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Demographic development of Russia in the global context: convergence or divergence?

GEOGRAPHIC INEQUALITIES IN ACCESS TIMES FOR ACUTE TREATMENT OF MYOCARDIAL INFARCTION IN RUSSIA

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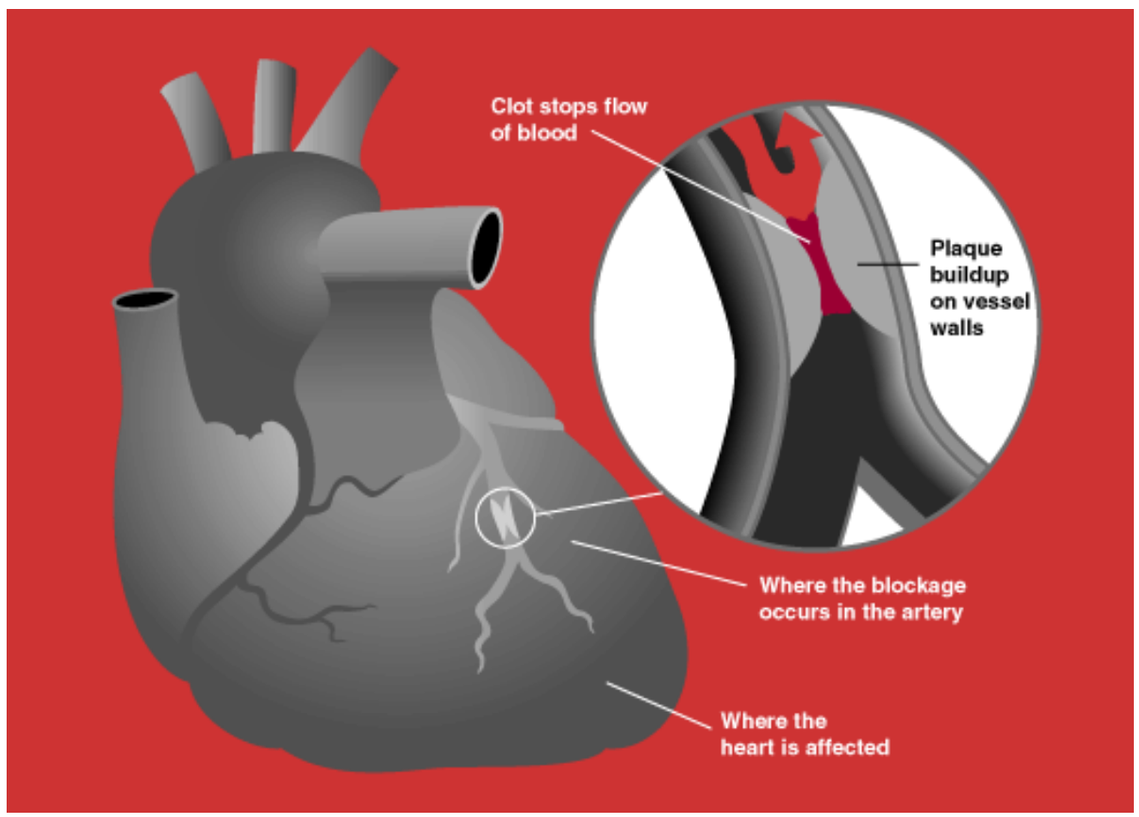
General context

- Despite the recent positive trends in mortality reduction, Russia still has one of the highest death rates from cardiovascular disease (particularly at middle ages)
- Ischemic heart disease is the single most common cause of death in Russia with a share of about 25% of all deaths



Blockage of a coronary artery

- Many recent studies have highlighted a fall in acute and long-term mortality from acute myocardial infarction in parallel with greater use of reperfusion therapy

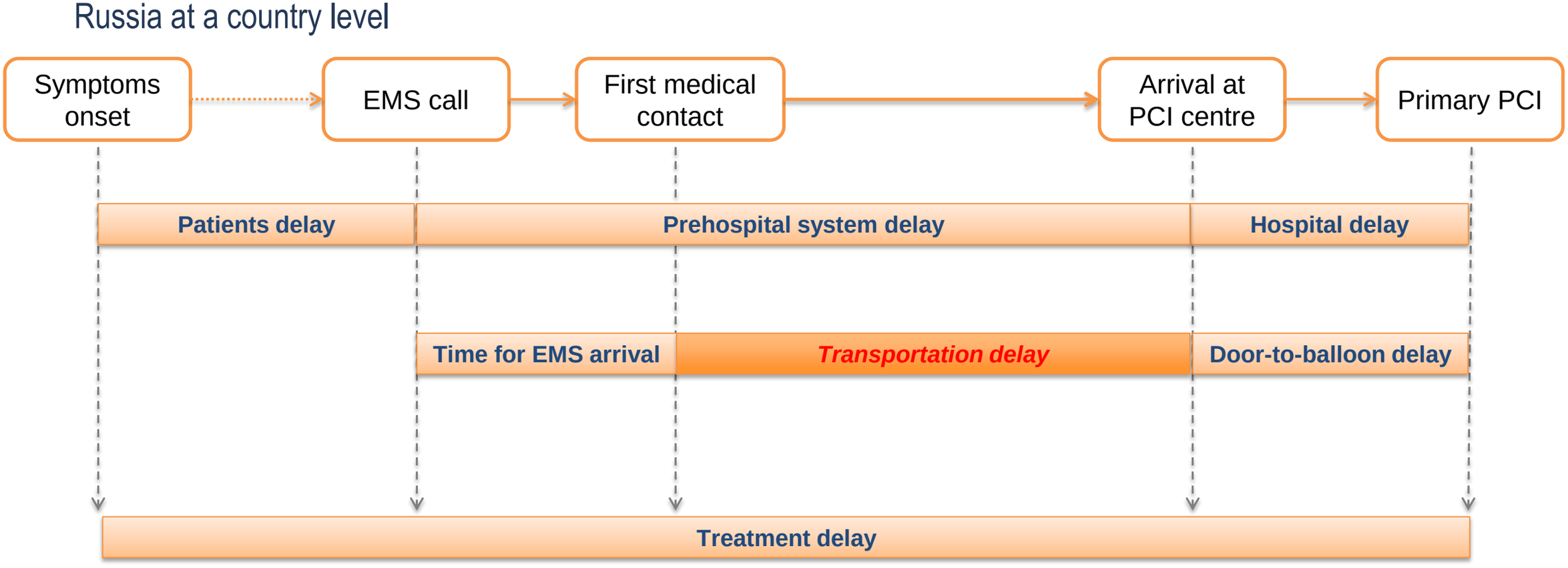
Primary percutaneous coronary intervention (pPCI), performed on the infarct-related artery (IRA)

Fibrinolysis (pre-hospital or in-hospital)

Pharmacoinvasive strategy (fibrinolysis with subsequent immediate transfer to PCI centres)

Motivations for the study

- Primary percutaneous coronary intervention (pPCI) is the preferred reperfusion strategy for patients with myocardial infarction under one major limitation - **treatment must be initiated rapidly**;
- Among all possible delays (patient or system), factor of **geographical accessibility** to PCI-capable centres, is a particular challenge in countries where population is unevenly distributed over large territories with a deficit of roads, especially of high quality;
- To our best knowledge, there has been no systematic attempt to assess the timely access to PCI facilities in Russia at a country level



Data sources

Data on PCI facilities:

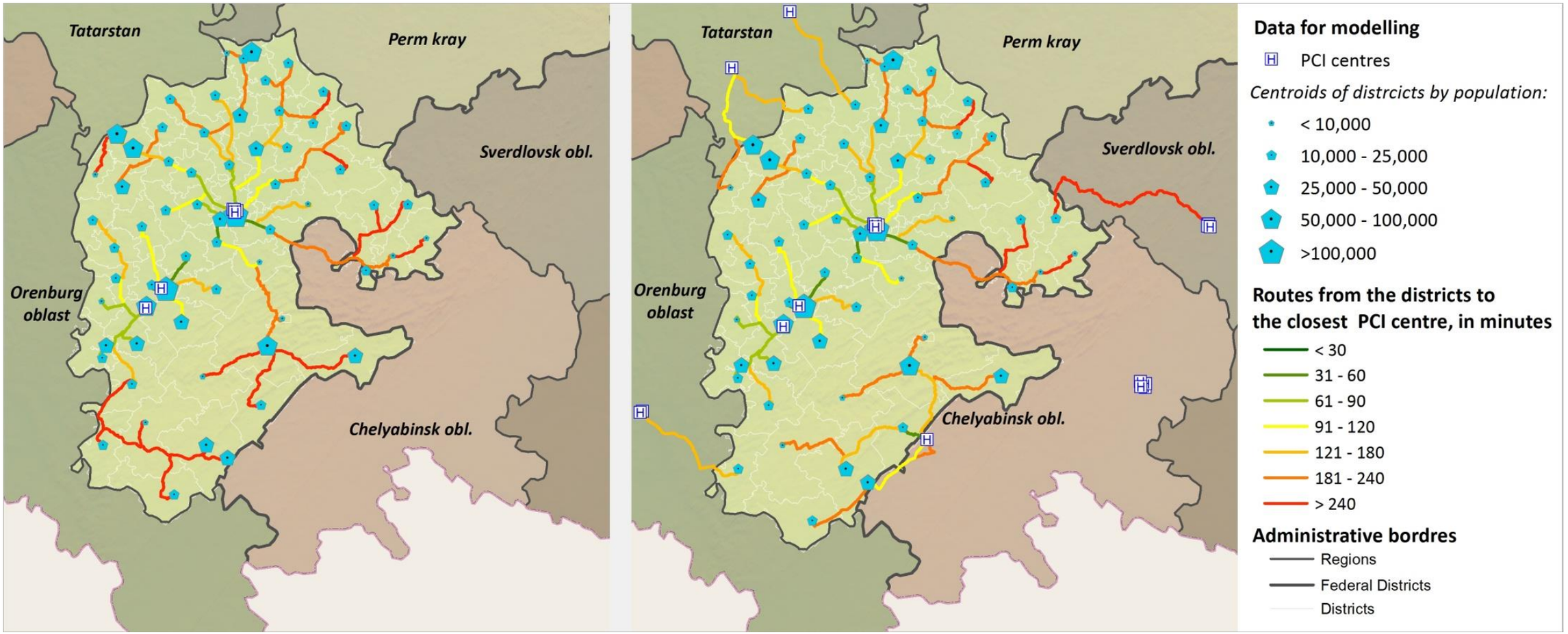
- Names and addresses of the clinics reported on performed PCIs in 2010 (N=144) and in 2015 (N=262);
- 69 new (hypothetical) PCI facilities added in currently underserved urban areas

Population data:

- Urban and rural population aged 40+ by the districts of Russia (N=2,612)

Modeling timely access to PCI facilities

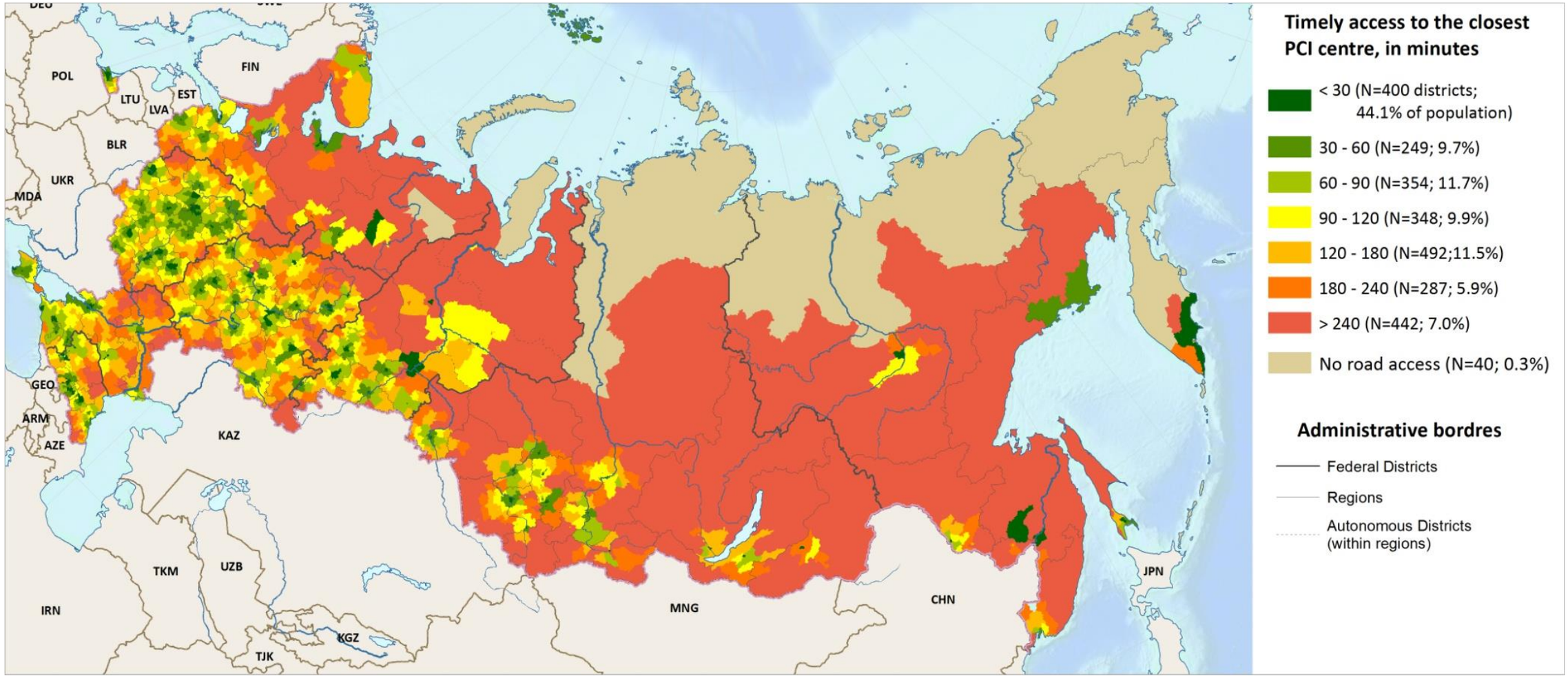
- Each district is represented by its geographical centre (not by specific residence places or areas);
- We calculate travelling (driving) times from each district centre to all PCI facilities using the real road network;
- We choose the two closest PCI facilities: a) the first one is located within the region (left picture), b) the second one could be located in a neighbouring region if it is closer (right picture);
- We repeat the modeling two times – for the year 2010, and for the year 2015
- Additionally, we identify 69 hypothetical PCI facilities in currently underserved urban areas (in cities with populations of 75,000 and more where the driving time to the closest existing PCI centres was more than 60 minutes)



Geographical access to PCI facilities (1)

GOOD NEWS:

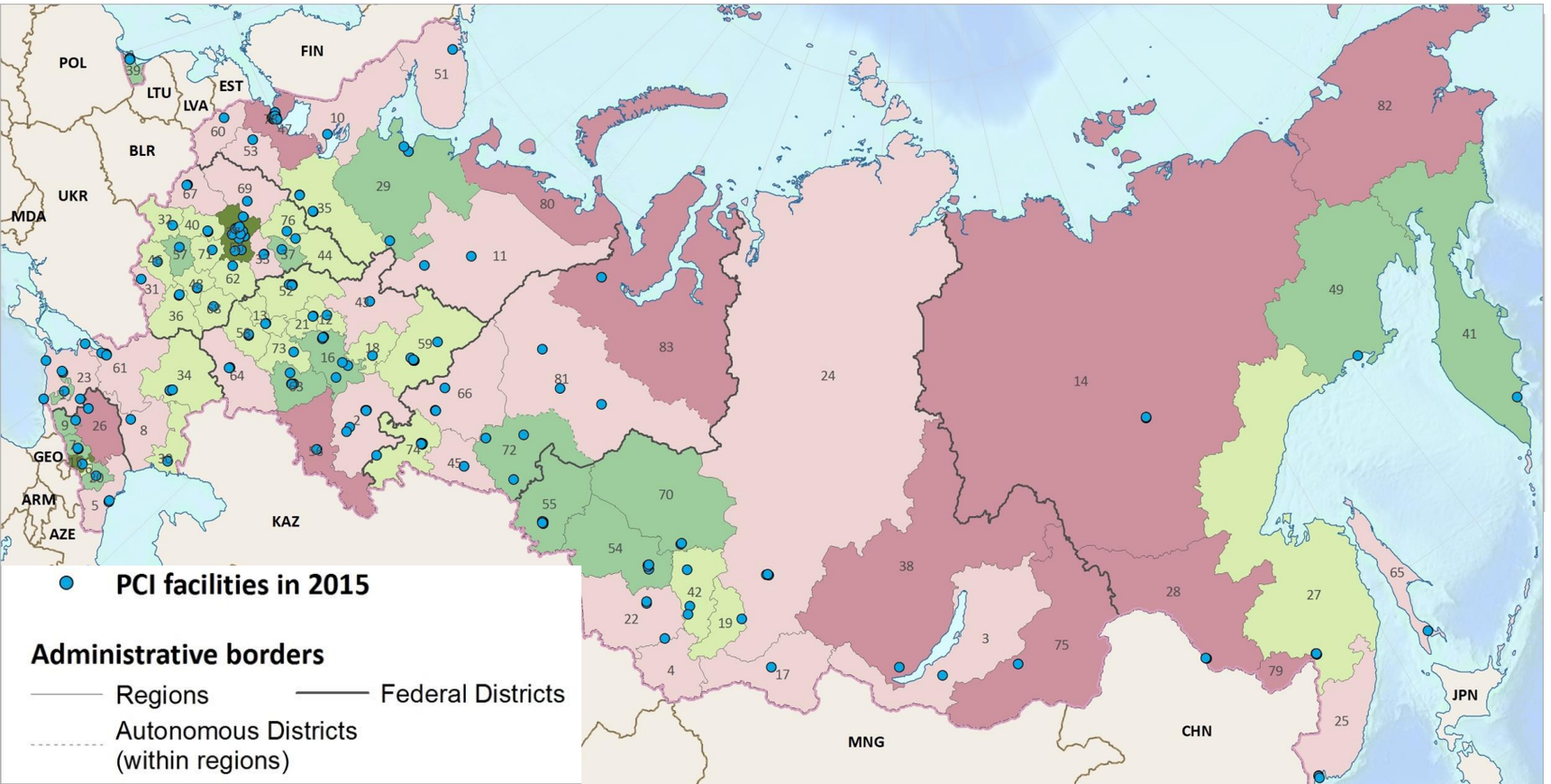
- Between 2010 and 2015, the number of hospitals performing PCIs almost doubled from 144 to 260;
- Median travel time (by roads) to the closest PCI facility was 48.2 minutes in 2015 down from 73.2 minutes in 2010;
- Overall, share of adults 40+ lived within 60 minutes driving time to the closest PCI centre was 54 % in 2015, up from 45 % in 2010;
- Two thirds of the *urban* population in Russian live within 60 minutes travel time to the PCI centres



Geographical access to PCI facilities (2)

CHALLENGING NEWS:

- Three regions in the Far East and one in the North Caucasus do not have any PCI-capable hospitals now;
- Some degree of inequality in access times is perhaps inevitable given the size of Russia and the uneven dispersion of the population. However, today they are still worrying large;
- Those living in urban areas have appreciably better access compared to the 18 million rural residents, only 1 in 5 of whom had access within 60 minutes in 2015;
- The best served regions are those in the central part of European Russia, with the Far East having the poorest access of all, with less than 40% of residents having access in 60 minutes or less.



Share of people lived within 60 minutes driving time to the closest PCI facility in 2015 by regions, %

- < 30 (n=9)
- 31 - 45 (n=26)
- 46 - 60 (n=26)
- 61 - 80 (n=16)
- >80 (n=4)

The effect of further expansion

- To evaluate the impact on timely accessibility, we add additional 67 hypothetical new PCI facilities to the 2015 scenario in currently underserved urban areas;
- 63 of these “new” PCI facilities were placed in cities with populations of 75,000 and over where the driving time to the closest existing PCI facility was more than 60 minutes. The other 4 PCI hypothetical facilities were placed in regional capitals that have not perform any PCIs so far;
- **This would increase the population share within 60 minutes travel to 62% of the population, benefiting an additional 5.7 million people currently lacking adequate access**

Share of people that would live within 60 minutes driving time to the closest PCI facility as a result of additing new hypothetical PCI facilities, by regions, %

- < 30 (n=2)
- 31 - 45 (n=20)
- 46 - 60 (n=28)
- 61 - 80 (n=27)
- 81 - 100 (n=7)

Effect of regional borders on PCI accessibility

We assess travel times to the nearest pPCI centre using two scenarios, one limited to regional facilities and one allowing access to the nearest facility wherever it is:

- For 11% of the population 40+ (7.9 M people) living in about 400 districts it would be faster to go to neighbouring regions for treatment;
- While this option does not lead to substantial increase in 60 minutes access at the national level, it turns out to be quite important for certain regions.

Limitations of the study

The study has a number of inevitable limitations:

- We assessed travel times only by road and assuming good conditions which, at night and during winter months, are unlikely to be realised;
- In some cases, helicopters or aircraft may be used, although these also face many challenges, especially weather conditions
- Our estimates make the simplistic assumption that the travel distances to the closest PCI facility are the only constraint (PCI facilities also differ in their capacity and not all of them operate 24 hour services);
- Our data on the population distribution are not precise enough. It would be better to have data by census tracts or at least by settlements

Final remarks

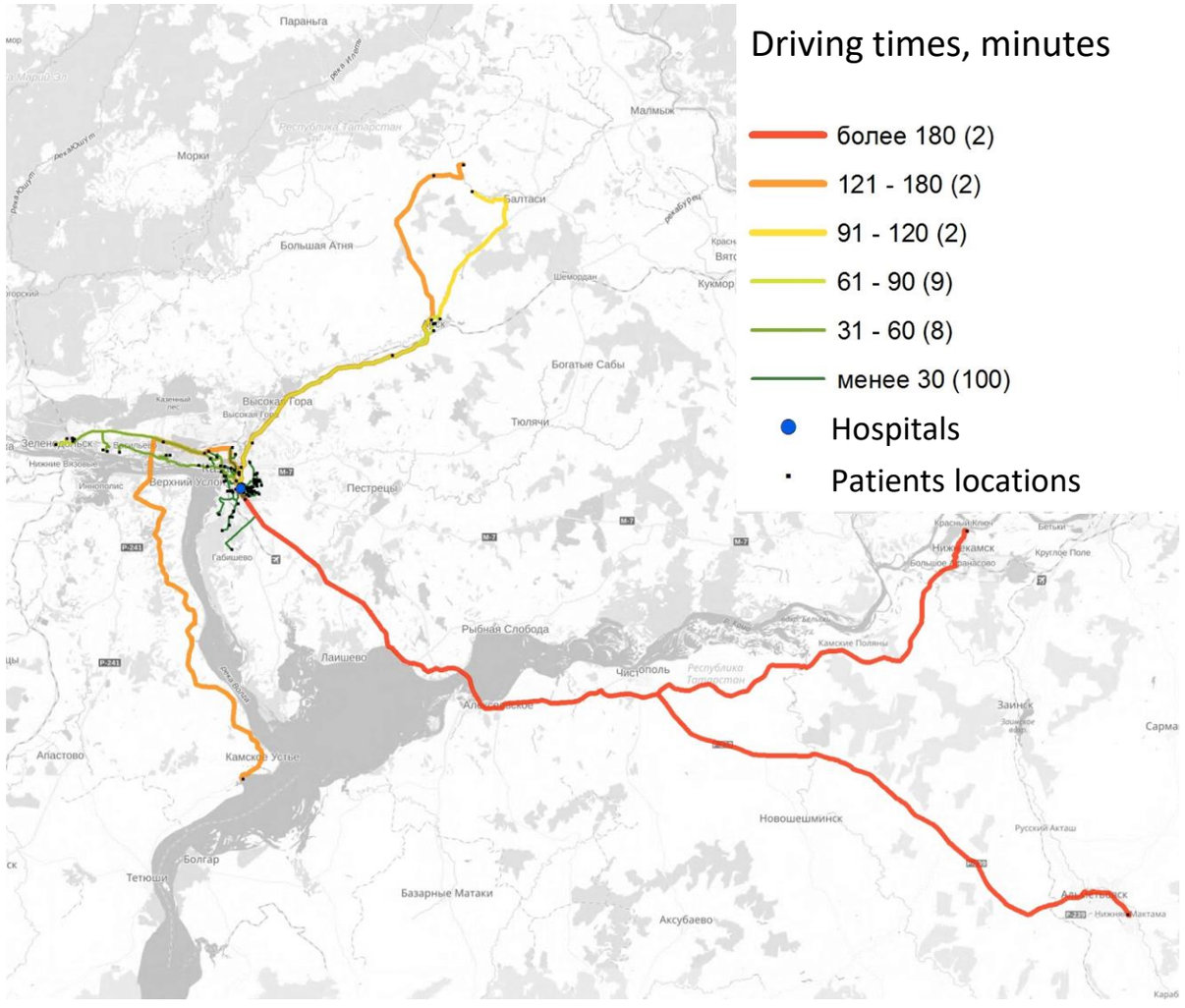
There are both positive and negative findings:

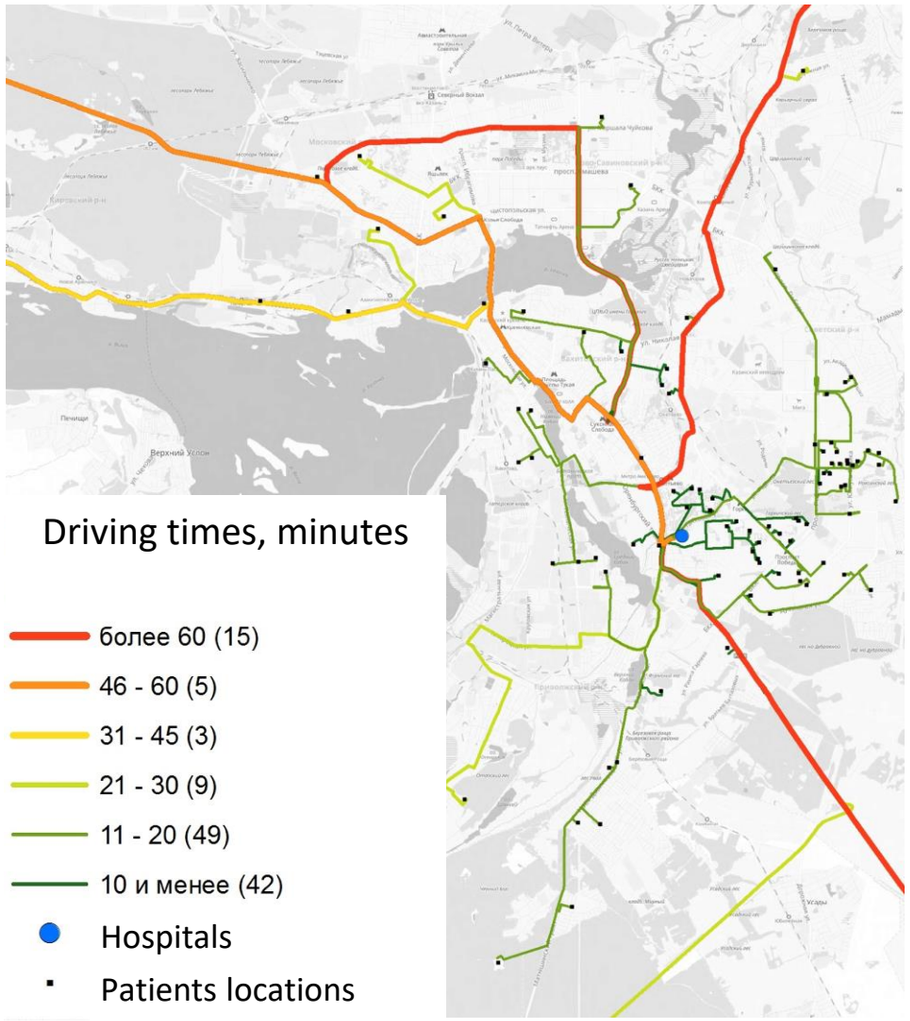
- Large countries with unevenly distributed populations, such as Russia, face challenges in delivering management of acute myocardial infarction (AMI) equitably;
- The number of hospitals performing PCIs in Russia almost doubled between 2010 and 2015, demonstrating substantial progress in providing advanced medical treatment for patients with AMI;
- In 2015, about half of all Russian adults aged 40+ years lived within 1 hour travel time to the closest PCI facility with a pronounced geographical inequality particularly between urban and rural populations;
- Creation of 67 new PCI facilities in currently underserved urban areas would significantly improve overall access, enabling Russia could approach Australia and Canada in terms of the share of people living within 60 minutes travel access;
- For regions with small sparsely populated settlements it may be better to deploy advanced support in vehicles or non-PCI hospitals with subsequent transportation to PCI facilities by road or air if needed.

Further plans…

…to look at the real data from the sub-study on ”Acute myocardial infarction (AMI)” of the International Project on Cardiovascular Disease in Russia:

- 1,100 patients-participants in 13 regions of Russia;
- exact address from which the patient was transferred to the clinic

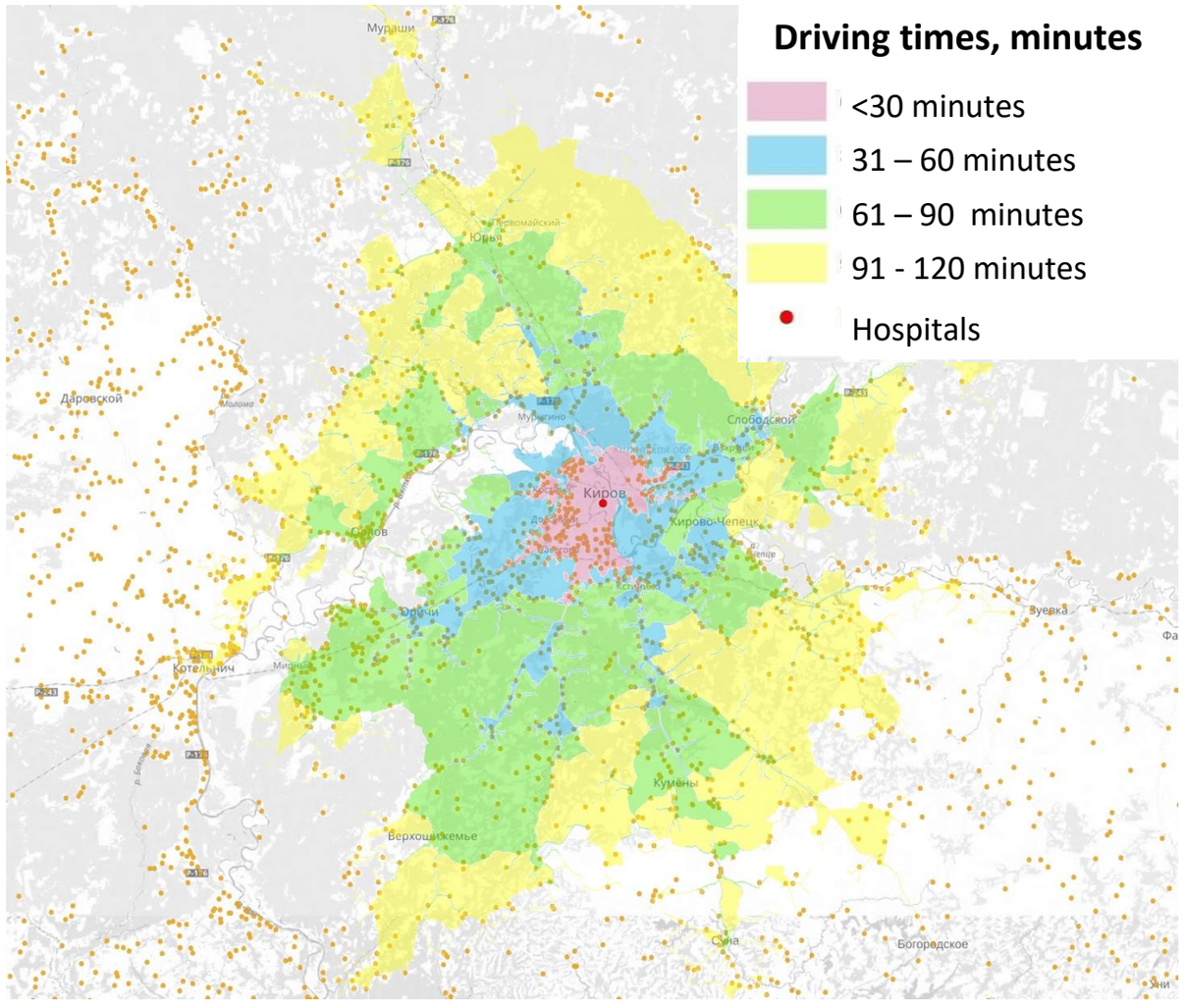


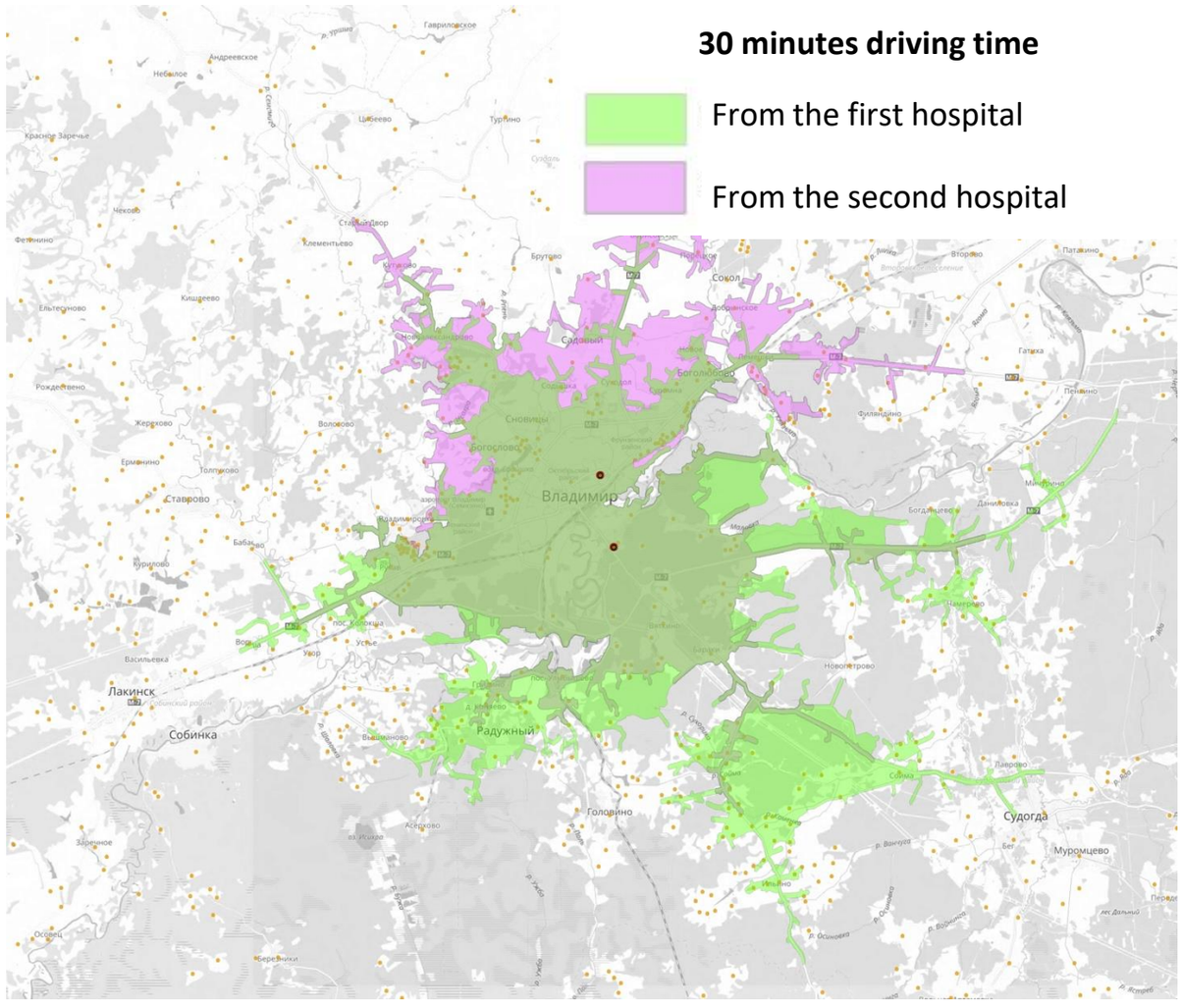


100 patients with AMI in Tatarstan region (82% of all participants) were within 30 minutes driving time from the clinic

Further plans…

… to estimate the number of people living in the catchment areas of each PCI-capable hospital in Russia (n=275 in 2016) and to match it with the number of performed PCIs





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MANY THANKS

QUESTIONS? SUGGESTIONS?

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