Methods for Weighting the 2009 Allen County Assessment Data

Data from sample surveys have the potential for bias if there are different rates of response for different segments of the population. In other words, some subgroups of the population may be more represented in the completed surveys than they are in the population from which those surveys are sampled. If a sample has 25% of its respondents being male and 75% being female, then the sample is biased towards the views of females (if females respond differently than males). This same phenomenon holds true for any possible characteristic that may alter how an individual responds to the survey items.

In some cases, the procedures of the survey methods may purposefully over-sample a segment of the population in order to gain an appropriate number of responses from that subgroup for appropriate data analysis when investigating them separately (this is often done for minority groups). Whether the over-sampling is done inadvertently or purposefully, the data needs to be weighted so that the proportioned characteristics of the sample accurately reflect the proportioned characteristics of the population. In the 2009 Allen County survey, a weighting was applied prior to the analysis that weighted the survey respondents to reflect the actual distribution of Allen County based on age, sex, race, and income.

Weightings were created for each category within sex (male, female), race (White, Non-White), Age (7 different age categories), and income (7 different income categories). The numerical value of the weight for each category was calculated by taking the percent of the Allen County population within the specific category and dividing that by the percent of the sample within that same specific category. Using sex as an example, the following represents the data from the 2009 Allen County Survey and the Census's 2007 American Community Survey Allen County Population Estimates.

	2009 Allen Survey		**2007 Allen County Census Estimate***		**Weight**
Sex	Number	Percent	Number	Percent	
Male	192	46.601942	52,231	49.5592603	1.063459127
Female	220	53.398058	53,160	50.4407397	0.944617489

* from the Census's American Community Survey

In this example, it shows that there was a slightly smaller portion of males in the sample compared to the actual portion in Allen County. The weighting for males was calculated by taking the percent of males in Allen County (based on Census information) (49.5592603%) and dividing that by the percent found in the 2009 Allen County sample (46.601942%) [49.5592603/46.601942= weighting of 1.063459127 for males]. The same was done for females [50.4407397/53.398058= weighting of 0.944617489]. Thus males' responses are weighted heavier by a factor of 1.063459127 and females' responses weighted less by a factor of 0.944617489.

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This same thing was done for each of the 18 specific categories as described above. For example, a respondent who was male, White, in the age category 35-44, and with a household income in the $50-$75k category would have an individual weighting of 1.334091839 [1.063459127 (weight for males) x 0.940161006 (weight for White) x 1.426689192 (weight for age 35-44) x 0.935262064 (weight for income $50-$75k)]. Thus, each individual in the 2009 Allen County sample has their own individual weighting based on their combination of age, race, sex, and income. See next page for each specific weighting and the numbers from which they were calculated.

Multiple sets of weightings were created and used in the statistical software package (SPSS 15.0) when calculating frequencies. For analyses done for the entire sample and analyses done based on subgroups other than age, race, sex, or income – the weightings that were calculated were based on the product of the four weighting variables (age, race, sex, income) for each individual. When analyses were done comparing groups within one of the four weighting variables (e.g., smoking status by race/ethnicity), that specific variable was not used in the weighting score that was applied in the software package. In the example of smoking status by race, the weighting score that was applied during analysis included only age, sex, and income. Thus a total of eight weighting scores for each individual were created and applied depending on the analysis conducted. The weight categories were as follows:

1) **Total weight** (product of 4 weights) – for all analyses that did not separate age, race, sex, or income.
2) **Weight without sex** (product of age, race, and income weights) – used when analyzing by sex.
3) **Weight without age** (product of sex, race, and income weights) – used when analyzing by age.
4) **Weight without race** (product of age, sex, and income weights) – used when analyzing by race.
5) **Weight without income** (product of age, race, and sex weights) – used when analyzing by income.
6) **Weight without sex or age** (product of race and income weights) – used when analyzing by sex and age.
7) **Weight without sex or race** (product of age and income weights) – used when analyzing by sex and race.
8) **Weight without sex or income** (product of age and race weights) – used when analyzing by sex and income.

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Category	Allen County Sample	%	2000 Census Data	%		Weighting Value
Sex:						
Male	192	46.601942	52,231	49.5592603		1.063459127
Female	220	53.398058	53,160	50.4407397		0.944617489
Age:						
20-24	15	3.333333	7,113	9.41146895		2.823440684
25-34	48	10.666667	12,706	16.8117706		1.576103496
35-44	57	12.666667	13,658	18.0713964		1.426689192
45-54	108	24.000000	15,514	20.5271375		0.855297397
55-59	46	10.222222	6,736	8.91264654		0.871889335
60-64	47	10.444444	4,667	6.1750774		0.591230815
65-74	74	16.444444	7,305	9.66551113		0.587767569
75-84	13	2.888889	5,871	7.76813358		2.688969317
85+	0	0.000000	2,008	2.65685782		
Race:						
White	376	91.041162	89,077	85.5933506		0.940161006
Other	37	8.958838	14,993	14.4066494		1.608093565
Household Income						
Less than $10,000	25	6.544503	2,991	7.36772		1.125787762
$10k-$15k	22	5.759162	2,618	6.44891		1.119765494
$15k-$25k	58	15.183246	5,325	13.11706		0.863916438
$25k-$35k	49	12.827225	5,519	13.59494		1.059850071
$35k-$50	62	16.230366	7,130	17.56331		1.082126318
$50k-$75k	79	20.680628	7,852	19.34181		0.935262064
$75k or more	87	22.774869	9,161	22.56626		0.9908405

Note: The weighting ratios are calculated by taking the ratio of the proportion of the population of Allen County (determined from Census's 2007 American Community Survey Eestimates) in each subcategory by the proportion of the sample in the Allen County survey for that same category.