


GIS and Tobacco Control


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CDC Surveillance and Evaluation Net-Conference
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Overview

- Part I -- GIS 101
- Part II -- Tobacco Control and GIS Case Studies
 - ✓ Sales to Minors
 - ✓ Tobacco Retailer Density
 - ✓ Retailers Near Schools
 - ✓ Mobile data collection




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PART I – GIS 101




What is GIS?



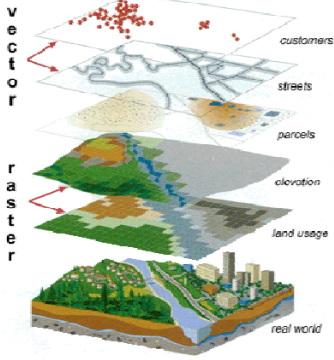
- GIS integrates:
 - Hardware
 - Software
 - Data
- Geographically - referenced information can be:
 - Captured
 - Managed
 - Analyzed
 - Displayed


Image credit www.esri.com





Data in GIS


- Vector data
 - Points (x,y)
 - Lines (Length)
 - Polygons (Area)
- Raster data
 - Images
 - Continuous coverage
- Tabular data





Data in GIS

VECTOR	RASTER
	
<p>Vector data:</p> <ul style="list-style-type: none"> ✓ Discrete location ✓ Precise boundary ✓ Isolates elements of interest 	<p>Raster data:</p> <ul style="list-style-type: none"> ✓ Source for creating vector data ✓ Adds 'real world' elements <ul style="list-style-type: none"> • Satellite imagery • Aerial Photo • Elevation • Land cover



Data in GIS: "Shapefile" = 3 Files

1. .shp = the Shape

- Stores actual geometry of feature shapes and location
- Each feature knows where it is in space and in relation to the other map layers

2. .dbf = the Data

- Each row in the table corresponds to one feature in a map layer
- Kwik Mart is selected both on the map and in the table
- Columns have variable information about that feature (e.g., retailer type, sold to minors Y/N, # of ads visible outside, etc.)

3. .shx = the "Glue" for Shape + Data

- Index file of shape geometry to allow quicker read of the shape data



Data in GIS: Census Data

- State
- County
- Census enumeration units
 - Tracts
 - Range in population from 1,500 to 8,000
 - Blockgroups
 - Range in population from 600 to 3,000
 - Meant to represent a relatively homogeneous population
 - Geographic size varies widely
 - Boundaries based on visible physical and cultural landmarks (roads, rivers, railways)



Census boundaries based on visible physical and cultural landmarks



Data in GIS: Census Data

Summary File 1 Summary File 2 Summary File 3 Summary File 4

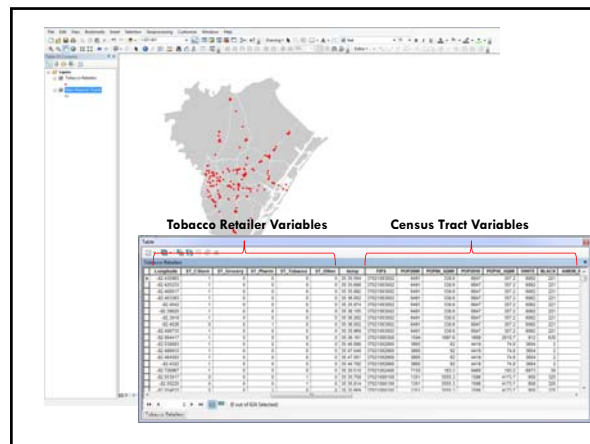
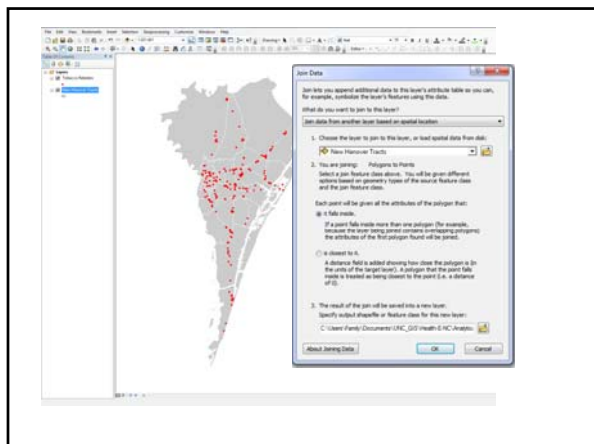
- 100% population surveyed (short-form)
- Data available to Block level
- Type of variables include:
 - Population (Race, Sex, and Age)
 - Family/HH size
 - Tenure
- Same as Summary 1 with ethnicity
- Data available to tract level
- Data collected from 1 in 6 U.S. HH (long-form)
- Data available to Blockgroup level
- Variables include:
 - Income
 - Home value
 - Education
 - Occupation
 - Ancestry/ Birthplace
- Same as Summary 3 with ethnicity
- Data available to tract level



2010 Summary 1 variables: www.factfinder2.census.gov

Subject	Number	Percent
RACE		
Total population		
One race		
White		
Black or African American		
American Indian and Alaska Native		
American Indian, specified (1)		
Alaska Native, specified (1)		
Both American Indian and Alaska Native, specified (1)		
American Indian or Alaska Native, not specified		
Asian		
Native Hawaiian and Other Pacific Islander		
Some Other Race		
Two or More Races		
Two races with Same Other Race		
Two races without Same Other Race		
Three or more races with Same Other Race		
Three or more races without Same Other Race		
HISPANIC OR LATINO		
Total population		
HISPANIC OR LATINO (of any race)		
Mexican		
Porto Rican		
Cuban		
Other Hispanic or Latino (2)		
Not Hispanic or Latino		
RACE AND HISPANIC OR LATINO		
Total population		
One race		
Hispanic or Latino		
Not Hispanic or Latino		
Two or More Races		

Tract	Population	White	Black	Hispanic	Latino	Other	Two or More	Hispanic or Latino	Other	Two or More
01000001	1000	800	100	100	0	0	0	0	0	0
01000002	1000	700	150	150	0	0	0	0	0	0
01000003	1000	600	200	200	0	0	0	0	0	0
01000004	1000	500	250	250	0	0	0	0	0	0
01000005	1000	400	300	300	0	0	0	0	0	0
01000006	1000	300	350	350	0	0	0	0	0	0
01000007	1000	200	400	400	0	0	0	0	0	0
01000008	1000	100	450	450	0	0	0	0	0	0
01000009	1000	0	500	500	0	0	0	0	0	0
01000010	1000	0	550	550	0	0	0	0	0	0
01000011	1000	0	600	600	0	0	0	0	0	0
01000012	1000	0	650	650	0	0	0	0	0	0
01000013	1000	0	700	700	0	0	0	0	0	0
01000014	1000	0	750	750	0	0	0	0	0	0
01000015	1000	0	800	800	0	0	0	0	0	0
01000016	1000	0	850	850	0	0	0	0	0	0
01000017	1000	0	900	900	0	0	0	0	0	0
01000018	1000	0	950	950	0	0	0	0	0	0
01000019	1000	0	1000	1000	0	0	0	0	0	0



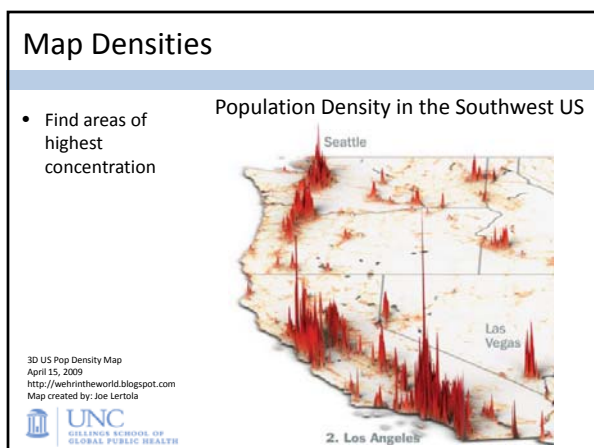
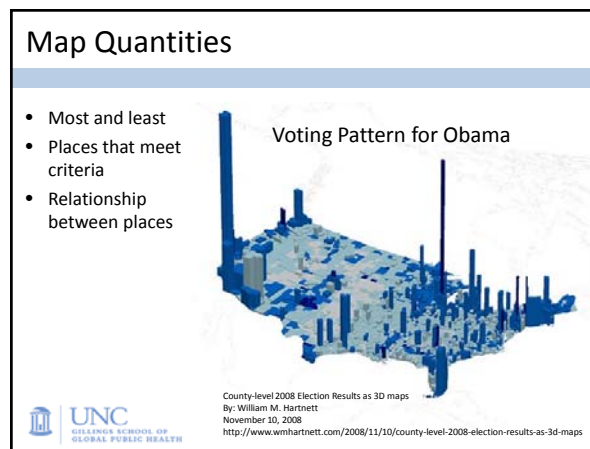
Geocoding & Mapping Data

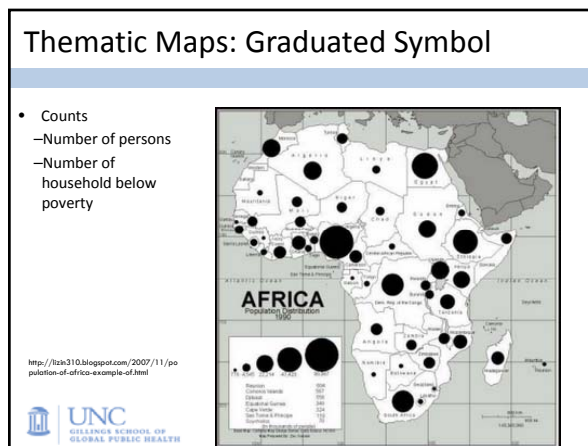
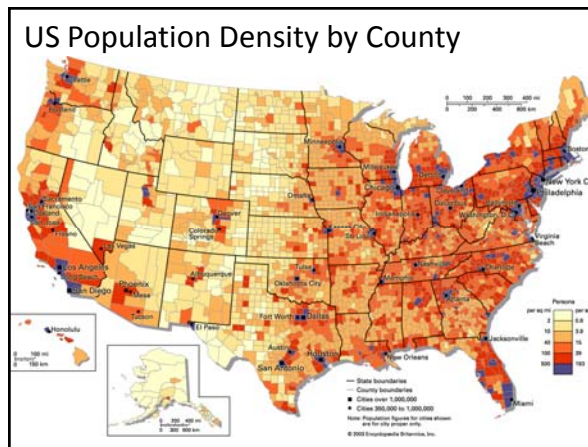
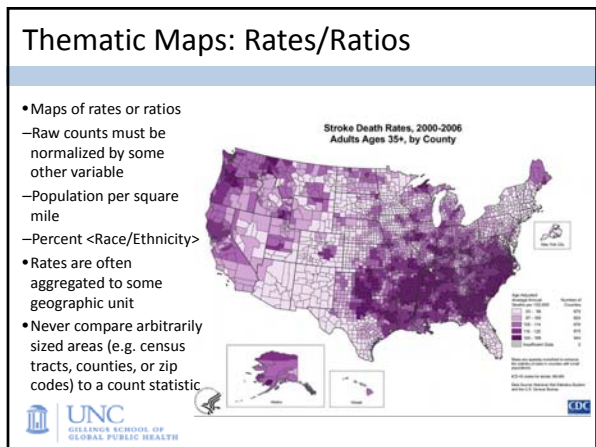
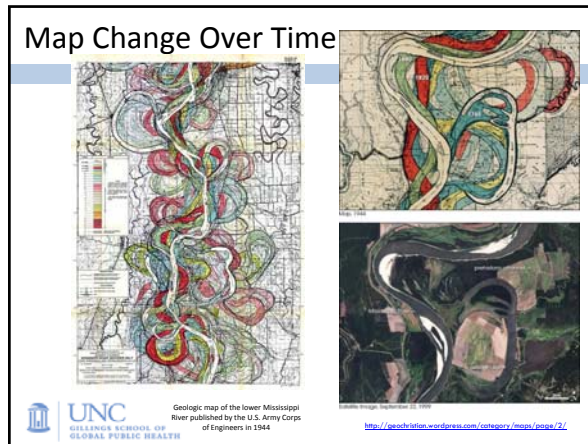
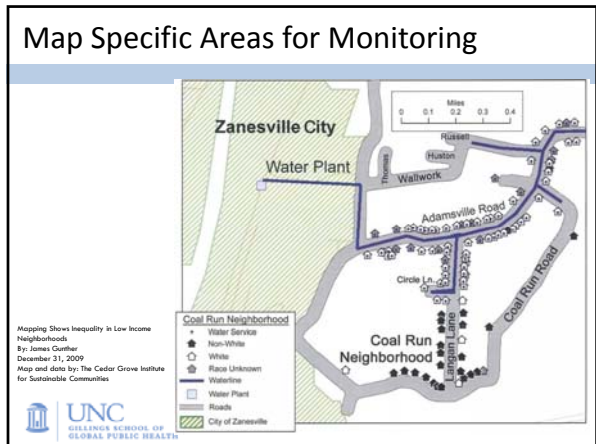
- Find a feature**
 - Geocode**
 - Convert street address to latitude and longitude coordinates
 - Geocode function in ArcMap
 - Pay a vendor to geocode addresses
 - Only an estimated point location, especially in rural areas
 - Global Positioning System (GPS)**
 - Take a waypoint at each location
 - Much more expensive and time consuming
 - Exact location
- Find a pattern**

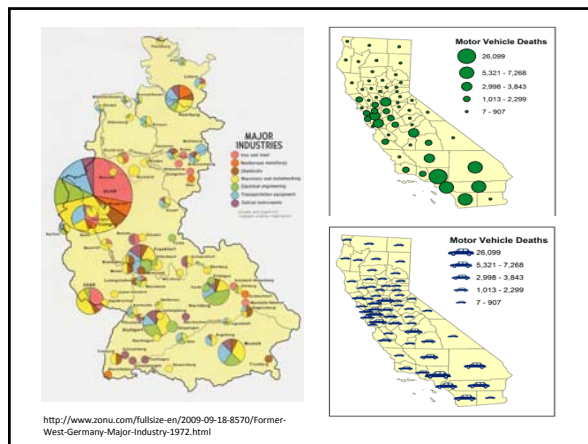
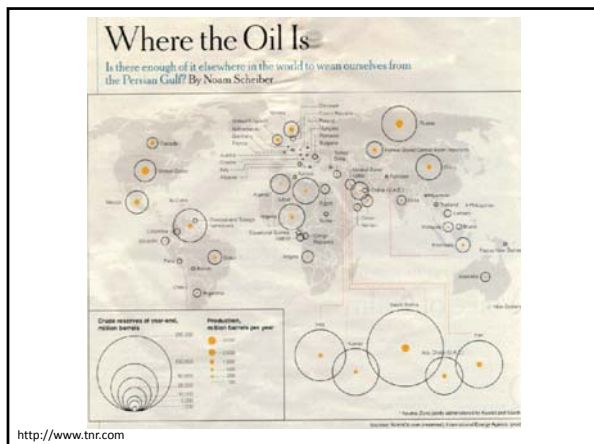
DUI's in San Francisco 2009-2010

Ethics in the Use of DUI Data
By: Doug McCune
February 23, 2011
Data Source: www.datasf.org


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Be Aware: Map Projections



- Projecting a sphere onto a plane creates data distortion
- Distance
- Direction
- Shape
- Area
- Match projection of all data
- Match projection to analysis needs

Mercator Projection Gall-Peters Projection


Miller Cylindrical Projection Mollweide Projection

Goode's Homolosine Equal-area Projection

Sinusoidal Equal-Area Projection Robinson Projection

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Be Aware: Metadata



- Scale (Accuracy)**
 - Raster data: obvious visual queue
 - Image pixelates when used beyond its scale
 - Vector data: NOT obvious visual queue
 - Line and polygon data may look jagged or unnaturally angled at inappropriate scale
- Read metadata
- Research history of the data and decide the appropriate scale
- Provenance (source of the data)**
 - How was the data made
 - What base data was used
- Age**
 - When was the data collected?
 - When was the data last edited?

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Be Aware: Scale



Scale 1:2,500 Scale 1:750 Scale 1:100

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Be Aware: Scale




Scale 1:475,000 Scale 1:150,000 Scale 1:10,000

ESRI Maps and Data: Schools (1:100,000) New Hanover County GIS Department: Schools (Local)

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PART II – CASE STUDIES



Case Study 1: Sales to Minors

Objective: Using Synar compliance checks, deliver a targeted intervention to high-risk areas (i.e., high rates of sales to minors).

- Step 1: Geocode tobacco retailers (>7,000) & link sale/no sale data
- Step 2: Map areas with high sales
- Step 3: Deliver intervention to these areas



Campaign Partners



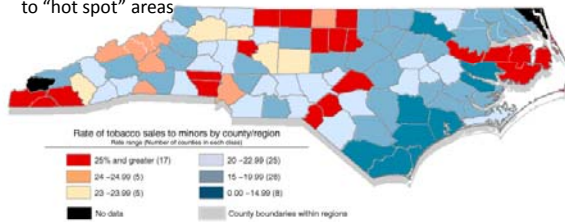



Division of Mental Health, Developmental Disabilities and Substance Abuse Services






NC Tobacco Sales to Minors: Empirical Bayes Rates


- Goal: Identify “hot spots” with high rates of illegal tobacco sales to minors
- Implement stepped up enforcement and media campaign to “hot spot” areas

District I Tobacco Sales Rates by County/Region





NC Approach: Driver's License



STOP	RED BORDER means the driver's license holder is 15-17 years of age. Do NOT sell alcohol and tobacco.
CAUTION	YELLOW BORDER means 18-20 years of age. You may sell tobacco, but NOT alcohol.
O.K.	GREEN BORDER means 21 years of age or older. You may sell alcohol and tobacco.

- In 2000, the NC DMV released a new driver's license and identification card design.
- This card design can help retail employees stop the purchase of alcohol and tobacco products by underage persons.



Postcard: Front



Sent to >1000 retailers in high risk areas

Postcard: Back

DON'T GET CAUGHT! CHECK ID!

North Carolina Alcohol Law Enforcement (ALE) agents and underage buyers check about 7,000 stores each year to prevent tobacco sales to minors. Clerks who sell tobacco products illegally are getting caught and penalized. In fact, your store has been cited in the past 3 years for selling tobacco to minors.

Your community has a high rate of tobacco sales to minors and you have the power to stop them from smoking. It's easy to avoid getting caught selling tobacco to underage consumers:

- CHECK ID if the customer appears to be younger than age 26
- If the ID has a RED border, the tobacco sale is dead!

Did you know? Nearly 12,000 North Carolina kids become new smokers every year. Over 190,000 kids under 18 in North Carolina today will ultimately die prematurely from smoking.

NC Department of Crime Control and Public Safety
Alcohol Law Enforcement Division
4704 Mail Service Center
Raleigh, NC 27608-4704
Address service requested.

Targeted printing:
 • Retailer history of past citations
 • Community rates of sales to minors

Postcard: Back

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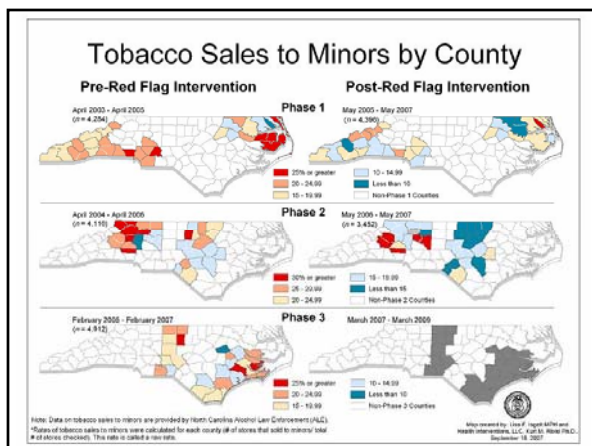
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Alcohol Law Enforcement Division
4704 Mail Service Center
Raleigh, NC 27608-4704
Address service requested.

Targeted printing:
 • Retailer history of past citations
 • Community rates of sales to minors

Sent to stores (not cited for selling to minors) in areas with high % African American

Sent to stores (cited for selling to minors) in all areas

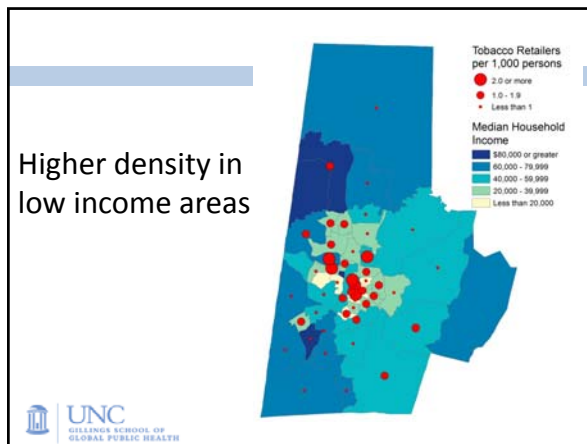


CASE STUDY 2: TOBACCO RETAILER DENSITY

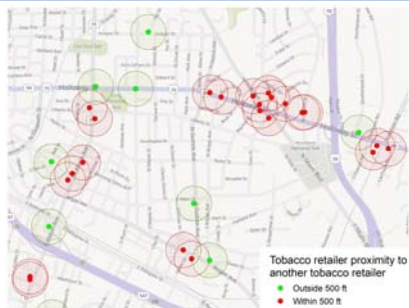


Case Study 2: Tobacco Retailer Density

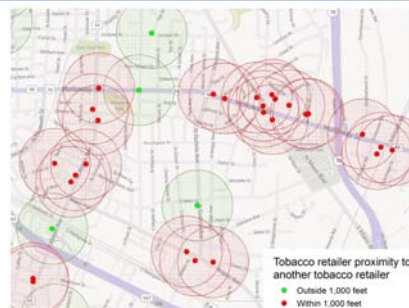
- Objective: Compute the density of tobacco retailers in your community.
- Are there clusters? Could a licensing policy limiting retailer proximity reduce density?
- Step 1: Geocode all licensed retailers
- Step 2: Map retailers, link with census data
- Step 3: Compute retailer proximity



Proximity – 500 ft buffer

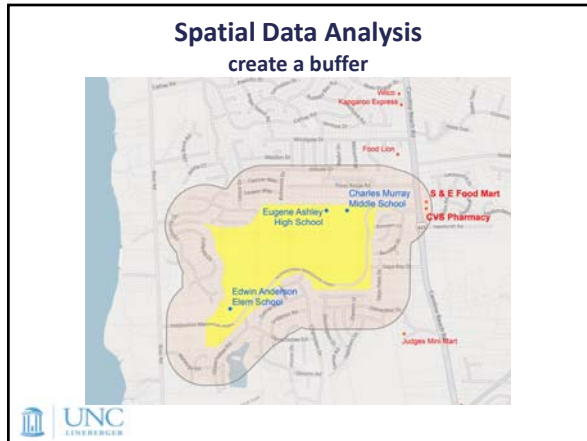


Proximity – 1000 ft buffer



Case Study 3: Retailers Near Schools

- Objective: Examine impact of Family Smoking Prevention and Tobacco Control Act (FSPTCA) rules banning outdoor tobacco advertising near schools and playgrounds would affect tobacco retailers in two states
 - New York (17,672)
 - Missouri (4,730)
- FDA is considering advertising ban distances ranging from 350 to 1000 feet, and the differential impact of these is estimated.



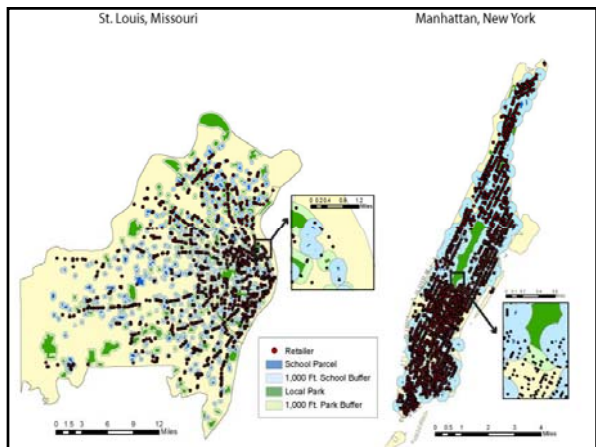
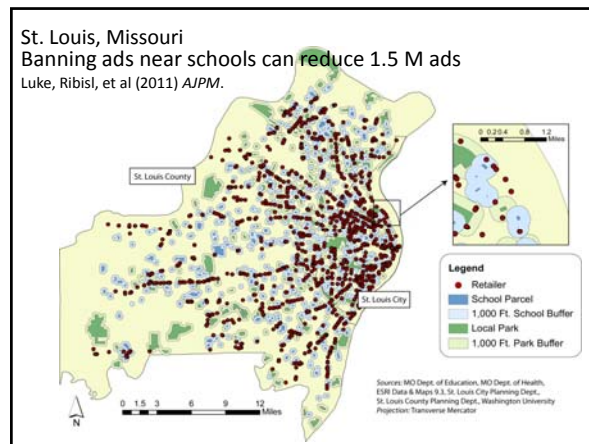
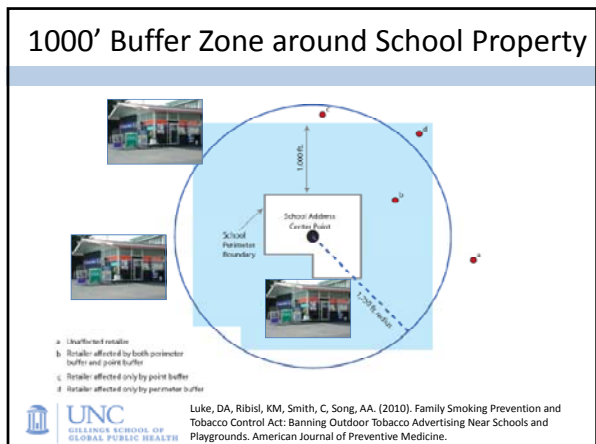


Table 5: Statewide results estimating^b the proportion of retailers affected by 1,000 ft. outdoor advertising bans for rural and urban areas

^aBased on the 2000 Census designation of urban area or urban cluster.
^bMO: 1250 ft school buffer, 1000 ft local park buffer; NY: 1150ft school buffer, 1000ft local park buffer.

	Missouri			New York		
	Urban ^a	Rural	Total	Urban	Rural	Total
Total number of retailers	2,535	2,195	4,730	14,367	3,305	17,672
Retailers affected by:						
All Schools	753 (29.7%)	278 (12.7%)	1,031 (21.8%)	8,381 (58.3%)	641 (19.4%)	9,022 (51.0%)
Public Schools	554 (21.8%)	222 (10.1%)	776 (16.4%)	6,615 (46.0%)	477 (14.4%)	7,092 (40.1%)
Non-public schools	300 (11.8%)	65 (3.0%)	365 (7.7%)	4,592 (32.0%)	226 (6.8%)	4,818 (27.3%)
Local Parks	350 (13.8%)	94 (4.3%)	444 (9.4%)	2,582 (18.0%)	190 (5.8%)	2,772 (15.7%)
All Schools and/or Local Parks	1,000 (39.4%)	355 (16.2%)	1,355 (28.6%)	9,254 (64.4%)	771 (23.3%)	10,025 (56.7%)

Recommendation: 1,000 Ft buffer everywhere

Case Study 4: Mobile Data Collection

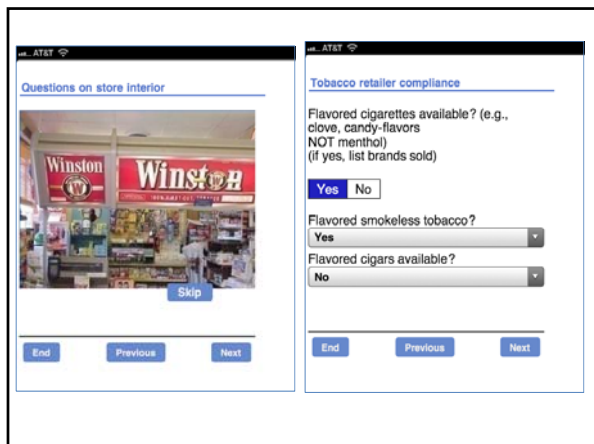
Mobile Assessment FDA Compliance @ POS

- FDA POS Compliance assessment using iPad/iTouch
- Violations – “light”, self service, or flavored cigarettes.
- Algorithm to compute compliance

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Questions on store exterior
 Skip
 End Previous Next

Tobacco retailer compliance
 Select the brands of cigarettes advertised on building exterior
 Marlboro
 Camel
 Newports
 American Spirits
 End Previous Next



MY-TRAC

Mobilizing Youth for Tobacco Regulation And Compliance

- Ability to take photo and upload

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Statewide Retailer Mapping Website

Purpose:

1. Compile list of NC tobacco retailers (7,000)
2. Publish ALE compliance check result data

Activities:

- Develop a public, interactive website that will:
 - Map all tobacco retailer locations
 - Calculate and map retailer density
 - List and map retailer violation patterns
 - Map retailer proximity to schools
 - Allow users to upload new retailer photographs and data
 - retail advertising assessments

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Questions?

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