

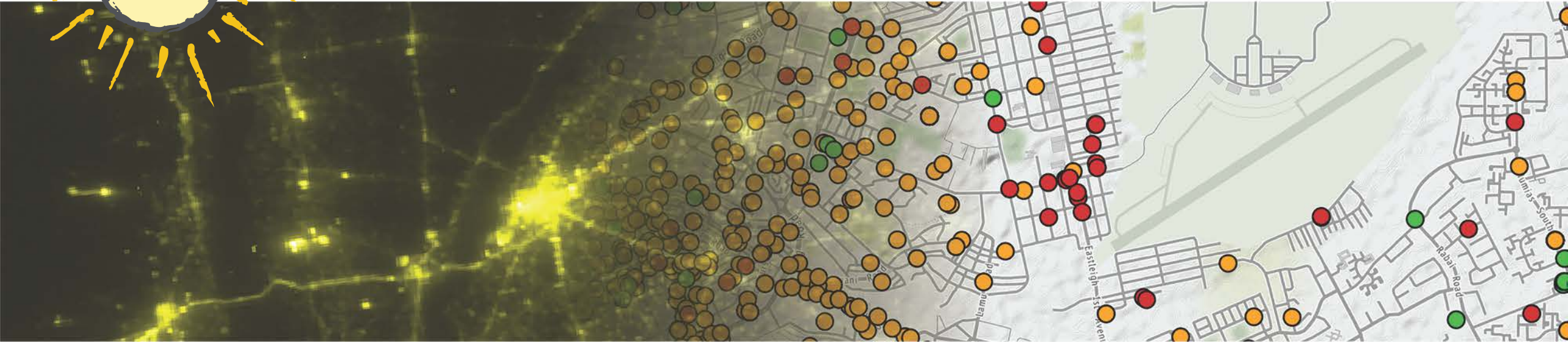


IE CONNECT FOR IMPACT

Transforming the Growth Potential
of Transport Investments

Impacts of improved roads on rural households

Nina Pkhikidze (World Bank, Transport)



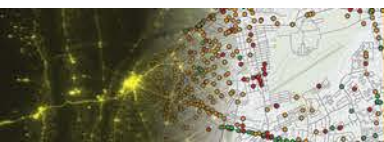
In next 10 minutes I will try to show

Improved road network improves:

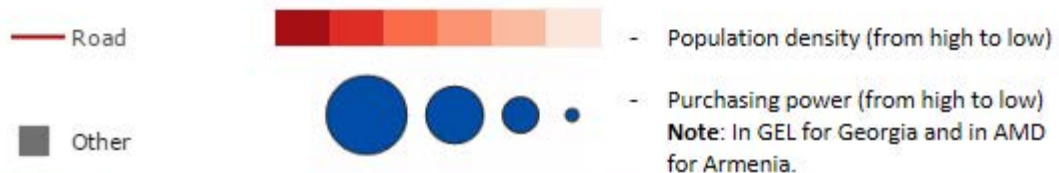
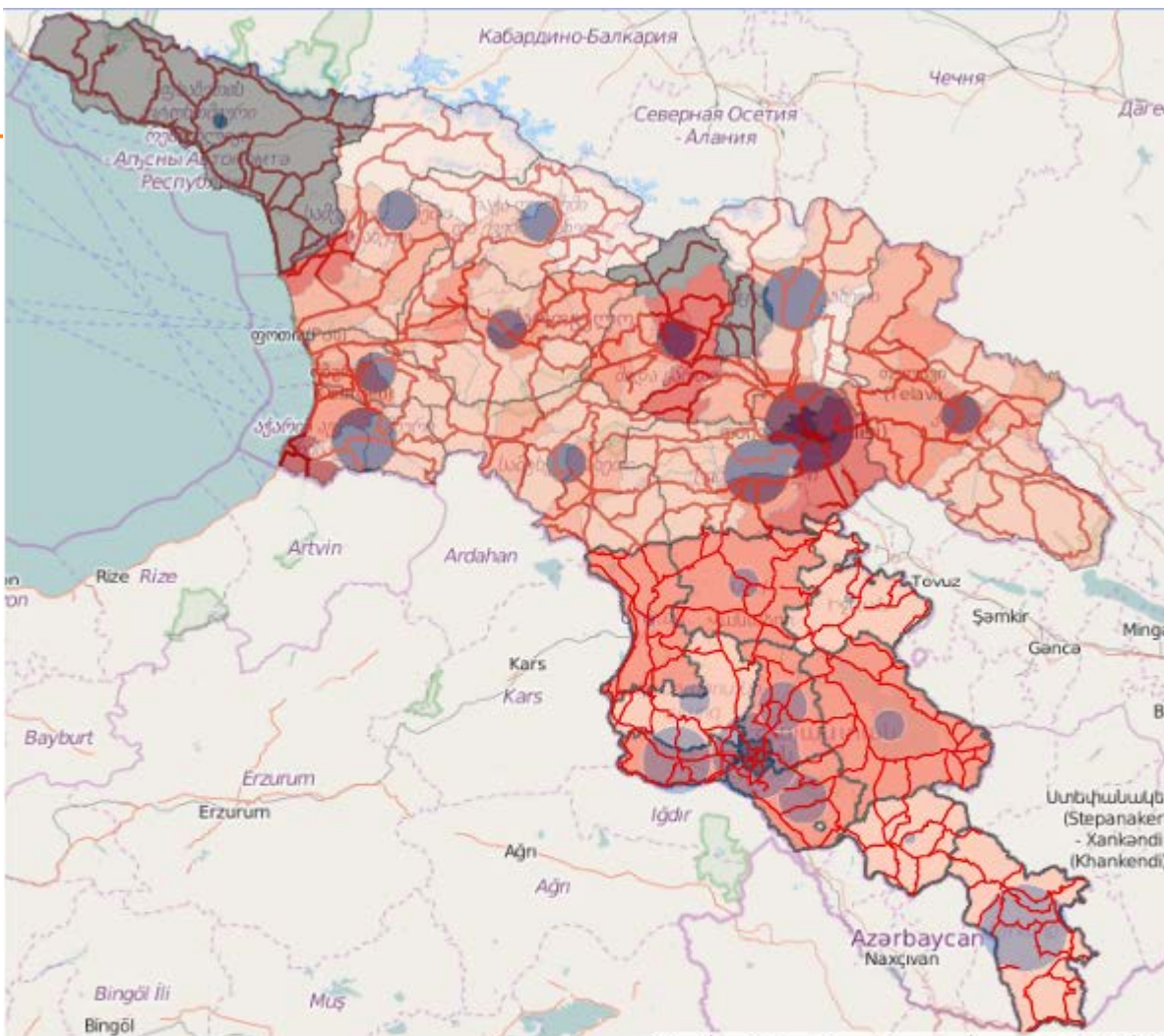
1. Households' living conditions and project complementarity
2. Households' economic outcomes and spending in human capital
3. Access to jobs and individual non-agricultural employment

By:

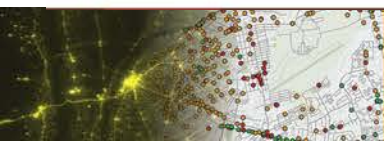
- Combing different econometric methods
- Combining different sets of data
 - household and village surveys
 - geospatial data,
 - administrative data
 - historical maps



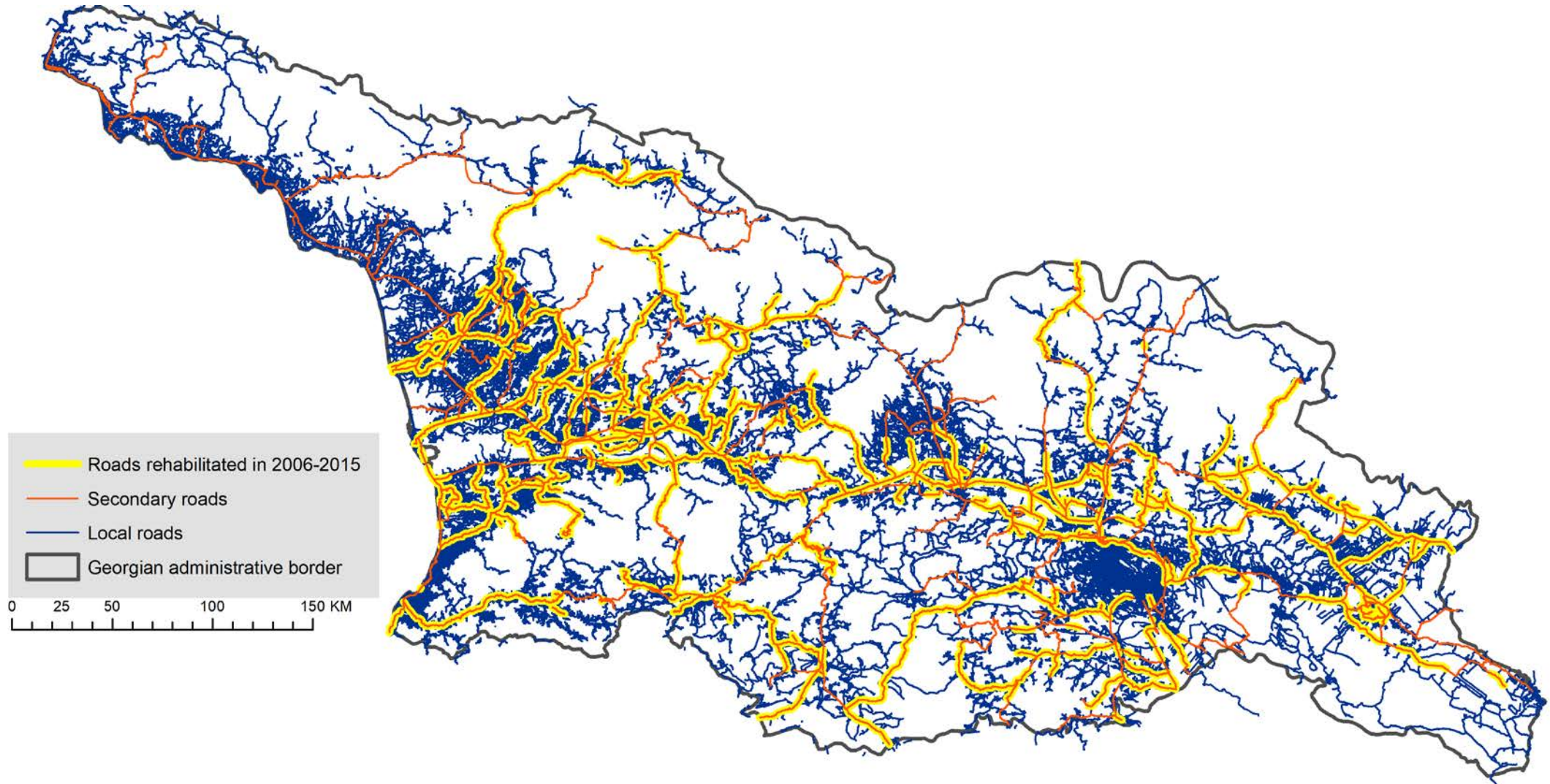
Background



| | Georgia | Armenia |
|------------------|-------------|--------------|
| Population | 3.7 million | 3 million |
| GDP | \$ 14 bln. | \$ 10.5 bln. |
| GDP per capita | \$ 9,600 | \$ 8,400 |
| Rural population | 46 % | 37 % |



Background - Improved Roads in Georgia



1. Impact on household living conditions

Data

GIS:

Built-up grid, ASTER Elevation, USGS water cover, Settlement/city locations, OpenStreetMaps.

Administrative:

Census, Road list, paper based road rehabilitation projects.

Surveys:

Welfare Monitoring Survey (UNICEF), Village Infrastructure Survey.

Method - Optimal least cost path road network

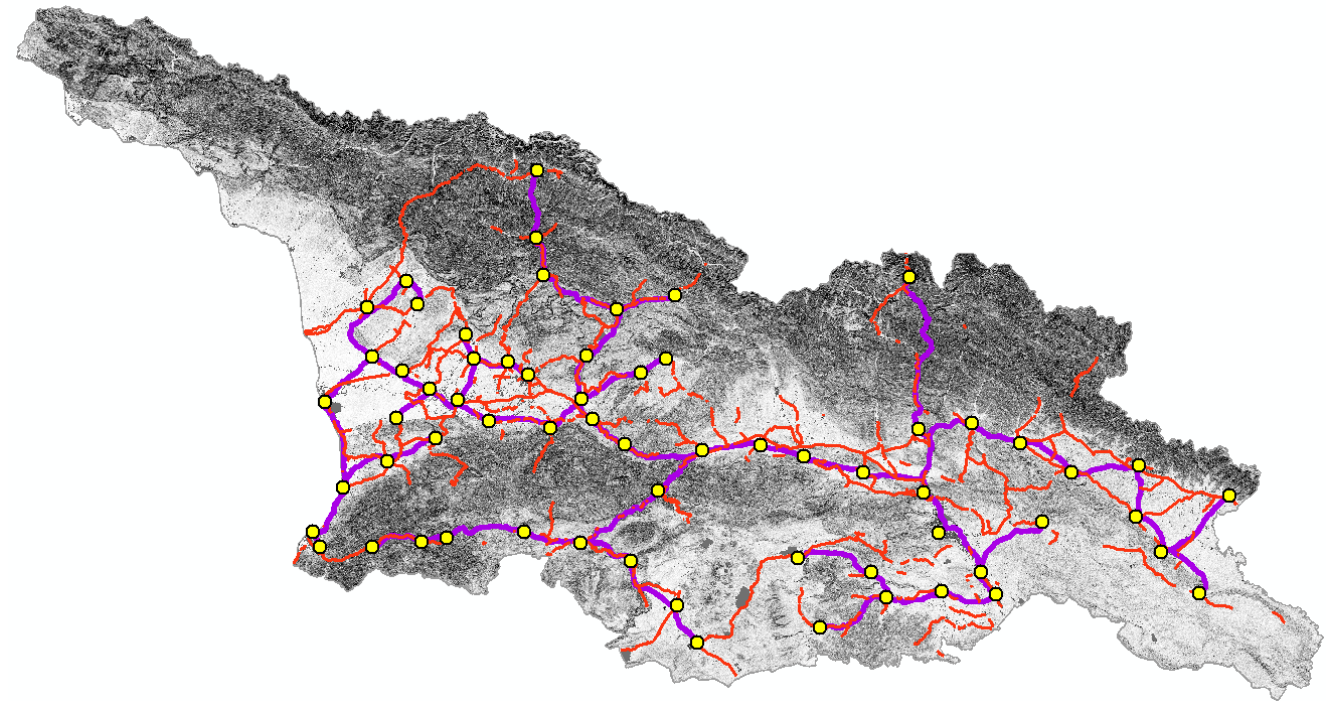















Figure: Cost raster with least cost path spanning tree network. The rehabilitated roads  and the cost tree network 

Results – Complementarity and impacts on living conditions

Access to Utilities

- Gas 
- Water 
- Sewage 
- Waste disp. 
- Internet 

Facilities at home

- Shower/bath 
- Shower/bath inside 
- Piped water 
- Water inside 
- Hot water 
- Electric/gas heater 

2. Impact on household income and expenditure

Data

GIS:

OpenStreetMaps, Digitized road network, Settlement/city locations, OD Matrix.

Administrative:

Census, Road list, paper based road rehabilitation projects.

Surveys:

Welfare Monitoring Survey, Village Infrastructure Survey.

Method - Treatment & control settlements (diff-in-diff)

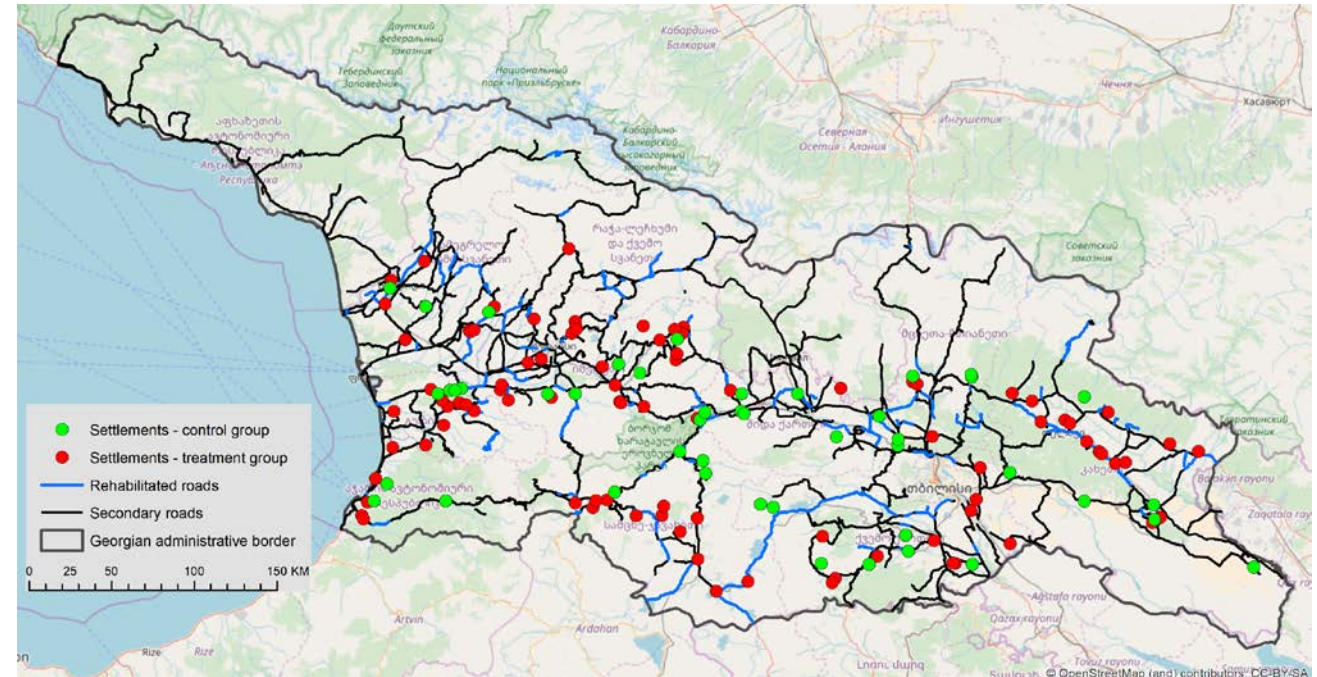


Figure: Pre-project comparisons: Population, Altitude, Rural settlement, Distances: to municipal center, to nearest health center, to nearest market, to nearest major road, to nearest secondary road, to nearest int. railway, Number of schools in the settlement.

Results - Impact on household income and expenditure






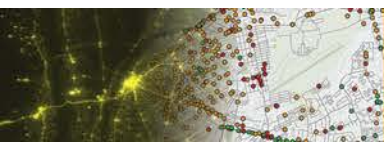
- Regular monthly income 
- Total non-food expenditure 
- Long-term expenditure 
- Short-term expenditure 
- Expenditure on education 

Table 4.6.2: Impact on rural households

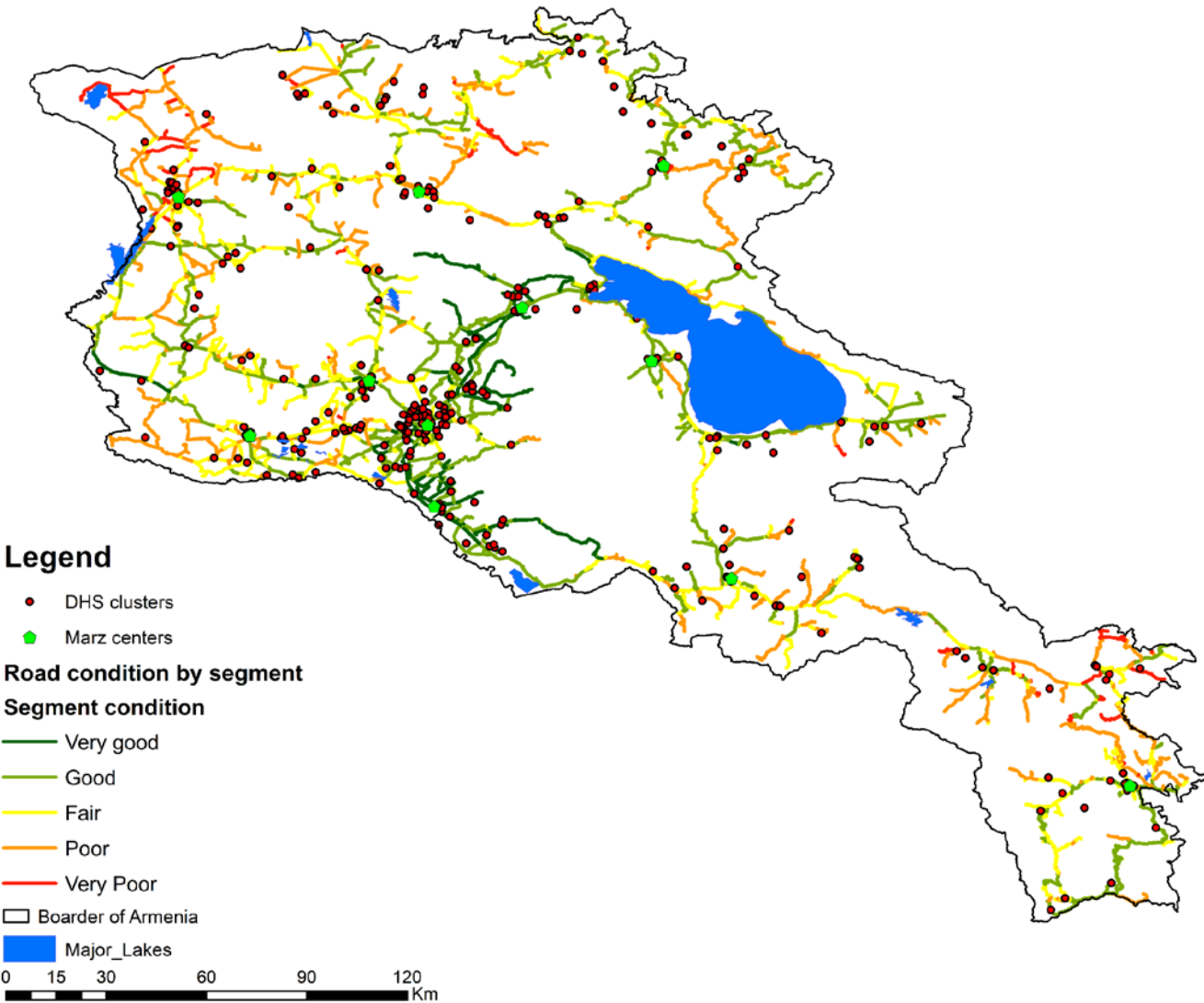
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|--------------|---------------------|---------------------|---------------------|---------------------|--------------------|--------------------|-------------------|-------------------|------------------|
| | totexp | foodexp | totnfexp | ltexp | shtexp | eduexp | hcexp | income1 | income2 |
| DiD | 0.060 (0.076) | -0.090 (0.090) | 0.351*** (0.125) | 0.408* (0.203) | 0.340** (0.127) | 0.469** (0.215) | 0.307 (0.248) | 0.366* (0.208) | 0.345 (0.485) |
| time | 0.222*** (0.070) | 0.488*** (0.082) | 0.065 (0.108) | 0.463*** (0.137) | -0.001 (0.120) | 0.098 (0.199) | -0.011 (0.177) | 0.034 (0.170) | 0.314 (0.428) |
| HH controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 2,522 | 2,522 | 2,522 | 2,522 | 2,522 | 780 | 2,522 | 2,522 | 2,522 |
| HH number | 1,261 | 1,261 | 1,261 | 1,261 | 1,261 | 505 | 1,261 | 1,261 | 1,261 |
| R-squared | 0.179 | 0.187 | 0.122 | 0.115 | 0.101 | 0.127 | 0.046 | 0.124 | 0.020 |

Household controls include: *familysize*, *child5*, *elder*, *idp*, *hhead_age*, *hhead_sex*, *hhead_edu*, *livestock*.

Robust standard errors in parentheses ***p<0.01, **p<0.05, *p<0.1.



3. What about road quality?



Regional road quality

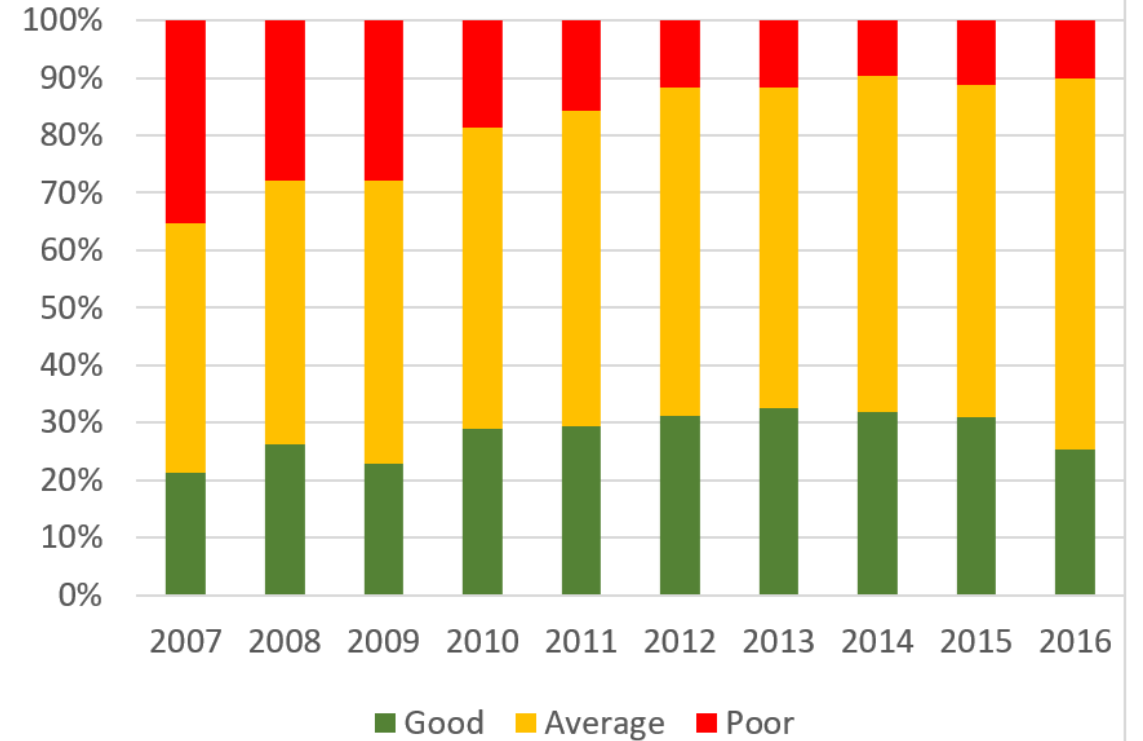


Figure (up): Integrated Living Conditions Survey data
 Figure (left): World Bank Road quality data

3. Impact on rural employment

Method - Historical road network

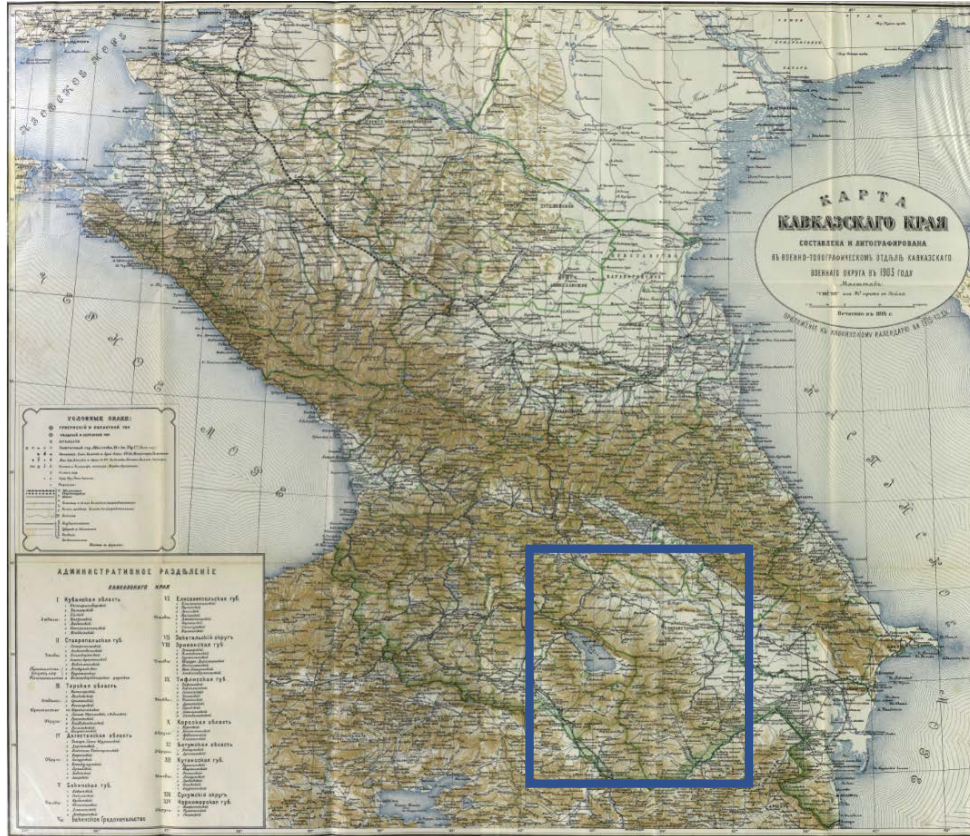


Figure: Military-topographic map of Caucasus, 1903

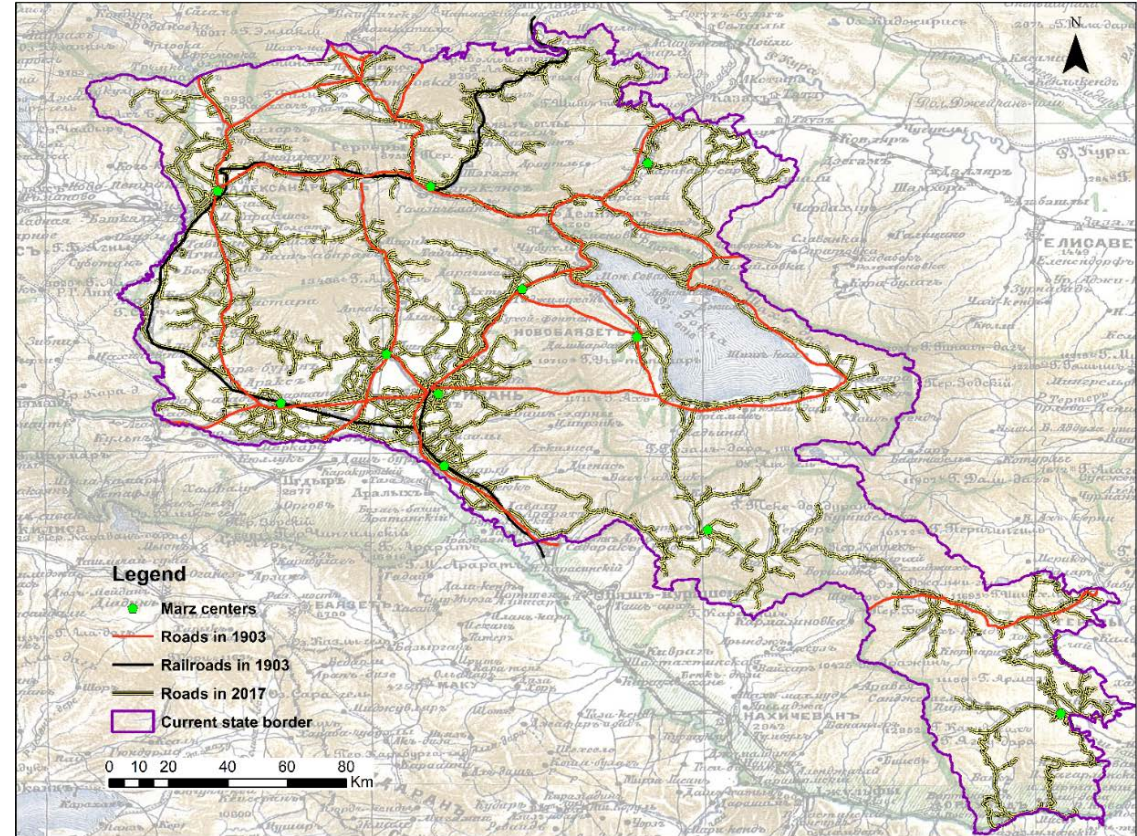
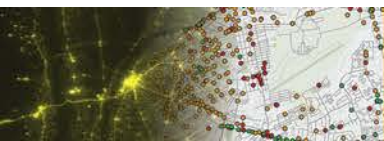


Figure: Background - extract from the map. Digitized historical routes and modern road network.



Results – Impact on jobs

Demographic and Health Survey (DHS)

- Non-agricultural employment
 - Women 5.8% ↑
 - Men 6.2% ↑
- Skilled manual employment
 - Women 2.7% ↓
 - Men 6.6% ↑
- Seasonal employment
 - Women 1% ↓
 - Men 10.7% ↑
- Cash earnings
 - Women 9.3% ↑
 - Men 1.6% ↓

Integrated Living Conditions Survey (ILCS)

- Non-agricultural employment ↑
- Seasonal employment ↑
- Job outside village ↑

Conclusions

Results

- Rural roads are good for improving access to utilities and living conditions of rural households
- Improved road network brings higher economic outcomes
- Better quality roads connects people to non-agricultural jobs

Methods

- Innovative ways to study impacts of road improvements
- Collecting wide range of secondary data is very important

