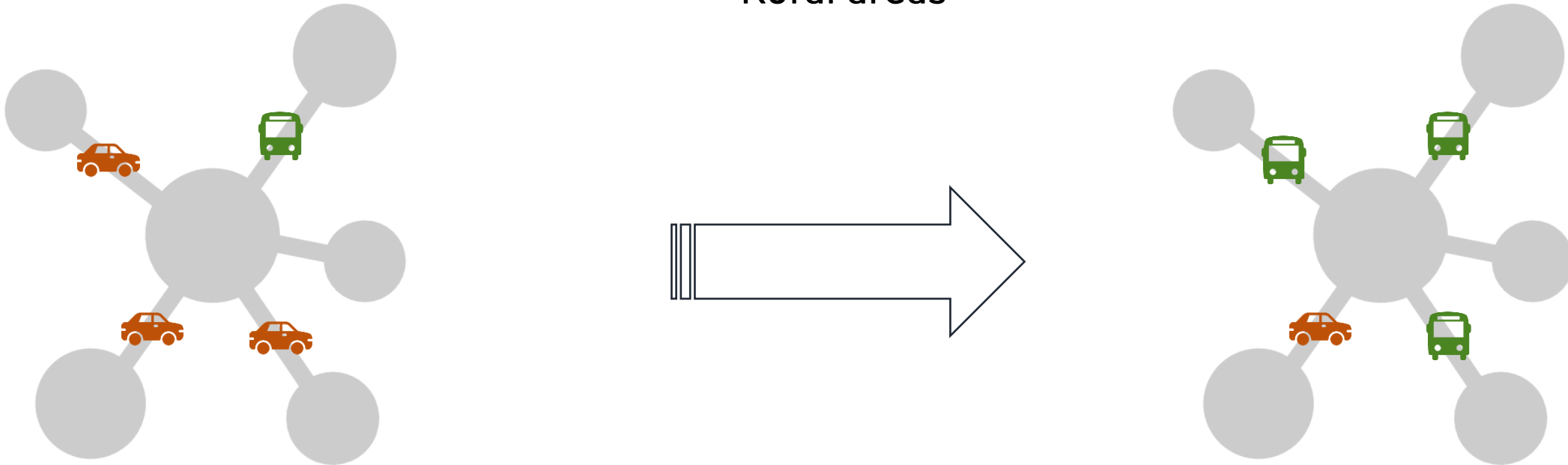
Source: <https://www.elissos.com/must-see-villages-in-crete/>



Source: <https://www.mobilize.com/>



Rural areas



- Examine public transport accessibility to basic amenities
 - Test different scenarios
 - Address equity based on private car ownership



Accessibility measurement

$$A_k = \sum_i^n o_i \quad o_i = \begin{cases} f, & \text{freq}(\frac{\text{route}}{\text{day}}) \\ 0, & \text{unconnected} \end{cases}$$

$$A_u = \frac{w_k A_k}{\sum_k^n w_k} \quad w_k = \text{pop}_k$$

Equity concerns

Palma ratio

$$P_k = \frac{\text{Average accessibility top 10\% car owners}}{\text{Average accessibility bottom 40\% car owners}}$$

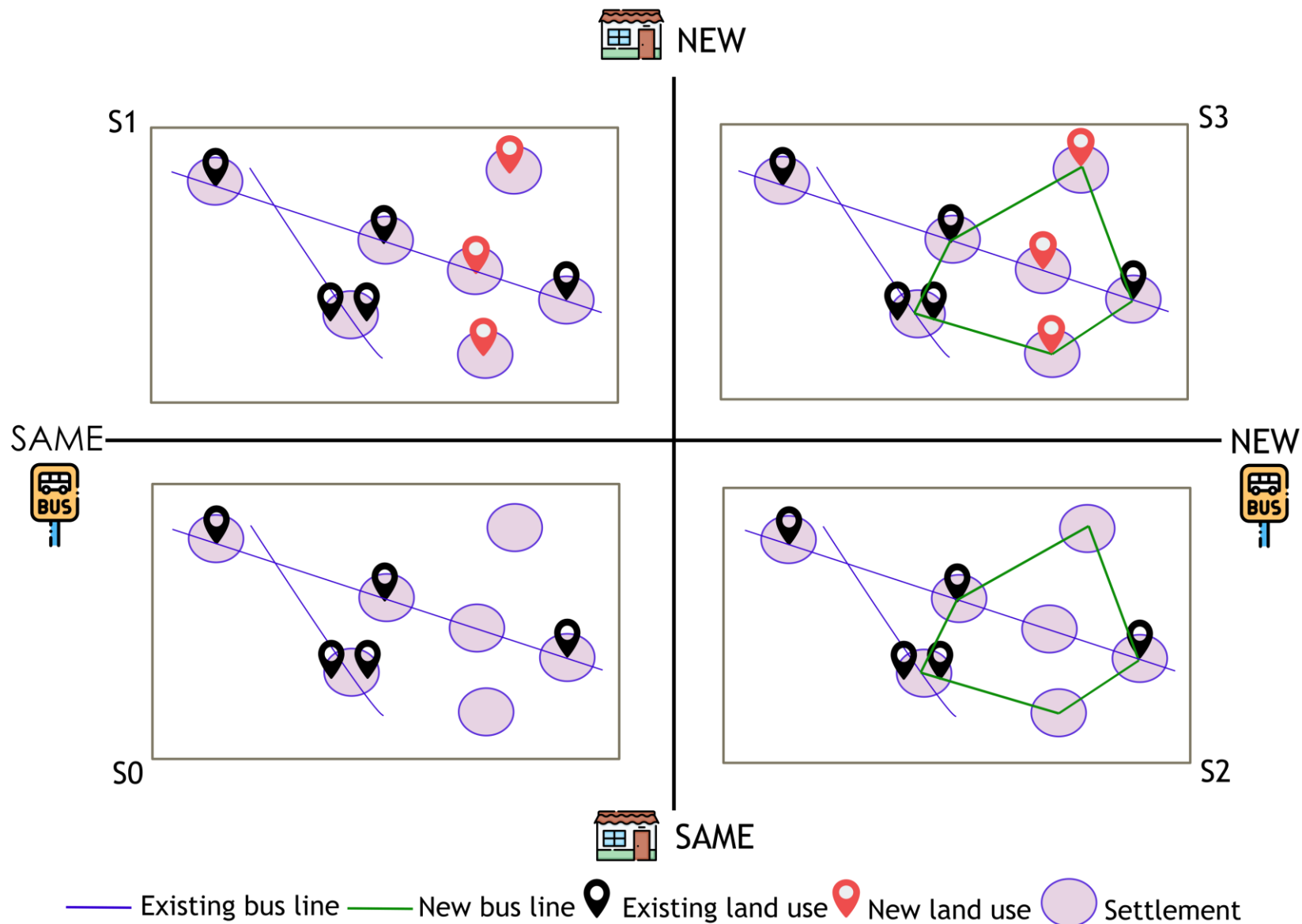
Concentration index

$$CCI_a = \frac{8}{n^2(m_x - n_x)} \sum_{i=1}^n a_i w_i$$

$$w_i = r_i - \left[\frac{(n+1)}{2} \right]$$

Method

Scenarios



Study area



Municipality of Amari **Regional Unit of Rethymno**

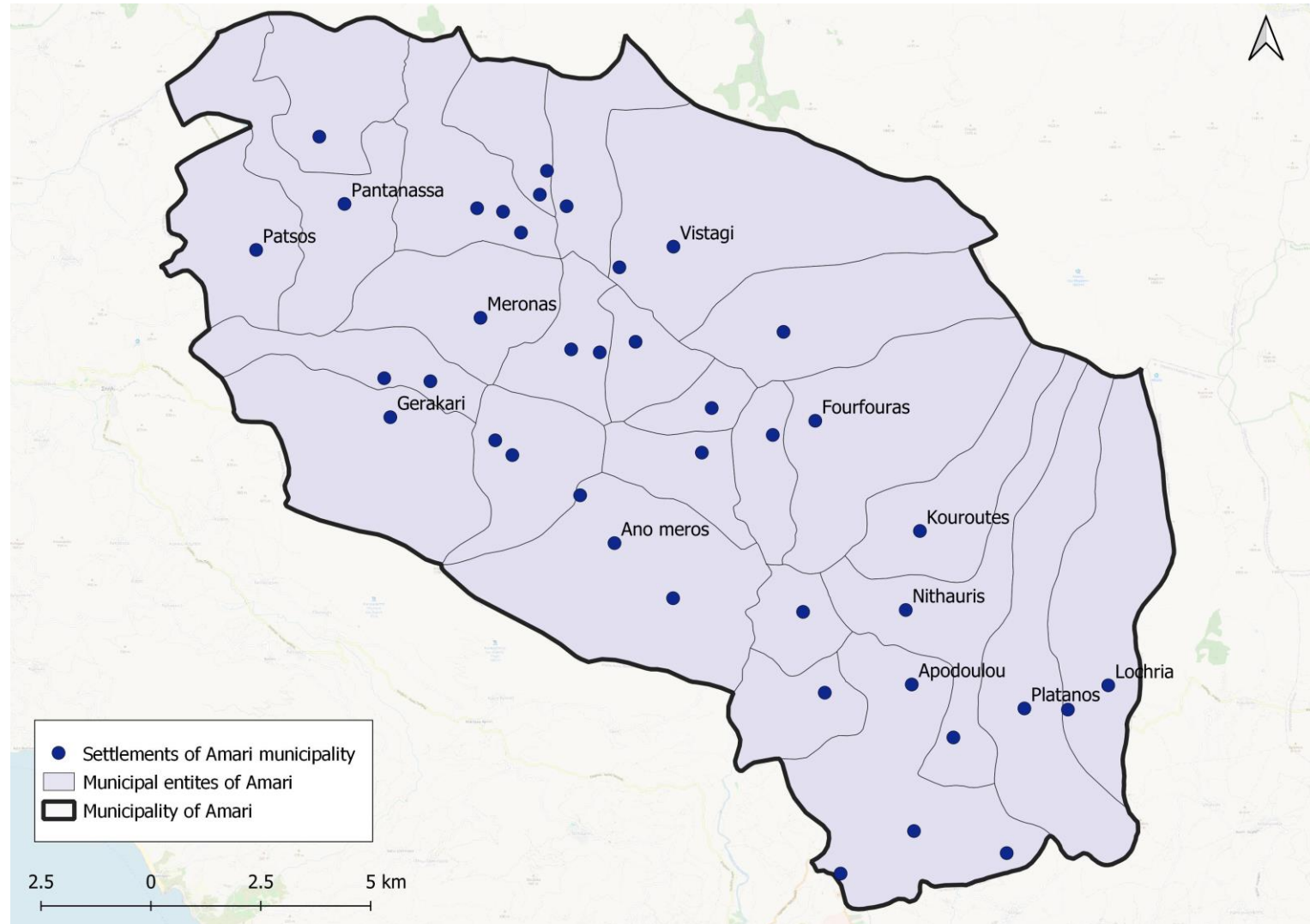
Location: Inland mountainous municipality

Area: 278.85 km²

Population:

2011: 5,915 permanent residents

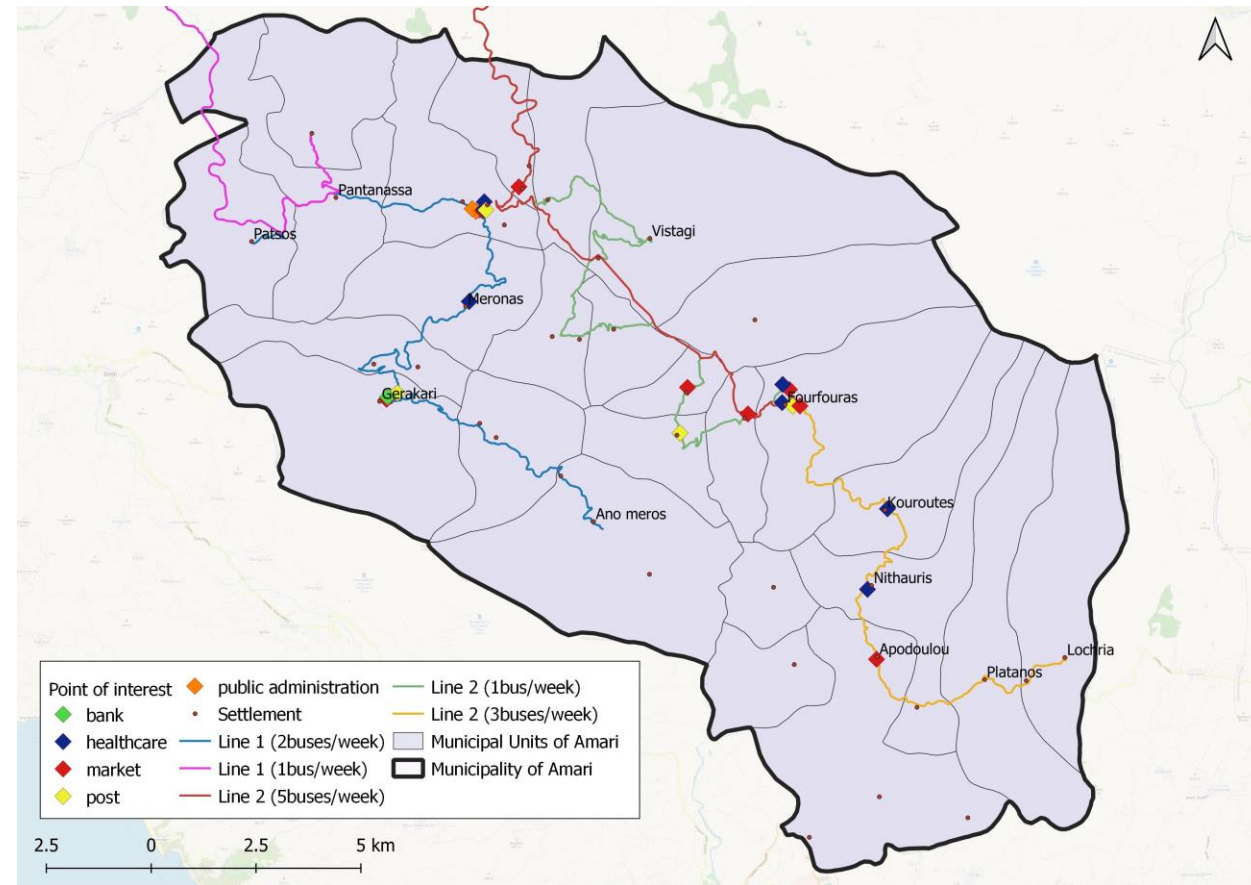
2021: 5,572 permanent residents



Municipal units: 26

Settlements: 40

Public transport and Points of interest (POI)

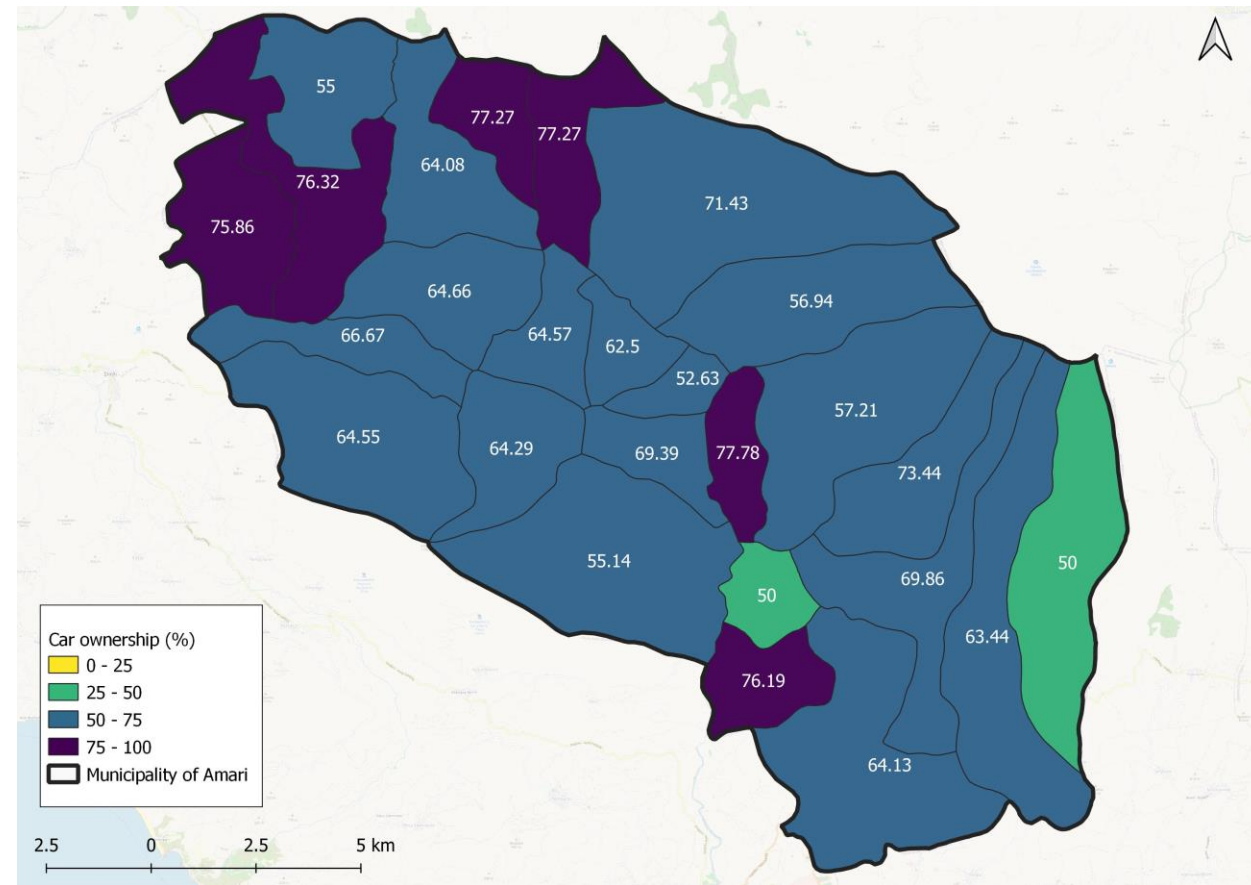


Public transport
lines:
2 lines with different
frequencies

POI:
23 points

Healthcare: 7
Market: 8
Public administration: 3
Post: 4
Bank: 1

Car ownership



Maximum value: 77.78%

Minimum value: 50%

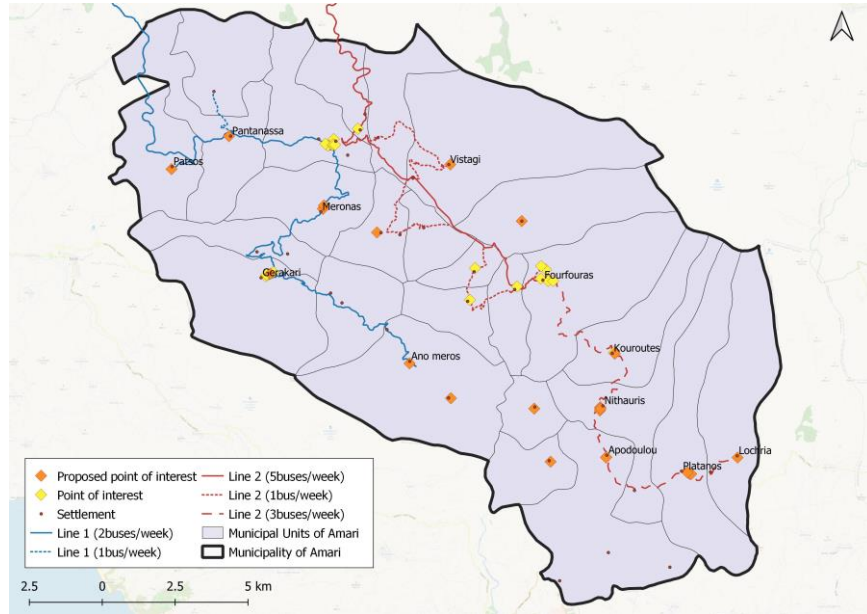


Results/Spatial formulation

S1

Public transport
lines: 2

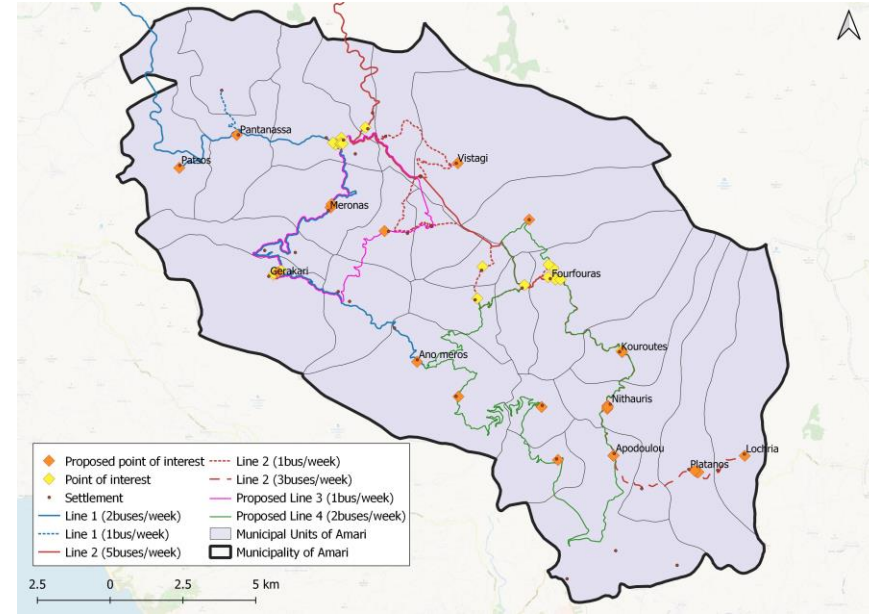
POI: 44 (+21)



S3

Public transport
lines: 4 (+2)

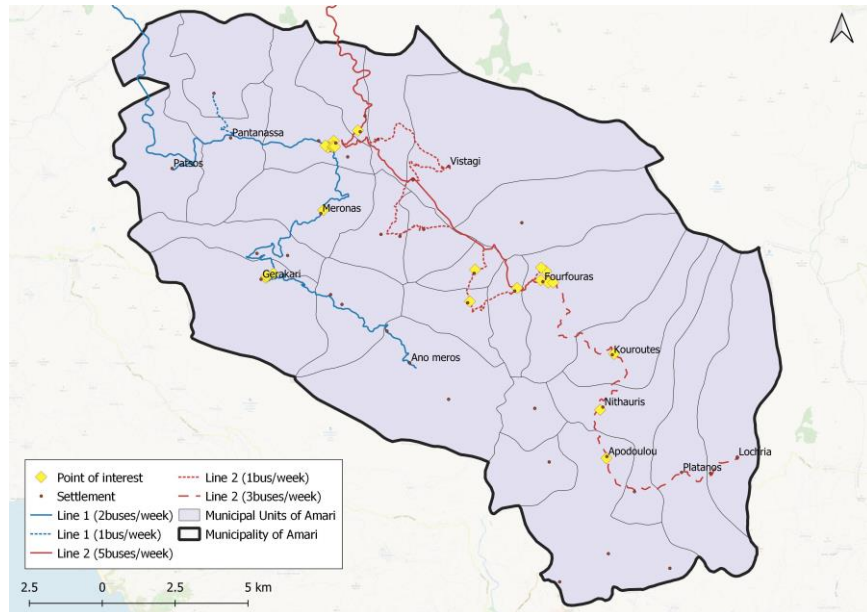
POI: 44 (+21)



S0

Public transport
lines: 2

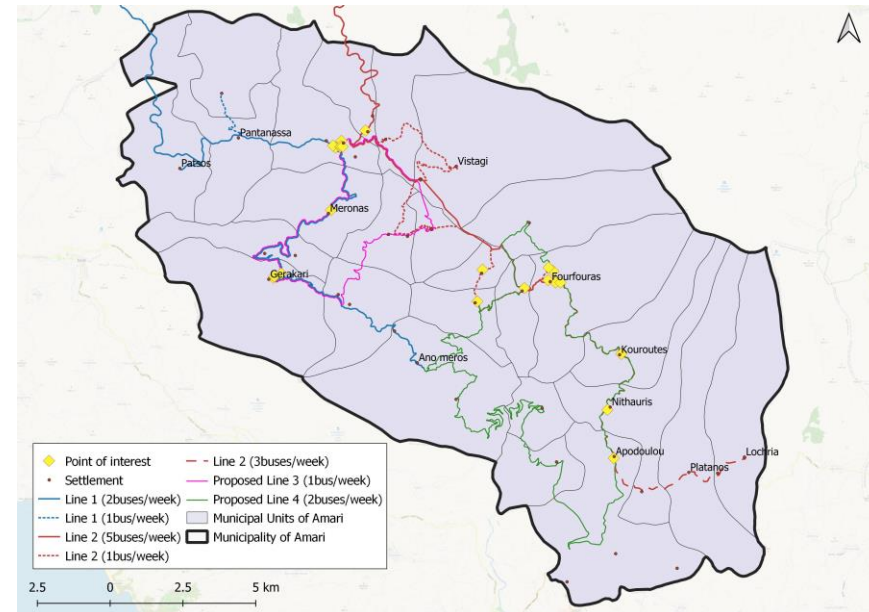
POI: 23



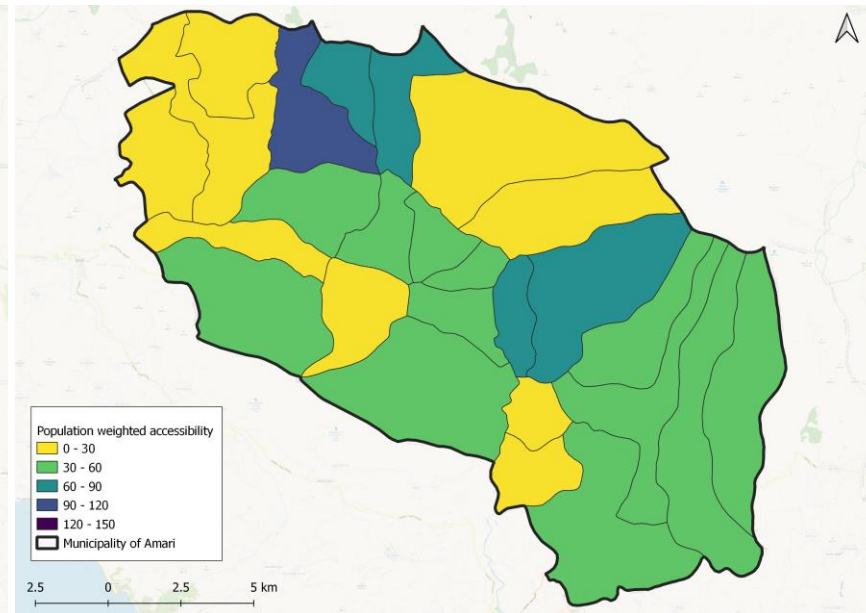
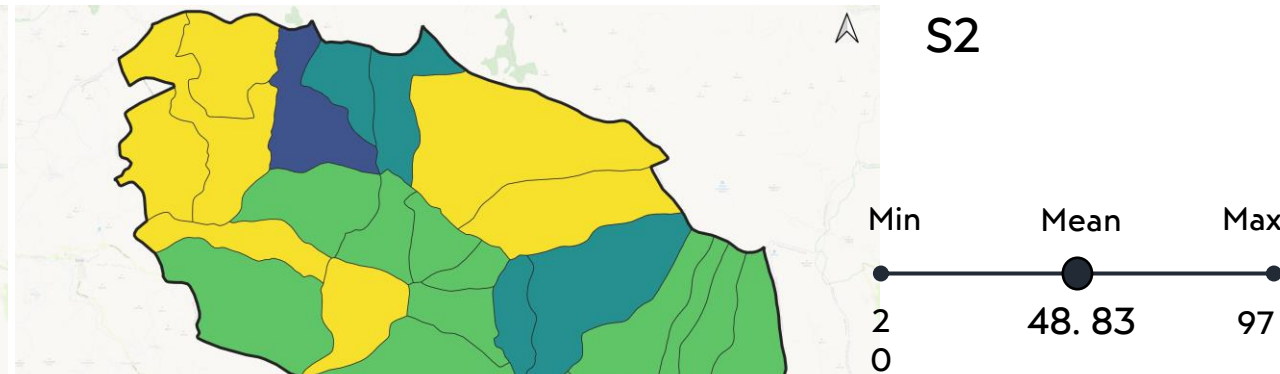
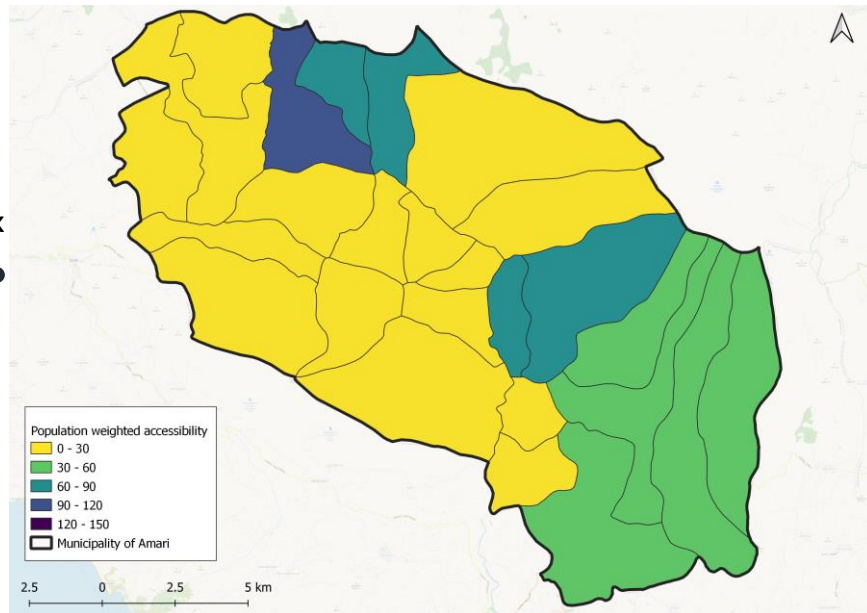
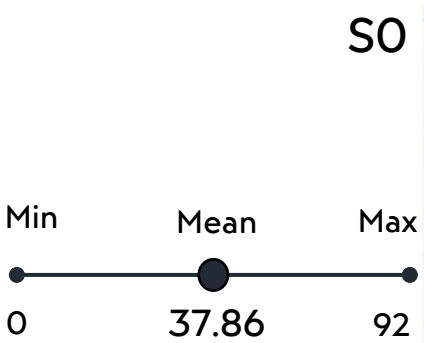
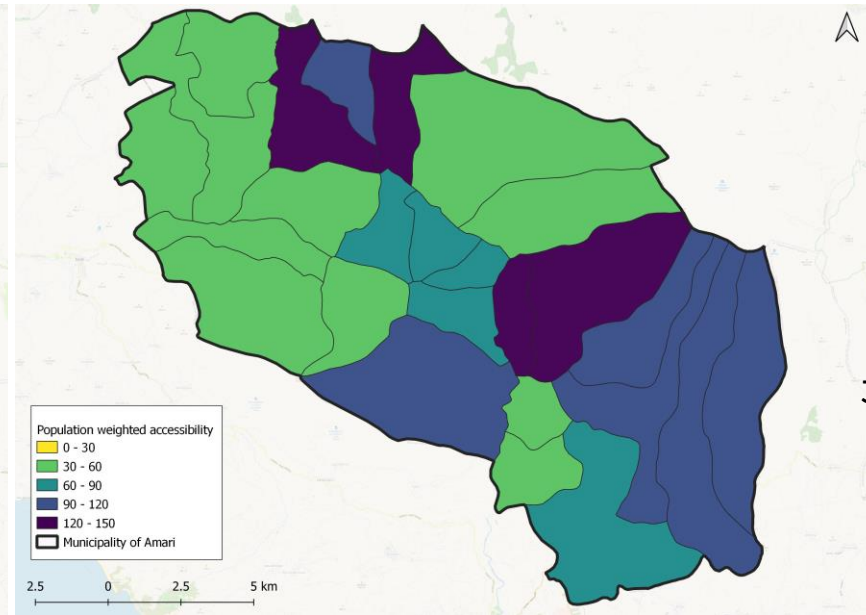
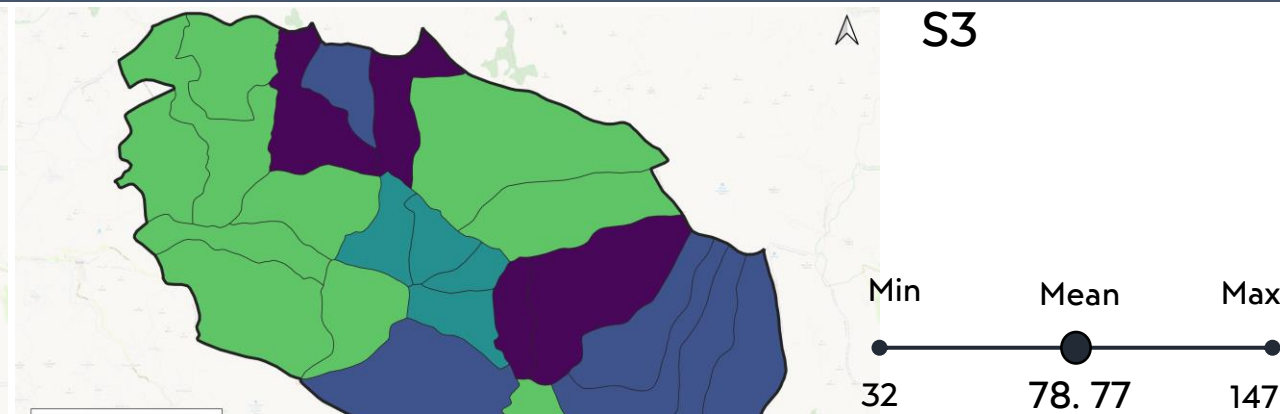
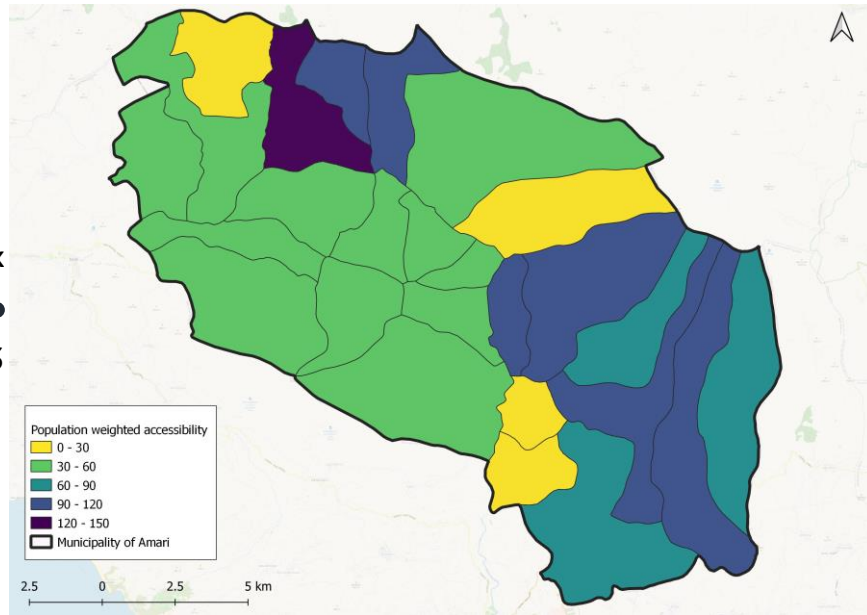
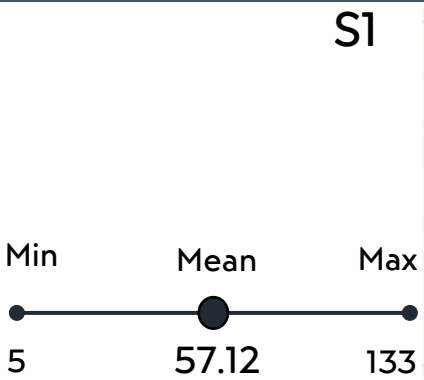
S2

Public transport
lines: 4 (+2)

POI: 23



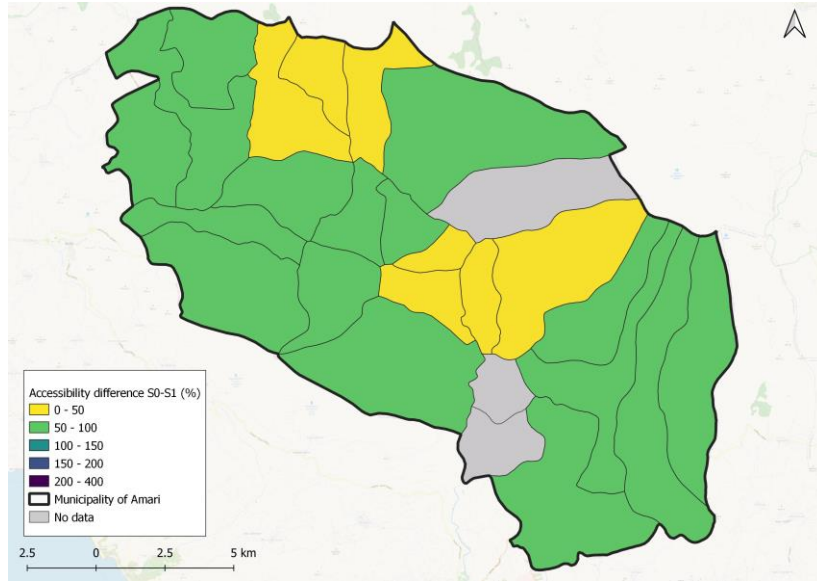
Results/Accessibility





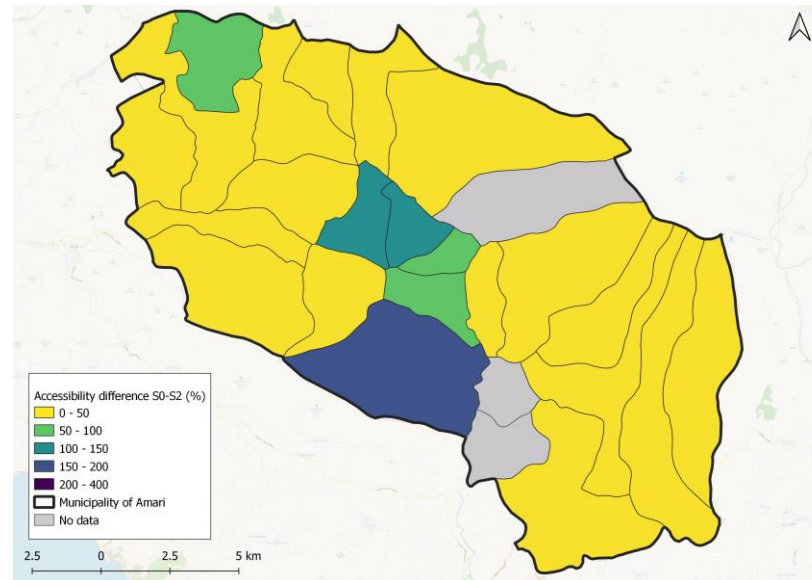
Results/Differences in accessibility

S0-S1



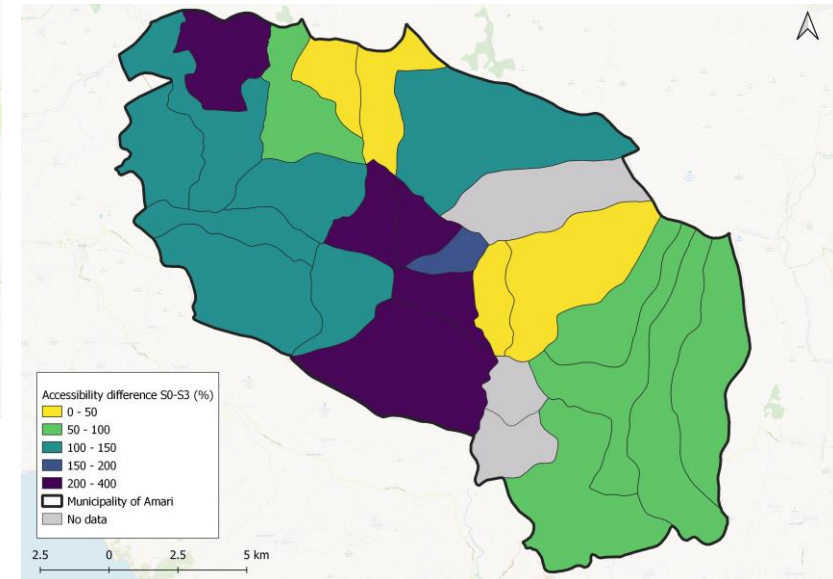
Average difference: 56%

S0-S2



Average difference: 44%

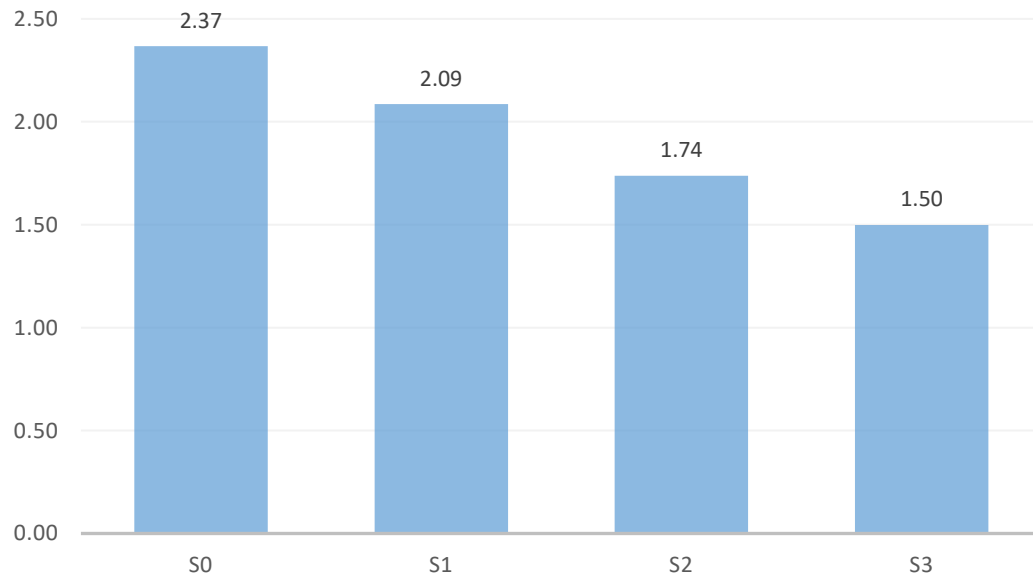
S0-S3





Average difference: 135%

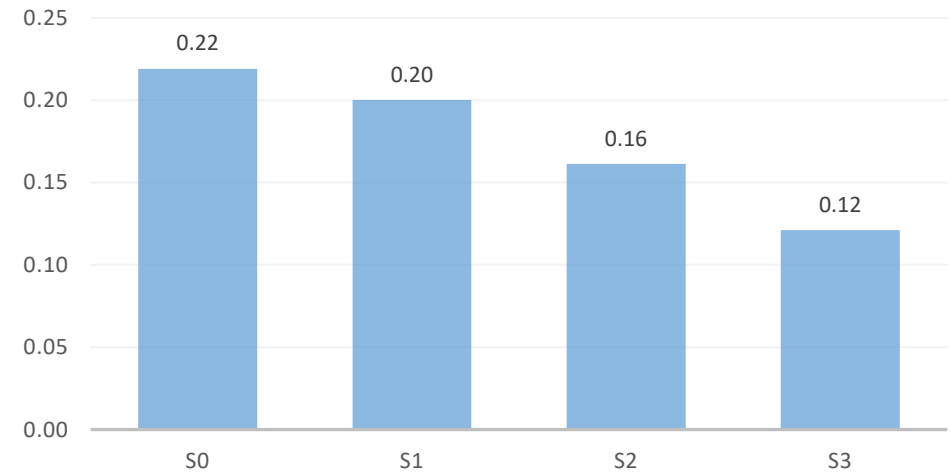




Palma ratio



Difference S0-S3: -36.71%  

Concentration index



Difference S0-S3: -45.45%  

Main findings

- Connectivity and frequency was tested
- Depending on the index, results may differ
- Solely increasing well-distributed POI is not enough
- Combined and new bus lines are the most prominent scenarios
 - New bus lines is the most feasible scenario and easily applicable, while the combined scenario is the most beneficial one as a whole
- Enhancing accessibility (see S1) may not always result in more equitable conditions (Tsigdinos et al., 2024; DeWeese et al., 2022; Pritchard et al., 2019)
- Balancing accessibility and equity is the most profitable solution



Source: <https://auto.economictimes.indiatimes.com/>

Policy recommendations

- Regional buses should prioritise serving all the settlements
- On-demand public transport might be beneficial for inland remote areas
- Routes should cover all the days of the week
- Integrated measures including both redistribution of pois and expansion of public transport services

Future research

- Cost and time perspectives could be considered as well
- Comparative analysis with different municipalities (inland or not)
- Scenarios with more transport modes



Source: <https://auto.economictimes.indiatimes.com/>

Conclusions



- Public transport accessibility should be deemed as a right for everyone!
- Rural areas in Greece and generally in Mediterranean (being quite car-centric) should shift towards sustainable mobility
- Inland areas should be taken into consideration, especially remote ones
- *Combinatorial solutions (on-demand and regular public transport) could be an answer*
- The quest for accessibility and equity is a constant effort both political and technical
- On-demand, initiatives for rural mobility



Source: <https://www.bbc.com/news/education-38639888>



Source: <https://nikana.gr/en/tourist-guide/kefalonia>

17th International Symposium on the Sustainable Development of Urban Transport Systems



Stefanos Tsigdinos

Postdoctoral Researcher
NTUA

Adjunct Lecturer
UniWA

distlp@mail.ntua.gr

stsigdinos@uniwa.gr



November 2024