

American Homicide Supplemental Volume (AHSV)

Population Estimates (PE)

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The text is an extended version of material on population estimates in the chapter on
Methods in *American Homicide*.

Table of Contents

New England

Virginia and Maryland

Ohio, Georgia, and South Carolina

Illinois, New York City, Philadelphia, and the Trans-Mississippi West

Table 1:

Table 2:

Table 3: Enumeration Factors, Northern United States, 1850

Population Estimates

New England

Raw population totals for New Hampshire and Vermont from 1790 through 1900 are taken from the published volumes of the U.S. Census, supplemented by information on the age and gender distribution of foreign-born whites available in the Integrated Public Use Microdata Series (IPUMS) samples of the 1850, 1860, 1870, 1880, and 1900 censuses. Population totals for New Hampshire and Vermont prior to 1790 are from Holbrook (1981: 10; 1982: xii). Totals for the black population prior to 1790 are from Bureau of the Census (1975: 2: Series Z 1-19). The age and gender distribution of the population before 1790 is determined by extrapolation and interpolation using the 1800 census for the white population and the 1820 census for the black population, together with the Vermont census of 1771 (Holbrook 1982: xviii) and the New Hampshire censuses of 1767 and 1773 (Bureau of the Census 1909: 149-54). The population of foreign-born whites was estimated at 1 percent of the white population in 1830 and 2 percent in 1840, with the same age and gender distribution as the population of foreign-born whites in 1850.

Most studies of homicide rates in British North America and in the United States use the raw population totals from published censuses to determine the population at risk of homicide. That approach has merit. The British colonial censuses of the 1760s and 1770s and the U.S. censuses from 1790 through 1920 were remarkably complete, given the logistical challenges that census takers faced (Wells 1975: 32-5; Rutman 1975; Parkerson 1991: 514-15; King and Magnuson 1995: 460; Magnuson 1995). Population totals derived from these censuses can be

reproduced easily and checked for accuracy.

Each of these censuses, however, suffered to some degree from underenumeration (i.e., the failure to list particular individuals or households) and from overenumeration (i.e., the listing of particular individuals or households two or more times). Scholars have yet to reach a consensus on the extent of underenumeration or overenumeration. They agree, however, that census takers were more likely to overlook the members of certain groups: infants, the poor, the foreign-born, African Americans, Native Americans, the geographically mobile, older women (especially if unmarried, divorced, or widowed), persons living in large cities or remote rural areas, and persons living in communities experiencing rapid population growth (Parkerson 1982: 107, and 1991: 514; Steckel 1988, 1991: 594; King and Magnuson 1995: 460-4). Differences in the rates at which the members of different social groups were enumerated can confound comparisons of homicide rates over time and among social groups. It is thus important for scholars who study homicide over long periods of time or among various social groups to consider the potential effect of enumeration errors.

Scholars employ two basic methods to determine the degree of underenumeration and overenumeration in past U.S. censuses. The first is demographic. Coale and Zelnick (1963), Coale and Rives (1973), and Hacker (1999) use stable population theory to reconstruct the native white population from 1880-1950, the black population from 1880-1970, and the native white population from 1850-1880. They use life tables, estimates of mortality and fertility, and adjustment factors for age heaping to determine enumeration rates for males and females at each age. The three studies find that the net rates of underenumeration were low. From 1880 through 1920, they varied from 6.5 percent to 7.5 percent for native-born whites and from 9 percent to 16 percent for blacks (Coale and Zelnick 1963: 179-80; Coale and Rives 1973: 21). From 1850

through 1880, they varied from 6.4 percent to 9 percent for native-born whites.

The censuses showed a slight improvement in 1880. That was the year in which the Census Bureau improved the organization of the census by transferring supervision of the census from federal marshals to census supervisors, who were appointed, trained, and supervised by the Census Bureau itself. The censuses showed no improvement in enumeration rates from 1880 through 1920, which is consistent with the findings of historians of the census (Knights 1991: 518; Magnuson and King 1995: 27-9; M. J. Anderson 1988: 78-115; King and Magnuson 1995: 460; Magnuson 1995: 107-78, 238). Infants and older women were most likely to be undercounted.

The second method scholars use to determine the extent of under- and overenumeration is record linkage. Davenport (1985), Ginsburg (1988), Knights (1991), Adams and Kasakoff (1991), and others compile lists of known residents from tax lists, maps, genealogies, and other sources. They then determine the proportion of the residents (usually adult white males) on those lists who can be traced to the nearest census. These studies find much higher rates of underenumeration than do demographic studies: 11 percent to 15 percent for native-born adult males in the Northeast, one of the best enumerated groups in the entire population (Steckel 1991b: 588). Enumeration rates are far lower in the Midwest, in the South, among unmarried women over the age of 20, and among African Americans (Adams and Kasakoff 1991; Pleck 1979: 215; Davenport 1985: 10-11).

The differences between the low estimates of demographers and the higher estimates of historians stem from differences in method (King and Magnuson 1995). Actual enumeration rates are higher than those found in record linkage studies. Errors in censuses or other lists can make linkage impossible, as can the intervention of migration (or death) between the taking of a

census and the creation of the list with which the census is compared. But demographic studies also have limits. Their accuracy depends on the accuracy of their assumptions. Coale and Zelnik (1963) and Coale and Rives (1973) assume that mortality was constant from 1850 to 1900, the year from which they draw their earliest mortality data. Recent studies indicate, however, that mortality was considerably higher in the mid-nineteenth century than in 1900 (Haines 1998; Pope 1992; Preston and Haines 1991; Fogel 1986). That suggests that the mid-nineteenth century censuses missed fewer people in the nineteenth century than these demographic studies indicate.

J. D. Hacker (1999) improves dramatically on the enumeration estimates of other demographic historians. Hacker takes advantage of improved mortality tables and of the Integrated Public Use Microdata Series (IPUMS) samples of the 1850, 1860, 1870, and 1880 censuses to develop precise estimates of under- and overenumeration for the native-born white population in the North and South.

Table 1 compares the estimates of net underenumeration (underenumeration less overenumeration) of the native-born white population in 1850 from Adams and Kasakoff (1991: 529, 530, 537), the most comprehensive genealogical record-linkage study to date, with the estimates from Hacker (1999: 124-5) for the native-born white population, North and South. Hacker finds that enumeration levels for males and females were nearly equal up to age thirty, but that older females were less well enumerated than older males. Hacker's findings are consistent with those of previous studies. He cautions, however, that the enumeration differential between older females and males may be overstated, if women were more likely to die in the nineteenth century in their thirties and forties than model life tables currently allow. Adams and Kasakoff's estimates show the same rough equality in enumeration for males and

females up to age 30. Adams and Kasakoff are not able, given their genealogical sources, to calculate underenumeration factors for married women, so their enumeration factors for older women are not comparable to Hacker's. Adams and Kasakoff conclude, however, as does Hacker, that older women were the most likely people to be missed by census takers.

The enumeration estimates in this study for the population in northern New England are based on Hacker's estimates for the native-born white population and Cole and Rives's estimates for the native-born black population. Enumeration estimates based on Adams and Kasakoff's estimates were also calculated to determine whether the higher estimates of underenumeration in linkage studies altered the shape of the homicide curves. They did not.

The estimates from the demographic studies of Hacker and of Cole and Rives must be used, however, in conjunction with estimates from linkage studies to determine enumeration levels for foreign-born whites and for regions within the United States, such as northern New England. Demographic studies must trace cohorts from birth, so they cannot study the foreign-born. They must also confine cohorts over the course of their lives to specific geographical regions. Because few native-born inhabitants of the United States migrated to other countries and because native-born Northerners and Southerners migrated almost exclusively within their home regions in the nineteenth century, it is possible to estimate their enumeration levels. But demographic studies cannot yet estimate enumeration levels for subregions, such as northern New England, because so many natives left each subregion and so many non-natives moved in.

It is necessary nonetheless to adjust the estimates of Hacker and of Cole and Rives to account for three things: the high levels of enumeration in northern New England, relative to other regions in the North; the lower levels of enumeration for the foreign-born; and the lower levels of enumeration for African Americans in the North than in the South. Linkage studies,

because of their methods, overstate regional and nativity differentials in enumeration. That is why this study halves the differentials found in those studies. But linkage studies can estimate the direction and relative magnitude of those differentials.

The enumeration factors for native-born whites in the North and for blacks are multiplied by 1.031 to account for the high level of enumeration in northern New England (Table 2).

Adams and Kasakoff (1991: 535) find that enumeration rates were highest in northern New England. According to their linkage study, males and females were 6.2 percent more likely than the national average to be enumerated in northern New England and 2.5 percent more likely in southern New England (Table 2). The resulting enumeration rates for native-born adult males in southern New England estimated by their study are consistent with the findings of other linkage studies. Ginsburg (1988: 77) locates 81.5 percent of the adult male taxpayers on the 1870 census in the seven towns she studied in Franklin County, Massachusetts (84 percent if the results from the poor census in Montague, Massachusetts are dropped). Knights (1991: 520-1) finds 85.3 percent to 89 percent of a sample of native-born adult male residents of Boston, Massachusetts in the censuses of 1860 and 1870.

Adams and Kasakoff have few individuals in their genealogical sample from the Midwest or the West, but the data they do have suggest that underenumeration rates were highest in those regions. Adams and Kasakoff's estimates of regional differences within the North are consistent with Parkerson (1982: 103-5, 107). D. H. Parkerson found that "rapidly growing communities" had the highest rates of underenumeration in mid-nineteenth century New York state, because of "ineffective record keeping, large concentrations of immigrants with unusual names and language problems, enumerators who were unfamiliar with large segments of the population, and great intra-city residential movement," a pattern that Parkerson discovered was borne out by

studies of frontier communities in Illinois, Oregon, and California. Crimmins (1980) finds similar regional differences in mortality registration.

The enumeration factors for foreign-born whites in northern New England were calculated by multiplying the unenumeration factors for native-born whites in each age and gender category by .95 (Table 2), an estimate based on Knights (1991: 521), which finds that enumeration levels for native-born white males varied in Boston from 85 percent to 89 percent, and for foreign-born white males from 77 percent to 80 percent. The relative rates at which men and women of various age categories were underrepresented in the census may have been different for the foreign-born, but to date no research is available to determine if that was the case.

The factors for blacks in northern New England were calculated by multiplying the median enumeration factors for the black population, 1880-1920, in Coale and Rives (1973: 21), by .95--the same multiplier used to arrive at the factors for foreign-born whites (Table 2). The resulting rates of enumeration for northern New England are higher, as expected, than those in the linkage studies of Pleck (1979: 215) for Boston and of Davenport (1985: 10-11) for rural New York state. The rates are consistent, however, with the findings in linkage studies that blacks were less likely to be enumerated than whites and less likely to be enumerated in the North than in the South (with the possible exception of the 1870 census).

The resulting enumeration factors for 1850 appear in Table 3. The factors for 1850 are used for all earlier censuses, because the basic organizational structure of the census remained the same.

The estimates of the white population of colonial New England, 1630-1760, are modified from Bureau of the Census (1909: 9), following Thomas and Anderson (1973), who find that

growth rates did not vary as widely from decade to decade as assumed in Bureau of the Census (1975: 2: series Z1-Z8). The estimates were further modified from 1700 to 1760, so that New England's white population would by 1790 and 1800 match the totals for the federal censuses of those years, corrected for underenumeration. The age and gender distribution of the population is interpolated between the distributions for 1690 (Thomas and Anderson 1973: 654) and 1800 (the federal census corrected for underenumeration). The interpolated age and gender distributions match those in the colonial censuses of the 1760s and 1770s (corrected for underenumeration) to within .1 percent. The age distribution between 1630 and 1690 is interpolated between the distributions for 1620-49 (Archer 1990: 480) and 1690 (Thomas and Anderson 1973: 654). The gender distribution of the population cannot be calculated precisely prior to 1690, however, because the male/female ratios in Archer (1990: 480) are 1.5 or higher at all ages, even among young children.

The estimates of the black and Native American populations of colonial New England are also imprecise. The estimates for the black population are from Bureau of the Census (1975: 2: series Z1-Z8), multiplied by 1.213 to correct for underenumeration (based on the level of underenumeration of nonwhites in the 1820 census, the first to report age-specific populations for nonwhites). The estimates for the Native American population are from Snow (1980: 31-42), Snow and Lanphear (1988), Cronon (1983), Ghere (1997: 257), and the colonial censuses of the 1750s, 1760s, and 1770s (Bureau of the Census 1909: 150-83). The latter censuses were also multiplied by 1.23, and the population loss during King Philip's War, 1675-6, was estimated at 25 percent. The data are too sparse to attempt reliable estimates of the age and gender distributions of the black and Native American populations.

The homicide rates in this book are based on the revised population estimates. It is

important to note, however, that the same historic trends would appear if the homicide rates were based on raw population figures from the Bureau of the Census. Historic rises and declines in homicide rates are too large to attribute to enumeration errors.

Virginia and Maryland

The populations, 1790-1880, of the four Virginia counties studied through the nineteenth century are estimated from U.S. census figures, using the enumeration estimates of Hacker for native-born whites in the South, the enumeration estimates of Coale and Rives for blacks, and the appropriate enumeration factors from Table 2.

Estimates of the white and black populations of Virginia and Maryland in the colonial and revolutionary period are from McCusker and Menard (1985: 136). The estimates are based on Menard (1980: 116-23, 157-66; 1981), Kulikoff (1977: 415-28), Earle (1979), and Bureau of Census (1975: Series Z 13-14). The estimates understate the total populations of Maryland and Virginia by probably 5 to 10 percent by the end of the eighteenth century, because they rely on raw U.S. Census figures for 1790 and 1800. Judicial examination rates for homicide in Maryland and Virginia are thus probably overstated by 5 to 10 percent in the 1750s, 1760s, and 1770s. The overstatement is negligible, however, relative to the magnitude of interregional differences and changes over time in examination rates.

Estimates of the changing age and gender distributions of the white and black populations in Virginia and Maryland in the colonial and revolutionary period are from Menard (1975; 1980: 121) and Morgan (1998: 82-3). The estimates are supplemented by estimates of the age and gender distributions of the white population in 1800 and of the black population in 1820,

which are based on U.S. Census figures adjusted for underenumeration.

It is difficult to estimate the white and black populations of particular counties in Virginia during the colonial and revolutionary period. Each Virginia county was obligated by law to produce a list of tithable persons each year--that is, a list of able-bodied free, indentured, and enslaved persons subject to assessment for tax purposes. These lists pose challenges, however, for demographers. First, the definition of "tithable person" changed several times (Rutman 1976; Rutman and Rutman 1980; Brown 1996: 116-28). In most years, the lists included all males and all "negro, mulatto, and Indian women" ages 16 and older; but that was not always the case. In 1662, the legislature voted to tax white female servants "whose common employment" was working in the fields. The law was never well enforced, but it added some female indentured servants to the tax rolls until 1705, when it was repealed. From 1705 to 1723, the legislature exempted free "negro, mulatto, and Indian women" as well from taxation. And from 1781 through 1786, the legislature raised the tithable age from sixteen to twenty-one. Because the original tithe lists have been lost for nearly every county, it is impossible to determine the precise number of free women who were taxed and the number of persons ages 16 to 20 who were exempted in the 1780s. The latter can be estimated by interpolating the number of tithable persons ages 16 and older between 1780 and 1787, but the former cannot. The number of free women who were taxed was probably small, because county totals of tithable persons reveal no abnormal rises in 1663 or 1724, or falls in 1706. The presence of free white women on the tax lists from 1663-1705 will produce, however, slight overestimates of the adult population, and the absence of some free black, mulatto, and Indian women from 1705 to 1723 slight underestimates.

The second problem with the lists of tithables is that they do not include the infirm or

disabled (who were exempt from taxation because of their inability to work), or able-bodied persons who escaped listing because of transience or fraud (a frequent complaint). Many counties compounded the problem by paring their lists before submitting them to the colonial or state government, in an effort to lighten their tax burden relative to other counties (Rutman 1976: 374-7). Counts recorded locally, however, were fairly complete, because county authorities were usually determined (if the number of presentments for tax evasion is any guide) to make every tithable person and every owner or employer of a tithable person pay their fair share of the county's taxes. In 1790 and 1800, an average of 82 percent of white males and black males and females ages 16 and older were listed as tithables in the eleven Virginia counties studied through the eighteenth century. The percentages ranged from 71 percent to 93 percent across the counties. It is impossible to know how the percentage of persons ages 16 and older who were exempted or missed changed over time, so a steady average rate of 82 percent is assumed.

Third, the ratios of children ages 0-15 to adults ages 16 and older varied widely from county to county, as did the ratio of males to females among white adults ages 16 and older. The variation is evident when the listed population in each county is compared to the total population enumerated in the census of 1699 (Rutman and Rutman 1980: 44-8), 1790, and 1800. In general, long-settled counties had higher proportions of children and white adult females in the population.

Finally, the racial composition of the tithable population is difficult to determine in the absence of the original tithe lists. In 1755, the colonial government reported separately the number of white and black tithables in each county, and in 1782 the number of whites and blacks in each county's total population (Greene and Harrington 1932: 141-55). These figures, together with the U.S. Censuses of 1790 and 1800, make it possible to estimate the racial composition of

individual counties in the second half of the eighteenth century. It is difficult, however, to estimate the racial composition of most counties in earlier years.

These problems are addressed in two ways. First, the study includes counties that were settled in the seventeenth century, the early eighteenth century, and the late eighteenth century, and it includes counties from each of early Virginia's major geographical regions: the Tidewater, the Piedmont, and the Shenandoah Valley. Thus, the counties studied are similar in geography and timing of settlement to the counties of Virginia as a whole in the seventeenth and eighteenth centuries. It is probable, therefore, that the age and gender composition of their combined populations is similar to that of Virginia as a whole. It is necessary, of course, to estimate the racial composition of the populations of these counties from other sources, notably colonial and U.S. Censuses, the colonial tithe list of 1755, and the few local tithe lists that have survived, as well as reconstructions of the populations of particular counties by demographic historians (Rutman and Rutman 1984: 2: 25-36, Kelly 1989, Nicholls 1972).

Second, the study includes the Virginia counties with the best surviving tithes lists from the early eighteenth century (Surry and Amelia) and the counties whose populations have been most thoroughly reconstructed by historians (Surry, Amelia, and Middlesex). Other counties in the study are similar to these in known demographic structure: Sussex County (adjacent to Surry County), Lancaster and Richmond counties (adjacent to Middlesex County), and Spotsylvania County (settled at roughly the same time as Amelia County and in similar terrain). The remaining counties in the study were settled in the late eighteenth century (Augusta, Botetourt, Rockbridge, and Rockingham), so their populations can be reconstructed well with the help of the colonial tithe list of 1755, the colonial census of 1782, and the U.S. Censuses of 1790 and 1800.

The colonial and revolutionary populations of the counties in this study were calculated twice: once by multiplying their combined enumeration of tithes by the appropriate factors for the age and gender composition of Virginia's population as a whole, and once by using local records and histories, together with the colonial censuses of 1699 and 1782, the colonial tithe list of 1755, the U.S. Censuses of 1790 and 1800, to estimate the population of each county separately. The first method rests on the assumption that the counties in the study are representative of Virginia and Maryland counties as a whole, and the second method rests on a host of assumptions necessary to fill gaps in local records so that population totals can be estimated. In the end, the estimates of the two methods are similar, because both depend above all on the enumeration of county tithes, which is the same in both cases.

The population estimates used in this book are those derived by the first method, which is simpler and which can be reproduced readily from the work of McCusker and Menard (1985: 136), Menard (1980: 121), and Morgan (1998: 82-3). The assumption on which these estimates rest--that the counties studied are representative of Virginia as a whole--should become more plausible in the future, as scholars study homicide in additional counties.

Ohio, Georgia, and South Carolina

The populations, 1790-1880, of the three Ohio counties, the seven Georgia counties, and the two South Carolina counties included in this study are estimated from U.S. census figures, using the enumeration estimates of Hacker for native-born whites in the North and South respectively, the enumeration estimates of Coale and Rives for blacks, and the appropriate enumeration factors from Table 2.

Illinois, New York City, Philadelphia, and the Trans-Mississippi West

The raw U.S. census figures are used for the populations of the other jurisdictions included in the study. Because the homicide counts for those jurisdictions are based on counts from primary sources rather than estimates from multiple sources, they understate the number of homicides. The decision was made to understate the populations as well, so the understatement of the number of homicides is not exaggerated.

The data from other quantitative studies of homicide are not available. In these cases, the population estimates are used as is or taken from improved population estimates, as noted. Where possible, homicide rates per 100,000 persons per year are recalculated as homicide rates per 100,000 persons ages 16 and older per year. In most populations from the sixteenth through the nineteenth century, the proportion of adults in the population ranged from 63 percent to 70 percent. Only frontiers showed significantly higher proportions of adults. So, as a rule of thumb, the adult population was historically about 65 percent of the total population. Homicide rates per capita can be translated roughly into adult homicide rates by dividing by .65, and adult homicide rates can be roughly translated into per capita rates by multiplying by .65.

AHSV: PE Table 1

Enumeration Factors for Native-Born White Males and Females in the United States, 1850: Adams and Kasakoff, and Hacker

Ages	Adams and Kasakoff	Hacker	Hacker	Adams and Kasakoff	Hacker	Hacker
	white males U.S.	white females North	white males South	white females U.S.	white males North	white females South
0-4	0.784	0.875	0.876	0.773	0.861	0.851
5-9	0.821	0.935	0.956	0.774	0.928	0.890
10-15	0.822	0.945	0.992	0.876	0.958	0.993
16-25	0.813	0.969	0.961	0.858	0.974	0.986
26-44	0.783	0.913	0.936	*	0.856	0.891
45+	0.855	0.993	0.953	*	0.892	0.802

Source: Adams and Kasakoff (1991) and Hacker (1999: 124-5).

AHSV: PE Table C2

Multipliers by Region, Race, and Nativity

	Linkage study estimates	Revised estimates
Region: Northern whites		
Northern New England	1.062	1.031
Southern New England	1.025	1.013
Mid-Atlantic	.994	.996
Old Midwest	.962	.981
Region: Southern whites		
Virginia and Maryland		1.010
Georgia and South Carolina		1.000
Race and Nativity		
Northern blacks		.95
Foreign-born whites		.95

AHSV: PE Table 3

Enumeration Factors, Northern United States, 1850

	Males			Females		
	Native- Born White	Foreign- Born White	Non- White	Native- Born White	Foreign- Born White	Non- White
0- 9	.902	.857	.793	.891	.847	.791
10-15	.945	.898	.865	.958	.910	.860
16-25	.969	.920	.846	.974	.925	.834
26-44	.913	.867	.792	.856	.813	.806
45+	.993	.943	.940	.892	.847	.710

1. The enumeration factors in this table must be multiplied by the regional factors in AHSV: PE Table 2 to obtain the factors for specific subregions, such as northern New England.

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