Thyroid Cancer cases/100,000 per year

Incidence Rate Report for Virginia by County

Thyroid, 2010-2014

All Races (includes Hispanic), Both Sexes, All Ages

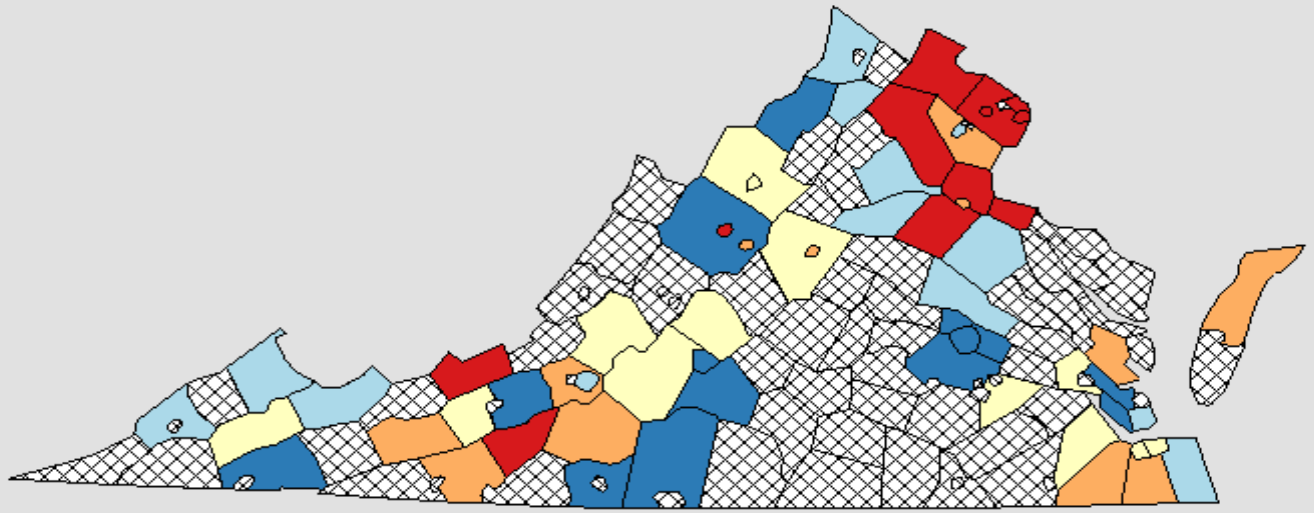
Sorted by Rate

County	Met Healthy People Objective of ***?	Age-Adjusted Incidence Rate† cases per 100,000 (95% Confidence Interval)	Average Annual Count	Recent Trend	Recent 5-Year Trend‡ in Incidence Rates (95% Confidence Interval)
Virginia [6,10]	***	12.8 (12.5, 13.2)	1,102	stable	3.0 (-1.7, 8.0)
US (SEER+NPCR) [1,10]	***	14.3 (14.2, 14.3)	46,634	stable	1.5 (-0.1, 3.2)

Floyd County [6,10]	***	20.6 (12.0, 33.2)	4	stable	-8.7 (-64.8, 136.8)
Giles County [6,10]	***	19.7 (11.4, 31.8)	4	stable	-12.9 (-34.6, 15.9)
Pulaski County [6,10]	***	11.9 (7.6, 17.9)	5	stable	-27.6 (-64.7, 48.2)
Montgomery County [6,10]	***	9.2 (6.5, 12.8)	8	falling	-21.9 (-30.5, -12.1)
Radford City [6,10]	*	*	3 or fewer	*	*

Loudoun County [6,10]	***	23.9 (21.5, 26.4)	82	stable	3.0 (-17.6, 28.7)
Fairfax County [6,10]	***	20.4 (19.3, 21.7)	240	stable	2.9 (-5.1, 11.5)
Roanoke County [6,10]	***	15.7 (12.2, 19.8)	15	stable	-4.3 (-30.5, 31.8)
Roanoke City [6,10]	***	9.8 (7.2, 12.9)	10	stable	20.7 (-26.5, 98.0)
Wythe County [6,10]	***	14.0 (8.4, 21.8)	4	stable	-6.4 (-28.5, 22.4)

Incidence Rates† for Virginia
Thyroid, 2010 - 2014
All Races (includes Hispanic), Both Sexes, All Ages



Age-Adjusted

Annual Incidence Rate

(Cases per 100,000)

Quantile Interval

- 5.3 to 9.4
- > 9.4 to 10.9
- > 10.9 to 12.4
- > 12.4 to 15.8
- > 15.8 to 23.9
- Suppressed * /**
- Data Not Available ◇

US (SEER + NPCR)
Rate (95% C.I.)
14.3 (14.2 - 14.3)

Virginia
Rate (95% C.I.)
12.8 (12.5 - 13.2)

Notes:

State Cancer Registries may provide more current or more local data.

Data presented on the State Cancer Profiles Web Site may differ from statistics reported by the State Cancer Registries (for more information).

† Incidence rates (cases per 100,000 population per year) are age-adjusted to the 2000 US standard population (19 age groups: <1, 1-4, 5-9, ... , 80-84, 85+). Rates are for invasive cancer only (except for bladder which is invasive and in situ) or unless otherwise specified. Rates calculated using SEER*Stat. Population counts for denominators are based on Census populations as modified by NCI. The 1969-2015 US Population Data File is used for SEER and NPCR incidence rates.

* Data have been suppressed to ensure confidentiality and stability of rate estimates. Data is currently being suppressed if there are fewer than 16 counts for the time period.

** Data have been suppressed for states with a population below 50,000 per sex combination for American Indian/Alaska Native or Asian/Pacific Islanders because of concerns regarding the relatively small size of these populations in some states.

◇ Data not available for this combination of geography, statistic, age and race/ethnicity.

Data for the United States does not include data from Puerto Rico

Co-Morbidities Associated with Thyroid Cancer

- Hypertension
- Diabetes
- Obesity
- Hyperlipidemia
- Gastroesophageal Reflux Disease

Risk Factors for Thyroid Cancer

- Age between 25 and 65 years old
- Female
- Being exposed to radiation to head/neck as a child or nuclear fallout
- History of goiter
- Family history of thyroid cancer
- Genetic conditions (Familial Medullary Thyroid Cancer, Multiple Endocrine Neoplasia)
- Asian

Iodine Deficiency

- Iodine deficiency causes an increase of thyroid stimulating hormone (TSH), a major growth factor for thyroid follicular cells. Animal experiments demonstrate a clear increase of thyroid cancer after prolonged iodine deficiency leading to significantly increased TSH. At present, the only recognized measures for reducing thyroid cancer risk are to minimize ionizing radiation exposure and avoid iodine deficiency

Virginia Cancer Registry

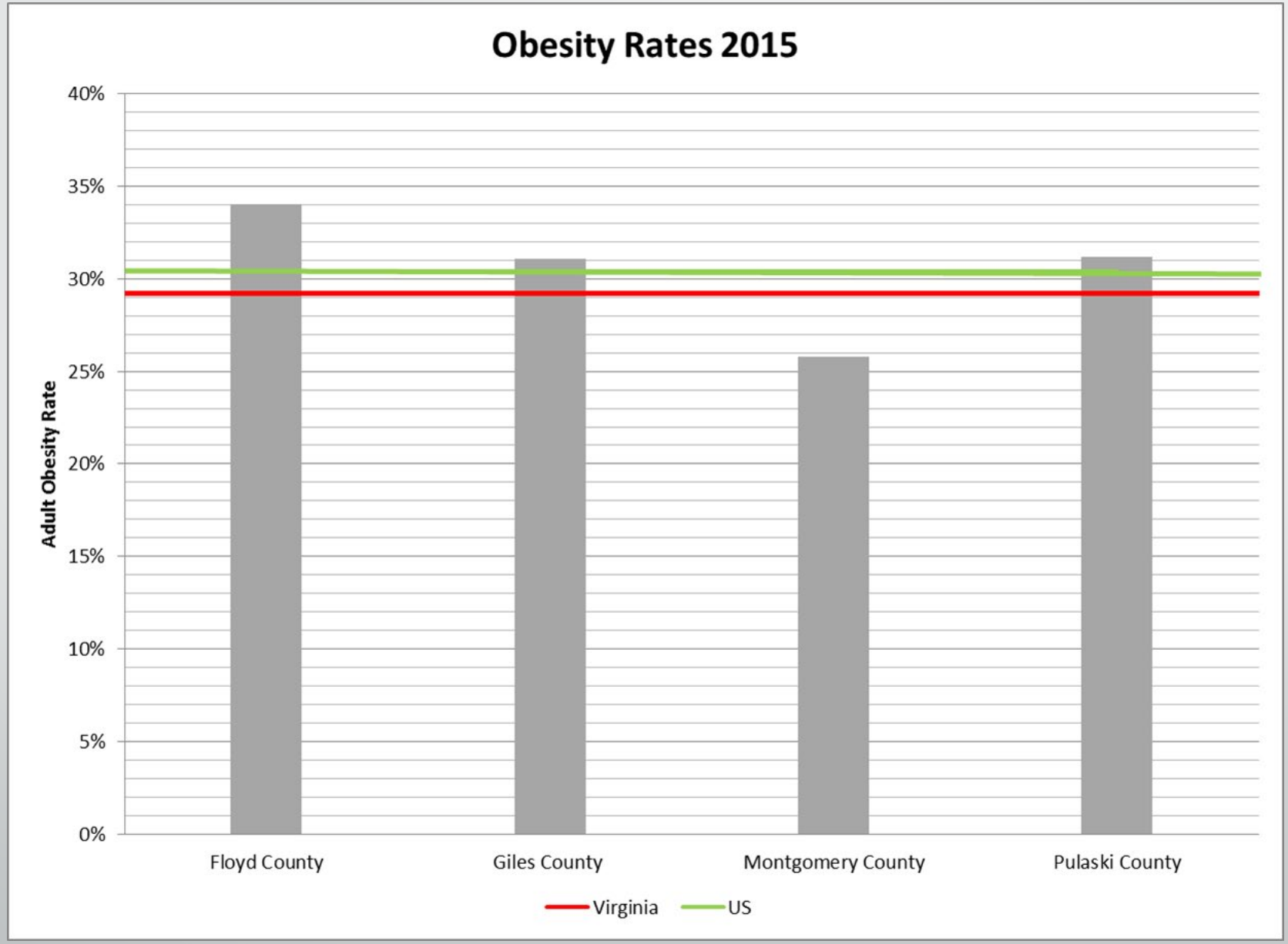
- The development of cancer is a complex and not fully understood process. Given the differences between the various types of cancer and the complexity of the development of cancer, when considering cancer causation, one must be careful not to think all cancers are the same. Personal lifestyle factors account for most cases of cancer and are much more significant risk factors than are environmental exposures.

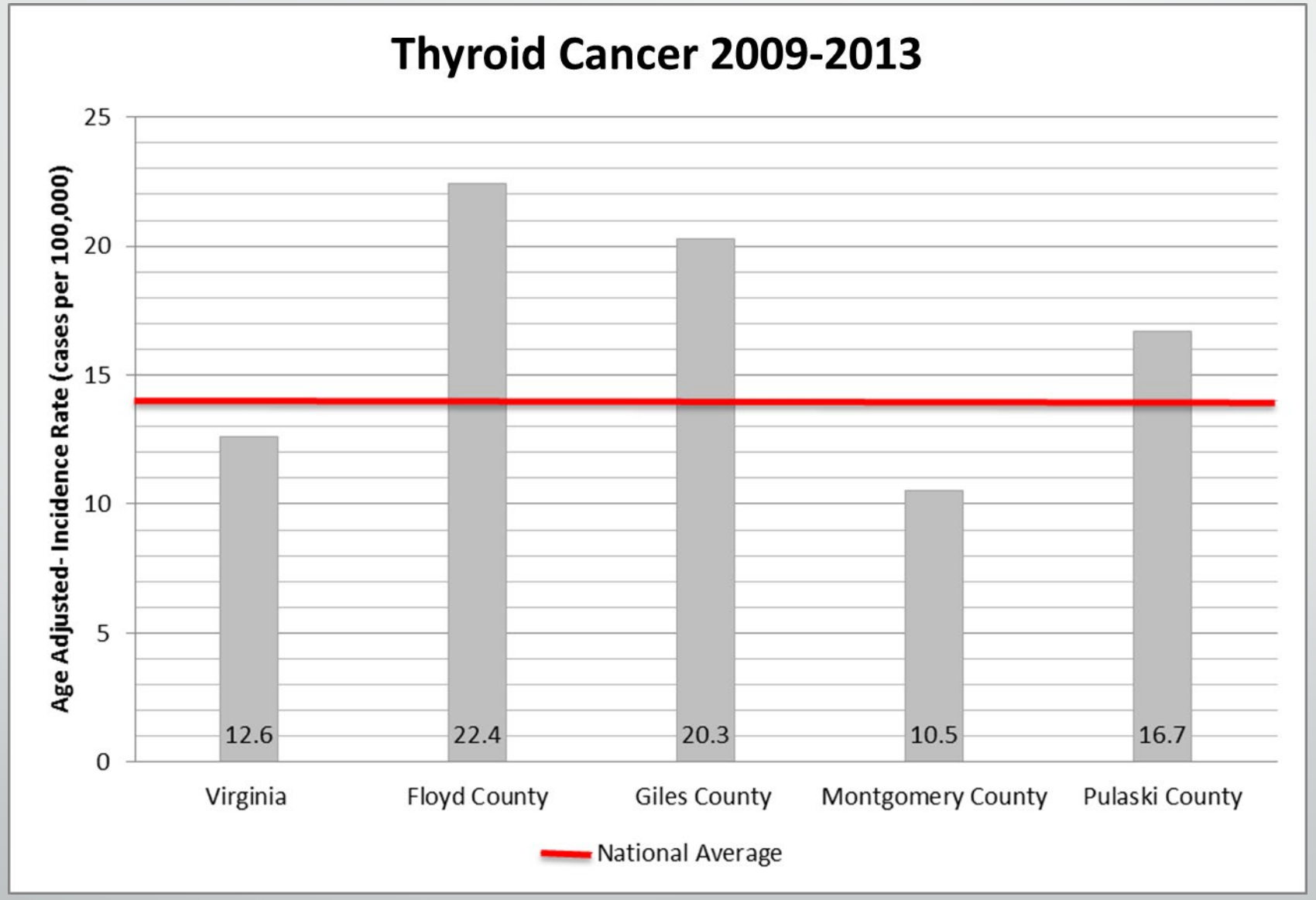
Worldwide Increasing Incidence of Thyroid Cancer: Update on Epidemiology and Risk Factors Journal of Cancer Epidemiology (2013)

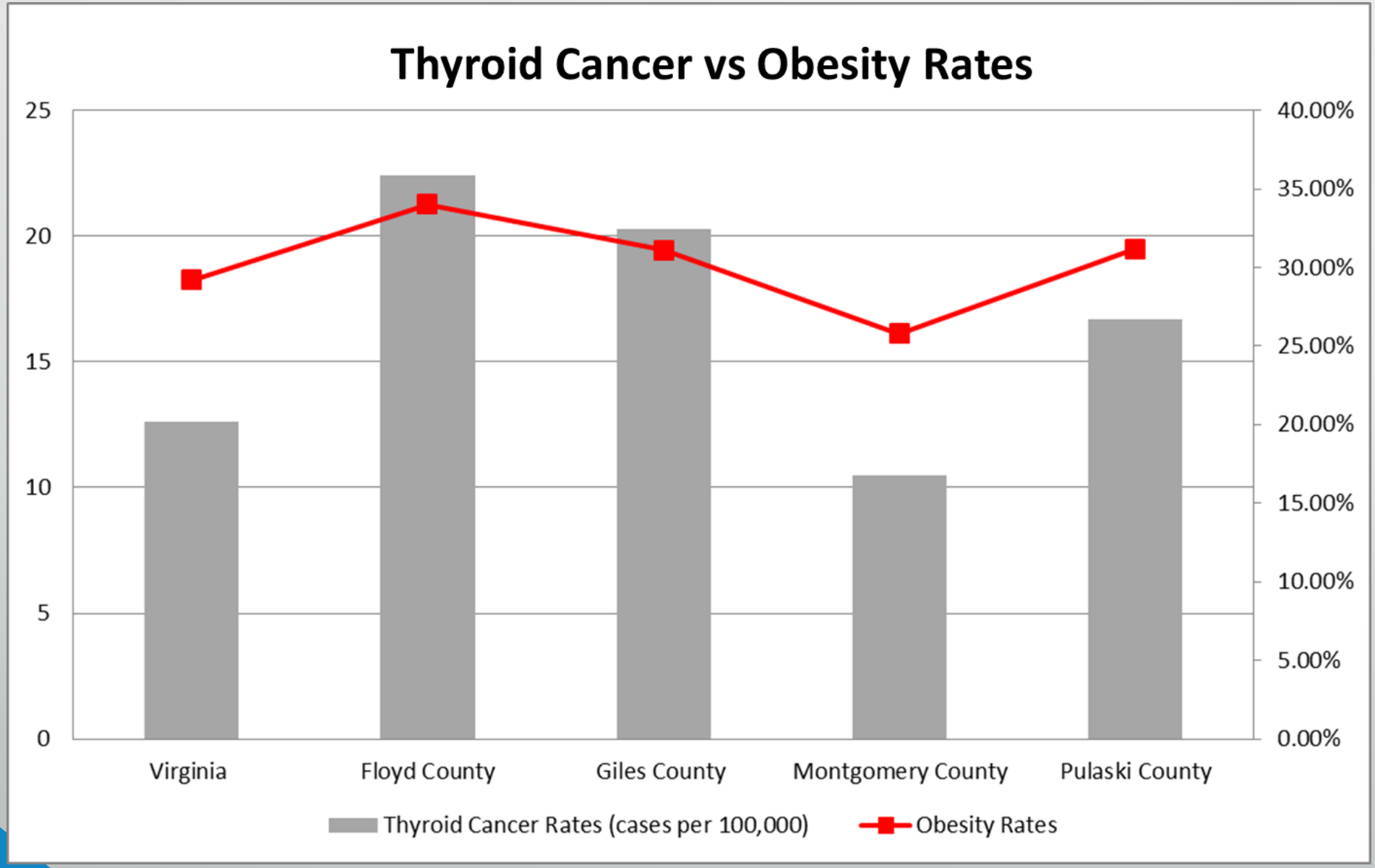
- Thyroid cancer has continuously increased all over the world
- Some of the increase is attributed to earlier detection, more sensitive screening ultrasounds/testing
- Of other factors, increased exposure to medical radiation is most likely – during the last 25 years the individual radiation dose in the U.S. has doubled, mainly due to medical diagnostic procedures (especially CT scans with iodinated contrast)
- At present, no causal correlation has been established between environmental pollutants and thyroid cancer in humans – increase is likely multifactorial (genetics, behavioral/lifestyle [iodine intake, obesity], environmental)

Perchlorate, Iodine and the Thyroid
Best Practice & Research: Clinical Endocrinology and Metabolism (2010)

- Perchlorate is produced by natural atmospheric processes and low level exposure is ubiquitous
- Studies of perchlorate exposure in healthy volunteers showed no changes in thyroid function for doses up to 35 mg (far higher than environmental exposures)
- Occupational perchlorate exposure (long-term, intermittent, high-level) did not affect thyroid function
- Health impact may be dependent upon adequate iodine intake [perchlorate can inhibit thyroidal iodine uptake and decrease thyroid hormone production]


Obesity Rates 2015
40%
35%
30%
25%
20%
15%
10%
5%
0%
Adult Obesity Rate
Floyd County
Giles County
Montgomery County
Pulaski County
Virginia
US


Thyroid Cancer 2009-2013
Age Adjusted- Incidence Rate (cases per 100,000)
25
20
15
10
5
0
12.6
22.4
20.3
10.5
16.7
Virginia
Floyd County
Giles County
Montgomery County
Pulaski County
National Average


Thyroid Cancer vs Obesity Rates
25
20
15
10
5
0
40.00%
35.00%
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
Virginia
Floyd County
Giles County
Montgomery County
Pulaski County
Thyroid Cancer Rates (cases per 100,000)
Obesity Rates

Environmental Exposures and Autoimmune Thyroid Disease
Thyroid (2010)

- 70-80% of susceptibility to autoimmune thyroid disease is genetic
- Other significant contributors:
  - exposure to radiation (medical and nuclear fallout) – variation in individual effects due to age, gender, thyroid autoantibodies, dietary iodine intake, intake of dairy products where iodine isotopes concentrate, variations in weather patterns and food/water intake
  - iodine intake (most reports are in communities with iodine deficiency and repletion with high dose iodine)

2015 VIRGINIA TOXICS RELEASE INVENTORY REPORT

Summary of Data from 2015 Industry Reports

www.deq.virginia.gov

March 2017

Nevertheless, there are limitations on the use of TRI data:

1. The TRI Report contains reported information on the quantities of chemicals released and managed, not the public's exposure to, or risk from, the chemicals. Risk to human health by a chemical release depends on the toxicity of the chemical; how it disperses, reacts, or persists in the environment; and the quantity, concentration, and type of human exposure. Furthermore, chemicals reported for the TRI Report are not weighted by their toxicity. For example, a pound of one substance may be more toxic or hazardous than 1,000 pounds of another. Due to the limited nature of TRI data collected, readers are strongly discouraged from making any health or environmental risk/exposure assessments from the information presented. Most of the TRI chemical releases are permitted under other federal and state regulatory programs. Data from these regulatory programs may provide additional information to better inform residents about their environment.
2. The TRI program captures only a portion of all toxic chemical releases in Virginia. The TRI reporting program does not account for TRI chemicals from most non-manufacturing facilities, facilities with fewer than 10 employees, facilities that do not meet the chemical quantity thresholds, other non-industrial sources, or transportation-related emissions.
3. The majority of facilities report TRI data based on estimates. The TRI program does not require facilities to monitor releases, only to use best available data in the facilities' estimates. Using different methods to estimate data can result in significant variability from one facility to another, as well as from one year to the next.
4. Patterns of releases and other waste management activities can change significantly from one year to the next. Thus, the data in this report for a specific facility differ from those reported for a prior year.
5. Direct comparison between figures in the current year's report and figures in past Virginia TRI Reports is discouraged because of changes in reporting requirements and the authorized incorporation of revisions to previous years' data. Several historical comparisons, with appropriate standardization of data, are provided in Chapter 4 and Appendix E.
6. EPA is required by law to compile an annual *Toxics Release Inventory – National Analysis* on the national level. The data published in the Virginia TRI Report is anticipated to not completely correspond to the data published by the EPA. Contributing factors include: differing dates on which data are extracted for processing, revised facility reports, and facilities which mistakenly report to the Commonwealth or EPA but not both. DEQ and EPA continue to work together to rectify such differences.

The data for calendar year 2015 show a decrease (6.32 percent) in the amount of TRI chemicals released on-site, transferred off-site and managed on-site from 2014 (see Chapter 4). There has been a downward trend in the amount of TRI chemicals released to the environment and managed as wastes in Virginia since the implementation of the TRI Program in 1988. The amount of TRI chemicals being recycled on-site and a reduction in TRI chemical released to the air accounted for the overall decrease in the total amount of TRI chemicals reported in 2015.

TRI - Introduction *2015 Toxics Release Inventory*

Nevertheless, there are limitations on the use of TRI data:

1. The TRI Report contains reported information on the quantities of chemicals released and managed, not the public's exposure to, or risk from, the chemicals. Risk to human health by a chemical release depends on the toxicity of the chemical; how it disperses, reacts, or persists in the environment; and the quantity, concentration, and type of human exposure. Furthermore, chemicals reported for the TRI Report are not weighted by their toxicity. For example, a pound of one substance may be more toxic or hazardous than 1,000 pounds of another. Due to the limited nature of TRI data collected, readers are strongly discouraged from making any health or environmental risk/exposure assessments from the information presented. Most of the TRI chemical releases are permitted under other federal and state regulatory programs. Data from these regulatory programs may provide additional information to better inform residents about their environment.

Appendix I-1 — *2015 Toxics Release Inventory*

APPENDIX I-1
2015 VA TRI
FACILITY RANKING BY ON-SITE RELEASES
(Excludes Dioxin and Dioxin-like Compounds)

Rank	Facility Name	Total On-Site Releases (lbs.)	Physical Street Address	Post Office City	Actual Physical County or Independent City	Facility ID
1	Bae Systems, Ordnance Systems Inc.	10,129,007	Radford Army Ammunition Plant 4050 Peppers Ferry Road	Radford	Montgomery	24141RDFRDPOBOX
2	Honeywell International Inc. Hopewell Plant	2,330,658	905 E Randolph Rd	Hopewell	Hopewell (City)	23860LLDSGPOBOX
3	Chesterfield Power Station	1,960,271	500 Coxendale Rd	Chester	Chesterfield	23836CHSTR500CO
4	International Paper Franklin Mill	1,314,062	34040 Union Camp Dr	Franklin	Isle Of Wight	23851NNCMPHIGHW
5	Jewell Coke Co LP	1,295,102	1034 Dismal River Rd	Oakwood	Buchanan	24656JWLLCHWY46
6	Clover Power Station	1,191,302	4091 Clover Rd	Clover	Halifax	24534CLVRPRTE92
7	Westrock Cp, LLC	975,517	1901 Main St	West Point	King William	23181CHSPK19THM
8	Virginia City Hybrid Energy Center	859,914	3425 Russell Creek Rd	Saint Paul	Wise	2428WVRGNC3425R
9	Hercules Incorporated	667,362	1111 Hercules Rd	Hopewell	Hopewell (City)	23860QLNCM1111H
	Westrock Virginia Corporation	635,566	104 E. Riverside Street	Covington	Covington (City)	24426WSTVCRIVER

2015 Toxics Release Inventory

Appendix F

Facility County/Independent City / Facility Name/Address / Chemical Name	form A*	On-Site Releases from Section 5 of Form R: Fugitive Air (pounds)	Stack Air (pounds)	Total Air (pounds)	Land (pounds)	Water (pounds)	Total On-Site Releases (pounds)	On-Site Management from Section 8 of Form R: Energy Recovery (pounds)	Recycling (pounds)	Treatment (pounds)	Total On-Site Management (pounds)	Off-Site Transfers from Section 6 of Form R: POTW (pounds)	Total Other Off-Site Transfers ** (pounds)
DIPHENYLAMINE	N	0	63	63	0	0	63	0	1,286	0	1,286	14	1,309
NITRATE COMPOUNDS	N	0	0	0	0	0	0	0	0	0	0	137,605	131,150
NITROGLYCERIN	N	0	1,999	1,999	0	0	1,999	0	75,552	0	75,552	80,465	136,522
Total for ALLIANT TECHSYSTEMS OPERATIONS L		**0**	**2,062**	**2,062**	**0**	**0**	**2,062**	**0**	**76,838**	**0**	**76,838**	**218,084**	**268,981**
MONTGOMERY	**BAE SYSTEMS, ORDNANCE SYSTEMS INC**							**RADFORD ARMY AMMUNITION PLANT 4050 PEPPER**				**NAICS Code**	**32592**
2,4-DINITROTOLUENE	N	1,253	0	1,253	0	0	1,253	0	0	5,129	5,129	0	2,365
AMMONIA	N	23,513	370	23,883	0	459	24,342	0	0	0	0	0	0
CHLORINE	N	0	0	0	0	0	0	0	0	3,933	3,933	0	0
COPPER COMPOUNDS	N	1,277	121	1,398	0	146	1,544	0	0	0	0	0	0
HYDROCHLORIC ACID (1995 AND	N	0	283,106	283,106	0	0	283,106	0	0	0	0	0	0
NITRATE COMPOUNDS	N	0	0	0	0	9,679,977	9,679,977	0	0	7,375	7,375	0	0
NITRIC ACID	N	830	747	1,577	0	0	1,577	0	24,504,990	9,679,977	34,184,967	0	0
NITROGLYCERIN	N	0	57,622	57,622	0	578	58,200	0	0	242,762	242,762	0	0
SULFURIC ACID - (1994 AND AFTER	N	0	74,574	74,574	0	0	74,574	0	0	0	0	0	0
Total for BAE SYSTEMS, ORDNANCE SYSTEMS I		**26,873**	**416,540**	**443,413**	**0**	**9,681,160**	**10,124,573**	**0**	**24,504,990**	**9,939,176**	**34,444,166**	**0**	**2,366**
MONTGOMERY	**FEDERAL-MOGUL CORP**							**300 INDUSTRIAL PARK RD SE**				**NAICS Code**	**33635**
ALUMINUM (FUME OR DUST)	N	97	9,708	9,805	0	0	9,805	0	0	0	0	0	405,442

Lead Exposure

	New River Valley High Risk Lead Zipcodes
Floyd	24072, 24091, 24105 24380
Giles	24086, 24093, 24094, 24124, 24128, 24134, 24147, 24150
Montgomery	24138, 24149
Pulaski	24301, 24347
Radford	24141
<27% of housing built before 1950 and or and increased prevalence of children with elevated blood lead levels per available data	

Source: Virginia Department of Health, Lead-Safe Virginia Program

Percent Confirmed Elevated Blood Lead Levels By Age 2011			
	Under 36 Months	Under 72 Months	Rate per 100,000 Age 0-15
Virginia	0.20%	0.30%	16.7
NRHD	-	-	7.3
Floyd	0	0	0
Giles	0	0	0
Montgomery	0	0	0
Pulaski	0.40%	0.30%	33.9
Radford	0	0	0

Source: Virginia Department of Health, Childhood Lead Poisoning Prevention Program Surveillance Summary Report