



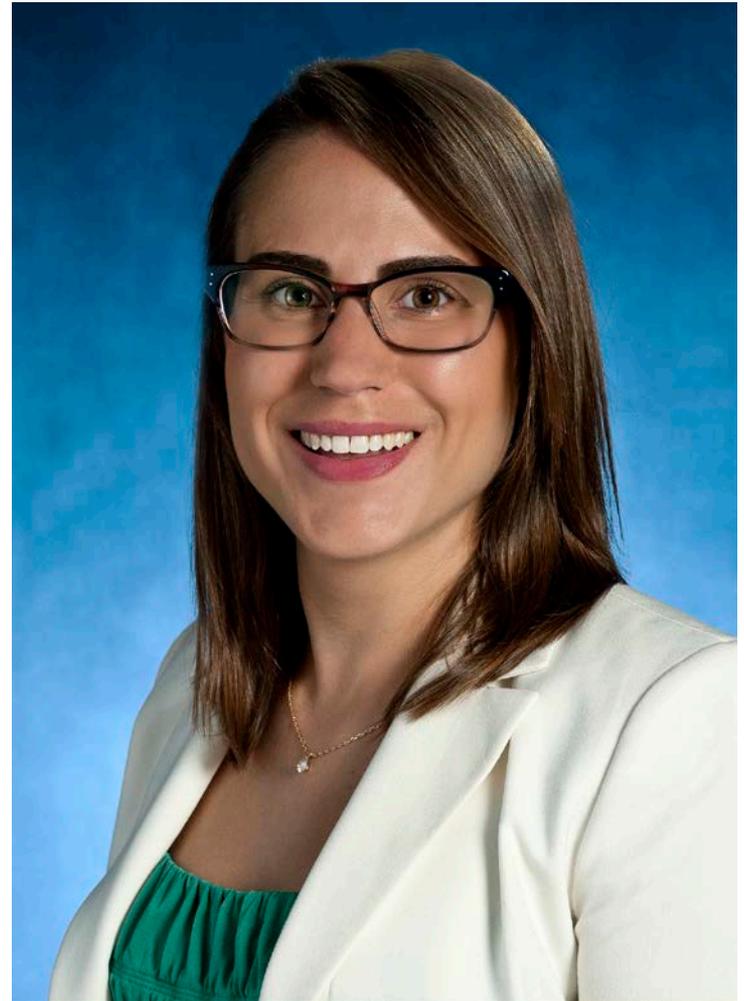
# Whole Genome Sequencing: the consumers' perspective

**Vanessa Coffman, M.S.**

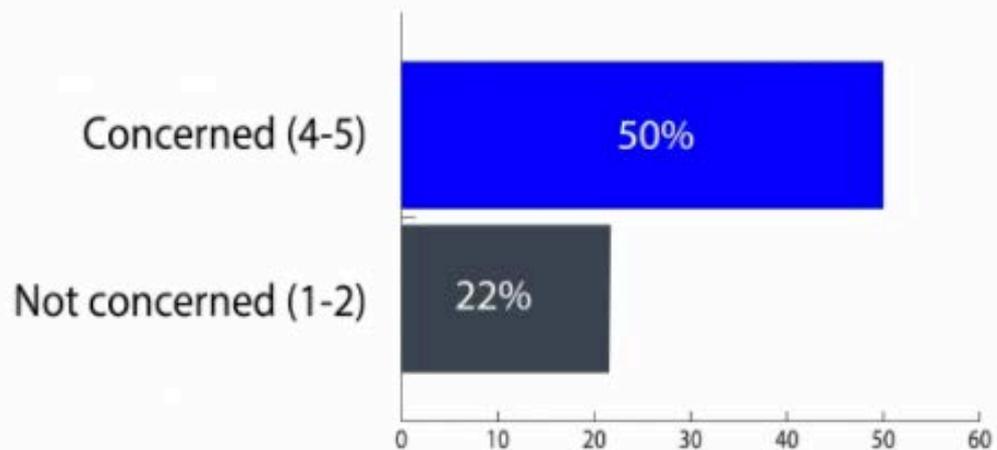
Use of Whole Genome Sequence (WGS) Analysis to  
Improve Food Safety and Public Health  
U.S. Department of Agriculture, Jefferson Auditorium  
October 27, 2017



- Last year of PhD at Johns Hopkins University Bloomberg School of Public Health
- Dissertation work focuses on the health impacts of industrial hog production
- Prior work in food safety, policy, and consumer advocacy
- NACMFC member
- Center for a Livable Future-Lerner Fellow

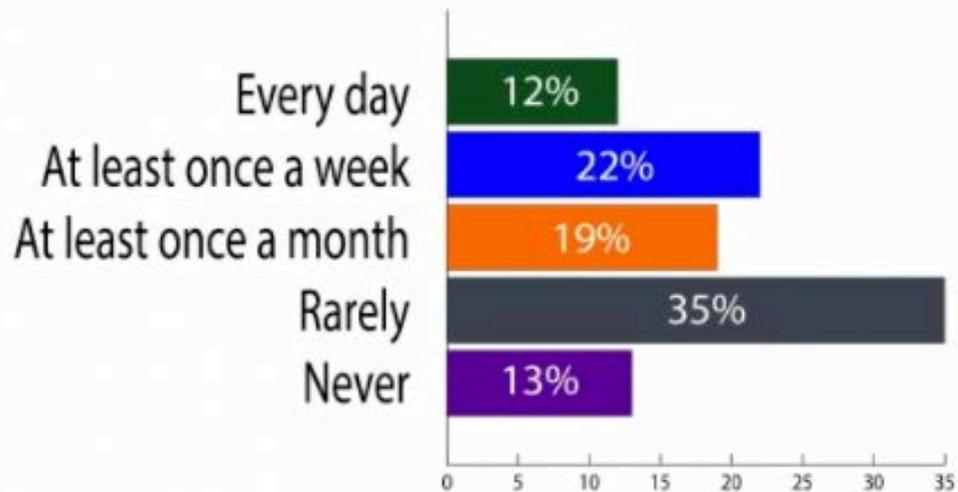


7. Using a 1 to 5 scale, where 1 is not at all concerned and 5 is very concerned, how concerned are you about the safety of the food available for purchase in your community compared to other communities?



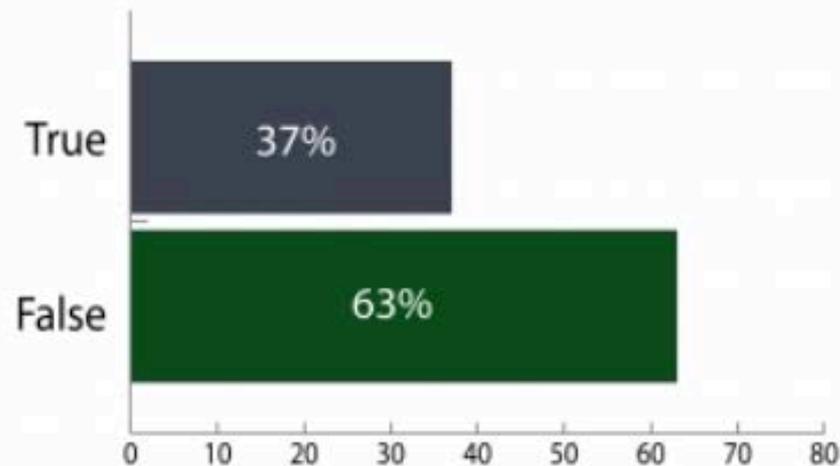
Source: <http://food.msu.edu/articles/msu-food-literacy-and-engagement-poll>

## 5. How often do you seek information about where your food was grown and how it was produced?



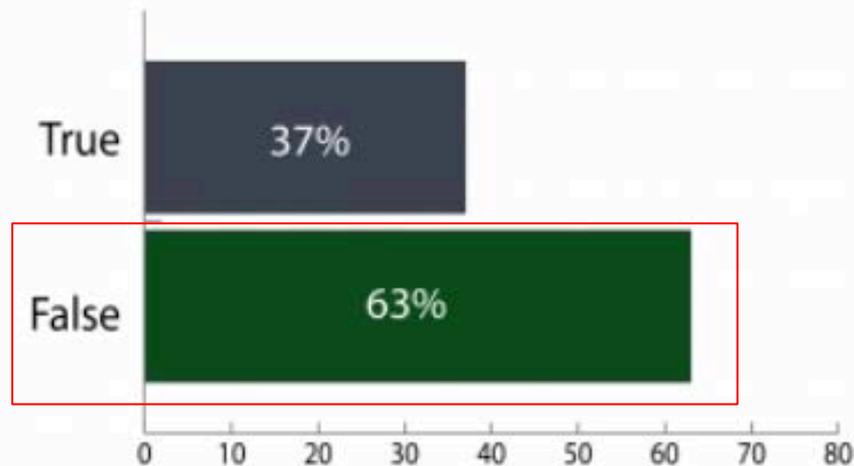
Source: <http://food.msu.edu/articles/msu-food-literacy-and-engagement-poll>

10. Please tell me whether you think the following statement is true or false:  
Genetically modified foods have genes and non-genetically modified foods do not.



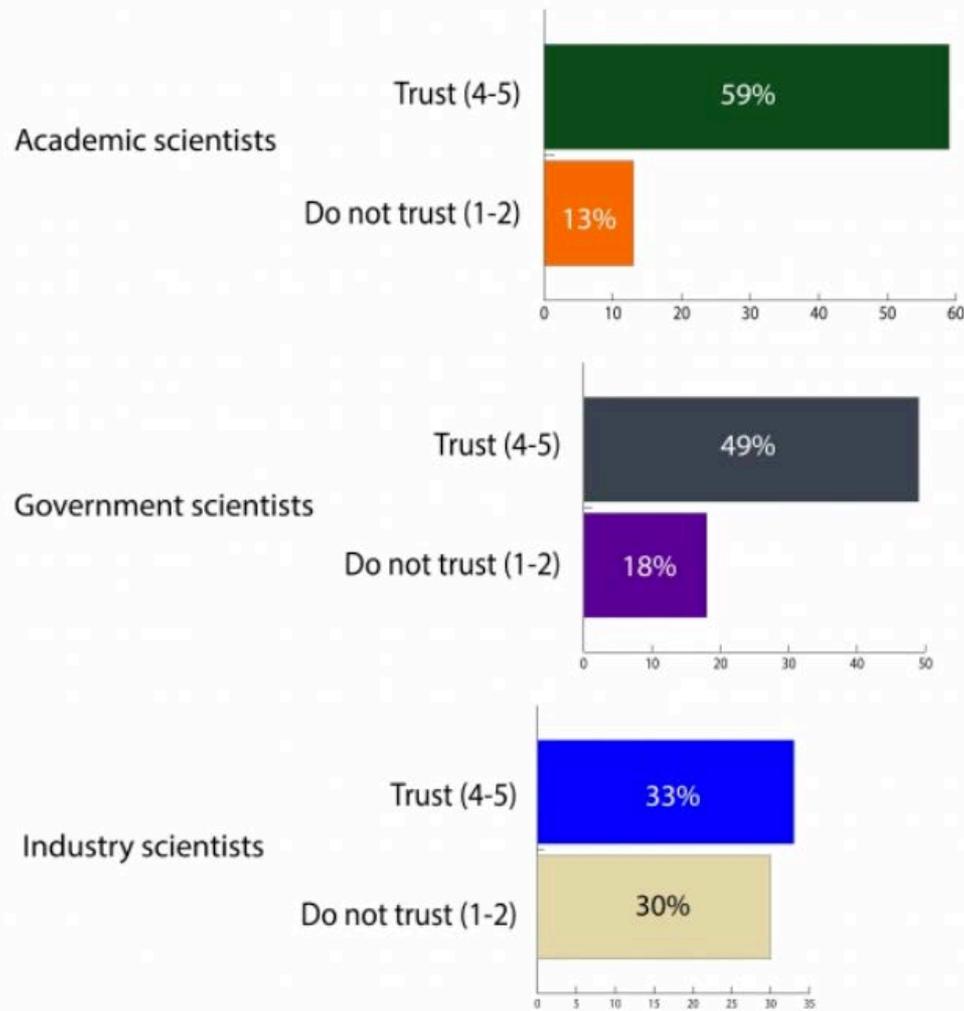
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10. Please tell me whether you think the following statement is true or false:  
Genetically modified foods have genes and non-genetically modified foods do not.



Source: <http://food.msu.edu/articles/msu-food-literacy-and-engagement-poll>

9. Using a 1 to 5 scale, where 1 is do not trust at all and 5 is completely trust, how much do you trust the following individuals or groups when it comes to the health and safety of food?

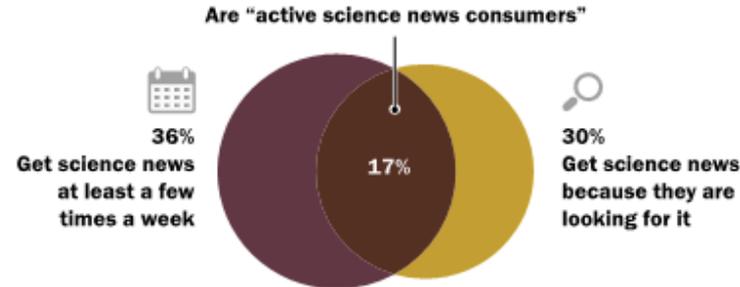


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# One-in-six Americans both actively seek out and frequently consume science news

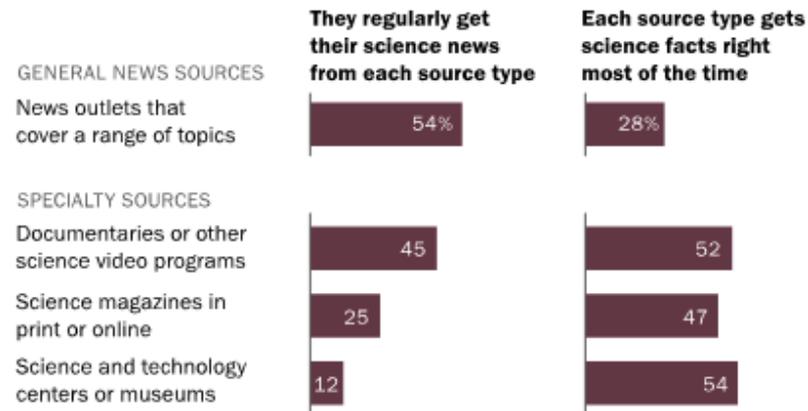
## One-in-six Americans both actively seek out and frequently consume science news

*% of U.S. adults who ...*



## Most Americans get science news from general sources, but fewer see them as accurate

*% of U.S. adults who say ...*



Source: <http://www.journalism.org/2017/09/20/science-news-and-information-today/>

## Most Americans rely on general news outlets for science news, but a minority says they get the facts right about science

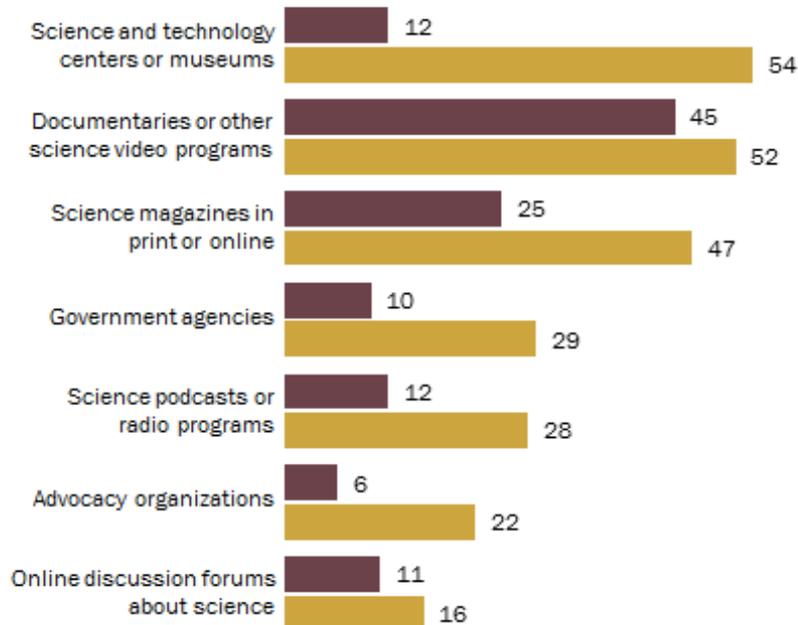
*% of U.S. adults who say ...*

- They regularly get their science news from each source type
- Each source type gets science facts right most of the time

### GENERAL NEWS SOURCES



### SPECIALTY SOURCES



Source: <http://www.journalism.org/2017/09/20/science-news-and-information-today/>

**Table 507.10. Literacy skills of adults, by type of literacy, proficiency levels, and selected characteristics: 2003 (modified)**  
% [Standard error]

	Prose Literacy				Document Literacy				Quantitative Literacy			
	Below basic	Basic	Intermediate	Proficient	Below basic	Basic	Intermediate	Proficient	Below basic	Basic	Intermediate	Proficient
<b>Sex</b>												
Male .....	15 (0.6)	29 (0.7)	43 (0.7)	13 (0.6)	14 (0.6)	23 (0.5)	51 (0.8)	13 (0.6)	21 (0.6)	31 (0.5)	33 (0.5)	16 (0.6)
Female .....	12 (0.6)	29 (0.6)	46 (0.8)	14 (0.6)	11 (0.6)	22 (0.6)	54 (0.8)	13 (0.6)	22 (0.8)	35 (0.7)	32 (0.7)	11 (0.6)
<b>Age</b>												
16 to 18 years old .....	11 (1.7)	37 (2.5)	48 (2.7)	5 (1.4)	11 (1.4)	24 (1.8)	56 (2.4)	9 (1.7)	28 (2.3)	38 (2.1)	28 (2.1)	6 (1.3)
19 to 24 years old .....	11 (1.1)	29 (1.3)	48 (1.5)	12 (1.1)	9 (1.1)	20 (1.2)	58 (1.7)	13 (1.5)	21 (1.4)	36 (1.3)	33 (1.4)	10 (1.1)
25 to 39 years old .....	12 (0.6)	25 (0.7)	45 (0.7)	18 (0.8)	8 (0.7)	19 (0.7)	56 (1.1)	17 (1.1)	17 (0.8)	31 (0.8)	35 (0.8)	17 (0.9)
40 to 54 years old .....	11 (0.9)	27 (1.1)	47 (1.2)	15 (1.1)	10 (0.7)	20 (0.8)	54 (1.1)	15 (0.9)	19 (0.9)	32 (0.8)	34 (0.8)	16 (0.9)
55 to 64 years old .....	13 (0.8)	27 (0.9)	44 (1.1)	15 (0.8)	12 (0.9)	23 (0.9)	54 (1.2)	12 (1.1)	19 (1.0)	30 (0.8)	34 (0.9)	17 (0.8)
65 years old and older .....	23 (1.3)	38 (1.2)	34 (1.4)	4 (0.6)	27 (1.5)	33 (1.0)	38 (1.4)	3 (0.4)	34 (1.6)	37 (1.2)	24 (1.2)	5 (0.6)
<b>Race/ethnicity</b>												
White .....	7 (0.5)	25 (0.8)	51 (0.9)	17 (0.9)	8 (0.5)	19 (0.7)	58 (1.0)	15 (1.0)	13 (0.7)	32 (0.7)	39 (0.8)	17 (0.8)
Black .....	24 (1.4)	43 (1.2)	31 (1.4)	2 (0.4)	24 (1.7)	35 (1.4)	40 (1.9)	2 (0.5)	47 (1.8)	36 (1.3)	15 (1.1)	2 (0.4)
Hispanic .....	44 (1.8)	30 (1.0)	23 (1.1)	4 (0.4)	36 (1.6)	26 (0.8)	33 (1.2)	5 (0.5)	50 (1.7)	29 (0.9)	17 (0.9)	4 (0.5)
Asian/Pacific Islander .....	14 (2.0)	32 (2.2)	42 (2.5)	12 (1.8)	11 (2.2)	22 (2.1)	54 (3.0)	13 (2.3)	19 (3.0)	34 (2.9)	35 (2.8)	12 (2.5)
<b>Highest level of education</b>												
Still in high school .....	14 (2.5)	37 (2.8)	45 (3.1)	4 (1.5)	13 (2.3)	24 (2.2)	54 (3.0)	9 (1.9)	31 (2.9)	38 (2.5)	25 (2.3)	5 (1.4)
Less than high school completion .....	50 (1.4)	33 (1.0)	16 (0.9)	1 (0.2)	45 (1.4)	29 (0.7)	25 (1.0)	2 (0.3)	64 (1.3)	25 (0.8)	10 (0.7)	1 (0.2)
GED/high school equivalency .....	10 (1.8)	45 (2.9)	43 (3.0)	3 (1.1)	13 (1.9)	30 (2.3)	53 (2.8)	4 (1.2)	26 (3.1)	43 (3.1)	28 (2.9)	3 (1.2)
High school graduate .....	13 (1.0)	39 (1.2)	44 (1.3)	4 (0.6)	13 (1.0)	29 (1.1)	52 (1.4)	5 (0.7)	24 (1.4)	42 (1.3)	29 (1.3)	5 (0.7)
Vocational/trade/business .....	10 (1.8)	36 (2.6)	49 (2.7)	5 (1.5)	9 (1.5)	26 (2.3)	59 (2.7)	7 (1.7)	18 (2.1)	41 (2.3)	35 (2.3)	6 (1.4)
Some college .....	5 (0.7)	25 (1.4)	59 (1.7)	11 (1.4)	5 (0.8)	19 (1.3)	65 (1.8)	10 (1.5)	10 (1.2)	36 (1.8)	43 (1.8)	11 (1.5)
Associate's degree .....	4 (0.7)	20 (1.5)	56 (2.0)	19 (2.0)	3 (0.7)	15 (1.5)	66 (2.3)	16 (2.2)	7 (1.1)	30 (1.9)	45 (2.1)	18 (2.1)
Bachelor's degree .....	3 (0.5)	14 (1.0)	53 (1.7)	31 (1.8)	2 (0.6)	11 (1.2)	62 (2.5)	25 (2.7)	4 (0.6)	22 (1.2)	43 (1.5)	31 (1.9)
Graduate studies/degree .....	1 (0.4)	10 (1.2)	48 (2.3)	41 (2.6)	1 (0.4)	9 (1.1)	59 (2.6)	31 (2.8)	3 (0.6)	18 (1.5)	43 (2.1)	36 (2.6)
<b>Language spoken before starting school</b>												
English only .....	9 (0.5)	27 (0.7)	49 (0.8)	15 (0.7)	9 (0.5)	21 (0.6)	56 (0.8)	13 (0.7)	18 (0.6)	33 (0.6)	35 (0.6)	15 (0.6)
English and Spanish .....	14 (2.1)	38 (2.2)	42 (2.4)	6 (1.3)	12 (2.5)	29 (3.0)	54 (3.8)	5 (1.8)	31 (3.3)	39 (2.6)	26 (2.8)	4 (1.3)
English and other language .....	7 (1.5)	33 (2.8)	51 (3.1)	9 (2.1)	10 (2.0)	25 (2.3)	57 (2.9)	8 (2.0)	15 (2.7)	38 (2.7)	34 (3.0)	14 (2.6)
Spanish .....	61 (1.8)	25 (1.1)	13 (0.9)	1 (0.3)	49 (2.0)	25 (1.0)	23 (1.3)	3 (0.4)	62 (2.2)	25 (1.2)	11 (1.1)	2 (0.5)
Other language .....	26 (2.2)	33 (2.0)	34 (2.3)	7 (1.3)	20 (1.9)	24 (1.3)	46 (2.0)	10 (1.2)	28 (2.3)	33 (1.7)	29 (1.9)	10 (1.5)

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1992 National Adult Literacy Survey (NALS) and 2003 National Assessment of Adult Literacy (NAAL), *A First Look at the Literacy of America's Adults in the 21st Century*; and supplemental data retrieved July 6, 2006, from [http://nces.ed.gov/naal/Excel/2006470\\_DataTable.xls](http://nces.ed.gov/naal/Excel/2006470_DataTable.xls). (This table was prepared July 2006.)

**Table 507.10. Literacy skills of adults, by type of literacy, proficiency levels, and selected characteristics: 2003 (modified)**  
% [Standard error]

	Prose Literacy				Document Literacy				Quantitative Literacy			
	Below basic	Basic	Intermediate	Proficient	Below basic	Basic	Intermediate	Proficient	Below basic	Basic	Intermediate	Proficient
<b>Sex</b>												
Male .....	15 (0.6)	29 (0.7)	43 (0.7)	13 (0.6)	14 (0.6)	23 (0.5)	51 (0.8)	13 (0.6)	21 (0.6)	31 (0.5)	33 (0.5)	16 (0.6)
Female .....	12 (0.6)	29 (0.6)	46 (0.8)	14 (0.6)	11 (0.6)	22 (0.6)	54 (0.8)	13 (0.6)	22 (0.8)	35 (0.7)	32 (0.7)	11 (0.6)
<b>Age</b>												
16 to 18 years old .....	11 (1.7)	37 (2.5)	48 (2.7)	5 (1.4)	11 (1.4)	24 (1.8)	56 (2.4)	9 (1.7)	28 (2.3)	38 (2.1)	28 (2.1)	6 (1.3)
19 to 24 years old .....	11 (1.1)	29 (1.3)	48 (1.5)	12 (1.1)	9 (1.1)	20 (1.2)	58 (1.7)	13 (1.5)	21 (1.4)	36 (1.3)	33 (1.4)	10 (1.1)
25 to 39 years old .....	12 (0.6)	25 (0.7)	45 (0.7)	18 (0.8)	8 (0.7)	19 (0.7)	56 (1.1)	17 (1.1)	17 (0.8)	31 (0.8)	35 (0.8)	17 (0.9)
40 to 54 years old .....	11 (0.9)	27 (1.1)	47 (1.2)	15 (1.1)	10 (0.7)	20 (0.8)	54 (1.1)	15 (0.9)	19 (0.9)	32 (0.8)	34 (0.8)	16 (0.9)
55 to 64 years old .....	13 (0.8)	27 (0.9)	44 (1.1)	15 (0.8)	12 (0.9)	23 (0.9)	54 (1.2)	12 (1.1)	19 (1.0)	30 (0.8)	34 (0.9)	17 (0.8)
65 years old and older .....	23 (1.3)	38 (1.2)	34 (1.4)	4 (0.6)	27 (1.5)	33 (1.0)	38 (1.4)	3 (0.4)	34 (1.6)	37 (1.2)	24 (1.2)	5 (0.6)
<b>Race/ethnicity</b>												
White .....	7 (0.5)	25 (0.8)	51 (0.9)	17 (0.9)	8 (0.5)	19 (0.7)	58 (1.0)	15 (1.0)	13 (0.7)	32 (0.7)	39 (0.8)	17 (0.8)
Black .....	24 (1.4)	43 (1.2)	31 (1.4)	2 (0.4)	24 (1.7)	35 (1.4)	40 (1.9)	2 (0.5)	47 (1.8)	36 (1.3)	15 (1.1)	2 (0.4)
Hispanic .....	44 (1.8)	30 (1.0)	23 (1.1)	4 (0.4)	36 (1.6)	26 (0.8)	33 (1.2)	5 (0.5)	50 (1.7)	29 (0.9)	17 (0.9)	4 (0.5)
Asian/Pacific Islander .....	14 (2.0)	32 (2.2)	42 (2.5)	12 (1.8)	11 (2.2)	22 (2.1)	54 (3.0)	13 (2.3)	19 (3.0)	34 (2.9)	35 (2.8)	12 (2.5)
<b>Highest level of education</b>												
Still in high school .....	14 (2.5)	37 (2.8)	45 (3.1)	4 (1.5)	13 (2.3)	24 (2.2)	54 (3.0)	9 (1.9)	31 (2.9)	38 (2.5)	25 (2.3)	5 (1.4)
Less than high school completion .....	50 (1.4)	33 (1.0)	16 (0.9)	1 (0.2)	45 (1.4)	29 (0.7)	25 (1.0)	2 (0.3)	64 (1.3)	25 (0.8)	10 (0.7)	1 (0.2)
GED/high school equivalency .....	10 (1.8)	45 (2.9)	43 (3.0)	3 (1.1)	13 (1.9)	30 (2.3)	53 (2.8)	4 (1.2)	26 (3.1)	43 (3.1)	28 (2.9)	3 (1.2)
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Vocational/trade/business .....	10 (1.8)	36 (2.6)	49 (2.7)	5 (1.5)	9 (1.5)	26 (2.3)	59 (2.7)	7 (1.7)	18 (2.1)	41 (2.3)	35 (2.3)	6 (1.4)
Some college .....	5 (0.7)	25 (1.4)	59 (1.7)	11 (1.4)	5 (0.8)	19 (1.3)	65 (1.8)	10 (1.5)	10 (1.2)	36 (1.8)	43 (1.8)	11 (1.5)
Associate's degree .....	4 (0.7)	20 (1.5)	56 (2.0)	19 (2.0)	3 (0.7)	15 (1.5)	66 (2.3)	16 (2.2)	7 (1.1)	30 (1.9)	45 (2.1)	18 (2.1)
Bachelor's degree .....	3 (0.5)	14 (1.0)	53 (1.7)	31 (1.8)	2 (0.6)	11 (1.2)	62 (2.5)	25 (2.7)	4 (0.6)	22 (1.2)	43 (1.5)	31 (1.9)
Graduate studies/degree .....	1 (0.4)	10 (1.2)	48 (2.3)	41 (2.6)	1 (0.4)	9 (1.1)	59 (2.6)	31 (2.8)	3 (0.6)	18 (1.5)	43 (2.1)	36 (2.6)
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English and Spanish .....	14 (2.1)	38 (2.2)	42 (2.4)	6 (1.3)	12 (2.5)	29 (3.0)	54 (3.8)	5 (1.8)	31 (3.3)	39 (2.6)	26 (2.8)	4 (1.3)
English and other language .....	7 (1.5)	33 (2.8)	51 (3.1)	9 (2.1)	10 (2.0)	25 (2.3)	57 (2.9)	8 (2.0)	15 (2.7)	38 (2.7)	34 (3.0)	14 (2.6)
Spanish .....	61 (1.8)	25 (1.1)	13 (0.9)	1 (0.3)	49 (2.0)	25 (1.0)	23 (1.3)	3 (0.4)	62 (2.2)	25 (1.2)	11 (1.1)	2 (0.5)
Other language .....	26 (2.2)	33 (2.0)	34 (2.3)	7 (1.3)	20 (1.9)	24 (1.3)	46 (2.0)	10 (1.2)	28 (2.3)	33 (1.7)	29 (1.9)	10 (1.5)

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Female .....	12 (0.6)	29 (0.6)	46 (0.8)	14 (0.6)	11 (0.6)	22 (0.6)	54 (0.8)	13 (0.6)	22 (0.8)	35 (0.7)	32 (0.7)	11 (0.6)
<b>Age</b>												
16 to 18 years old .....	11 (1.7)	37 (2.5)	48 (2.7)	5 (1.4)	11 (1.4)	24 (1.8)	56 (2.4)	9 (1.7)	28 (2.3)	38 (2.1)	28 (2.1)	6 (1.3)
19 to 24 years old .....	11 (1.1)	29 (1.3)	48 (1.5)	12 (1.1)	9 (1.1)	20 (1.2)	58 (1.7)	13 (1.5)	21 (1.4)	36 (1.3)	33 (1.4)	10 (1.1)
25 to 39 years old .....	12 (0.6)	25 (0.7)	45 (0.7)	18 (0.8)	8 (0.7)	19 (0.7)	56 (1.1)	17 (1.1)	17 (0.8)	31 (0.8)	35 (0.8)	17 (0.9)
40 to 54 years old .....	11 (0.9)	27 (1.1)	47 (1.2)	15 (1.1)	10 (0.7)	20 (0.8)	54 (1.1)	15 (0.9)	19 (0.9)	32 (0.8)	34 (0.8)	16 (0.9)
55 to 64 years old .....	13 (0.8)	27 (0.9)	44 (1.1)	15 (0.8)	12 (0.9)	23 (0.9)	54 (1.2)	12 (1.1)	19 (1.0)	30 (0.8)	34 (0.9)	17 (0.8)
65 years old and older .....	23 (1.3)	38 (1.2)	34 (1.4)	4 (0.6)	27 (1.5)	33 (1.0)	38 (1.4)	3 (0.4)	34 (1.6)	37 (1.2)	24 (1.2)	5 (0.6)
<b>Race/ethnicity</b>												
White .....	7 (0.5)	25 (0.8)	51 (0.9)	17 (0.9)	8 (0.5)	19 (0.7)	58 (1.0)	15 (1.0)	13 (0.7)	32 (0.7)	39 (0.8)	17 (0.8)
Black .....	24 (1.4)	43 (1.2)	31 (1.4)	2 (0.4)	24 (1.7)	35 (1.4)	40 (1.9)	2 (0.5)	47 (1.8)	36 (1.3)	15 (1.1)	2 (0.4)
Hispanic .....	44 (1.8)	30 (1.0)	23 (1.1)	4 (0.4)	36 (1.6)	26 (0.8)	33 (1.2)	5 (0.5)	50 (1.7)	29 (0.9)	17 (0.9)	4 (0.5)
Asian/Pacific Islander .....	14 (2.0)	32 (2.2)	42 (2.5)	12 (1.8)	11 (2.2)	22 (2.1)	54 (3.0)	13 (2.3)	19 (3.0)	34 (2.9)	35 (2.8)	12 (2.5)
<b>Highest level of education</b>												
Still in high school .....	14 (2.5)	37 (2.8)	45 (3.1)	4 (1.5)	13 (2.3)	24 (2.2)	54 (3.0)	9 (1.9)	31 (2.9)	38 (2.5)	25 (2.3)	5 (1.4)
Less than high school completion .....	50 (1.4)	33 (1.0)	16 (0.9)	1 (0.2)	45 (1.4)	29 (0.7)	25 (1.0)	2 (0.3)	64 (1.3)	25 (0.8)	10 (0.7)	1 (0.2)
GED/high school equivalency .....	10 (1.8)	45 (2.9)	43 (3.0)	3 (1.1)	13 (1.9)	30 (2.3)	53 (2.8)	4 (1.2)	26 (3.1)	43 (3.1)	28 (2.9)	3 (1.2)
High school graduate .....	13 (1.0)	39 (1.2)	44 (1.3)	4 (0.6)	13 (1.0)	29 (1.1)	52 (1.4)	5 (0.7)	24 (1.4)	42 (1.3)	29 (1.3)	5 (0.7)
Vocational/trade/business .....	10 (1.8)	36 (2.6)	49 (2.7)	5 (1.5)	9 (1.5)	26 (2.3)	59 (2.7)	7 (1.7)	18 (2.1)	41 (2.3)	35 (2.3)	6 (1.4)
Some college .....	5 (0.7)	25 (1.4)	59 (1.7)	11 (1.4)	5 (0.8)	19 (1.3)	65 (1.8)	10 (1.5)	10 (1.2)	36 (1.8)	43 (1.8)	11 (1.5)
Associate's degree .....	4 (0.7)	20 (1.5)	56 (2.0)	19 (2.0)	3 (0.7)	15 (1.5)	66 (2.3)	16 (2.2)	7 (1.1)	30 (1.9)	45 (2.1)	18 (2.1)
Bachelor's degree .....	3 (0.5)	14 (1.0)	53 (1.7)	31 (1.8)	2 (0.6)	11 (1.2)	62 (2.5)	25 (2.7)	4 (0.6)	22 (1.2)	43 (1.5)	31 (1.9)
Graduate studies/degree .....	1 (0.4)	10 (1.2)	48 (2.3)	41 (2.6)	1 (0.4)	9 (1.1)	59 (2.6)	31 (2.8)	3 (0.6)	18 (1.5)	43 (2.1)	36 (2.6)
<b>Language spoken before starting school</b>												
English only .....	9 (0.5)	27 (0.7)	49 (0.8)	15 (0.7)	9 (0.5)	21 (0.6)	56 (0.8)	13 (0.7)	18 (0.6)	33 (0.6)	35 (0.6)	15 (0.6)
English and Spanish .....	14 (2.1)	38 (2.2)	42 (2.4)	6 (1.3)	12 (2.5)	29 (3.0)	54 (3.8)	5 (1.8)	31 (3.3)	39 (2.6)	26 (2.8)	4 (1.3)
English and other language .....	7 (1.5)	33 (2.8)	51 (3.1)	9 (2.1)	10 (2.0)	25 (2.3)	57 (2.9)	8 (2.0)	15 (2.7)	38 (2.7)	34 (3.0)	14 (2.6)
Spanish .....	61 (1.8)	25 (1.1)	13 (0.9)	1 (0.3)	49 (2.0)	25 (1.0)	23 (1.3)	3 (0.4)	62 (2.2)	25 (1.2)	11 (1.1)	2 (0.5)
Other language .....	26 (2.2)	33 (2.0)	34 (2.3)	7 (1.3)	20 (1.9)	24 (1.3)	46 (2.0)	10 (1.2)	28 (2.3)	33 (1.7)	29 (1.9)	10 (1.5)

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1992 National Adult Literacy Survey (NALS) and 2003 National Assessment of Adult Literacy (NAAL), *A First Look at the Literacy of America's Adults in the 21st Century*; and supplemental data retrieved July 6, 2006, from [http://nces.ed.gov/naal/Excel/2006470\\_DataTable.xls](http://nces.ed.gov/naal/Excel/2006470_DataTable.xls). (This table was prepared July 2006.)

**Table 507.10. Literacy skills of adults, by type of literacy, proficiency levels, and selected characteristics: 2003 (modified)**  
% [Standard error]

	Prose Literacy				Document Literacy				Quantitative Literacy			
	Below basic	Basic	Intermediate	Proficient	Below basic	Basic	Intermediate	Proficient	Below basic	Basic	Intermediate	Proficient
<b>Sex</b>												
Male .....	15 (0.6)	29 (0.7)	43 (0.7)	13 (0.6)	14 (0.6)	23 (0.5)	51 (0.8)	13 (0.6)	21 (0.6)	31 (0.5)	33 (0.5)	16 (0.6)
Female .....	12 (0.6)	29 (0.6)	46 (0.8)	14 (0.6)	11 (0.6)	22 (0.6)	54 (0.8)	13 (0.6)	22 (0.8)	35 (0.7)	32 (0.7)	11 (0.6)
<b>Age</b>												
16 to 18 years old .....	11 (1.7)	37 (2.5)	48 (2.7)	5 (1.4)	11 (1.4)	24 (1.8)	56 (2.4)	9 (1.7)	28 (2.3)	38 (2.1)	28 (2.1)	6 (1.3)
19 to 24 years old .....	11 (1.1)	29 (1.3)	48 (1.5)	12 (1.1)	9 (1.1)	20 (1.2)	58 (1.7)	13 (1.5)	21 (1.4)	36 (1.3)	33 (1.4)	10 (1.1)
25 to 39 years old .....	12 (0.6)	25 (0.7)	45 (0.7)	18 (0.8)	8 (0.7)	19 (0.7)	56 (1.1)	17 (1.1)	17 (0.8)	31 (0.8)	35 (0.8)	17 (0.9)
40 to 54 years old .....	11 (0.9)	27 (1.1)	47 (1.2)	15 (1.1)	10 (0.7)	20 (0.8)	54 (1.1)	15 (0.9)	19 (0.9)	32 (0.8)	34 (0.8)	16 (0.9)
55 to 64 years old .....	13 (0.8)	27 (0.9)	44 (1.1)	15 (0.8)	12 (0.9)	23 (0.9)	54 (1.2)	12 (1.1)	19 (1.0)	30 (0.8)	34 (0.9)	17 (0.8)
65 years old and older .....	23 (1.3)	38 (1.2)	34 (1.4)	4 (0.6)	27 (1.5)	33 (1.0)	38 (1.4)	3 (0.4)	34 (1.6)	37 (1.2)	24 (1.2)	5 (0.6)
<b>Race/ethnicity</b>												
White .....	7 (0.5)	25 (0.8)	51 (0.9)	17 (0.9)	8 (0.5)	19 (0.7)	58 (1.0)	15 (1.0)	13 (0.7)	32 (0.7)	39 (0.8)	17 (0.8)
Black .....	24 (1.4)	43 (1.2)	31 (1.4)	2 (0.4)	24 (1.7)	35 (1.4)	40 (1.9)	2 (0.5)	47 (1.8)	36 (1.3)	15 (1.1)	2 (0.4)
Hispanic .....	44 (1.8)	30 (1.0)	23 (1.1)	4 (0.4)	36 (1.6)	26 (0.8)	33 (1.2)	5 (0.5)	50 (1.7)	29 (0.9)	17 (0.9)	4 (0.5)
Asian/Pacific Islander .....	14 (2.0)	32 (2.2)	42 (2.5)	12 (1.8)	11 (2.2)	22 (2.1)	54 (3.0)	13 (2.3)	19 (3.0)	34 (2.9)	35 (2.8)	12 (2.5)
<b>Highest level of education</b>												
Still in high school .....	14 (2.5)	37 (2.8)	45 (3.1)	4 (1.5)	13 (2.3)	24 (2.2)	54 (3.0)	9 (1.9)	31 (2.9)	38 (2.5)	25 (2.3)	5 (1.4)
Less than high school completion .....	50 (1.4)	33 (1.0)	16 (0.9)	1 (0.2)	45 (1.4)	29 (0.7)	25 (1.0)	2 (0.3)	64 (1.3)	25 (0.8)	10 (0.7)	1 (0.2)
GED/high school equivalency .....	10 (1.8)	45 (2.9)	43 (3.0)	3 (1.1)	13 (1.9)	30 (2.3)	53 (2.8)	4 (1.2)	26 (3.1)	43 (3.1)	28 (2.9)	3 (1.2)
High school graduate .....	13 (1.0)	39 (1.2)	44 (1.3)	4 (0.6)	13 (1.0)	29 (1.1)	52 (1.4)	5 (0.7)	24 (1.4)	42 (1.3)	29 (1.3)	5 (0.7)
Vocational/trade/business .....	10 (1.8)	36 (2.6)	49 (2.7)	5 (1.5)	9 (1.5)	26 (2.3)	59 (2.7)	7 (1.7)	18 (2.1)	41 (2.3)	35 (2.3)	6 (1.4)
Some college .....	5 (0.7)	25 (1.4)	59 (1.7)	11 (1.4)	5 (0.8)	19 (1.3)	65 (1.8)	10 (1.5)	10 (1.2)	36 (1.8)	43 (1.8)	11 (1.5)
Associate's degree .....	4 (0.7)	20 (1.5)	56 (2.0)	19 (2.0)	3 (0.7)	15 (1.5)	66 (2.3)	16 (2.2)	7 (1.1)	30 (1.9)	45 (2.1)	18 (2.1)
Bachelor's degree .....	3 (0.5)	14 (1.0)	53 (1.7)	31 (1.8)	2 (0.6)	11 (1.2)	62 (2.5)	25 (2.7)	4 (0.6)	22 (1.2)	43 (1.5)	31 (1.9)
Graduate studies/degree .....	1 (0.4)	10 (1.2)	48 (2.3)	41 (2.6)	1 (0.4)	9 (1.1)	59 (2.6)	31 (2.8)	3 (0.6)	18 (1.5)	43 (2.1)	36 (2.6)
<b>Language spoken before starting school</b>												
English only .....	9 (0.5)	27 (0.7)	49 (0.8)	15 (0.7)	9 (0.5)	21 (0.6)	56 (0.8)	13 (0.7)	18 (0.6)	33 (0.6)	35 (0.6)	15 (0.6)
English and Spanish .....	14 (2.1)	38 (2.2)	42 (2.4)	6 (1.3)	12 (2.5)	29 (3.0)	54 (3.8)	5 (1.8)	31 (3.3)	39 (2.6)	26 (2.8)	4 (1.3)
English and other language .....	7 (1.5)	33 (2.8)	51 (3.1)	9 (2.1)	10 (2.0)	25 (2.3)	57 (2.9)	8 (2.0)	15 (2.7)	38 (2.7)	34 (3.0)	14 (2.6)
Spanish .....	61 (1.8)	25 (1.1)	13 (0.9)	1 (0.3)	49 (2.0)	25 (1.0)	23 (1.3)	3 (0.4)	62 (2.2)	25 (1.2)	11 (1.1)	2 (0.5)
Other language .....	26 (2.2)	33 (2.0)	34 (2.3)	7 (1.3)	20 (1.9)	24 (1.3)	46 (2.0)	10 (1.2)	28 (2.3)	33 (1.7)	29 (1.9)	10 (1.5)

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1992 National Adult Literacy Survey (NALS) and 2003 National Assessment of Adult Literacy (NAAL), *A First Look at the Literacy of America's Adults in the 21st Century*; and supplemental data retrieved July 6, 2006, from [http://nces.ed.gov/naal/Excel/2006470\\_DataTable.xls](http://nces.ed.gov/naal/Excel/2006470_DataTable.xls). (This table was prepared July 2006.)

**Table 507.10. Literacy skills of adults, by type of literacy, proficiency levels, and selected characteristics: 2003 (modified)**  
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	Prose Literacy				Document Literacy				Quantitative Literacy			
	Below basic	Basic	Intermediate	Proficient	Below basic	Basic	Intermediate	Proficient	Below basic	Basic	Intermediate	Proficient
<b>Sex</b>												
Male .....	15 (0.6)	29 (0.7)	43 (0.7)	13 (0.6)	14 (0.6)	23 (0.5)	51 (0.8)	13 (0.6)	21 (0.6)	31 (0.5)	33 (0.5)	16 (0.6)
Female .....	12 (0.6)	29 (0.6)	46 (0.8)	14 (0.6)	11 (0.6)	22 (0.6)	54 (0.8)	13 (0.6)	22 (0.8)	35 (0.7)	32 (0.7)	11 (0.6)
<b>Age</b>												
16 to 18 years old .....	11 (1.7)	37 (2.5)	48 (2.7)	5 (1.4)	11 (1.4)	24 (1.8)	56 (2.4)	9 (1.7)	28 (2.3)	38 (2.1)	28 (2.1)	6 (1.3)
19 to 24 years old .....	11 (1.1)	29 (1.3)	48 (1.5)	12 (1.1)	9 (1.1)	20 (1.2)	58 (1.7)	13 (1.5)	21 (1.4)	36 (1.3)	33 (1.4)	10 (1.1)
25 to 39 years old .....	12 (0.6)	25 (0.7)	45 (0.7)	18 (0.8)	8 (0.7)	19 (0.7)	56 (1.1)	17 (1.1)	17 (0.8)	31 (0.8)	35 (0.8)	17 (0.9)
40 to 54 years old .....	11 (0.9)	27 (1.1)	47 (1.2)	15 (1.1)	10 (0.7)	20 (0.8)	54 (1.1)	15 (0.9)	19 (0.9)	32 (0.8)	34 (0.8)	16 (0.9)
55 to 64 years old .....	13 (0.8)	27 (0.9)	44 (1.1)	15 (0.8)	12 (0.9)	23 (0.9)	54 (1.2)	12 (1.1)	19 (1.0)	30 (0.8)	34 (0.9)	17 (0.8)
65 years old and older .....	23 (1.3)	38 (1.2)	34 (1.4)	4 (0.6)	27 (1.5)	33 (1.0)	38 (1.4)	3 (0.4)	34 (1.6)	37 (1.2)	24 (1.2)	5 (0.6)
<b>Race/ethnicity</b>												
White .....	7 (0.5)	25 (0.8)	51 (0.9)	17 (0.9)	8 (0.5)	19 (0.7)	58 (1.0)	15 (1.0)	13 (0.7)	32 (0.7)	39 (0.8)	17 (0.8)
Black .....	24 (1.4)	43 (1.2)	31 (1.4)	2 (0.4)	24 (1.7)	35 (1.4)	40 (1.9)	2 (0.5)	47 (1.8)	36 (1.3)	15 (1.1)	2 (0.4)
Hispanic .....	44 (1.8)	30 (1.0)	23 (1.1)	4 (0.4)	36 (1.6)	26 (0.8)	33 (1.2)	5 (0.5)	50 (1.7)	29 (0.9)	17 (0.9)	4 (0.5)
Asian/Pacific Islander .....	14 (2.0)	32 (2.2)	42 (2.5)	12 (1.8)	11 (2.2)	22 (2.1)	54 (3.0)	13 (2.3)	19 (3.0)	34 (2.9)	35 (2.8)	12 (2.5)
<b>Highest level of education</b>												
Still in high school .....	14 (2.5)	37 (2.8)	45 (3.1)	4 (1.5)	13 (2.3)	24 (2.2)	54 (3.0)	9 (1.9)	31 (2.9)	38 (2.5)	25 (2.3)	5 (1.4)
Less than high school completion ..	50 (1.4)	33 (1.0)	16 (0.9)	1 (0.2)	45 (1.4)	29 (0.7)	25 (1.0)	2 (0.3)	64 (1.3)	25 (0.8)	10 (0.7)	1 (0.2)
GED/high school equivalency .....	10 (1.8)	45 (2.9)	43 (3.0)	3 (1.1)	13 (1.9)	30 (2.3)	53 (2.8)	4 (1.2)	26 (3.1)	43 (3.1)	28 (2.9)	3 (1.2)
High school graduate .....	13 (1.0)	39 (1.2)	44 (1.3)	4 (0.6)	13 (1.0)	29 (1.1)	52 (1.4)	5 (0.7)	24 (1.4)	42 (1.3)	29 (1.3)	5 (0.7)
Vocational/trade/business .....	10 (1.8)	36 (2.6)	49 (2.7)	5 (1.5)	9 (1.5)	26 (2.3)	59 (2.7)	7 (1.7)	18 (2.1)	41 (2.3)	35 (2.3)	6 (1.4)
Some college .....	5 (0.7)	25 (1.4)	59 (1.7)	11 (1.4)	5 (0.8)	19 (1.3)	65 (1.8)	10 (1.5)	10 (1.2)	36 (1.8)	43 (1.8)	11 (1.5)
Associate's degree .....	4 (0.7)	20 (1.5)	56 (2.0)	19 (2.0)	3 (0.7)	15 (1.5)	66 (2.3)	16 (2.2)	7 (1.1)	30 (1.9)	45 (2.1)	18 (2.1)
Bachelor's degree .....	3 (0.5)	14 (1.0)	53 (1.7)	31 (1.8)	2 (0.6)	11 (1.2)	62 (2.5)	25 (2.7)	4 (0.6)	22 (1.2)	43 (1.5)	31 (1.9)
Graduate studies/degree .....	1 (0.4)	10 (1.2)	48 (2.3)	41 (2.6)	1 (0.4)	9 (1.1)	59 (2.6)	31 (2.8)	3 (0.6)	18 (1.5)	43 (2.1)	36 (2.6)
<b>Language spoken before starting school</b>												
English only .....	9 (0.5)	27 (0.7)	49 (0.8)	15 (0.7)	9 (0.5)	21 (0.6)	56 (0.8)	13 (0.7)	18 (0.6)	33 (0.6)	35 (0.6)	15 (0.6)
English and Spanish .....	14 (2.1)	38 (2.2)	42 (2.4)	6 (1.3)	12 (2.5)	29 (3.0)	54 (3.8)	5 (1.8)	31 (3.3)	39 (2.6)	26 (2.8)	4 (1.3)
English and other language .....	7 (1.5)	33 (2.8)	51 (3.1)	9 (2.1)	10 (2.0)	25 (2.3)	57 (2.9)	8 (2.0)	15 (2.7)	38 (2.7)	34 (3.0)	14 (2.6)
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# Positives

Consumers

Consumer groups

Concerns

The path forward

# Positives

- “All WGS data will continue to be uploaded to a Federal database that is readily accessible to all food safety and public health partners and stakeholders, including consumers.” – *Federal Register, 2017*

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  - Communication
  - Unique database for food safety relevance
- Increase consumer confidence in USDA/FDA results and safety
- Decrease in illnesses and outbreaks
- Rapid
- Sensitive and specific test
- Track antimicrobial resistance
- Don't need to know the target

# Drawbacks

Consumers

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Concerns

The path forward

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- What happens when this system fails?
  - Humans, versus computers (black box)
- Bioinformatic bottleneck
  - Working on this
  - Developing a relevant/efficient reference database

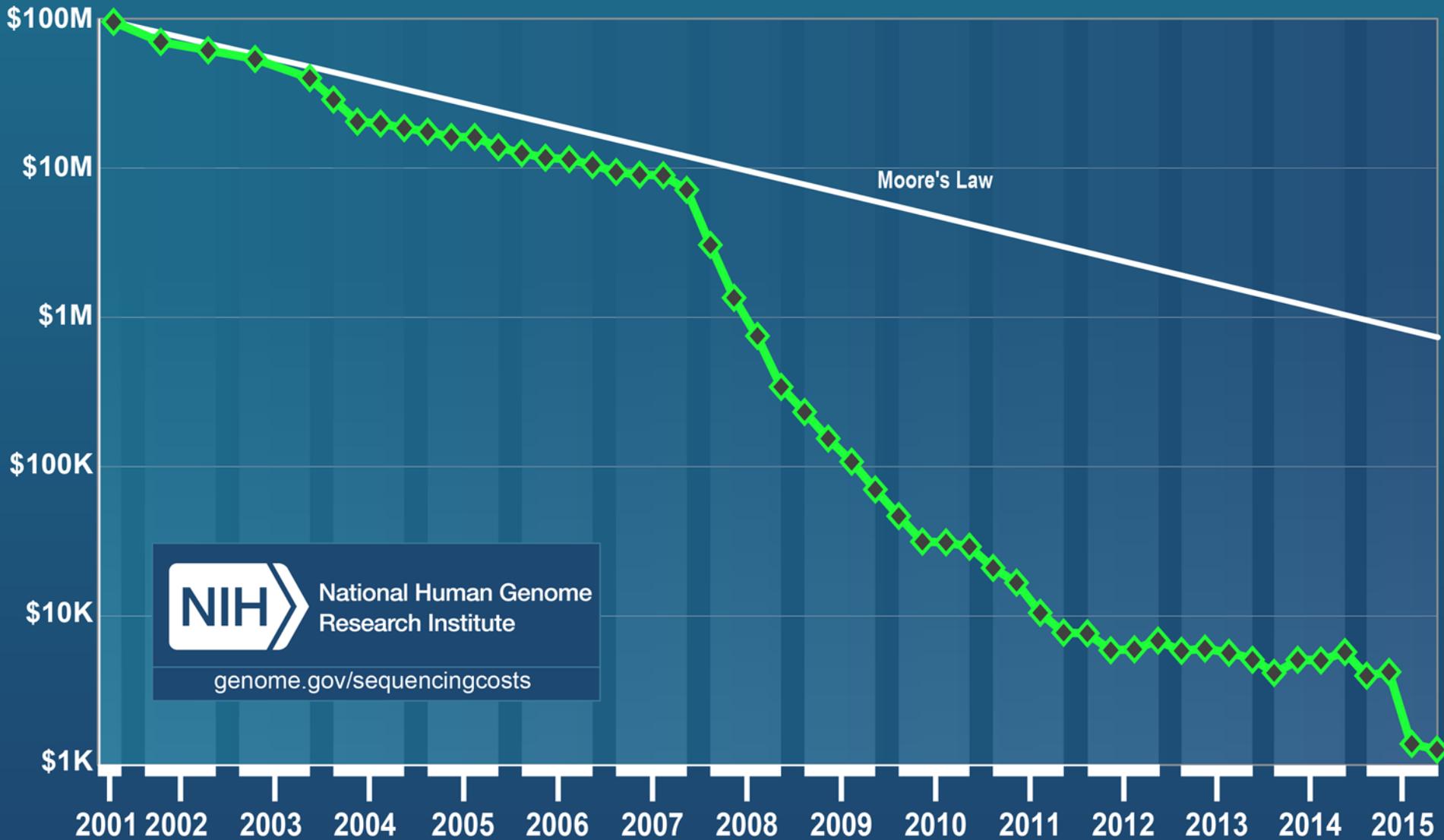
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- Transparency
- What happens when this system fails?
  - Humans, versus computers (black box)
- Bioinformatic bottleneck
  - Working on this
  - Developing a relevant/efficient reference database
- New definition of adulterants?

# Drawbacks

- Who can upload to NCBI/other databases?
- Will this translate to significant improvements in public health?
- Transparency
- What happens when this system fails?
  - Humans, versus computers (black box)
- Bioinformatic bottleneck
  - Working on this
  - Developing a relevant/efficient reference database
- New definition of adulterants?
- Expensive, technological advances

# Cost per Genome



# Communication

Consumers

Consumer groups

Concerns

The path forward

# Communication

- Do we communicate?

# Communication

- Do we communicate?
- What do we communicate?

# Communication

- Do we communicate?
- What do we communicate?
- To whom do we communicate?

# Communication

- Do we communicate?
- What do we communicate?
- To whom do we communicate?
- In what manner do we communicate?

Thanks for your time and attention!

## Questions?

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