Global Variability in NCDs
PURE
(Perspective Urban Rural Epidemiology) study

CLEAN COOKING AND NCD INDICATORS/ BIOMARKERS MEETING
WASHINGTON DC, DEC 16 2014

MyLinh Duong MBBS FRACP
On behalf of PURE Investigators
Population Health Research Institute,
McMaster University, Canada
Multilevel influences of health determinants, on risk factors and outcomes

- Clean indoor air regulation
- Tobacco taxes/ price
- Regulating age of smoking/alcohol
- Tobacco cessation support programs
- Social/ cultural norms

Community

Individual
Behavioral RFs

Physical Activity

Individual biological RFs

Tobacco use

Social behavior

Tobacco

Smoking

Blood pressure

Overweight/ obesity

Diabetes

Cholesterol

Nutrition and diet

Others

Air pollution

Access to health care, Poverty

Food policy

Access to healthy choices

Walkability of built environment

Safety from crime/ traffic

Places for walking

Access to facilities

Land use mix

Social networks

Social capital

Access to healthy choices

Stress/ anxiety/ depression

Others

Overweight/ obesity

Poverty

CK Chow IJE 2009
Data Collection

Causal pathway of Community influences on Individual risk

Community Environment
- Policy/ Legislative
- Physical Environment
- Social/ Cultural
- Economic

Household
- Family structure
- Socioeconomic status

Behaviors
- Smoking
- Physical Activity
- Diet

Biological risk factors
- Blood pressure
- Diabetes
- Obesity

Cardiovascular disease
- Other chronic diseases

PURE Study Data collection
- EPOCH1 - Community profiling instrument
- EPOCH 2 - Community Attitudes questionnaire
- Neighborhood Walkability Scale tool
- Aggregates of Adult Questionnaire
- Secondary data sources

Household questionnaire
- Family census

Adult questionnaire
- IPAQ (Physical Activity)
- Food frequency questionnaires

Adult questionnaire

Cross-sectional Study - from Adult questionnaire
- Cohort Study - from Follow-up forms
Countries and Communities

Global Distribution of EPOCH Communities

Canada - 82
Brazil - 14
Argentina - 20
Chile - 5
Colombia - 58
South Africa - 8

Sweden - 31
Poland - 4
Palestine - 39

Turkey - 44
Iran - 20
China - 115
Saudi-18

UAE-3
Pakistan - 4
Tanzania - 19
Malaysia - 71
Zimbabwe - 3

B’desh - 56
India - 90
Philippines - 2

Existing countries
New countries
PURE participants

• 623 urban/rural communities in 17 countries
• 154,000 individuals between ages 35-70 years (42% males, 58% females)
• Baseline Survey in 2003-2009
  – Data collection on community, household, individual characteristics (lifestyles, health conditions, anthropometrics, BP, lipids, glucose, lung function and drug use).
• Long term follow-up ongoing (now @ 4yrs).
## Number of Communities

<table>
<thead>
<tr>
<th>Country</th>
<th>Overall</th>
<th>Urban</th>
<th>Rural</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Countries</td>
<td>628</td>
<td>348 (55.4)</td>
<td>280 (44.6)</td>
</tr>
<tr>
<td>HIC</td>
<td>116</td>
<td>82 (70.7)</td>
<td>34 (29.3)</td>
</tr>
<tr>
<td>UMIC</td>
<td>166</td>
<td>104 (62.7)</td>
<td>62 (37.3)</td>
</tr>
<tr>
<td>LMIC</td>
<td>193</td>
<td>91 (47.2)</td>
<td>102 (52.8)</td>
</tr>
<tr>
<td>LIC</td>
<td>153</td>
<td>71 (46.4)</td>
<td>82 (53.6)</td>
</tr>
</tbody>
</table>
Analysis

- Multiple adjustments for confounders

- Geographical regions (7 regions)
  - N Am/Eur, M East, S America, East Asia, SE Asia, Africa, S Asia

- World bank economic regions (2003 classification)
  - HIC: Canada, Sweden, UAE (3)
  - UMIC: Argentina, Brazil, Chile, Malaysia, Poland, South Africa, Turkey.
  - LMIC: China, Colombia, Iran (10)
  - LIC: Bangladesh, India, Pakistan, Zimbabwe (4)
CVD events

- 3,483 with >=1 major CVD events; 1,163, non-major CVD; 3,900 deaths
  - Incidence of major CVD and fatality rates significantly higher in LMIC
  - Incidence of non-major events higher in HIC

(Major CVD = death from CV causes, stroke, MI and HF)
(Non major CVD = all other CVD events that led to hospitalization)
Within Region Variability

**A** Event Rates for Major Cardiovascular Disease
- **Urban areas**
- **Rural areas**

<table>
<thead>
<tr>
<th>Country Economic Status</th>
<th>Event Rate (no./1000 person-yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High income</td>
<td>3.0</td>
</tr>
<tr>
<td>Middle income</td>
<td>6.0</td>
</tr>
<tr>
<td>Low income</td>
<td>9.0</td>
</tr>
</tbody>
</table>

- **P** values:
  - High income vs. Urban: P=0.27
  - Middle income vs. Urban: P<0.001
  - Low income vs. Urban: P<0.001

**B** Case Fatality Rates for Major Cardiovascular Disease
- **Urban areas**
- **Rural areas**

<table>
<thead>
<tr>
<th>Country Economic Status</th>
<th>Case Fatality Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High income</td>
<td>5.0</td>
</tr>
<tr>
<td>Middle income</td>
<td>10.0</td>
</tr>
<tr>
<td>Low income</td>
<td>15.0</td>
</tr>
</tbody>
</table>

- **P** values:
  - High income vs. Urban: P=0.66
  - Middle income vs. Urban: P<0.001
  - Low income vs. Urban: P=0.85

- **Significant within-region variability in event and fatality rates**
- **In LMIC significantly greater CVD burden in rural areas/communities**

Yusuf et al NEJM 2014
CVD Risk Burden

INTERHEART Risk Score
- Composite non-laboratory risk stratification tool
- Incorporate risks: age, WHR, smoking, SHS, HT, DM, family history, stress & dietary factors and physical activity
- Highest in HIC and lowest in LIC

Yusuf et al NEJM 2014
Management of risk burden

**TREATMENT Hypertension**

- **HIC**: Urban (45), Rural (40)
- **UMIC**: Urban (48), Rural (42)
- **LMIC**: Urban (42), Rural (38)
- **LIC**: Urban (40), Rural (35)

**CONTROL Hypertension**

- **HIC**: Urban (20), Rural (15)
- **UMIC**: Urban (18), Rural (14)
- **LMIC**: Urban (14), Rural (10)
- **LIC**: Urban (12), Rural (8)

**% receiving proven medications in CVD**

- **Overall**: 60%
- **HIC**: 50%
- **UMIC**: 40%
- **LMIC**: 30%
- **LIC**: 20%

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Current & Quite rates of Smoke Tobacco

Teo et al JAMA 2013
Lung function in non-smokers

Adjusted for height, age and sex

Duong M et al. Lancet Respir Med 2013,
True Global Collaboration

Argentina – R Diaz
Bangladesh – O Rahman
Brazil – A Avezum
Canada – G Dagenais, K Teo, S Lear, A Wielgosz
Chile – F Lanas
China – Liu Lisheng, Li Wei
Colombia – P. Lopez-Jaramillo
India – P Mony, V Maz, V Mohan, R Gupta, C R Soman, R Kutty, K Vijayakumar, R Kumar
Iran – R Kelishadi
Malaysia – K Yusoff, NH Ismail
Pakistan – R Iqbal
Palestine – R Khatib
Peru – J Miranda
Philippines – T Dans
Poland – W Zatonski, A Szuba
S Africa – A Kruger, T Puoane
Saudi – K AlHabib
Sweden – A Rosengren
Tanzania – K Yeates
Turkey – A Oguz
UAE – A Yusufali
Zimbabwe – J Chifamba
PURE PHRI Team

S Rangarajan, J DeJesus, G Lewis, P Mackie, S Chin, D Agapay, J Rimac, R Solano, T Tongana, I Kay, S Trottier, M Mushtaha, D Hari, S Ramacham, N Kandy, W ElSheikh, N Aoucheva, J Swallow, E Ramezani


Nutrition – M Dehghan, A Merchant**

Programmers – L Farago, L Dyal, M Zarate

Fellows – A Smyth

Faculty – K Teo, C Chow, A Mente, D Leong, P Joseph, R Nieuwlaat, JD Schwalm, M McQueen, G Pare, M O’Donnell, E Smith, R Hart, M Sharma, S Anand, H Gerstein, M Duong

Collaborators – M McKee, SV Subramanian, A Gilmore, K Lock, M Brauer, P Hystad, A Cohen

PI: S Yusuf

** Former