Preferred STI Retesting Method

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Krieger School of Arts and Sciences², Department of Gynecology and Obstetrics²
The Johns Hopkins University School of Medicine

BACKGROUND

- CDC recommends chlamydia, gonorrhea, and trichomoniasis (CGT) retesting 3 months post-treatment to detect reinfection, however retesting rates are low nationwide.
- Sexually transmitted infection (STI) reinfection is associated with increase risk of reproductive complications.
  - Two to 4.5-fold increased risk of ectopic pregnancy after 2 or more chlamydial infections.
- Self-collected samples are just as accurate in detecting CGT compared with clinician collected².

OBJECTIVE

- To increase STI retesting by implementing alternative retesting options of home-based self testing kits or clinic-based "fast-track" appointments.
- To determine if patient's travel distance from home to clinic impacts patient's selection STI retesting method.

METHODS

- Implemented STI retesting protocol in Ob/Gyn clinic.
  - Called all clinic patients who tested positive for CGT in 2016 who were not retested.
  - Offered a post-paid home-test kit (home kit) or a fast-track appointment (fast-track appt.) with a medical assistant.
- Spatial analysis and ArcGis 10.4.1, a geographic information system, were used to map the distance between a participating patient's address and the outpatient clinic.
- Wilcoxon rank-sum test was used to compare the difference in address-to-clinic distance between patients who selected the home kit and those who selected the fast-track appointment.

RESULTS

![Map of preferred STI retesting method](image)

- STI Positive Patients: 127/1383 (9%)
- Accepted retesting:
  - Provider Retested: 44/61 (72%)
  - Kit Retested: 20/44 (45%)
- Fast-track: 24/44 (55%)
  - Completed: 12/24 (71%)

<table>
<thead>
<tr>
<th>Table 1. Clinical characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characteristic</td>
</tr>
<tr>
<td>Raw Distance</td>
</tr>
<tr>
<td>Route Distance</td>
</tr>
</tbody>
</table>

CONCLUSIONS

- There were no differences in address-to-home distance between patients who selected to receive home kits and those who selected fast-track appointments.

SOURCES

Non-Conforming Liquor Stores & “Sham” BD-7s Under TransForm Baltimore, 2016

Legend
- “Sham” BD-7
- Non-Conforming Liquor Store
- Alcohol Outlet
- Morgan State University
- Buffer Zone

Non-conforming liquor stores are off-premise alcohol outlets with license type 1A, 1A2, or 1A4 located in neighborhoods zoned as residential.

“Sham” BD-7s are “sham” alcohol outlets with an LSD-7 (bar/tavern) license operating primarily as a liquor store. TransForm Baltimore mandated that all alcohol outlets with an LSD-7 license devote at least 50% of their sales floor space in on-premise consumption, and require the establishment’s staff average daily visits, not including calls on inventory levels, become more frequent, and staff images, or other receipts not derived from the sale of food or beverages.

The Alcohol Environment in Greenmount East, Midway/Coldstream & Northwood

Pamela Trangenstein, MPH Rainee Eck, MPH, MPA Cassie Greisen, & David Jernigan, PhD
Center on Alcohol Marketing and Youth, Johns Hopkins Bloomberg School of Public Health

Background

Baltimore has seen as many alcohol outlets (1 outlet per every 500 residents) or more alcohol outlets per every 100 residents) than New Orleans is in the area, and many are located in low-income, minority neighborhoods. This report investigates the role of alcohol outlets in the city of Baltimore.

Methods

This report uses administrative data and on-premise site visits to describe the alcohol environment in 3 communities in Baltimore City. Licensed business information was obtained from the Baltimore Liquor License Commission. Raw crime data were collected in July 2016 when there were 1,216 liquor outlets in Baltimore City. Violations were collected from the Baltimore City Police Department. In 2015, there were 11,999 violations for liquor license, 208 cases, 130 people, and 8,746 aggravated assault in a Baltimore City and 877 violent crimes in the community area. Drug arrest data were obtained from SPC via Open Baltimore. In 2015, there were 3,575 drug arrests in Baltimore City and 927 in the catchment area.

Rule Violations

<table>
<thead>
<tr>
<th>Violation</th>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>11,999</td>
<td>208</td>
</tr>
<tr>
<td>Serious</td>
<td>208</td>
<td>130</td>
</tr>
<tr>
<td>Minor</td>
<td>11,791</td>
<td>78</td>
</tr>
</tbody>
</table>

Conclusion

Consistent with the findings of the earlier needs assessment, most of the alcohol outlets (29%) in this community area had a violation history under the current laws. Further, a distinct minority (26%) had more than one violation under the current liquor laws. Nearly, 60% of the LSD-7 had a violation for failure to operate as a bar/tavern, which suggests that these outlets could be operating as an unsubstantial liquor stores.
Pharmacy-level Barriers to Implementing Expedited Partner Therapy in Baltimore City

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The Johns Hopkins University School of Medicine¹, Departments of Gynecology and Obstetrics²,
Johns Hopkins Hospital, Baltimore, MD

BACKGROUND
- Expedited partner therapy (EPT) is a strategy to treat the sexual partners of patients diagnosed with a sexually transmitted infection (STI) without prior medical evaluation of the partners
- As of 2015, EPT in Maryland is legal for treatment of Chlamydia trachomatis (CT)
- A large academic ob/gyn clinic operationalized EPT for clinicians

OBJECTIVE
- To determine if there are pharmacy-level barriers to implementing prescription-EPT for CT treatment

METHODS
- Questionnaire: surveyed all retail pharmacies located within Baltimore zip code areas with highest CT incidence (1180.25-4255.31/100,000)
- Spatial Analysis: used kernel density estimation in ArcGIS 10.4.1 to evaluate pharmacy distribution
  o Followed USDA’s guidelines to define a census tract as a pharmacy desert (PD) if:
    1. More than a third of the tract is not within walking distance (.5 mile) to a pharmacy
    2. Tract has low vehicle access
    3. Tract is low income (>20% of households under FPL or tract median income less than 80% of Baltimore median income)
- T-tests and Spearman’s rank correlation used to evaluate relationship between access, cost, and tract characteristics
- Significance determined at p < .05

RESULTS
- Response rate of 96% (50/52)
  o N varies because not all pharmacists answered all questions

<table>
<thead>
<tr>
<th>Table 1. Pharmacist Responses to EPT Questionnaire</th>
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</thead>
<tbody>
<tr>
<td>Response</td>
</tr>
<tr>
<td>aware of EPT</td>
</tr>
<tr>
<td>Knowledge of EPT legality</td>
</tr>
<tr>
<td>Prior Receipt of EPT</td>
</tr>
<tr>
<td>ID required to fill prescription</td>
</tr>
<tr>
<td>Age requirement to fill EPT</td>
</tr>
<tr>
<td>Willing to fill prescription</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Figure 1. Pharmacy Access in Baltimore City</th>
</tr>
</thead>
<tbody>
<tr>
<td>A) Kernel density of pharmacies with darker areas representing higher pharmacy density and B) distribution of pharmacy deserts</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2. Characteristics of PD Compared to Non-PDs</th>
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</thead>
<tbody>
<tr>
<td>Characteristics</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>Ct Incidence</td>
</tr>
<tr>
<td>Non-Hispanic White*</td>
</tr>
<tr>
<td>Black</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
</tr>
</tbody>
</table>

*Rate per 100,000 persons, *All race and ethnicity data is by population in a census tract

RESULTS (cont.)
- Cost of one dosage of azithromycin (1gm): $5-$9.99 USD (median, $9)

<table>
<thead>
<tr>
<th>Table 3. Cost and Tract Characteristics</th>
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</thead>
<tbody>
<tr>
<td>Characteristics</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>Ct Incidence</td>
</tr>
<tr>
<td>Median income</td>
</tr>
<tr>
<td>Pharmacy Density</td>
</tr>
</tbody>
</table>

CONCLUSIONS
- Barriers:
  o Lack of pharmacist awareness
  o Variance in cost of EPT
  o Limited pharmacy access
  o Racial/ethnic minorities may have less access to pharmacies
- Possible facilitators:
  o EPT delivery that does not depend on existing pharmacy infrastructure and practices merits consideration
  o Educating pharmacists since most were willing to fill EPT prescriptions after more information

<table>
<thead>
<tr>
<th>SOURCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Baltimore City Health Department. 2015 Map of Chlamydia Rates.</td>
</tr>
<tr>
<td>2. Maryland Board of Pharmacy.</td>
</tr>
</tbody>
</table>
BACKGROUND

Neighborhood crime may prevent individuals from going to gyms, parks or recreation areas. Decision-makers likely want to know the potential impact of crime on leisure-time physical activity (LTPA) and obesity.

The limited data on the relationship between neighborhood crime, physical activity and obesity have shown mixed results.

OBJECTIVE

To quantify the impact of crime on physical activity location accessibility, LTPA and obesity among African American women.

METHODS

We developed a geospatially explicit agent-based model representing populations in resource-limited Washington DC communities (Wards 5, 7, and 8). The model included virtual representations of households, PA and crime locations and African American women aged 18-65 in these D.C. wards.

We calculated crime’s impact on LTPA based on:
- Duration (amount of time agent impacted by crime, days)
- Effect (reduction in probability of LTPA in area, 0-100%)
- Radius (radii; distance of impact from crime location, 0.1-1 mile)

RESULTS

Figure 1: Diagram of Agent Based Model

Figure 2: Daily Exerciser Percentage by Percentage of Accessible PA Locations

Figure 3A: Change in Overweight/Obesity

Figure 3B: Change in Obesity

SUMMARY

At the baseline exercise propensity, when 90% LTPA locations became accessible due to crime reductions, 24.2% women engaged in LTPA on a given day with a 0.79% reduction on obesity.

When baseline propensity increased to 50% and crime reductions led to 90% LTPA location accessibility, 48.4% women exercised per day and obesity prevalence decreased by 8.1%.

When isolating crime reduction’s impact (at 100% baseline exercise propensity), making 90% LTPA location accessibility with crime reduction led to 96.9% of women exercising daily and 24% obesity reduction.

CONCLUSIONS AND IMPLICATIONS

Our study focused on how crime’s spatial nature can impact women’s ability and willingness to access LTPA locations in an affected area.

As baseline exercise propensity increases, reductions of crime and subsequent increases in LTPA location accessibility have a larger impact on LTPA participation and obesity.

Our findings suggest policies aimed at reducing obesity by increasing LTPA should take a multi-level approach to target individual-level and environmental barriers, including crime.

Efforts to target crime through urban renewal and policies to improve perceived safety in resource-limited urban communities may be particularly effective at improving cardiometabolic health in at-risk populations.

ACKNOWLEDGEMENTS

The Global Obesity Prevention Center (GOPC) at Johns Hopkins University is funded by the NIH and AMI, as well as the Division of Intramural Research of the National Heart, Lung, and Blood Institute.
Introduction

- Fruit and vegetable consumption amongst United States children is lower than recommended daily intakes.  
- Studies have shown an increase in fruit and vegetable consumption when living proximity to a corner store is low, but few studies have examined the impact of living proximity to urban farms on fruit and vegetable consumption.  
- We examined the association between living proximity to urban farms and fruit and vegetable intake among low income African American children in Baltimore City.

Methods

- Baseline data from the B’more Healthy Communities for Kids trial provided data on 459 children, ages 10-14 years, living in low-income areas in Baltimore City.  
- Daily fruit and vegetable servings estimated via the 2004 Block Kids Food Frequency Questionnaire.  
- Urban farms addresses from 2013 and 2015 were provided by the Johns Hopkins Center for a Livable Future. Distance between urban farms and children’s residences were determined through ArcGIS.  
- An urban farm density variable was created to indicate the number of urban farms within a mile a participant’s residential address.  
- Multiple linear regression models investigated the association of living proximity to urban farms and the number of daily fruit and vegetable servings.

Results

- Urban farm density ranged from 0 to 5 farms out of a possible 15 (Figure 1) for 2013 participants and 19 (Figure 2) for 2015 participants.  
- Linear regression did not reveal a significant relationship between an increase in urban farm density and fruit or vegetable serving consumptions among children.

Discussion

- There is a slight increase in both consumption of fruit and vegetables by our sample as the urban farm density variable increases by 1, but this relationship is not significant.  
- Limitations: This analysis is not longitudinal in nature. Although we can see a relationship between proximity to urban farms and fruit and vegetable consumption, we cannot see the consumption increase or decrease before and after the presence of an urban farm in the area.  
- Distances were calculated using Euclidean distance, which does not account for obstacles, such as highways, that may pose as a barrier in a participant’s walkable boundary.

Conclusions

- Although we did not find urban farm density to be significantly related to an increase in child fruit and vegetable consumption, further analysis is needed.  
- Other factors associated with urban farms, such as size of farms, presence of a farm stand, specific cities, or crop yield should be investigated to test their relationship with child fruit and vegetable consumption.  
- Calculating distance in a block-by-block fashion will provide more realistic results for daily travel around residences.

References

- Acknowledgements

Globalobesity.org | Facebook.com/globalobesity | @globalobesity | bmore4kids | @bmore4kids | HealthyBaltimore.org

Table 1: Characteristics of Baltimore City study sample

<table>
<thead>
<tr>
<th>Child Sociodemographics (n=459)</th>
<th>Percent/Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>11.7</td>
</tr>
<tr>
<td>Female, %</td>
<td>94.9</td>
</tr>
<tr>
<td>Race - African American</td>
<td>92.9</td>
</tr>
<tr>
<td>Other</td>
<td>7.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Caregiver Sociodemographics (n=459)</th>
<th>Percent/Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female, %</td>
<td>58.2</td>
</tr>
<tr>
<td>Race, %</td>
<td>96.5</td>
</tr>
<tr>
<td>African American</td>
<td>78.9</td>
</tr>
<tr>
<td>Other</td>
<td>21.1</td>
</tr>
<tr>
<td>SNAP Participating</td>
<td>32.3</td>
</tr>
<tr>
<td>WIC Participating</td>
<td>22.3</td>
</tr>
<tr>
<td>Education Level, %</td>
<td></td>
</tr>
<tr>
<td>High school degree</td>
<td>17.1</td>
</tr>
<tr>
<td>College degree</td>
<td>70.8</td>
</tr>
<tr>
<td>Associates degree</td>
<td>27.4</td>
</tr>
<tr>
<td>Bachelors degree</td>
<td>3.3</td>
</tr>
<tr>
<td>More than Bachelors degree</td>
<td>2.3</td>
</tr>
<tr>
<td>Other</td>
<td>1.6</td>
</tr>
<tr>
<td>Average Income (US$)</td>
<td>25,228.63</td>
</tr>
</tbody>
</table>

Table 2: Linear regression results for the relationship between urban farm density and fruit and vegetable servings

<table>
<thead>
<tr>
<th>Estimate</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruit servings</td>
<td>0.06 (0.02 - 0.10)</td>
</tr>
<tr>
<td>Vegetable servings</td>
<td>0.07 (0.05 - 0.10)</td>
</tr>
</tbody>
</table>

Research reported in this publication was supported by the Global Obesity Prevention Center (GOPC) at Johns Hopkins, and the Kaiser-Alzheimer-Bericht National Institute of Child Health and Human Development (KABNIHDD) and its Office of the Director, National Institutes of Health (OD). The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health. Thank you to Dr. Tim Anderson and Dr. Alpar Chertov for their guidance and input.
Spatial Analysis of Traffic Fatality Risk by Vehicle Using Publicly Available Data

Andrew Patton

*Department of Environmental Science and Engineering, Johns Hopkins Bloomberg School of Public Health

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**Introduction**

- Approximately 35,000 deaths per year in car accidents
- Approximately 2,000 deaths per year in motorcycle accidents
- Motorcycles are any motorized vehicle ridden by one or more persons, and are responsible for a significant number of deaths and injuries.
- Data from the National Highway Traffic Safety Administration (NHTSA) and the Centers for Disease Control and Prevention (CDC) was used to analyze the fatality risk associated with motorcycle and car accidents.

**Objectives**

1. Establish spatial, demographic, and accident-specific patterns for motorcycle and car fatalities.
2. Determine what (if any) significant differences exist.

**Spatial Analysis**

- Collect fatality data from NHTSA Fatality Analysis Reporting System (FARS).
- Database for all fatal accidents on public roads in the United States.
- Includes vehicle, person, time, date, conditions, location, etc.
- Determine population by county.
- Determine registrations by state.
- Use county population as proportion of state population to find registrations by county.
- This is the primary assumption of the analysis.
- Count fatalities per county.
- Using SatScan v8.4.4, conduct Poisson (strictly spatial) cluster analysis.
- Control for average winter temperature.
- Create proxy for miles driven (moderately motorcycle related).
- Exclude clusters P > 0.05.
- Categorize relative risk as ≥ 1 (High) and < 1 (Low).
- Conduct for both cars and motorcycles.
- Combine car and motorcycle High and Low risk counties to find counties with excess fatalities for both/motorcycles.

**Results**

- Graphs showing relative risk of motorcycle and car fatality rates.

**Regression Modeling**

**Motorcycles**

\[
\text{Logit (Probability of High Risk)} = \beta_0 + \beta_1 (\% \text{ White}) + \beta_2 (\% 30-45)
\]

Table 1: 95% CI for OR’s (1% increase)

<table>
<thead>
<tr>
<th>Predictor</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.04</td>
<td>0.00 - 0.10</td>
</tr>
<tr>
<td>% White</td>
<td>1.05</td>
<td>1.02 - 1.08</td>
</tr>
<tr>
<td>% 30-45</td>
<td>1.31</td>
<td>1.30 - 1.33</td>
</tr>
</tbody>
</table>

**Automobiles**

\[
\text{Logit (Probability of High Risk)} = \beta_0 + \beta_1 (\% \text{ White})
\]

Table 2: 95% CI for OR’s (1% increase)

<table>
<thead>
<tr>
<th>Predictor</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>3.74</td>
<td>2.22 - 6.42</td>
</tr>
<tr>
<td>% White</td>
<td>0.98</td>
<td>0.92 - 1.04</td>
</tr>
</tbody>
</table>

**Conclusions and Future Directions**

- The high/lower risk areas may be too ecologic to make conclusions regarding differences in motorcycle fatalities.
- Unclear if the predictors are direct or indicators selected by the map.
- The data where lots of travel occurs (Texas for example) have the most characteristics.
- Still needs work to determine if this is valid methodology and it's viability.
- Time series data would be ideal, but the data is not available.
- Part of an in-depth multivariate analyses on motorcycle safety statistics in collaboration with Asphalt & Rubber.
- If meaningful results are found, relay those findings to the Congressional Motorcycle Caucus and support future DOT planning and safety initiatives.
- Partner with manufacturers.

**Data Sources**

- NHTSA Fatality Analysis Reporting System (FARS).
- US Census Bureau TIGER Files.
- US Census Bureau 2010-ACS.
Comparison of Homicide Rates Between Baltimore Neighborhoods Across Two Time Periods:
2005-2014 and 2015-2016

Rene E. Najera, MPH, DrPH, Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health

INTRODUCTION

- Violence is a public health problem. Homicides, the most severe form of violence, affect families and communities.
- In Baltimore, an epidemic of violence in general and homicides in particular has been taking place since 2015.
- Objective: To understand the areas of Baltimore City that have exhibited the most acute increase in homicides during the “epidemic period” of 2015-2016 through the use of GIS.

MATERIALS AND METHODS

Data sources:
- Justin Kenney (Baltimore Sun), curates a dataset of homicides since 2005. Includes victim name, data and location of homicide events in Baltimore from 2005 to the present.
- Baltimore City Open Data: verified the location and time of the events occurring between 2012 and 2016.

Case definition: Death resulting from the intentional use of force.

Other data: Baltimore Neighborhood Indicators Alliance (BNA) Operationalization:
- These categories were chosen because homicides rates in Baltimore were relatively stable between 2005-2014 and increased to epidemic proportions in 2015 and 2016.
- We calculated the average number of homicides per CSA per year and calculated a homicide rate using the 2010 census population numbers for each CSA.
- The homicide rate for the pre-epidemic period (2005-2014) was subtracted from the homicide rate for the epidemic period (2015-2016) for each CSA and the absolute difference color-coded on the map.

REFERENCES

ACKNOWLEDGEMENTS

RESULTS

Out of 55 CSAs:
- 16 declined in the yearly homicide rate.
- 21 had an increase between 0 and 1.0 homicides per 10,000 residents.
- 9 had an increase between 1.1 and 4.0 homicides per 10,000 residents.
- 8 had an increase between 4.1 and 8.0 homicides per 10,000 residents.
- 1 CSA ("Population/The Terraces/Hollins Market") had the highest increase.

CONCLUSIONS

The location and intensity of homicides in Baltimore City varies across time. There have been years where the city as a whole experiences low levels of homicides in particular and similar low levels of gun violence in general. At times areas within the city show fluctuations in the same/opposite direction from citywide trends.

The reasons for this are varied:
- There is a strong association between crime and poverty. As a result, while some neighborhoods may be experiencing economic stability and improvement, others may experience economic stagnation and decline.
- There are also areas in Baltimore targeted by government agencies, including the Baltimore Police Department, for violence reduction.
- There is anecdotal evidence that some areas have experienced an increase (decrease) in criminal activity associated with the drug trade and/or gang activity.

Examination of these trends and changes in factors within and between neighborhoods may lead to a better understanding of why homicides spike in some places while they decline in others. City officials, civil societies and individual residents may wish to examine these trends and analyses closely to reduce the burden of homicide in their neighborhoods.
Access to Healthcare Resources in an Emerging Latino Community

Pablo Martinez-Ameezua MD, MHS; Linda Bucay-Harrari MPH; Carlos Castillo-Salgado MD, JD, MPH; DrPH

Background
In recent years, Baltimore City has seen a dramatic growth in its immigrant community. In 2014, 8.2% of Baltimore’s population was foreign-born, a figure that nearly doubled between 2000 and 2014. Latinos are the largest and fastest growing minority in the country, and U.S.-born Latinos outnumber foreign-born Latinos in most states with the exception of the District of Columbia and Maryland. (1-3) In the last two decades, the influx of Latino immigrants has expanded to non-traditional Latino areas, such as Baltimore City (Figure 1).

According to the evidence, undocumented immigrants are exposed to several risks before, during and after migration. Once in the U.S., they face additional stresses related to their documentation status, language and cultural barriers, fear of family separation, discrimination, exclusion of access to health insurance, and limited access to services.

Immigrants in emerging communities face additional challenges due to a lack of social support and culturally competent services for newly arrived populations. Thus, the unique and rapidly changing demography of Baltimore’s Latino community has not been extensively studied and the magnitude of the health needs in this population and possible health disparities are unknown.

Methods
Data Collection
Data were extracted from the American Community Survey (U.S. Bureau of Census), and from the Baltimore Neighborhood Indicators Alliance.

Statistical Procedures
We created a Score for each Community Statistical Area of Baltimore City (CSPA) using three indicators commonly used to monitor access: (1) Percent of deliveries where the mother received early prenatal care (1st trimester); and (2) Percent of population without health insurance.

Z scores were calculated for each indicator in each CSPA. Because indicators have different directions, the sign for the Z score for prenatal care was inverted. Therefore, a higher Z score represents better access. The average of these scores is the final healthcare access score we used to rank the CSAs.

Results

Table 2: Ranking of access score by CSPA

<table>
<thead>
<tr>
<th>CSPA</th>
<th>Access Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSPA1</td>
<td>0.75</td>
</tr>
<tr>
<td>CSPA2</td>
<td>0.65</td>
</tr>
<tr>
<td>CSPA3</td>
<td>0.5</td>
</tr>
</tbody>
</table>

Table 3: Calculation of Z scores and access score by CSPA

<table>
<thead>
<tr>
<th>Area</th>
<th>Z Early Prenatal Care</th>
<th>Z Pol�ne Insurance</th>
<th>Access Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area1</td>
<td>0.85</td>
<td>0.75</td>
<td>1.60</td>
</tr>
<tr>
<td>Area2</td>
<td>0.60</td>
<td>0.50</td>
<td>1.10</td>
</tr>
<tr>
<td>Area3</td>
<td>0.40</td>
<td>0.30</td>
<td>0.70</td>
</tr>
</tbody>
</table>

Conclusion
The areas with highest concentration of Latinos, including downtown and Southeastern, had the highest access scores which translates to the lowest access to healthcare. (meaning worse access).

Although it can’t be assumed that these results represent the level of access of the Latino population directly, these findings align with previous evidence that suggests that emergent immigrant communities have poorer access to care.

Discussion
Since a large proportion of Latinos in Baltimore City are undocumented, most are unable to access public, private or employer based health insurance, which creates an additional barrier to access to healthcare services. On top of this, availability of culturally appropriate health services in Spanish are limited in areas with little or no historic presence of Latino communities. This makes accessing is health resources difficult among this population, despite known multiple risk factors for health complications, which is also a limitation of our results.

References
1. Johns Hopkins, Bloomberg School of Public Health, Department of Epidemiology.
2. Johns Hopkins, Bloomberg School of Public Health, Global Public Health Observatory.

Contact Information: pablo@jh.edu
Cryptosporidiosis is a leading cause of diarrhoea in children worldwide

Cryptosporidiosis is caused by oocyst-producing protozoa. Cryptosporidium and Cyclospora commonly infect humans. The primary route of transmission is fecal-oral with ingestion of oocysts from contaminated food, water, or soil. An estimated 2.3 billion people are infected worldwide, and 680,000 children die each year from Cryptosporidiosis-related diarrhoea.

OBJECTIVE
To determine the clustering of Cryptosporidium cases and genotypes in urban and rural Bangladesh using the spatial analysis software, ArcGIS.

METHODS
- Pilot, case control study of children age 6 months to 14 years living in urban and rural Bangladesh
- Cases were identified through a sentinel surveillance system for Cryptosporidium using oocyst detection, and diagnosis was confirmed by qPCR
- Controls were age and sex matched
- Household members, defined as individuals living under the same roof or eating from the same cooking pot, were recruited
- Field Research Assistants visited households once weekly to survey for clinical illness
- Weekly stool samples were collected from all participants and tested for Cryptosporidium by qPCR
- Using a GPS device, coordinates for each of the thirty rural children and thirty urban children were obtained which included the room where the child slept, their toilet facility, and their drinking water source.
- These coordinates were sent to Johns Hopkins University where they were mapped using ArcGIS 10.5.1 to determine whether there was clustering of symptomatic and asymptomatic cases.

RESULTS
- Our preliminary results suggest there is a clustering effect of both symptomatic and asymptomatic cases
- At our rural site both symptomatic and asymptomatic cases seem to be evenly distributed, though we had a small sample size.

CONCLUSIONS AND FUTURE DIRECTIONS
- There is a clustering effect seen in the urban site suggesting that the clustering is due to the close proximity to other symptomatic cases and person to person contact
- Spatial statistics will be applied to determine clustering of cases, and association with socioeconomic factors and water and sanitation
- Further data is being collected to discern specific toilets and drinking sources that could be contributing to the spread of Cryptosporidiosis

ACKNOWLEDGEMENTS
We thank the families of Mymrapur and Mirzapur for participating in this study.
Evaluating three years of a targeted IRS campaign in a high transmission area of northern Zambia

Marisa Kast1, Mike Chaponda2, James Lupa3, Mbaso Mulila3, Jean-Bertrand Kabuya4, Tamaki Koba5, Timothy Sheldon5, Frank Currie5, Justin Lesher1, Modest Mulanga2, Jennifer C. Stevenson4, Douglas E.Howard5, William J. Moss5 for the Southern Africa International Centers of Excellence in Malaria Research

The foto was made by the School of Medical Health, Lusaka, Zambia, The Southern Africa International Centers of Excellence for Malaria Research (SAGE-MR)

BACKGROUND

Vector control is a key strategy in reducing community malaria burden, however limited resources and surveillance capacity remain a challenge in regions with the greatest need

Zambia has a goal to eliminate malaria by 2030. Despite scale-up of interventions, malaria has increased in Northern Province, Lusaka Province since 2008 and parasite prevalence remains >10% among children under 16 years old.1,2

Nchelenge District has two primary malaria vectors, Anopheles gambiae and An. funestus, which have different spatial and seasonal distributions, resulting in year-round transmission and two yearly seasonal peaks in malaria prevalence

An indoor residual spraying (IRS) campaign was conducted annually from 2014-2016 using the organophosphate insecticide Deltamethrin, which was associated with 100% mortality among mosquitoes in Zambia in 2013.

The spray campaign used a novel methodology to target high-transmission areas through household satellite mapping and health center malaria reports with the goal to reduce malaria transmission

A multi-year evaluation of the IRS campaign in Nchelenge District was conducted using active surveillance data from the Southern Africa International Centers of Excellence for Malaria Research (SAGE-MR)

OBJECTIVE

To evaluate the impact of three years of targeted IRS with Actellic on malaria prevalence in Nchelenge District

METHODS

Cross-sectional household surveys were conducted in approximately 25 households per month throughout the study area. consenting household members were administered a questionnaire and provided with a rapid malaria diagnostic test (RDT)

Data used for this analysis was collected from 3,332 cross-sectional participants in L80 households from 2014 - July 2017

Potential demographic and geographic confounders were collected from the survey questionnaire and Geographic Information Systems (GIS) maps.

Meteorological and hydrological variables were collected from the African Flood and Drought Monitor (AFDM) and a HOBO weather station in Kashikishi, Nchelenge District

A pre- vs post-IRS comparison of individual-level malaria prevalence in IRS targeted areas was conducted using multivariate Poisson regression models with robust variances, clustered by household, and stratified by season

Indices of intervention were investigated among unsprayed households in sprayed areas in stratified analyses

A difference-in-differences analysis was conducted using interaction terms to compare the change in malaria prevalence pre vs post-intervention between sprayed and unsprayed areas

Stepwise regression and AIC optimization methods were used to develop initial models. Metrices of weather variables were constructed using 1-3 week intervals and lags to account for inter-annual variation. The most predictive weather variables were selected using random forest methods and confirmed using AIC optimization methods

RESULTS

Malaria prevalence was highest among school age children, men, and among participants with only primary school education

In the IRS-targeted area, 5% of households reported being sprayed

In unadjusted analyses, 50% of participants in the IRS targeted area were RDT positive before the IRS intervention and 46% were RDT positive after the intervention (P = 0.03)

After adjusting for covariates, there was a 28% (CI: 16-38%) reduction in rainy season malaria prevalence post-intervention and no significant difference in dry season malaria prevalence post-intervention within the IRS-targeted area

Within the sprayed area, there was a 3% (CI: 20-45%) reduction in malaria prevalence among unsprayed households in the rainy season compared to the pre-IRS time period, and a 28% (CI: 13-37%) reduction in malaria prevalence among unsprayed households

Figure 3: Time series of malaria prevalence in cross-sectional data collection in IRS targeted areas

In the rainy season, logged rainfall and high temperature were associated with increased malaria risk. In the dry season, logged high temperature was associated with increased malaria risk and logged high flow was associated with decreased malaria risk

Malaria prevalence increased in unsprayed areas during the study period from 36 to 64% (P<0.007). In a difference-in-differences analysis, there was a significant difference in the change in malaria prevalence pre vs post-intervention between sprayed and unsprayed areas in the rainy season

Table 1: Demographic characteristics of participants, pre- vs post-IRS

| Demographics | Pre-IRS | Post-IRS | Post-IRS
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>50 (35-65)</td>
<td>50 (35-65)</td>
<td>50 (35-65)</td>
</tr>
<tr>
<td>Gender</td>
<td>50% (50%</td>
<td>50% (50%</td>
<td>50% (50%</td>
</tr>
<tr>
<td>Education</td>
<td>50% (50%</td>
<td>50% (50%</td>
<td>50% (50%</td>
</tr>
<tr>
<td>Occupation</td>
<td>50% (50%</td>
<td>50% (50%</td>
<td>50% (50%</td>
</tr>
</tbody>
</table>

CONCLUSIONS AND NEXT STEPS

The IRS intervention led to a moderate but significant decrease in malaria prevalence compared to previous years in the six months following the IRS campaign

In stratified analyses, there was evidence of an indirect effect of IRS among unsprayed households within the targeted area

When compared to the increased prevalence in unsprayed areas, there was evidence of a further increase of the IRS intervention in targeted areas

Additional interventions are warranted in this setting, particularly in the dry season when malaria prevalence is equivalent to pre-intervention levels

Meteorological and hydrological variables contributed significantly to model fit. Analyses will be conducted to further investigate the impact of weather on malaria dynamics and detect for spatial and temporal autocorrelation

Models will be run to investigate the direct and indirect effects of the percent IRS coverage using self-report and other sources of data

Acknowledgements

This work was supported in part by the Bill and Melinda Gates Foundation through the Johns Hopkins Malaria Research Institute, the Division of Malaria and Vector Diseases, and the National Institutes of Allergy and Infectious Diseases, National Institutes of Health as part of the International Centers of Excellence for Malaria Research (I-CEMR)

REFERENCES


Table 2: Poisson models of the impact of IRS by season with relevant covariates, using robust standard errors and GEE by household

<table>
<thead>
<tr>
<th>Covariates in final models</th>
<th>Rainy Season</th>
<th>Dry Season</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-IRS</td>
<td>0.72 (0.62, 0.84)**</td>
<td>0.91 (0.80, 1.00)</td>
</tr>
<tr>
<td>Under 5 (yes, no)</td>
<td>1.31 (0.40, 4.28)**</td>
<td>1.39 (0.48, 4.29)**</td>
</tr>
<tr>
<td>Age 5-15 (yes, no)</td>
<td>2.1 (1.8, 2.4)**</td>
<td>2.3 (2.0, 2.7)**</td>
</tr>
<tr>
<td>Male</td>
<td>1.2 (1.0, 1.4)</td>
<td>1.2 (1.0, 1.4)</td>
</tr>
<tr>
<td>Sleep under bed net</td>
<td>0.79 (0.66, 0.96)**</td>
<td>0.87 (0.78, 0.96)**</td>
</tr>
<tr>
<td>Only primary education</td>
<td>1.2 (1.0, 1.4)</td>
<td>1.2 (1.0, 1.4)</td>
</tr>
<tr>
<td>Households within 10km (yes, no)</td>
<td>0.93 (0.80, 1.08)**</td>
<td>0.95 (0.82, 1.10)**</td>
</tr>
<tr>
<td>Excess rainfall</td>
<td>0.88 (0.83, 0.96)**</td>
<td>0.90 (0.85, 0.96)**</td>
</tr>
<tr>
<td>Distance from health clinics (km)</td>
<td>0.41 (0.37, 1.07)**</td>
<td>0.45 (0.31, 1.13)**</td>
</tr>
<tr>
<td>Distance from health clinics (km)</td>
<td>0.41 (0.37, 1.07)**</td>
<td>0.45 (0.31, 1.13)**</td>
</tr>
<tr>
<td>Lagged average rainfall (mm/day)</td>
<td>0.99 (0.95, 0.99)**</td>
<td>1.07 (1.03, 1.05)**</td>
</tr>
<tr>
<td>Lagged average temperature (°C)</td>
<td>1.0 (1.0, 1.0)</td>
<td>1.0 (1.0, 1.0)</td>
</tr>
<tr>
<td>Lagged average maximum temp (°C)</td>
<td>1.0 (1.0, 1.0)</td>
<td>1.0 (1.0, 1.0)</td>
</tr>
<tr>
<td>Lagged average temperature (°C)</td>
<td>1.0 (1.0, 1.0)</td>
<td>1.0 (1.0, 1.0)</td>
</tr>
<tr>
<td>Difference in differences (IRR)</td>
<td>0.85 (0.64, 0.96)**</td>
<td>0.81 (0.61, 1.0)</td>
</tr>
<tr>
<td>Comparison note of pre- vs post-intervention to sprayed area to unsprayed area</td>
<td>0.85 (0.64, 0.96)**</td>
<td>0.81 (0.61, 1.0)</td>
</tr>
</tbody>
</table>

**P < 0.05; ***P < 0.01; ****P < 0.001

Figure 2: IRS targeted area and Nchelenge sampled and enumerated households

Figure 4: Adjusted and unadjusted reduction in malaria prevalence compared to pre-IRS time period in A) rainy and B) dry seasons
Examining the Macro and Micro Physical Food Environment of Urban Family Child Care Homes

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Johns Hopkins University School of Nursing, Baltimore, MD 21201
Division of Growth and Nutrition, Department of Pediatrics, University of Maryland School of Medicine, Baltimore, MD 21201
3RT International, Research

Introduction

- Nearly 2 million children less than five years of age are in the care of family child care providers.
- The Child and Adult Care Food Program (CACFP), instituted by the USDA, provides cash incentives to eligible providers for purchase of nutritious foods.
- However, little is known about both the food environment of FCCs and the relationship between CACFP participation status and the food environment of FCCs.

Objectives

1) To compare the physical food environment and quality and frequency of foods offered in FCCs by the CACFP participation status.
2) To examine the association between the physical food environment and the quality and frequency of foods offered in FCCs.

Methods

Cross-sectional telephone survey, Proportionate Stratified Random Sample
Spearman's ρ test for zero independence was performed to examine associations between food desert status and the CACFP participation status of FCCs.
Simple and multivariable linear regressions were conducted to examine:

Table 1: Summary of Regression Analysis for Variables Predicting the Macro Physical Food Environment of FCCs

<table>
<thead>
<tr>
<th>Model</th>
<th>CACFP Status</th>
<th>Nutrition Training Status</th>
<th>R2</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
<td>0.13</td>
<td>0.01</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>Model 2</td>
<td>0.15</td>
<td>0.02</td>
<td>0.06</td>
<td>0.06</td>
</tr>
<tr>
<td>Model 3</td>
<td>0.14</td>
<td>0.01</td>
<td>0.05</td>
<td>0.05</td>
</tr>
</tbody>
</table>

Table 2: Summary of Regression Analysis for Variables Predicting the Quality and Frequency of Foods Offered in FCCs

<table>
<thead>
<tr>
<th>Model</th>
<th>CACFP Status</th>
<th>Nutrition Training Status</th>
<th>R2</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
<td>0.13</td>
<td>0.01</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>Model 2</td>
<td>0.15</td>
<td>0.02</td>
<td>0.06</td>
<td>0.06</td>
</tr>
<tr>
<td>Model 3</td>
<td>0.14</td>
<td>0.01</td>
<td>0.05</td>
<td>0.05</td>
</tr>
</tbody>
</table>

Summary of Findings

- Significantly more CACFP than non-CACFP providers located in a food desert.
- Significantly more CACFP than non-CACFP providers had nutrition training.
- Providers with nutrition training within past year had higher frequency of foods offered to 2–5 year-old children.

Implications

The findings indicate that expanding the CACFP to support providers with quality nutrition training and advocating on their behalf for better neighborhood food environments can help to provide optimal physical food environments for the children they serve.

Johns Hopkins School of Nursing
Geographical Distribution of Opisthorchiasis and its determinants in Thailand

Yijing Feng
Department of Epidemiology

Introduction
Thailand is the most affected area of Opisthorchiasis. Although disease control measurements have been implemented for years, prevalence remains high among Northern and North-Eastern areas of the country.

Despite Thailand researchers have done a lot survey on Opisthorchiasis, regions other than North-Eastern Thailand only have sparse disease data. National surveys only provide regional and provincial data.

Determinants of prevalence of Opisthorchiasis are not yet clear.

Producing high-resolution disease risk estimation through geostatistical modelling will provide information for target control interventions, which may lead to a better disease control.

Purpose
Identifying important environmental, climate and socioeconomic determinants of Opisthorchiasis.

Producing high-resolution disease risk estimation of Opisthorchiasis in Thailand.

Provide information for target control interventions.

Methods
- Geo-referenced prevalence data was obtained from PubMed, ISI Web of Science as well as Baidu Scholar through systematic review.
- Environmental and social-economic proxies were obtained from open-database online.
- Conducted Bayesian variable selection to identify predictors for prevalence of Opisthorchiasis through R-INLA and applied Geostatistical models to quantify the relationship between predictors and the prevalence.

Results
Estimated prevalence 10.83%/95%BCI 7.38%-24.02%
Estimated number of cases 7.12 million/95%BCI 4.8-15.7 million

Conclusions
- The prevalence of Opisthorchiasis remains high in the Northern and North-Eastern Thailand. Government should pay more attention to target-intervention in these areas.
- In order to get a better control of Opisthorchiasis, government of Thailand as well as other high prevalence area in South-east Asia should boost economic growth, education development and sanitary facilities construction.

Reference

Acknowledgement
Assistance from Professor Yingyi Lai, Dean Yuan Qiao and fellows in School of Public Health, Sun Yat-sen University.
Access to Greenspace and Asthma Symptoms in Urban Children with Persistent Asthma

K. DePriest,1 A. Butz,1,2 C. Land,2 M. Bollinger3
Johns Hopkins University School of 1Nursing and 2 Medicine, 3 University of Maryland School of Medicine, Baltimore, Maryland, USA

Background and Aims

Greenspace, such as parks, is associated with increased physical activity and decreased stress. It has also been proven to decrease environmental heat and air pollution. All of these variables theoretically reduce asthma symptoms. Poorly controlled asthma is associated with secondhand smoke exposure and increased short-acting beta agonist (SAMA) use.

Aim: To examine the association of distance to nearest park with asthma symptoms in urban children with asthma, controlling for secondhand smoke exposure and SAMA use.

Methods

Study Design: Cross sectional analysis of data obtained from ongoing RCT testing the efficacy of a behavioral educational intervention delivered in the ED and home.

Sample: N=196 children with persistent asthma

- Aged 3-12 years
- ≥3 ED visits or one hospitalization over past 12 months
- Children recruited & enrolled during an asthma ED visit

Measurements:

- Caregiver report of symptom days, socio-demographics, and secondhand smoke exposure
- Pharmacy records obtained for past 12 months
- Distance to nearest park calculated using participant address and map of Baltimore parks in ArcGIS

Data Analysis:

- Multivariate regression used to model associations between asthma symptom days and distance to nearest park
- Stratified by child age

Results

Sample Characteristics (N=196):

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child Characteristics</td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td>10.5 (2.7)</td>
</tr>
<tr>
<td>Sex (M/F)</td>
<td>128/68</td>
</tr>
<tr>
<td>Race (White/Black)</td>
<td>118/78</td>
</tr>
<tr>
<td>Asthma Control</td>
<td>Poor (63)</td>
</tr>
<tr>
<td>Parents Smoke</td>
<td>Yes (72)</td>
</tr>
</tbody>
</table>

Caregiver Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caregiver Age</td>
<td>32.6 (7.3)</td>
</tr>
<tr>
<td>Education</td>
<td>14 (3)</td>
</tr>
<tr>
<td>Income (every 3,000)</td>
<td>25 (34)</td>
</tr>
</tbody>
</table>

Child Health Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptom Days</td>
<td>5.3 (3.4)</td>
</tr>
<tr>
<td>Asthma Control</td>
<td>Poor (63)</td>
</tr>
<tr>
<td>Growth (Percentiles)</td>
<td>&lt; 2 &lt; 2</td>
</tr>
</tbody>
</table>

Multiple Linear Regression Model for Asthma Symptom Days: N=196

<table>
<thead>
<tr>
<th>Model</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>0.34</td>
<td>0.05</td>
<td>6.84</td>
</tr>
</tbody>
</table>

Neighborhood Parks in Baltimore, Maryland USA

Implications

- Among children with asthma in Baltimore, those who lived closer to parks reported fewer symptom days than those who lived further from parks
- This relationship was strongest amongst older children potentially because they have easier access due to their age

Conclusions

- Future research in this area is warranted
- Health care providers for children with asthma should inquire about neighborhood factors, including access to greenspace, that may be associated with children's health
- Greenspace represents a potentially modifiable neighborhood factor that could improve asthma for children living in urban cities
- Access to greenspace may encourage physical activity which can improve asthma control

Funding: NIH, NINR N013486, F31NR017319
The use of GIS and spatial statistics to assess malaria risk factors in the Brazilian Amazon forest

Canelas, T.1,2; Castillo-Salgado, C.2,3; Ribeiro, H.1
1 University of São Paulo; 2Jonhs Hopkins Bloomberg School of Public Health; 3Global Public Health Observatory

INTRODUCTION
Malaria risk factors are not constant over space and understand this heterogeneity is crucial to plan interventions for prevention and malaria control. The is huge and complex ecosystem and the use of GIS and spatial statistics might be key to understand the environmental and socioeconomic risk factors that lead to transmission variation.
Our objective was to understand which risk factors are influencing the malaria transmission in the Brazilian Amazon forest.

METHODOLOGY
Malaria data were obtained from the Brazilian health system by municipality, month and year. Socioeconomic data was taken from the 2010 Brazilian national census. Environmental (ERF) data were extracted from the multiple sources:

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>YEARS</th>
<th>SOURCE &amp; PRODUCT</th>
<th>TEMPORAL RES.</th>
<th>SPATIAL RES.</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precipitation</td>
<td>2015</td>
<td>GPM, GPM,IMERG v03</td>
<td>Monthly</td>
<td>10 km²</td>
<td>mm/yr</td>
</tr>
<tr>
<td>Precipitation</td>
<td>2014-10</td>
<td>TRMM, TRMM_3B43_v7</td>
<td>Monthly</td>
<td>0.25 km²</td>
<td>mm/yr</td>
</tr>
<tr>
<td>Land Surface Temperature</td>
<td>2015-10</td>
<td>MODIS, Terra, MODIS-CI, V005</td>
<td>Monthly</td>
<td>0.05 km²</td>
<td>Kelvin</td>
</tr>
<tr>
<td>Land Surface Temperature at Night</td>
<td>2015-10</td>
<td>MODIS, Terra, MODIS-CI, V005</td>
<td>Monthly</td>
<td>0.05 km²</td>
<td>Kelvin</td>
</tr>
<tr>
<td>NDVI</td>
<td>2015-10</td>
<td>MODIS, Terra, MODIS-CI, V005</td>
<td>Monthly</td>
<td>0.05 km²</td>
<td>NDVI (0 to 1)</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>2015-10</td>
<td>AIRS, AIRS/RTM V006</td>
<td>Monthly</td>
<td>3 km</td>
<td>% at 25Pa</td>
</tr>
<tr>
<td>Indigenous habitat</td>
<td>2015</td>
<td>FUNAI</td>
<td>Yearly</td>
<td>area</td>
<td>Yes/No</td>
</tr>
<tr>
<td>Number of mines</td>
<td>2015</td>
<td>DNPA</td>
<td>Yearly</td>
<td>area</td>
<td>Yes/No</td>
</tr>
</tbody>
</table>

Data sources were in spreadsheets, web format, remote sensing or shapefile. In order to get all the information into the GIS the following flowchart was followed:

RESULTS
Here are summarized some of the main results (other results are not shown). Raw data was converted into spatial data and then organized into tables by municipalities to perform the statistical analysis.
The GWPR performed a global and local model: the local influence of the neighbors was selected using the algorithm golden selection.

The regression is calibrated independently for each observation, this map is the goodness-of-fit; in some areas the model explained up to 95% of the variance.

T-values are generated for each covariate, allowing to visually interpret the distribution of the nature and strength of the relationships.
The gray colors are non significant (p-value < 0.05), the pink colors are those municipalities where the risk factor increased the chance to have malaria, the green colors are the risk factors that decreases the transmission. Here for the most part we observed that an increase of the rate of indigenous population, GINI index, population above 60 years and temperature at night might be risk factors that led to malaria transmission.
Identifying cholera “hotspots” in Uganda: An analysis of cholera surveillance data from 2011 to 2016

G Bwire, MAli, D Sack, A Nakinsige, M Naigaga, AK Debes, M Ngawa, WA Brooks, CG Osrch

BACKGROUND
- Uganda has regularly reported cholera outbreaks since its first appearance in 1971.
- The government of Uganda has taken initiative to improving access to health care, water, sanitation, hygiene and education. However, cholera has continued to be reported in several districts of the country.
- In most instance, cholera cases tend to be clustered in specific areas and among certain population groups.
- Identification of the areas that create increased risk of the disease and use this information to plan for an effective intervention strategy is important.

OBJECTIVES
To identify cholera hotspots in order to provide insights and guidance for prevention, control and ultimately elimination of cholera in Uganda

METHODS
- District level cholera data from 2011 to 2016 were abstracted from the Uganda Health Management Information System, disease surveillance database.
- Cholera outbreaks were confirmed using national guidelines adopted WHO standards that utilized both laboratory testing and clinical symptoms and signs.
- National census 2014 population was obtained from the Uganda Bureau of Statistics.
- Water, sanitation and hygiene data were obtained from the Ministry of Water and Environment.
- Digital maps of Uganda were obtained from the Energy Sector GIS Working Group Uganda.
- Digital map of health facilities were obtained from World Health Facility Database (https://healthsites.co/).
- SaTScan version 9.4.4 (http://www.satscan.org) was used to identify cholera hotspots.
- Zero-inflated negative binomial model was used to identify the risk factors for cholera.

RESULTS
- 16 hotspots in 22 districts with 7 million people were at risk for cholera.
- The risk of having cholera in high risk districts was 1.26 to 21.50 times compared to that elsewhere in the country.
- Of the 22 districts
  - 13 of them (4.8 million people) are near border of DRC
  - 9 of them (2.2 million people) are near border of Kenya.
- Higher incidence rate in a district was significantly associated with shorter distance to a lake or river shorter distance to DRC or Kenya border higher incidence rate in the neighbor districts.

<table>
<thead>
<tr>
<th>Risk group</th>
<th>Relative risk</th>
<th>No. of districts</th>
<th>Total population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.26-2.00</td>
<td>5</td>
<td>1,666,078</td>
</tr>
<tr>
<td>2</td>
<td>2.01-5.00</td>
<td>8</td>
<td>2,484,056</td>
</tr>
</tbody>
</table>

Distinct seasonal pattern of cholera between eastern and western region

LIMITATIONS
- Included cases only from confirmed outbreaks, which may result in underestimation of the number of cases.

CONCLUSIONS
- Seasonal pattern of cholera varied by year and by region.
- Cholera hotspots are mostly near border with DRC and Kenya.
- The high risk districts encompasses 7 million people, making up ~20% of the population of Uganda.
- Those with a very high risk district (relative risk is 10 or more) have a population of 2.4 million, all of which are bordering with DRC.
- Proximity to a large border lake, specially Lake Albert and Lake Victoria or the Nile River, creates increased risk.
School Environmental Conditions and Links to Academic Performance and Absenteeism in Urban, Mid-Atlantic Public Schools

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Introduction

nd: School facility, environment, and safety have been shown to individually and development and school performance in its components, but the relationships between school factors are complex.

To investigate how school community and environment impact academic performance and school absenteeism.

Methods and Materials

- Data: 168 public schools in Baltimore City in grades 3-5 and 6-8
- Measures: School-level academic in (A) reading and (B) math, plus C rates, and D chronic absence rates
- Outcomes: 52 total measures
- Environment: Roadway proximity, school facilities, industrial pollutant exposure (RSEI)
- Characteristics: Racial diversity, free/reduced eligibility, special education population rate, perceptions of safety, climate leadership, environment

Characteristics: School community of poverty, crime, education, workforce

Table 1. School-level summary statistics (2013-2014 academic year)

<table>
<thead>
<tr>
<th>School Statistics</th>
<th>School Variable</th>
<th>Grades 3-5</th>
<th>Grades 6-8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td></td>
</tr>
<tr>
<td>Performance</td>
<td>Reading Proficiency (%)</td>
<td>63.0% (13.3)</td>
<td>60.7% (15.4)</td>
</tr>
<tr>
<td>Measures</td>
<td>Math Proficiency (%)</td>
<td>45.2% (17.4)</td>
<td>38.6% (18.4)</td>
</tr>
<tr>
<td></td>
<td>Facility Condition Index (FCI) (SIE)</td>
<td>61.5 (26.1)</td>
<td>55.5 (28.5)</td>
</tr>
<tr>
<td></td>
<td>Risk Screening Environmental Indicator (RSEI)</td>
<td>3.547 (2.099)</td>
<td>3.716 (2.363)</td>
</tr>
<tr>
<td></td>
<td>Free/Reduced Meals Eligible</td>
<td>88.1% (14.5)</td>
<td>88.4% (10.9)</td>
</tr>
<tr>
<td></td>
<td>% Black Students</td>
<td>84.3% (22.1)</td>
<td>82.8% (23.7)</td>
</tr>
<tr>
<td></td>
<td>School Climate Survey</td>
<td>21.2% (9.8)</td>
<td>22.3% (10.0)</td>
</tr>
<tr>
<td></td>
<td>Teaching and Learning – Disagree teaching/learning is adequate</td>
<td>14.8% (7.0)</td>
<td>15.5% (7.1)</td>
</tr>
<tr>
<td></td>
<td>Community Cancer</td>
<td>56.0% (15.6)</td>
<td>54.2% (17.0)</td>
</tr>
<tr>
<td></td>
<td>Teen Birth Rate</td>
<td>56.0% (2.0)</td>
<td>54.2% (1.7)</td>
</tr>
<tr>
<td></td>
<td>Adult Arrests Rate</td>
<td>56.0% (2.0)</td>
<td>54.2% (1.7)</td>
</tr>
</tbody>
</table>

Figure 2. Mapped Baltimore City Schools stratified by facility condition index, educational adequacy scores, and Risk Screening Environmental Indicator (RSEI)

Methods and Materials (continued...)

- Statistical Approach: Eight performance measure models for grades 3-5 and 6-8 students. A negative binomial GLS Poisson model was applied for academic performance and an OLS model for absenteeism.
- Univariate models assessed significance, followed by multivariate models reduced through forward-backward selection with checks for collinearity, outliers, model-fit, and significance.

Table 2. Directional association between significant school factors and outcomes of academic performance and absenteeism from regression models. NS denotes non-significance in the final model.

<table>
<thead>
<tr>
<th>School Factors</th>
<th>Grade</th>
<th>Math</th>
<th>Reading</th>
<th>Attendance</th>
<th>Chronic Absences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facility</td>
<td>Grades 3-5</td>
<td>N/S</td>
<td>N/S</td>
<td>N/S</td>
<td>N/S</td>
</tr>
<tr>
<td>Conditions</td>
<td>Grades 6-8</td>
<td>N/S</td>
<td>N/S</td>
<td>N/S</td>
<td>N/S</td>
</tr>
<tr>
<td>School</td>
<td>Grades 3-5</td>
<td>N/S</td>
<td>N/S</td>
<td>N/S</td>
<td>N/S</td>
</tr>
<tr>
<td>Safety</td>
<td>Grades 6-8</td>
<td>N/S</td>
<td>N/S</td>
<td>N/S</td>
<td>N/S</td>
</tr>
<tr>
<td>Teen</td>
<td>Grades 3-5</td>
<td>N/S</td>
<td>N/S</td>
<td>N/S</td>
<td>N/S</td>
</tr>
<tr>
<td>Birthrates</td>
<td>Grades 6-8</td>
<td>N/S</td>
<td>N/S</td>
<td>N/S</td>
<td>N/S</td>
</tr>
<tr>
<td>RSEI Value</td>
<td>Grades 3-5</td>
<td>N/S</td>
<td>N/S</td>
<td>N/S</td>
<td>N/S</td>
</tr>
<tr>
<td>Gun Related</td>
<td>Grades 6-8</td>
<td>N/S</td>
<td>N/S</td>
<td>N/S</td>
<td>N/S</td>
</tr>
<tr>
<td>Homicides</td>
<td>Grades 6-8</td>
<td>N/S</td>
<td>N/S</td>
<td>N/S</td>
<td>N/S</td>
</tr>
</tbody>
</table>

Table 2. Directional association between significant school factors and outcomes of academic performance and absenteeism from regression models. NS denotes non-significance in the final model.

Summary of Results

- Poor building conditions persist with 122 of 168 schools labeled “poor or worse” condition. 40 are eligible for full replacement.
- Exposure to industrial pollution (RSEI) is highest in southern Baltimore City.
- School building conditions and perceptions of safety strongly influenced both academic achievement and absenteeism.
- RSEI is associated with increased absenteeism, but not academics, which may indicate chronic health effects of air pollution exposures.
- No significant association was observed between roadway density and either absenteeism or academic performance.
- Findings provide empirical evidence for the influence of community and school-environment on children.
- Investment in building infrastructure and safety promotes healthy school environments that improve academic performance. This may provide long-term benefits.

Conclusions

Healthy school environments can be promoted with better buildings and improved school safety, which may be a means to improve academic performance. Site new schools farther from industrial hazards and in safer communities could reduce chronic absences and improve health.

Acknowledgement

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