

ANONYMISED CITY SPATIALISED ECONOMIC DATA INNOVATION SERIES

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Background

- South Africa's economic problems might be misdiagnosed without a spatial lens
- The metros have a critical role to play in job creation and investment
- There is a gap in economic data at a sub-metro level with existing data sources either:
 - At higher levels (Quarterly Labour Force Survey and Business Sampling Frame) and often not accounting for "head office" effect, or
 - Private sector data that is expensive and disaggregated from official higher level data sets using 'black box' methods
- Since 2015, SARS and NT have had a collaboration with UN University hosting anonymised administrative tax data in a secure data centre (SDC) at NT in Tshwane that is accessible to researchers and other interested parties
- Data includes tax information on individuals, firms, customs and VAT. Additional datasets are added on a continual basis
- Despite this being available, utilising this data has several challenges including:
 - Limited access
 - Knowledge of statistical and analytical packages required (Stata, R, Python, SQL etc.)
 - Time and resources required
- The National Treasury Project is meant to enable easy access to this data for Metros in a standardized manner that allows for a uniform and comparable analysis.



Data Sources

- **Data primarily built from the IRP5/IT3a submissions of tax data.**
 - These relates to Pay-as-you-Earn (PAYE) registered employees earning more than R2000 per annum.
 - Often include other employee/employer relationships (e.g. financial services paying out pensions/retirement annuities, short term consulting etc.)
 - Still missing components of employment (Sole proprietors, self employed etc.)
 - Includes data related to work address, income, gender, age and industry
- **Firm level information merged onto this data from:**
 - ITR14 – Main Firm Tax submission – includes data related to industry, firm size
 - VAT – Includes data related to industry
 - Customs – Includes data related to import/export status
- **Data does not match completely between datasets**
 - Government departments and agencies do not file firm level tax submissions
 - ITR14 submissions are only for firms registered with CIPC
 - VAT is only mandatory when total value of taxable supplies is above R1M in a year

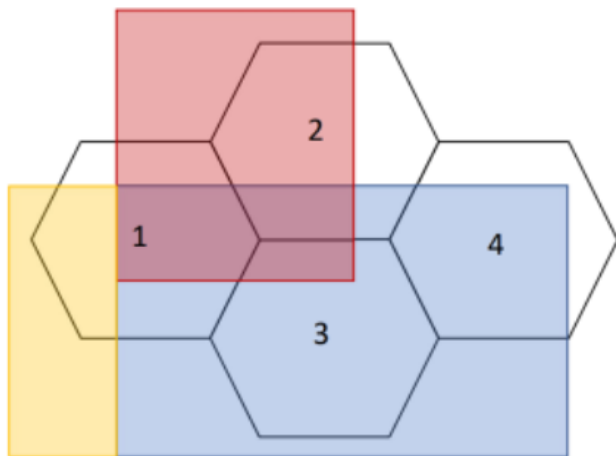


Spatialising the Data

- **The only spatial component of the tax data is postal codes**
- **The Postal code system has several major problems/limitations:**
 - Delivery routes rather than coherent boundaries and often referenced to a regional hub where mail can be delivered rather than address
 - Overlap with each other
 - Often non-contiguous area that can be separated by large distances
 - Does not cover full area of South Africa and often no postal codes for newly established settlements
 - Does not overlap with other useful spatial groupings (Stats SA, Wards, Municipalities etc.)
- **No formal shapefiles!**
- **Despite limitations this is only currently available data** and this **data has been disaggregated into equal area hexagons (with a 1.2km edge length)** using Uber's H3 spatial index to enable visualisation using a combination of shapefiles and geocoded postal code data from the South Africa Post Office
- Future work will incorporate aggregated geocoded data at SARS to more suitable higher level aggregation (sub place, ward or similar)

Spatial Disaggregation Explained

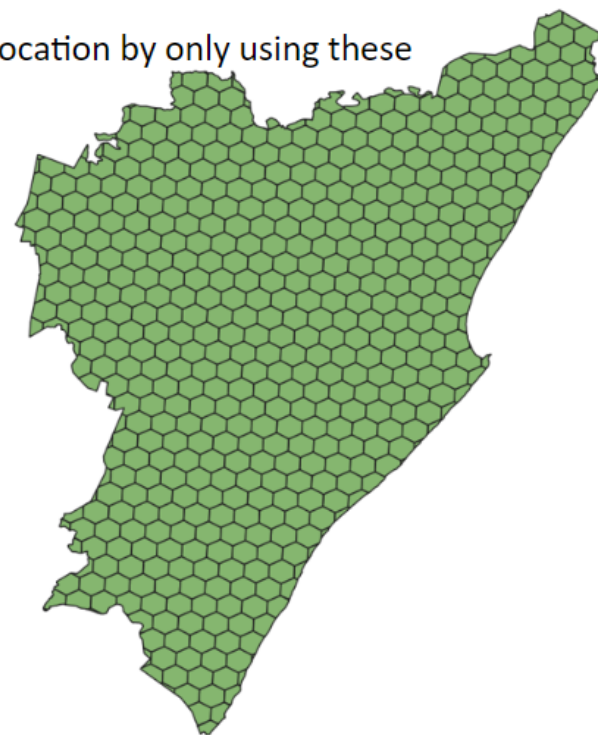
Postal Code to Hexagon Conversion



This means:

- hexagon 1 would include data on firms/employees in all 3 postal codes,
- while hexagon 4 would only include a percentage of the blue postal code and
- the yellow postal code would have all firms/employees allocated to hexagon 1

- Postal Code areas are indicated by coloured rectangles
- Equal Area Hexagons are numbered hexagons (This could be any area including main places)
- All firms/employees located within a postal code would be multiplied by the percentage area overlapping with the corresponding hexagon of total postal code area
- A dasymetric approach was included to improve allocation by only using these





Insight Areas

Evolution of the national urban system

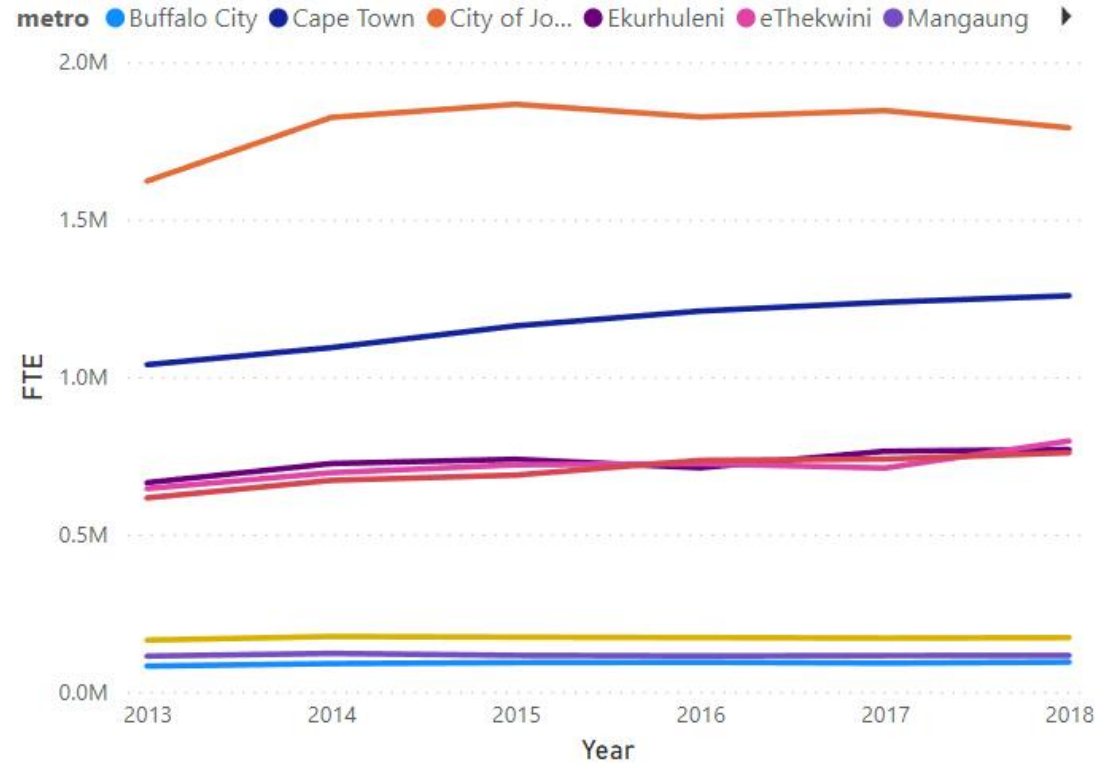
- Is it a 'winner take all' scenario for Gauteng? – because of economies of scale/agglomeration and diversity
- Or are we seeing a gradual move toward specialised secondary economic centres? – such as the recovery of mining towns / manufacturing hubs
- Anecdotal evidence of COVID-induced 'semigration' to coastal/tourism cities/towns
- What are the implications for fiscal allocations / basic service provision?

Internal structure of eThekweni's Economy

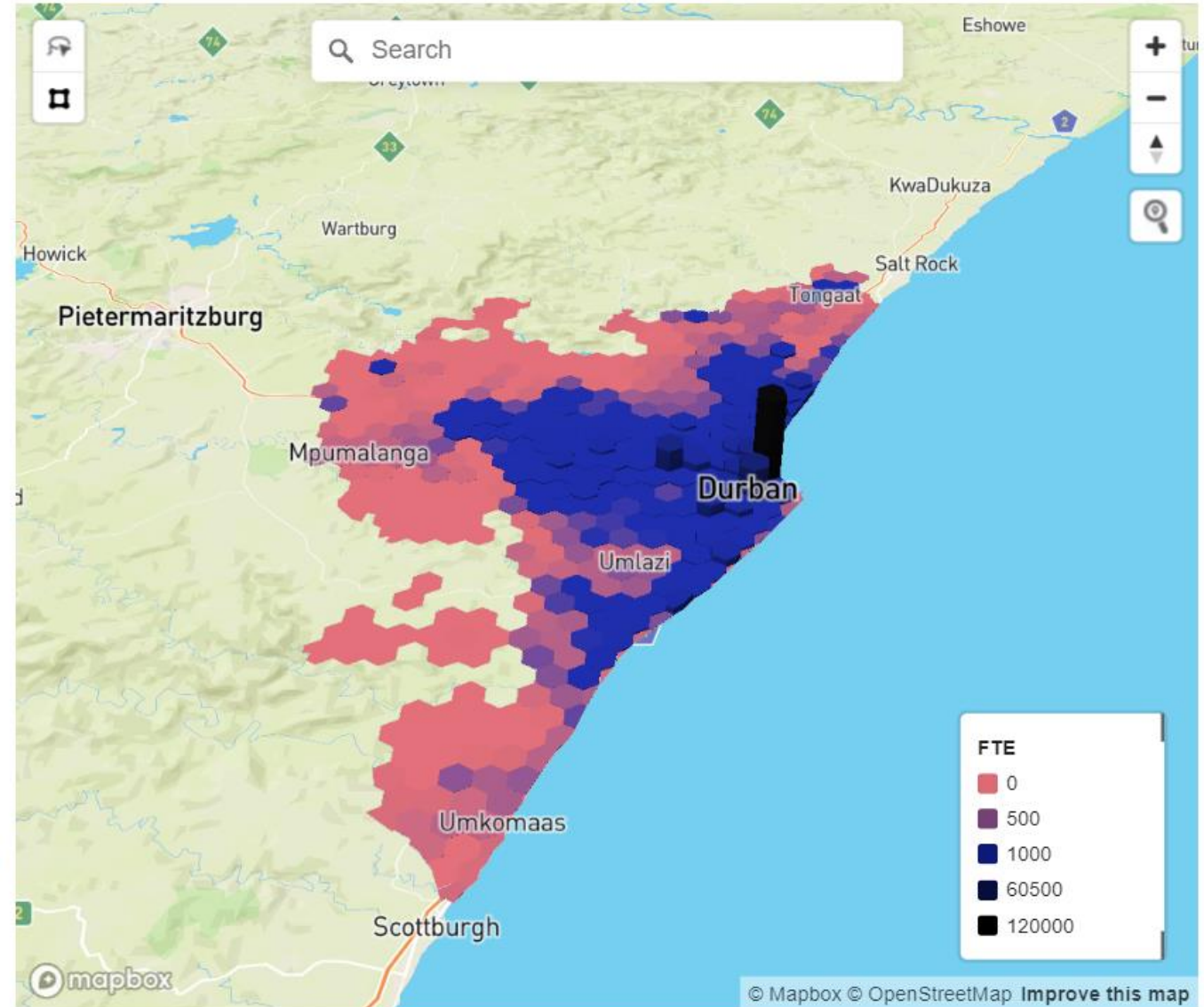
- Poly-centric? – with local specialisation
- Mono-centric? – mixed precincts + diverse amenities
- **Where are the sectoral nodes or industry clusters?** What are the infrastructure needs for these places?
- What are the implications for all municipal depts: housing, transport, education, health, water, electricity

INNER CITY LEADING IN EMPLOYMENT

FTE by Year and metro



FTE Jobs per Area





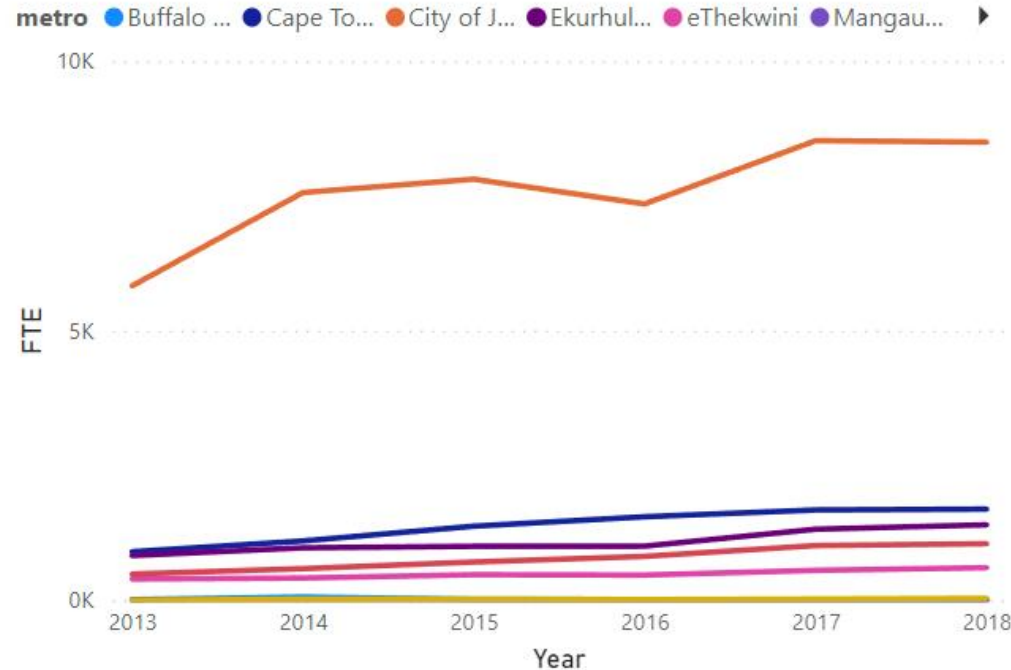
Jobs per Wage Band

The inflation adjusted wage of corresponding full time equivalent employees aggregated into bands.

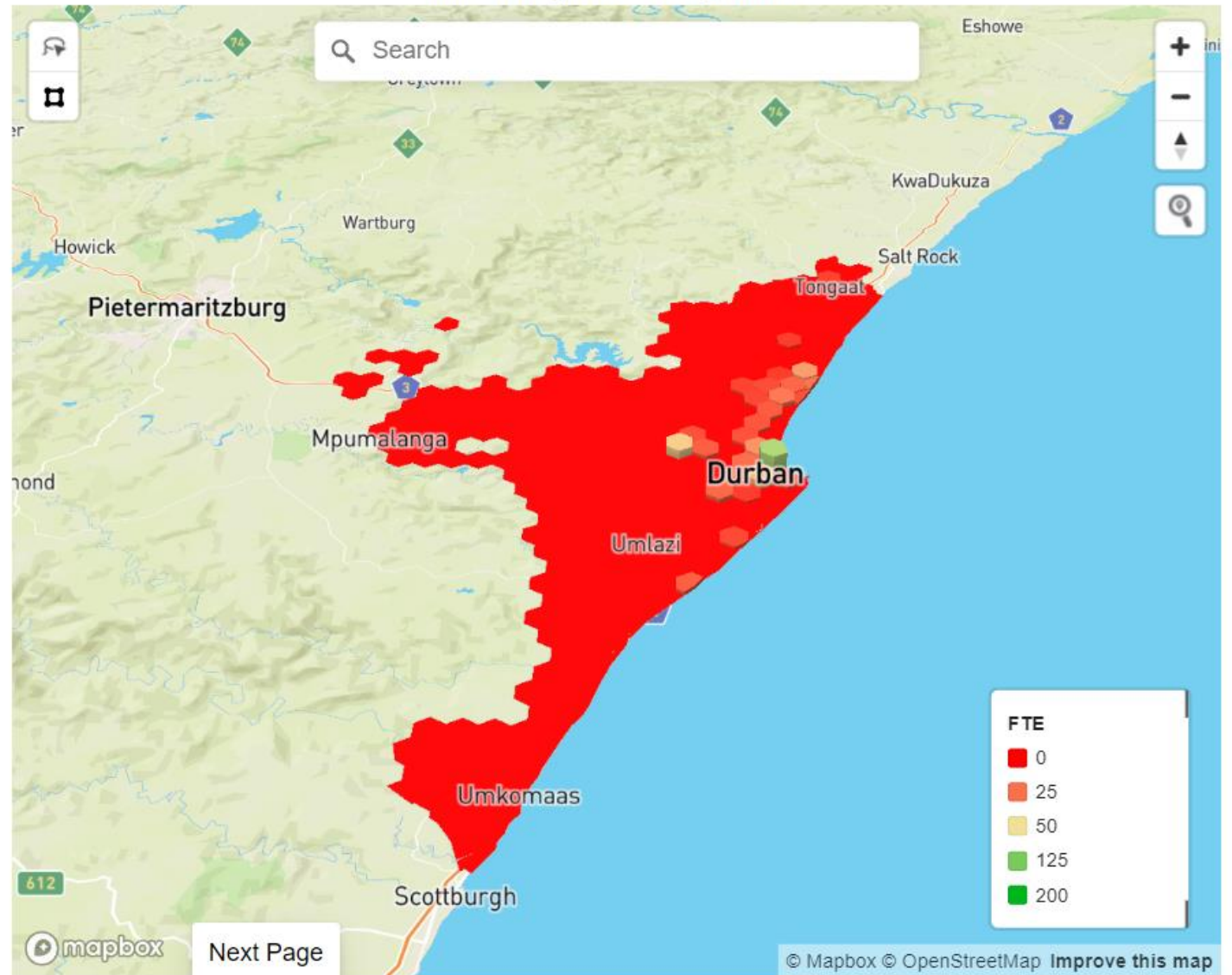
real_wage_band

- ☐ [0.0, 400.0)
- ☐ [102400.0, 204800.0)
- ☐ [12800.0, 25600.0)
- ☐ [1600.0, 3200.0)
- ☐ [1638400.0, 10000000.0)
- ☒ [204800.0, 409600.0)
- ☐ [25600.0, 51200.0)
- ☐ [3200.0, 6400.0)
- ☐ [400.0, 800.0)

FTE by Year and metro



FTE Jobs per Real Wage Band





Jobs per Gender

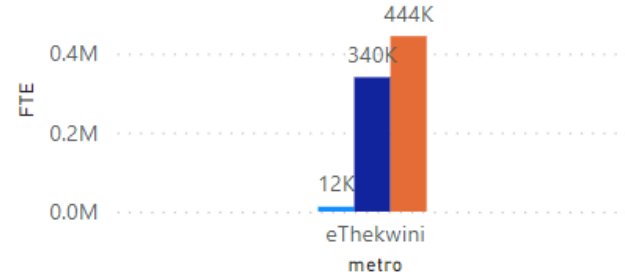
The age of corresponding full time equivalent employees aggregated into bands, as defined by the date of birth variable completed on the IRP5 certificate.

gender

All

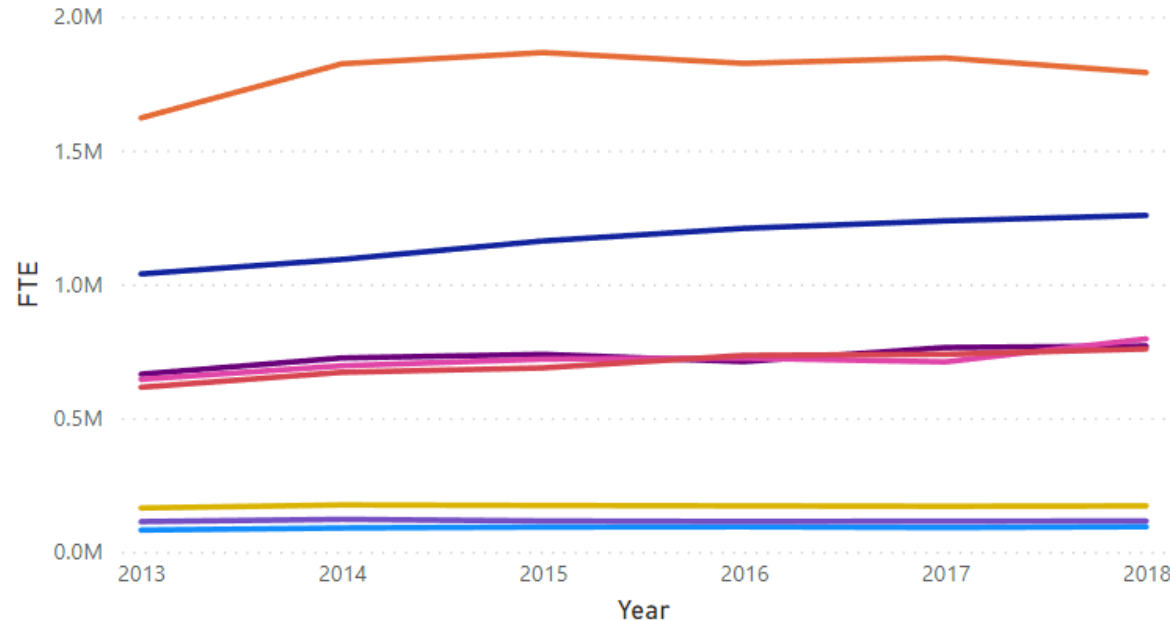
FTE by metro and gender

gender ● F ● M

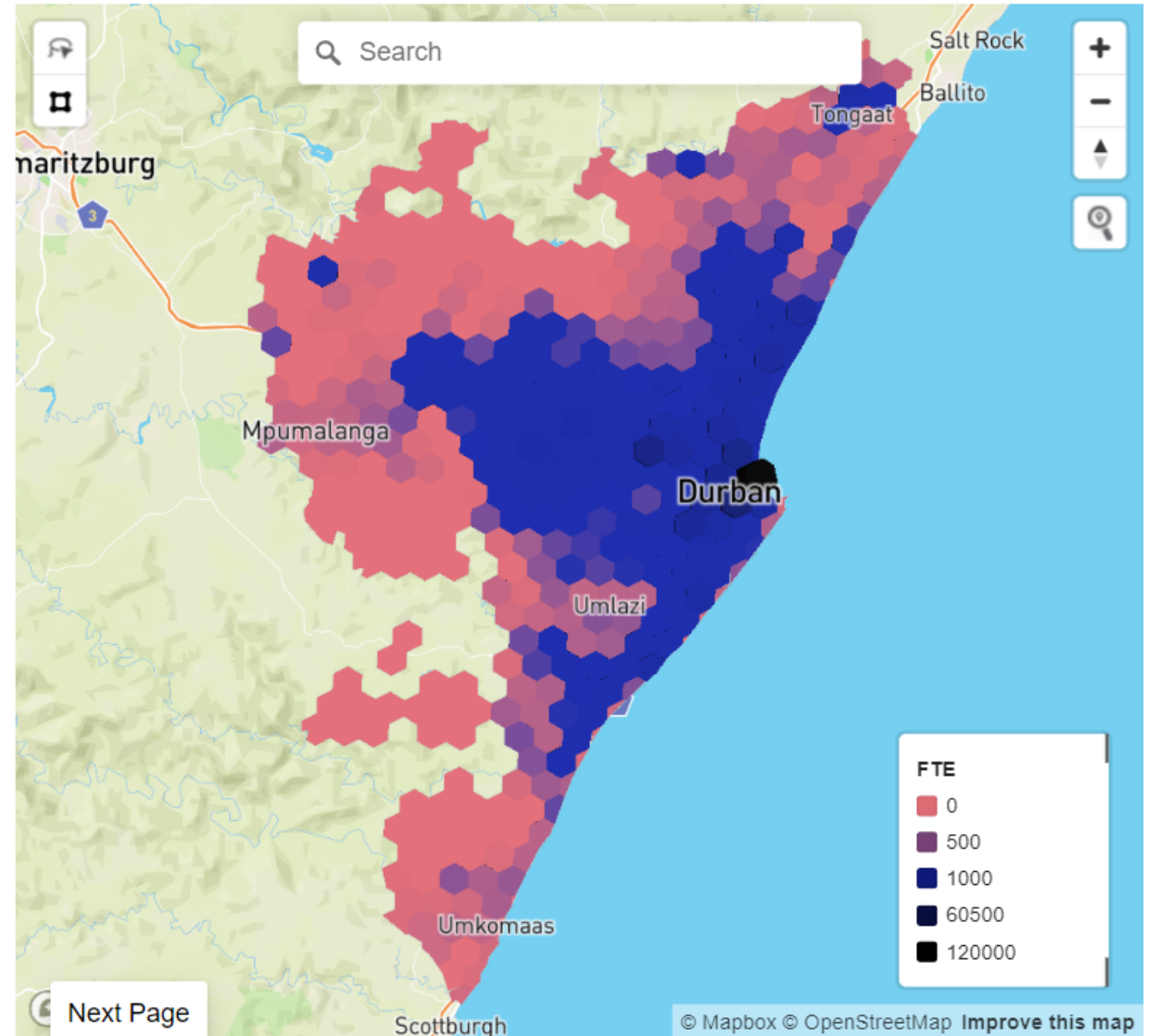


EMPLOYMENT: FTE by Year and Metro

metro ● Buffalo ... ● Cape To... ● City of J... ● Ekurhul... ● eThekweni ● Mangau... ● Nelson ...



FTE Jobs per Gender





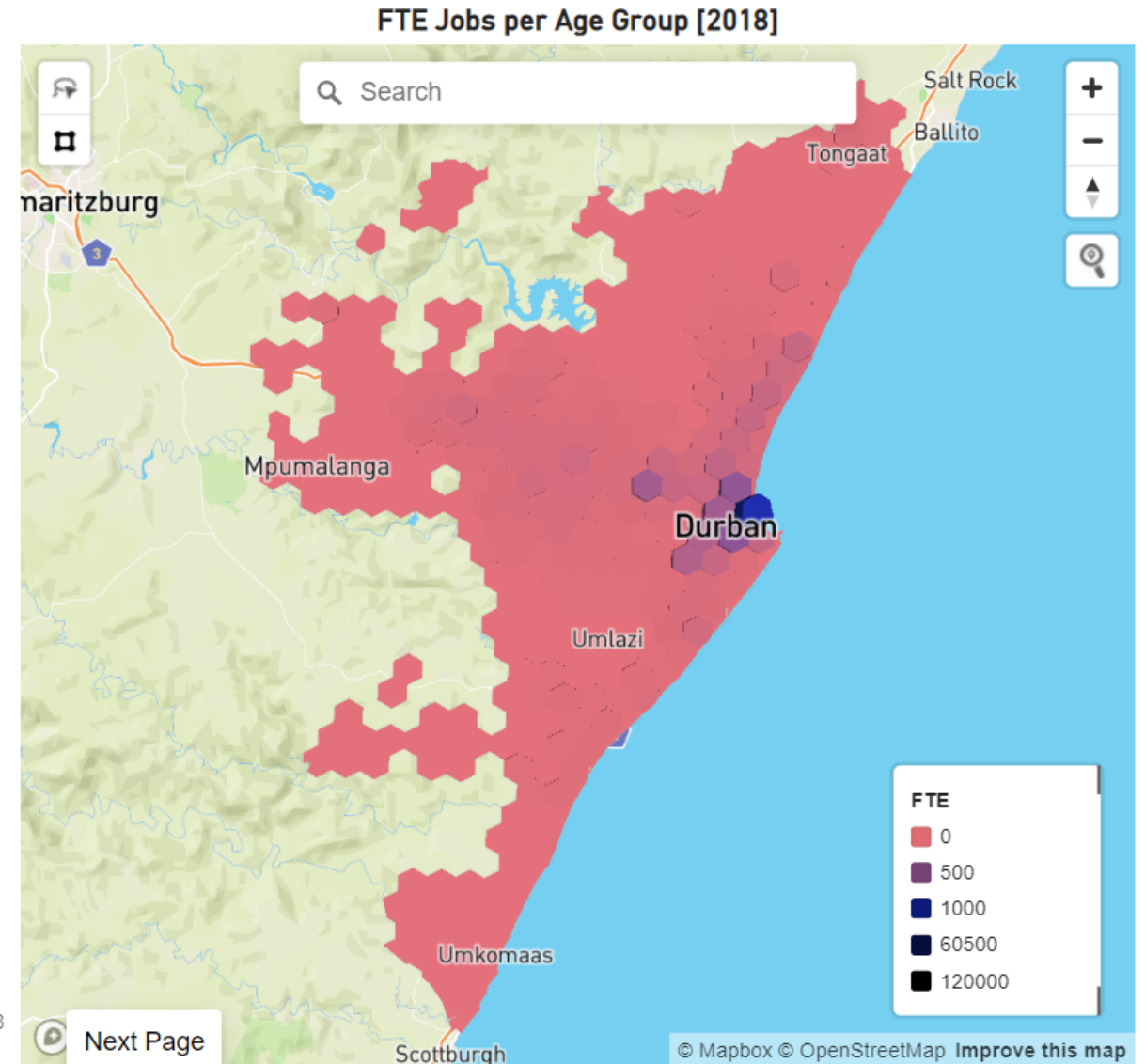
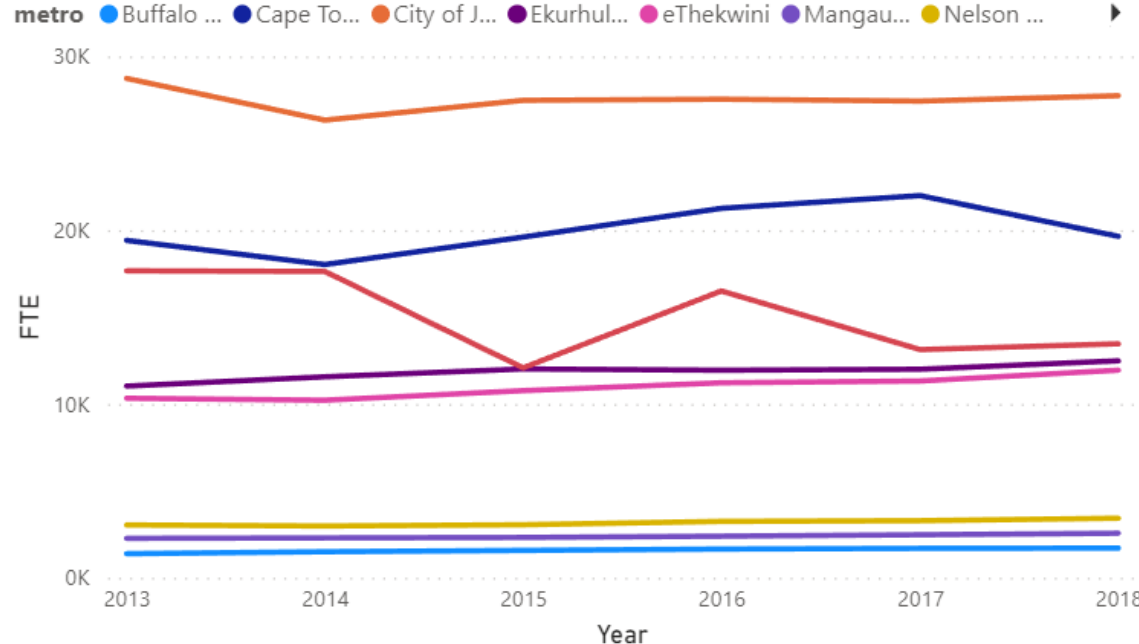
Jobs per Age Group

The age of corresponding full time equivalent employees aggregated into bands, as defined by the date of birth variable completed on the IRP5 certificate.

age_group

- ☐ [15.0, 20.0)
- ☐ [20.0, 25.0)
- ☐ [25.0, 30.0)
- ☐ [30.0, 35.0)
- ☐ [35.0, 40.0)
- ☐ [40.0, 45.0)
- ☐ [45.0, 50.0)
- ☐ [50.0, 55.0)
- ☐ [55.0, 60.0)
- ☐ [60.0, 65.0)

EMPLOYMENT: FTE by Year and Metro

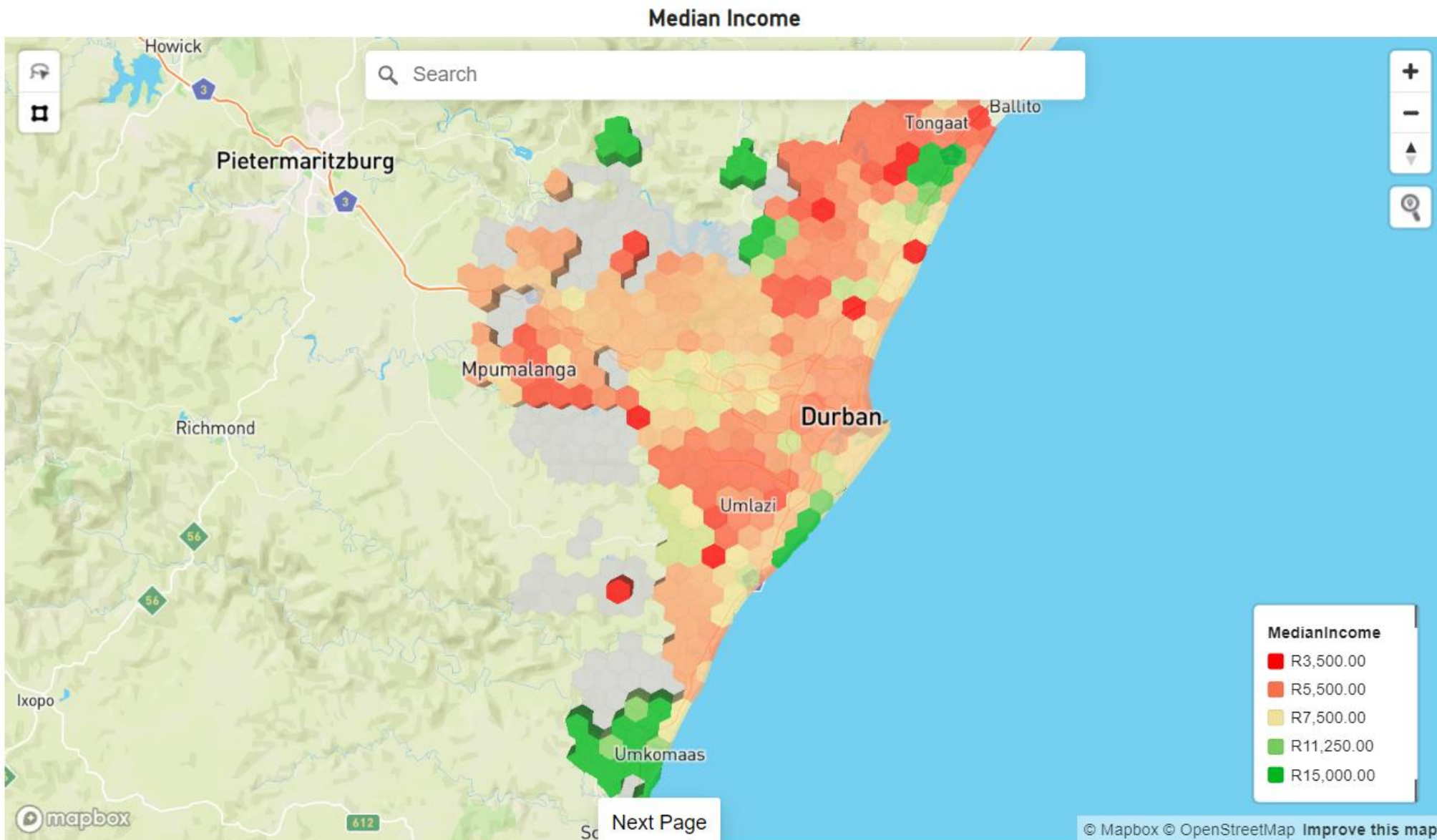


Median Income

The median income weighted by full time equivalent employees based on incomes of all employees within an aggregation.

taxyear

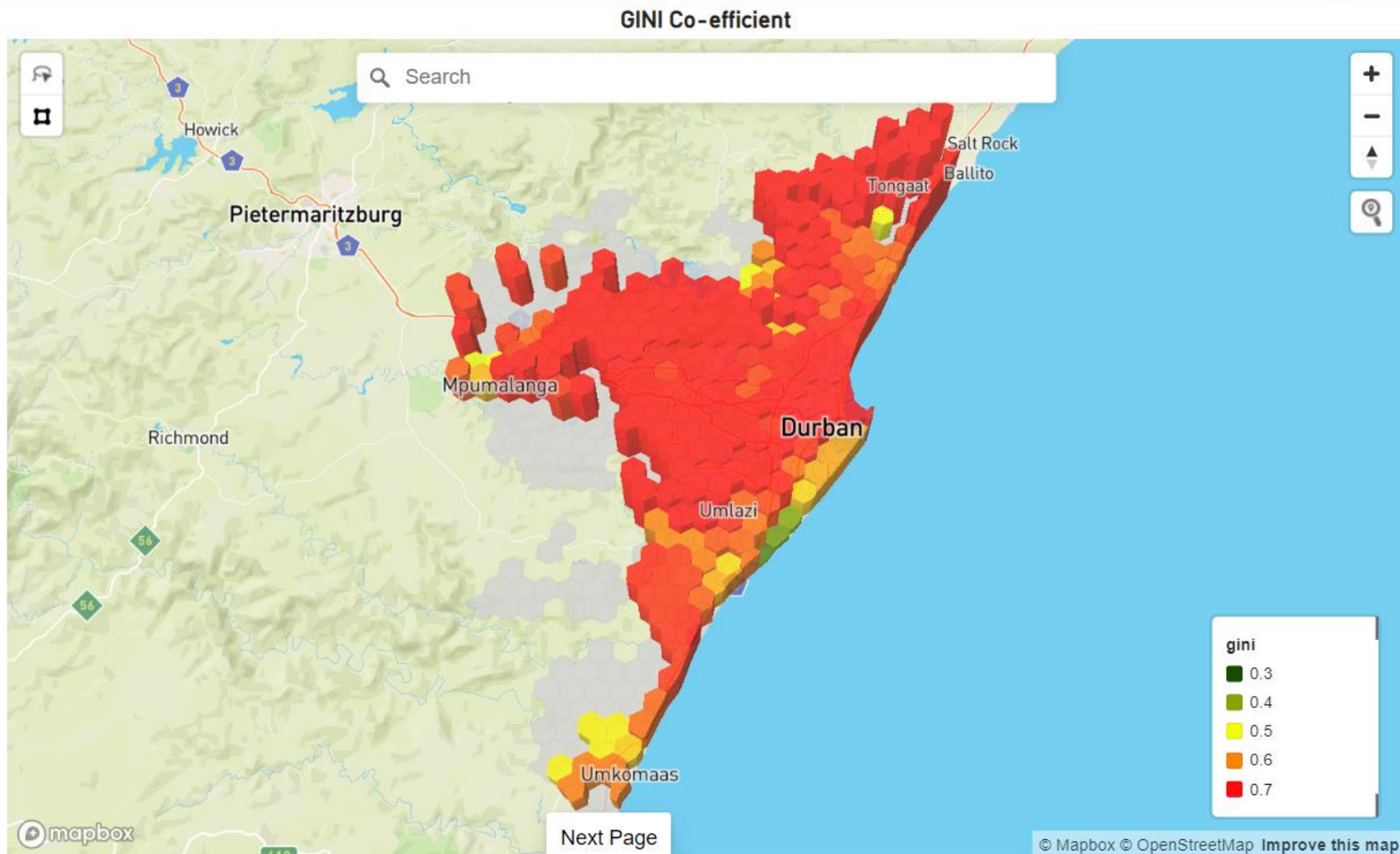
- ☐ Tuesday, January 01, 2013
- ☐ Wednesday, January 01, ...
- ☐ Thursday, January 01, 2015
- ☐ Friday, January 01, 2016
- ☐ Sunday, January 01, 2017
- ☒ Monday, January 01, 2018



The gini coefficient weighted by full time equivalent employees based on incomes of all employees within an aggregation

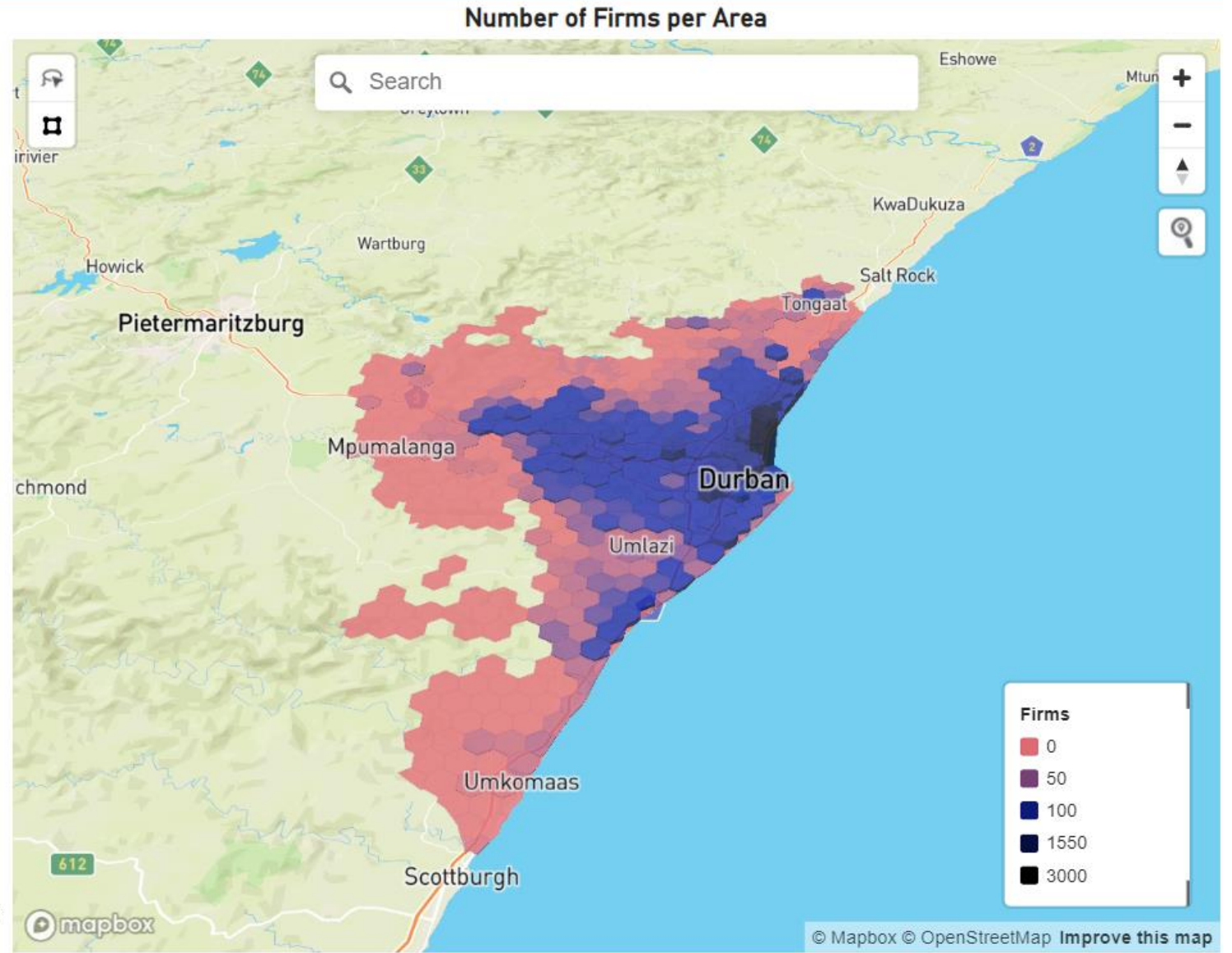
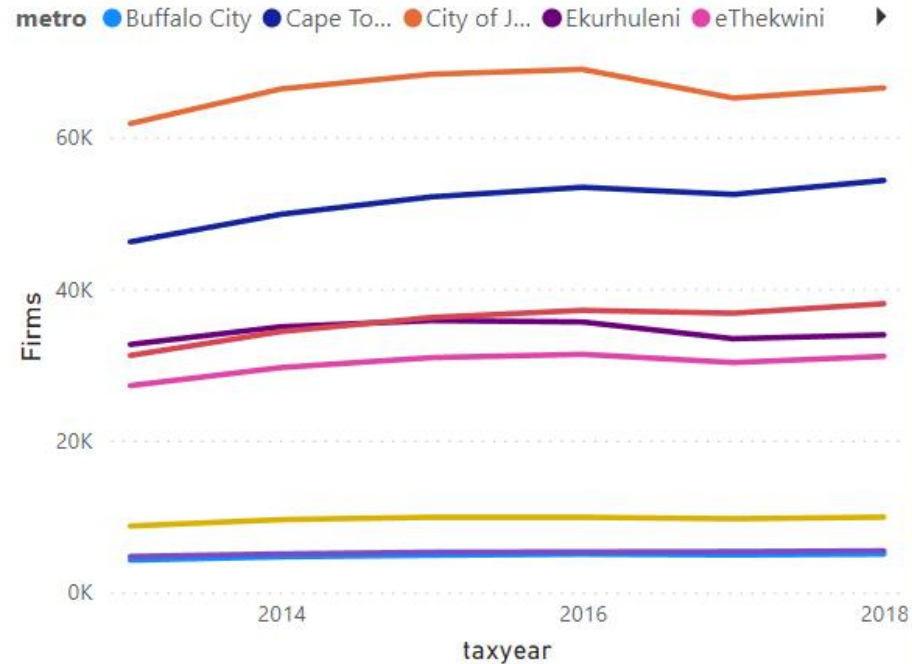
taxyear

- ☐ Tuesday, January 01, 2013
- ☐ Wednesday, January 01, 2014
- ☐ Thursday, January 01, 2015
- ☐ Friday, January 01, 2016
- ☐ Sunday, January 01, 2017
- ☒ Monday, January 01, 2018



INNER CITY CRITICAL IN FIRM LOCATION

Firms by taxyear and metro





Firms by Size of Business

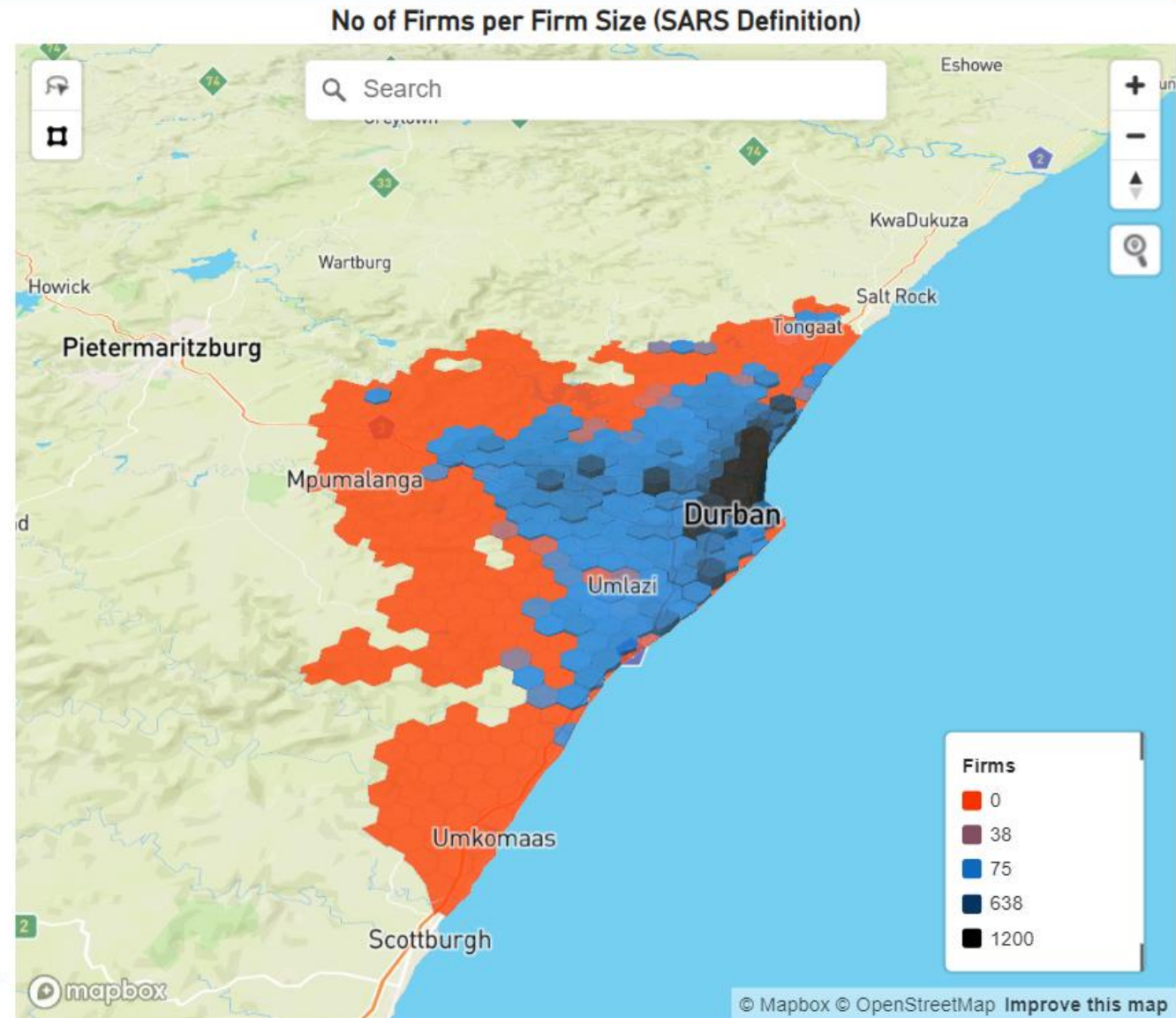
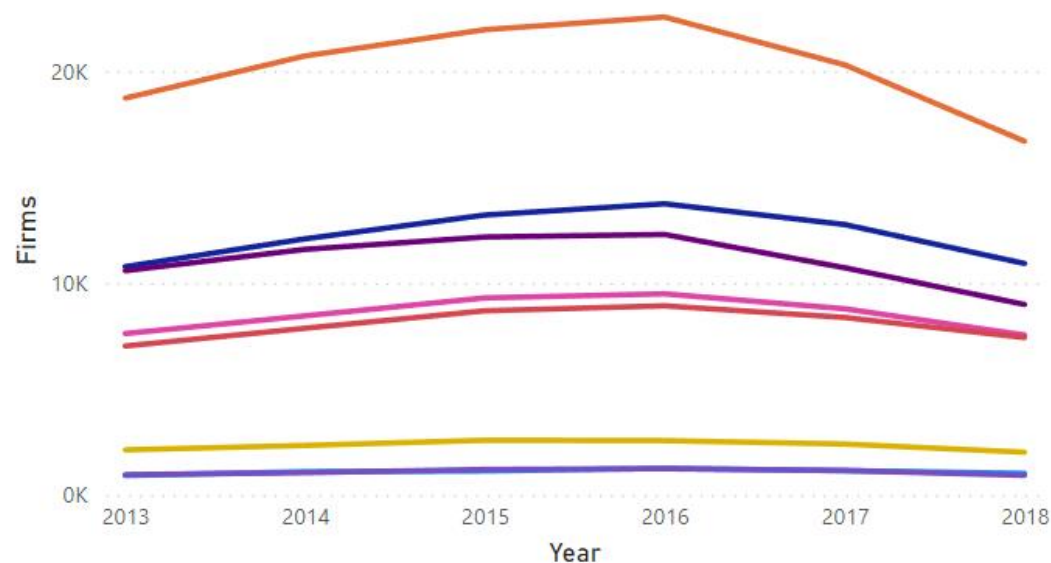
The size of Firms by SARS definition of firm Size per area.

FirmSize_SARS

- ☐ Dormant
- ☒ Medium to Large
- ☐ Micro
- ☐ Shareblock/Body Corporate
- ☐ Small
- ☐ Unknown

FIRMS by Firm Size

metro ● Buffalo ... ● Cape Town ● City of Jo... ● Ekurhuleni ● eThekweni ● Mangaung ▶



Net New Firms Opened

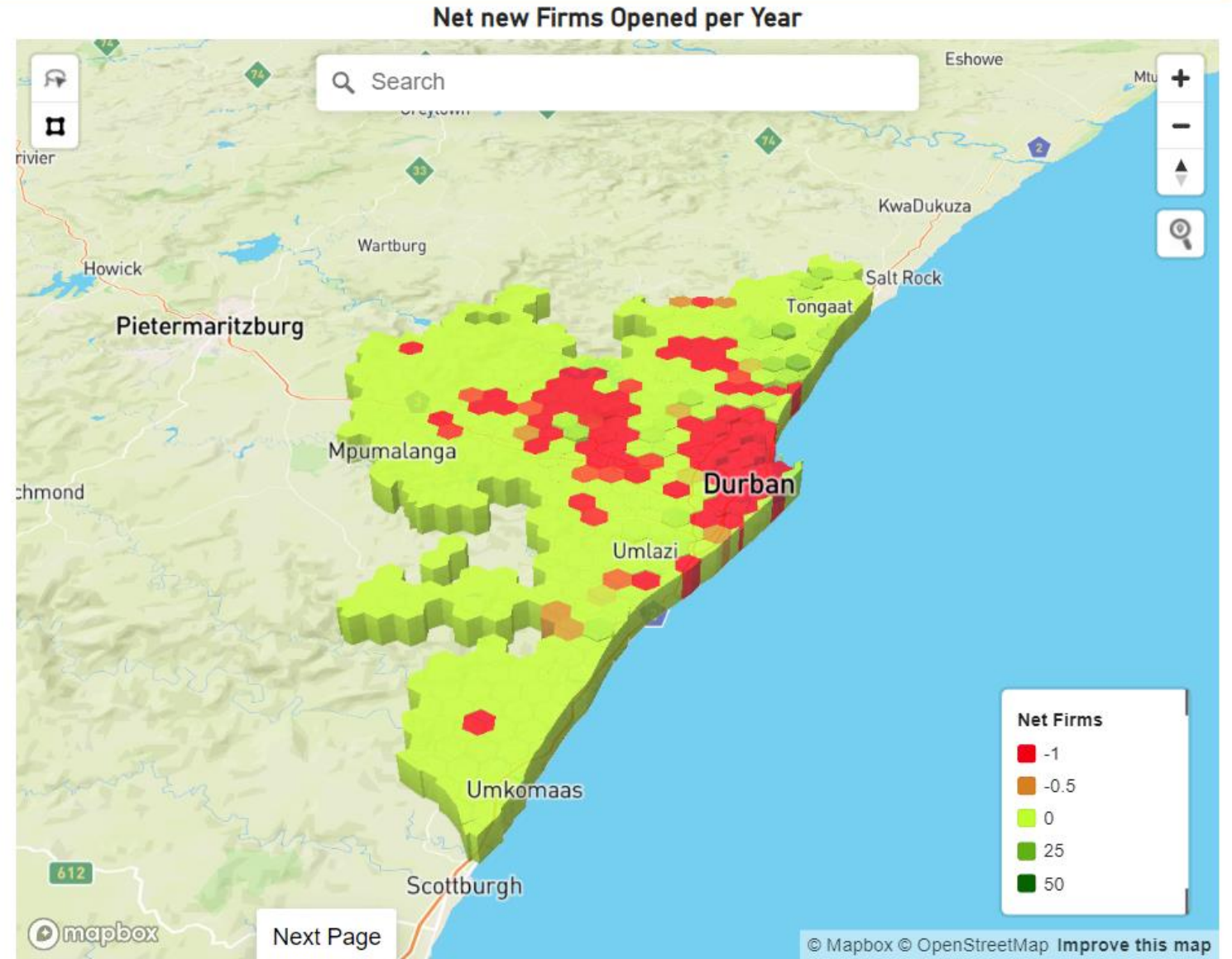
Difference between Firms Opened and Firms Closed per area

INNER CITY HAS SEEN A LOT OF BUSINESS CLOSURES

taxyear
☐ 2014
☐ 2015
☐ 2016
☒ 2017

NET FIRMS OPENED by Metro

metro ● Buffalo City ● Cape To... ● City of J... ● Ekurhuleni ● eThekweni ▶





Exporting Firms

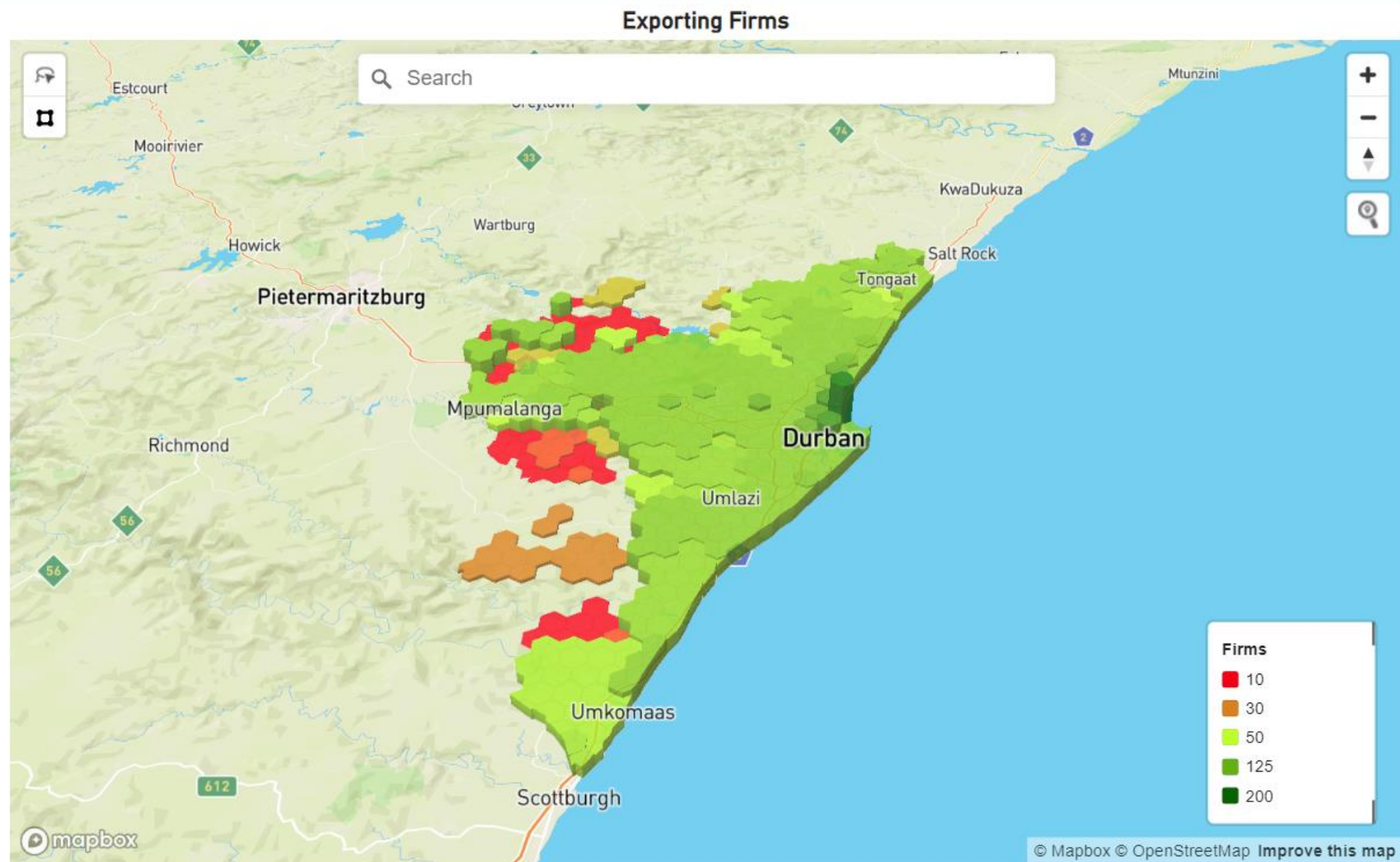
**EXPORT ACTIVITIES ARE
PREVALENT ACROSS THE
WHOLE CITY REGION.**

taxyear

- ☐ 2013
- ☐ 2014
- ☐ 2015
- ☐ 2016
- ☐ 2017
- ☒ 2018

export

- ☐ 0
- ☒ 1





Exporting Firms by Employment

export

- ☐ 0
- ☒ 1

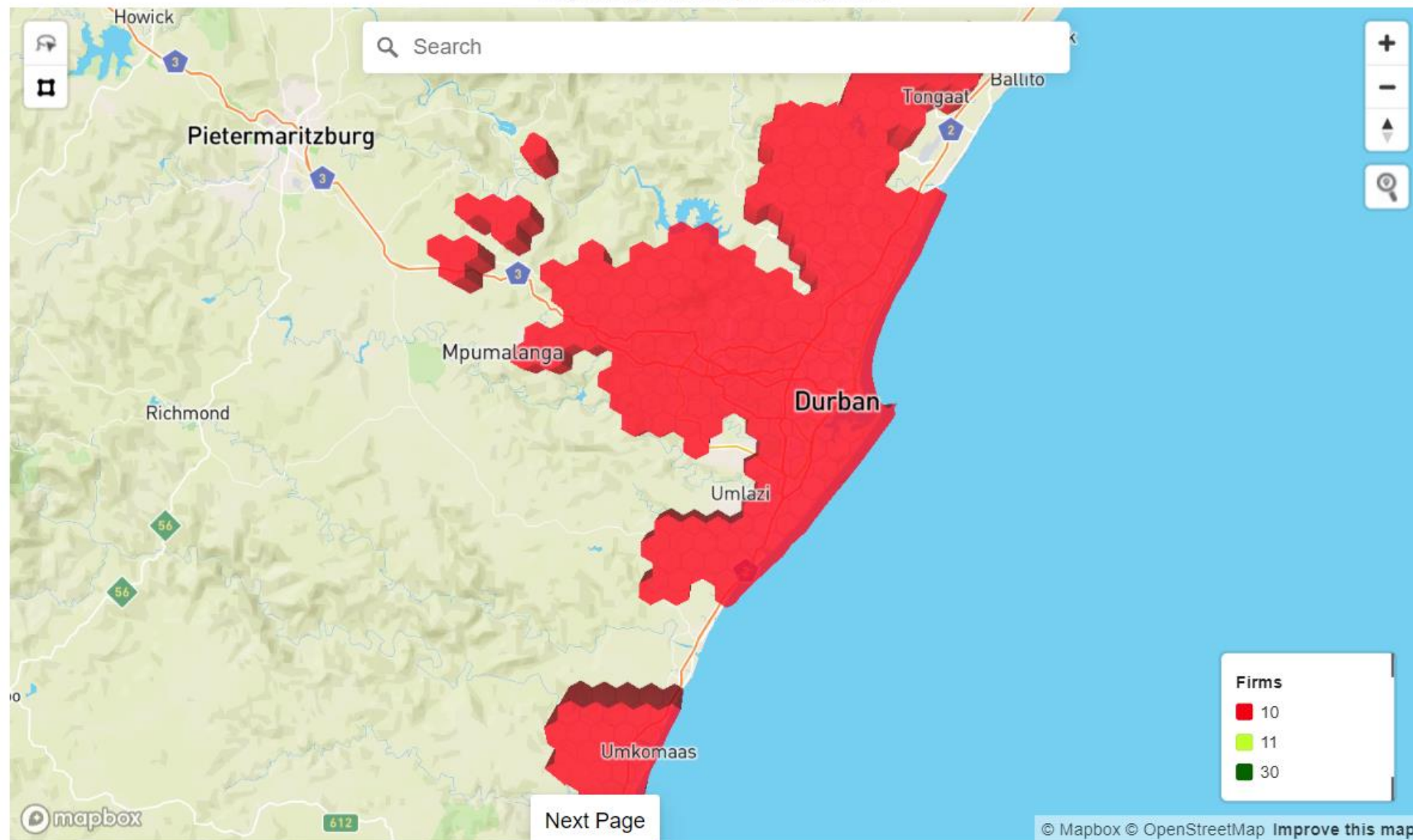
taxyear

- ☐ 2013
- ☐ 2014
- ☐ 2015
- ☐ 2016
- ☐ 2017
- ☒ 2018

FirmSize_FTE

- ☐
- ☐ [0.0, 1.0)
- ☐ [1.0, 2.0)
- ☐ [10.0, 20.0)
- ☐ [100.0, 250.0)
- ☐ [2.0, 5.0)
- ☐ [20.0, 50.0)
- ☐ [250.0, 500.0)
- ☐ [5.0, 10.0)
- ☐ [50.0, 100.0)
- ☒ [500.0, 113690.416)

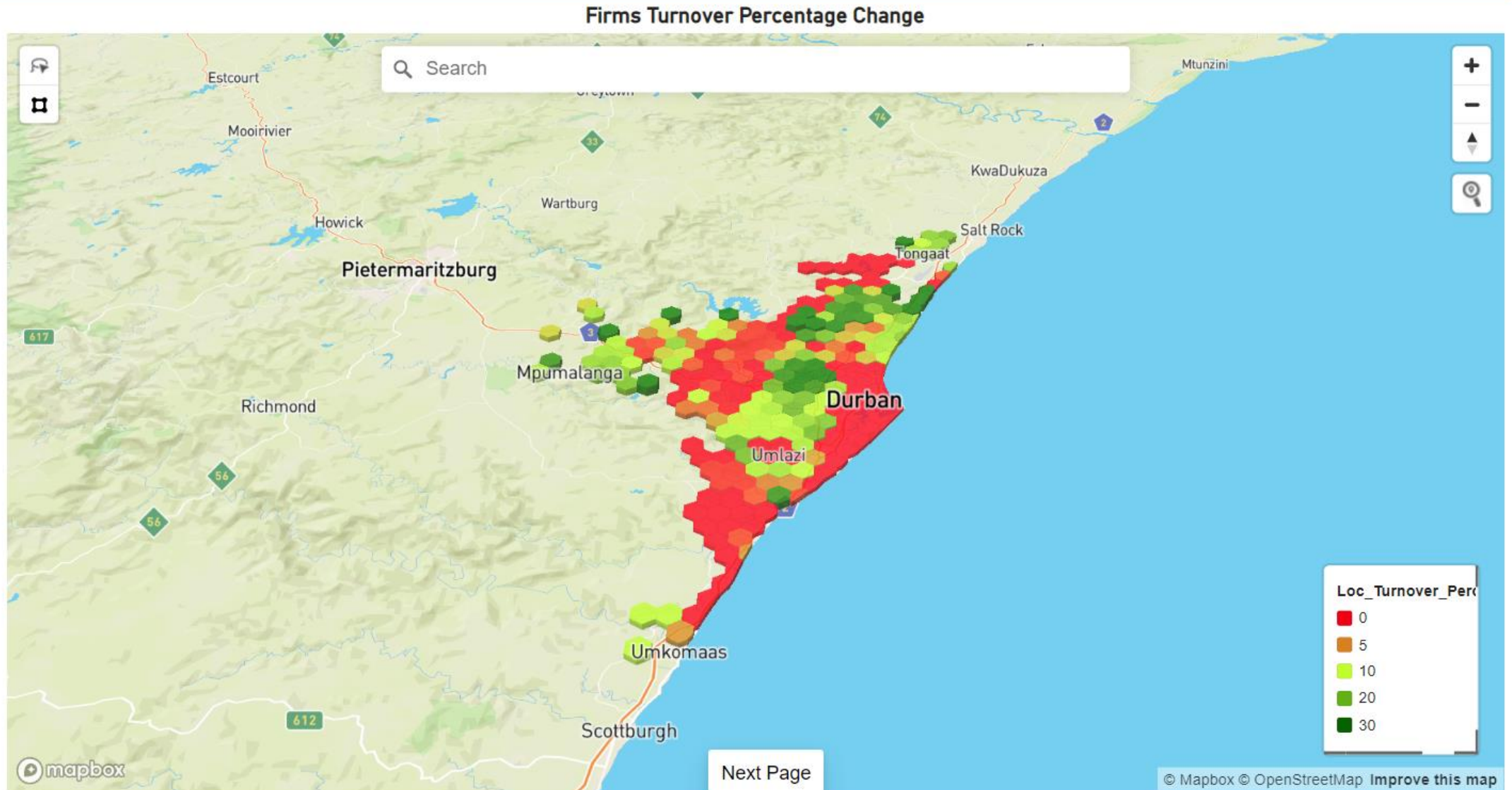
Exporting Firms by Employment



Firms Turnover Percentage Change

taxyear

- ☐ 2013
- ☒ 2014
- ☐ 2015
- ☐ 2016
- ☐ 2017
- ☐ 2018



- DOES THE INNER CITY REMAINS CRITICAL IN ETHEKWINI'S DEVELOPMENT?
- WHAT CAN BE DONE TO BRIDGE THE GENDER EMPLOYMENT GAP?
- WHAT STRATEGIES CAN BE USED TO ENSURE THE ESTABLISHMENT AND GROWTH OF NEW FIRMS OPENED IN ETHEKWINI?
- WHAT CAN BE DONE TO INCREASE THE INCOME LEVELS OF JOBS IN ETHEKWINI?

DISCUSSION?

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**COMING UP NEXT:
SECTOR IN-DEPTH ANALYSIS
GENDER GAP ANALYSIS**