# A DEMOGRAPHIC ASPECT OF INTERSTATE VARIATIONS IN AMERICAN FERTILITY, 1800–1860

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THE lack of extensive and systematic information about early 19th century American fertility precludes a clear understanding of many aspects of its movement, particularly when the measurement of fertility for those years is the number of children under 5 per 1,000 women of childbearing age. This fertility ratio is known to be affected by various demographic factors such as the age distribution of females in the reproductive period, mortality of children under 5 (and their under-enumeration), migration, proportion of females who are married, etc.

The fertility ratio is therefore not without many unavoidable pitfalls when used as a measure of true fertility and/or its modifications in the early years of the 19th century. In the 1810's and 1820's, for example, the textile industry in New England began to attract females from rural areas to its factories. Aside from other possible factors, this internal migration of females, single and married, must have somewhat distorted fertility ratios for different regions or states.[2]

However, the usefulness of the fertility ratio is still substantial when the limited data render difficult the employment of other means of arriving at some approximation of fertility in the early decades of the last century. Measured in terms of fertility ratios, the decline of, and regional differences in, fertility in the United States were shown to date from the beginning of the 19th century.[3] The complexity of the causes of the

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[2] *Cf.* Kemp, L.: A Note on the Use of the Fertility Ratio in the Study of Rural-Urban Differences in Fertility, *Rural Sociology*, 1945, 10, No. 3, pp. 312–13.

[3] Willcox, W. F.: The Change in the Proportion of Children in the United States and in the Birth Rate in France During the Nineteenth Century. *Publications of the American Statistical Association*, March, 1911, 12, No. 93, pp. 490–99.

reduction in fertility requires little elaboration; but, in the few studies cited, the keynote of their interpretation of early American fertility phenomena was the importance of industrialization and urbanization. It was maintained that "since 1800 industrialization has cut down the rate of natural increase."[4] And, ". . . Beginning in southern New England, shortly after the opening of the nineteenth century, the decline in fertility proceeded westward into the Middle Atlantic States with the development of industry and the growth of cities. By 1820 the ratio of children to women in the frontier States from Ohio to Mississippi, where agriculture was dominant, was nearly twice that in southern New England."[5] It was also reported that fertility differentials by urban-rural division and according to "plane of living" were of considerable magnitude in the United States at the beginning of the 19th century.[6]

But, the aim of the present paper is not to discuss the general validity of the thesis that industrialization and urbanization, and what these two terms imply, are the chief forces reducing fertility in the modern era. Rather, the present attempt touches upon an aspect of interstate variations in American fertility which has been overlooked up to the present. It views early American fertility from a different perspective and proposes to indicate other possible factors (not in socio-economic terms) accountable for some of these fertility phenomena.

## ASSUMPTIONS AND HYPOTHESIS

As the United States in the early decades of the 19th century was still a "newly settled" country, at least in a demographic sense, it is improbable, in the author's opinion, that its fertility could have been affected so much and so early by industrialization and urbanization. Especially, the decline in

Whelpton, P. K.: Industrial Development and Population Growth. *Social Forces*, March 1928 6, 3, pp. 458–67.

Jaffe, A. J.: Differential Fertility in the White Population in Early America, *Journal of Heredity*, Sept. 1940. 31, No. 9, pp. 407–11.

[4] Whelpton, *op. cit.*, p. 467.

[5] THE PROBLEMS OF A CHANGING POPULATION. National Resources Committee, May 1938, p. 123.

[6] Jaffe, *op. cit.*

fertility in most of the Western European countries, where populations were then more stable and industrialization and urbanization more advanced, apparently did not commence until after the 1870's.[7] (France and Ireland excepted.)

Indicative of the fact that the United States was a demographically new country in the early 19th century were the shifts in its state sex ratios in those years. It has been observed that "the proportion of males in the white population shows a more marked decrease from 1790 to 1900 in the Middle and Southern states than New England."[8] In view of the shifts in the sex ratios, it seems reasonable to assume that some demographic factors, heretofore undetected and particularly likely to be influential in a relatively new population, could have produced certain fertility patterns in the United States.

Ideally, of course, the present attempt should relate fertility to such demographic factors as age at first marriage, proportion of those ever married, etc. The absence of such marital data, however, necessitates an indirect inquiry into the matter, and the indirect way of resolving the problem seems to be that of relating fertility ratios to sex ratios.

Whether or not the sex ratio was causally related to fertility in the 19th century can only be surmised. It seems an appropriate conjecture that the relatively high fertility in many parts of the United States in those years could have been due in part to the scarcity of females. A great majority of females in the areas of high sex ratios were likely to be married and contribute substantially to reproduction as measured by the fertility ratio. In areas where the number of females exceeded the number of males, not all of the females could be married in a monogamous society. The fertility ratios for such places would therefore be lower because a larger proportion of unmarried females were included.

Thus the analysis which follows is based on the postulate

[7] United Nations: THE DETERMINANTS AND CONSEQUENCES OF POPULATION TRENDS. New York, 1953, p. 72.
[8] A CENTURY OF POPULATION GROWTH. Bureau of the Census, Washington, 1909, p. 93.

that the sex ratio affects marriage behavior directly,[9] and, therefore, the fertility ratio indirectly, *in the absence of extensive practice of contraception.*

Contraceptive knowledge is known to have existed in the United States long before the 19th century. As a matter of record, *coitus interruptus* was mentioned in historical documents as far back as 1630–1650, and a publication advocating birth control was first printed in America in 1830.[10] Such facts are certainly indicative of the *existence* of contraception, but they do not seem to shed any light on the *extensiveness* of the practice. The lack of positive information on the extent of contraceptive practices might possibly be and is taken to denote their limited acceptance in the United States during the early decades of the 19th century.[11]

[9] Brunner, C. T.: Local Variations in the Birth-Rate. *The Economic Journal,* March 1925, 35, pp. 60–65.

Kramm, E. R. and Thomas, D. S.; Rural and Urban Marriage in Relation to the Sex Ratio, *Rural Sociology,* March 1942, 7, 1, pp. 33–39.

Brunner examined the variations of the birth rates of England and Wales in terms of the proportions of the sexes in the population and the proportion of marriages in which women were under 21. He found that the higher the proportion of marriages under 21, the higher was the birth rate in a county (a correlation of .77), and that the proportion of women to men was negatively correlated with the proportion of marriages under 21 (a correlation of – .45, or – .77 if agricultural counties were excluded). When the proportion of women to men was correlated with the birth rate, there was again a negative correlation (– .41, or – .81 if agricultural counties were excluded). His conclusion was that "the sex-distribution of the population determines the age at which the women marry through the keenness or otherwise of the competition for them, and the age of marriage of the women determines the birth rate." *Op. cit.,* p. 65.

Kramm and Thomas utilized the 1930 census data for selected counties in Washington, Oregon, and California, and two samples from the Swedish census of 1935 and examined the relationship between the sex ratio and the proportion of each sex married. Using the sex ratio as the independent variable and the proportion of each sex married as the dependent variable, correlation coefficients and linear regressions were calculated, yielding theoretically relevant implications for the present study. Their conclusion was that "the relative supply of the sexes probably accounts for the major part of the trend in the proportion married." *Op. cit.,* p. 39.

[10] Himes, N. E.: MEDICAL HISTORY OF CONTRACEPTION. Baltimore, the Williams and Wilkins Co., 1936, pp. 224–225. The publication referred to here was entitled MORAL PHYSIOLOGY; OR, A BRIEF AND PLAIN TREATISE ON THE POPULATION QUESTION, by Robert D. Owen.

[11] This contention seems consistent with the sales of birth control literature at that time. Himes reported that the sale of Owen's pamphlet in America and England reached a total of only 75,000 copies over a period of 47 years (1830–1877), and that not more than 10,000 copies of the FRUITS OF PHILOSOPHY, a similar publication, were sold in the United States up to 1839. *Ibid.,* p. 224. and pp. 230–231. When these figures are viewed against the enumerated population of the United

Reasoned thus, it seems plausible that the sex ratio could have been a factor affecting fertility in the years considered. Derived from this postulate and the empirical studies cited is the following hypothesis to be tested in the present analysis, which treats individual states, even though their numbers varied from census to census, as the basic units in the inquiry. The hypothesis is that, in a state,

> the lower the sex ratio (the higher the age at marriage for females and the smaller the proportion of females married), the lower the fertility; or, *conversely,*

> the higher the sex ratio (the lower the age at marriage for females and the higher the proportion of females married), the higher the fertility.

## DATA AND METHOD

Data for the present study were drawn from the United States Census. Little effort was made to correct the census. Variations in the extent of under-enumeration of children under 5 undoubtedly existed in different states and in different censuses, but the adoption of one correction factor for all states would not alter the overall picture of fertility and, for the present purposes, it seemed impractical to work out a correction factor for each state separately. As the extent of under-enumeration cannot be precisely determined, any manipulation of this sort might seriously distort the picture. Census materials were therefore used in their original published form.

However, estimates of the number of children under 5 had to be made for 1800, 1810, and 1820. These three censuses show only the number of children under 10 without the subdivision into age-groups 0–4 and 5–9 given in subsequent censuses. In order to obtain the number of children under 5 prior to 1830, the proportion of those under 5 of the total group under 10 in

States in those years, it does not seem an exaggeration to think that contraception was not widely practised, or that it was then probably not of a magnitude sufficient to modify fertility rates. As a case in point, both of the publications were being sold in England from the 1830's onward, but the decline in English fertility occurred, not before, but after the 1870's when the Bradlaugh-Besant trial and the prosecution of Truelove initiated what has been termed by Himes "the democratization of birth control by publicity." *Ibid.,* ch. X.

1830 was computed for each state. Applying this proportion to the number under 10 in 1800, 1810, and 1820, estimates of the number of children under 5 were obtained.

Furthermore, owing to the age-classifications used in the early censuses, it was not possible to compute sex and fertility ratios on the basis of exactly comparable age-groups throughout all of the period under study. For 1800, 1810, and 1820 these ratios were computed on the basis of the number of males 16–44 per 1,000 females 16–44 and the number of children under 5 per 1,000 females 16–44. From 1830 to 1860, sex ratios were calculated on the basis of males 15–49 and of females 15–49. Fertility ratios for those years were also based on the female population 15–49. The sex and fertility ratios by states are given in the Appendix, and are based on the enumerated *white* population in the censuses, 1800–1860.

It can be seen in the Appendix that in each of the seven decades fairly consistent discrepancies existed between the states either in terms of their sex ratios or fertility ratios. Broadly speaking, relatively low ratios are shown for the New England and the Middle Atlantic states and some of the older states in the South Atlantic region. Sex ratios and fertility ratios are generally somewhat, and in some cases considerably, higher for the states in other areas, such as East North Central, West North Central, East South Central, etc. The two scatter diagrams make visible this positive association between the sex ratio and the fertility ratio. They are for the years 1800 and 1830.

The consistent pattern of variations in both sex and fertility ratios during this period bears out, at least impressionistically, the hypotheses that the lower the sex ratio, the lower the fertility, or that the higher the sex ratio, the higher the fertility ratio. To give statistical substance to these visual observations, Kendall's Coefficient of Rank Correlation technique was used.

Kendall's Rank Correlation was employed instead of the straight Pearsonian $r$ because this latter method assumes the
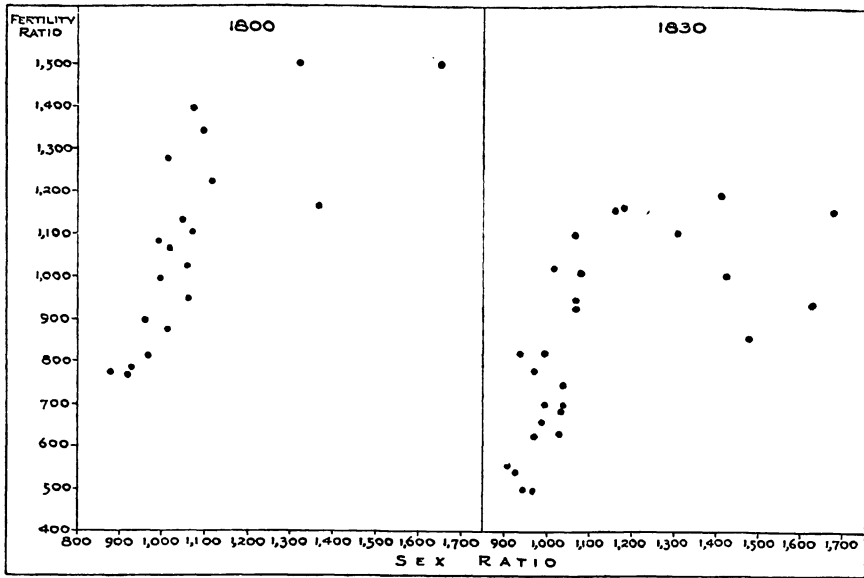
Figure 1. Scatter diagram fertility ratios and sex ratios for States, white population, United States, 1800 and 1830.

existence of a linear relationship between the variables examined. This assumption seems *a priori* unsatisfactory in terms of the two variables in the present analysis; namely, the sex ratio and the fertility ratio.

That is, it does not seem tenable that the fertility ratio could vary positively and indefinitely with the sex ratio even if no contraception of any form existed. For the simple reason that human reproduction is limited by the long period of gestation, the number of children per woman cannot be expected to enlarge in direct proportion to sex ratios. And, the pattern of the dots in the scatter diagrams suggests the possibility of a curvilinear relationship between the two variables. (Fig. 1.)

In view of the above, Kendall's Rank Correlation was used to show the degree of association between sex and fertility ratios by state. The simplicity of this method is consistent with the aim of the present study, which is to demonstrate some demographic factors affecting interstate fertility patterns in the early 19th century. The findings of this inquiry should be regarded as suggestive rather than definitive.

FINDINGS AND DISCUSSION

The procedure for the testing of the hypothesis was as follows: for each decade, states[12] were first ranked by sex ratios, giving 1 to the state with the highest sex ratio. States were then ranked according to their fertility ratios, assigning 1 to the state with the highest fertility ratio and so on. Coefficients of rank correlation were computed decade by decade, and the results are given in Table 1.

Table 1. Coefficients of rank correlation between sex and fertility ratios, 1800–1860.

| YEAR | $\tau$ | $\dfrac{S}{\sigma_s}$ | SIGNIFICANT AT .01 LEVEL |
|---|---|---|---|
| 1800 | 0.66 | 4.09 | Yes |
| 1810 | 0.57 | 3.87 | Yes |
| 1820 | 0.38 | 2.71 | Yes |
| 1830 | 0.58 | 4.23 | Yes |
| 1840 | 0.48 | 3.68 | Yes |
| 1850 | 0.49 | 4.11 | Yes |
| 1860 | 0.49 | 4.53 | Yes |

For method of computation and test of significance, *see* Hagood, M. J. and Price, D. O.: STATISTICS FOR SOCIOLOGIST, New York, Henry Holt 1952, pp. 469–473.

The coefficients of rank correlation between the sex and fertility ratios are almost uniformly high and all significant, tending to support the notion that demographic factors (of which the sex ratio is one) could have accounted, to some extent, for interstate fertility differences in the early years of the 19th century. Their influence on fertilty, as would be expected, tended to diminish as the country advanced in industrial and urban development. The gradual reduction of the coefficients in the second half of the period investigated suggests that fertility performance became more and more independent of demographic factors, but increasingly dependent on socio-economic factors.

It seems appropriate to recall and re-consider the thesis that the decline in American fertility appeared to commence from the beginning of the 19th century, basing its measurement in terms of the fertility ratio.[13]

The reported early decline in American fertility probably could have differed intrinsically from the later fall in the birth

[12] Some of the "states" when first enumerated in the Census were actually called "territories," a fact which is of political significance. For the sake of convenience, they are all referred to as states in the present study.

[13] Willcox, *op. cit.* and Whelpton, *op. cit.*

rate resulting from voluntary and deliberate family limitation. Fertility data for those years are too sketchy to provide a definite answer; but, in at least one series of estimated white birth rates, no appreciable alterations were shown until around the 1830's.[14] The present findings indicate that the fertility ratios for those years were partially affected by demographic factors. Quite apart from the consideration that, as previously mentioned, these demographic factors could have affected marriage behavior directly and fertility indirectly in those years, they might have also been responsible for the apparent early decline in American fertility. That is, changes in the demographic composition of the population could have given rise to some seemingly real modifications in early American fertility *as measured by the fertility ratio*. Consequently, if we speak of fertility decline as an exclusive result of controlled fertility, might it be possible that the reduction in American fertility did not occur until after the date generally accepted?[15]

In conclusion, it appears that, while socio-economic factors are manifestly important as regards fertility behavior, they probably do not enjoy a monopoly over time and space. They should be used with caution to interpret fertility, especially with reference to such newly-settled populations as existed in the United States in the early 19th century, where demographic factors were clearly influential.

[14] *See* Thompson, W. S. and Whelpton, P. K.: POPULATION TRENDS IN THE UNITED STATES. New York, McGraw-Hill, 1933, p. 263, Table 74.

[15] In addition to publications previously cited, *see also* Thompson: POPULATION PROBLEMS, 4th ed., New York, McGraw-Hill, 1953, p. 164 and pp. 175–176. Bennett, M. K.: THE WORLD'S FOOD, New York, Harper & Bros., 1954, pp. 46–7.

Appendix: State sex and fertility ratios, 1800–1860.[1] (per 1,000 base population).

| | Sex Ratio | | | | | | | Fertility Ratio | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1800 | 1810 | 1820 | 1830 | 1840 | 1850 | 1860 | 1800 | 1810 | 1820 | 1830 | 1840 | 1850 | 1860 |
| *New England* | | | | | | | | | | | | | | |
| Maine | 1,015 | 994 | 953 | 991 | 1,005 | 1,051 | 1,005 | 1,068 | 1,007 | 877 | 705 | 661 | 536 | 500 |
| New Hampshire | 956 | 920 | 902 | 905 | 930 | 954 | 938 | 893 | 814 | 727 | 559 | 501 | 391 | 406 |
| Vermont | 1,068 | 956 | 954 | 970 | 993 | 1,047 | 1,009 | 1,098 | 945 | 779 | 631 | 594 | 488 | 442 |
| Massachusetts | 925 | 951 | 1,064 | 942 | 994 | 961 | 922 | 786 | 756 | 675 | 502 | 470 | 401 | 432 |
| Rhode Island | 872 | 925 | 1,123 | 923 | 927 | 965 | 919 | 784 | 759 | 708 | 544 | 472 | 431 | 418 |
| Connecticut | 920 | 926 | 1,096 | 962 | 957 | 998 | 963 | 781 | 742 | 663 | 506 | 474 | 408 | 442 |
| *Middle Atlantic* | | | | | | | | | | | | | | |
| New York | 1,060 | 1,057 | 1,034 | 1,040 | 1,030 | 1,026 | 964 | 949 | 1,012 | 894 | 700 | 616 | 493 | 508 |
| New Jersey | 992 | 1,002 | 975 | 1,031 | 1,001 | 930 | 983 | 996 | 938 | 880 | 698 | 657 | 514 | 559 |
| Pennsylvania | 1,054 | 1,011 | 1,020 | 1,034 | 1,005 | 1,025 | 988 | 1,033 | 1,011 | 959 | 751 | 521 | 611 | 613 |
| *East North Central* | | | | | | | | | | | | | | |
| Ohio | 1,315 | 1,089 | 1,091 | 1,066 | 1,072 | 1,065 | 1,029 | 1,500 | 1,382 | 1,279 | 933 | 838 | 671 | 644 |
| Indiana | 1,360 | 1,120 | 1,111 | 1,065 | 1,077 | 1,081 | 1,086 | 1,168 | 1,197 | 1,296 | 1,112 | 945 | 763 | 731 |
| Illinois | — | 1,342 | 1,330 | 1,155 | 1,269 | 1,152 | 1,168 | — | 1,307 | 1,326 | 1,165 | 948 | 747 | 737 |
| Michigan | — | 1,982 | 2,327 | 1,623 | 1,220 | 1,146 | 1,149 | — | 1,205 | 1,037 | 945 | 798 | 651 | 629 |
| Wisconsin | — | — | — | — | 2,053 | 1,247 | 1,137 | — | — | — | — | 867 | 736 | 787 |
| *West North Central* | | | | | | | | | | | | | | |
| Minnesota | — | — | — | — | — | 2,028 | 1,274 | — | — | — | — | — | 780 | 891 |
| Iowa | — | — | — | — | 1,519 | 1,139 | 1,140 | — | — | — | — | 973 | 812 | 822 |
| Missouri | — | 1,299 | 1,409 | 1,675 | 1,236 | 1,182 | 1,180 | — | 1,384 | 1,276 | 1,165 | 1,007 | 764 | 754 |
| Dakotas | — | — | — | — | — | — | 1,710 | — | — | — | — | — | — | 465 |
| Nebraska | — | — | — | — | — | — | 1,667 | — | — | — | — | — | — | 773 |
| Kansas | — | — | — | — | — | — | 1,377 | — | — | — | — | — | — | 759 |

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *South Atlantic* | | | | | | | | | | | | | | |
| Delaware | 601 | 579 | 660 | 666 | 857 | 906 | 810 | 1,038 | 1,009 | 960 | 989 | 1,001 | 995 | 963 |
| Maryland | 567 | 576 | 648 | 634 | 826 | 874 | 875 | 979 | 1,042 | 980 | 1,024 | 1,013 | 1,025 | 1,010 |
| Virginia | 659 | 641 | 768 | 788 | 952 | 990 | 1,288 | 1,001 | 1,002 | 972 | 970 | 986 | 981 | 1,004 |
| North Carolina | 623 | 634 | 789 | 823 | 1,027 | 1,045 | 1,081 | 953 | 932 | 917 | 936 | 944 | 961 | 986 |
| South Carolina | 608 | 636 | 812 | 829 | 1,025 | 1,081 | 1,129 | 984 | 986 | 990 | 992 | 1,034 | 1,047 | 1,049 |
| Georgia | 704 | 761 | 981 | 1,017 | 1,170 | 1,220 | 1,227 | 1,025 | 1,032 | 1,066 | 1,077 | 1,099 | 1,103 | 1,112 |
| Florida | 742 | 788 | 859 | 1,010 | — | — | — | 1,153 | 1,288 | 1,773 | 1,420 | — | — | — |
| *East South Central* | | | | | | | | | | | | | | |
| Kentucky | 718 | 736 | 897 | 950 | 1,175 | 1,286 | 1,342 | 1,077 | 1,084 | 1,103 | 1,061 | 1,027 | 1,070 | 1,097 |
| Tennessee | 696 | 728 | 943 | 1,023 | 1,246 | 1,301 | 1,396 | 1,039 | 992 | 988 | 1,018 | 984 | 1,052 | 1,070 |
| Alabama | 710 | 746 | 1,040 | 1,171 | 1,335 | — | — | 1,046 | 1,063 | 1,162 | 1,178 | 1,258 | — | — |
| Mississippi | 724 | 819 | 1,064 | 1,111 | 1,304 | 1,226 | 1,500 | 1,138 | 1,170 | 1,316 | 1,306 | 1,402 | 1,485 | 1,643 |
| *West South Central* | | | | | | | | | | | | | | |
| Arkansas | 805 | 874 | 1,128 | 1,200 | 1,289 | — | — | 1,154 | 1,182 | 1,368 | 1,402 | 1,363 | — | — |
| Louisiana | 633 | 623 | 821 | 868 | 1,026 | 1,058 | — | 1,192 | 1,385 | 1,557 | 1,479 | 1,611 | 1,372 | — |
| Texas | 855 | 827 | — | — | — | — | — | 1,301 | 1,350 | — | — | — | — | — |
| *Mountain* | | | | | | | | | | | | | | |
| Colorado | 428 | — | — | — | — | — | — | 29,263 | — | — | — | — | — | — |
| New Mexico | 650 | 572 | — | — | — | — | — | 1,161 | 1,032 | — | — | — | — | — |
| Utah | 1,097 | 846 | — | — | — | — | — | 974 | 1,249 | — | — | — | — | — |
| Nevada | 763 | — | — | — | — | — | — | 1,429 | — | — | — | — | — | — |
| *Pacific* | | | | | | | | | | | | | | |
| Washington | 1,040 | — | — | — | — | — | — | 4,624 | — | — | — | — | — | — |
| Oregon | 1,100 | 953 | — | — | — | — | — | 2,027 | 2,319 | — | — | — | — | — |
| California | 764 | 484 | — | — | — | — | — | 3,277 | 20,019 | — | — | — | — | — |

† Source: United States Census.
— These States were not enumerated in the Census.