

## ***Why Do We Calculate Age-adjusted Rates ?***

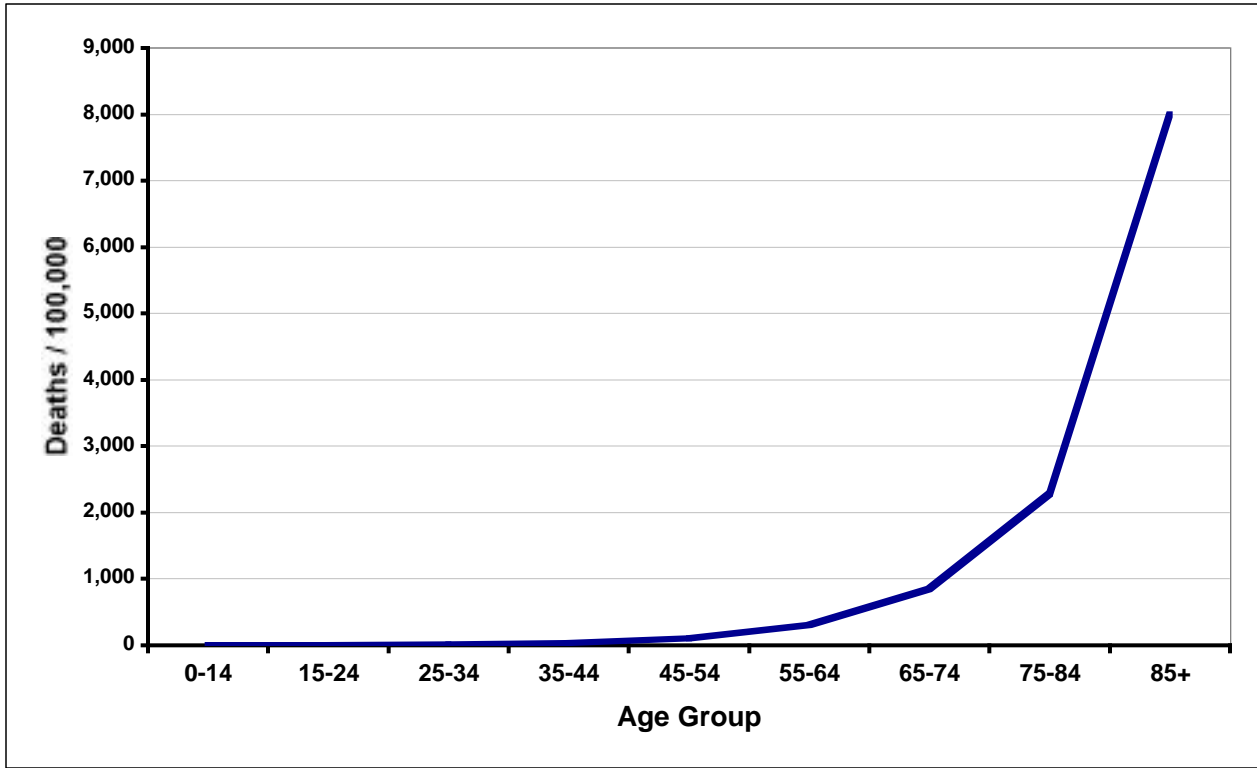
- 1) Many causes of death vary with age.
- 2) The age structure of populations differs both between areas and across time.
- 3) Failing to account for differences in population age structure can result in inaccurate comparisons of death rates between populations or within a population across time.
- 4) The solution is to adjust rates to a standard (or 'reference') population, producing 'age-adjusted' rates.

### **What do we use as a reference population ?**

Sometimes varies by agency

- 1) Cancer mortality: 1970 U.S. Population
- 2) NYS Vital Records: 1990 NYS Population

## Deaths from Heart Disease per 100,000 Population

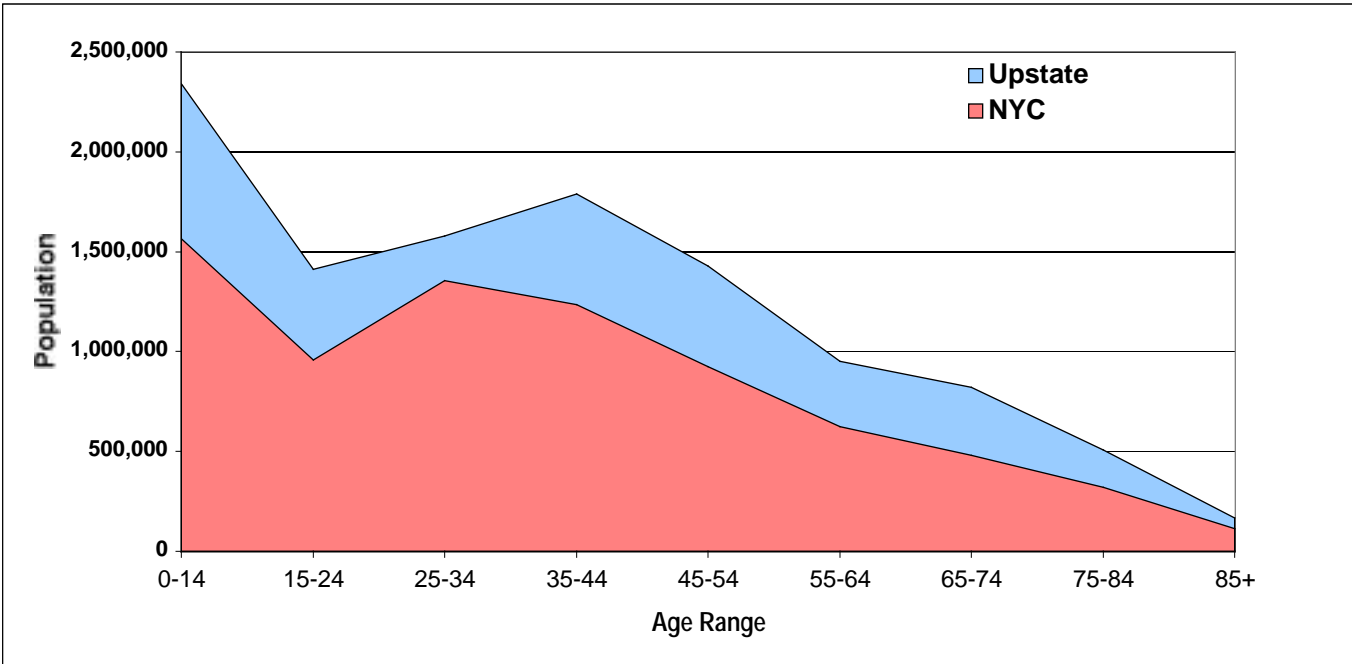


<i>Age Group</i>	<i>Heart Disease Mortality</i>
<b>0-14</b>	1.9
<b>15-24</b>	3.3
<b>25-34</b>	7.7
<b>35-44</b>	28.7
<b>45-54</b>	100.5
<b>55-64</b>	305.6
<b>65-74</b>	845.4
<b>75-84</b>	2,282.8
<b>85+</b>	7,996.5

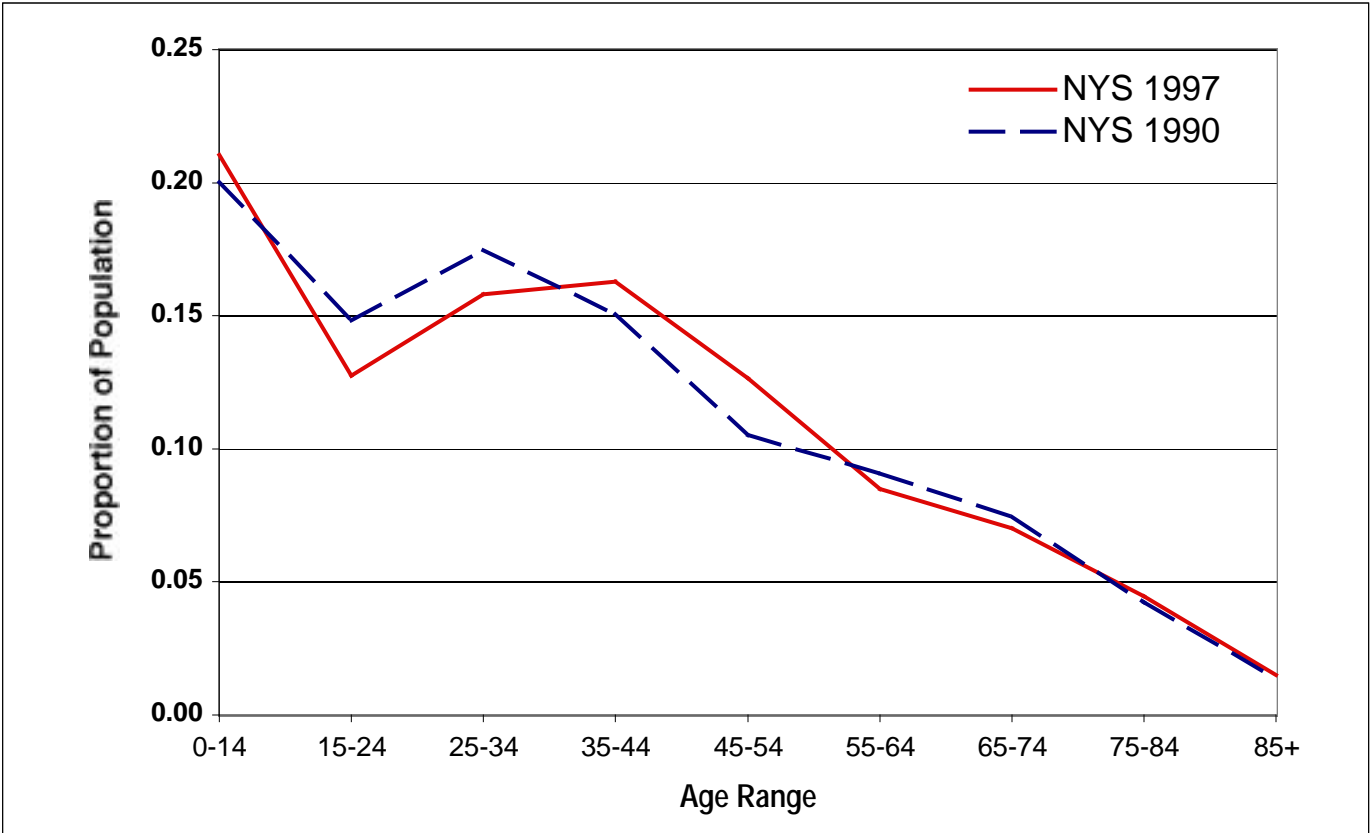
*Based on 1997 New York State Data*

*Prepared by: E. Waltz  
University at Albany School of Public Health*

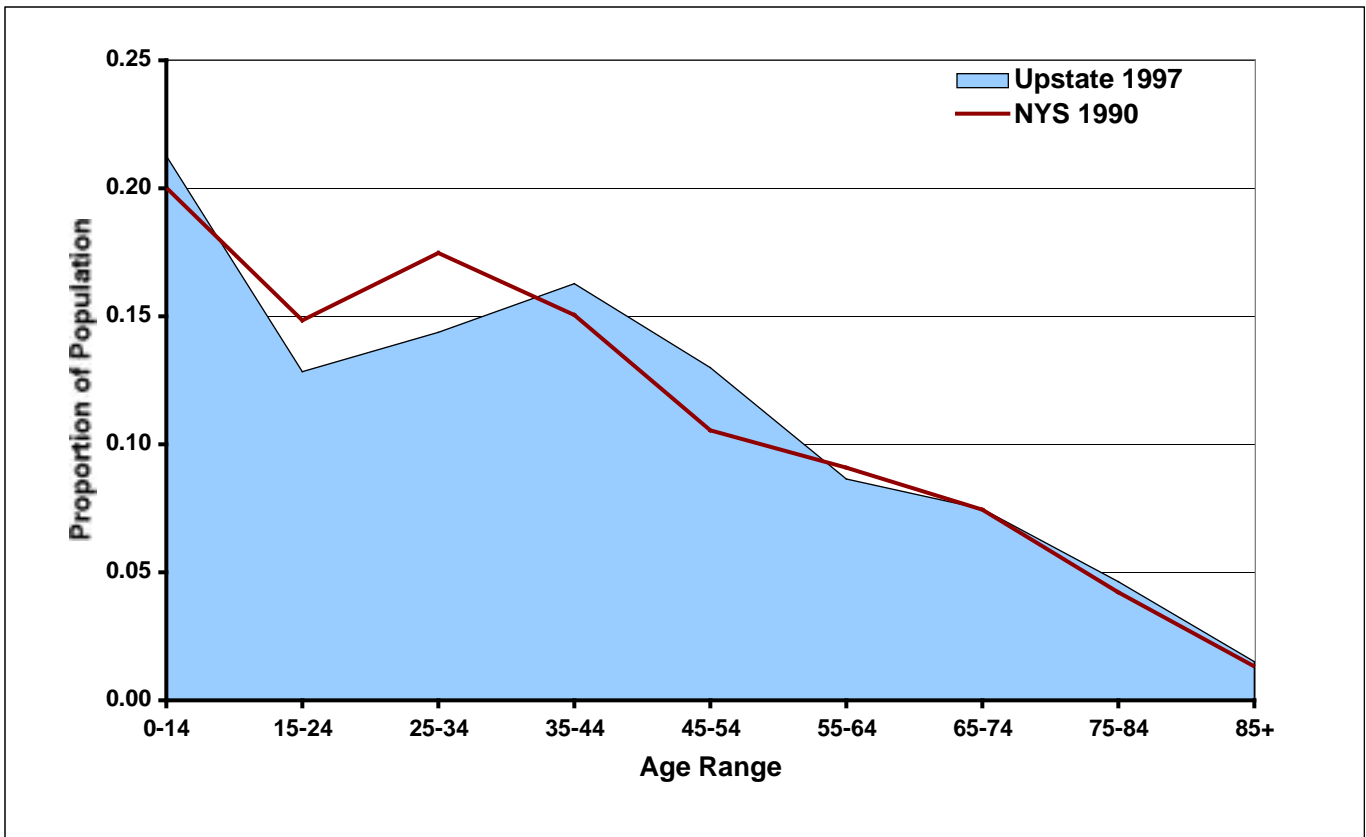
## Populations in 1997: New York City and Rest of State



## Population Proportions in NY State: 1990 & 1997 Estimate



## Population Proportions: Upstate 1997 and New York State 1990 †



† reference population

Age Group	NYS 1990	NYS 1997
0-14	0.200	0.213
15-24	0.148	0.128
25-34	0.175	0.144
35-44	0.150	0.163
45-54	0.105	0.130
55-64	0.091	0.087
65-74	0.074	0.075
75-84	0.042	0.046
85+	0.013	0.015

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## Calculating Age-adjusted Rates

In 1997, the age-adjusted death rate from heart disease was 311.3 deaths per 100,000 in NYS  
Reference population: 1990 United States Population

**Problem:** Calculate the comparable 1997 rate for NYS exclusive of NYC ('Upstate')

**Three steps:**

- a. Calculate age-specific rates
- b. Weight (i.e., multiply) each of these by the proportion of the reference population
- c. Total these weighted rates across all age groups

AGE	# Upstate Heart Disease deaths	Upstate Population	Upstate Deaths/ 100,000	(from 1990 NYS) Weight	Weighted rate	Sum over all ages ↓	
<b>0-9</b>	36	1,564,665	2.3	0.137	0.315		
<b>10-19</b>	21	1,491,841	1.4	0.132	0.186		
<i>Individual</i>	<b>20-24</b>	26	695,873	3.7	0.079		0.296
<i>lines are</i>	<b>25-34</b>	122	1,579,947	7.7	0.175		1.349
<i>age-specific</i>	<b>35-44</b>	296	1,788,674	16.5	0.150		2.490
<i>rates</i>	<b>45-54</b>	1,339	1,428,300	93.7	0.105		9.876
	<b>55-64</b>	2,688	951,966	282.4	0.091		25.649
	<b>65-74</b>	6,305	821,265	767.7	0.074		57.146
	<b>75-84</b>	10,785	508,707	2,120.1	0.042		89.552
	<b>85+</b>	12,693	165,562	7,666.7	0.013		102.706
	<b>34,311</b>	<b>10,996,800</b>	<b>312.0</b>		<b>289.6</b>		

→ **Crude Rate**      ↑ **Age-adjusted Rate**

all rates are expressed as deaths per 100,000 population

<i>How do the rates compare ?</i>			
True Odds-Ratio	$\frac{289.6}{311.3}$	=	<b>0.93</b>
If (incorrectly) used Upstate Crude rate:	$\frac{312.0}{311.3}$	=	<b>1.00</b>



## For Local Health Department Use: Resources used in the Workshop *Public Health Data: Our Silent Partner*

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**MS-Excel Spreadsheets:** (these are all small files under 16 k)

----- Reference Population Files-----  
for Calculating Age-Adjusted Rates

the **1990 NYS population** profile (used by NYSDOH Vital Records)  
[Download nys\\_reference.xlw](#)

the **1970 U.S. Population** Profile (used in cancer mortality rates)  
[Download US\\_pop\\_1970.xlw](#)

and the **1940 US Population** (used in most Healthy People, 2000 rates)  
[Download US\\_pop\\_1940.xlw](#)

----- Sample Worksheet -----

"age\_adjust.xlw" is a sample spreadsheet demonstrating how to calculate age-adjusted death rates in Excel.

[Download age\\_adjust.xlw](#)

**Handouts:** (all in .pdf format)

Topic:	Handout (Black & White)	Overhead Slide (Color)
<b>Age Adjustment</b>	<a href="#">Download</a> (approx. 40k)	<a href="#">Download</a> (approx. 92k)
<b>Statistics,</b> including confidence intervals	NA -- color only	<a href="#">Download</a> (approx. 80k)
<b>Risk Measures</b>	<a href="#">Download</a> (approx. 4k)	<a href="#">Download</a> (approx. 8k)

**Web Links:**

Finally, we have added links to websites we mentioned in the workshop:

[NYS DOH Chronic Disease Teaching Tools](#)

[NYSDOH Information for Researchers Page](#)

[CDC Website for \*Public Health Data: Our Silent Partner\*](#)

(All materials, including manuals, facilitator guide, & answer key are available to download)

and don't forget ...

[Visit the School of Public Health Web Site](#)