



# EUROPEAN CONFERENCE ON QUALITY IN OFFICIAL STATISTICS 2024 ESTORIL - PORTUGAL





EUROPEAN CONFERENCE ON  
QUALITY IN OFFICIAL STATISTICS  
2024 ESTORIL - PORTUGAL

# Improving statistical registers - innovative integration methods for building and population registers

Damiano Abbatini [abbatini@istat.it](mailto:abbatini@istat.it)

Armando D'Aniello [armando.daniello@istat.it](mailto:armando.daniello@istat.it)

Stefania Lucchetti [lucchetti@istat.it](mailto:lucchetti@istat.it)

Enrico Orsini [eorsini@istat.it](mailto:eorsini@istat.it)

Andrea Pagano [andrea.pagano@istat.it](mailto:andrea.pagano@istat.it)

**Affiliation:** Istat – Italian National Institute of Statistics



eurostat 

The conference is partly  
financed by the European Union



EUROPEAN CONFERENCE ON  
QUALITY IN OFFICIAL STATISTICS  
2024 ESTORIL - PORTUGAL

# Context and Objectives

## **Context:**

The challenge for statistical institutes to produce official statistics using administrative archives

## **ISTAT Objectives:**

Construction of statistical registers for various units, providing a socio-economic snapshot of the country

## **Goal:**

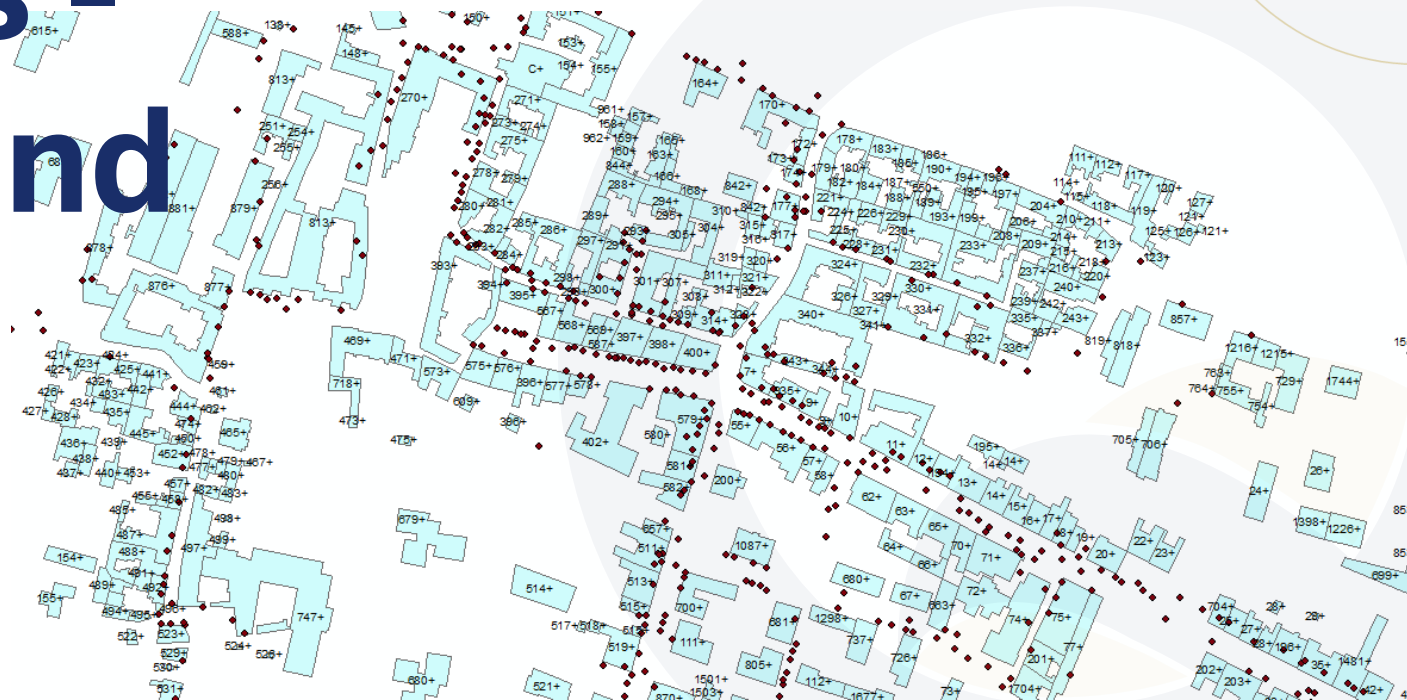
Integrate data from real estate and building registries with resident population data to place families within dwellings



# Data Sources - Real Estate and Building Register

## The register contains:

- Information on real estate and buildings
- Addresses and geo-coding details





# Data Sources - Population Register

## Population Registers contains:

- National Resident Population Archive (ANPR)
- Results of the annual sample surveys in the territory (Master Sample)
- Integrated Archive of Dwellers Habitually in Italy (AIDA)



EUROPEAN CONFERENCE ON  
QUALITY IN OFFICIAL STATISTICS  
2024 ESTORIL - PORTUGAL

# Integration Process

- Begins with geo-coded addresses
- Utilizes deterministic methodologies for integration



EUROPEAN CONFERENCE ON  
QUALITY IN OFFICIAL STATISTICS  
2024 ESTORIL - PORTUGAL

# Detailed Integration Process

## Step 1:

Deterministic Integration - Unique associations based on ownership and lease agreements

## Step 2:

Secondary Deterministic Integration - Resolves non-unique associations using calculated weights and the Hungarian algorithm



# Ownership- Based Methodology

## Ownership-Based Approach:

Matches residential addresses to dwelling addresses with geographically variable precision

### Linkage quality



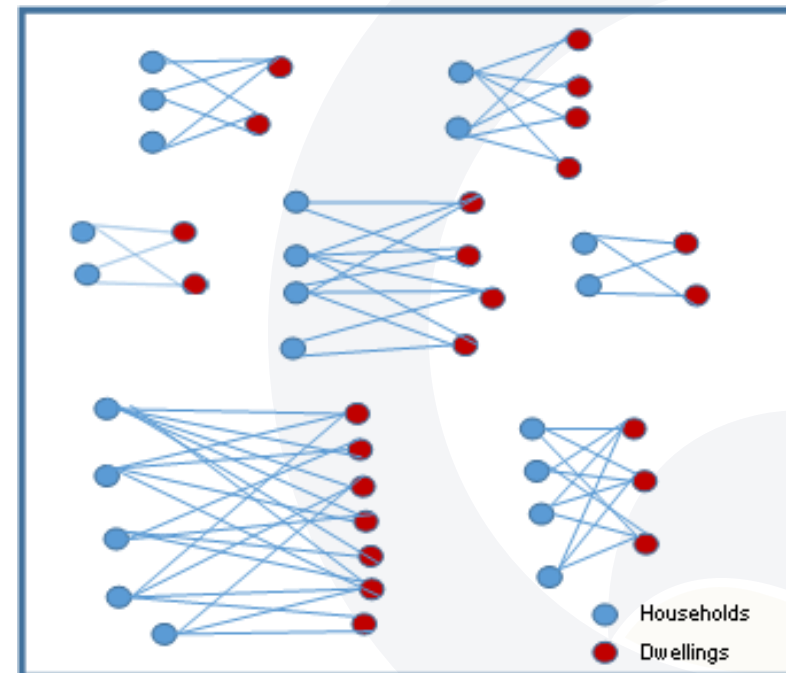




# Non-Ownership-Based Methodology

## Non-Ownership-Based Approach:

Uses a matrix of resident families and available properties at the same address to create unique household-dwelling associations





EUROPEAN CONFERENCE ON  
QUALITY IN OFFICIAL STATISTICS  
2024 ESTORIL - PORTUGAL

# Weight Calculation

Measures the quality of the family-dwelling association using geo-spatial and non-geo-spatial variables



eurostat 

The conference is partly  
financed by the European Union



# Optimization Method

Utilizes the Hungarian algorithm to solve the assignment problem,  
maximizing the sum of calculated weights

| Housholds | Dwellings |      |      |      |      |
|-----------|-----------|------|------|------|------|
|           | 1         | 2    | 3    | 4    | 5    |
| A         | 0.12      | 0.33 | 0.54 | 0.00 | 0.00 |
| B         | 0.19      | 0.40 | 0.61 | 0.00 | 0.00 |
| C         | 0.26      | 0.47 | 0.68 | 0.00 | 0.00 |
| D         | 0.00      | 0.00 | 0.00 | 0.75 | 0.92 |
| E         | 0.00      | 0.00 | 0.00 | 0.82 | 0.96 |



# Results

## **Population Placement:**

Successfully placed the entire resident population within dwellings

## **Statistical Indicators:**

Enabled the calculation of various indicators previously obtained through surveys



# Results

| NUTS 2                | Uniquely<br>Deterministic Association | Secondary<br>Deterministic Approach | Residual Process<br>Approach |
|-----------------------|---------------------------------------|-------------------------------------|------------------------------|
| Piemonte              | 77.65                                 | 22.17                               | 0.18                         |
| Valle d'Aosta         | 75.11                                 | 24.78                               | 0.11                         |
| Lombardia             | 78.79                                 | 20.80                               | 0.40                         |
| Trentino–Alto Adige   | 74.96                                 | 24.39                               | 0.65                         |
| Veneto                | 83.04                                 | 16.57                               | 0.39                         |
| Friuli–Venezia Giulia | 82.82                                 | 17.00                               | 0.18                         |
| Liguria               | 74.31                                 | 25.50                               | 0.19                         |
| Emilia-Romagna        | 79.28                                 | 20.41                               | 0.31                         |
| Toscana               | 79.50                                 | 20.04                               | 0.46                         |
| Umbria                | 77.04                                 | 22.24                               | 0.73                         |
| Marche                | 81.35                                 | 18.40                               | 0.25                         |
| Lazio                 | 72.15                                 | 26.51                               | 1.33                         |
| Abruzzo               | 75.07                                 | 24.34                               | 0.59                         |
| Molise                | 76.90                                 | 22.59                               | 0.51                         |
| Campania              | 62.26                                 | 34.82                               | 2.92                         |
| Puglia                | 78.14                                 | 20.93                               | 0.94                         |
| Basilicata            | 74.43                                 | 24.15                               | 1.41                         |
| Calabria              | 61.22                                 | 35.47                               | 3.31                         |
| Sicilia               | 71.30                                 | 27.58                               | 1.12                         |
| Sardegna              | 72.67                                 | 25.38                               | 1.95                         |
| <b>Total</b>          | <b>75.36</b>                          | <b>23.70</b>                        | <b>0.95</b>                  |



EUROPEAN CONFERENCE ON  
QUALITY IN OFFICIAL STATISTICS  
2024 ESTORIL - PORTUGAL

# Conclusions and Future Work

## Conclusions:

Innovative methodologies effectively integrate diverse data sources, providing accurate population and housing statistics

## Future Work:

Continue refining integration processes to enhance statistical accuracy and reliability



# EUROPEAN CONFERENCE ON QUALITY IN OFFICIAL STATISTICS 2024 ESTORIL - PORTUGAL