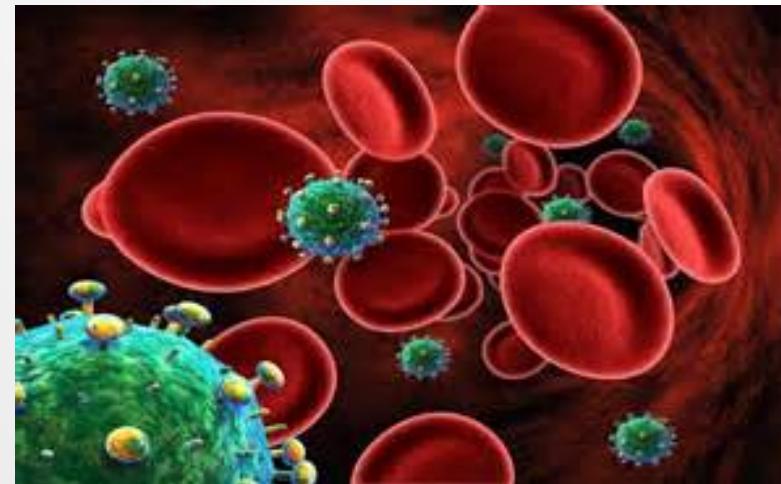


HIV MORTALITY RATE

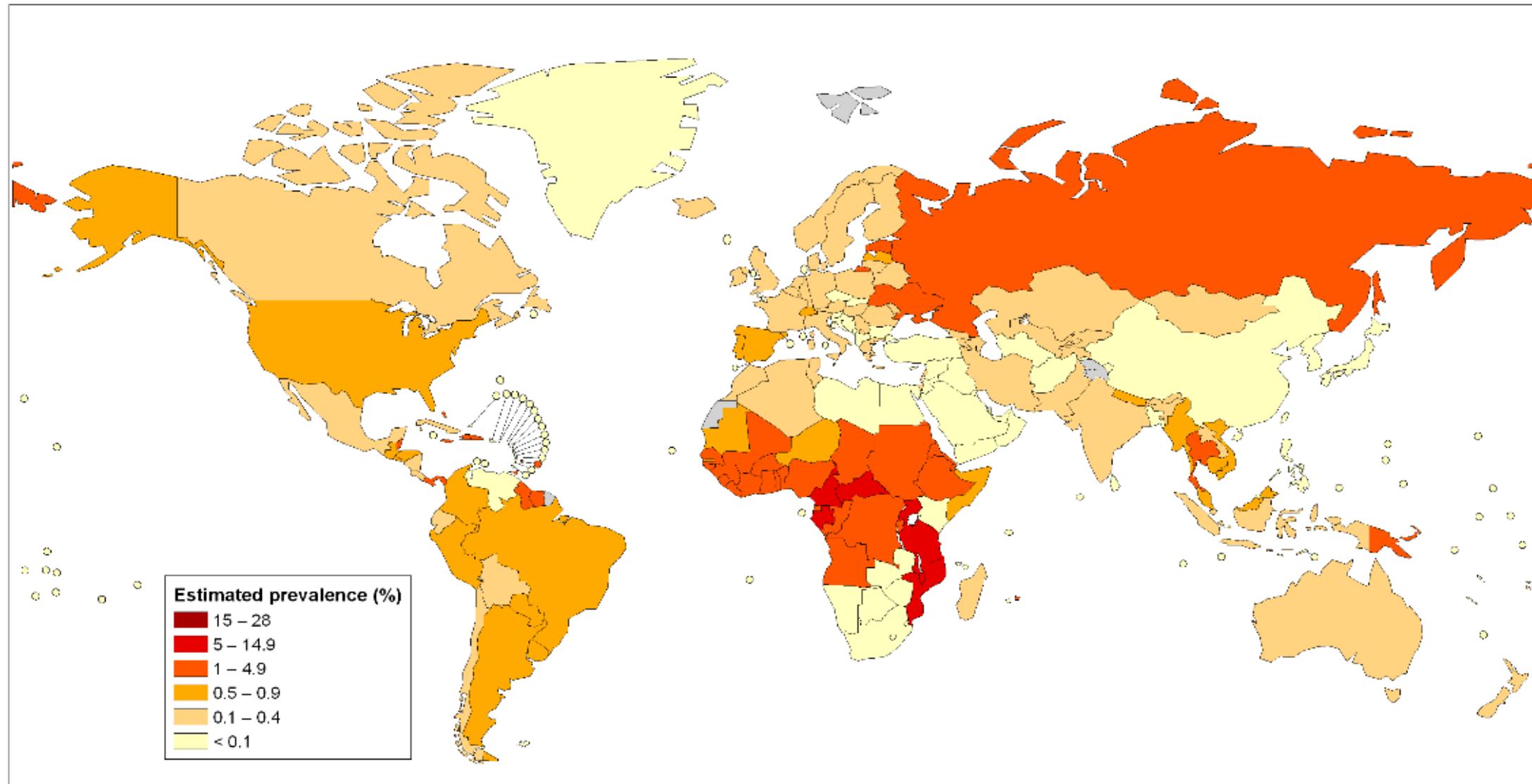
Brandon Vermeer, Danny Breyfogle, Corey Coole,
James Altman, and Carson Mohr

WHAT IS HIV?

- According to the Center for Disease Control (CDC): HIV stands for human immunodeficiency virus
- In 2000, there were 59,807 deaths attributed to HIV
- In 2014, there were 12,333 deaths attributed to HIV
- We want to study if there has been a significant decrease in HIV deaths over time. (We will look at it as a ratio of per 100,000)



HIV estimated prevalence among population aged 15–49 years (%), 2007



The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

Data Source: UNAIDS/World Health Organization
Map Production: Public Health Information
and Geographic Information Systems (GIS)
World Health Organization

INTRODUCTION: QUESTIONS WE WILL LOOK AT

- Are there certain age groups that are more likely to die given they have HIV?
- Has there been a change in mortality rate over the time period in HIV Cases?

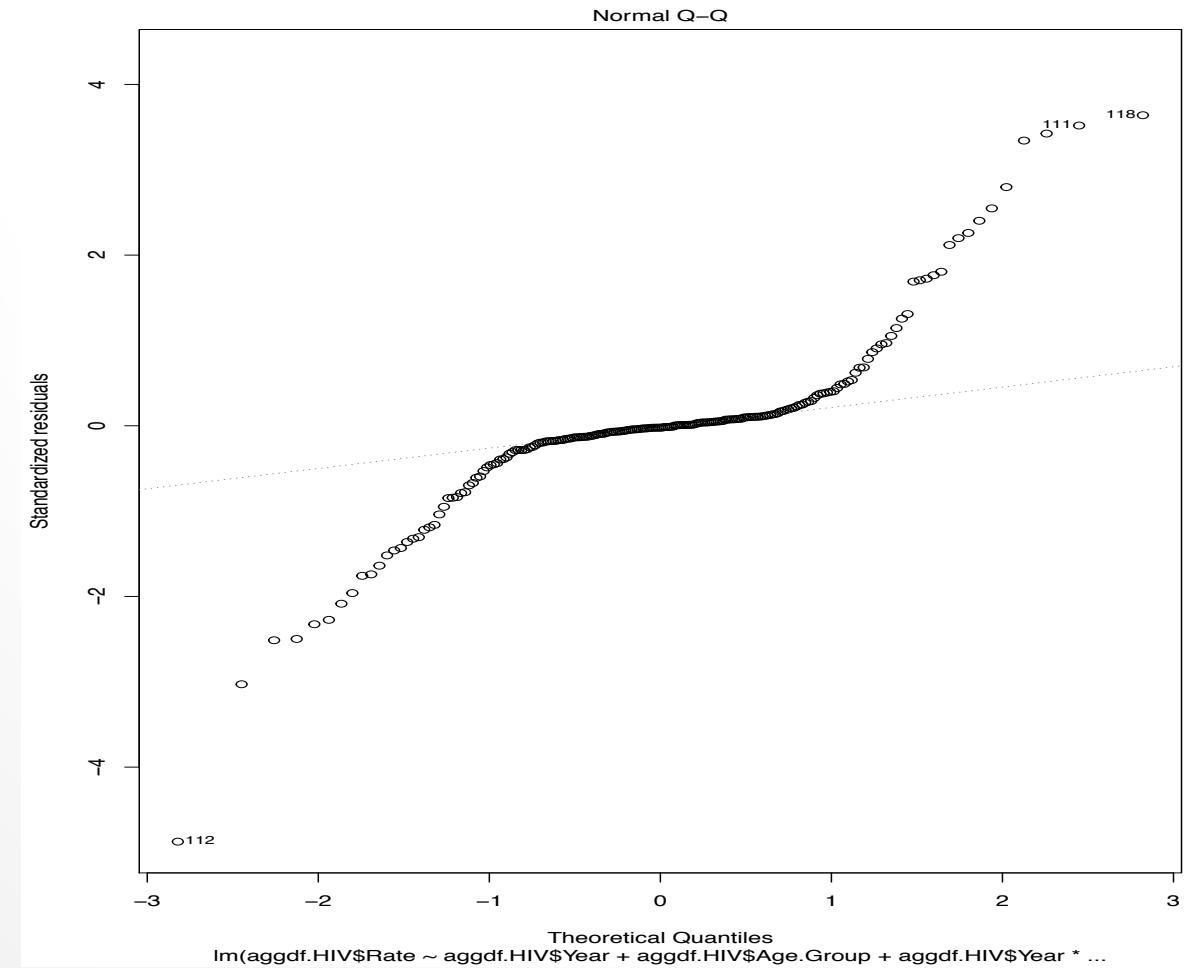
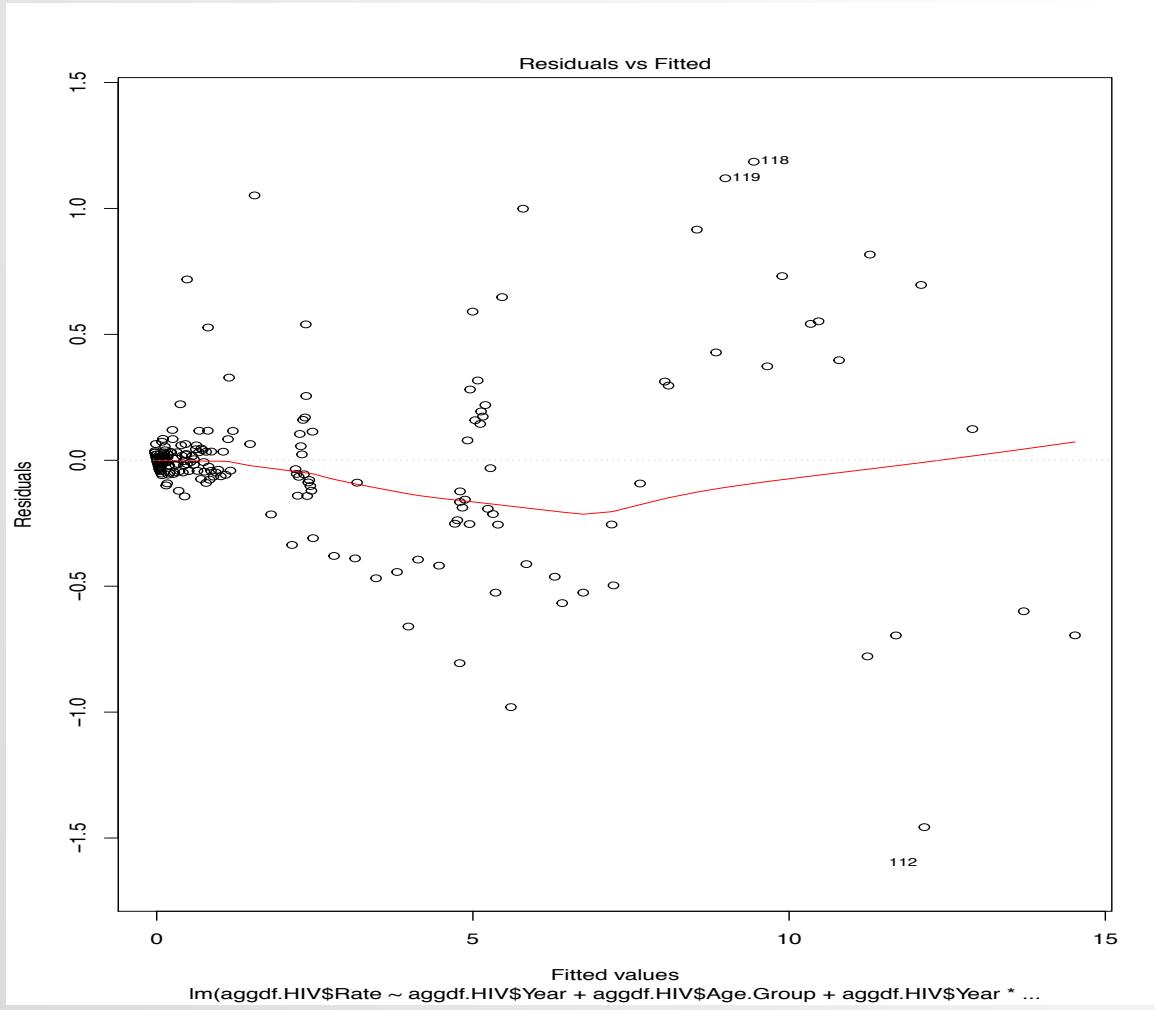
DATA SOURCE

- Data was imported from the CDC website which, “contains mortality and population counts for all U.S. counties. Counts and rates of death can be obtained by underlying cause of death, state, county, age, race, sex, and year” (CDC WONDER).
- The data that we are most interested in though, was that from the years 1999-2015.

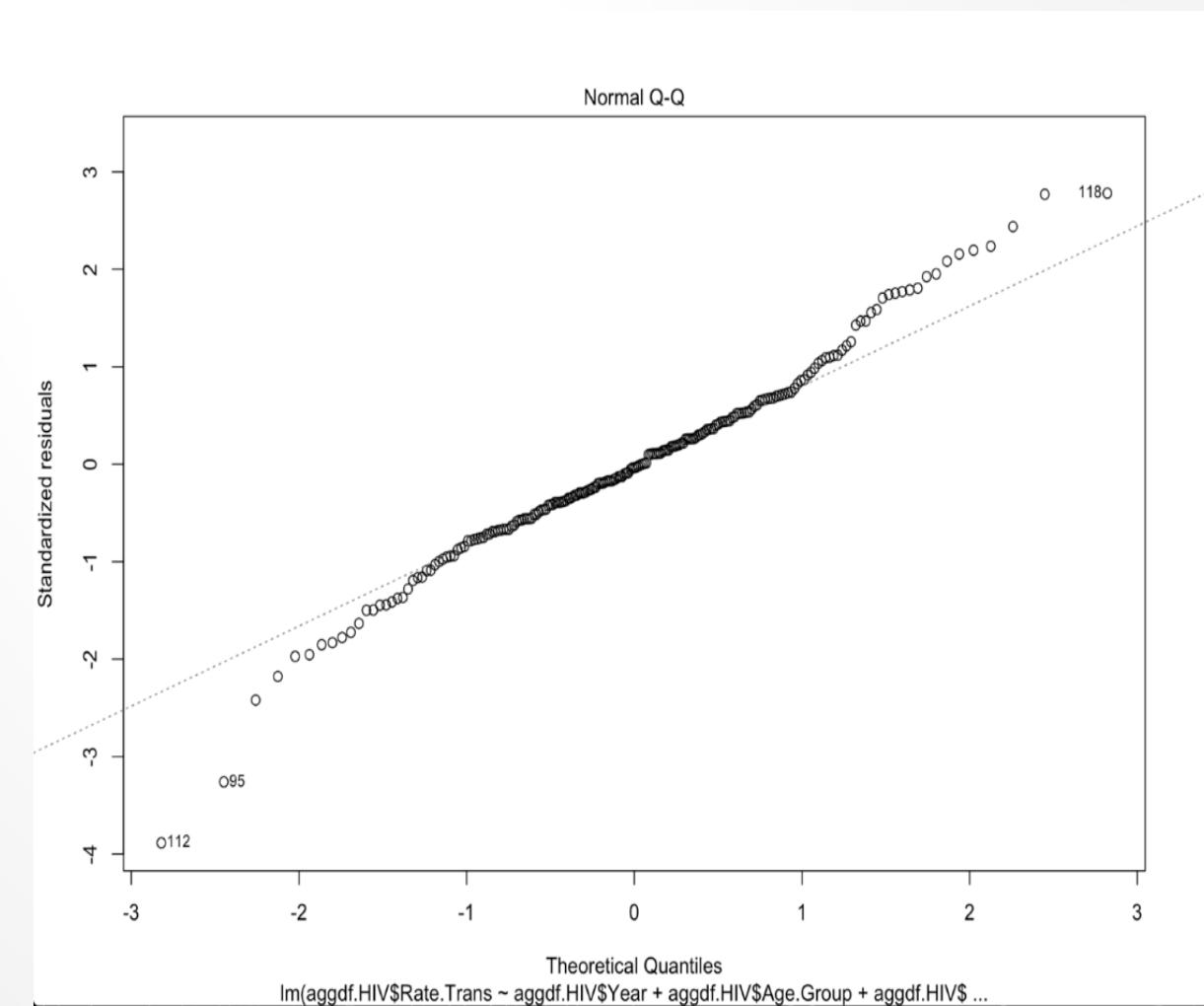
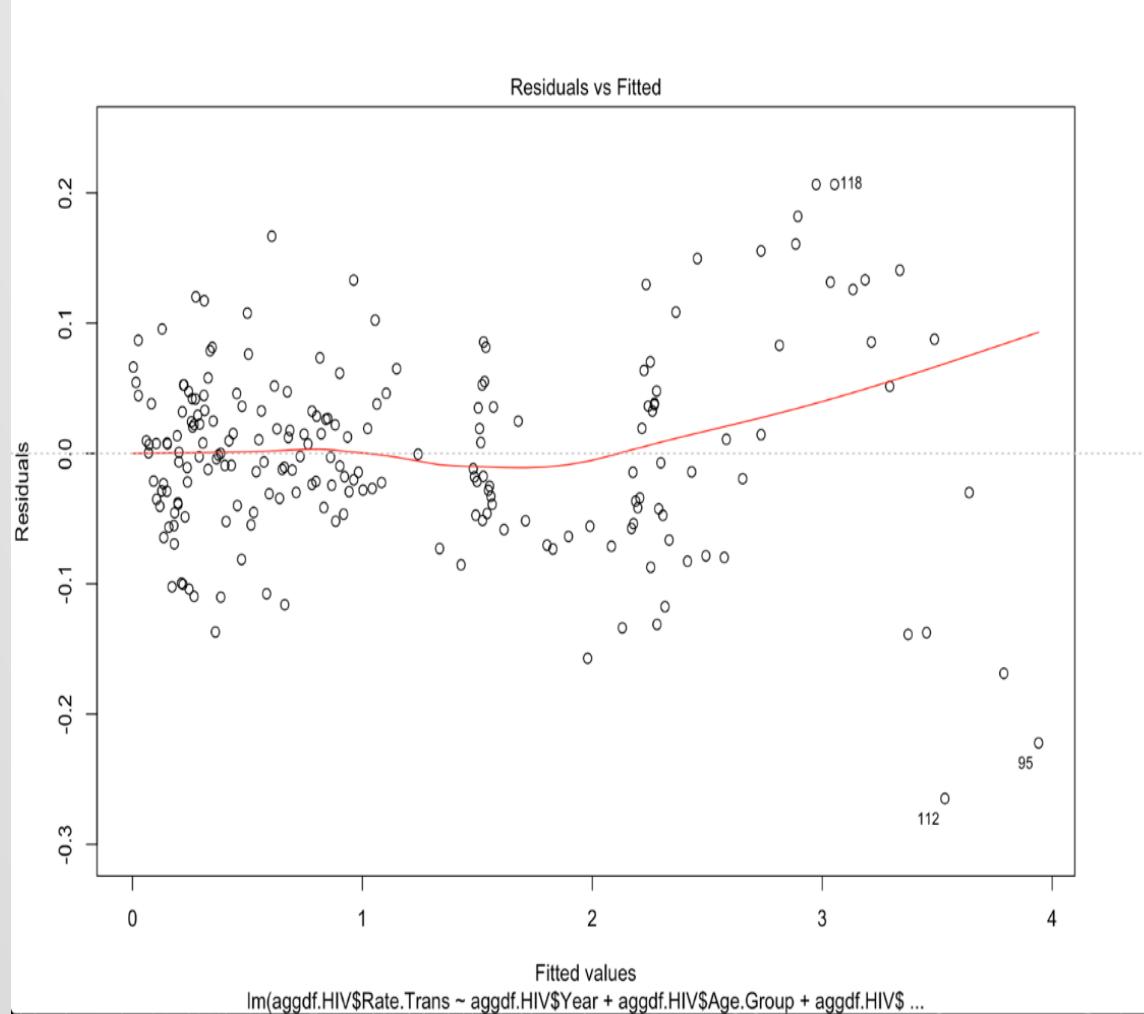


Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™

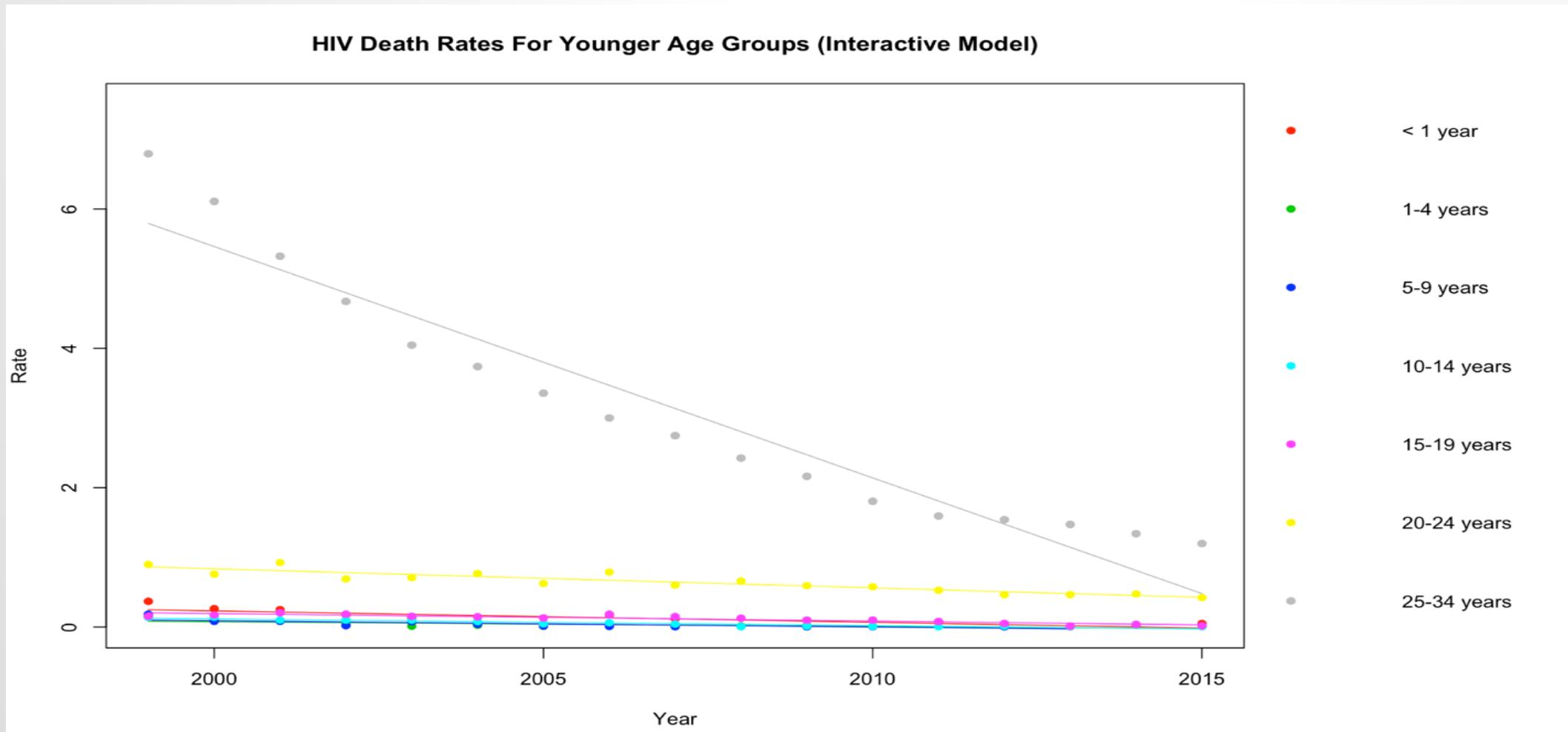
VALIDITY TESTING PRE-TRANSFORMATION



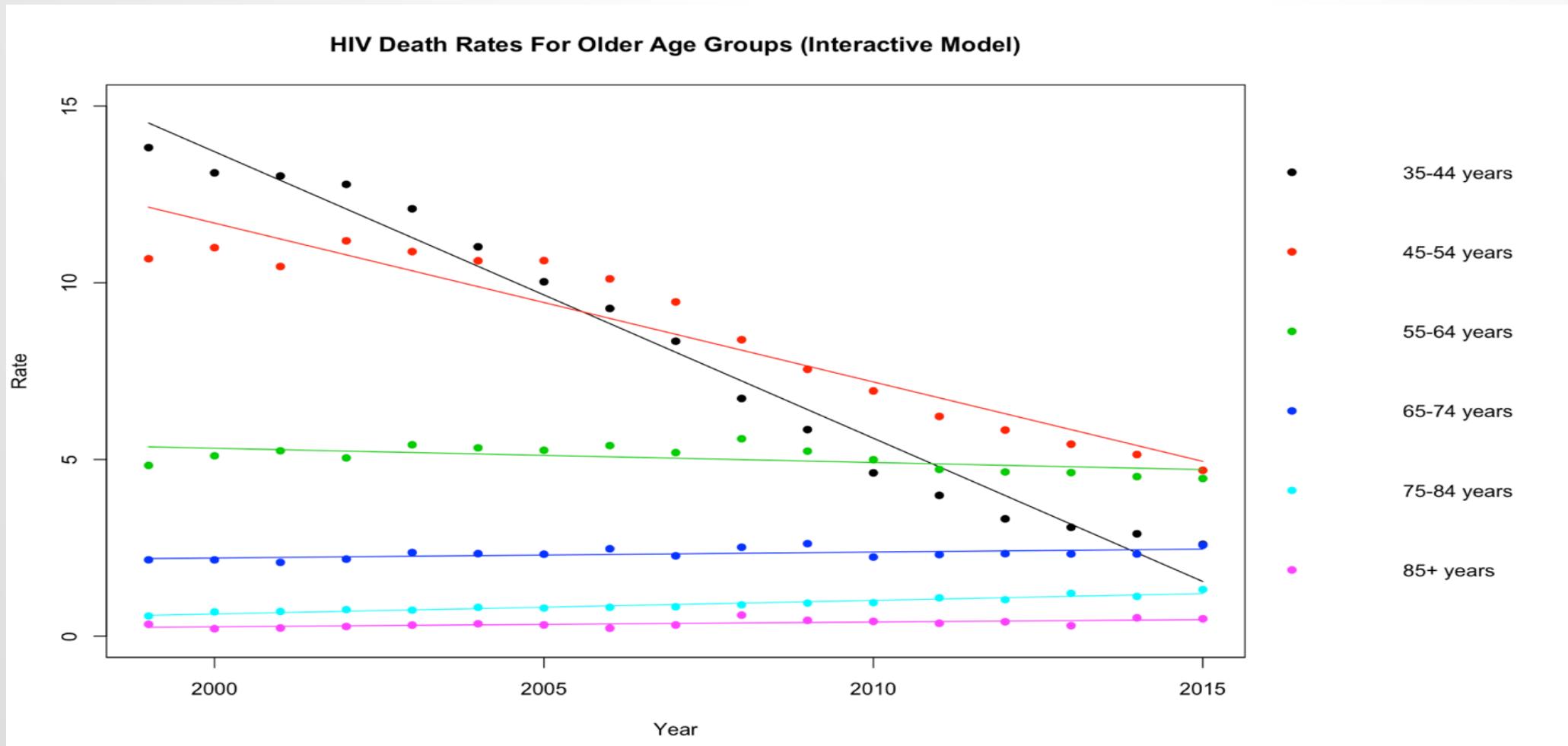
VALIDITY TESTING SQUARE-ROOT TRANSFORMATION



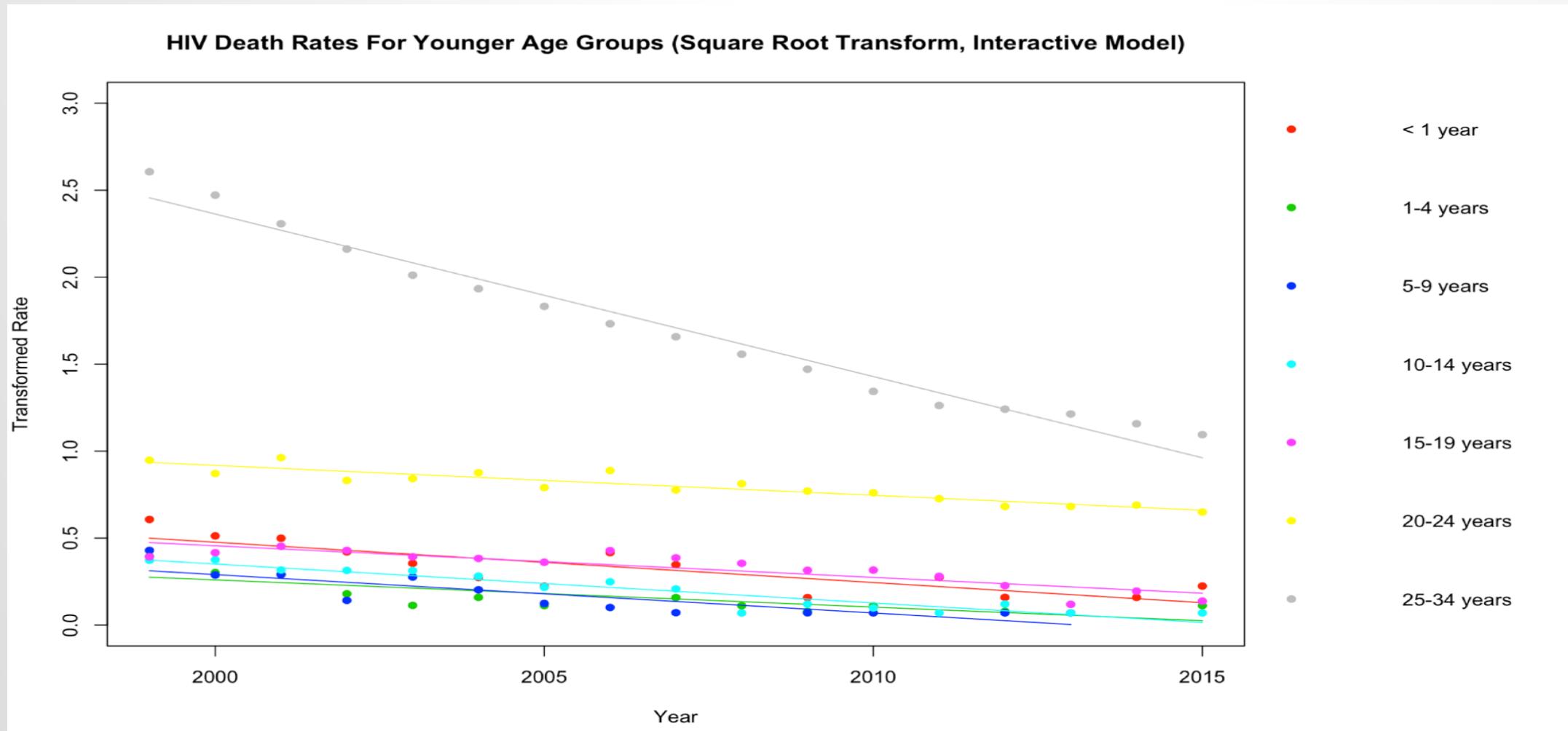
INTERACTION MODEL 0-44 YEARS (PRE-TRANSFORMATION)



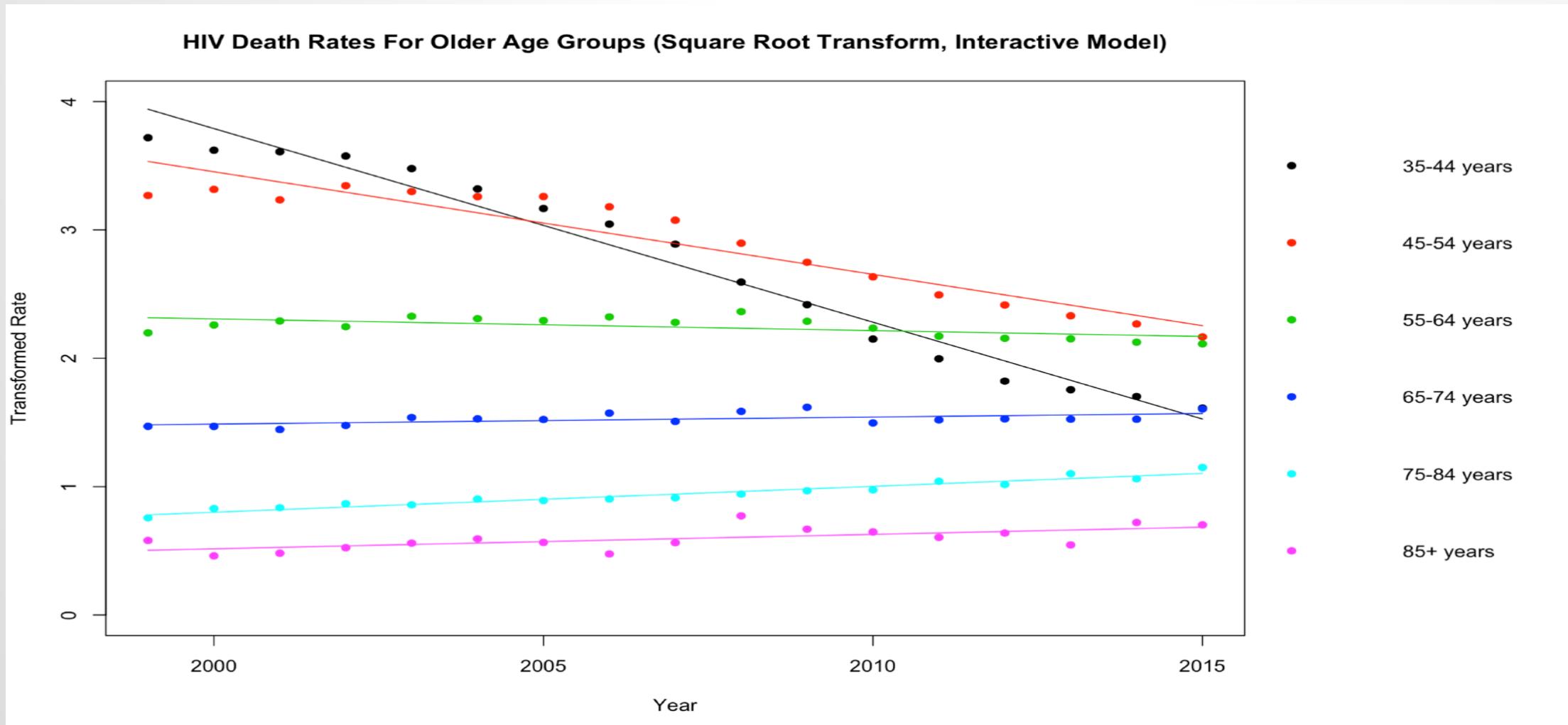
INTERACTION MODEL 44+ YEARS (PRE-TRANSFORMATION)



MODEL: SQRT-DATA TRANSFORMATION 0-44 YEARS



MODEL: SQRT-DATA TRANSFORMATION 44+ YEARS



MODEL SUMMARY

$$\text{SQRT}(RATE) = (4.684E+01) + (-2.318E-02)(YEAR) + (-1.531E+01)(AGE:1-4) + \dots + (3.444E-02)(YEAR * AGE:85+)$$

(Intercept)	4.42e-08	***
aggdf.HIV\$Year	5.40e-08	***
aggdf.HIV\$Age.Group1-4 years	0.2137	
aggdf.HIV\$Age.Group10-14 years	0.8835	
aggdf.HIV\$Age.Group15-19 years	0.3737	
aggdf.HIV\$Age.Group20-24 years	0.3039	
aggdf.HIV\$Age.Group25-34 years	< 2e-16	***
aggdf.HIV\$Age.Group35-44 years	< 2e-16	***
aggdf.HIV\$Age.Group45-54 years	< 2e-16	***
aggdf.HIV\$Age.Group5-9 years	0.8491	
aggdf.HIV\$Age.Group55-64 years	0.0201	*
aggdf.HIV\$Age.Group65-74 years	1.19e-06	***
aggdf.HIV\$Age.Group75-84 years	7.89e-13	***
aggdf.HIV\$Age.Group85+ years	4.97e-09	***
aggdf.HIV\$Year:aggdf.HIV\$Age.Group1-4 years	0.2188	
aggdf.HIV\$Year:aggdf.HIV\$Age.Group10-14 years	0.8917	
aggdf.HIV\$Year:aggdf.HIV\$Age.Group15-19 years	0.3731	
aggdf.HIV\$Year:aggdf.HIV\$Age.Group20-24 years	0.2843	
aggdf.HIV\$Year:aggdf.HIV\$Age.Group25-34 years	< 2e-16	***
aggdf.HIV\$Year:aggdf.HIV\$Age.Group35-44 years	< 2e-16	***
aggdf.HIV\$Year:aggdf.HIV\$Age.Group45-54 years	< 2e-16	***
aggdf.HIV\$Year:aggdf.HIV\$Age.Group5-9 years	0.8601	
aggdf.HIV\$Year:aggdf.HIV\$Age.Group55-64 years	0.0127	*
aggdf.HIV\$Year:aggdf.HIV\$Age.Group65-74 years	7.25e-07	***
aggdf.HIV\$Year:aggdf.HIV\$Age.Group75-84 years	5.71e-13	***
aggdf.HIV\$Year:aggdf.HIV\$Age.Group85+ years	4.39e-09	***

Adjusted R-squared: 0.9941

p-value: < 2.2e-16

$$\text{SQRT}(RATE) = (\text{INTERCEPT}) + (\text{YEAR}) + (\text{AGE.GROUP}) + (\text{YEAR} * \text{AGE.GROUP})$$

CONCLUSION

- Our model as said before can account for about 99.41% of the Data.
- As observed there are certain age groups that have higher mortality rates, those include age groups (25-34), (35-44), and (45-54).
- One major reason as to why this is, is because humans are most sexually active during those times, making it more likely that they are to contract HIV. (CDC)

CONCLUSION CONTINUED

- One major point we did find is that in those three groups, they have had a general decrease in mortality rate.
- Thanks to the World Health Organization, The UN, and the CDC there have been major campaigns to eradicate HIV by 2030 . (UNAIDS)
- What does this mean for the future?

Based off of our model HIV is very well on its way to being eradicated. It has decreased by as much as 2% for specific age groups.

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(n.d.). UNAIDS. Retrieved March 14, 2017, from <http://unaids.org>