Spatial and Temporal Aspects of Childhood Injuries:

Implications for Injury Prevention and Safety Promotion

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Social science that makes a difference

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Child injuries as research focus

- An estimated 10 children die each day in South Africa due to an injury
- 19% of the 38 047 child deaths in 1995 were due to injuries
- Compared to:
  - Intestinal infections (14%)
  - Respiratory diseases (7.5%)
- Injuries are the single largest contributor (32%) to potential years of life lost (PYLL) in 1996

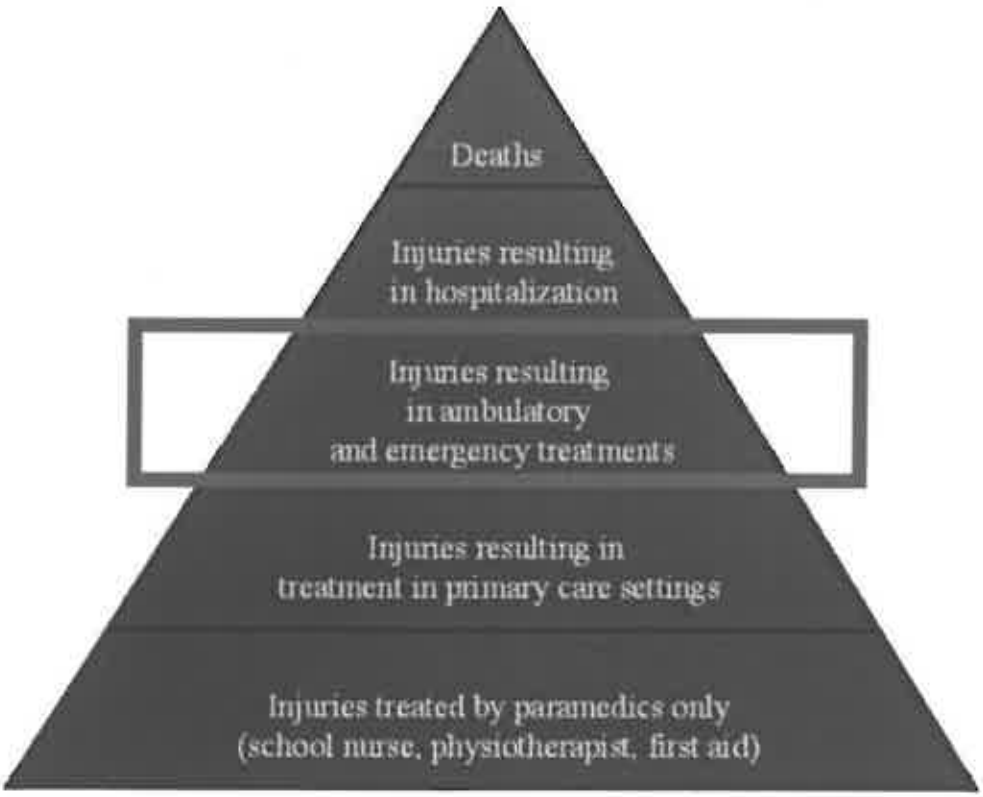
Injuries as geographical focus (i)

- **Injury prevention** in South Africa is hampered by the lack of adequate data
- Led to the development of the National Injury Mortality Surveillance System (NIMSS); since 1999
- 'Who, what, when and how' of injuries
- Spatial component and reporting domain is the mortuary where the autopsy was performed
- Even though injury data must identify areas for prevention
- No real emphasis on spatial analysis of injuries

Injuries as geographical focus (ii)

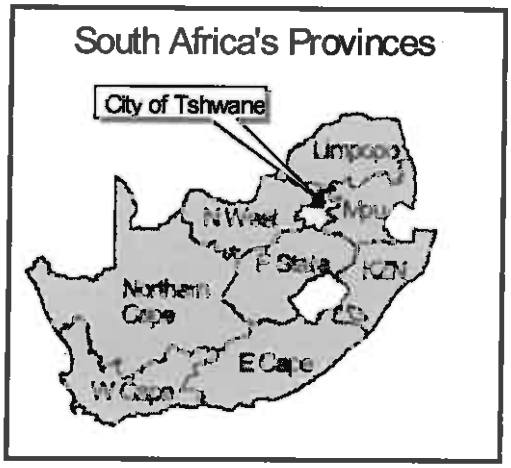
- **Safety Promotion** is a 'tradition' in public health that deals with
  - Societal structures
  - Public policy
  - Engineering
  - Legislation
  - Administration of justice
- All impact on spatial organisation

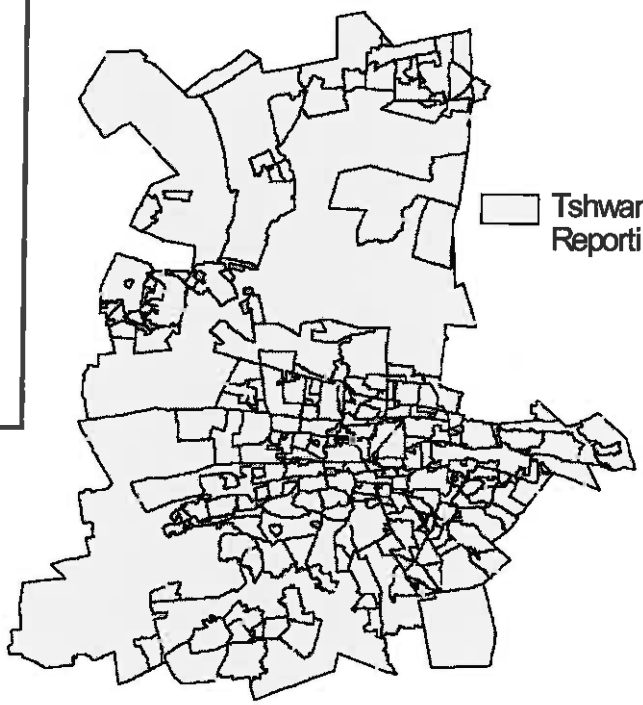
The Injury Pyramid



Source:
WHO

City of Tshwane, Gauteng





Tshwane Census 2001 Reporting Units

N

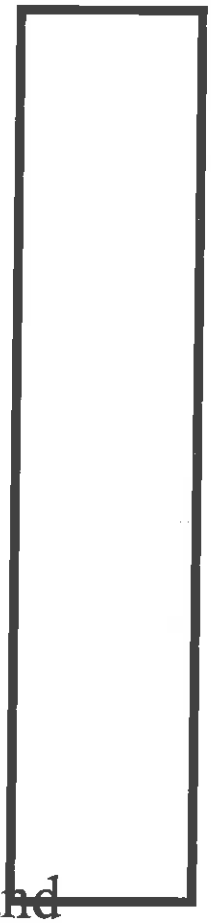
10 0 10 20 Kilometers

Injury Data for Tshwane

- Data recorded onto the Emergency Services System (ESS)
- Childhood refers to persons 0-18 years, but age is not explicitly recorded
- Records were selected based on "what caller said"; where "Child, Kid, Seun, Dogter, Boy, Girl, Baby, etc." were mentioned
- Utilised the 0-19 years cohort of Census 2001 as denominator population

Data recorded on Tshwane Emergency Services System (ESS)

- Incident Nr
- Date
- Time
- Time_slot *
- Street
- Suburb
- Sub category
- Inj_category
- Transfered To
- Caller Said
- Patient Priority and Total



- Temporal Aspects
- Spatial Aspects
- Event Coding and Descriptions

* Data element generated for purposes of the research

Emergency Calls per Month

Month	Total_Calls	Child Calls	Perc
November 2002	**2319**	51	2.2%
December 2002	**2556**	84	3.3%
January 2003	**5002**	113	2.3%
February 2003	**5188**	91	1.8%
March 2003	**5699**	111	1.9%
April 2003	**5191**	94	1.8%

· **544** (2.1%) of the 25 955 emergency calls involved **at least** one child

· **91 calls** per month between November 2002 & April 2003

·Three children injured **per day**

External Cause of Injury

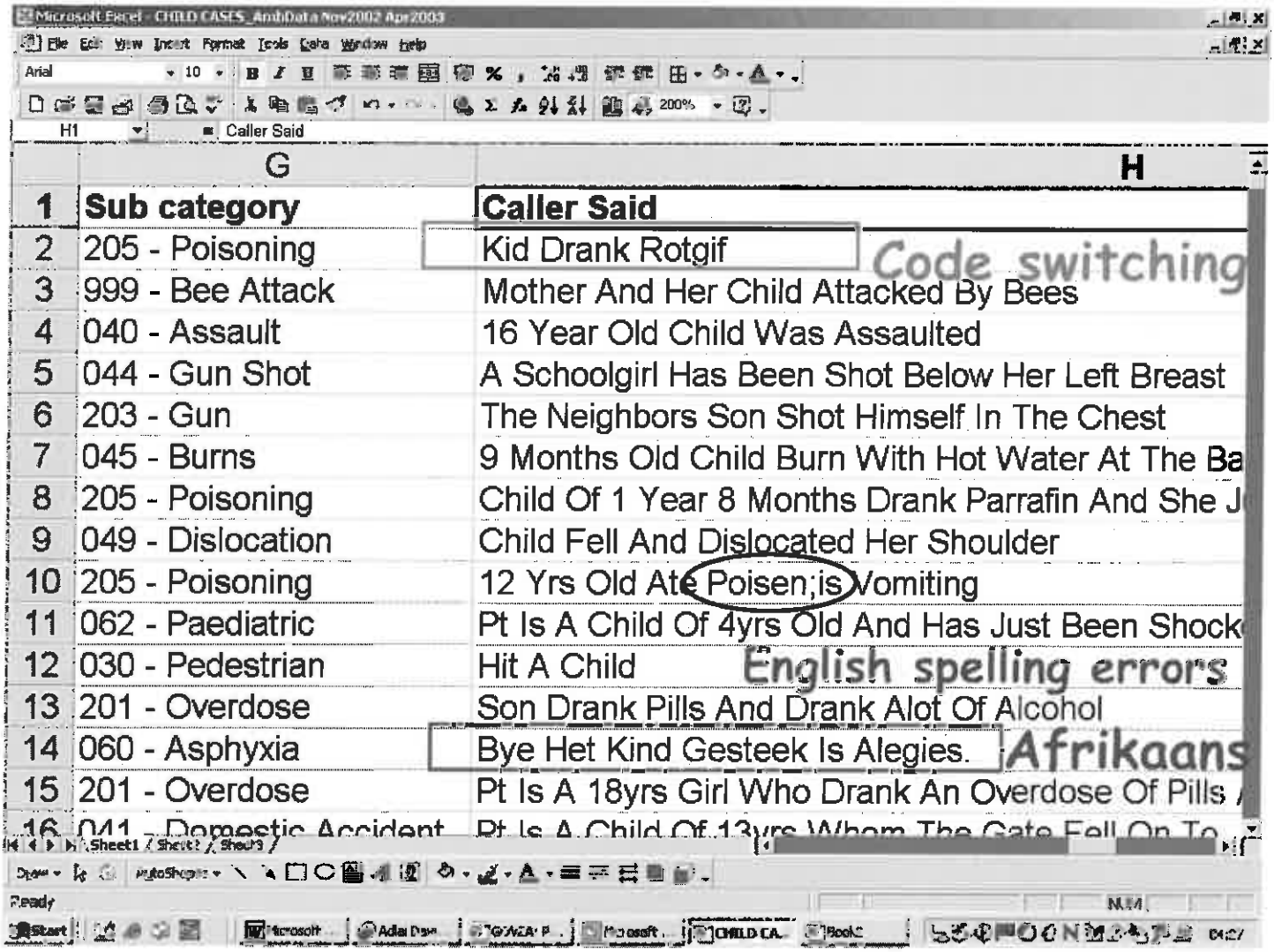
External Cause	Frequency	Percent
Poisoning/Ingestion	138	25.4
MVA (All Types)	129	23.7
Unknown	44	8.1
Fall on Level	32	5.9
Burn	30	5.5
Fall from height	28	5.1
Bicycle/Motorcycle	22	4.0
Sharp Object	20	3.7
Assault	19	3.5
Drowning, immersion	18	3.3
Sport	13	2.4
Animal Attack	10	1.8
Blunt Object	9	1.7
Crushing	8	1.5
Firearm discharge	7	1.3
Rape	5	0.9
Suffocation	5	0.9
Railway	3	0.6
Electrocution	2	0.4
Gassing	2	0.4

External Cause	Frequency	Percent
MVA (Passenger)	*27*	*5.0*
MVA (Pedestrian)	*98*	*18.0*
MVA (Unspecified)	*4*	*0.7*

Total: 544

Limitations of using ESS Injury Data

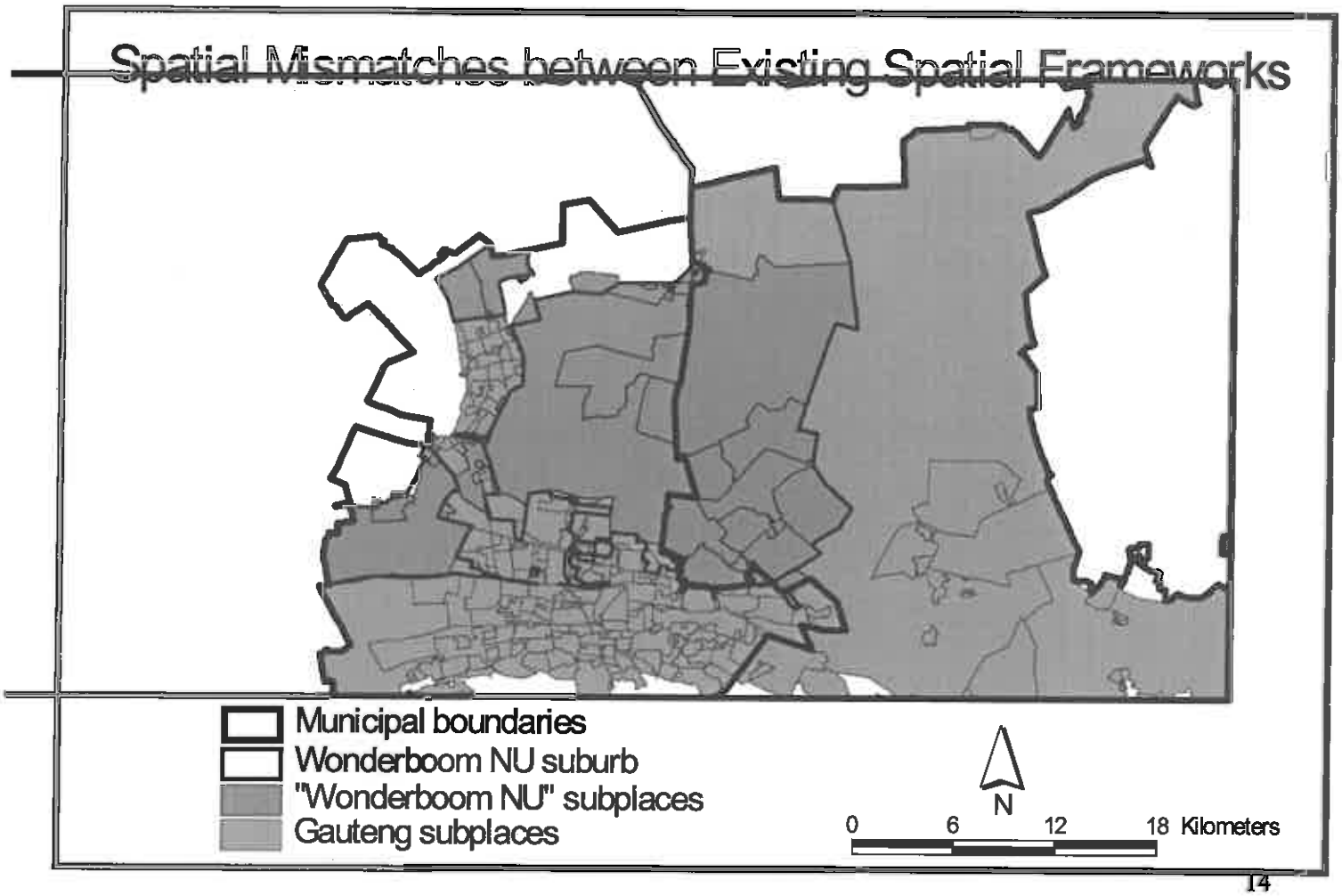
- Names of residential areas may be misspelled during an emergency call
- Data is bilingual (English, Afrikaans and code switching)
- Only a limited data set was available
  - Six months' data
  - November 2002 to April 2003
- Records only public sector data; excludes at least three private sector ambulance services


Microsoft Excel - CHILD CASES_AmbData Nov2002 Apr2003
File Edit View Insert Format Tools Data Window Help
Arial 10
H1
Caller Said
G
H
Sub category
Caller Said
205 - Poisoning
Kid Drank Rotgif
Code switching
999 - Bee Attack
Mother And Her Child Attacked By Bees
040 - Assault
16 Year Old Child Was Assaulted
044 - Gun Shot
A Schoolgirl Has Been Shot Below Her Left Breast
203 - Gun
The Neighbors Son Shot Himself In The Chest
045 - Burns
9 Months Old Child Burn With Hot Water At The Ba
205 - Poisoning
Child Of 1 Year 8 Months Drank Parrafin And She J
049 - Dislocation
Child Fell And Dislocated Her Shoulder
205 - Poisoning
12 Yrs Old Ate Poisen;is Vomiting
062 - Paediatric
Pt Is A Child Of 4yrs Old And Has Just Been Shock
030 - Pedestrian
Hit A Child
English spelling errors
201 - Overdose
Son Drank Pills And Drank Alot Of Alcohol
060 - Asphyxia
Bye Het Kind Gesteek Is Alegies.
Afrikaans
201 - Overdose
Pt Is A 18yrs Girl Who Drank An Overdose Of Pills
041 - Domestic Accident
Pt Is A Child Of 13yrs Whom The Gate Fell On To
Sheet1 / Sheet2 / Sheet3 /
Ready
NUM

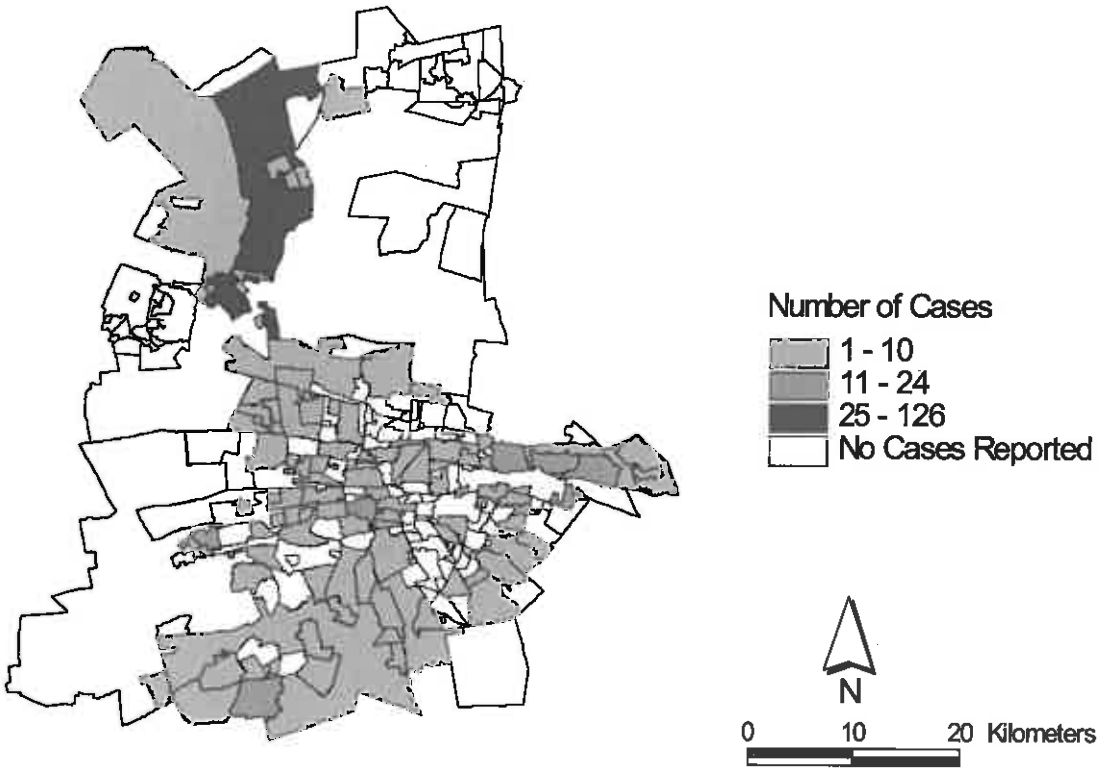
Spatial framework options for Gauteng

- **Suburb boundaries** [n=2317]
  - Knowledge Factory; Surveyor General (1999)
  - No demographic data, a name is the only attribute

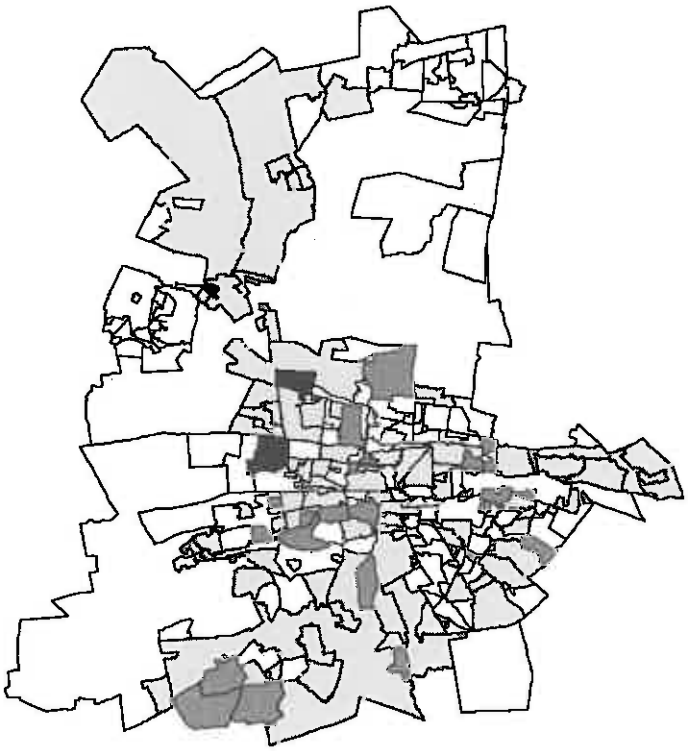
- **Enumerator Areas (EAs)** [n=15967]
  - Statistics South Africa (1996 Census output areas)
  - extensive socio-economic data, 5 year age cohorts, household sizes
- **Subplace boundaries** [n=2221]
  - Statistics South Africa (2001 output areas)
  - Larger spatial unit than the EA (7 EAs per subplace


Spatial Mismatches between Existing Spatial Frameworks
Municipal boundaries
Wonderboom NU suburb
"Wonderboom NU" subplaces
Gauteng subplaces
N
0
6
12
18 Kilometers

Cases of Childhood Injuries (November 2002 - April 2003)



Number of Cases by 'Suburb' (November 2002 - April 2003)



Cases per 10 000 population
(0-19 years)

- 0.124 - 25.640
- 25.641 - 77.921
- 77.922 - 430.839
- No Reported Cases

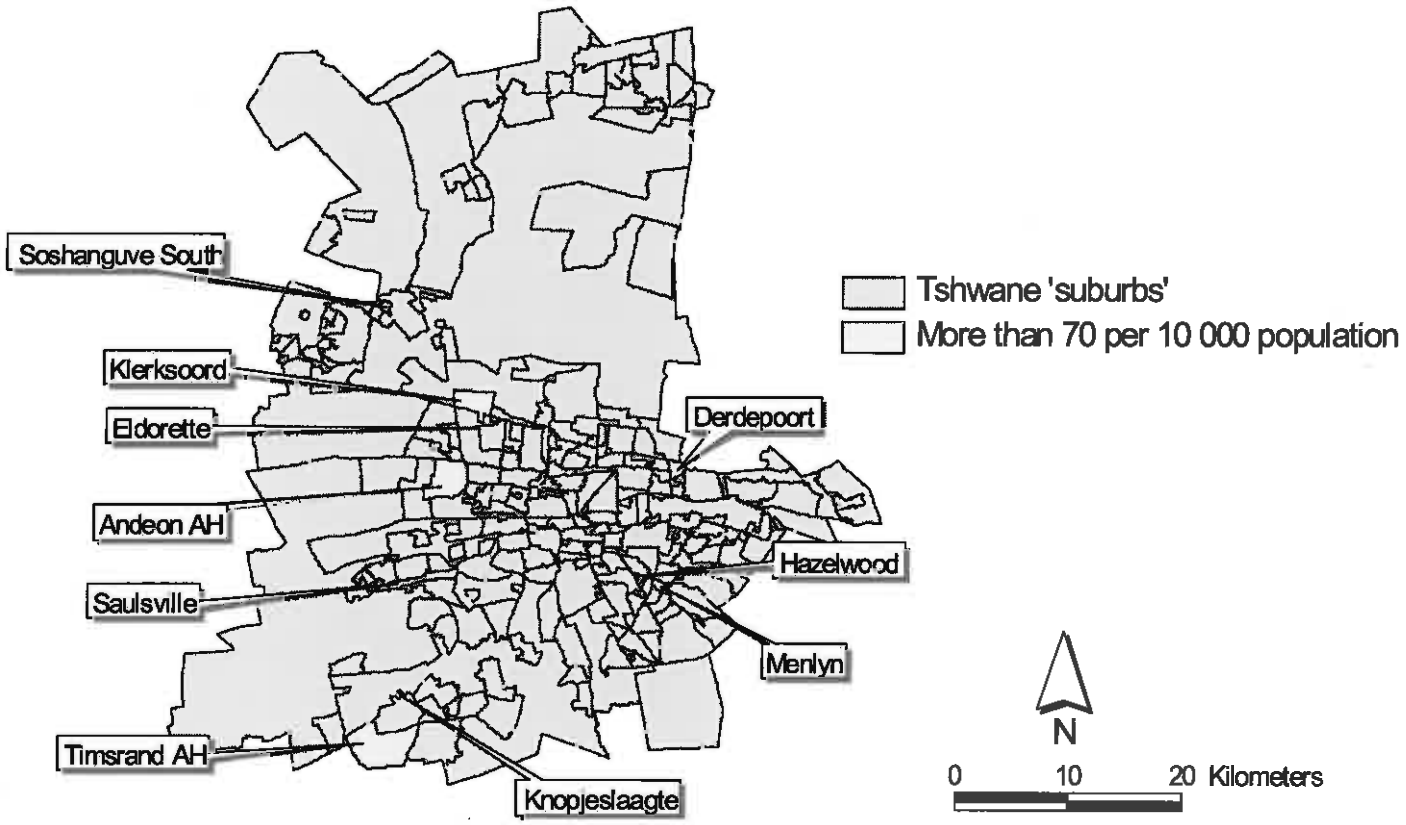
N

0 10 20 Kilometers

Temporal distribution of Calls (at least 1 child reported injured)

Time_slot	Time Range	Frequency	Perc
Early morning	00:01 - 06:00	27	5.0%
Late morning	06:01 - 12:00	101	18.6%
Afternoon	12:01 - 18:00	209	38.4%
Evening	18:01 - 24:00	158	29.0%
Time not recorded	***	*49*	*9.0%*
	Total:	544	100.0%

'Suburbs' with the highest caseload (November 2002 - April 2003)



'Suburbs' with highest case load (>70 per 10 000)

SUBURB	CASES	TOTAL 0-19 YRS	PER 10 000
Timsrand AH	2	267	74.906
Derdepoort	3	385	77.922
Hazelwood	1	83	120.482
Klerksoord	1	83	120.482
Soshanguve South	13	1048	124.046
Eldorette	1	80	125.000
Knopjeslaagte	3	207	144.928
Andeon AH	4	270	148.148
Menlyn	1	62	161.290
Saulsville	19	441	430.839

Lifestyle Segmentation

SUBURB	LS_category	Race	Housing Type	Education
Knopjeslaagte	4	Cosmopolitan	Formal, Retirement Dwellings	Graduate level
Eldorette	6	White	Formal	Graduate level
Derdepoort, Andeon AH & Merlyn	7	White & African	Formal	Graduate level
Hazelwood	8	Coloured	Primary	Primary & Secondary
Saulsville	9	Coloured	Formal	Primary & Secondary
Timsrand AH	15	African	Formal & Backyard Shacks	Primary education
Klerksoord	18	African	Formal	No formal education
Soshanguve South	29	African	Informal Shacks	No formal education

Future Research

- Differentiation between age and gender of children (Are African girls between 15 & 18 more likely to get injured?)
- Compare odds ratios for different areas (Does geography matter when it comes to injury risk?)
- Establish a 'universal' spatial framework to report census figures (Is everyone singing from the same map sheet?)

Future Research (continued)

- Emergency treatment data should be integrated into non-fatal injury surveillance
- Inclusion of data elements such as
  - Injured body part (head, etc)
  - Outpatient treatment or hospitalisation
  - Nature of treatment outcome
- Greater interface between fatal and non-fatal injury surveillance
- Monitoring and evaluation of injury prevention and safety promotion programmes.

Thank you

for your interest
and attention!!

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