*The New Landscape of Tobacco Products: E-cigarettes and Other Emerging Nicotine Delivery Devices*

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5-24-2017

The Health Consequences of Smoking:
50 Years of Progress

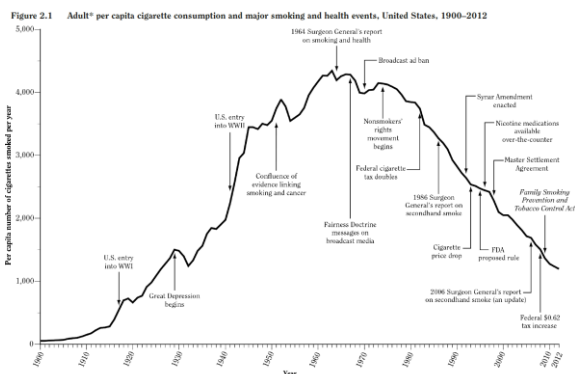**A Report of the Surgeon General**
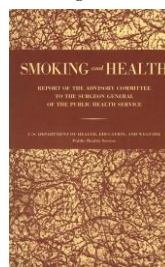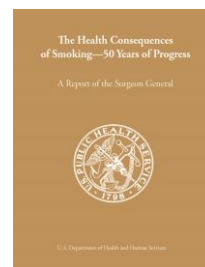
1964   2014

Figure 2.1 Adult* per capita cigarette consumption and major smoking and health events, United States, 1900–2012

Sources: Adapted from Warner 1985 with permission from Massachusetts Medical Society, ©1985; U.S. Department of Health and Human Services 1989; Creek et al. 1994; U.S. Department of Agriculture 2000; U.S. Census Bureau 2013; U.S. Department of the Treasury 2013.

Adults ≥18 years of age as reported annually by the Census Bureau.

Key Findings from the 2014 Surgeon General's Report

- Tobacco use is the number one preventable cause of premature death and disability.

- Smoking causes heart disease, stroke, cancer and lung diseases (including **asthma**, emphysema, bronchitis, and chronic airway obstruction) and diabetes.

- For every person who dies from a smoking-related disease, 30 more people suffer with at least one serious illness from smoking.

Key Findings from the 2014 Surgeon General's Report

▸ Secondhand smoke (SHS) causes premature death and disease in non-smokers.

▸ Secondhand smoke contains more than 7,000 chemicals.

▸ Children exposed to SHS are at an increased risk for acute respiratory infection, ear problems and **asthma**.

There is No Safe Level of Secondhand Smoke Exposure
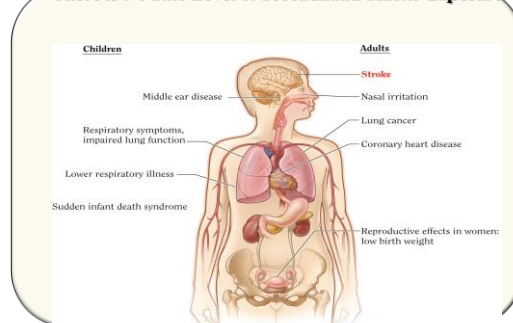
Source: The health consequences of smoking – 50 years of progress: a report of the Surgeon General. – Atlanta, GA.: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2014.
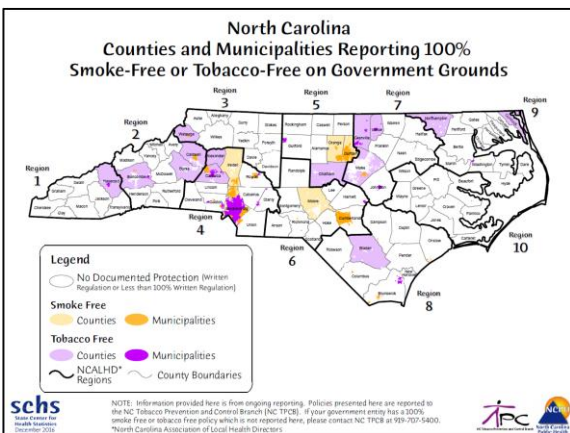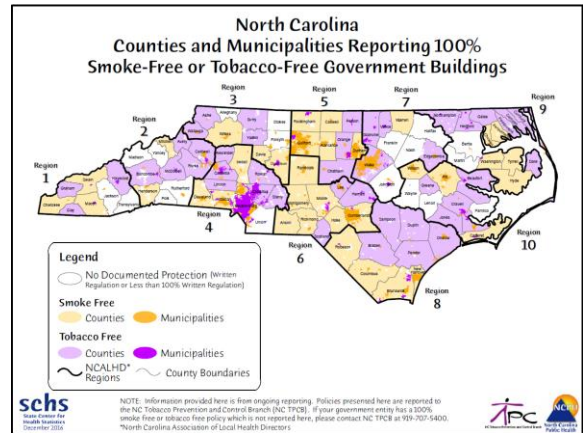
Secondhand Smoke and Asthma

- Secondhand smoke exposure causes children who already have asthma to experience more frequent and severe attacks.

- The EPA estimates that 200,000 to 1,000,000 asthmatic children have their condition worsened by exposure to secondhand smoke.

- Secondhand smoke exposure is associated with increased respiratory-related school absenteeism among children, especially those with asthma.

Source: Americans for Nonsmokers' Rights, 2015

Preventing Asthma Attacks

- Eliminate Exposure to Secondhand Smoke
  - Public Areas (such as restaurants and other public places)
  - Schools and Daycare Centers
  - Colleges
  - Multi-unit housing

Smoke-Free Restaurant and Bar Laws

North Carolina
Counties and Municipalities Reporting 100%
Smoke-Free or Tobacco-Free Government Buildings

North Carolina
Counties and Municipalities Reporting 100%
Smoke-Free or Tobacco-Free on Government Grounds

Progress in Tobacco-free Environments in North Carolina

Hospitals
All 127 acute care hospitals in North Carolina have a 100% tobacco-free campus wide policy.
- Community hospital behavioral health units means more consumers treated in tobacco-free environments

State Operated Healthcare Facilities
All 14 State Operated Mental Health, Developmental, Alcohol and Drug Abuse Treatment Centers have a 100% tobacco-free campus wide policy.

Public Schools K-12
State law requires local boards of education to prohibit the use of tobacco at all times.

Community Colleges and Private/Independent Colleges
Community colleges and private/independent colleges and universities may prohibit smoking and all tobacco product use in their buildings and on their grounds.

UNC University System
State law authorizes the sixteen campuses of the UNC system to prohibit smoking on their grounds-- within 100 linear feet of a building:
UNC and ECU Medical Care Facilities authorized to prohibit smoking on all grounds.

Prisons
State law prohibits any person from using tobacco products inside or on the grounds of a state correctional facility.

Slide 1

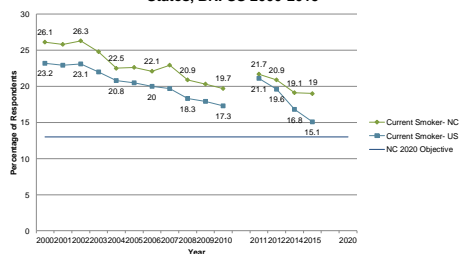*Tips from Former Smokers:*
Real People, Real Stories

Terrie's Story

Amanda's Story

A TIP FROM A FORMER SMOKER
RECORD YOUR VOICE FOR YOUR LOVED ONES WHILE YOU STILL CAN.
Learn More >

A TIP FROM A FORMER SMOKER
Some of the reasons to quit are very small.
Learn More

Slide 2

QuitlineNC
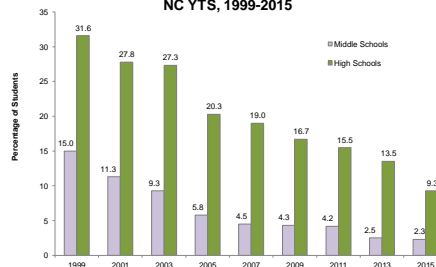1-800-QUIT-NOW
1-800-784-8669

Spanish Speaking
1-855-Dejelo-Ya

❖ An evidence-based telephone tobacco treatment service

❖ Consists of four treatment sessions
  • Special 10 treatment sessions and protocol for pregnant women

❖ Highly trained, professional Quit Coaches

❖ Available free to all North Carolina residents

❖ Accessible 24 hours a day, 7 days a week

❖ English, Spanish and interpretation service

❖ Integrated with an interactive web based tobacco treatment program

Slide 3

Percentage of Smokers in North Carolina and United States, BRFSS 2000-2015

Current Smoker- NC: 26.1, 26.3, 22.5, 22.1, 20.9, 19.7, 21.7, 20.9, 19.1, 19
Current Smoker- US: 23.2, 23.1, 20.8, 20, 18.3, 17.3, 21.1, 19.0, 16.8, 15.1
NC 2020 Objective

Current Smoker- NC
Current Smoker- US
NC 2020 Objective

Note: The BRFSS methodology changed in 2011 so we can not compare data from 2000-2010 to 2011-2015. We have showed this change by including a break in the trend line.

Source: North Carolina Department of Health and Human Services, Division of Public Health, State Center for Health Statistics, *North Carolina Behavioral Risk Factor Surveillance System* (NC BRFSS), 2000-2015. <http://www.schs.state.nc.us/schs/brfss/>.

Slide 4

**NC Middle & High School Current* Smoking Prevalence:
NC YTS, 1999-2015**

Middle Schools
High Schools

Middle Schools: 15.0, 11.3, 9.3, 5.8, 4.5, 4.3, 4.2, 2.5, 2.3
High Schools: 31.6, 27.8, 27.3, 20.3, 19.0, 16.7, 15.5, 13.5, 9.3

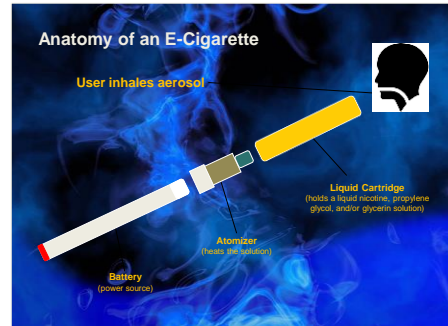*Current use is defined as using 1+ days of past 30 days.

Slide 5

Changing Landscape of Tobacco Products

Slide 6

Electronic Cigarettes
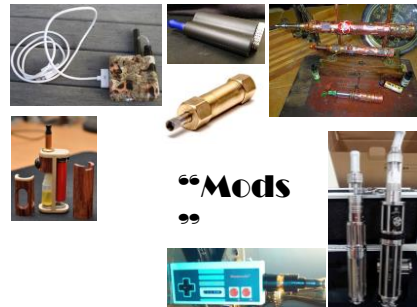**(Also Known as Electronic Nicotine Delivery Systems (ENDS) or E-cigarettes)**

Image Source: Wake Forest Baptist Medical Center

Terms for Various Electronic Cigarettes

- Cigalikes
- E-cigars
- E-pipes
- E-Hookah
- Vape Pens
- Hookah Pens
- Personal Vaporizers
- Mods

Anatomy of an E-Cigarette

User inhales aerosol

Liquid Cartridge
(holds a liquid nicotine, propylene glycol, and/or glycerin solution)

Atomizer
(heats the solution)

Battery
(power source)

Types of E-Cigarettes

Disposables   Rechargeable – Replacement Cartridges   Rechargeable – Refillable Tank System   Mods

Image Source: Wake Forest Baptist Health; ecigaretteb2c.com

"Mods"

Hookah Pens "Cooler and Better"

VS.

…we'll just be passing it [ehookah] around & enjoying the smell that the vapor leaves in the air because **it smells all fruity & candyish & delicious**."

"ehookah just sounds like it's better because if you have an ecig, it's still a cigarette in a way. Then you have a hookah pen. It's like hookah, it's kind of **cool**. It's **better**"

Wagoner et al. Nicotine Tob Res. 2016 Mar 30. [Epub ahead of print]
The Triangulum, Thanks to Mary Rezk-Hanna, NP, PhD, UCLA

E-liquid

- Nicotine derived from tobacco; amounts vary by product (0-36 mg/ml)
- Solvent propylene glycol, vegetable glycerin
- Flavorings
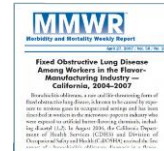- Other additives
  - Sweeteners

Flavors and Brands

- Over 460 brands (Zhu et al., 2014)
- 7,764 unique flavors

Image Sources: www.ecigarettereviewed.com

Flavors

Flavors, including many with diacetyl, are associated with respiratory irritation and disease.

Employee wearing protective gear

MMWR
Morbidity and Mortality Weekly Report

Fixed Obstructive Lung Disease Among Workers in the Flavor-Manufacturing Industry — California, 2004–2007

MMWR, 2007 Apr 27;56(16);
Farsalinos, K.E., et al (2015). Nicotine & Tobacco Research;
Tierney, P. A., et al (2015). Tobacco Control

Nicotine Delivery

- *Potential* to deliver nicotine directly to pulmonary system for rapid absorption
- Newer products can deliver as much, or more nicotine than conventional cigarettes (Talih et al., 2014)
- Nicotine delivery varies by
  - Product design (voltage, heating element, nicotine solution)
  - Puffing behavior (volume, velocity, intervals)

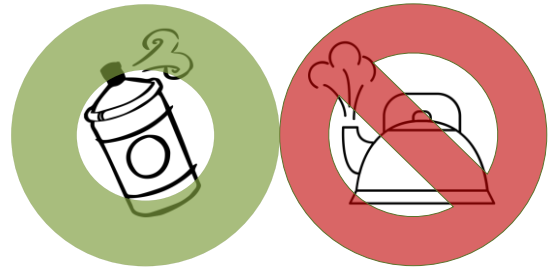## It's an Aerosol, Not a Vapor

Image Credit: via thenounproject.com

What's in the Aerosol?

- Perception of harmlessness "water vapor"
- Nicotine
- Several harmful toxins have been found, but at levels lower than conventional cigarettes; depends largely on the device voltage
- Fine and ultrafine particles delivered are *similar* to conventional cigarettes– some tobacco specific carcinogens have been documented
- Propylene glycol--can cause respiratory illness (Grana et al., 2014)
- Heavy Metals have been documented: tin, silver, iron, nickel aluminum, sodium, chromium, copper, magnesium, manganese, lead, potassium and silicate nanoparticles
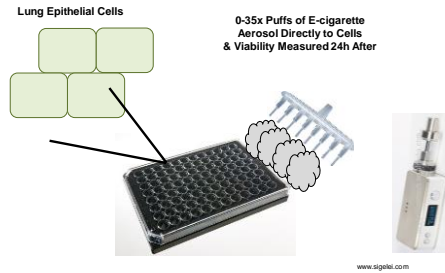
Emissions from E-cigarettes

Mainstream (Exhaled) Aerosol

Secondhand Aerosol

- Exhaled air contains (Schripp et al., 2012 and RTI 2015)
  - Nicotine
  - Ultrafine particles—inhaled deep in the lungs, and may cause cancer
  - Propylene glycol-- can cause respiratory illness (Grana et al., 2014)
 - Artificial flavorings
  - Heavy metals

Research at UNC-CH School of Medicine (TCORS)

Methods: E-cigarette Aerosol Exposures

Lung Epithelial Cells

0-35x Puffs of E-cigarette Aerosol Directly to Cells & Viability Measured 24h After

www.sigelei.com

32

Cell screening data after flavored e-liquid aerosol exposures show similar flavor-dependent dose-dependent decreases in cell viability ≥ 5 puffs

Rowell, TR, et al. (2017) *Am J Physiol Lung (Accepted)*

33
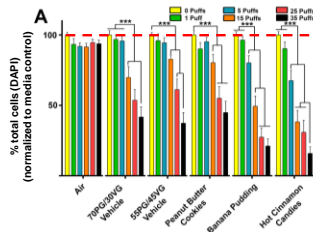
Increasing e-cigarette device power (W) increases amount of aerosol produced in each puff, which speeds up negative effects of PG/VG aerosol

Rowell, TR, et al. (2017) *Am J Physiol Lung (Accepted)*

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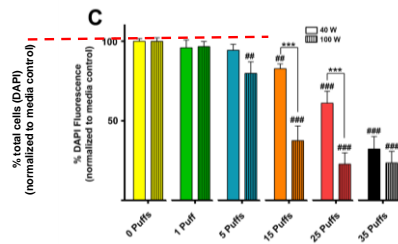
2016 Report of the Surgeon General
KEY FINDINGS
7 Major Conclusions

Major Conclusion   #1

E-cigarettes are a rapidly emerging and diversified product class

Major Conclusion **#2**

E-cigarette use among youth and young adults has become a public health concern.

Major Conclusion **#3**

"E-cigarettes are now the **most commonly used tobacco product among youth,** surpassing conventional cigarettes in 2014.

E-cigarette use is **strongly associated with the use of other tobacco products** among youth and young adults, including combustible tobacco products."

Current E-Cigarette Use – NC High School Students: NC YTS, 2011–2015
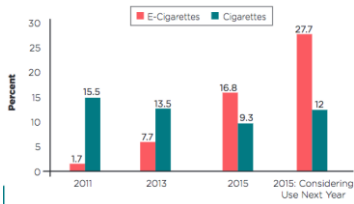
Among Youth, E-cigarette Use May Lead to Conventional Cigarette Use

U.S. adolescents and young adults who had never smoked, but used e-cigarettes at baseline were 8.3 times more likely to progress to cigarette smoking after 1 year than nonusers of e-cigarettes
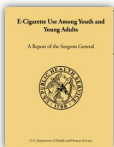
Major Conclusion **#4**

The use of products containing **nicotine poses dangers to youth, pregnant women, and fetuses**. The use of products containing nicotine in any form among youth, including in e-cigarettes, is unsafe.

Major Conclusion **#5**

E-cigarettes contain nicotine, ultrafine particles, heavy metals, and volatile organic compounds

"E-cigarette **aerosol is not harmless**. It can contain harmful and potentially harmful constituents, including **nicotine, ultrafine particles, heavy metals and volatile organic compounds**. Nicotine exposure during adolescence can cause addiction and can harm the developing adolescent brain."

Major Conclusion #6

"E-cigarettes are **marketed by promoting flavors** and using a **wide variety of media channels** and approaches that have been used in the past for marketing conventional tobacco products to youth and young adults."

E-cigarette Marketing Uses Traditional Tactics

| 1940's / 1950's | 2010's |

www.tobaccodocuments.org   Source: Centers for Disease Control and Prevention, 2016

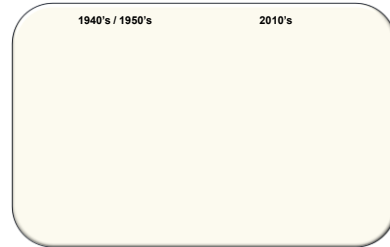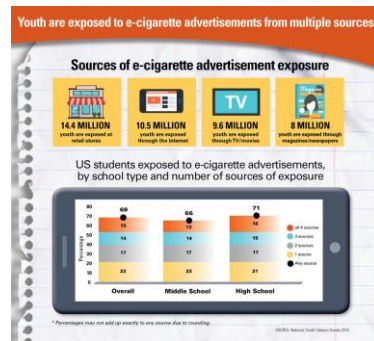*A Majority of Current Youth E-cigarette Users Report Using Flavored E-cigarettes*

7 out of 10 middle and high school students who currently use tobacco have used a **FLAVORED** product.

63% of students who currently use e-cigarettes have used flavored e-cigarettes (1.6 million)

61% of students who currently use hookah have used flavored hookah (1 million)

64% of students who currently use cigars have used flavored cigars (910,000)

Source: Morbidity and Mortality Weekly Report (MMWR)

Youth are exposed to e-cigarette advertisements from multiple sources.

Sources of e-cigarette advertisement exposure

14.4 MILLION youth are exposed at retail stores
10.5 MILLION youth are exposed through the Internet
9.6 MILLION youth are exposed through TV/movies
8 MILLION youth are exposed through magazines/newspapers

US students exposed to e-cigarette advertisements, by school type and number of sources of exposure

E-Cigarettes Potential for Harm if:

Leads to initiation of combustible tobacco use among non-smokers, particularly children | Leads to relapse among former smokers | Diminishes the chances that a smoker will quit | Discourages smokers from using proven quit methods | Exposes children, pregnant women, and non-users to secondhand aerosol | Glamorizes or renormalizes tobacco use | Results in poisonings or injury among users or non-users

Dual Users

http://dx.doi.org/10.15585/mmwr.mm6542a7

- A majority of adult e-cigarette users also smoke conventional cigarettes.

E-cigarettes - Poisoning

Explosions and Fires

Major Conclusion #7

"Action can be taken at the national, state, local, tribal, and territorial levels to address e-cigarette use among youth and young adults.

Actions could include:
- incorporating e-cigarettes into smoke-free policies,
- preventing access to e-cigarettes by youth,
- price and tax policies,
- retail licensure,
- regulation of e-cigarette marketing likely to attract youth, and
- educational initiatives targeting youth and young adults."

Family Smoking Prevention and Tobacco Control Act of 2009

Provides FDA authority to regulate:
- cigarettes,
- cigarette tobacco,
- roll-your-own tobacco,
- smokeless tobacco, and
- any other tobacco products that the Agency by regulation deems to be subject to the law.

2015 FDA Deeming of Tobacco Products
Became Effective August 2016

The new rule includes currently marketed products:

Electronic cigarettes, all ENDS products, including all the parts/components, but not accessories

Liquids/e-liquids

Hookah tobacco, water pipes

Cigars

Pipe tobacco

Certain dissolvable tobacco products (i.e., dissolvable products)

FDA Final Rule

The rule includes the following provisions:

- Prohibits sales to children under 18 (retail and online), requires age verification for all sales and provides for federal enforcement and penalties against retailers and online vendors who sell to minors
- Restricts vending machines to adult-only facilities
- Prohibits free samples

FDA Final Rule New Manufacturer Requirements:

- Registering manufacturing establishments and providing product listings to the FDA
- Reporting ingredients, and harmful and potentially harmful constituents
- Requiring premarket review and authorization of new tobacco products by the FDA
- Placing health warnings on product packages and advertisements
- Not marketing newly deemed tobacco products (including e-cigarettes)with modified risk claims unless authorized by the FDA.
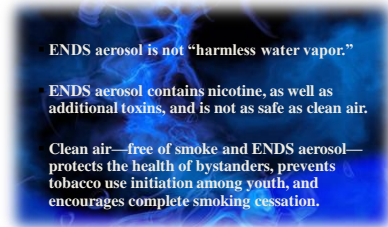
The FDA Final does not include:

- Banning flavorings in e-cigarettes that may appeal to youth

- Restricting marketing that appeals to kids

Current Federal, State and Local Government Regulations on E-Cigarettes

- Implications for Community/Clinical Connections

Evidence-Based Interventions are Key: Protect Clean Indoor Air Standards

ENDS aerosol is not "harmless water vapor."

ENDS aerosol contains nicotine, as well as additional toxins, and is not as safe as clean air.

Clean air—free of smoke and ENDS aerosol—protects the health of bystanders, prevents tobacco use initiation among youth, and encourages complete smoking cessation.

New Signage

—NO—
SMOKING
INCLUDING ELECTRONIC CIGARETTES

NC Counties and Municipalities that Specifically Prohibit Use of E-Cigarettes

Counties (32)

- Catawba
- Beaufort
- New Hanover
- Transylvania
- Hyde
- Pender
- Rutherford
- Pitt
- Mecklenburg
- Haywood
- Granville
- Vance
- Clay
- Henderson
- Chatham
- Person
- Bladen
- Durham
- Surry
- Dare
- Alamance
- Orange
- Iredell
- Lee
- Wake
- Yadkin
- Cabarrus
- Brunswick
- Tyrell
- Wilson
- Wilkes
- Bertie

Municipalities (35)

- Brookford
- Chapel Hill
- Catawba
- Saluda
- Wilmington
- Waynesville
- Butner
- Canton
- Creedmoor
- Henderson
- Kittrell
- Lewis
- Middleburg
- Oxford
- Stem
- Stovall
- Roxboro
- Duck
- Kill Devil Hills
- Kitty Hawk
- Manteo
- Nags Head
- Southern Shores
- Asheville
- Elon
- Durham
- Granite Falls
- Rolesville
- Kannapolis
- Hayesville
- Dunn
- Bessemer City
- North Wilkesboro
- Ronda
- Wilkesboro

Source: Information compiled from ongoing reporting and documentation collected by the NC Tobacco Prevention and Control Branch. Updated May 2017.
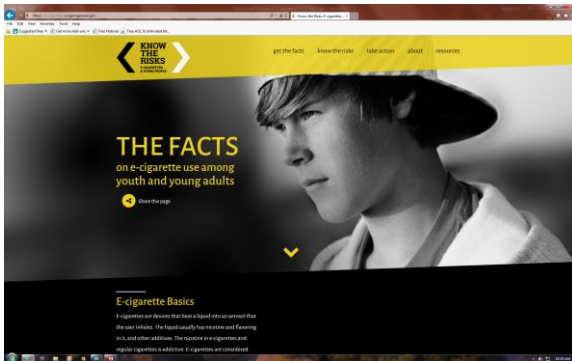
Cessation

- There are 7 products approved by the FDA for cessation….these products have gone through clinical trials and have shown that when used in combination with cessation counseling double the chances for cessation
- E-cigarettes are <u>not</u> approved as a cessation device
  - FDA has sent warning letters to e-cigarette manufacturers regarding false cessation claims
- E-cigarettes are commonly used along with cigarettes - Dual users (undermining true cessation attempts)

www.quitlinenc.com

2017 Legislative Update

- HB 276 Strengthen Youth Tobacco Prevention/Funds

- QuitlineNC Funds

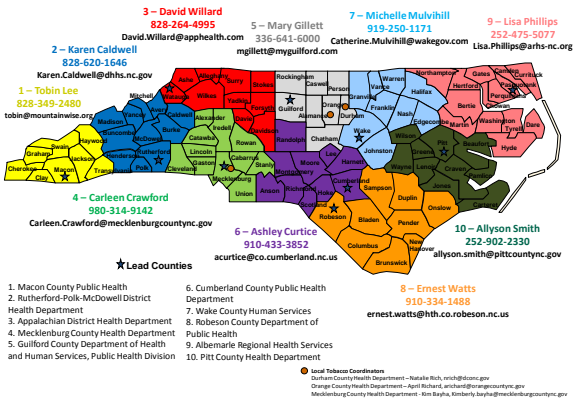- Budget Picture

Rationale to Regulate E-cigarettes

- If treated differently, implies acceptance of addiction to nicotine delivery products, complicating the health message
- Permitting e-cigarettes encourages dual usage (cigarettes and e-cigarettes) in lieu of cessation in some individuals who might otherwise quit
- Exposes children, adolescents and pregnant women to nicotine and other toxins in e-cigarette aerosol
- Creates potential confusion regarding rules and mixed health message

Summary

- ✓ E-cigarettes are now the most commonly used tobacco product among U.S. youth.
- ✓ Youth use of tobacco products in any form, including e-cigarettes, is **unsafe**.
- ✓ Based on current findings, researchers believe that e-cigarettes could increase users' risk for oral cancer.
- ✓ E-cigarettes are not currently an FDA-approved quit aid.
- ✓ The tobacco product landscape continues to diversify, and it's critical to modernize tobacco control strategies to adapt to these changes.
- ✓ Multiple different stakeholders can take action to implement policies and strategies that can clearly reduce the public health threat posed by tobacco use, including e-cigarettes.

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2. Rutherford-Polk-McDowell District Health Department
3. Appalachian District Health Department
4. Mecklenburg County Health Department
5. Guilford County Department of Health and Human Services, Public Health Division

6. Cumberland County Public Health Department
7. Wake County Human Services
8. Robeson County Department of Public Health
9. Albemarle Regional Health Services
10. Pitt County Health Department

Ⓖ **Local Tobacco Coordinators**
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Mecklenburg County Health Department - Kim Bayha, Kimberly.bayha@mecklenburgcountync.gov

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