

**2008 NEW YORK CITY HOUSING AND VACANCY SURVEY  
SAMPLE DESIGN, ESTIMATION PROCEDURE AND ACCURACY STATEMENT**

**I. SAMPLE DESIGN**

The City of New York is required by law to periodically conduct a survey to determine if rent regulations should be continued. A primary tool in this decision is the "*vacant available for rent*" rate, which is defined as the ratio of the vacant available for rent units to the total number of renter occupied and vacant available for rent units for the entire city. The New York City Housing and Vacancy Survey (NYCHVS) measures rental and homeowner vacancy rates, as well as various household and person characteristics. The design requires the standard error of the estimate of the vacant available for rent rate for the entire city be no more than one-fourth of 1 percent, if the actual rate was 3 percent.

**A. Sampling Frames**

The 2008 NYCHVS sample consists of housing units selected from the following four sampling frames:

1. Housing units included in the 2000 Census
2. Housing units constructed since the 2000 Census
3. Housing units in structures owned by New York City (IN REM). These types of housing units were oversampled to ensure a large enough sample for analysis of this subuniverse. Note that these housing units are also part of the 2000 Census frame.
4. Housing units constructed since the 2000 Census in preexisting buildings altered to create more units or converted from nonresidential use.

The NYCHVS sample includes only housing units. The principal exclusions were living quarters classified as:

- Transient hotels,
- Commercial and mission lodging houses,
- Inmate living quarters in institutions,
- Quarters for the military on military installations, and
- Other large group quarters not meeting the definition of a housing unit.

Also, generally excluded were housing units in special places. These included housing units located on the grounds of institutions (both civilian and military). Residential hotels and motels, however, were included in the survey.

## **B. Sample Selection**

Within each NYCHVS sampling frame, we selected clusters (groups of housing units) of generally four housing units, with the exception of IN REM and some of C of O units where we selected clusters of size five. For all frames except the IN REM frame, the housing units were consecutive units. For the IN REM frame, we selected a systematic sample of housing units within each sample building.

### 1. Housing Units Included in the 2000 Census

Within this frame, we sorted housing units by (a) borough, (b) sub-borough, (c) percent renter occupied in the block, (d) tract, (e) block number, (f) basic street address, and (g) unit designation. We selected a systematic sample of housing units across all boroughs. This frame included IN REM units.

### 2. Housing Units Constructed Since the 2000 Census

We selected units in this frame from Certificates of Occupancy (C of Os) issued between January 2000 and October 2007. We dropped all housing units that were also on the 2000 census frame from this sample. We sorted the housing units by borough and date (i.e., year and month) of issue and selected a systematic sample of housing units within each borough. We listed each structure that contained a sample housing unit and then identified the designated sample unit in the order in which the unit appeared on these listings.

As part of the 2008 NYCHVS, an additional 2300 housing units constructed since November 2001 were selected to produce more reliable estimates of these housing units.

### 3. Housing Units in Structures Owned by New York City (IN REM)

This frame consisted of units in structures owned by New York City as of November 2007. The City owned these units because the owner failed to pay the real estate tax and/or other charges on the property. We selected a probability proportional to size sample of in rem buildings first, then selected sample units within buildings. In this procedure, each building is assigned a probability of selection based on the expected number of housing units in the building. This probability is in direct proportion to this expected number of units. Thus, a building with 8 units has twice the probability of selection as a building that has 4 units. Buildings are sampled using these probabilities.

First, we sorted the buildings by:

- (1) Borough, and
- (2) Size of the Building (number of units)

We selected a systematic sample of buildings, then, after listing the individual units in each building, we selected a systematic sample of units within each sample building.

#### 4. Housing Units from Alterations and Conversions

Housing units added to existing residential buildings (alterations) and housing units in buildings converted from nonresidential use (conversions) were sampled for the 2008 survey. The city identified addresses where units were potentially created through alterations or conversions, which received Certificates of Occupancy since 2000. That list of alteration and conversion addresses was matched to the C of O frame list for newly constructed buildings and to the 2000 Census on basic address. For matching addresses, the unit counts were compared between the city's alteration and conversion list and the new construction C of O or Census 2000 list. If the city listing for the address contained more units than the new construction C of O or the Census list, it was considered an alteration and eligible for the alteration sample. If the address did not match, the building was considered a conversion and included in the conversion frame. If the city listing for the address contained the same or fewer units than the new construction C of O or the Census list, it was dropped from the alteration and conversion frames.

Within each frame, a sample of buildings was selected. These buildings were listed; that is, each unit in the building was identified. For the alterations, a determination was made about which units were not included in the Census or the new construction C of O file. These units were then eligible for the alterations sample. For the buildings identified as conversions, all units listed were eligible for the conversion sample.

### C. Sample Size

The total number of sample housing units selected for the 2008 NYCHVS was 20,975. The table below provides the total number of sampled housing units by borough.

Borough	Number of Housing Units
Bronx	3,317
Brooklyn	5,713
Manhattan	5,493
Queens	5,009
Staten Island	1,443
Total	20,975

Of these housing units, 419 interviews were not obtained because, for occupied housing units, the occupants

- refused to be interviewed,
- were not at home after repeated visits,
- or were unavailable for some other reason.

For vacant units, an interview wasn't obtained if no informed respondent could be found after repeated visits. These 419 noninterviews are known as type-A noninterviews. There were an additional 1130 units, known as type-C noninterviews, that were not interviewed because they no longer exist or are uninhabitable. This classification produced a 98 percent overall response rate  $(20,975 - 419 - 1130) / (20,975 - 1130) = (19,426 / 19,845)$ . The response rate is calculated as the total number of interviews (total sample minus type A's and type C's) divided by the total eligible sample (total sample units minus type C's). Note the response rate using the base weight is also 98 percent.

The sample housing units were visited between January and May 2008 by field representatives (FRs) hired and trained for this task. The FRs visited each sample address and completed a questionnaire for both occupied and vacant units. In addition, for evaluation purposes, the occupancy status of all vacant units and a sample of occupied units was independently determined in a reinterview. An independent third interview reconciled any differences.

## II. ESTIMATION PROCEDURE

To compute estimates of housing unit and person characteristics based on the data we collected for the 2008 NYCHVS, we calculated sample weights for each housing unit and person record. The final weight for each housing unit equals the product of the following weight and adjustments:

### 1. Base Weight

We determined a base weight as the reciprocal of the probability of selecting the unit. Because IN REM sample units and a few census sample units were eligible for selection from both the 2000 Census and the IN REM frames, we adjusted the basic weights of these units to reflect the fact that they had multiple chances of selection.

### 2. Nonresponse Adjustment

We adjusted the base weight of each interviewed housing unit to account for the 419 eligible units that did not respond (type-A noninterviews).

### 3. Ratio Adjustments

We adjusted the sampling weights using a three-stage housing unit ratio estimation procedure to do the following:

- to account for known sampling variability in the 2000 Census frame,
- to account for known sampling variability in the IN REM frame,
- to bring the sample estimates of housing units into close agreement with estimates derived from independent sources, and
- to account for housing unit undercoverage.

We used the same procedure to determine weights for estimating person characteristics, but added a ratio adjustment to adjust for person undercoverage within households.

#### A. Nonresponse Adjustment

We applied a noninterview adjustment factor to all interviewed housing units to account for type-A noninterviews using a factor equal to the following ratio:

$$\frac{(\text{weighted count of interviewed units}) + (\text{weighted count of Type A noninterviews})}{(\text{weighted count of interviewed units})}$$

We computed the factor separately for old construction and new construction housing units as follows:

### Old Construction

1. For sample housing units selected from the 2000 Census frame, we computed the noninterview adjustment factor separately by borough using the characteristics below. We used 2005 NYCHVS data where available to determine the tenure and characteristics cell of a unit. If the 2005 NYCHVS data were not available, we used 2002 NYCHVS data. If 2002 data were also not available, we used 2008 NYCHVS data.

a. For renter-occupied units HUs, we used

#### Monthly rent

- < \$100
- \$100-\$199
- \$200-\$299
- \$300-\$399
- \$400-\$499
- \$500-\$599
- \$600-\$699
- \$700-\$999
- ≥\$1,000

#### Number of Rooms

- 1, 2, 3, 4+, or
- 1-2, 3, 4, 5+ or
- 1-3, 4, 5, 6+

b. For owner-occupied units HUs, we used

#### Value

- < \$25,000
- \$25,000-\$49,999
- \$50,000-\$74,999
- \$75,000-\$99,999
- \$100,000-\$149,999
- \$150,000-\$199,999
- \$200,000-\$249,999
- \$250,000-\$299,999
- \$300,000-\$399,999
- \$400,000-\$499,999
- \$500,000

#### Number of Rooms

- 1-4, 5, 6, 7+ or
- 1-3, 4, 5, 6+ or
- 1-3, 4, 5-6, 7+ or
- 1-4, 5, 6, 7+ or
- 1-5, 6, 7, 8+ or
- 1-5, 6-7, 8, 9+

c. For vacant units, we used

Vacancy status

- renter occupied/vacant for rent,
- owner occupied/vacant for sale,
- vacant/unavailable or vacancy status unknown.

2. We computed the factor for IN REM units separately by borough.

New Construction

For new construction units, we computed the factor separately using the year the segment was selected (2002, 2005 or 2008) and borough.

B. Ratio Estimate Factors

For each ratio estimation procedure, we computed factors for ratio estimate cells and applied the factors to the appropriate units in the corresponding cell. The factors were equal to the following ratio:

$$\frac{\text{Independent Estimate of the Number of HUs (persons) for the cell}}{\text{NYCHVS Sample Estimate of the Number of HUs (persons) for the cell}}$$

The denominators of the ratios equals the sum of the weights of housing units (or persons) with all previous factors applied.

1. 2000 Census Ratio Estimate Factor

This procedure adjusted for differences between the 2000 Census counts and the corresponding weighted sample counts. We adjusted the weights of all NYCHVS sample units selected from the 2000 Census frame. We computed the factors separately by borough using the following 2000 Census characteristics:

- For renter-occupied housing units, we used

- (a) *Subborough* (Bronx(10), Brooklyn (18), Manhattan (10), Queens (14), Staten Island (3))
  - (b) *Number of Persons in the Housing Units* (1, 2, 3-4, 5 or more)
  - (c) *Race of the Householder* (White, Black, All Remaining Races)
- For owner-occupied housing units, we used
    - (a) *Subborough* (Bronx(10), Brooklyn (18), Manhattan (10), Queens (14), Staten Island (3))
    - (b) *Number of Persons in the Housing Units* (1, 2, 3-4, 5 or more)
  - For vacant housing units, we used *vacancy status* (vacant for rent; vacant for sale; rented/sold; seasonal; migrant; other.)

2. IN REM Ratio Estimate Factor

This procedure adjusts for known sampling variability in the IN REM sample selection. We adjusted the weights of all sample units selected from the IN REM frame by borough (5 cells). We used the total number of units in each borough in the IN REM frame as control totals.

3. 2008 Housing Unit Ratio Estimate Factor

This procedure adjusted the 2008 NYCHVS sample estimate for sampling variability and housing unit undercoverage by controlling the sample estimate to independent estimates of 2008 total housing units. The control totals were derived from 2000 Census housing unit totals. We applied this ratio estimation procedure to all interviewed housing units. We calculated the ratio estimate factor for each of the boroughs (5 cells). The independent estimates were counts of the total number of housing units in each of the boroughs at the time of the 2008 survey.

4. 2008 Person Ratio Estimate Factor

This additional adjustment accounted for sampling variability and known coverage deficiencies for persons within interviewed households. This ratio estimation assumes that reference persons, spouses or unmarried partners are always picked up during the interview and only persons other than a reference person, spouse or unmarried partner could be missed in

households. We computed this factor within each borough by age, race, Hispanic Origin and sex (200 cells).

- The numerator of the ratio equaled the independent estimate of 2008 total persons for the cell minus the NYCHVS sample estimate of reference persons and spouses or unmarried partners. The independent estimates were projected based on 2000 Census person totals.
- The denominator of the ratio equaled the NYCHVS sample estimate of persons other than reference persons, spouses or unmarried partners for the cell. The person ratio estimate factor was applied only to the persons other than reference persons, spouses, or unmarried partners.

The ratio estimation procedures, as well as the overall estimation procedure, reduced the sampling error for most statistics in comparison to what would have been obtained by simply weighting the sample by the base weight.

### **III. SAMPLING AND NONSAMPLING ERRORS**

Since the statistics produced from this survey are estimates derived from a sample, they will differ from the “true values” being estimated. There are two types of errors which cause estimates based on a sample survey to differ from the true value - sampling error and nonsampling error.

#### **A. Nonsampling Errors**

If every housing unit in New York City were interviewed, the estimates of housing unit characteristics would still differ from the true value (for example, the median contract rent). In this instance, the difference is due solely to nonsampling errors. We attribute nonsampling errors in sample surveys to many sources:

- deficiencies in the sampling frame (i.e., not all housing units are covered),
- inability to pick up all persons within sample households,
- inability to obtain information about all cases in the sample,
- definitional difficulties,
- differences in the interpretation of questions,
- inability or unwillingness to provide correct information on the part of the respondents, and
- mistakes in recording, coding or keying the data obtained.

There are also other errors of collection, response, processing, coverage, and estimation for missing data.

In the 2008 NYCHVS, we missed about six percent of the housing units in the five boroughs covered by the survey. Overall, we missed about nine percent of the people in sample households. The following table gives the undercoverage of the various race-sex groups for the city as a whole:

Race-Sex Group	Undercoverage
White & Other Females	6%
White & Other Males	7%
African American Females	12%
African American Males	13%
Asian Females	4%
Asian Males	1%
Hispanic Females	10%
Hispanic Males	15%

We adjusted for this undercoverage through the housing unit and person ratio estimate factors previously described. Measures of other errors for this survey are not available. However, we believe some of the important response and most of the operational errors were detected and corrected during the Bureau's review of the data for reasonableness and consistency.

B. Sampling Errors

Sampling error is a measure of how estimates from a sample vary from the actual value. NOTE: By the term "actual value" we mean the value we would have gotten had all housing units been interviewed, under the same conditions, rather than only a sample.

The formulas in Tables 1 through 6, citywide and for each borough which can be found toward the end of this document, allow you to compute a range of error such that there is a known probability of being correct if you say the actual value is within the range. The error formulas are approximations to the errors. They indicate the order of magnitude of the errors rather than the actual errors for any specific characteristic. To construct the range, add and subtract the error computed from the formulas to the estimate. A table of the standard errors of the estimates for selected NYCHVS items is posted at the Census Bureau's website at [http://www.census.gov/hhes/www/housing/nychvs/2008/se\\_contract.pdf](http://www.census.gov/hhes/www/housing/nychvs/2008/se_contract.pdf).

The letter "A" in the formula represents the weighted sample estimate you derive from the file.

The letter "Z" determines the probability the actual value is within the range you compute. The larger the value of Z, the larger the range, and the higher the odds

the actual value will be in the range. The following values of Z are most commonly used.

Value of Z	Meaning
1.00	There is a 67-percent chance you'll be correct if you say the actual value is in the range you compute.
1.64	There is a 90-percent chance you'll be correct if you say the actual value is in the range you compute.
1.96	There is a 95-percent chance you'll be correct if you say the actual value is in the range you compute.
2.58	There is a 99-percent chance you'll be correct if you say the actual value is in the range you compute.

Note that if  $Z = 1.00$ , the formula computes the standard error. Ranges of 90 and 95-percent are commonly used. The range of error is also referred to as the confidence interval since there is a certain level of confidence the actual value is within the interval. You can compute a standard error and confidence interval for data from the HVS that are total numbers, percents, differences, medians, or means using formulas from Tables 1-6 as shown in the following examples.

Sets of standard errors have been computed for New York City as a whole and for each of the five boroughs. Table 1 contains the set for New York City and Tables 2 through 6 for each of the boroughs. The tables are divided into two major sections. The upper portion contains three formulas that apply to housing units. The lower portion contains seven formulas that apply to persons. Tables 7A and 7B contain a description of which formula to use for estimates pertaining to housing units. Table 7A specifically pertains to the second of the three formulas. Table 7B specifically pertains to the third of the three formulas. The first formula is used for any item not listed in either Table 7A or 7B. The first column in Tables 7A and 7B lists the characteristic for which the tables are to be applied. The second column lists the applicable subgroups (e.g. total occupied, vacant for rent, etc). If the estimate of interest matches to both the first and second column of either table, use the corresponding formula. If no match is found, use the first formula.

1. Totals

According to the 2008 HVS, there are 15,600 vacant-for-rent units in Brooklyn. To compute a 90-percent confidence interval, you would use the first formula in Table 3 and you would compute the error as follows:

$$Z \times \sqrt{(269.63 \times A) - (0.00028 \times A^2)}$$

$$1.64 \times \sqrt{(269.63 \times 15,600) - (0.00028 \times 15,600^2)} = 3,336$$

Thus there is a 90-percent chance you'll be correct if you conclude the actual number of vacant-for-rent units in Brooklyn is 15,600 plus or minus 3,336 or in the range 12,264 to 18,936.

If the estimate involves two characteristics from Tables 1 through 6, use the formula with the larger first number under the square root.

## 2. Percents

The formula (not shown in a table) for computing the error of any percent derived from the data is the following:

$$Z \times Y \times \sqrt{\frac{269.63 \times P \times (100-P)}{B}}$$

where:

- Z: defines the confidence the range will include the actual value,
- Y: is the number from the last column of Tables 1 through 6 (chosen based on the characteristics represented in the numerator and denominator),
- P: is the percent you calculate, and
- B: is the denominator of the percent.

For example, there are 624,759 occupied home owner conventional housing units in New York City and 135,960, or 21.76 percent, were built between 1947 and 1969. Using Table 1 for New York City, together with Tables 7A and 7B, you choose the value of Y = 1 because the characteristic is not included in 7A or 7B. (While year-built is in 7B, the subgroup owner occupied units is not). To compute a 90-percent confidence interval you would plug the following numbers into the above formula:

$$1.64 \times 1.000 \times \sqrt{\frac{269.63 \times 21.76 \times 78.24}{624,759}} = 1.4$$

Thus, if you say that the actual percentage of owners in buildings built between 1947 and 1969 is between 20.4 percent and 23.2 percent, there is a 90-percent chance you'll be correct.

## 3. Differences

People often ask whether two numbers are actually different. If the range of error for the difference doesn't include zero, the numbers are different. As a general rule, if the confidence intervals don't overlap, they're different. To compute the range of error of the difference use the following formula:

$$\sqrt{(\text{error on first number})^2 + (\text{error on second number})^2}$$

This formula is quite accurate for (a) the difference between estimates of the same item in two different areas or (b) the difference between separate and uncorrelated items in the same area. If there is a high positive correlation between the two items, the formula will overestimate the error. If there is a high negative correlation, the formula will underestimate the error. The following illustration shows how to compute the error of a difference.

There are 11,177 vacant-for-rent units in New York City with 3 to 5 units in the building and 3,491 vacant-for-rent units with 6 to 9 units in the building. The respective errors for a 90-percent confidence interval are 2,847 and 1,591. The error for a 90-percent confidence interval for the 7,686 difference is the following:

$$\sqrt{(2,847)^2 + (1,591)^2} = 3,261$$

Thus, there is a 90-percent chance you'll be correct if you say the actual difference between vacant-for-rent units in 3 to 5 unit buildings vs. 6 to 9 unit buildings in New York City is between 4,425 and 10,947.

#### 4. Medians

The median is the value 50-percent of the way through the distribution. Thus, 50-percent of the total falls below and 50-percent falls above the median. Note that the median presented in this example is the true median (i.e., computed by SAS) not an approximation. You can construct a confidence interval around the median by computing the standard error on a 50-percent characteristic and then translating that into an interval for the characteristic.

- a. Using the error formula for percents, above, compute the error of 50-percent. The total number of housing units from the distribution is the denominator in the formula. Subtract the "not applicable" category from the total.
- b. Calculate the confidence interval for the true median by adding and subtracting the width of the interval containing the median times the standard error on the 50-percent characteristic divided by

the proportion of units in the interval containing the median, to the median.

The probability you will be correct if you conclude that the actual median is within the interval depends on the value of Z in the error of percent formula. The following example shows how to compute a 90-percent confidence interval.

For example, the median value for all occupied housing units in New York City is \$500,000. The number of occupied housing units in the distribution of value of units is presented below.

Distribution of Value of Units

Value	Number of HUs	Percent	Cumulative Percent
Less Than \$25,000	18,206	1.79	1.79
\$25,000-\$49,999	10,629	1.04	2.83
\$50,000-\$74,999	8,855	0.87	3.70
\$75,000-\$99,999	6,516	0.64	4.34
\$100,000-\$149,999	27,738	2.72	7.06
\$150,000-\$199,999	39,303	3.86	10.91
\$200,000-\$249,999	40,325	3.96	14.87
\$250,000-\$299,999	44,065	4.32	19.19
\$300,000-\$349,999	42,616	4.18	23.37
\$350,000-\$399,999	58,650	5.75	29.13
\$400,000-\$499,999	170,592	16.74	45.86
\$500,000-\$599,999	140,911	13.82	59.69
\$600,000-\$699,999	128,638	12.62	72.31
\$700,000-\$799,999	84,106	8.25	80.56
\$800,000-\$999,999	80,972	7.94	88.50
\$1,000,000 or more	117,223	11.50	100.0
Not Applicable	2,081,953		
TOTAL	3,101,298		

The error on a 50-percent characteristic based on 1,019,345 (3,101,298 minus the "not applicable" number) housing units is calculated as illustrated below. *Since the median value is the endpoint of an interval, calculate the average of the errors for the interval containing the median and the interval above the interval containing the median.*

$$1.64 \times 1.0000 \times \sqrt{\frac{269.63 \times 50 \times 50}{1,019,345}} = 1.33$$

$$(499,999.5 - 399,999.5) \times \frac{1.33}{16.74} = 7,945$$

$$(599,999.5 - 499,999.5) \times \frac{1.33}{13.82} = 9,624$$

$$\frac{9,624 + 7,945}{2} = 8,785$$

Where:

- 599,999.5-499,999.5 is the width of the interval that contains the median and 499,999.5-399,999.5 is the width of the interval above the interval containing the median.
- 1.33 is the error for a 90-percent confidence interval for the 50-percent characteristic
- 13.82 is the percent of cases that fall in the interval containing the median and 16.74 is the percent of cases that fall in the interval above the interval containing the median.

The 90-percent confidence interval for the median (\$500,000) is:

$$\$500,000 \pm \$8,785$$

Thus, there is a 90-percent chance that you will be correct if you conclude that the actual median value for all occupied housing units in New York City is between \$491,215 and \$508,785.

## 5. Means

The mean and the median usually differ. The mean is usually higher because it is influenced more heavily than the median by very large values. Use the following formula to estimate the error of the mean:

$$Z \times Y \times \sqrt{\frac{\left[ \sum_{i=1}^n p_i x_i^2 - \left( \sum_{i=1}^n p_i x_i \right)^2 \right]}{c}} \times 269.63$$

where:

Y: is the number from the last column of Tables 1 through 6.

For housing unit characteristics, review Tables 7A and 7B. If both the characteristic and the subgroup match to any listed in either table, use the corresponding value for Y (the second listed for a match to Table 7A, the third for a match to Table 7B). If no match is found, use the first value of Y, that is 1.00.

Z: defines the confidence the range will include the actual value

$p_i$ : is the proportion of total households or persons from a distribution in the  $i^{\text{th}}$  interval

$x_i$ : is the midpoint of the  $i^{\text{th}}$  interval (NOTE: The midpoint of the open-ended interval is 1.5 times the lower limit)

c: is the total number of households or persons in the distribution (NOTE: Subtract the number of "not applicable" from the total to get c)

n: is the total number of intervals in the distribution

For example, the mean (or average) value of all occupied housing units in New York City was \$640,782 (compared to a median of \$500,000). The distribution from which the mean was computed is given below.

Value	Number of HUs	$p_i$	$x_i$
Less Than \$25,000	18,206	.0179	\$12,500
\$25,000-\$49,999	10,629	.0104	\$37,500
\$50,000-\$74,999	8,855	.0087	\$62,500
\$75,000-\$99,999	6,516	.0064	\$87,500
\$100,000-\$149,999	27,738	.0272	\$125,000
\$150,000-\$199,999	39,303	.0386	\$175,000
\$200,000-\$249,999	40,325	.0396	\$225,000
\$250,000-\$299,999	44,065	.0432	\$275,000
\$300,000-\$349,999	42,616	.0418	\$325,000
\$350,000-\$399,999	58,650	.0575	\$375,000
\$400,000-\$499,999	170,592	.1674	\$450,000
\$500,000-\$599,999	140,911	.1382	\$550,000
\$600,000-\$699,999	128,638	.1262	\$650,000
\$700,000-\$799,999	84,106	.0825	\$750,000
\$800,000-\$999,999	80,972	.0794	\$900,000
\$1,000,000 Or More	117,223	.1150	\$1,500,000
Not Applicable	2,081,953	-----	
Total	3,101,298	1.000	

Plugging the numbers in the above formula, the error for a 90-percent confidence interval on the mean income is computed as follows:

$$1.64 \times 1.000 \times \sqrt{\frac{518,009,974,849 - (607,057)^2}{1,019,345}} \times 269.63 = \$10,220$$

Thus, there is a 90-percent chance of being correct if you say the mean value of all occupied housing units in New York City was between \$630,562 and \$651,002.

**Table 1: Errors for New York City**

	Publication Estimates	Percentages
	The error is the larger of:	Value of Y for Percent Formula
<b>Errors on Housing Units</b>		
<b>Housing Unit Characteristics Not Listed in Tables 7A or 7B</b>	$Z x \sqrt{269.63 x A - .000081 x A^2}$ or $Z x 270$	1.000
<b>Housing Unit Characteristics<sup>1</sup> Listed in Table 7A</b>	$Z x \sqrt{448.65 x A - .000134 x A^2}$ or $Z x 449$	1.290
<b>Housing Unit Characteristics<sup>2</sup> Listed in Table 7B</b>	$Z x \sqrt{615.34 x A - .000184 x A^2}$ or $Z x 615$	1.511
<b>Errors on Persons</b>		
<b>Characteristics of Persons Not Listed Below</b>	$Z x \sqrt{281.8 x A - .000035 x A^2}$ or $Z x 282$	1.022
	<p><b>NOTE:</b> For any of the person characteristics listed below that are cross-tabbed by Borough and Sub-borough use the formula for the specific characteristic listed below. Don't use the formulas listed below for cross-tabs of characteristics of persons listed below {e.g., Age by sex (males under 25), Age by Race (African Americans under 25), or sex by race (white females)}. Use the formula above (Characteristics of Persons Not Listed Below).</p>	
<b>Whites and other Races and Ethnicity</b>	$Z x \sqrt{702.72 x A - .000113 x A^2}$ or $Z x 703$	1.614
<b>Males</b>	$Z x \sqrt{702.72 x A - .000182 x A^2}$ or $Z x 703$	1.614
<b>Females</b>	$Z x \sqrt{702.72 x A - .000166 x A^2}$ or $Z x 703$	1.614
<b>Persons under 25 yrs. old</b>	$Z x \sqrt{492.68 x A - .000061 x A^2}$ or $Z x 493$	1.352
<b>African Americans</b>	$Z x \sqrt{1,503.51 x A - .000788 x A^2}$ or $Z x 1,504$	2.361
<b>Borough and Sub-borough<sup>3</sup></b>	$Z x \sqrt{1,503.51 x A - .000185 x A^2}$ or $Z x 1,504$	2.361

<sup>1</sup>Use this formula only for estimates of the housing unit characteristics and subgroups listed in Table 7A. For estimates of the housing unit characteristics for subgroups not listed, use the first formula listed above.

<sup>2</sup>Use this formula only for estimates of the housing unit characteristics and subgroups listed in Table 7B. For estimates of the housing unit characteristics for subgroups not listed, use the first formula listed above.

<sup>3</sup> Exclude total population in households. Use the formula for “Characteristics of Persons Not Listed Below” for these person characteristics.

**Table 2: Errors for Bronx**

	Publication Estimates	Percentages
	The error is the larger of:	Value of Y for Percent Formula
<b>Errors on Housing Units</b>		
<b>Housing Unit Characteristics Not Listed in Tables 7A or 7B</b>	$Z x \sqrt{269.63 x A - .000528 x A^2}$ or $Z x 270$	1.000
<b>Housing Unit Characteristics<sup>1</sup> Listed in Table 7A</b>	$Z x \sqrt{448.65 x A - .000878 x A^2}$ or $Z x 449$	1.290
<b>Housing Unit Characteristics<sup>2</sup> Listed in Table 7B</b>	$Z x \sqrt{615.34 x A - .001204 x A^2}$ or $Z x 615$	1.511
<b>Errors on Persons</b>		
<b>Characteristics of Persons Not Listed Below</b>	$Z x \sqrt{281.8 x A - .000212 x A^2}$ or $Z x 282$	1.022
	<b>NOTE: For any of the person characteristics listed below that are cross-tabbed by Borough and Sub-borough use the formula for the specific characteristic listed below. Don't use the formulas listed below for cross-tabs of characteristics of persons listed below {e.g., Age by sex (males under 25), Age by Race (African Americans under 25), or sex by race (white females)}. Use the formula above (Characteristics of Persons Not Listed Below).</b>	
<b>Whites and other Races and Ethnicity</b>	$Z x \sqrt{702.72 x A - .000766 x A^2}$ or $Z x 703$	1.614
<b>Males</b>	$Z x \sqrt{702.72 x A - .00114 x A^2}$ or $Z x 703$	1.614
<b>Females</b>	$Z x \sqrt{702.72 x A - .000988 x A^2}$ or $Z x 703$	1.614
<b>Persons under 25 yrs. old</b>	$Z x \sqrt{492.68 x A - .000371 x A^2}$ or $Z x 493$	1.352
<b>African Americans</b>	$Z x \sqrt{1,503.51 x A - .003664 x A^2}$ or $Z x 1,504$	2.361
<b>Borough and Sub-borough<sup>3</sup></b>	$Z x \sqrt{1,503.51 x A - .001133 x A^2}$ or $Z x 1,504$	2.361

<sup>1</sup>Use this formula only for estimates of the housing unit characteristics and subgroups listed in Table 7A. For estimates of the housing unit characteristics for subgroups not listed, use the first formula listed above.

<sup>2</sup>Use this formula only for estimates of the housing unit characteristics and subgroups listed in Table 7B. For estimates of the housing unit characteristics for subgroups not listed, use the first formula listed above.

<sup>3</sup> Exclude total population in households. Use the formula for “Characteristics of Persons Not Listed Below” for these person characteristics.

**Table 3: Errors for Brooklyn**

	Publication Estimates	Percentages
	The error is the larger of:	
Errors on Housing Units		
Housing Unit Characteristics Not Listed in Tables 7A or 7B	$Z x \sqrt{269.63 x A - .00028 x A^2}$ or $Z x 270$	1.000
Housing Unit Characteristics <sup>1</sup> Listed in Table 7A	$Z x \sqrt{448.65 x A - .000465 A^2}$ or $Z x 449$	1.290
Housing Unit Characteristics <sup>2</sup> Listed in Table 7B	$Z x \sqrt{615.34 x A - .000638 x A^2}$ or $Z x 615$	1.511
Errors on Persons		
Characteristics of Persons Not Listed Below	$Z x \sqrt{281.8 x A - .000113 x A^2}$ or $Z x 282$	1.022
	<b>NOTE: For any of the person characteristics listed below that are cross-tabbed by Borough and Sub-borough use the formula for the specific characteristic listed below. Don't use the formulas listed below for cross-tabs of characteristics of persons listed below {e.g., Age by sex (males under 25), Age by Race (African Americans under 25), or sex by race (white females)}. Use the formula above (Characteristics of Persons Not Listed Below).</b>	
Whites and other Races and Ethnicity	$Z x \sqrt{702.72 x A - .000424 x A^2}$ or $Z x 703$	1.614
Males	$Z x \sqrt{702.72 x A - .000598 x A^2}$ or $Z x 703$	1.614
Females	$Z x \sqrt{702.72 x A - .000534 x A^2}$ or $Z x 703$	1.614
Persons under 25 yrs. old	$Z x \sqrt{492.68 x A - .000198 x A^2}$ or $Z x 493$	1.352
African Americans	$Z x \sqrt{1,503.51 x A - .001806 x A^2}$ or $Z x 1,504$	2.361
Borough and Sub-borough <sup>3</sup>	$Z x \sqrt{1,503.51 x A - .000604 x A^2}$ or $Z x 1,504$	2.361

<sup>1</sup>Use this formula only for estimates of the housing unit characteristics and subgroups listed in Table 7A. For estimates of the housing unit characteristics for subgroups not listed, use the first formula listed above.

<sup>2</sup>Use this formula only for estimates of the housing unit characteristics and subgroups listed in Table 7B. For estimates of the housing unit characteristics for subgroups not listed, use the first formula listed above.

<sup>3</sup> Exclude total population in households. Use the formula for "Characteristics of Persons Not Listed Below" for these person characteristics.

**Table 4: Errors for Manhattan**

	Publication Estimates	Percentages
	The error is the larger of:	Value of Y for Percent Formula
<b>Errors on Housing Units</b>		
Housing Unit Characteristics Not Listed in Tables 7A or 7B	$Z x \sqrt{269.63 x A - .000318 x A^2}$ or $Z x 270$	1.000
Housing Unit Characteristics <sup>1</sup> Listed in Table 7A	$Z x \sqrt{448.65 x A - .000529 x A^2}$ or $Z x 449$	1.290
Housing Unit Characteristics <sup>2</sup> Listed in Table 7B	$Z x \sqrt{615.34 x A - .000725 x A^2}$ or $Z x 615$	1.511
<b>Errors on Persons</b>		
Characteristics of Persons Not Listed Below	$Z x \sqrt{281.8 x A - .00018 x A^2}$ or $Z x 282$	1.022
	<p><b>NOTE: For any of the person characteristics listed below that are cross-tabbed by Borough and Sub-borough use the formula for the specific characteristic listed below. Don't use the formulas listed below for cross-tabs of characteristics of persons listed below {e.g., Age by sex (males under 25), Age by Race (African Americans under 25), or sex by race (white females)}. Use the formula above (Characteristics of Persons Not Listed Below).</b></p>	
Whites and other Races and Ethnicity	$Z x \sqrt{702.72 x A - .000516 x A^2}$ or $Z x 703$	1.614
Males	$Z x \sqrt{702.72 x A - .000941 x A^2}$ or $Z x 703$	1.614
Females	$Z x \sqrt{702.72 x A - .00086 x A^2}$ or $Z x 703$	1.614
Persons under 25 yrs. old	$Z x \sqrt{492.68 x A - .000315 x A^2}$ or $Z x 493$	1.352
African Americans	$Z x \sqrt{1,503.51 x A - .00739 x A^2}$ or $Z x 1,504$	2.361
Borough and Sub-borough <sup>3</sup>	$Z x \sqrt{1,503.51 x A - .000961 x A^2}$ or $Z x 1,504$	2.361

<sup>1</sup>Use this formula only for estimates of the housing unit characteristics and subgroups listed in Table 7A. For estimates of the housing unit characteristics for subgroups not listed, use the first formula listed above.

<sup>2</sup>Use this formula only for estimates of the housing unit characteristics and subgroups listed in Table 7B. For estimates of the housing unit characteristics for subgroups not listed, use the first formula listed above.

<sup>3</sup> Exclude total population in households. Use the formula for “Characteristics of Persons Not Listed Below” for these person characteristics.

**Table 5: Errors for Queens**

Publication Estimates		Percentages
The error is the larger of:		Value of Y for Percent Formula
<b>Errors on Housing Units</b>		
Housing Unit Characteristics Not Listed in Tables 7A or 7B	$Z x \sqrt{269.63 x A - .000321 x A^2}$ or $Z x 270$	1.000
Housing Unit Characteristics <sup>1</sup> Listed in Table 7A	$Z x \sqrt{448.65 x A - .000535 x A^2}$ or $Z x 449$	1.290
Housing Unit Characteristics <sup>2</sup> Listed in Table 7B	$Z x \sqrt{615.34 x A - .000733 x A^2}$ or $Z x 615$	1.511
<b>Errors on Persons</b>		
Characteristics of Persons Not Listed Below	$Z x \sqrt{281.8 x A - .000125 x A^2}$ or $Z x 282$	1.022
	<p><b>NOTE:</b> For any of the person characteristics listed below that are cross-tabbed by Borough and Sub-borough use the formula for the specific characteristic listed below. Don't use the formulas listed below for cross-tabs of characteristics of persons listed below {e.g., Age by sex (males under 25), Age by Race (African Americans under 25), or sex by race (white females)}. Use the formula above (Characteristics of Persons Not Listed Below).</p>	
Whites and other Races and Ethnicity	$Z x \sqrt{702.72 x A - .000384 x A^2}$ or $Z x 703$	1.614
Males	$Z x \sqrt{702.72 x A - .000643 x A^2}$ or $Z x 703$	1.614
Females	$Z x \sqrt{702.72 x A - .000609 x A^2}$ or $Z x 703$	1.614
Persons under 25 yrs. old	$Z x \sqrt{492.68 x A - .000219 x A^2}$ or $Z x 493$	1.352
African Americans	$Z x \sqrt{1,503.51 x A - .003594 x A^2}$ or $Z x 1,504$	2.361
Borough and Sub-borough <sup>3</sup>	$Z x \sqrt{1,503.51 x A - .000669 x A^2}$ or $Z x 1,504$	2.361

<sup>1</sup>Use this formula only for estimates of the housing unit characteristics and subgroups listed in Table 7A. For estimates of the housing unit characteristics for subgroups not listed, use the first formula listed above.

<sup>2</sup>Use this formula only for estimates of the housing unit characteristics and subgroups listed in Table 7B. For estimates of the housing unit characteristics for subgroups not listed, use the first formula listed above.

<sup>3</sup> Exclude total population in households. Use the formula for “Characteristics of Persons Not Listed Below” for these person characteristics.

**Table 6: Errors for Staten Island**

	Publication Estimates	Percentages
	The error is the larger of:	Value of Y for Percent Formula
<b>Errors on Housing Units</b>		
<b>Housing Unit Characteristics Not Listed in Tables 7A or 7B</b>	$Z x \sqrt{269.63 x A - .001511 x A^2}$ or $Z x 270$	1.000
<b>Housing Unit Characteristics<sup>1</sup> Listed in Table 7A</b>	$Z x \sqrt{448.65 x A - .002514 x A^2}$ or $Z x 449$	1.290
<b>Housing Unit Characteristics<sup>2</sup> Listed in Table 7B</b>	$Z x \sqrt{615.34 x A - .003448 x A^2}$ or $Z x 615$	1.511
<b>Errors on Persons</b>		
<b>Characteristics of Persons Not Listed Below</b>	$Z x \sqrt{281.8 x A - .000594 x A^2}$ or $Z x 282$	1.022
	<b>NOTE: For any of the person characteristics listed below that are cross-tabbed by Borough and Sub-borough use the formula for the specific characteristic listed below. Don't use the formulas listed below for cross-tabs of characteristics of persons listed below {e.g., Age by sex (males under 25), Age by Race (African Americans under 25), or sex by race (white females)}. Use the formula above (Characteristics of Persons Not Listed Below).</b>	
<b>Whites and other Races and Ethnicity</b>	$Z x \sqrt{702.72 x A - .001633 x A^2}$ or $Z x 703$	1.614
<b>Males</b>	$Z x \sqrt{702.72 x A - .003046 x A^2}$ or $Z x 703$	1.614
<b>Females</b>	$Z x \sqrt{702.72 x A - .002884 x A^2}$ or $Z x 703$	1.614
<b>Persons under 25 yrs. old</b>	$Z x \sqrt{492.68 x A - .001039 x A^2}$ or $Z x 493$	1.352
<b>African Americans</b>	$Z x \sqrt{1,503.51 x A - .034127 x A^2}$ or $Z x 1,504$	2.361
<b>Borough and Sub-borough<sup>3</sup></b>	$Z x \sqrt{1,503.51 x A - .003169 x A^2}$ or $Z x 1,504$	2.361

<sup>1</sup>Use this formula only for estimates of the housing unit characteristics and subgroups listed in Table 7A. For estimates of the housing unit characteristics for subgroups not listed, use the first formula listed above.

<sup>2</sup>Use this formula only for estimates of the housing unit characteristics and subgroups listed in Table 7B. For estimates of the housing unit characteristics for subgroups not listed, use the first formula listed above.

<sup>3</sup> Exclude total population in households. Use the formula for "Characteristics of Persons Not Listed Below" for these person characteristics.

## Table 7A: Housing Unit Characteristics Associated with the Second of Three Error Formulas

For characteristics and subgroups matching to Table 7A, use the second of the three housing unit error formulas.

Characteristics	Applicable Subgroups
<ul style="list-style-type: none"> <li>Race and Ethnicity of Householder (White, non-Hispanic and Black, non-Hispanic)</li> </ul>	Total Housing Units
<ul style="list-style-type: none"> <li>Borough Totals</li> </ul>	Renter Occupied (Stabilized, Mitchell Lama, Public Housing) and Owner Occupied (Condominiums and Total Cooperatives)
<ul style="list-style-type: none"> <li>Sub-borough of Staten Island Totals</li> </ul>	Total Housing Units, Total Occupied Housing Units, Total Rental Housing Units and Total Occupied Rental Housing Units
<ul style="list-style-type: none"> <li>Contract Rent &lt; \$300</li> </ul>	Total Housing Units and Total Occupied Housing Units
<ul style="list-style-type: none"> <li>Wheel Chair Accessibility</li> </ul>	All subgroups except Renter Occupied - Controlled and Owner Occupied - Conventional
<ul style="list-style-type: none"> <li>Floor Unit is on (except basement)</li> </ul>	
<ul style="list-style-type: none"> <li>Access from Sidewalk to Elevator/Unit without using Stairs</li> </ul>	
<ul style="list-style-type: none"> <li>Households Not Receiving Part of Monthly Rent from Government Programs</li> </ul>	
<ul style="list-style-type: none"> <li>Condition of Building External Walls, Windows, Stairways, and Floors of Building</li> </ul>	Total Occupied and Total Renter Occupied
<ul style="list-style-type: none"> <li>Number of Building Condition Problems 1-4</li> </ul>	

## Table 7B: Housing Unit Characteristics Associated with the Third of Three Error Formulas

For characteristics and subgroups matching to Table 7B, use the third of the three housing unit error formulas.

Characteristics	Applicable Subgroups
<ul style="list-style-type: none"> <li>● Sub-borough Totals (All Boroughs Except Staten Island)</li> </ul>	Total Housing Units, Total Occupied Housing Units, Total Rental Housing Units and Total Occupied Rental Housing Units
<ul style="list-style-type: none"> <li>● Structure Classification - Multiple dwelling units</li> </ul>	Total Housing Units and Total Occupied Housing Units
<ul style="list-style-type: none"> <li>● Structure Classification - One or 2 family house</li> </ul>	Total Housing Units
<ul style="list-style-type: none"> <li>● Rent Control Status</li> </ul>	Total Rental Housing Units and Total Occupied Rental Housing Units
<ul style="list-style-type: none"> <li>● Year Building Built</li> </ul>	Total Occupied and Total Renter Occupied
<ul style="list-style-type: none"> <li>● Number of Stories in Building</li> </ul>	
<ul style="list-style-type: none"> <li>● Number of Units in Building</li> </ul>	
<ul style="list-style-type: none"> <li>● Presence of Owner in Building</li> </ul>	
<ul style="list-style-type: none"> <li>● Elevator in Building with 2 or more stories</li> </ul>	
<ul style="list-style-type: none"> <li>● State/City Assisted Cooperatives</li> </ul>	Total Owner Housing Units and Total Occupied Owner Housing Units
<ul style="list-style-type: none"> <li>● Private Cooperatives</li> </ul>	
<ul style="list-style-type: none"> <li>● Private Condominiums</li> </ul>	