

Quality of care among type 2 diabetes patients in Siun Sote, Finland - Register based geospatial approach

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Background

- Siun Sote utilizes regional electronic patient register including primary health care and specialized care – the only regional jointly used register in Finland at the moment.
- Type 2 diabetes care in Finland is based on Current Care Guidelines.
 - General aims: to give means for early screening, to prevent complications of diabetes, ensure a balanced treatment and a good life quality for diabetes patients.
 - For example, Hemoglobin A1c (HbA1c) should be less than 53 mmol/mol (7.0%) (good treatment balance) and should be measured regularly.
- For example, USA, UK and Australia have developed quality and outcome standards for follow-up of care.
- Follow-up systems do not exist in Finland. It is poorly known how well the clinical guidelines are implemented in practice in different geographical contexts and what are the real outcomes of care.

Aims

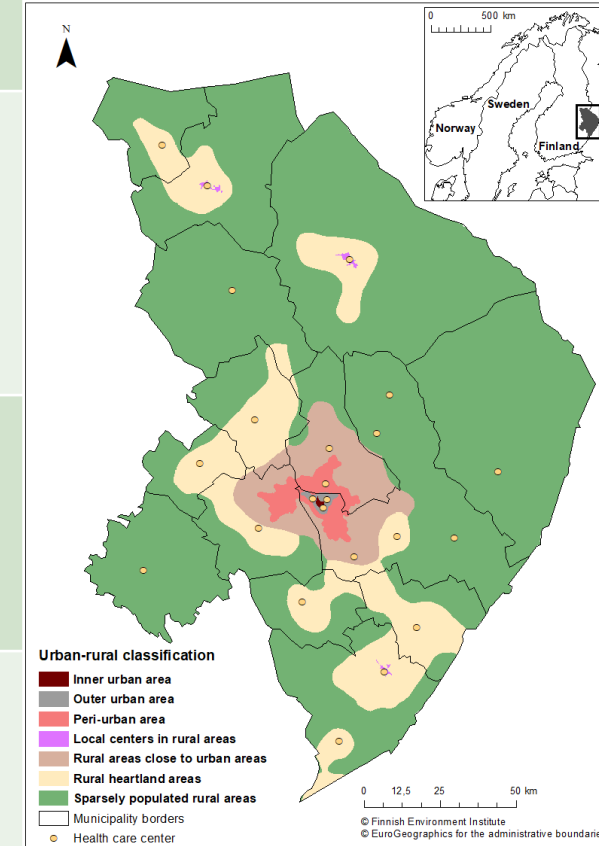
- Aim is to study the **quality of type 2 diabetes care** in Siun Sote region, Finland.
 - What is the spatial variation of type 2 diabetes care?
 - How the treatment targets of type 2 diabetes care guidelines have been achieved?
 - How different factors affect type 2 diabetes care?

Summary of the articles

| Article | Title | EHR data | Methods | Main Findings |
|---------|--|---|--|--|
| I | Type 2 diabetes care in North Karelia Finland: Do area-level socio-economic factors affect processes and outcomes? (published) | n = 10 204 patients n = 131 postal code areas encompassing 10 067 patients | Principal component analysis Linear regression analysis Logistic regression analysis | Several small-area-level SES factors are associated with treatment outcomes. |
| II | Do the classification of areas and distance matter to the assessment results of achieving the treatment targets among type 2 diabetes patients? (published) | n = 9606 patients | Chi square test Logistic regression analysis | It is more informative to apply a more refined area classification than a simple urban-rural dichotomy. Distance is not a barrier for achieving the treatment targets. |
| III | The usefulness of small-area-based socioeconomic characteristics in assessing the treatment outcomes of type 2 diabetes patients: a register-based mixed-effect study (published) | n = 10 204 patients n = 131 postal code areas encompassing 10 067 patients | Mixed-effect modeling | Valid small-area-based SES variables (such as education) can provide a useful way to predict the treatment outcomes by area. |
| IV | The association of neighborhood characteristics with the treatment outcomes of type 2 diabetes patients in Siun Sote region, Finland (planning phase) | n= 13 322 | ? | ? |

Data

| Variables | Data Source | Used in articles |
|---|---|-------------------|
| Patient characteristics <ul style="list-style-type: none"> Age, gender, laboratory results, home address | <ul style="list-style-type: none"> Electronic patient database | I, II, III, IV |
| Socio-economic variables (individual level) <ul style="list-style-type: none"> Income, education, unemployed | <ul style="list-style-type: none"> Database of Statistics Finland (restricted access, subject to a charge) | III |
| Socio-economic variables (postal code level) <ul style="list-style-type: none"> Median income (thousands / €), Educated (%), Unemployed (%) | <ul style="list-style-type: none"> Database of Statistics Finland (open data, free of charge) | I, II, III |
| 7-class classification of urban and rural areas <ul style="list-style-type: none"> Inner urban area, Outer urban area, Peri-urban area, Local centers in rural areas, Rural areas close to urban areas, Rural heartland areas, Sparsely populated rural areas | <ul style="list-style-type: none"> Grid based classification by Finnish Environment Institute (SYKE) | II, IV? |
| Characteristics/greenness of the living environment <ul style="list-style-type: none"> Meadow, park, sport/recreational area, walkway, cycleway, pathway Outdoor fields and sport parks Forests, water | <ul style="list-style-type: none"> Topographic database of National Land Survey of Finland Lipas, a national database of sport facilities CORINE LandCover2012 | IV? IV? IV? |



Results so far...

Patient characteristics

- **Female gender** is associated with higher HbA1c follow-up rates and a higher proportion of achieving the recommended HbA1c level.
- The probability of HbA1c measurements increases with **ageing**. However, **younger age** increases the probability of achieving the recommended HbA1c level.
- **Distance is not a barrier** to good control or to achieve treatment targets.

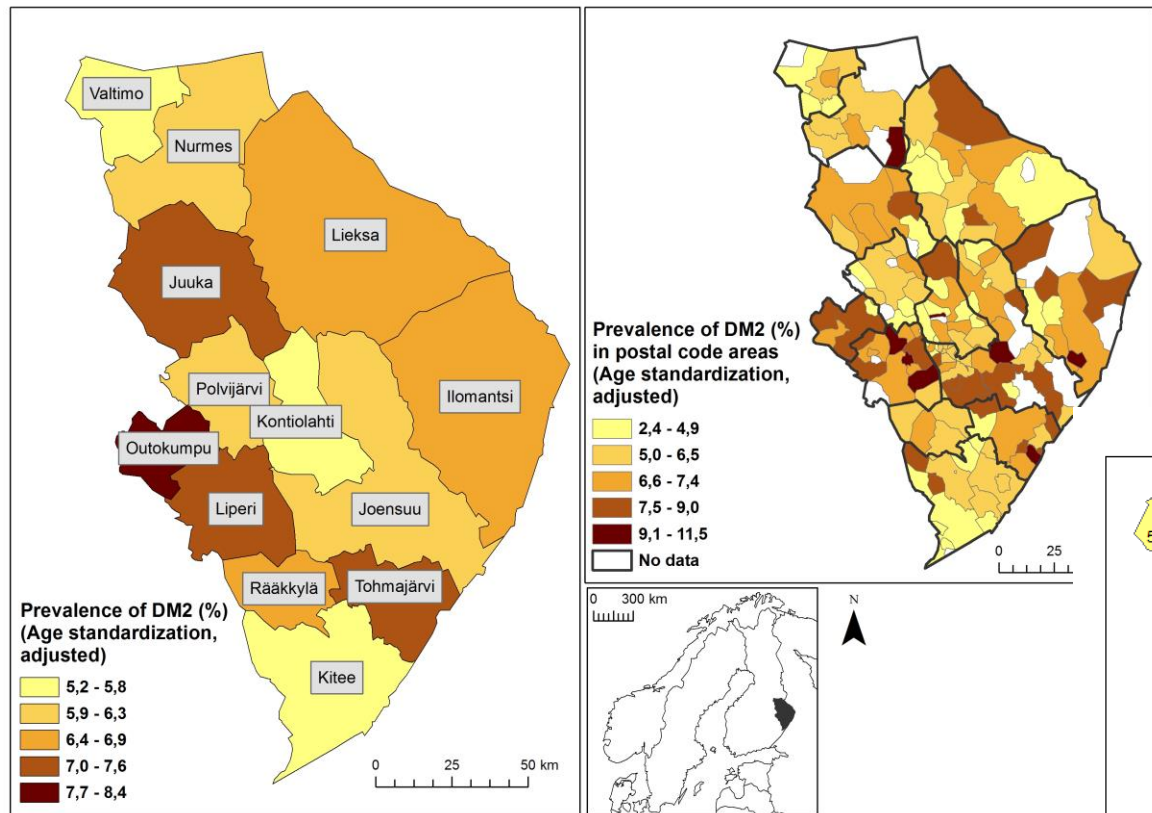
Socioeconomic variables

- **Area-level unemployment** is negatively associated with measurement activity. Neighborhood variables such as **better education, higher income** and **higher proportion of lower and upper clerical employees** are associated with the better attainment of the recommended level of HbA1c.
- The association of the area-level predictor of **educational level** and the outcomes of care is **closely comparable** with the respective association of the individual-level predictor of educational status.

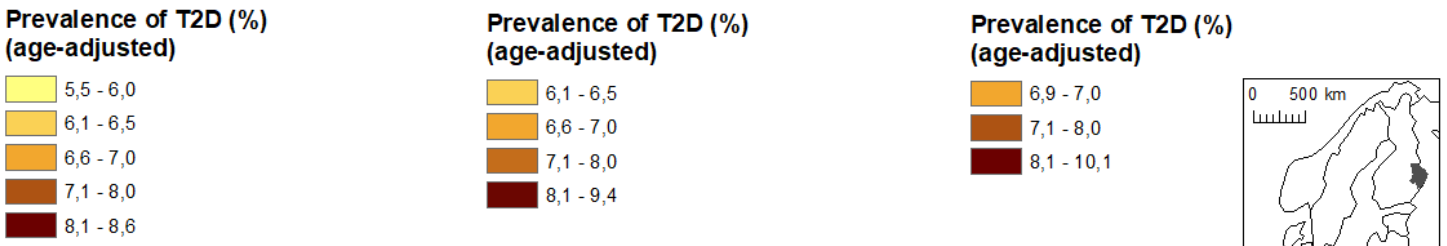
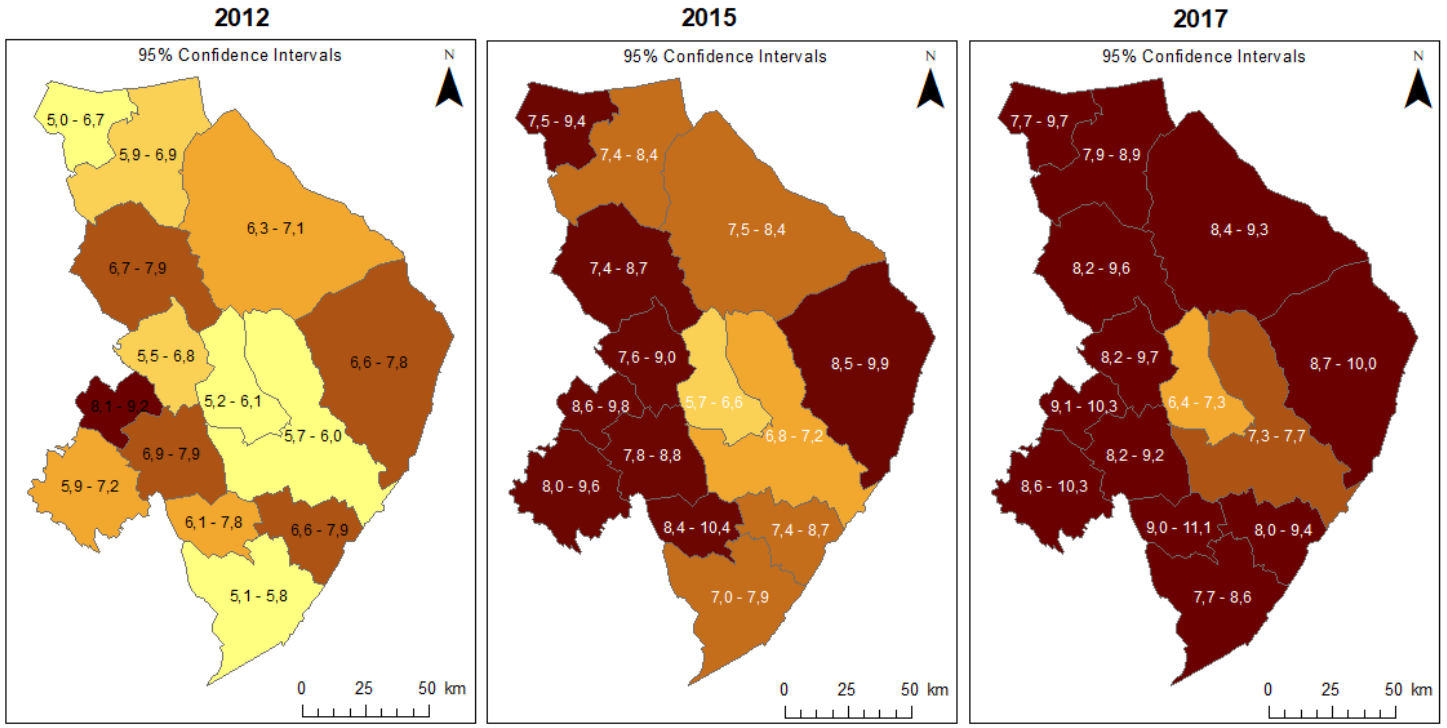
7-class classification of urban and rural areas

- More refined area classification reveals spatial differences in the process and outcomes of care.
- Best follow-up rates: peri-urban area, rural areas close to urban areas, rural heartland areas.
- Worst follow-up rates: local centers in rural areas.

The age-standardized prevalence of type 2 diabetes varies in the region in different spatial scales.



Screening of type 2 diabetes has improved in the region.



Data Sources: Diabetesdata: Mediatri
Municipal borders: Municipalities 2018, Statistics Finland. Data was downloaded from Statistics Finland's interface service on 13 March 2018 with the license CC BY 4.0.

Article 4

- **Aim:** To investigate the association between neighborhood characteristics and type 2 diabetes prevalence and the clinical care outcomes among type 2 diabetes patients.
 - Is type 2 diabetes prevalence higher in less green areas?
 - Are care outcomes worse in less green areas?

- What analysis method I could utilize to assess the associations?
 - GWR (geographically weighted regression)?

To sum up

- Register based study can provide important information for planning, resourcing and targeting primary health care services.
- Combining information from various databases is cost-effective and can help to assess the outcomes of care among patients in different spatial scales.

Thank you!
Comments, questions?

