

Spatial frameworks for the analysis of road traffic injuries

Adlai Davids

The Soweto Hotel, Kliptown, Johannesburg

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What is meant by a spatial framework?

- Not a policy context such as in the National Spatial Information Framework (NSIF) of Department of Land Affairs
- Rather an essential element in the generic description/definition of a geographical information system (GIS)
 - To collect, input, manage, analyse and output **georeferenced** data
 - Using computer software and hardware
 - Within an organisational context

- Utilising a grid reference such as latitude and longitude
- Representing the location of real world features as one of at least three features, e.g.
 - Polygons (Municipal boundaries)
 - Lines (Roads, rivers)
 - Points (Trigonometric beacons)

when using a 1: 250 000 map as data input source and spatial reference

Why the interest in a spatial framework
for the analysis of road traffic injuries?

- Injury surveillance
- Safety promotion

Definition of Surveillance:

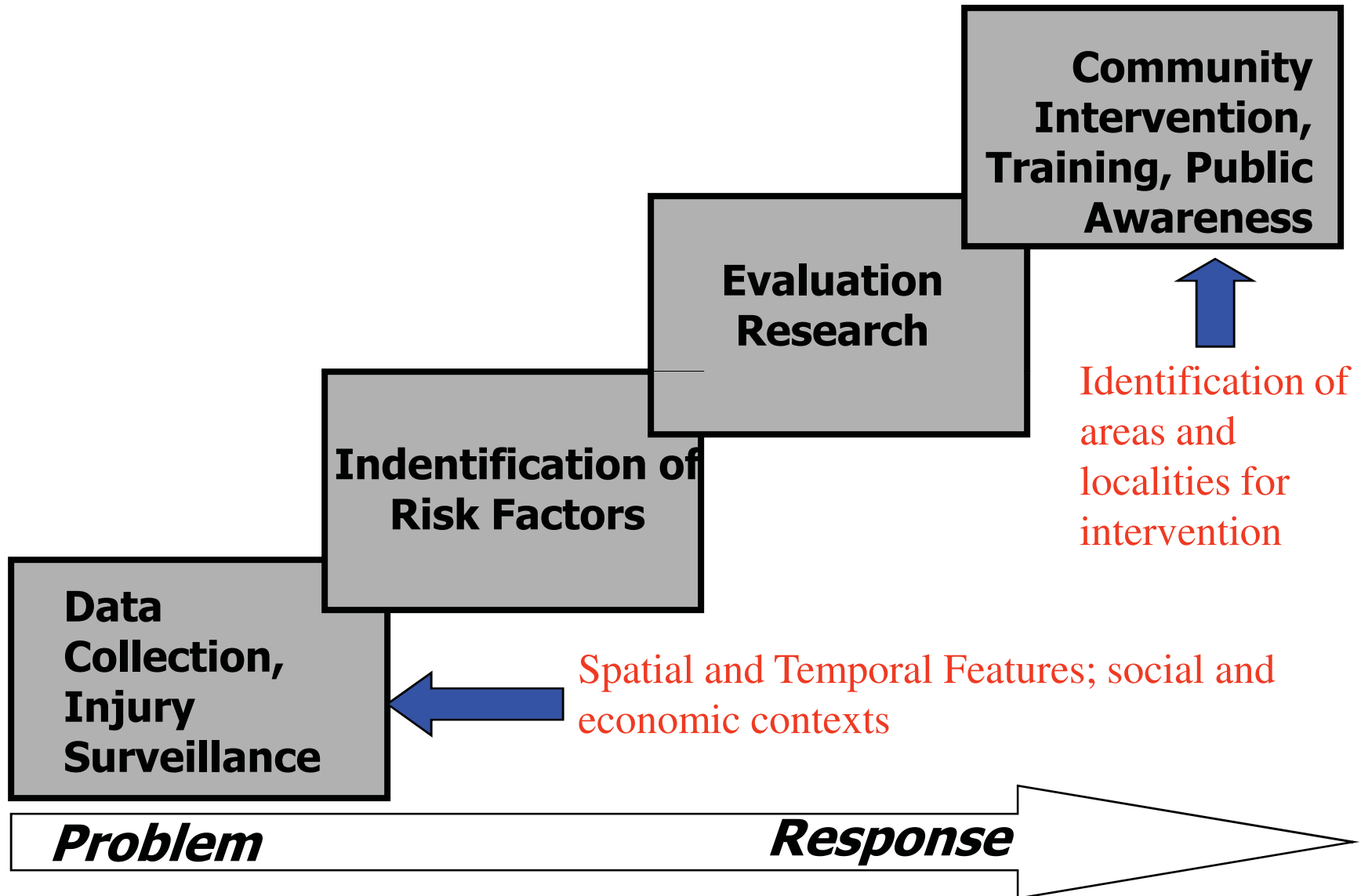
The ongoing, systematic **collection, analysis,** and **interpretation** of health data essential to

* **planning, implementation, and evaluation** of health practice,

* timely **dissemination** of these data

* the final link ...the **application** of these data to prevention and control.

Public Health Approach to Injury Prevention [after Seedat (2002)]



Sources of Injury Data in South Africa

- **National Injury Mortality Surveillance System (NIMSS)**
 - Launched in 1998; MRC/UNISA Crime, Injury and Violence Lead Programme
 - In 2007, 39 participating mortuaries in seven provinces (excluding Free State & Limpopo)
- **Road Traffic Management Corporation (RTMC) – agency of the NDoT**
 - Categorized by vehicle drivers, vehicle passengers, pedestrians & cyclists/motorcyclists

NIMSS Data for Gauteng

- **Seven mortuaries:** Pretoria Academic Hospital, Medunsa, Bronkhorstspuit, Diepkloof, Roodepoort, Johannesburg
- List 29 options for **External Cause or Circumstance of Injury**
- Based on the International Classification of Diseases (**ICD-10**)
- The smallest spatial unit recorded on the NIMSS Data Collection Form is a **Suburb or District**

Gauteng: Fatal injuries due to road traffic injuries

MVAs as % of Totals	
<u>2001</u>	<u>2002</u>
26.28%	21.91%

Mortuary	MVA_01	Total_01	MVA_02	Total_02	MVA_all	Grand Total
Bronkhorstspuit	88	205	74	199	162	404
Diepkloof	442	1807	357	1778	799	3585
Germiston	577	2404	589	3064	1166	5468
Johannesburg	674	2732	690	3468	1364	6200
Medunsa	166	492	202	658	368	1150
Pretoria	558	2076	560	2390	1118	4466
Roodepoort	405	1359	360	1368	765	2727
Totals:	2910	11075	2832	12925	5742	24000

NIMSS Data for Gauteng (Road traffic injury deaths)

- 89 suburbs listed as the ‘Suburb or District’ where a fatal injury occurred due to a road traffic injury
 - Ermelo in Mpumalanga also listed
- Data cannot be linked to the suburbs as these are not universal census areas with population data
- Subplaces seems to be an option, although a name is non-unique

Example of Non-Unique Names (Suburbs vs Subplaces)

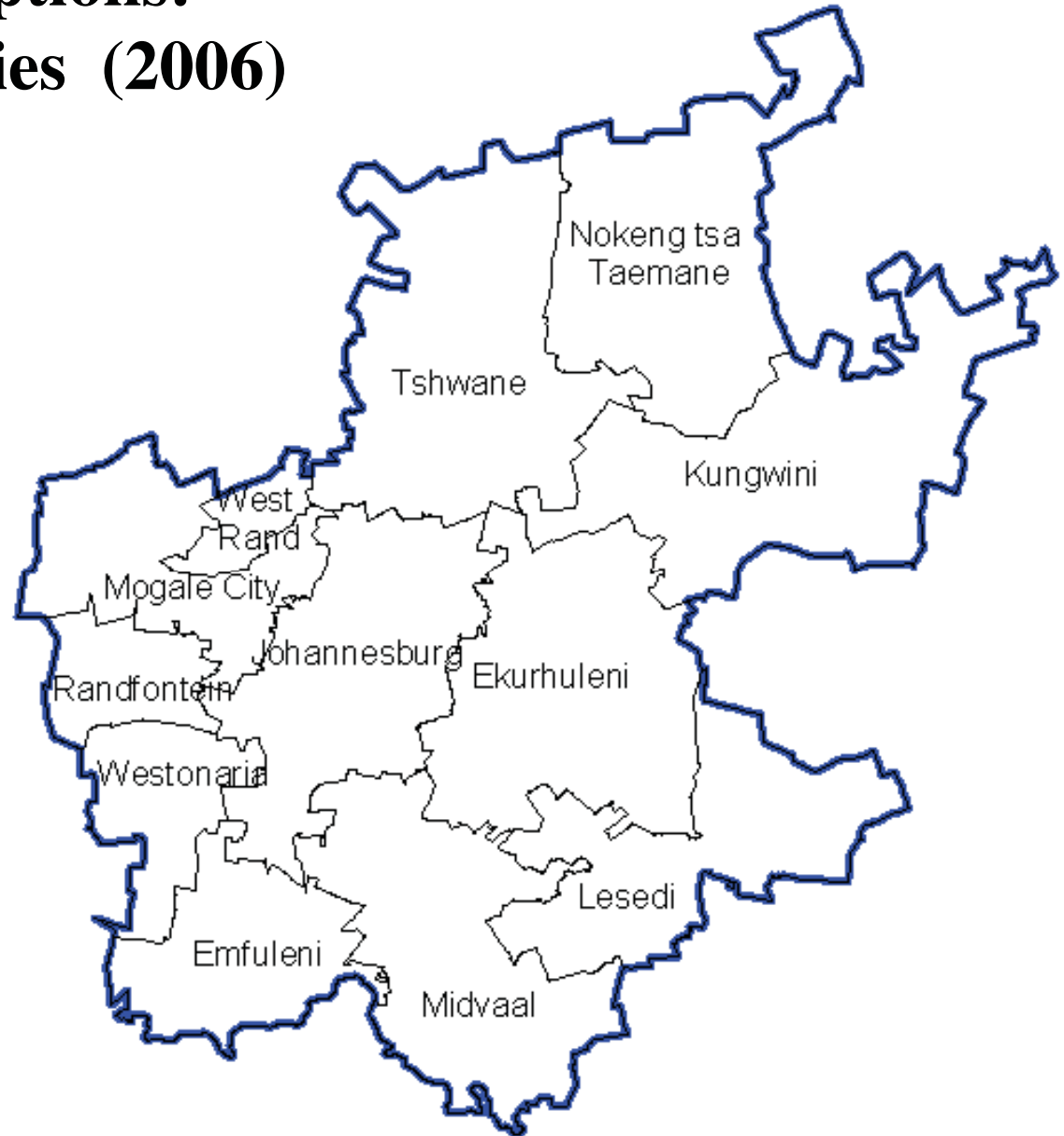
NIMSS Suburb	Sub-Place	Sub-Place Code
BARAGWANATH	<i>Boksburg</i>	77305008
BELLAVISTA	<i>Boksburg Central</i>	77305009
BOKSBURG	<i>Boksburg Ext 1</i>	77305010
BOOYSENS	<i>Boksburg North</i>	77305011
CARLTONVILLE	<i>Boksburg Oos</i>	77305012
CHIAWELO	<i>Boksburg South</i>	77305013

265 Subplace names identified from 89 suburb names

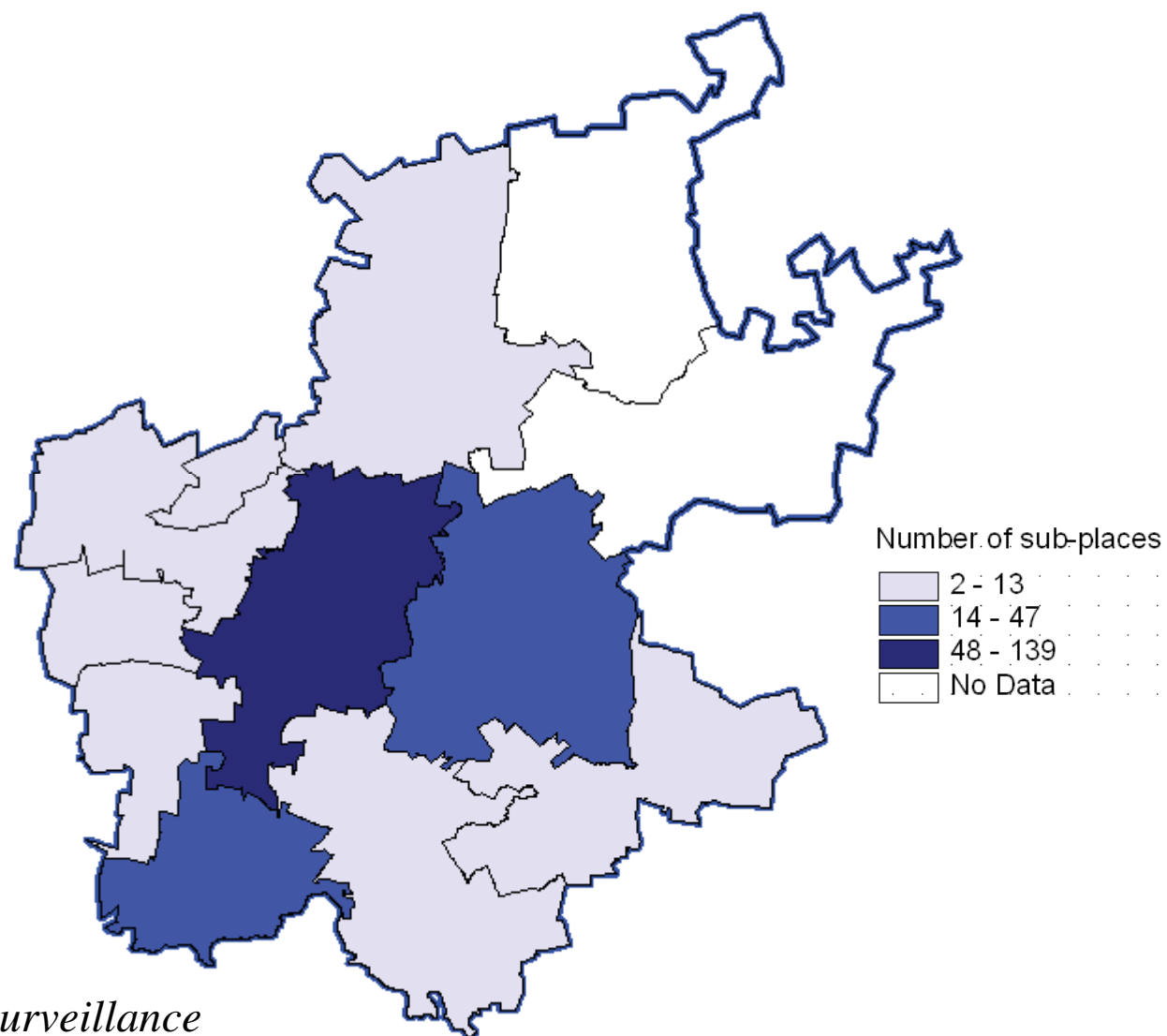
Spatial framework options: Gauteng municipalities (2006)

Municipal boundaries [n=12]

- Municipal Demarcation Board
- Demographic data as available from Statistics South Africa data (Stats SA) – 2001 and later



Road traffic injury deaths - Distribution of subplaces with RTI deaths by municipalities: Gauteng 2001 & 2002

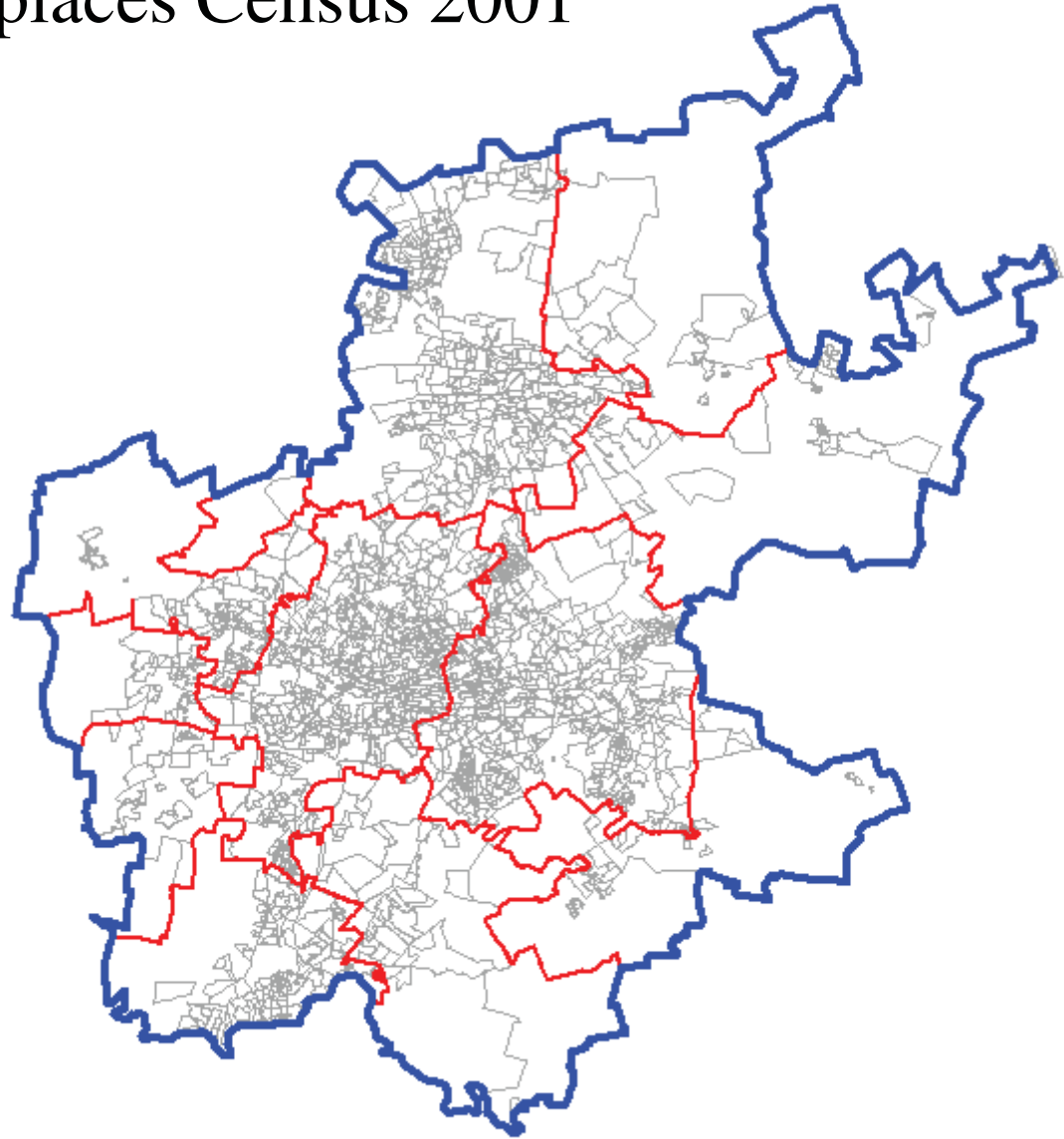


Source:
*National Injury Mortality Surveillance
System (NIMSS)*

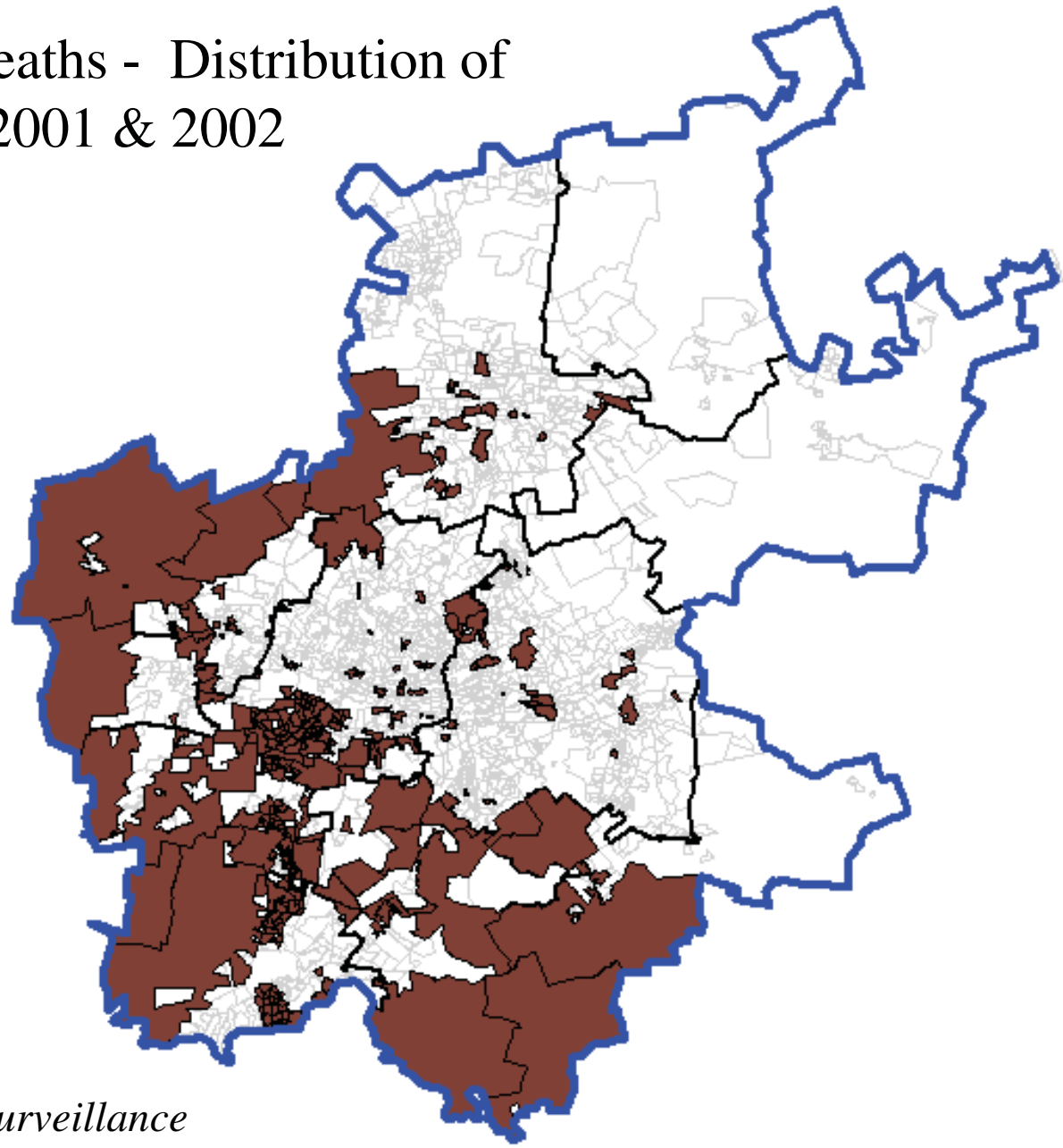
Spatial framework options for Gauteng: Subplaces Census 2001

Subplace boundaries [n=2243]

- Statistics South Africa (2001 output areas)
- Larger spatial units, demographic data dependent on what is published by Stats SA



Road traffic injury deaths - Distribution of subplaces: Gauteng 2001 & 2002



Source:
*National Injury Mortality Surveillance
System (NIMSS)*

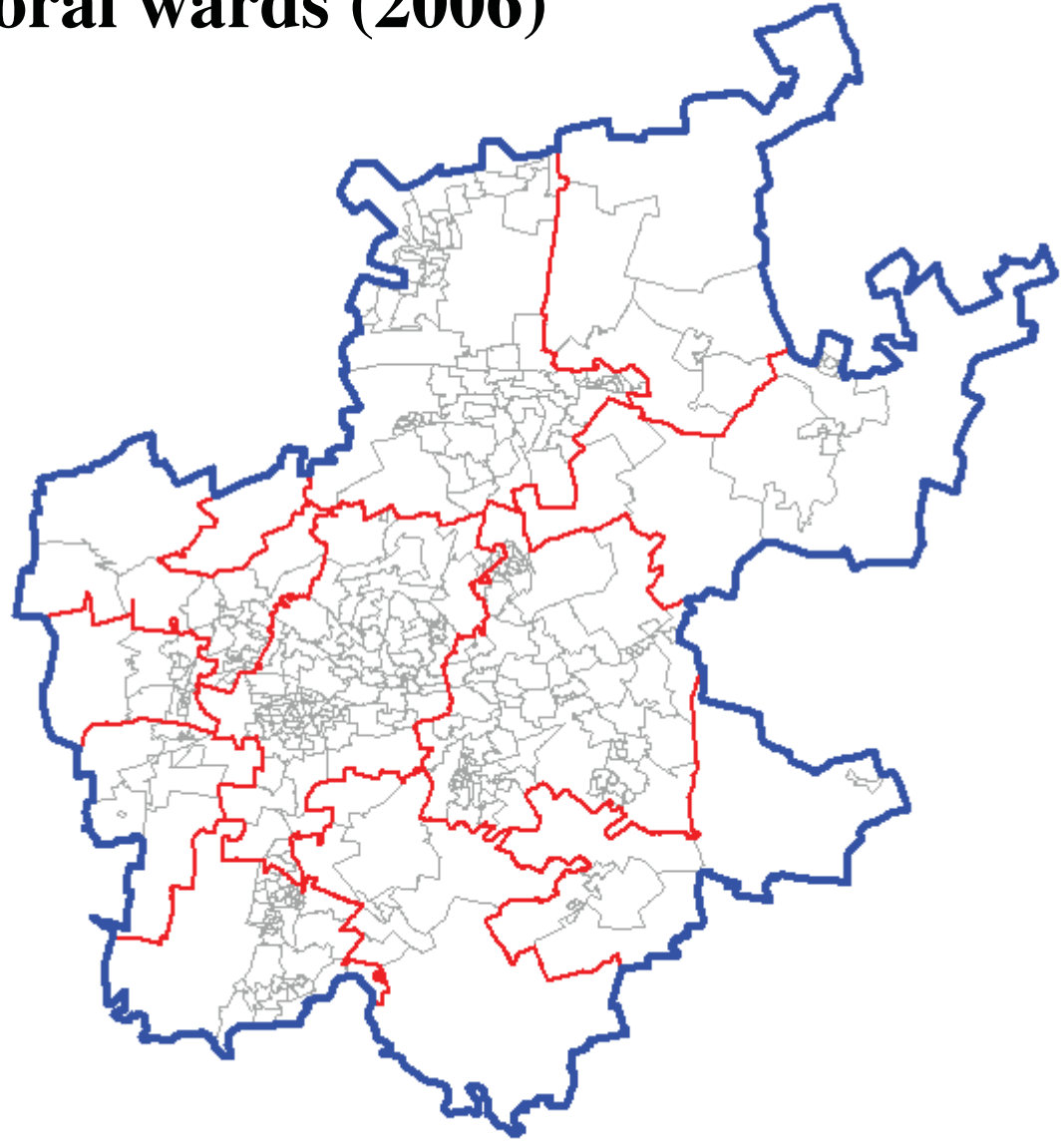
Benefits of using subplaces

- The subplaces identifies the actual denominator population, i.e. the population affected by road traffic injuries
- Identifies those Gauteng subplaces where road traffic deaths occur
 - Useful in focusing injury prevention and safety promotion

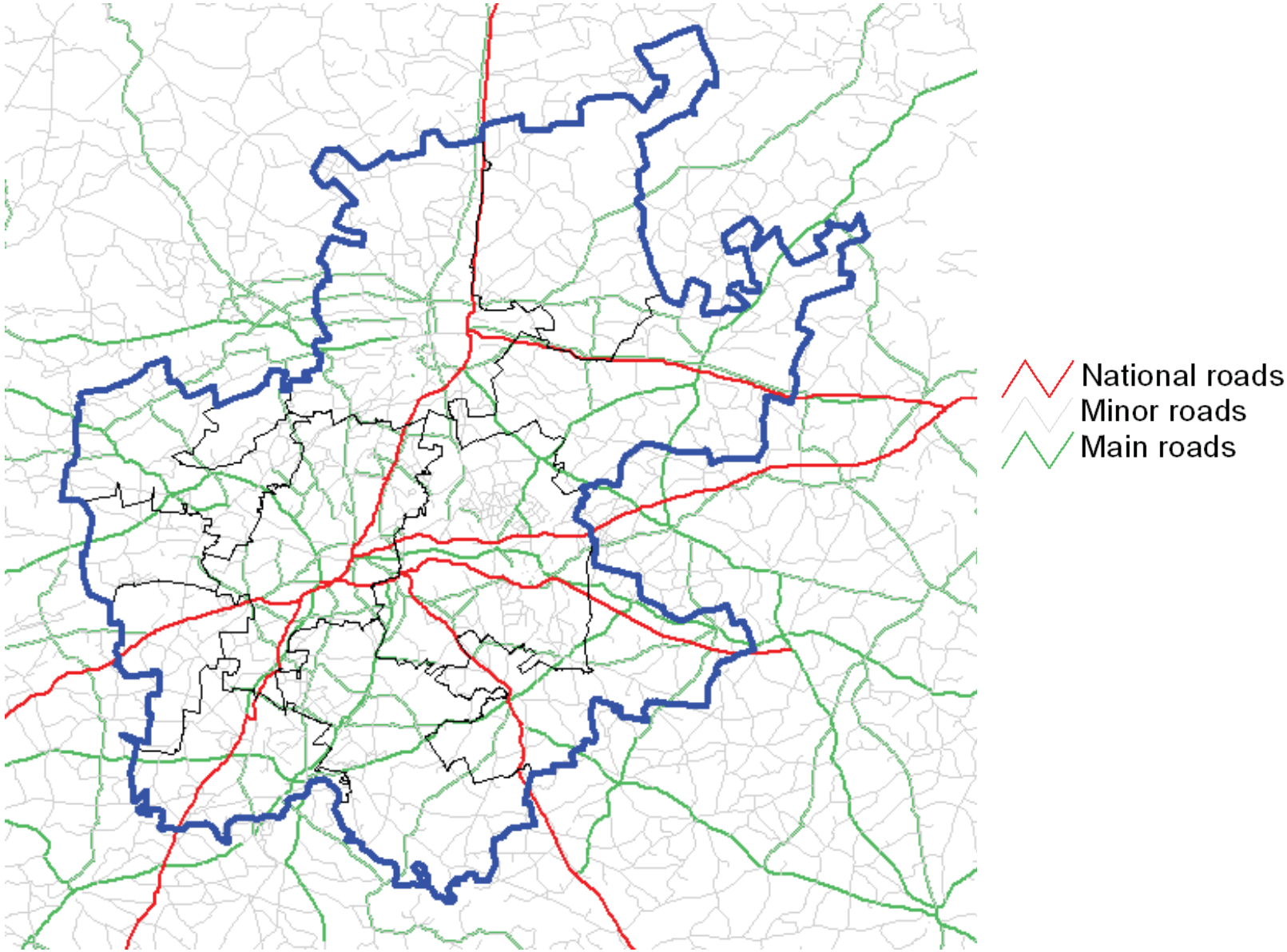
Spatial framework options for Gauteng: Electoral wards (2006)

Local government wards [n=423]

- Municipal Demarcation Board - 2006
- Independent Electoral Commission (IEC) data from the Voters' roll, 18 years and older – 2011
- **Known, local political representative**



Spatial framework options for Gauteng: Road networks



Future Research

- Broad suburbs names will remain in NIMSS records
- Analysis of individual injury categories (pedestrian vs vehicle occupant deaths)
- Can be investigated using a defined denominator population, with age cohorts, socio-economic profiles, etc.
- More localised recording of events – ‘hot spots’; with links to societal actions, norms, etc.
- Spatial analysis – cluster analysis, accessibility analysis, etc.