Background
Finland is in the process of introducing a major administrative reform of health and social services. Measles-mumps-rubella (MMR) vaccination coverage in children was chosen as one of the indicators for comparing the performance of the newly formed counties’ health systems. MMR is given twice within the National Vaccination Programme, i.e. at 12 to 18 months and 6 years of age.

Methods
Vaccination coverage, the percentage of vaccinated in a population, is monitored in real-time through the National Vaccination Register and can be calculated also on sub-national levels. The target population depends on the vaccine of interest. So far, MMR coverage has been estimated in two-year-olds. In future, MMR coverage will also be monitored for seven-year-olds.

Population included in vaccination coverage calculations

Finnish counties
- Covered by the National Vaccination Register
- (No deficiencies in the recording of vaccinations or data dispatch)
- Not covered by the National Vaccination Register
- (Deficiencies in the recording of vaccinations or data dispatch)

Two-year-olds born in the year of interest, currently residing in Finland (Data including residential history from the Population Information System)
- Included in vaccination coverage calculations
- Excluded from vaccination coverage calculations due to past or present residence in county not covered by the National Vaccination Register.

If a county is not continuously covered by the National Vaccination Register for the years the two-year-olds are followed up, no vaccination coverage is reported for that county.

Population (denominator) and vaccination (numerator) data are linked via a unique identifier.

Results
Vaccination coverage varies over time and differs markedly between regions. While on average 95% of the two-year-olds were vaccinated with MMR, sub-national figures range from <85% to 100%. To present the estimates in a clear and user-friendly way, interactive InstantAtlas maps have been created. These maps show the vaccination coverage colour-coded on a county level, the national average, time trends, and tables with the underlying population count. Regional outliers can be easily identified and the performance of the counties’ health systems can be directly compared using MMR coverage as one proxy to it.

Conclusion
The maps revealed that the national average is not useful for measuring a vaccination programme’s success on a sub-national level. In contrast, county-specific figures arising from automated data collection and analysis processes are vital for the real-time monitoring of a vaccination programme’s performance. They can be used for identifying pockets of low coverage, for targeting interventions, and for rewarding counties which manage to improve or maintain high coverage.

References

Interactive vaccination coverage maps
A multipurpose tool for programme monitoring and health system development
Ulrike Baum, Jonas Sundman, Susanna Jääskeläinen, Taneli Puimalainen, Hanna Nohynek
National Institute for Health and Welfare, Helsinki, Finland

Interactive maps showing the vaccination coverage of MMR (and three other vaccines) in two-year-olds

By year of birth (2012-2014) • On county and national level • Vaccination coverage, i.e. the percentage of two-year-olds vaccinated at least once with the vaccine of interest during their first three years of life • Counties of similar vaccination coverage (class) can be all selected with one click • Time trends are shown by comparing the vaccination coverage by year of birth for the selected countries (and/or the national average) • List of counties can be sorted e.g. by vaccination coverage • Alternative area division by health care centre • Small health care centres might achieve 100% vaccination coverage • Map, tables and figures can be printed and downloaded • https://www.thl.fi/roko/rokotusrekisteri/atlas/atlas-en.html?show=infantbc