TB in the context of epidemiological transition and urbanisation

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Outline

- Setting the scene
- Drivers of epidemiological transition
- ID/NCD comorbidity in South Africa
- Integrated approaches to addressing multimorbidity
Epidemiological transition

Setting the scene
Changing patterns of MORBIDITY in South Africa

Leading causes of DALYs and percent change 1990 to 2010 for South Africa

Percent change 1990-2010:

1. DIARRHEAL DISEASES
2. HIV/AIDS
3. LOWER RESPIRATORY INFECTIONS
4. TUBERCULOSIS
5. DIABETES
6. STROKE
7. COPD
8. MAJOR DEPRESSIVE DISORDER
9. LOW BACK PAIN
10. ISCHEMIC HEART DISEASE
11. MECHANICAL FORCES
12. ROAD INJURY
13. DRUG USE DISORDERS
14. EPILEPSY
15. OTHER MUSCULOSKELETAL
16. NEONATAL ENCEPHALOPATHY
17. CHRONIC KIDNEY DISEASE
18. ASTHMA
19. ANXIETY DISORDERS
20. CONGENITAL ANOMALIES
21. NECK PAIN
22. HYPERTENSION HEART DISEASE
23. CHRONIC KIDNEY DISEASE
24. NECK PAIN
25. CONGENITAL ANOMALIES
Drivers of epidemiological transition

Context matters: Urbanisation, Deprivation, Economic
Urbanisation - a sprinkle of complexity

- Built environments
  - Dense informal settlements => ID transmission
  - Unhealthy environments => NCD and multimorbidity
- Inadequate urban infrastructure unable to cope with waste and water demands => persistence of ID
- Increasing exposure of young people to unhealthy cities => NCDs at earlier ages
Deprivation and multi-morbidity

Most deprived aOR 1.5
Urban aOR 1.9
Obese aOR 1.7

Economic transition, TB & DM

Heterogeneous TB and DM association

+ve association in E & C Africa, but not in S & W Africa

Need to consider impact of transition on TB burden

Oni, T. PHASA conference abstract 2013
Epidemiological transition and the rise of ID/NCD co-morbidity

The case of South Africa
Subclinical TB disease 8.5% (95% CI 5.1-13.0%); 22% smear +ve

### TB & NCD

#### Body Mass Index distribution in TB cases and controls

<table>
<thead>
<tr>
<th>Variable</th>
<th>Overall</th>
<th>Odds Ratio; (95% CI)</th>
<th>p=0.030</th>
<th>p=0.012</th>
<th>p=0.068</th>
<th>p=0.055</th>
<th>p=0.055</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBMI</td>
<td></td>
<td>2.4 (1.3 – 4.3)</td>
<td>p=0.005</td>
<td>2.4 (1.0 – 5.9); p=0.05</td>
<td>2.2 (0.7 – 6.4); p=0.160</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HbA1c</td>
<td></td>
<td>2.4 (1.2 – 4.6); p=0.012</td>
<td>2.4 (1.0 – 5.9); p=0.05</td>
<td>2.2 (0.7 – 6.4); p=0.160</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FPG</td>
<td></td>
<td>2.3 (0.9 – 5.5); p=0.068</td>
<td>2.9 (0.7 – 12.2); p=0.148</td>
<td>1.9 (0.6 – 6.4); p=0.295</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OGTT</td>
<td></td>
<td>1.2 (0.5 – 3.3); p=0.690</td>
<td>2.5 (0.6 – 10.3); p=0.218</td>
<td>0.5 (0.1 – 3.1); p=0.491</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Previously diagnosed DM only</td>
<td></td>
<td>3.7 (1.5 – 9.1); p=0.004</td>
<td>6.3 (1.3 – 30.8); p=0.022</td>
<td>3.1 (0.9 – 10.1); p=0.066</td>
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</tr>
</tbody>
</table>

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13% DM prevalence in TB (60% not previously diagnosed)

14% PARF of TB to DM

(Oni et al ERJ 2017 50: 1700004)

22% of TB patients overweight/obese versus 11.7% underweight
TB in DM

- 440 DM patients screened
  - Gene Xpert, TB Culture, HIV

- 3% prevalence of TB in DM patients (4-fold higher than pop)
- 54% of TB cases were asymptomatic
- HIV & haemoptysis assoc with TB in DM

HIV & NCD

Number of patients among patients with a given disease

Co-morbid Disease Pattern %

DM HIV TB HPT

MM Prevalence %

Prevalence of T2DM and HPT across age-groups; stratified by HIV

<table>
<thead>
<tr>
<th>Age Group</th>
<th>HPT HIV-</th>
<th>T2DM HIV-</th>
<th>HPT HIV+</th>
<th>T2DM HIV+</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-35</td>
<td>7.95%</td>
<td>6.63%</td>
<td>19.73%</td>
<td>12.36%</td>
</tr>
<tr>
<td>36-45</td>
<td>16.92%</td>
<td>16.03%</td>
<td>30.21%</td>
<td>25.84%</td>
</tr>
<tr>
<td>46-55</td>
<td>33.56%</td>
<td>32.64%</td>
<td>34.35%</td>
<td>43.82%</td>
</tr>
<tr>
<td>&gt;55</td>
<td>41.57%</td>
<td>44.70%</td>
<td>15.71%</td>
<td>17.98%</td>
</tr>
</tbody>
</table>

Chronic disease & multimorbidity

Multi-morbidity distribution among MM patients

<table>
<thead>
<tr>
<th></th>
<th>CVD</th>
<th>T2DM</th>
<th>HIV</th>
<th>TB</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVD</td>
<td>0.00%</td>
<td>97.27%</td>
<td>77.09%</td>
<td>36.79%</td>
</tr>
<tr>
<td>T2DM</td>
<td>75.11%</td>
<td>0.00%</td>
<td>16.71%</td>
<td>11.95%</td>
</tr>
<tr>
<td>HIV</td>
<td>27.43%</td>
<td>7.70%</td>
<td>0.00%</td>
<td>79.56%</td>
</tr>
<tr>
<td>TB</td>
<td>3.91%</td>
<td>1.64%</td>
<td>23.76%</td>
<td>0.00%</td>
</tr>
</tbody>
</table>

Participants with MM stratified by HIV

<table>
<thead>
<tr>
<th>Age</th>
<th>HIV neg</th>
<th>18-35</th>
<th>36-45</th>
<th>46-55</th>
<th>&gt;55</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIV neg</td>
<td>3.90%</td>
<td>3.50%</td>
<td>14.50%</td>
<td>32.81%</td>
<td>48.78%</td>
</tr>
<tr>
<td>HIV pos</td>
<td>26.01%</td>
<td>30.05%</td>
<td>30.70%</td>
<td>13.24%</td>
<td></td>
</tr>
</tbody>
</table>

TB in the context of epidemiological transition
TB in the context of epidemiological transition

Re-thinking health systems

Integrated approaches to addressing epi transition
Spectrum of intervention needed

- Tertiary prevention: integrated treatment
- Secondary prevention: screening and integrated services
- Primary prevention: intersectoral upstream systems for health
Tertiary Prevention

The case for integrated convergent management
Effect of chronic disease morbidities on:

- Susceptibility and risk of HIV/TB (incl. role of shared risk factors)
- Diagnosis and clinical manifestation of TB
- Diagnosis and clinical manifestation of NCD
- Complications and treatment outcomes of HIV/TB/NCD

Biological Interaction

Effect of chronic disease morbidities on:
- Susceptibility and risk of HIV/TB (incl. role of shared risk factors)
- Diagnosis and clinical manifestation of TB
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- Complications and treatment outcomes of HIV/TB/NCD

Healthcare Provider Perspective
- Health provider capacity to deal with high patient load and complexity
- Health provider role delineation

Patient Perspective
- Patient workload (incl. impact of poverty)
- Treatment load
- Resilience and capacity
- Patient prioritization of morbidities

Health System Perspective
- How to integrate these perspectives at a policy level to inform integrated management
- Incorporating disease interaction complexity, patient and provider priorities into patient engagement with the health system

Modified ICCC framework

Multimorbid HIV DM patient perspectives

Theme 1: Patient workload of demands
- Long waiting periods during clinic visits
- Frequency of clinic visits
- Preparation to go to the health facility
- Transportation and travelling time
- Understanding health education
  - Dietary plan
  - Self-care
  - Taking medication
- Stigma
- Demands of family members and relatives
- Occupational demands

Theme 2: Patient capacity
- Physical and mental functioning
  - Attitudes, values and beliefs
  - Health literacy
  - Social support
    - Family
    - Community members
    - Clinic
  - Socioeconomic resources
    - Self
    - Family
    - Clinic

Theme 3: Access, utilisation, self-care
Strategies to address workload
- Administrative and consultative procedures
- Pharmacy related issues
- Waiting periods
Strategies to enhance capacity
- Support services
- Socioeconomic resources

Theme 4: Outcomes
- Intermediate
- Final


Matima et al. Plos One. 2018;14;13(3):e0194191
Secondary prevention

Missed opportunities in the healthcare system
Primary prevention

Intersectoral approaches to addressing shared risk factors

Healthy urban environments

8 S’s of urban exposure

- Sugar and salt
- Safe housing and social cohesion
- Smoke and smoking
- Sleep and stress
- Sports and recreation
- Sanitation and water
- Substance and alcohol abuse
- Injuries/Violence

HIV/TB

NCD
COPD, Asthma, obesity, hypertension, mental health

MCH
Pneumonia, Diarrhea

INJURIES/VIOLENCE
Global Diet and Activity Research

POLICY
- Global, regional, national and sub-national intersectoral policy opportunities to reduce sugar intake and increase physical activity
- Data required to inform modelling of impact of transport policies on physical activity
  • School food and activity policies

SCHOOL ENVIRONMENT
- School: food and activity environment
  • Identifying adolescent levers for intervention at school and on journey to school

NEIGHBOURHOOD ENVIRONMENT
- Assessing current food environment in context of a new hypermarket
  • Identifying adolescent levers for intervention

HOUSEHOLD
- Food security and expenditure,
- Healthy eating and active living
  • perceptions and behaviours

INDIVIDUAL
Adolescent diet and activity knowledge, attitudes, behaviours
Tackling epidemiological transition in context of urbanisation

SYSTEMS FOR HEALTH

- Health in human settlements
- Food systems governance
- Intersectoral policy analyses

HEALTH SYSTEMS

- HIV/NCD MM & Integrated care & prevention
- Adolescents

RESEARCH INITIATIVE FOR CITIES HEALTH & EQUITY
Research Initiative for Cities Health and Equity (RICHE)

TACKLING EPIDEMIOLOGICAL TRANSITION IN CONTEXT OF URBANISATION

- Amy Weimann, Researcher, Health in Housing
- Monika Kamkuemah, PhD Candidate, HIV/NCD in Adolescents
- Natacha Berkowitz, Researcher, Integrated models of chronic care
- Limakatso Lebina, PhD Candidate, Integrated models of chronic care
- Mmamapudi Kubjane, PhD Candidate, Modelling TB risk factors
- Blessings Gausi, Researcher, HIV/NCD in Adolescents
- Adaeze Okorie, MPH (graduated)
- Ranga Matima, MPH (graduated)

- Robert Wilkinson, CIDRI-Africa
- Naomi Levitt, Chronic Disease Initiative in Africa
- Tracy Jooste & Noxolo Kabane, Western Cape Department of Human Settlements
- Tony Hawkridge, Western Cape Department of Health
- GDAR team and partners

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