Neighbourhood deprivation and smoking outcomes in South Africa

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CAPE TOWN, SOUTH AFRICA
Background and Justification

• Individual-level predictors for adult smoking behaviours in South Africa have been established through previous research (Strebel et al., 1989; Peer et al., 2009; Vellios & van Walbeek, 2013)

• Smoking disparities exist across the country:
  
  • 12% males and 6.2% of females are cigarette smokers (Tobacco Atlas 4th edition, 2009)
    
    • Among men: BLACK - 32.8%, COLOURED - 52.1%, WHITE - 35.7%, INDIAN - 55.5% (DHS, 2003)
    
    • Among women: BLACK - 5.2%, COLOURED - 41.8%, WHITE - 27.3%, INDIANS - 13.1% (DHS, 2003)
Background and Justification

- Understanding the role of neighbourhood influences on smoking-related outcomes is important for addressing these disparities.
- The effectiveness of tobacco control strategies depends on the socioeconomic and environmental context in which they are implemented.
- Economic and social deprivation has been shown to be significantly associated with smoking status in other contexts (Kleinschmidt et al., 1995; Shohaimi et al., 2003; Baumann et al., 2007; Blakely et al., 2013).
- This study is the first multi-level analysis of individual and neighbourhood socioeconomic contexts for smoking behaviours in South Africa.
Neighbourhoods and Health
Neighbourhoods and Health

Residential segregation by race and SES position

Inequalities in resource distributions
Neighbourhoods and Health

Residential segregation by race and SES position

↑↓

Inequalities in resource distributions

Neighbourhood physical environments
- Environmental exposures
- Food & recreational resources
- Built environment
- Aesthetic quality/natural spaces
- Services
- Quality of housing
Neighbourhoods and Health

Residential segregation by race and SES position

↑↓ Inequalities in resource distributions

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Neighbourhood social environments
- Safety/violence
- Social connections/cohesion
- Local institutions
- Norms
Neighbourhoods and Health

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Behavioural mediators ↑↓ Stress

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UNIVERSITY OF MICHIGAN
Neighbourhoods and Health

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Behavioural mediators
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Health

Adapted from Diez Roux & Mair (2010)
Neighbourhoods and Health

How might smoking outcomes vary by neighbourhood environment?
Neighbourhoods and smoking

Policy implementation
- Smoke-free policies
- Availability of tobacco
- Tobacco advertising
- Youth access to tobacco
- Local enforcement

Smoking norms
Economic conditions

Behavioural mediators
↑↓ Stress

Smoking status

Residential segregation by race and SES position
↑↓ Inequalities in resource distributions
Neighbourhood deprivation How does it associate with smoking outcomes?
Neighbourhood deprivation

- Conditions of the physical and social environment in local communities that contribute to the experience of deprivation including:

  - (1) income and material, (2) employment, (3) education, and (4) living environment deprivation

- These four dimensions of deprivation are used by the South African Index of Multiple Deprivation (SAIMD) at municipality level (Wright and Nobel, 2009)

- Subindices of each domain, and an overall multiple deprivation index, were constructed with the same items as SAIMD, using Principal Component Analysis
Deprivation and smoking?

Social and physical deprivation due to living circumstances
Deprivation and smoking?

Social and physical deprivation due to living circumstances

- Poor enforcement and implementation of tobacco control policies
- Lack of local institutions to support health
- Social norms that encourage smoking
- Life stressors
Deprivation and smoking?

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Worse smoking outcomes
Deprivation and smoking?

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Worse smoking outcomes

- Reduced availability of tobacco products
- Insufficient money to purchase tobacco
- Social norms that do not encourage smoking
Deprivation and smoking?

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Worse smoking outcomes

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- Insufficient money to purchase tobacco
- Social norms that do not encourage smoking

Better smoking outcomes
Methods

• NIDS 2008 Data: Adult and Household

• **Multilevel analysis (Oakes & Kaufman, 2006)**
  - A neighbourhood is defined as a census enumeration area

• Outcomes of interest:
  - Smoking status
  - Smoking intensity: cigarettes per day
Methods

- Covariates
  - **Individual level**: age, age squared, gender, race, educational attainment, alcohol consumption
  - **Household level**: household income quintiles, other smokers in household (yes/no), urban/rural
  - **Neighbourhood level**: neighbourhood deprivation constructed from SAIMD Index (Wright and Nobel, 2009)
Preliminary results: smoking status
# Model 1: individual-level covariates only

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<thead>
<tr>
<th>Factor</th>
<th>Odds ratio</th>
<th>95% CI</th>
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<tbody>
<tr>
<td>Age</td>
<td>1.1642***</td>
<td>[1.1408;1.1881]</td>
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<tr>
<td>Age</td>
<td>0.9983***</td>
<td>[0.9980;0.9985]</td>
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<tr>
<td>Male</td>
<td>7.7015***</td>
<td>[6.7026;8.8492]</td>
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<tr>
<td>Race: Coloured</td>
<td>8.2898***</td>
<td>[1.1237;3.6109]</td>
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<tr>
<td>Indian/Asian</td>
<td>2.0144**</td>
<td>[1.1237;3.6108]</td>
</tr>
<tr>
<td>White</td>
<td>4.5478***</td>
<td>[3.4129;6.0599]</td>
</tr>
<tr>
<td>Education: Primary school or less</td>
<td>3.1935***</td>
<td>[2.6407;3.8621]</td>
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<tr>
<td>Employed</td>
<td>1.1315</td>
<td>[0.9833;1.3020]</td>
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<tr>
<td>Alcohol</td>
<td>6.7123***</td>
<td>[5.5512;8.1162]</td>
</tr>
</tbody>
</table>

p≤0.05*
p≤0.01**
p≤0.001***
Model 2: adding household-level covariates to Model 1

- Positive significant associations found with being a smoker and:
  - Urban (OR = 1.21**)
  - has other smoker(s) in household (OR = 15.92***)
  - 2nd (OR = 1.27*), 3rd (OR = 1.45**) and 4th quintiles (OR = 1.48***) [ref: 5th quintile]

- Individual level associations stayed generally the same

p≤0.05*; p≤0.01**; p≤0.001***
Models 3A - E: add neighbourhood deprivation to Model 2

<table>
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<td>1.02</td>
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<tr>
<td>Living environment</td>
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<td>0.99</td>
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<td>—</td>
<td>0.61**</td>
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<tr>
<td>Income and material</td>
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Models differ in the deprivation indexes used.
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Models differ in the deprivation indexes used
Results stratified by race
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<tr>
<td>Multiple deprivation</td>
<td>0.978</td>
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<tr>
<td>Living environment</td>
<td>0.876</td>
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<td>Education</td>
<td>0.509</td>
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<td>Employment</td>
<td>0.880</td>
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<tr>
<td>Income and material</td>
<td>0.191</td>
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<td></td>
<td>p-value</td>
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<tr>
<td>--------------------------</td>
<td>----------</td>
</tr>
<tr>
<td><em>Multiple deprivation</em></td>
<td>0.231</td>
</tr>
<tr>
<td><em>Living environment</em></td>
<td>0.561</td>
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<tr>
<td><strong>Education</strong></td>
<td>0.001***</td>
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<tr>
<td><em>Employment</em></td>
<td>0.122</td>
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<td><em>Income and material</em></td>
<td>0.536</td>
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<td>Feature</td>
<td>p-value</td>
</tr>
<tr>
<td>------------------------------</td>
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</tr>
<tr>
<td><strong>Multiple deprivation</strong></td>
<td>0.069</td>
</tr>
<tr>
<td>Living environment</td>
<td>0.276</td>
</tr>
<tr>
<td>Education</td>
<td>0.403</td>
</tr>
<tr>
<td>Employment</td>
<td>0.637</td>
</tr>
<tr>
<td><strong>Income and material</strong></td>
<td><strong>0.006</strong>**</td>
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Preliminary results: smoking intensity
Results: smoking intensity

- Preliminary results indicate that none of the deprivation indices were significantly associated with smoking intensity.

- Individual factors: age, male, being coloured, white, or Indian/Asian (ref: Black), regular alcohol consumption are significantly, positively associated with smoking intensity.

- Household factors: Being in households of poorer quintiles is associated with lower smoking intensity.
Conclusions

- Some types of deprivation matter more than others
  - Proportion of adults who have had no secondary education matters more than the quality of living environment
  - Employment deprivation is negatively associated with being a smoker
Policy implications?

• Continuous surveillance of tobacco use should be a priority

• Addressing disparities in smoking behaviours could help address disparities in burden of ill-health (see Ataguba et al., 2011)

• Characterising adult smokers could improve targeting of smoking cessation and tobacco interventions on local level
Limitations

- Although stratified analysis (i.e. by race) is straightforward with individual level (Model 1), it is harder to interpret (and probably needs to be controlled for) in multilevel analysis.

- Difficult to draw conclusions for some subgroups due to small sample sizes (female smokers, Asian/Indian).

- Smoking status and smoking intensity are both self-reported; could be subject to recall bias and social desirability bias.

- Analyses do not account for sample weights.
Next Steps and Future Directions

- Policies are not affecting all communities the same way
  - future research might investigate how deprivation might prevent successful policy implementation

- Consider longitudinal evidence for the relationship between neighbourhood deprivation and smoking status and intensity
References


