Comparing Patient Flows by Scales and Categories of Medical Services in Istanbul and Ankara

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Introduction

In 2003, the Health Transformation Program (HTP) was implemented to provide citizens with equitable access to healthcare services. During this program, Turkey experienced a great increase in nurse density, number of hospitals, and national expenditure on healthservices.

However, with the **extreme low urbanization rate of 0.61%**, it is necessary to consider the influences of megacities, such as Istanbul and Ankara, in medical resources supply.

To investigate their influences, this research analyzed **a 4-year dataset of more than 30 million patients moving away from their provinces of residence to seek for medical services** in nation level between December 2009 and December 2013. It contains the location of patients' residences and that of the medical service providers in province level, and category of medical services received.

Research Question

1. Compare the patient inflows and outflows in Istanbul with Ankara.
2. Compare the patient inflows by medical service categories in Istanbul and Ankara in nation level.

Methodology

1. Patient Flow of Istanbul Versus Ankara

We **visualized the flows with FlowMapper**[1]and discussed the **origins and destinations of patients flows** in two megacities.

2. Calculate the Number of patients by Category of Medical Services

We calculated the **number of patients travelling to each province for a specific type of medical services,** and found out the following variables of Istanbul and Ankara in nation level.

➢ How many categories of medical services do it have the largest inflow?
➢ What's the proportion of the largest inflow to the total national inflow for each medical service?

Visualization

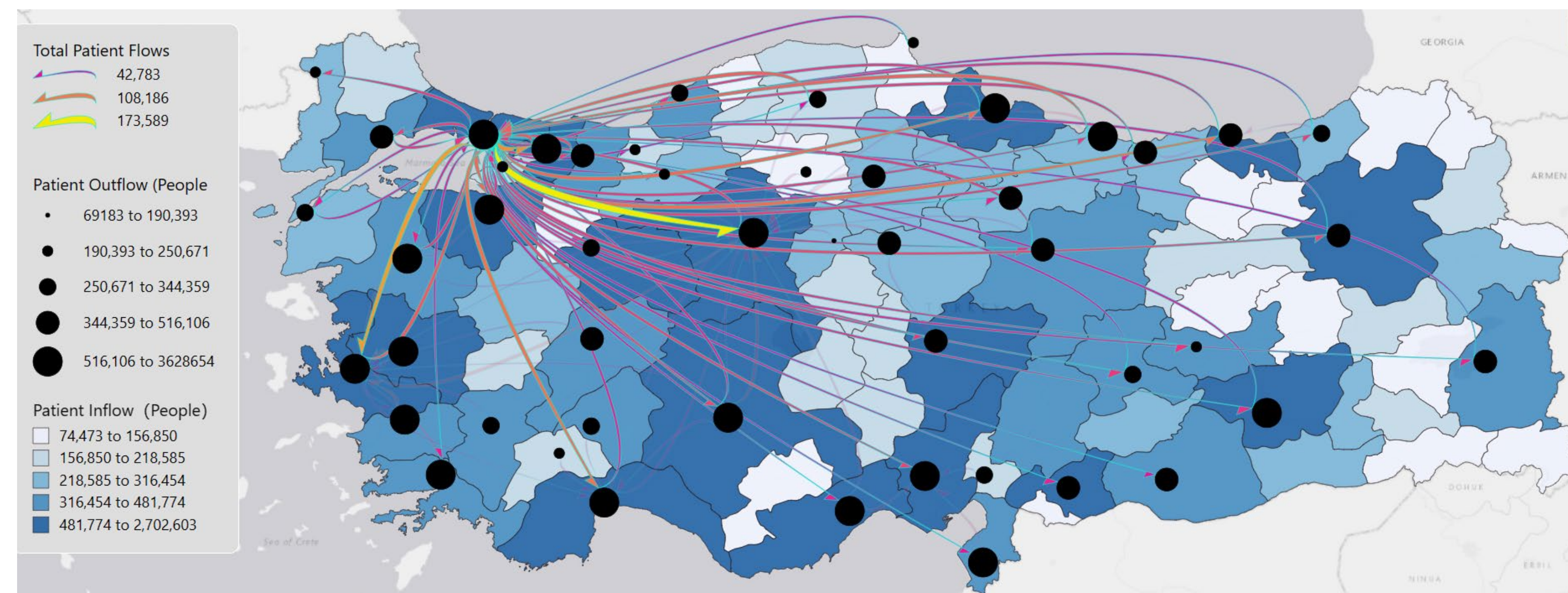### 1. Inflows and Outflows of Istanbul and Ankara

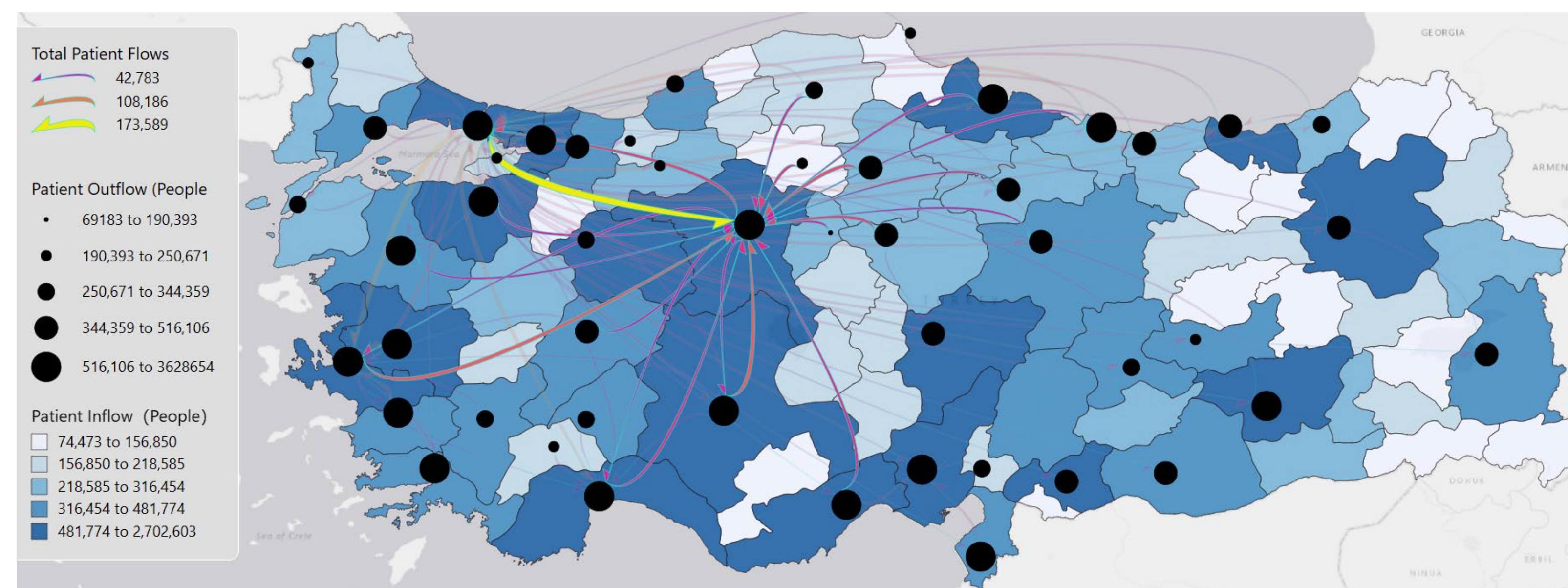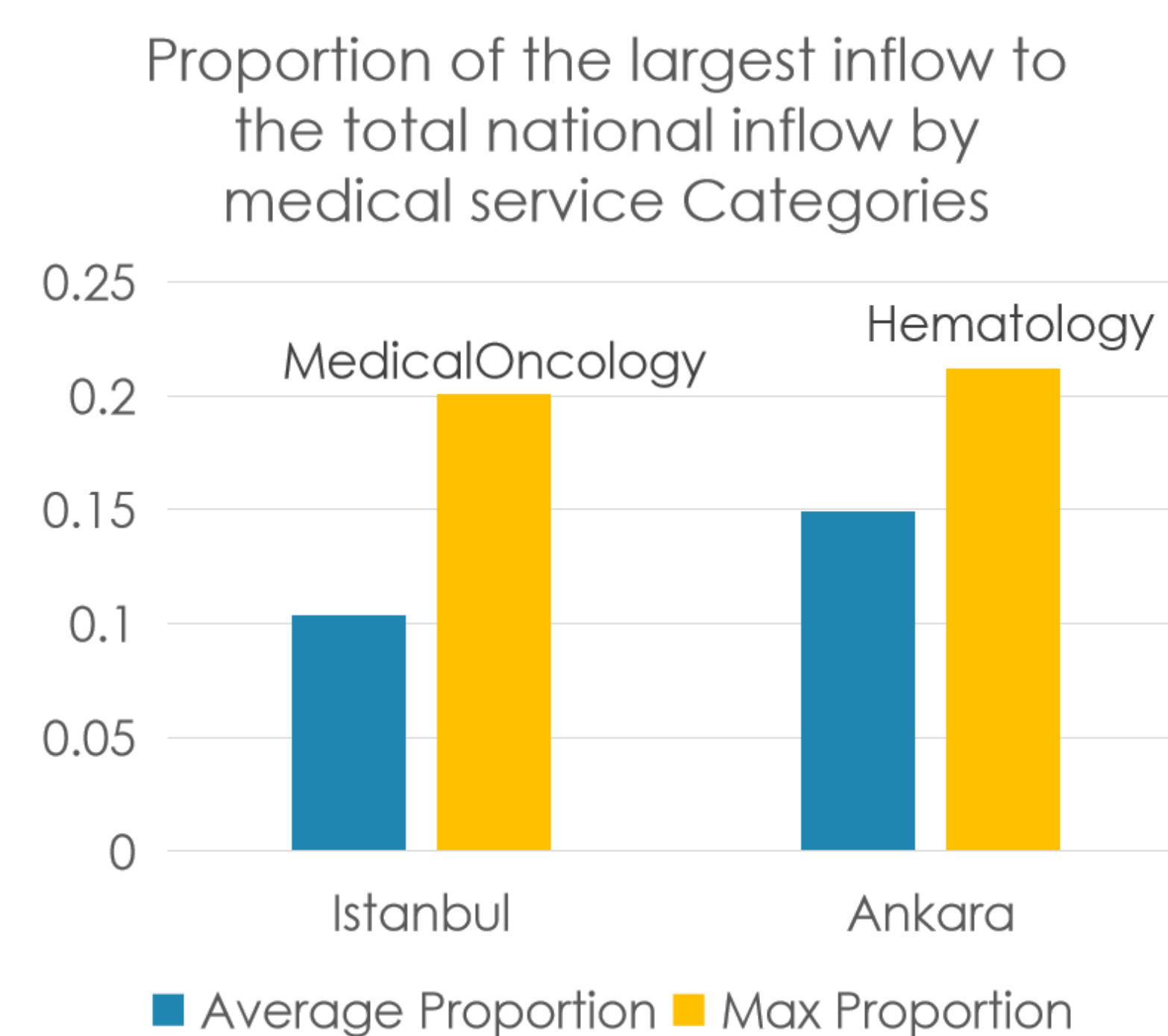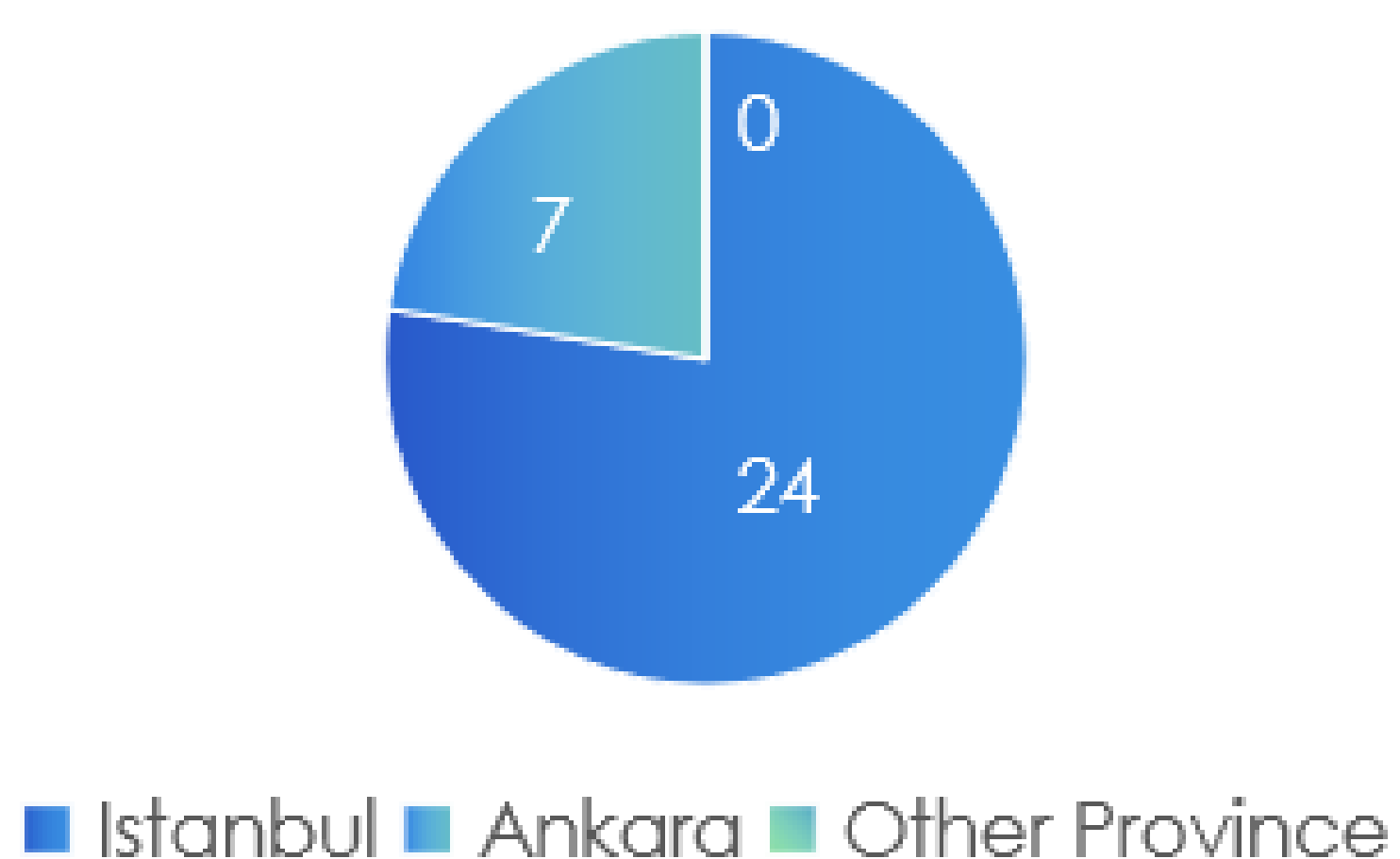*Fig.1 Highlighted inflows and outflows of Istanbul*

Fig.2 Highlighted inflows and outflows of Ankara

2. Comparing inflows and outflows of Istanbul and Ankara in nation level

Numbers of categories of medical services have the largest inflow in that category

■ Istanbul ■ Ankara ■ Other Province

Proportion of the largest inflow to the total national inflow by medical service Categories

■ Average Proportion ■ Max Proportion

Results

1. Inflows and Outflows of Istanbul and Ankara

➢ Istanbul has **significantly more outflows(3,628,654) and inflows(2,702,603)** than Ankara.

➢ Istanbul has **outflows entering the east,** while Ankara has it most outflows entering **western provinces with high inflows**(shown in darker blue areas).

➢ Istanbul has **inflows mainly from the west**, while Ankara's inflow is **more averagely spread in all provinces**.

2. Comparing inflows and outflows of Istanbul and Ankara in nation level

➢ Although Istanbul has **more categories(24) of medical services** centralized in it, Ankara owns **a larger extent of centralized medical services(Ave. 14%).**

➢ **All 31 categories of medical services** have their largest patient inflows in Istanbul and Ankara.

Conclusion

For this research, the patient flows among provinces searching for 31 healthcare resources from 2009 to 2013 are analyzed to evaluate the influences of HTP on the accessibility of healthservices. The results show that people still travel long distances to search more medical treatments, and the extentious spread of medical resources is mitigated by centrality of multiple medical resources in megacities.

References

1. Koylu, C., Tian, G., & Windsor, M. (2022). FlowMapper.org: A web-based framework for designing origin-destination flow maps. Journal of Maps.
2. Koylu, C., Delil, S., Guo, D., & Celik, R. N. (2018. August 2). Analysis of big patient mobility data for identifying medical regions, spatio-temporal characteristics and care demands of patients on the move - International Journal of Health Geographics. BioMed Central.

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