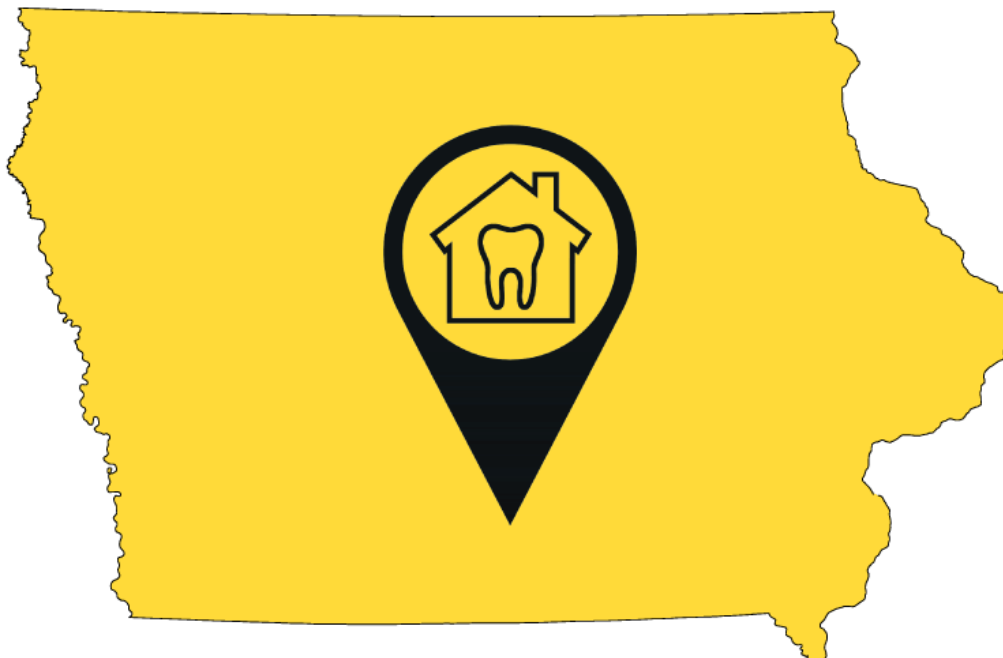


Chapter 5: Workforce Trends, by Selected Variables



**Iowa Dentist Workforce Atlas, 1997-2016:
20 Years of the Iowa Dentist Tracking System**



Workforce Trends

Sex

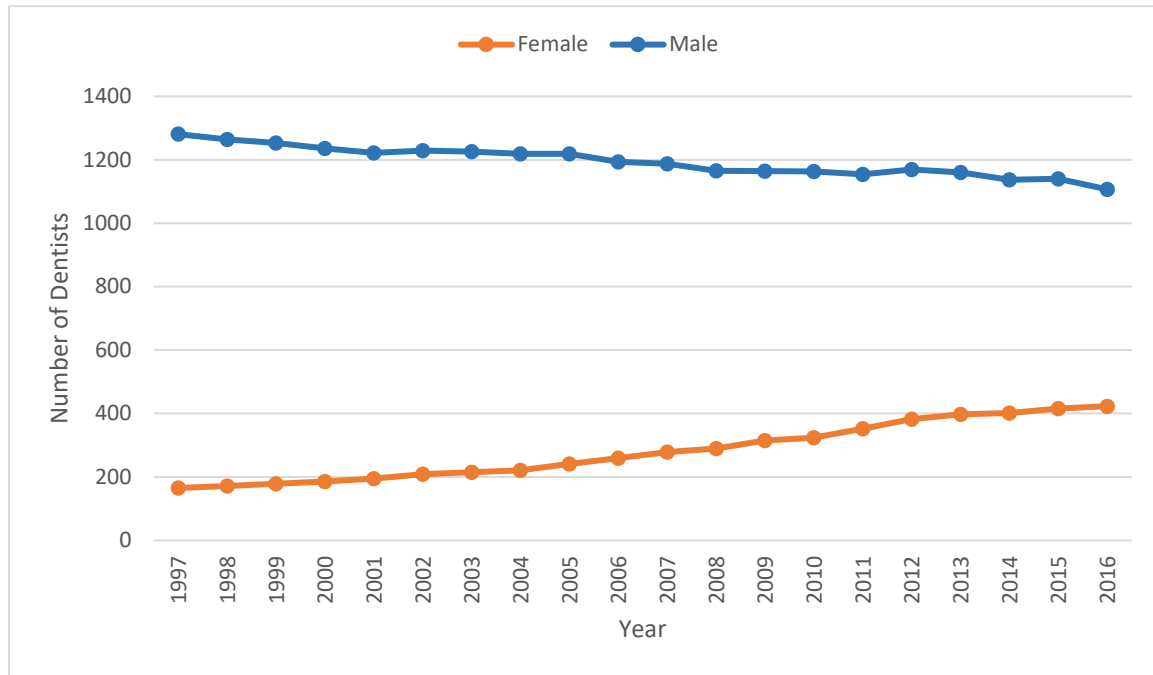


Figure 28. Active Iowa dentists, by sex, 1997-2016

In 1997, there were 165 active female dentists in Iowa, constituting 11.4% of all dentists. This number and percent have risen each year since. By 2016, there were 423 active female dentists, representing 27.6% of the total number of active dentists. This number will continue to rise during the immediate future for two reasons. First, the percent of University of Iowa incoming dental school classes have become more sex balanced. Second, the preponderance of dentists who will be retire in the short term will be male.

The increase in the number of women entering dentistry is reflected nationally, as well. In 2016, the percent of male and female enrollees in US dental schools was approximately equal.⁶

⁶ Wanchek T, Cook BJ, Valachovic RW. U.S. dental school applicants and enrollees, 2016 entering class. *J Dent Educ* 2017;81(11):1373-1382.

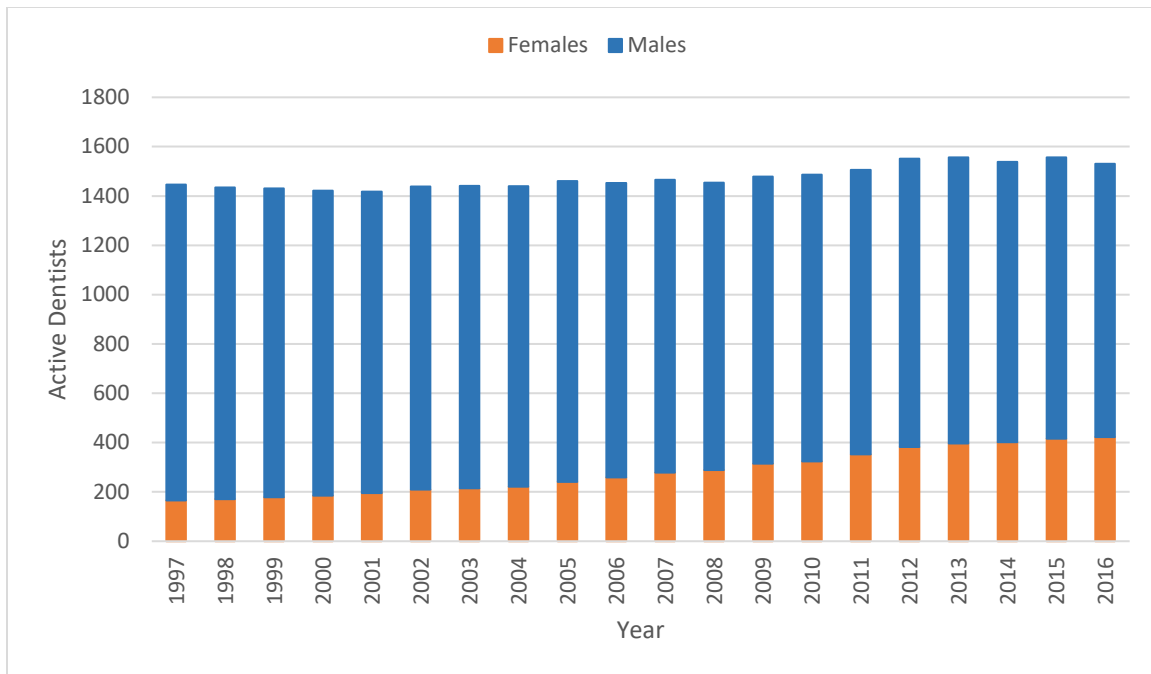


Figure 29. Active Iowa dentists, by sex, 1997-2016

Figure 29 is an alternate view of Figure 28.

The greatest number of active male dentists during this census occurred in 1997 ($n=1,281$), whereas, there were only 165 active female dentists that year. Conversely, the greatest number of female dentists ($n=423$) occurred in 2016, the same year in which there was the fewest number of active male dentists ($n=1,107$).

In total, the fewest number of total active dentists for this 20-year period was in 2001 ($n=1,417$) and the greatest number was in 2013 ($n=1,557$).

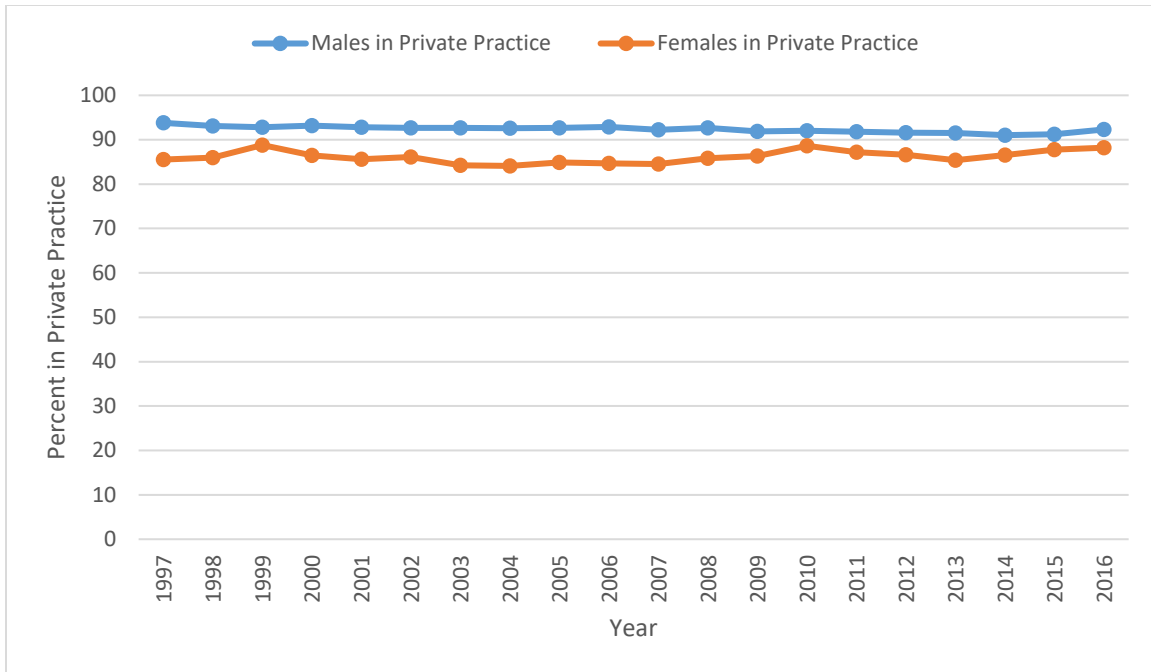


Figure 30. Percent of Iowa dentists in private practice, 1997-2016

The percent of male dentists who were in private practice for the period between 1997 through 2016 was approximately 91-94%. Although the overwhelming majority of female dentists also participated in private practice, the percent was slightly lower than their male colleagues, ranging from a low of 84% (2004) to a high of 89% (1999 and 2010).

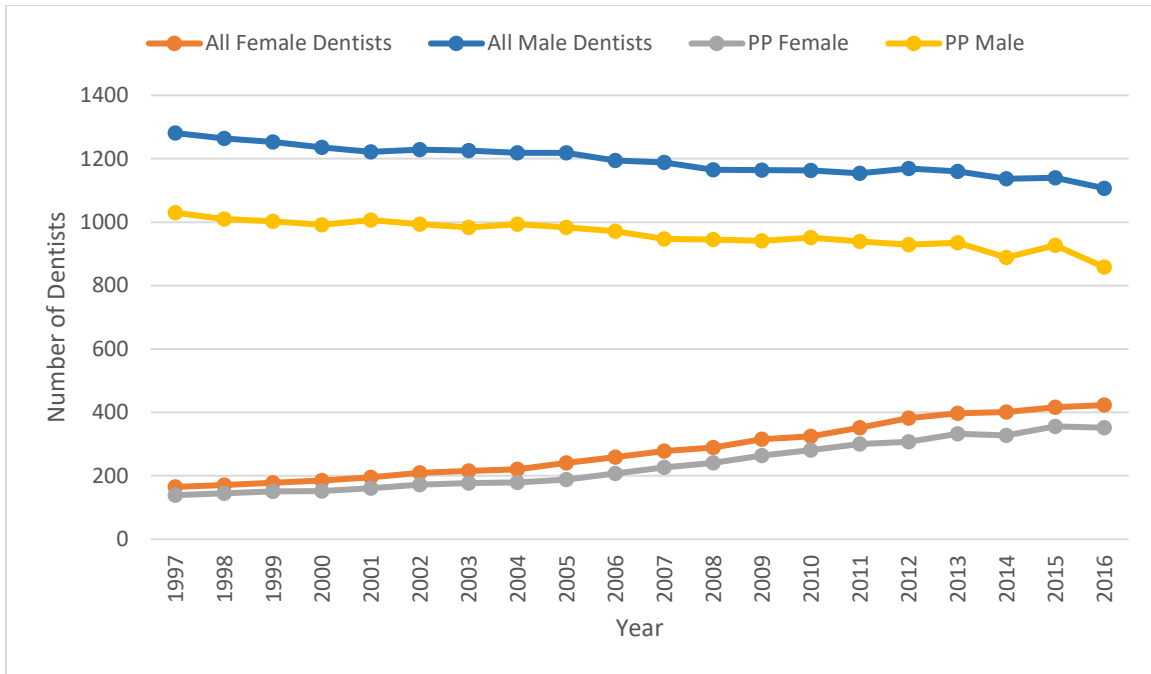


Figure 31. Active and private practice (PP) Iowa dentists, by sex, 1997-2016

The number of male dentists in private practice decreased from a high of 1,030 (1997) to 858 (2016). The ever-increasing number of female dentists in private practice ranged from 139 (1997) to 356 (2015). Thus, although female dentists made up only 11.9% of all private practice dentists in 1997, this percent had increased to 29.1% by 2016.

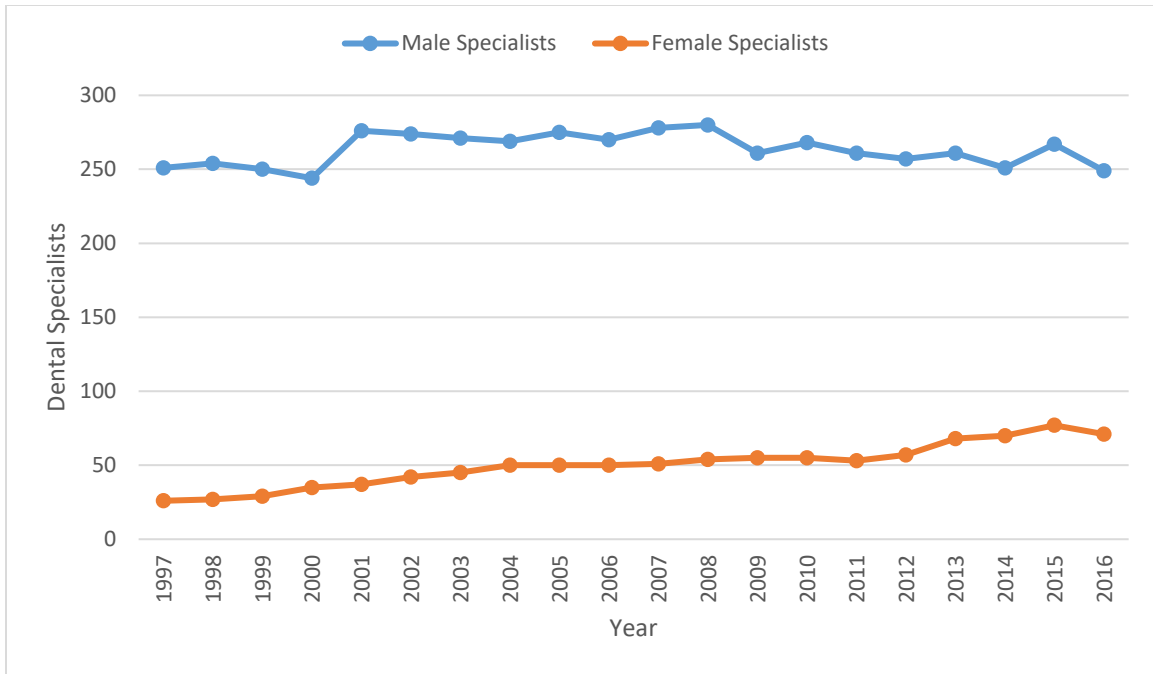


Figure 32. Number of Iowa dental specialists, by sex, 1997-2016

The total number of dental specialists in the state increased from 277 (1997) to 344 (2015), a 24.2% increase. The number of male dental specialists increased to a high of 280 (in 2008), but in recent years has reverted to about 250. By contrast, the number of female specialists steadily increased from 27 in 1997 to 77 in 2015.

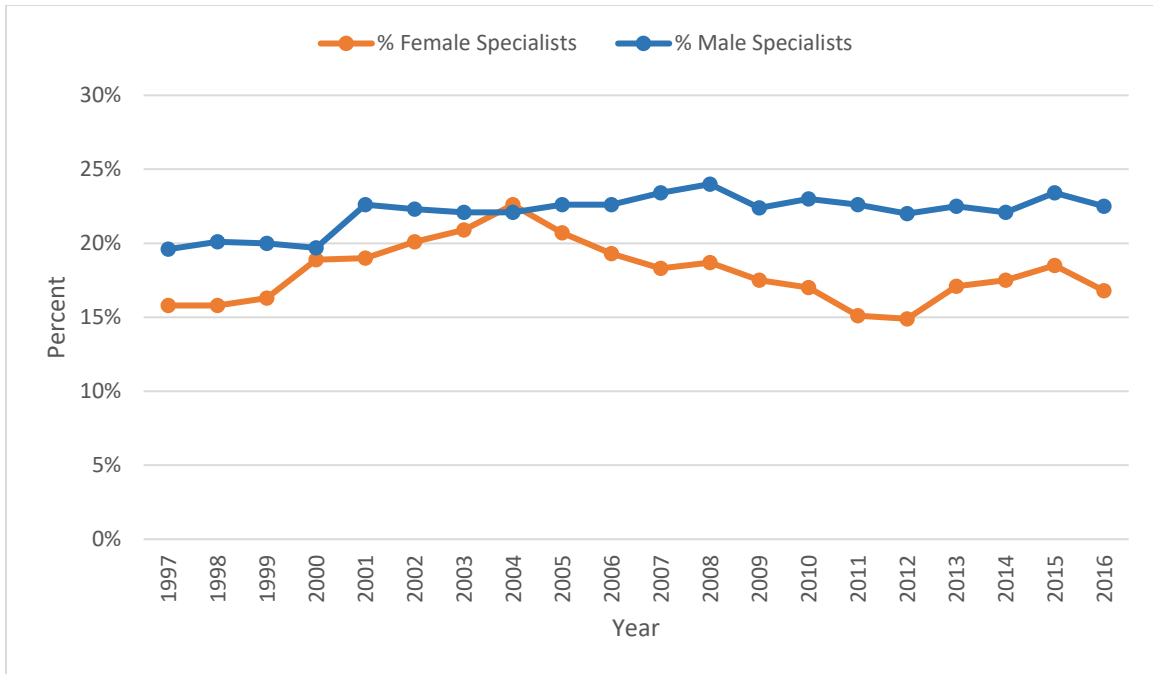


Figure 33. Percent of active Iowa dentists who are specialists, by sex, 1997-2016

The percent of active Iowa dentists who were specialists ranged from 19.6% (1997) to 24.0% (2008) for males and 15.8% (1997 and 1998) to 22.6% (2004) for females. 2004 was the only time when the percent of females who were specialists (as a percent of total active female dentists) exceeded males (22.6% versus 22.1%)

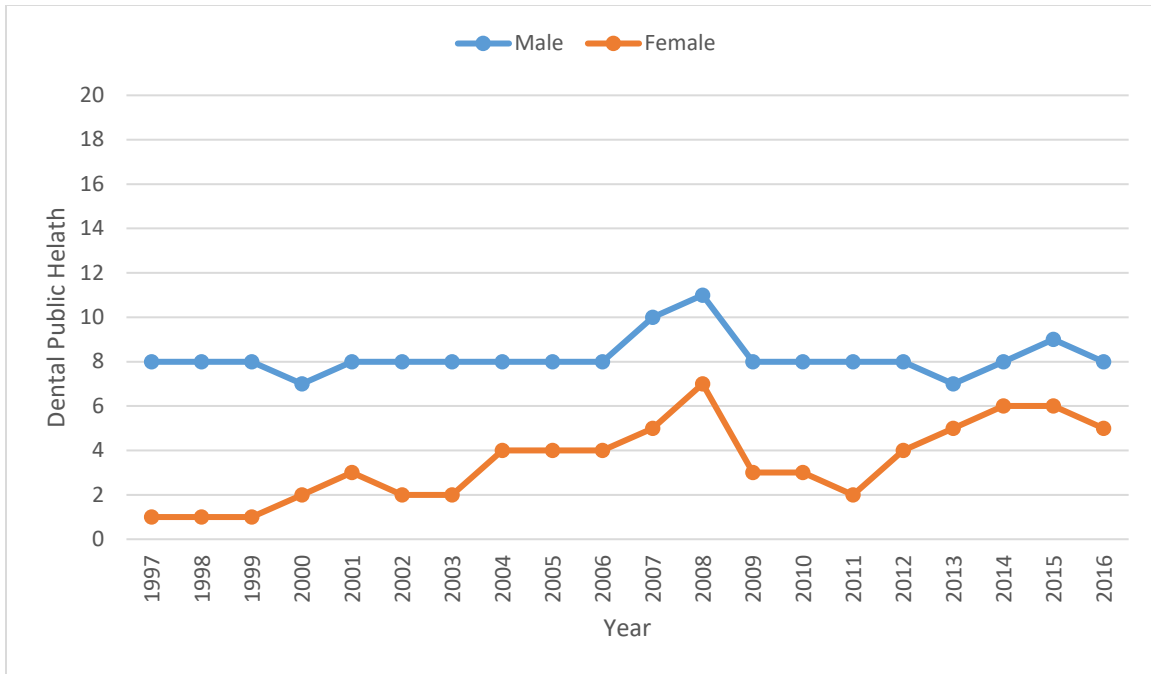


Figure 34. Dental public health dentists in Iowa, by sex, 1997-2016

Dental public health specialists are most likely employed either in educational institutions, government agencies, or organizational management. The numbers for each sex ranged as follows: for males, there was a high of 11 in 2008 and low of 7 in 2000 and 2013, and for females, there was a high of 7 in 2008 and low of 1 from 1997 through 1999.

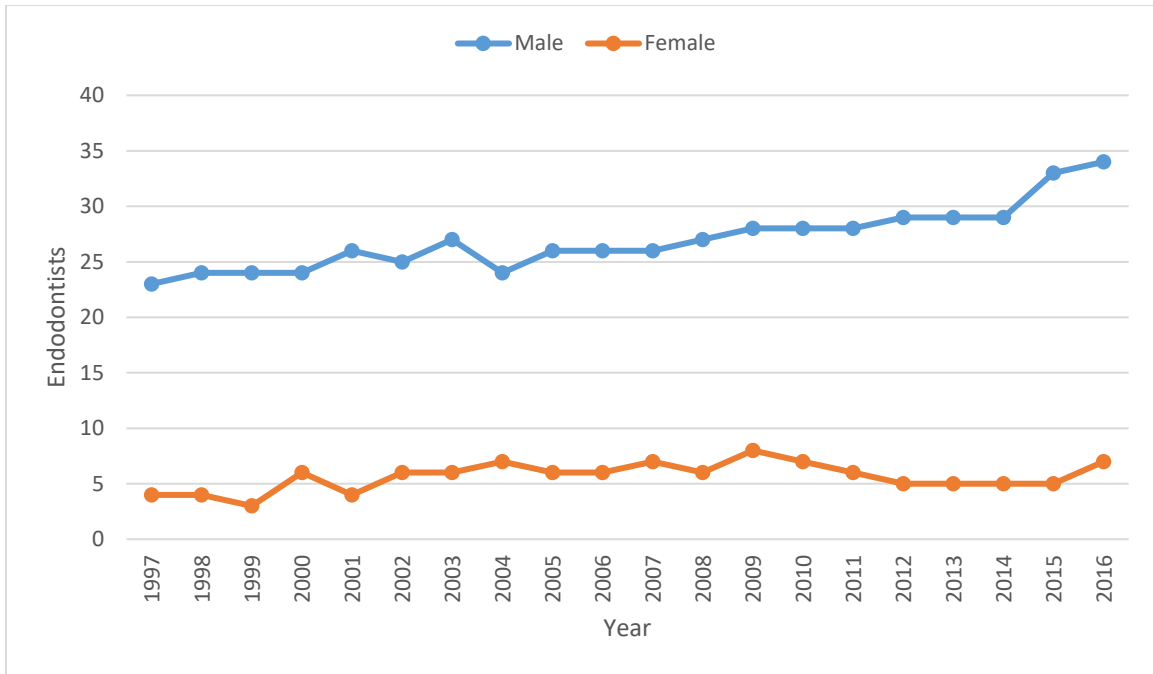


Figure 35. Endodontists in Iowa, by sex, 1997-2016

The number of male endodontists exceeded females by fivefold. The number of endodontists who were male ranged from a low of 23 in 1997 to a high of 34 in 2016. The number of female endodontists ranged from a low of 3 in 1999 to a high of 8 in 2009.

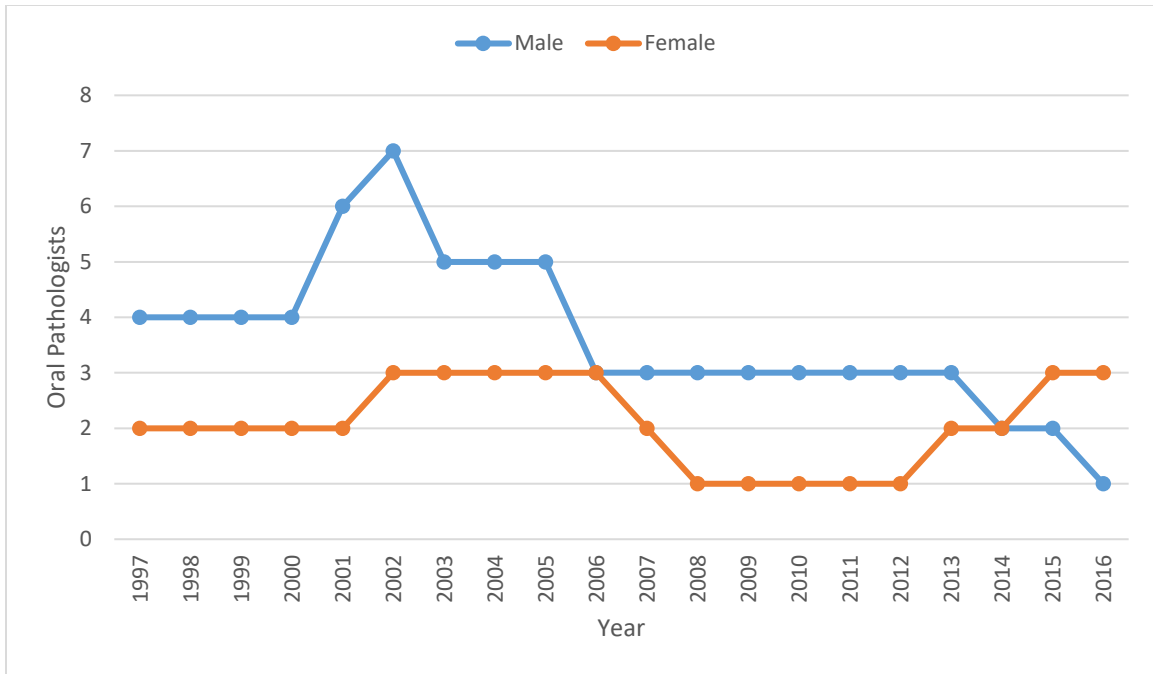


Figure 36. Oral and maxillofacial pathologists in Iowa, by sex, 1997-2016

Oral and maxillofacial pathologists general are generally employed in educational institutions or occasionally in hospitals. The number of male oral pathologists peaked at 7 in 2002 and dropped to a low of 1 in 2016. During this 20-year period, the number of female oral pathologists ranged from 1 to 3.

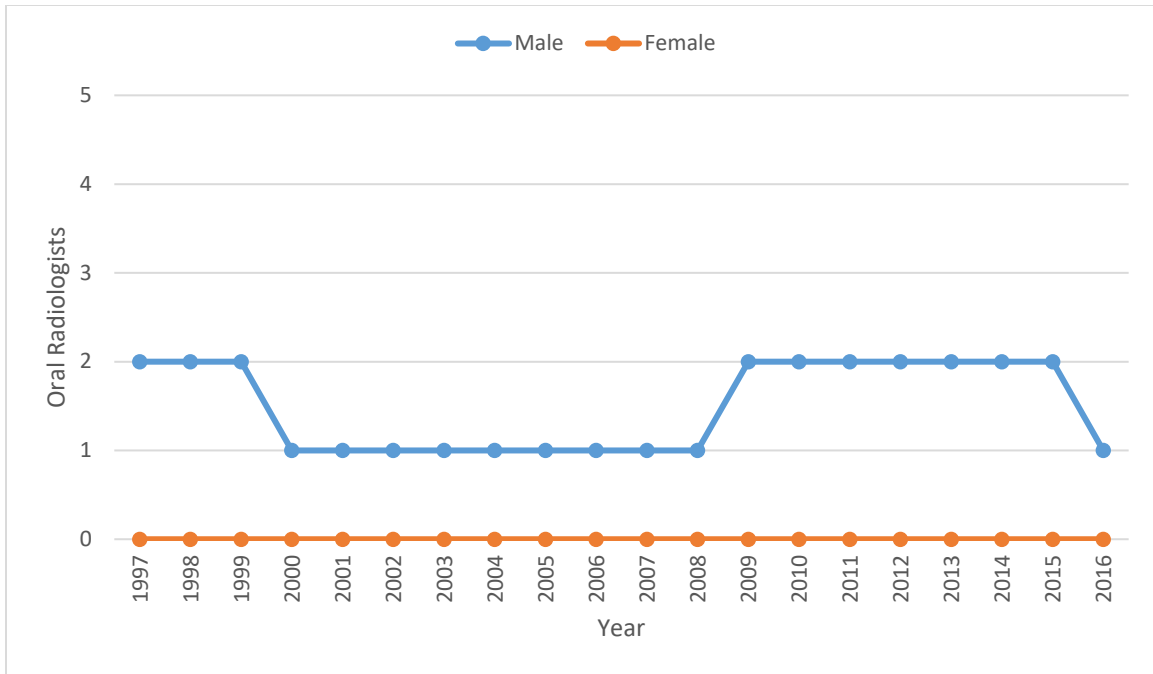


Figure 37. Oral and maxillofacial radiologists in Iowa, 1997-2016

Over this 20-year period, the number of oral radiologists working in the state remained low. There were at most 2 oral radiologists working at any given point during this time period, and all oral radiologists were males.

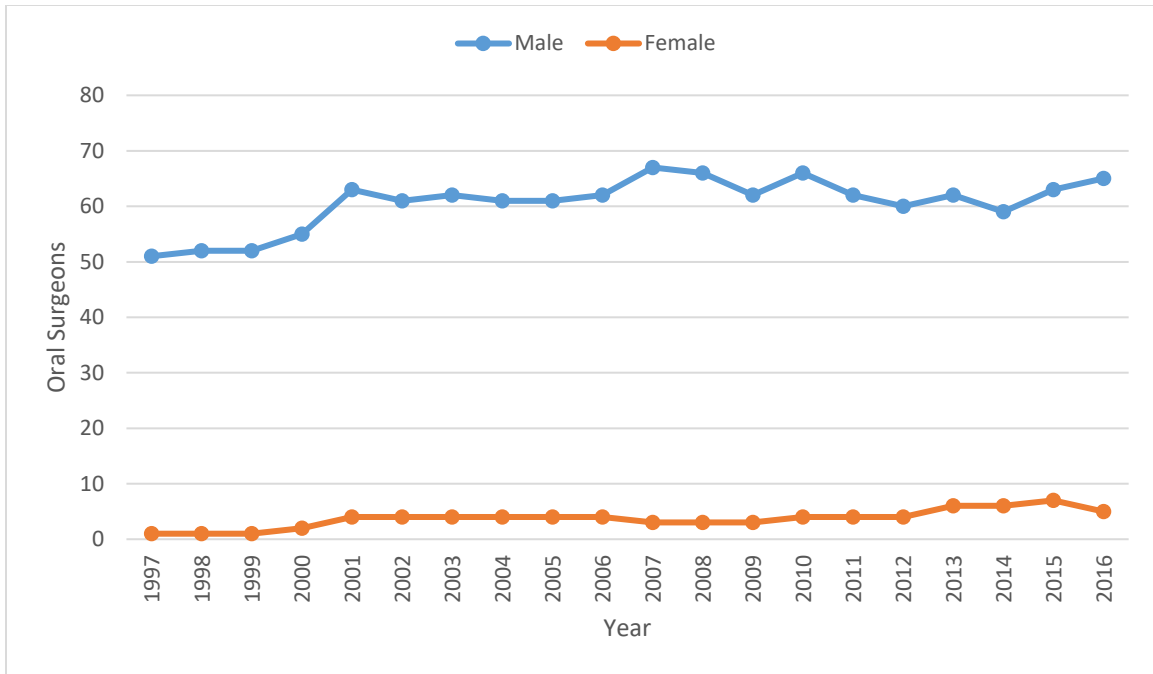


Figure 38. Oral and maxillofacial surgeons in Iowa, by sex, 1997-2016

There is a large disparity in the numbers of male and female oral and maxillofacial surgeons. The number of males ranged from a low of 51 in 1997 to a high of 67 in 2007. On the other hand, there was only 1 female oral surgeon for the first few years of this analysis, reaching a high of 7 in 2015.

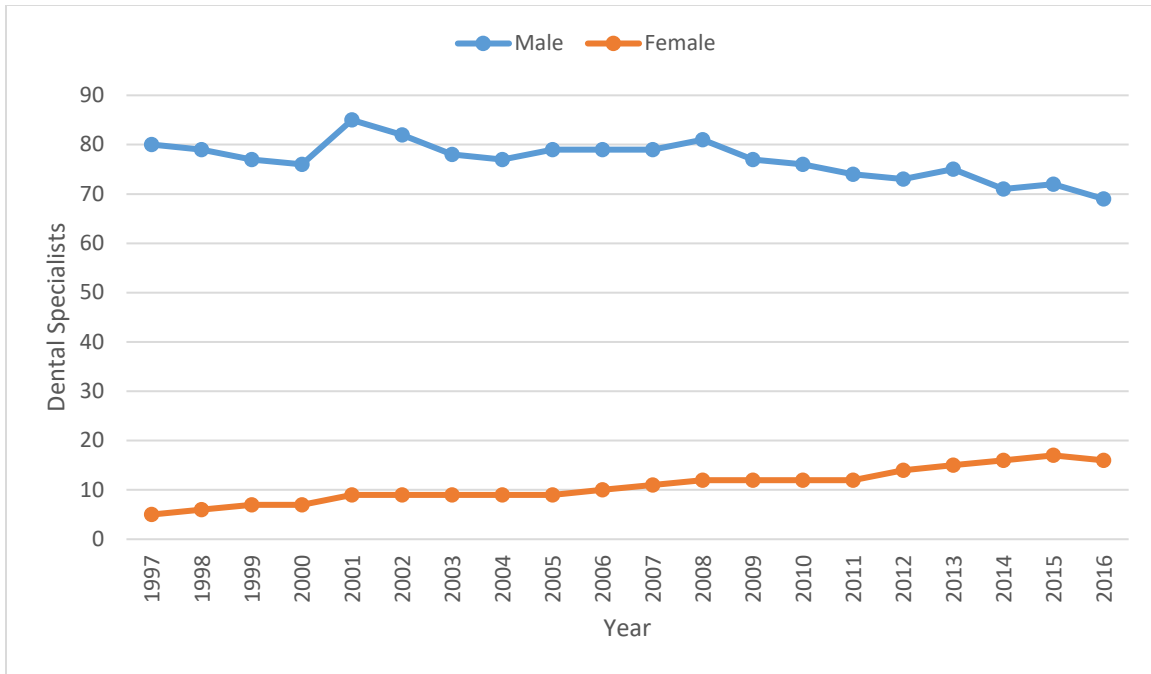


Figure 39. Orthodontists in Iowa, by sex, 1997-2016

The highest number of male orthodontists was 85 in 2001. However, there has been a slow, steady decline of male orthodontists during the past several years, ending with 69 in 2016.

There has been a threefold increase in the number of female orthodontists, from a low of 5 in 1997 to a high of 17 in 2015.

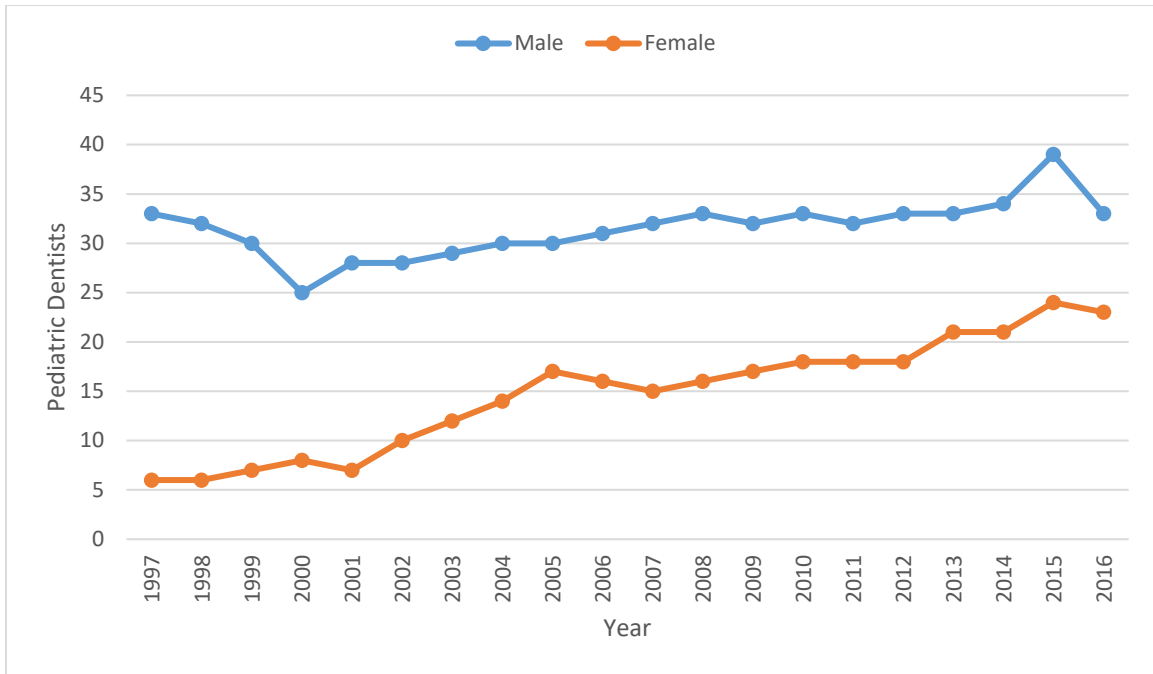


Figure 40. Pediatric dentists in Iowa, by sex, 1997-2016

As indicated in an earlier figure, the number of pediatric dentists had the greatest percentage increase of any of the dental specialties.

Initially, the number of males dipped from 33 in 1997 to bottom out at 25 in 2000. Since 2000, there has been a slow but steady increase in male pediatric dentists, peaking at 39 in 2015.

There was a fourfold increase in the number of female pediatric dentists, from 6 in 1997 to 24 in 2015.

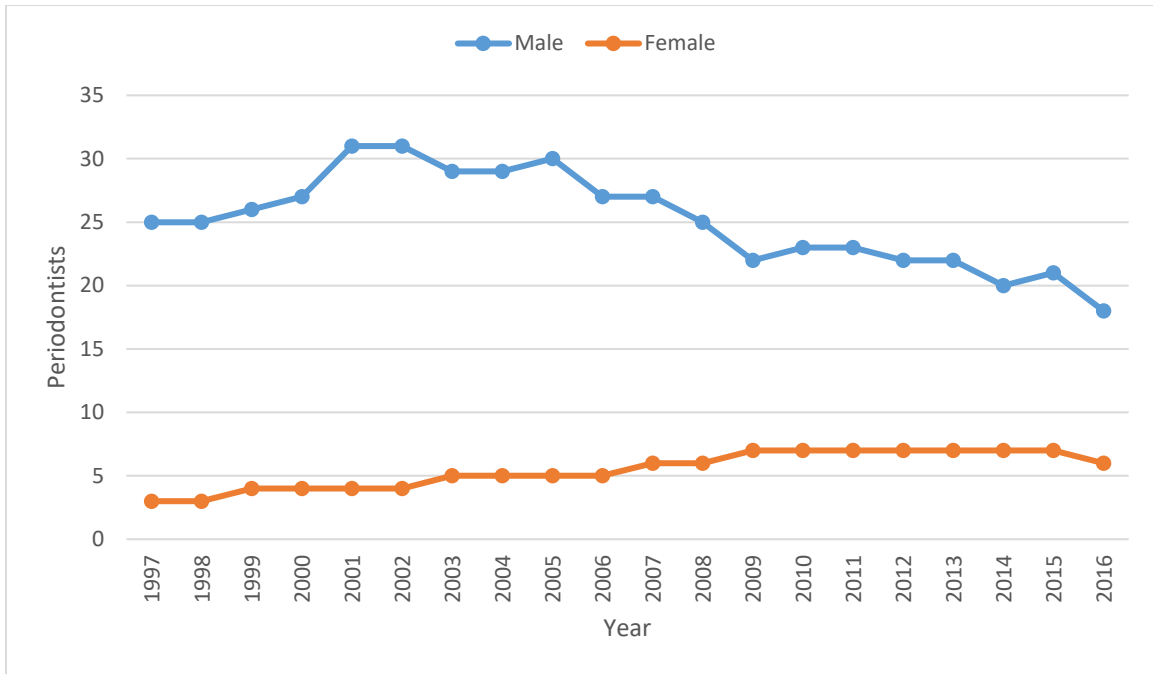


Figure 41. Periodontists in Iowa, by sex, 1997-2016

After an initial surge that saw a high of 31 in the number of male periodontists in 2001 and 2002, that number steadily declined to 18 in 2016. The number of female periodontists ranged from a low of 3 in 1997 and 1998 to a high of 7 in 2009 through 2015.

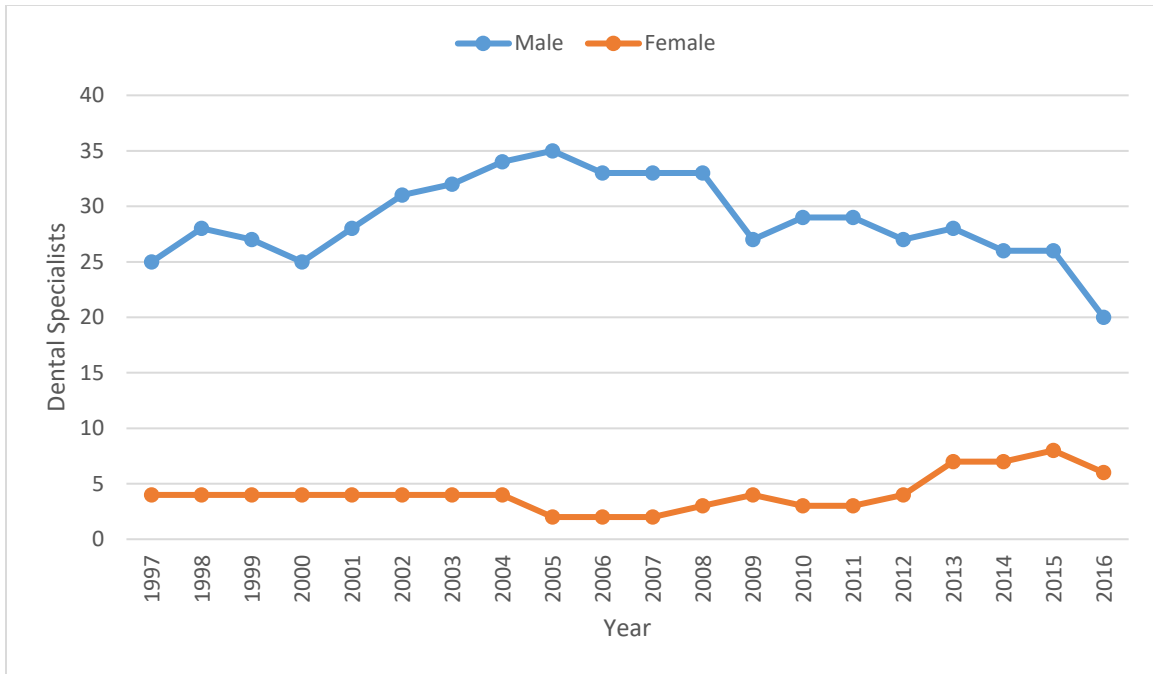
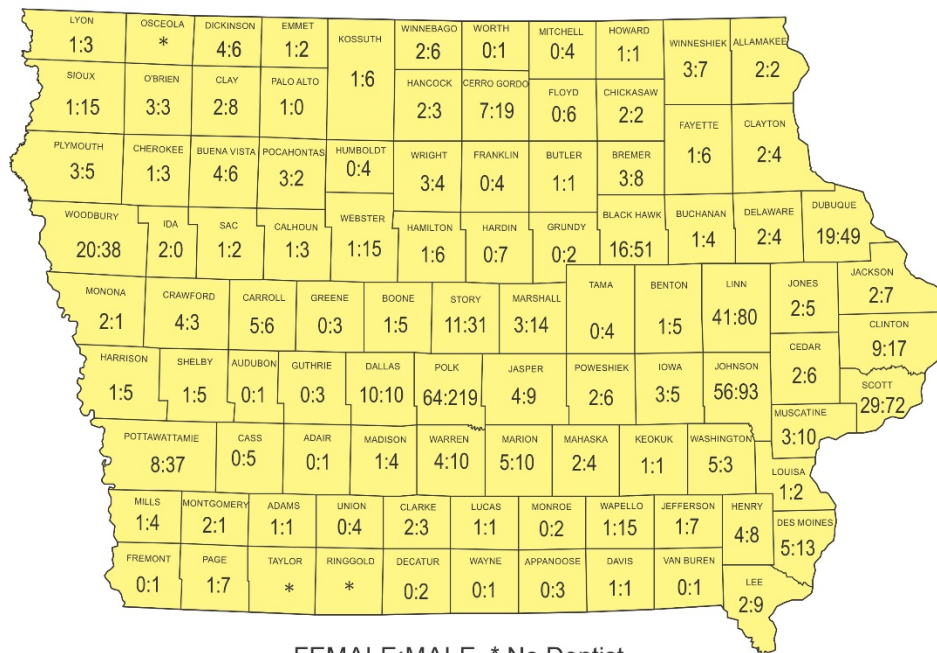


Figure 42. Prosthodontists in Iowa, by sex, 1997-2016

The number of male prosthodontists peaked at 35 in 2005 and diminished to 20 in 2016. The number of female prosthodontists saw a low of 2 from 2005 through 2007 and then reached a high of 8 in 2015.



FEMALE:MALE, * No Dentist

Statewide 423:1007

Figure 43. Number of dentists per county, by sex, 2016

In 2016, there were 295 female and 734 male dentists in Iowa's urban counties,⁷ indicating that females had a slightly larger presence in urban areas than in rural areas (69.6% versus 66.3%).

The number of female dentists exceeded their male counterparts in 7 counties, all of which were rural except one (Washington): Crawford (4:3), Ida (2:0), Monona (2:1), Montgomery (2:1), Palo Alto (1:0), Pocahontas (3:2), and Washington (5:3).

⁷ See section about Urbanicity of Iowa's Dentist Workforce Location for further information about urban and rural counties.

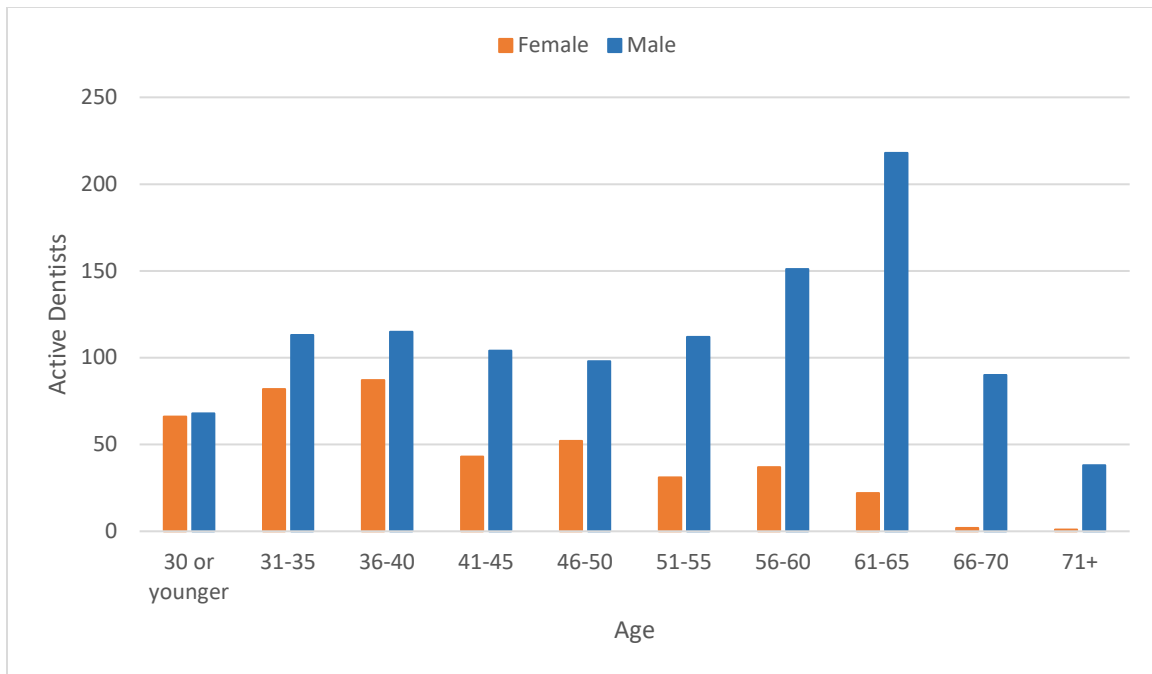


Figure 44. Age of active dentists, by sex, 2016 (N=1,530)

For decades, dentistry and medicine were almost exclusively male professions. Women started to apply and enroll in dental schools in greater numbers by the late 1980s. It is only during the past decade that women applied and enrolled in approximately equal numbers with men.

For females, the mean and median age for active dentists in 2016 were 41.6 and 39, respectively. For males, the mean and median age were 51.1 and 53, respectively.

The next chart reviews age findings from 1997.

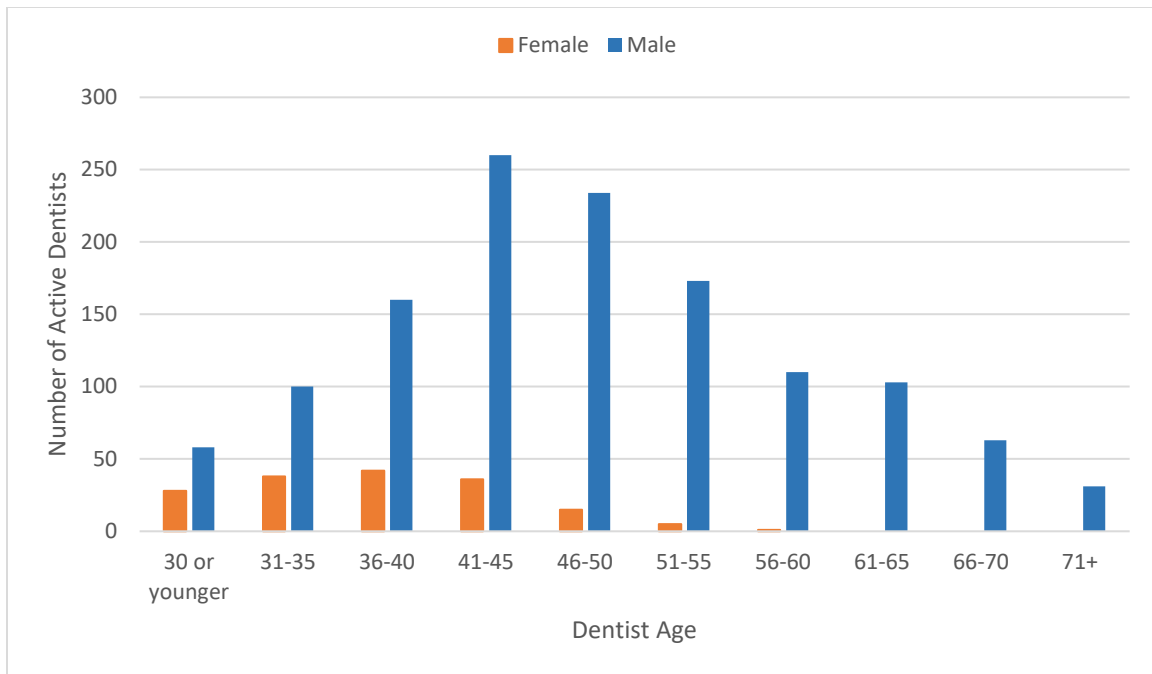


Figure 45. Age of active dentists, by sex, 1997 (N=1,447)

This figure readily illustrates two points: There was a paucity of female dentists in Iowa in 1997 and none of the females were older than 60 years of age.

The mean and median age for female dentists (n=165) in 1997 were 37.7 and 37, respectively. For males, the mean and median age were 47.9 and 47, respectively.

Race

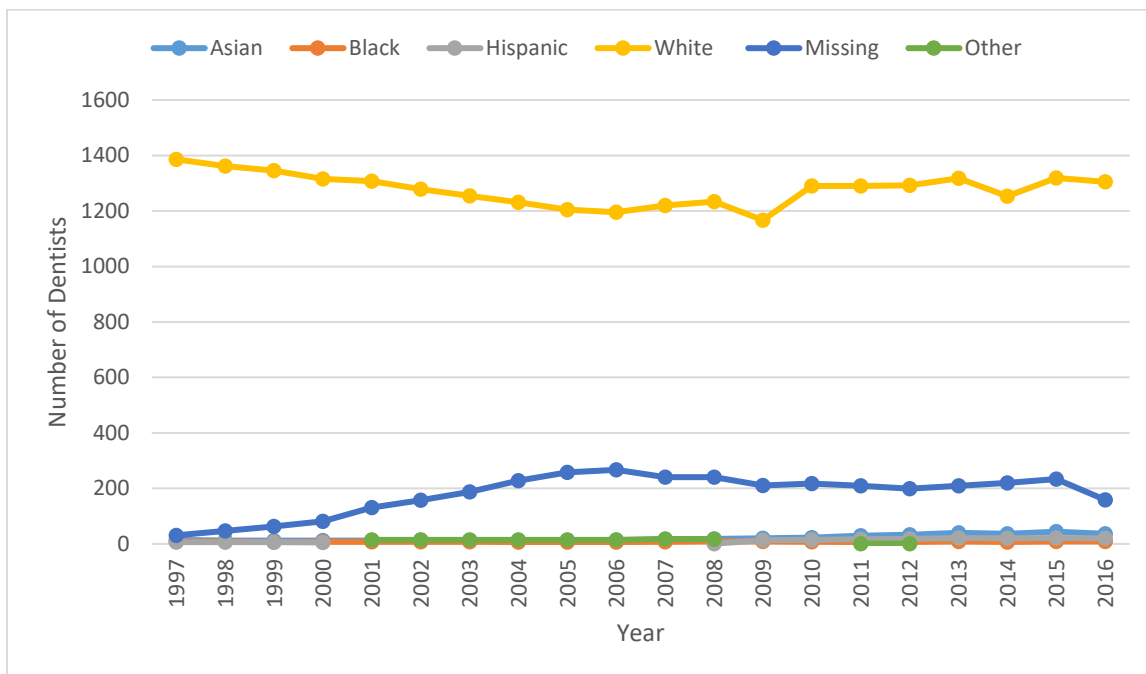


Figure 46. Racial composition of Iowa dentist workforce, 1997-2016

Within the Iowa Dentist Tracking System, collection of racial and ethnic data is the one variable that may not be as reliable due to changing measurement criteria. For example, from 1997 through 2000, there were six categories: Asian, black, Hispanic, white, missing, and other (e.g., Native American). Thereafter, the “missing” category increased annually. No individuals were identified as Hispanic until 2009, when there were some Hispanic dentists listed. The number of Hispanic dentists reached at high of 21 in 2013 and 2015.

The number of dentists with Asian heritage peaked at 44 in 2015. In the years recorded, there have never been more than 9 black dentists.

Age

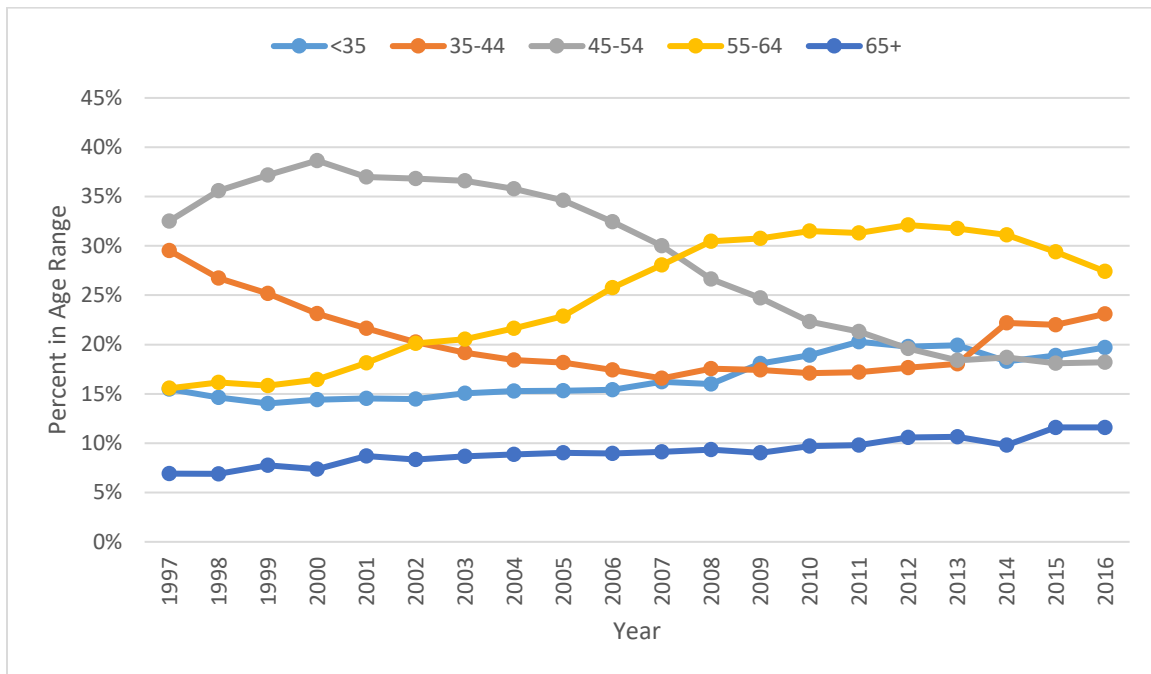


Figure 47. Percent of active Iowa dentists, by age category, 1997-2016

The age distribution of Iowa dentists, like other dentists throughout the United States for this same period, is somewhat skewed by the historically high numbers of graduates during the 1970s and early 1980s, when class sizes were greater due to a perceived shortage of health professionals, including dentists. The next graph provides a more detailed explanation about the rationale for dental school class size.

See Figure 85 for number of University of Iowa graduates per year.

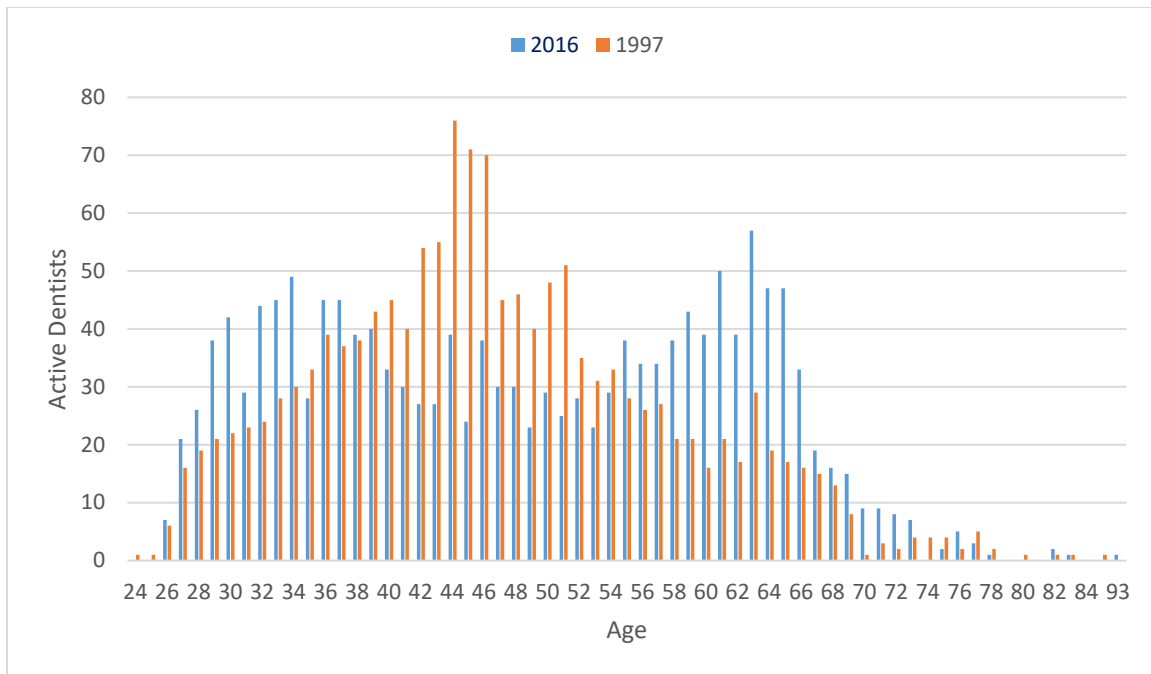


Figure 48. Age of active Iowa dentists, 1997 and 2016

This figure requires some context. The University of Iowa, along with most dental schools, increased their class size from the late 1960s through the mid-1970s in response for a national push with federal incentives to graduate more physicians and dentists. Subsequently, there was a reversal in enrollment numbers, with several dental schools, but principally private institutions, deciding to eliminate their dental schools (e.g., Farleigh Dickinson [NJ], Loyola [IL], Oral Roberts [OK], Northwestern [IL]).

The University of Iowa, like most dental schools, curtailed enrollment in the 1980s in response to a perception of an oversupply of dentists coupled with less prevalence of dental decay among school-aged children. (During the last couple of decades, however, several new dental schools have opened, and many dental schools gradually started to increase the number of enrollees.)

The 1997 data represent the relatively large number of dentists 42 to 52 years of age, most of whom were part of the increase in enrollment that occurred during the 1960s and 1970s. That age cohort is reaching historical natural retirement between 2010 and 2020. However, as explained in the Inflow/Outflow section, many dentists postponed retirement during the Great Recession.

Thus, while there is a unimodal peak (44-46 years of age) for 1997, there is a bimodal age distribution in 2016, with substantial numbers of dentists ages 29 through 40 and 55 through 66.

Mean and median age of active Iowa dentists in 1997 were 46.7 and 46, respectively. In 2016, the mean and median age were 48.5 and 48, respectively.

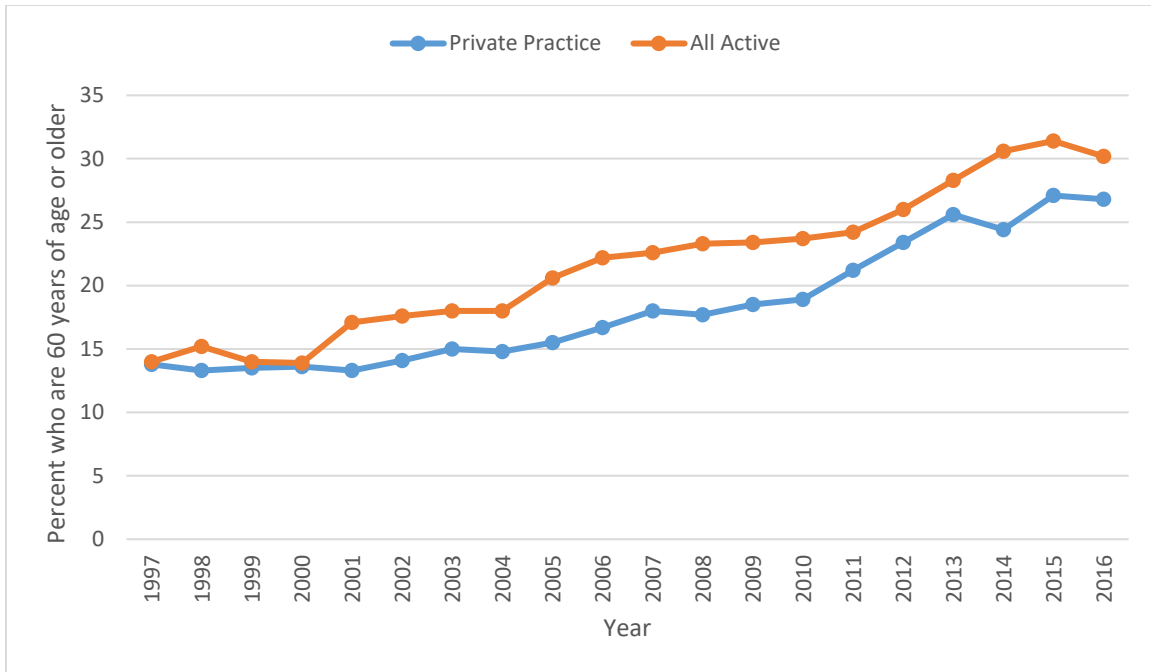


Figure 49. Percent of Iowa private practice dentists who are 60 years of age or older, 1997-2016

The percent of active Iowa dentists who were 60 years of age and older rose from 13.9% (2000) to peak at 31.4% (2015). For private practitioners, the percent of dentists 60 years of age or older ranged from 13.3% (1998) to 27.1% (2015).

There are several possible explanations for this increase. First, since the peak graduation rates occurred in the 1970s and early 1980s, this cohort reflects the natural retirement age. Second, the Great Recession (2007-2008) in the United States may have had a strong influence about when practitioners retired. Third, the increase in group practices may allow for older practitioners to phase into retirement (i.e., work part-time) for a few years prior to full retirement.

Based on available information, we anticipate that the percent of Iowa private practice dentists who are 60 or older will continue to drop during the next couple of decades.

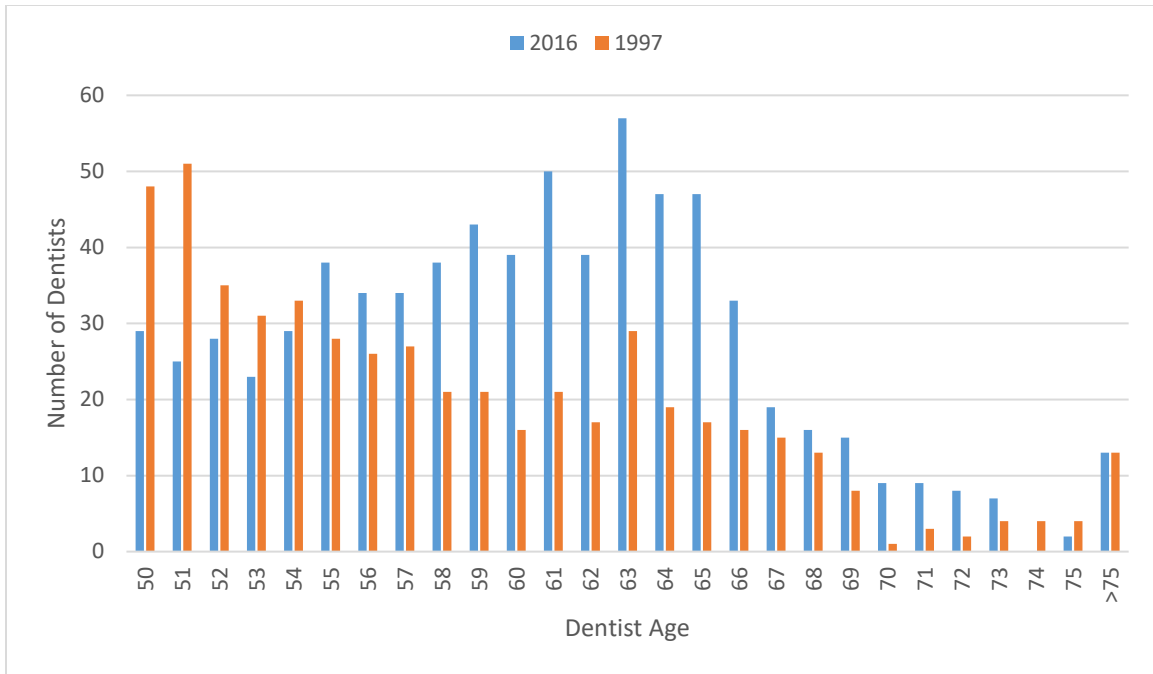


Figure 50. Distribution of Iowa active dentists greater than 50 years of age, 1997 and 2016

This figure displays the age distribution of dentists age 50 years and older for 1997 and 2016. The bars for 2016 are a subset of Figure 48, which highlighted the higher graduation rates for the 1970s and early 1980s.

Practice Activity (Other than Private Practice)

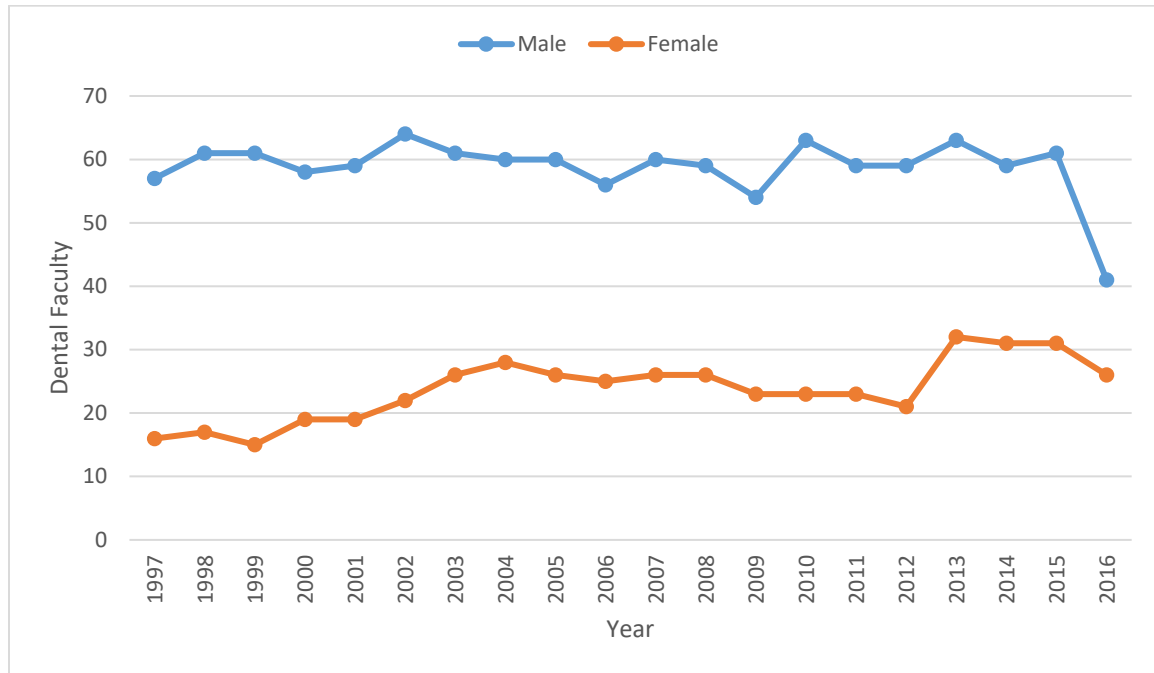


Figure 51. Iowa dentist faculty, by sex, 1997-2016

With the exception of 2016, the number of male faculty ranged between 54 and 64. However, an early retirement incentive, coupled with a large older faculty workforce, saw a substantial drop (to 41) in male faculty members in 2016. The number of female faculty rose to a high of 32 in 2013, but the number has slightly dropped during the final few years of this time period.

The total number of dentist faculty peaked at 95 in 2013.

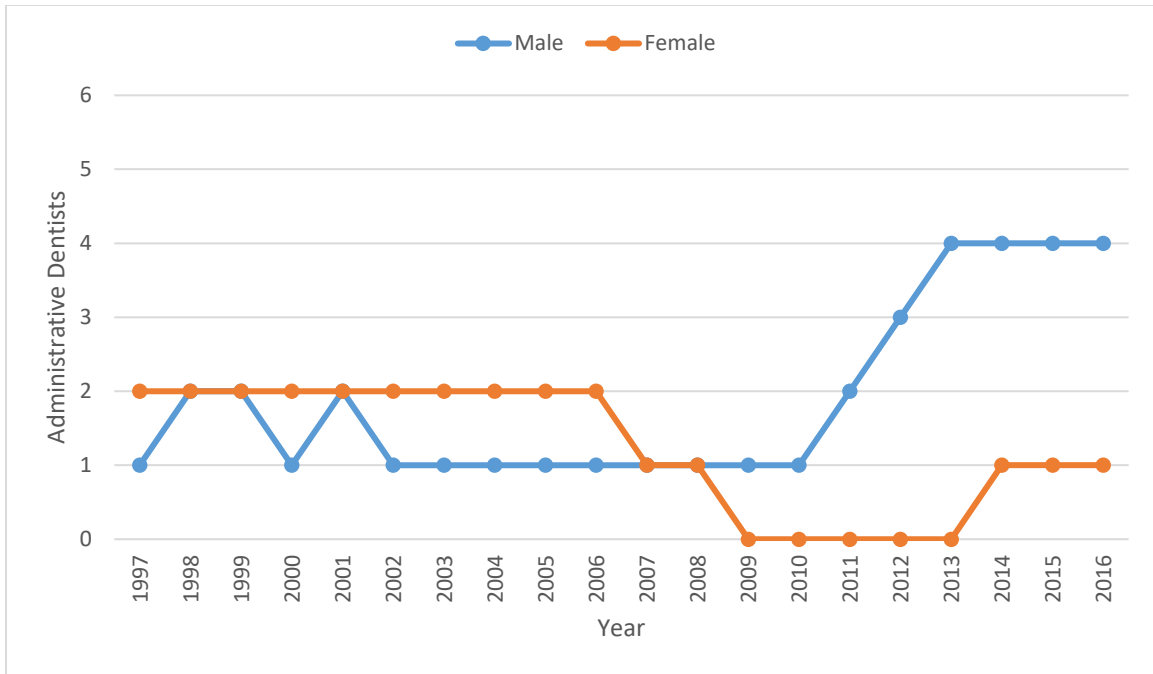


Figure 52. Iowa dentists with an administrative position, by sex, 1997-2016

There were very few Iowa dentists who primarily had their primary employment as an administrator. In any year there were 5 or fewer individuals who held an administrative position.

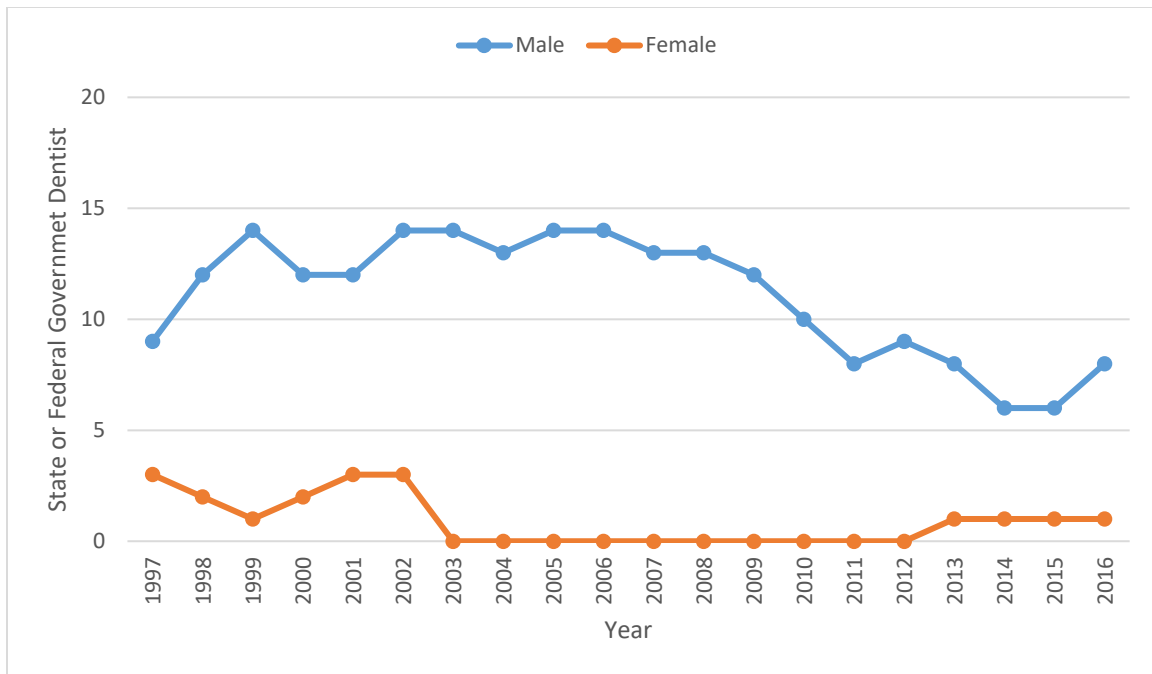


Figure 53. State or federal government dentists in Iowa, by sex, 1997-2016

There were several more male dentists who were employed in state or federal positions, exclusive of the Office of Veterans Affairs. There were as many as 14 male dentists in these positions, but that number has trailed off since 2006. There have been very few female dentists in state or federal government positions, with the maximum (3) occurring in 1997, 2001, and 2002.

Note that the Iowa Dentist Tracking System differentiates dentists who are employed by Veterans Affairs and those who work in other federal or state positions. Thus, the current graph does not include dentists employed by Veterans Affairs. Information about VA dentists is displayed in Figure 55.

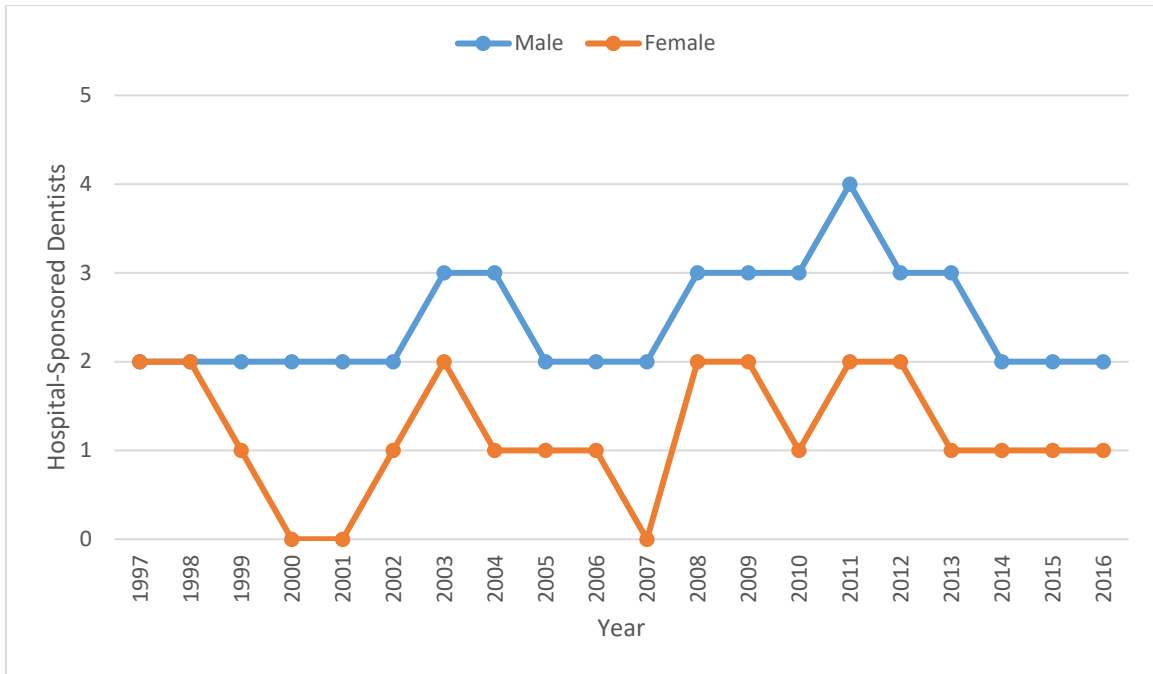


Figure 54. Hospital-sponsored dentists in Iowa, by sex, 1997-2016

There have been only a handful of hospital-sponsored dentists in any one year, with the greatest number of males (4) occurring in 2011.

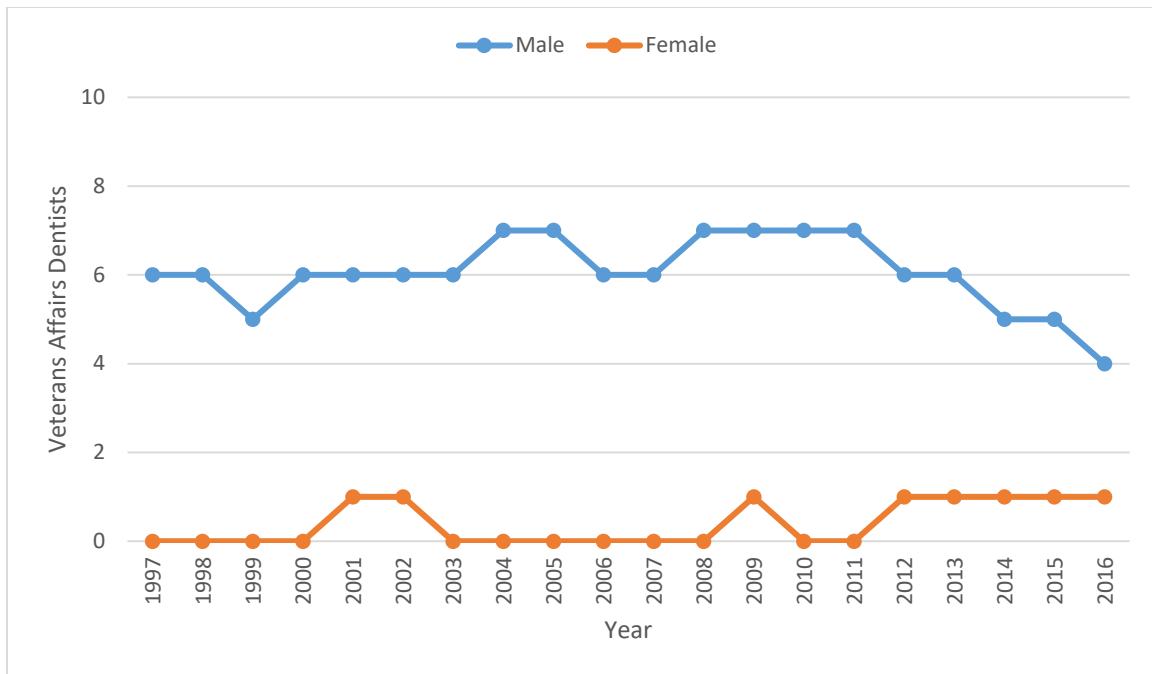


Figure 55. Veterans Affairs dentists in Iowa, by sex, 1997-2016

Besides state and federal dentists in Figure 53, the Iowa Dentist Tracking System keeps tab of the number of dentists employed by Veterans Affairs. Among males, the highest number was 7 dentists for several years between 2004 and 2011. There was never been more than 1 female dentist employed by the VA in any year during this data collection period.

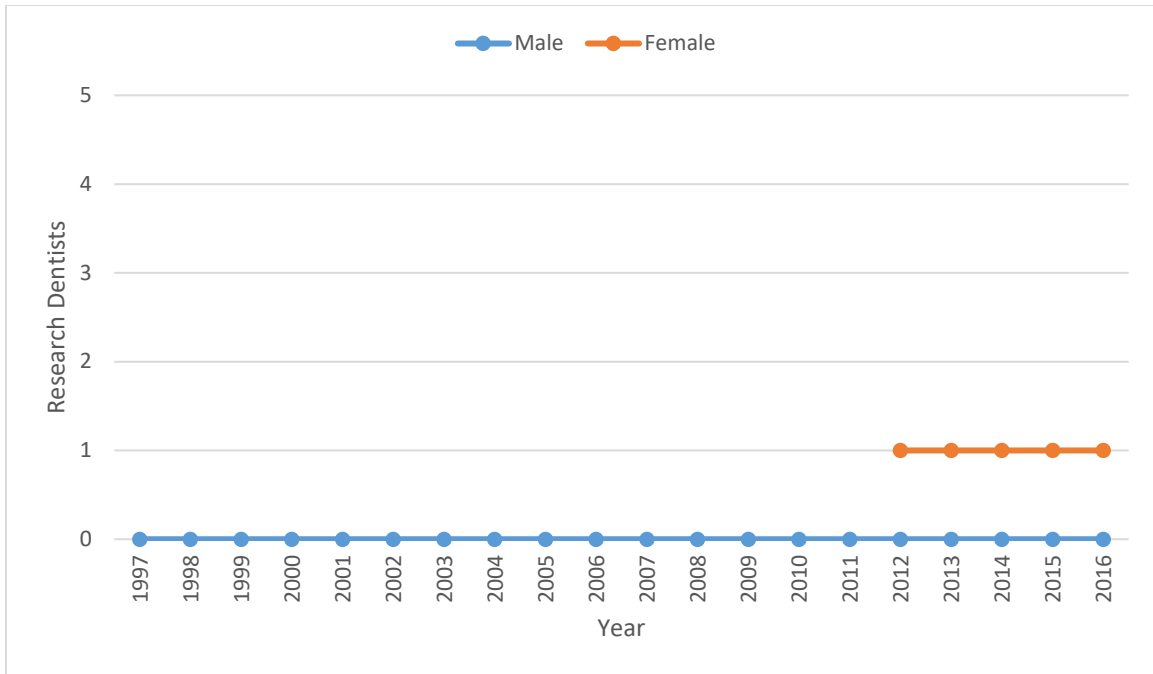


Figure 56. Full-time research dentists in Iowa, by sex, 1997-2016

Prior to 2012, there had never been a dentist who devoted his or her time to dental research. However, since 2012 there was 1 female dentist who devoted her time to pursuing dental research.

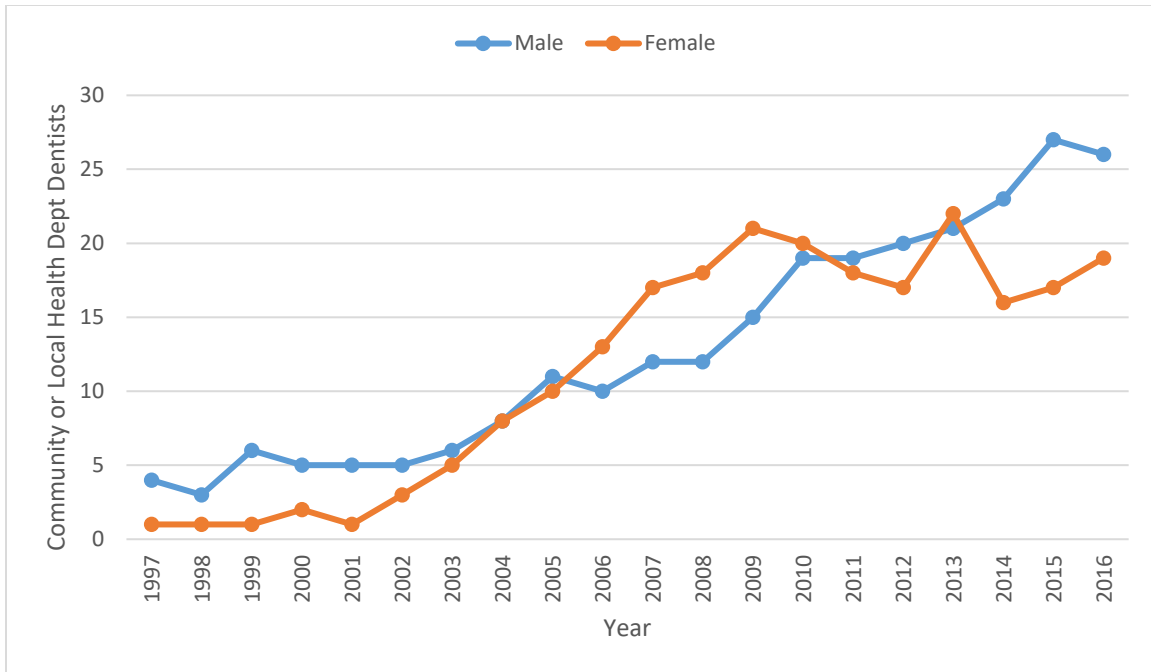


Figure 57. Community or local health department dentists in Iowa, by sex, 1997-2016

The number of dentists employed in positions either at local health departments or community health centers have increased substantially since 1997, corresponding to the increase in the number of community health centers. By 2016, there were 45 dentists employed there, almost all being in community health centers. At times there were more females than males, whereas more recently there were more male dentists. The highest number of male and female dentists in any one year were 27 in 2015 and 22 in 2013.

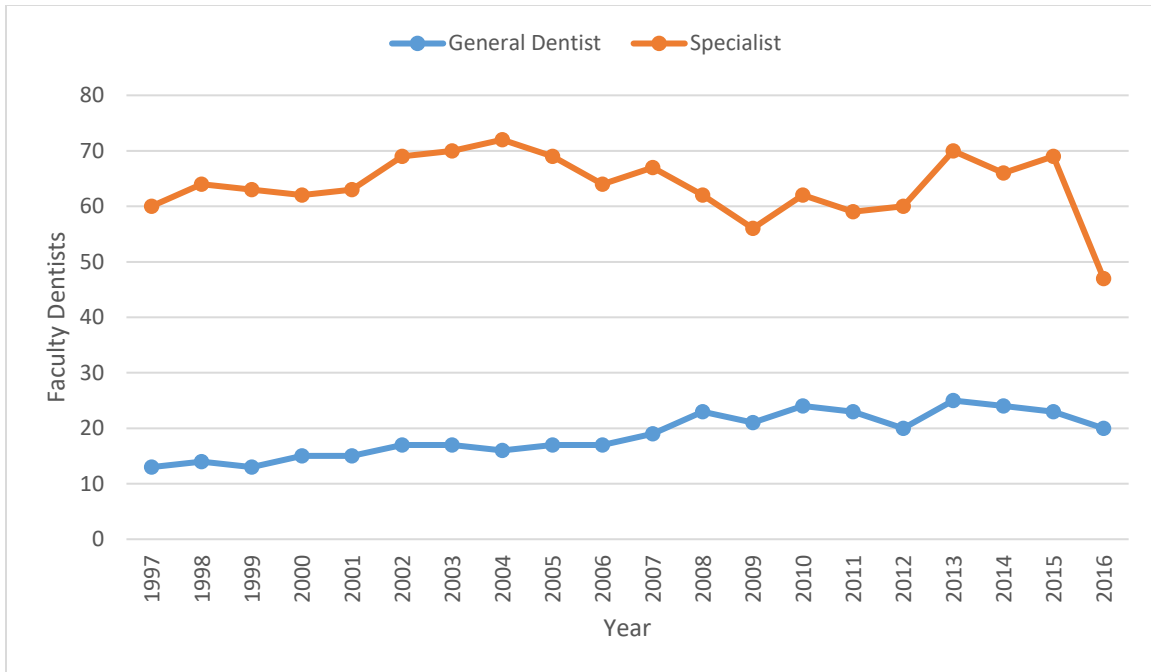


Figure 58. Iowa dentist faculty, general dentists versus specialists, 1997-2016

The number of dental specialists whose primary employment was in educational institutions far exceeded the number of general dentists at educational institutions. For most years there were 60 or more dental specialists in faculty positions. That number dropped dramatically to 47 in 2016, coinciding with a retirement incentive for faculty members.

The number of general dentists ranged from a low of 13 in 1997 and 1999 to a high of 25 in 2013.

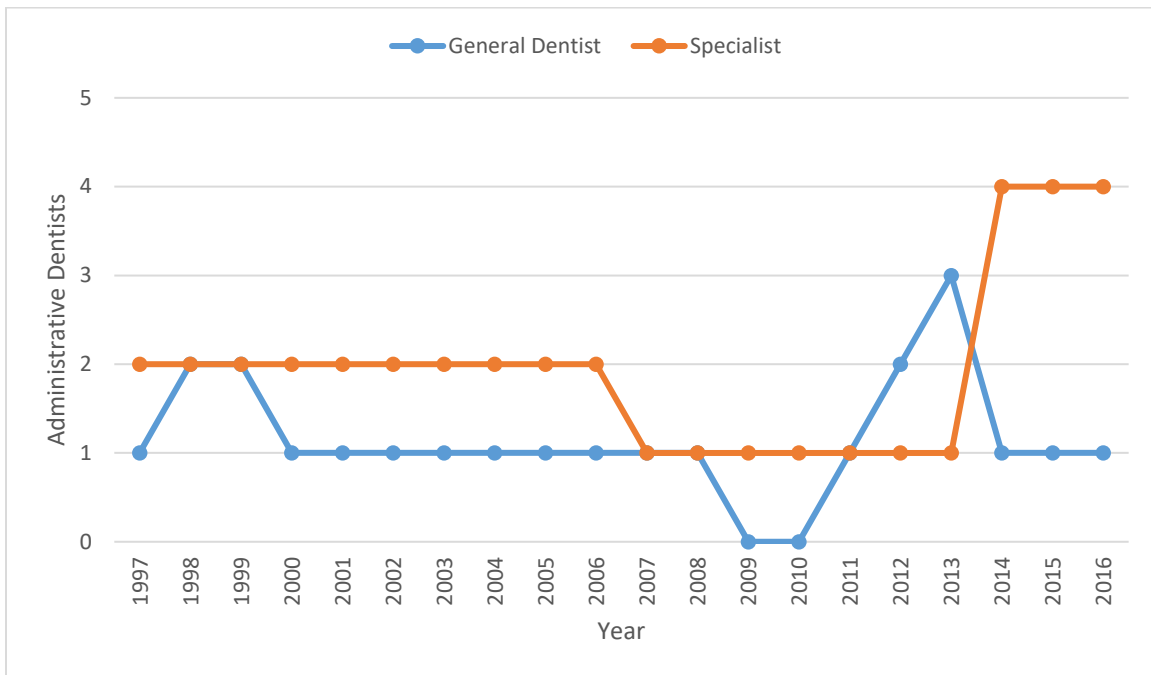


Figure 59. Iowa dentists in administrative positions, general dentists versus specialists, 1997-2016

As noted in a previous figure, there were very few dentists primarily occupied in an administrative position. In most years, the number of dental specialists in administrative positions exceeded general dentists, but the differences were extremely small.

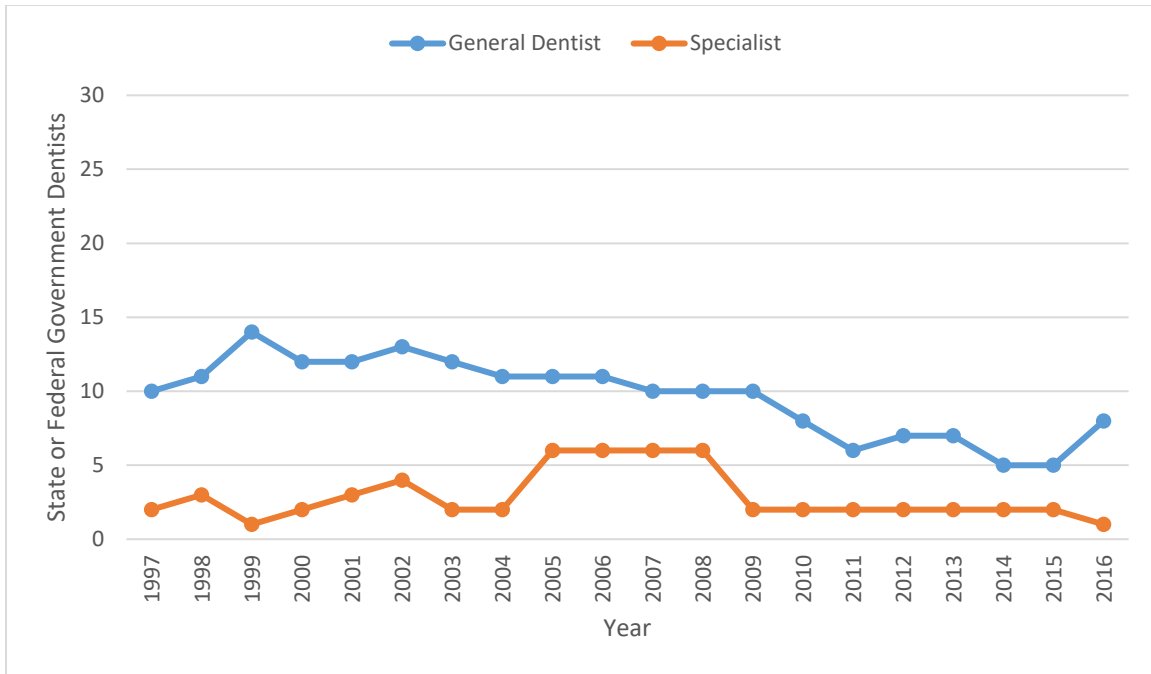


Figure 60. State or federal government dentists in Iowa, general dentists versus specialists, 1997-2016

The number of general dentists whose primary employment was either with a state or federal institution exceeded that of dental specialists for each year of this analysis. The number of general dentists had gradually declined through 2015, with a low of 5 (in 2014 and 2015) and a high of 14 (in 1999). There were 6 dental specialists in state or federal government positions from 2005 through 2008. From 2009 forward, there were 2 or fewer dental specialists employed in state or federal positions.

Note that the Iowa Dentist Tracking System differentiates dentists who are employed by Veterans Affairs and those who work in other federal or state positions. Thus, the current graph does not include dentists employed by Veterans Affairs.

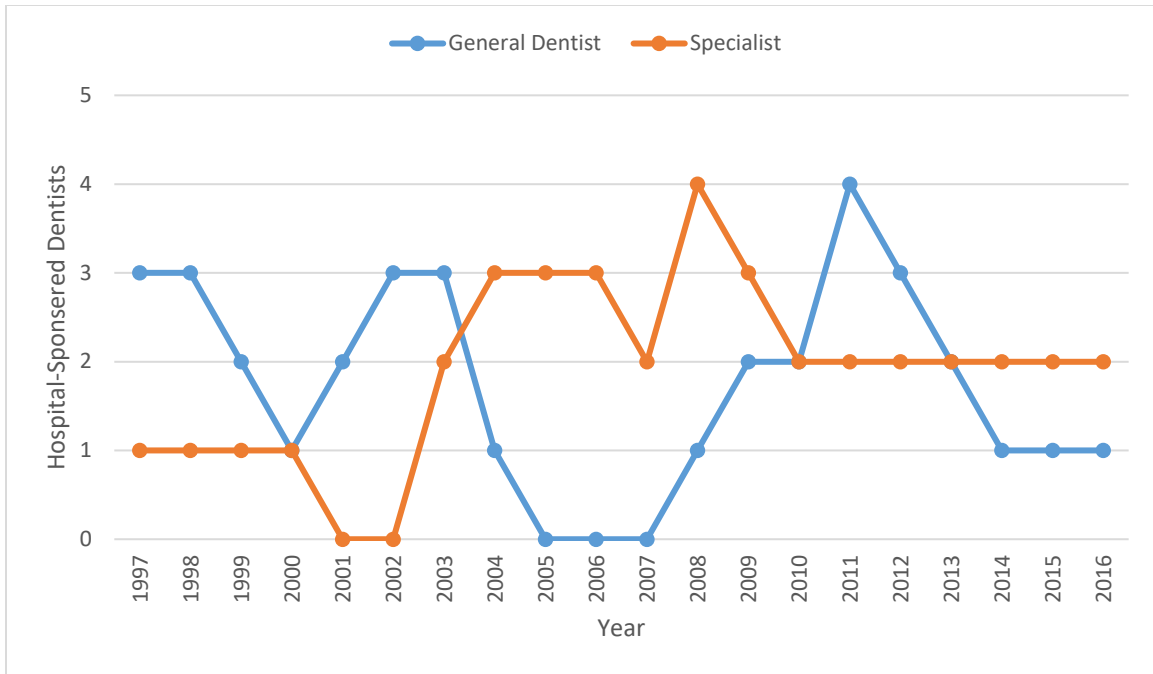


Figure 61. Hospital-sponsored dentists in Iowa, general dentists versus specialists, 1997-2016

As noted previously, there were few dentists who held hospital-sponsored positions. In some years, the number of dental specialists exceeded general dentists and vice versa. However, the numbers are too small to draw any inferences.

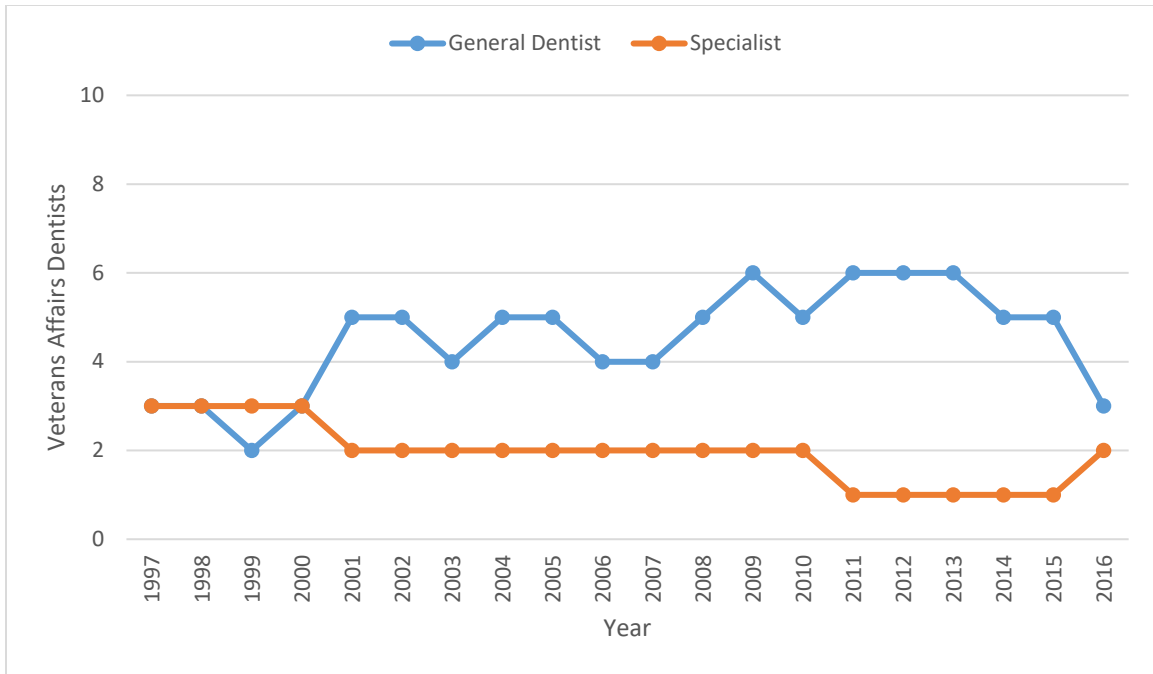


Figure 62. Veterans Affairs dentists in Iowa, general dentists versus specialists, 1997-2016

Except for the early years of this period, the number of general dentists working for Veterans Affairs exceeded the number of dental specialists.

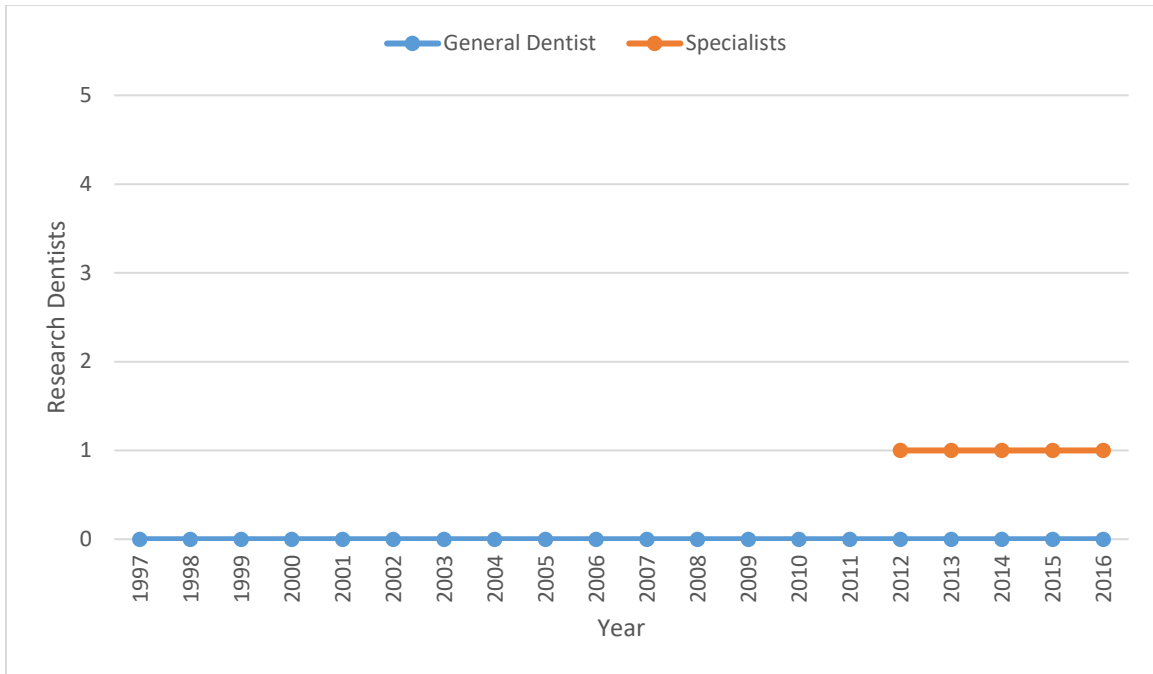


Figure 63. Full-time research dentists, general dentists versus specialists, 1997-2016

The only person devoted to full-time research was a prosthodontist.

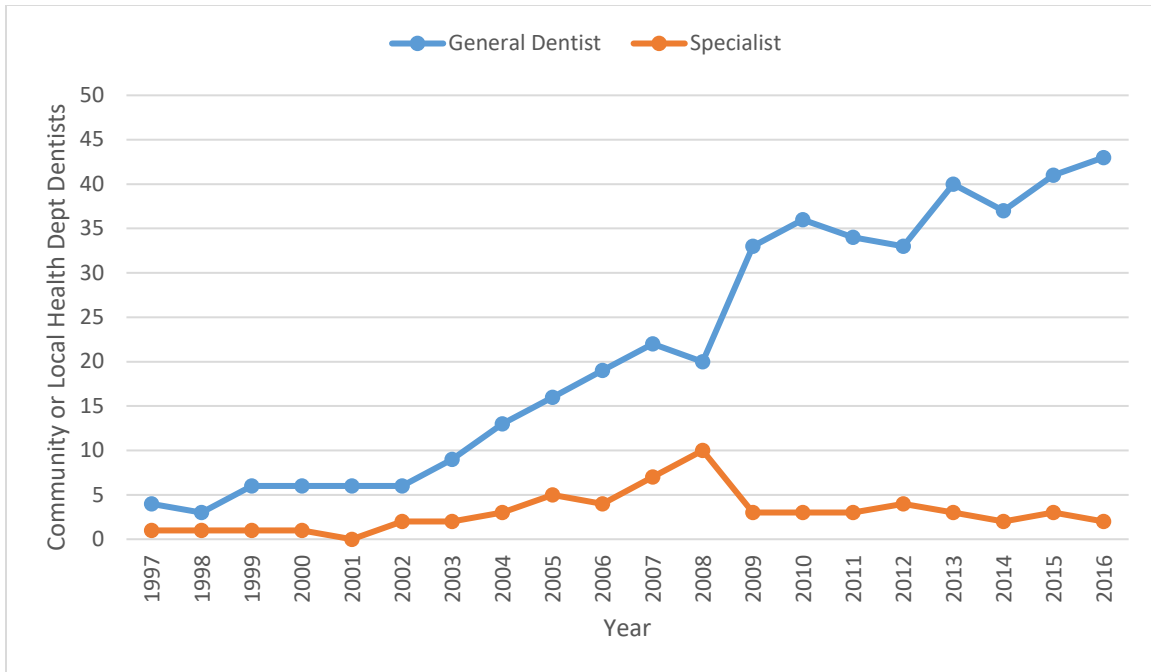


Figure 64. Community or local health department dentists, general dentists versus specialists, 1997-2016

There were few dental specialists working at local health departments or community health centers, with at most 10 (in 2008) being employed in this setting.

The trajectory for the number of general dentists in this type of setting has grown steadily from 3 in 1997 to 43 in 2016. This rise coincided with the increase in the number of community health centers during this period.

Practice Arrangement

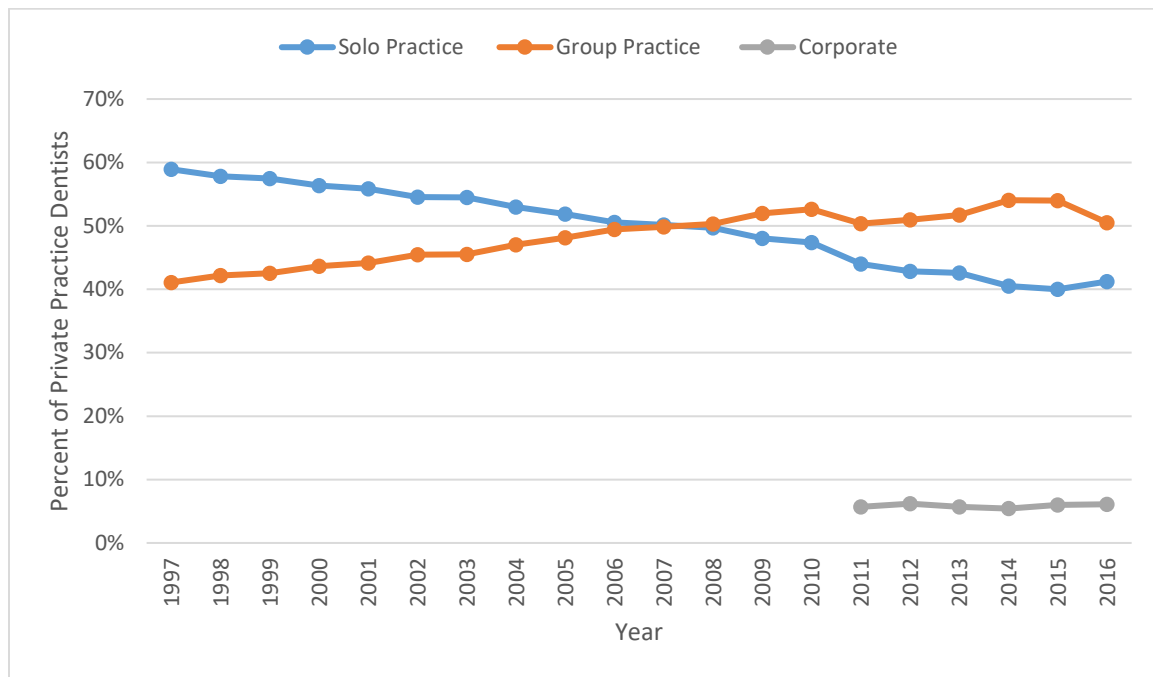


Figure 65. Percent of Iowa private practice dentists, by practice arrangement, 1997-2016

In 1997, 58.9% of Iowa's private practitioners were in solo practice. That percentage declined to 40.0% in 2015. Conversely, the percent of practitioners in group practice increased from 41.1% (1997) to 54.0% (2014 and 2015), with group practice displacing solo practice as the leading practice arrangement modality in 2008.

Corporate dentistry was introduced as a practice arrangement option in 2011. Since then, the percentage of dentists in corporate practice has ranged from 5 to 6%.

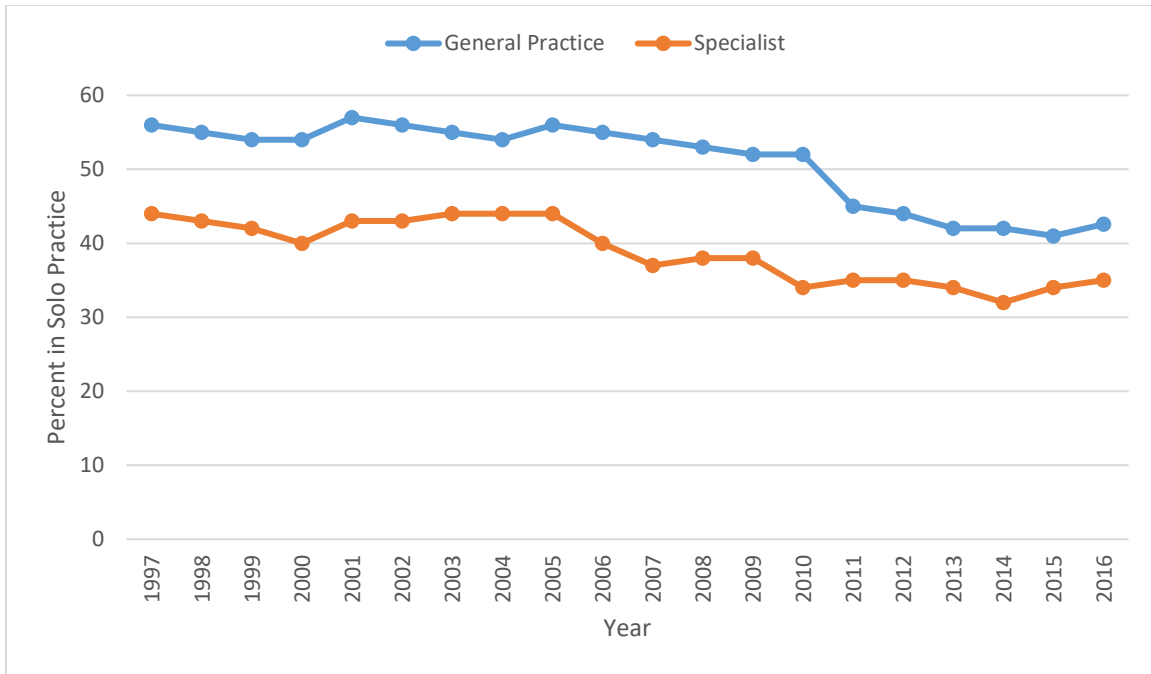


Figure 66. Percent of private practice general dentists and specialists in solo practice, 1997-2016

The percentage of general dentists and dental specialists in private practice who were in solo practice declined in both groups. The percentage of general dentists in solo practice decreased from 56% (1997) to 41% (2015). Although the percentage of private practice dental specialists in solo practice also declined, there was a slight difference. There were several years (1997, 2003-2005) in which 44% of dental specialists practiced alone, with the percent falling to as low as 32% in 2014. The percentage gap between the 2 groups had slightly decreased by the end of this 20-year period.

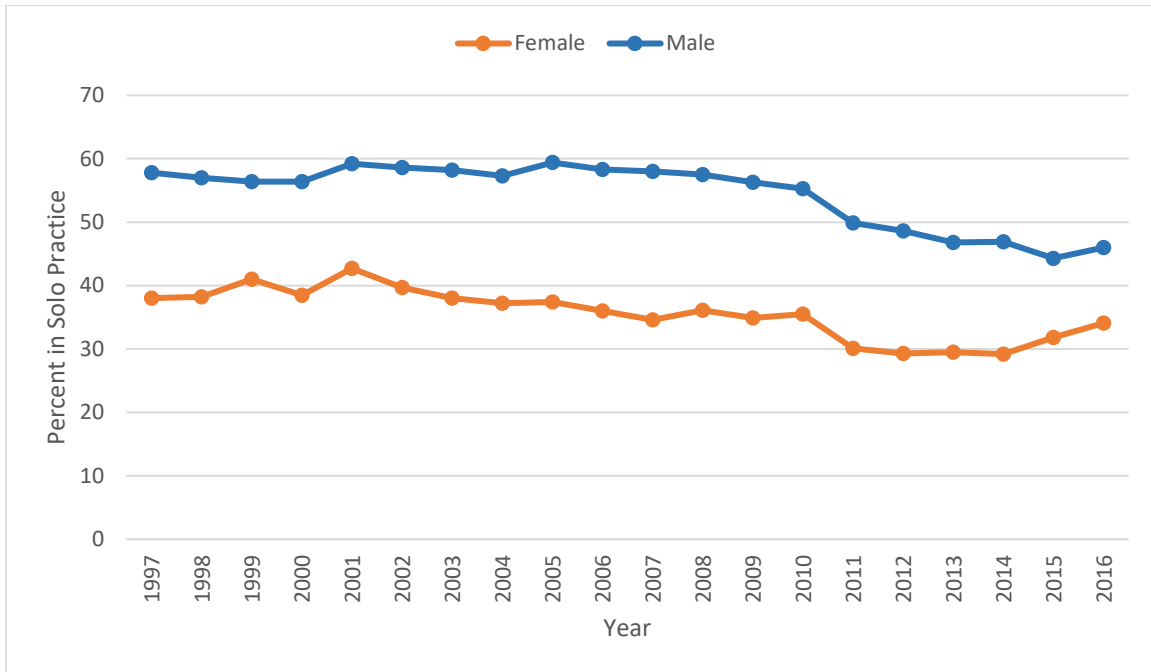


Figure 67. Percent of private practice general dentists in solo practice, by sex, 1997-2016

There was a decline in the percent of both male and female private practice general dentists who worked as solo practitioners. However, males started at a higher percent, differing from their female colleagues by 20 percentage points.

The percent of male private practice general dentists remained between 55 and 60% up until 2010. Thereafter, the percent dipped as low as 44% (2015). The percent of female private practice general dentists bottomed out at 29% in 2014, with an uptick for the final 2 years of this analysis.

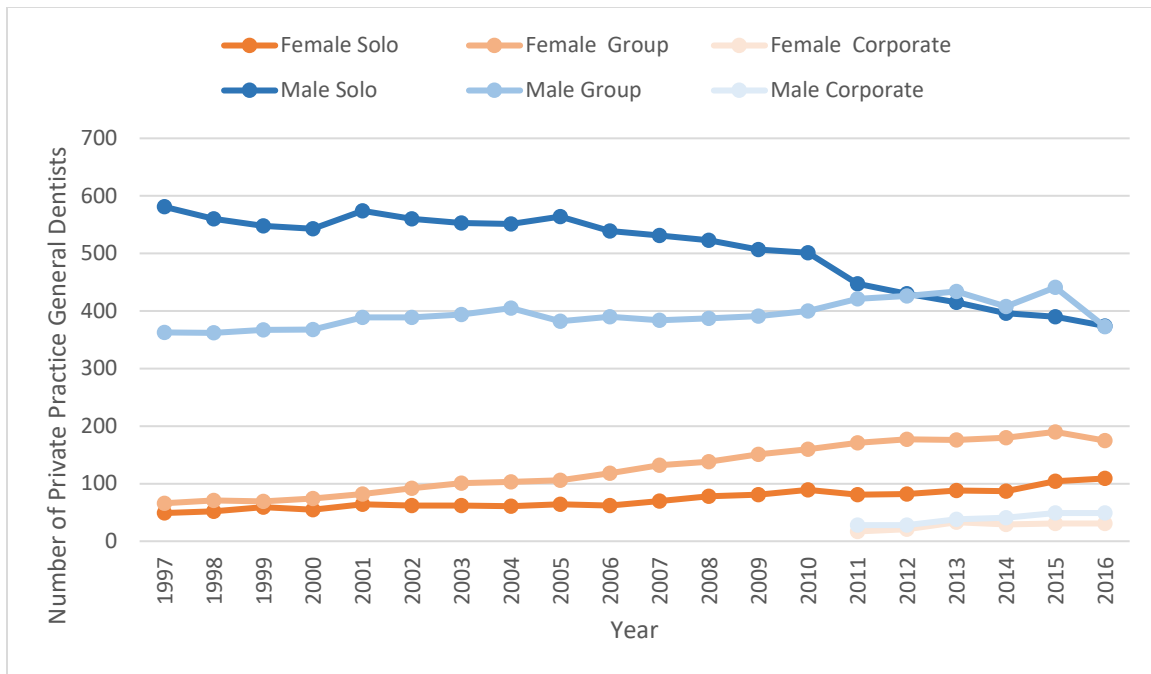


Figure 68. Number of private practice general dentists, by sex and practice arrangement, 1997-2016

The number of male dentists in solo practice decreased from a high of 581 in 1997 to a low of 374 in 2016. Male dentists in group practice reached a high of 441.

The number of female dentists in solo practice and in group practice increased throughout the 20-year period. Those in solo practice went from 49 in 1997 to 109 in 2016. Females in group practice went from 66 in 1997 to peak at 190 in 2015.

There were slightly more males than females participating in corporate practice. Males peaked at 49 (2015 and 2016), whereas there were close to 30 females in corporate practice during the last 4 years of this study period.

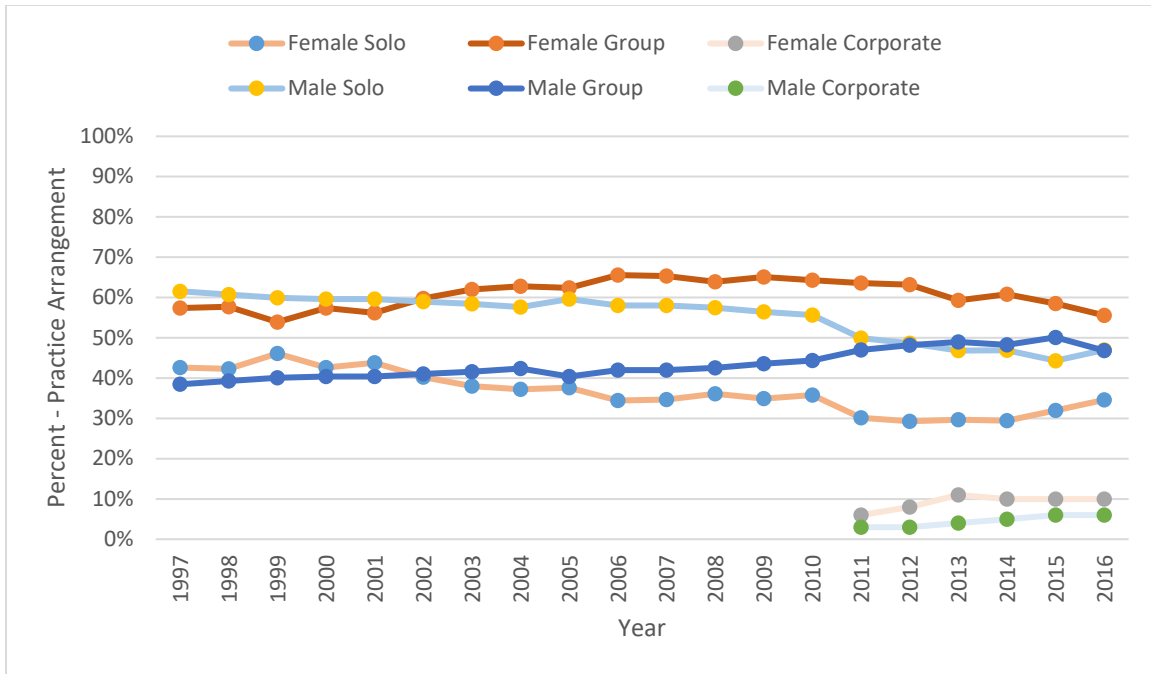


Figure 69. Percent of private practice general dentists, by sex and practice arrangement, 1997-2016

Group practice was the preferred practice arrangement for female private practice dentists in Iowa. Between 54% (1999) and 66% (2006) of female private practice Iowa dentists were in group practices, while between 29% (2012) and 46% (1999) were in solo practice.

The percent of solo male private practice dentists first crossed below the 50% mark in 2012. There has been a gradual increase in the percent of male dentists who practice in a group setting, peaking in 2015.

Although the numbers are comparatively smaller for those who were in corporate practice, the percent of women who chose this modality exceeded the percent of men who chose a corporate practice arrangement.

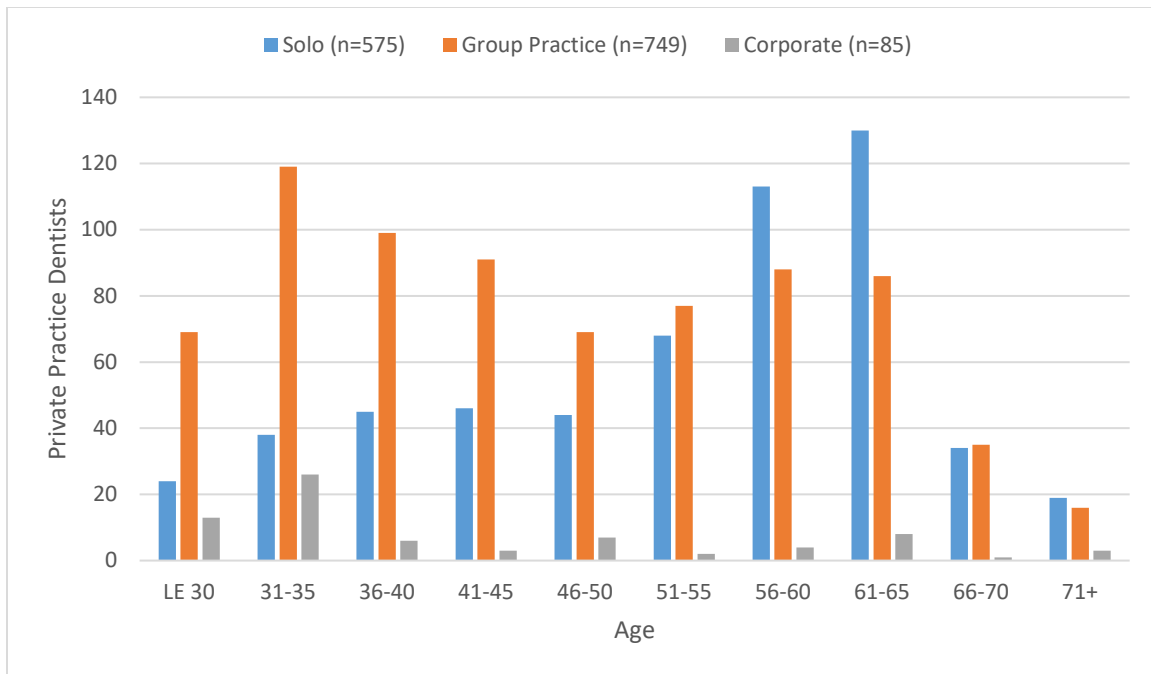


Figure 70. Age of Iowa private practice dentists, by practice arrangement, 2016 (N=1,395)

This figure is a snapshot of 2016's practice arrangement categories by dentist age. Those in solo practice tend to be older. Group practice is the preferred arrangement for those 55 years of age and younger.

A relatively small but nevertheless substantial number of dentists were in corporate practice, especially those 35 years of age and younger. However, corporate is not limited to this age group. Variation in corporate practice involvement between age groups may be due, in large part, of what constitutes a corporate practice. The Iowa Dentist Tracking System uses a more inclusive definition, which comprises not only national organizations (e.g., Aspen) but also smaller, regional group practices that have multiple locations where the dentist retains some measure of autonomy (e.g., Heartland Dental).

The mean age was highest for solo practitioners (51.9), followed by those in a group practice (46.7), then those in corporate organizations (43.5).

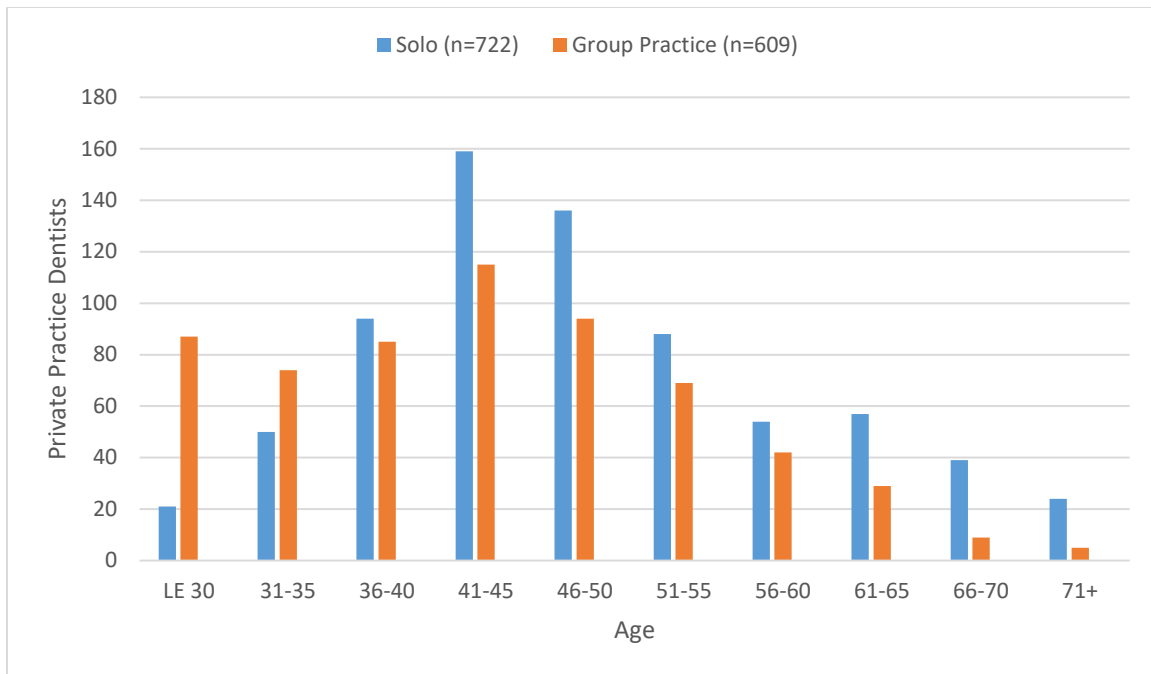


Figure 71. Age of Iowa private practice dentists, by practice arrangement, 1997 (N=1,331)

Solo practice was the predominant practice arrangement (54%) during the initial year of the tracking system. However, those 35 years of age and younger were more likely to be in a group practice, often as an associate. Although those in solo practice exceeded those in group practice for the remaining age categories, nonetheless many in each age category were in group practice.

Although information is collected about various sizes and mixes (e.g., single specialty) of group practice, we have defined any non-corporate private practice with 2 or more dentists as a “group”.

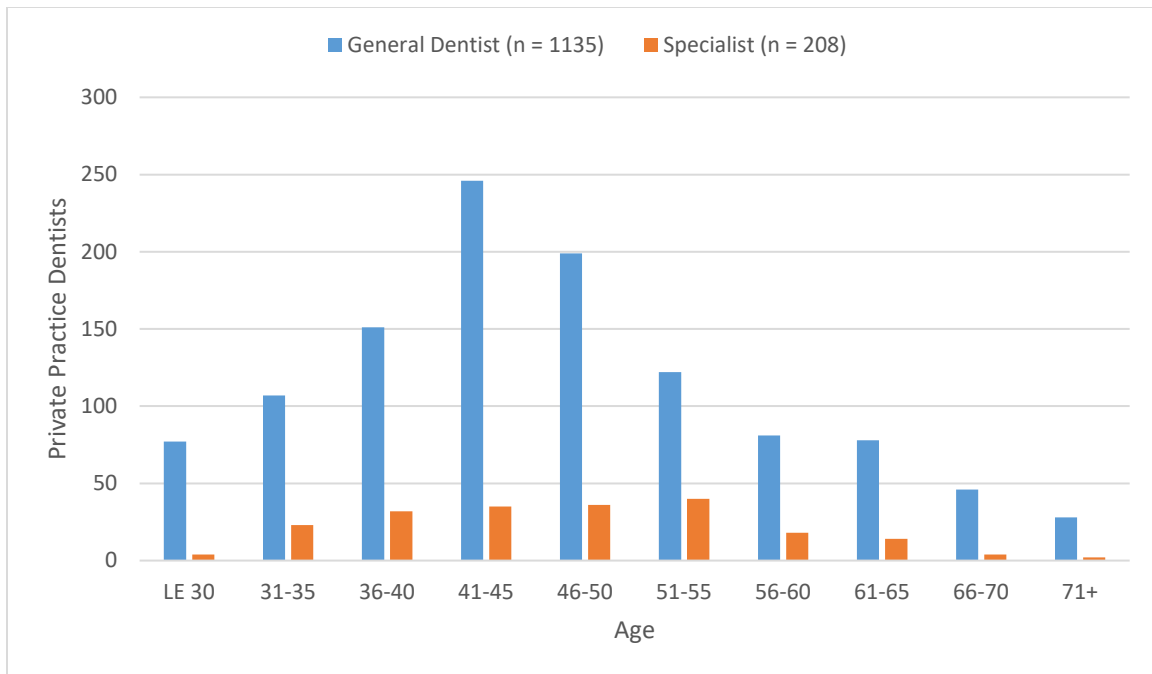


Figure 72. Age of Iowa private practice dentists, general dentists versus specialists, 1997 (N=1,343)

At the start of the Iowa Dentist Tracking System, the largest cohort of general dentists was between 41 and 50 years of age, which represented approximately 40% of the general dentists at that time.

Dental specialists accounted for 15.5% of the private practitioners in 1997.

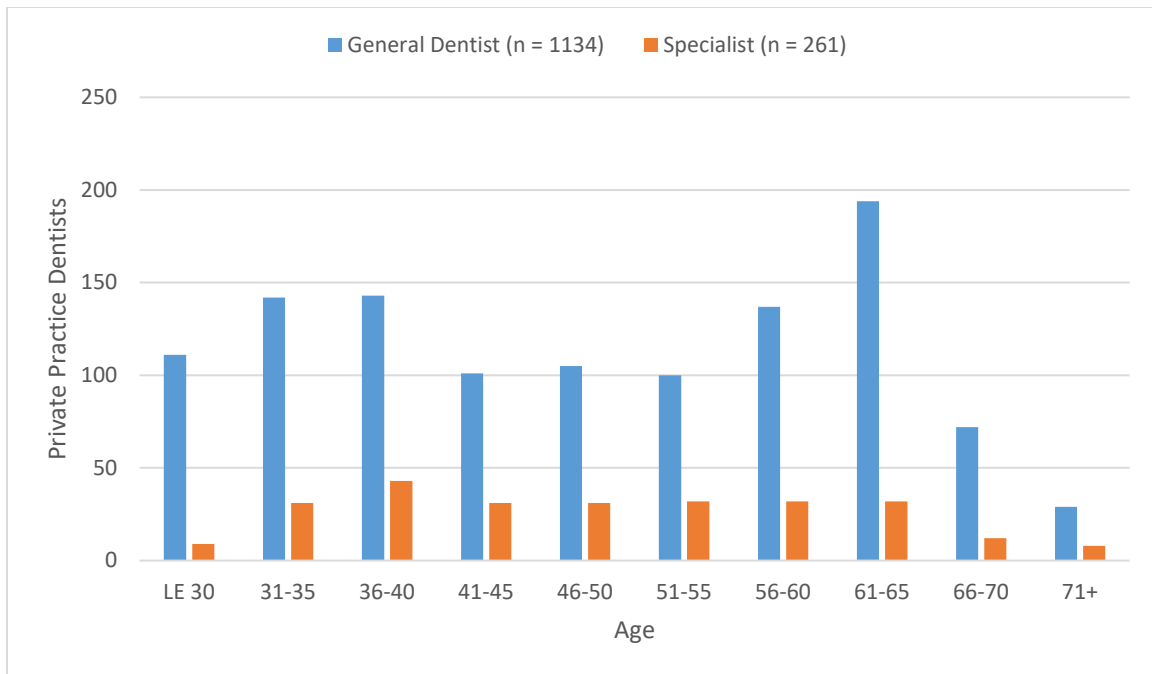


Figure 73. Age of Iowa private practice dentists, general dentists versus specialists, 2016 (N=1,395)

There was an increase of 52 private practice dentists between 1997 and 2016. Moreover, there was a shift in the age during this time, with increased numbers of those 35 years and younger and those 55 years and older.

The proportion of general dentists to dental specialists differs somewhat from that of 1997. The percent of specialists to all private practice dentists was 18.7%, an increase of more than 3 percentage points from 20 years previous. There was a 25% increase in the number of dental specialists from 208 in 1997 to 261 in 2016.

Urbanicity of Iowa's Dentist Workforce Location

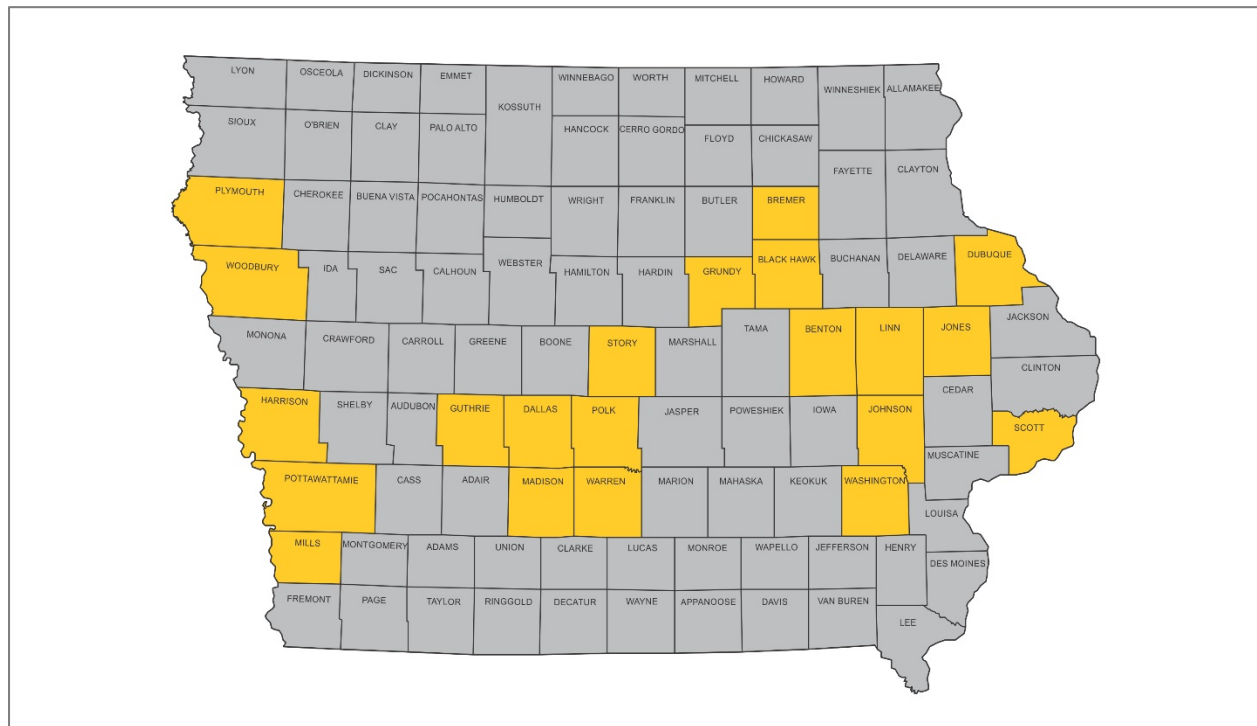


Figure 74. Iowa metropolitan counties (in gold), 2013

The 1993 edition of the US Department of Agriculture Economic Research Service's Rural Urban Continuum Codes (RUCC) indicated that there were then 10 counties designated as metro/urban. By the 2013 edition, an additional 11 counties were reclassified as metro/urban. They included the following counties followed by the 1993 RUCC codes: Benton (6), Bremer (6), Grundy (8), Guthrie (8), Harrison (6), Jones (6), Madison (6), Mills (6), Plymouth (6), Story (4), and Washington (6). No 1993 metro county converted to non-metro status.

A list of RUCC codes, their descriptions, and number of Iowa counties in each category are found in Table 6 on the next page.

Table 6. Rural-Urban Continuum Code (RUCC), 2013

Code*	Description	Number of Iowa Counties N=99
1	Counties in metro areas of 1 million population or more	0
2	Counties in metro areas of 250,000 to 1 million population	12
3	Counties in metro areas of fewer than 250,000	9
4	Urban population of 20,000 or more, adjacent to a metro area	3
5	Urban population of 20,000 or more, not adjacent to a metro area	5
6	Urban population of 2,500 to 19,999, adjacent to a metro area	26
7	Urban population of 2,500 to 19,999, not adjacent to a metro area	24
8	Completely rural or less than 2,500 urban population, adjacent to a metro area	9
9	Completely rural or less than 2,500 urban population, not adjacent to a metro area	11

*RUCC Codes 1-3 are designated as metropolitan/urban counties; codes 4-9 are non-metro (rural) counties.

More than one-half of Iowa's counties were classified as either 6 or 7 (i.e., urban populations of between 2,500 and 19,999) within the Rural-Urban Continuum Code. In addition, there were 20 completely rural counties. Only 21 counties qualified for the designation as a metropolitan/urban area.

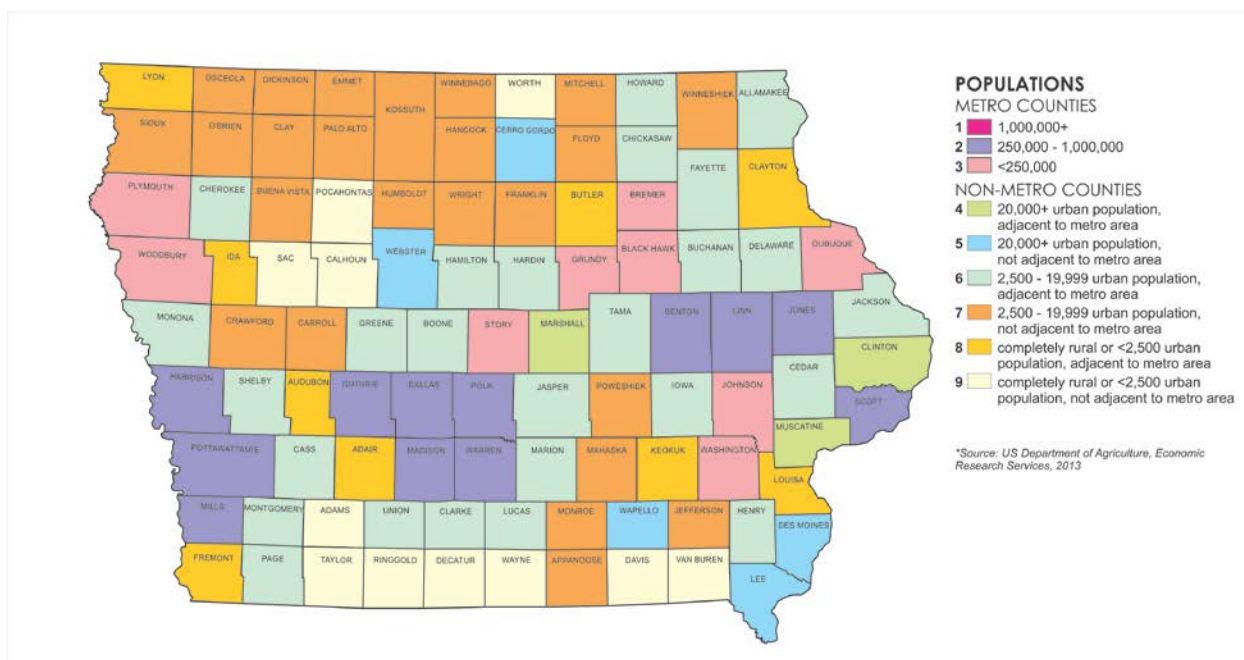


Figure 75. Rural-Urban Continuum Codes (RUCC), Iowa

Iowa has 21 urban counties and 78 rural counties (see Figure 74). Metropolitan areas are based on the federal Office of Management and Budget (OMB) delineation as of February 2013.

Rural codes are not ordinally scaled, with the non-metro county codes alternating between those adjacent and not adjacent to a metro as the codes numerically increase. These codes were first developed in 1974 and updated each decennial. Codes prior to 2000 are not directly comparable to latter-day codes because of methodologic changes made in developing the 2000 metropolitan areas.

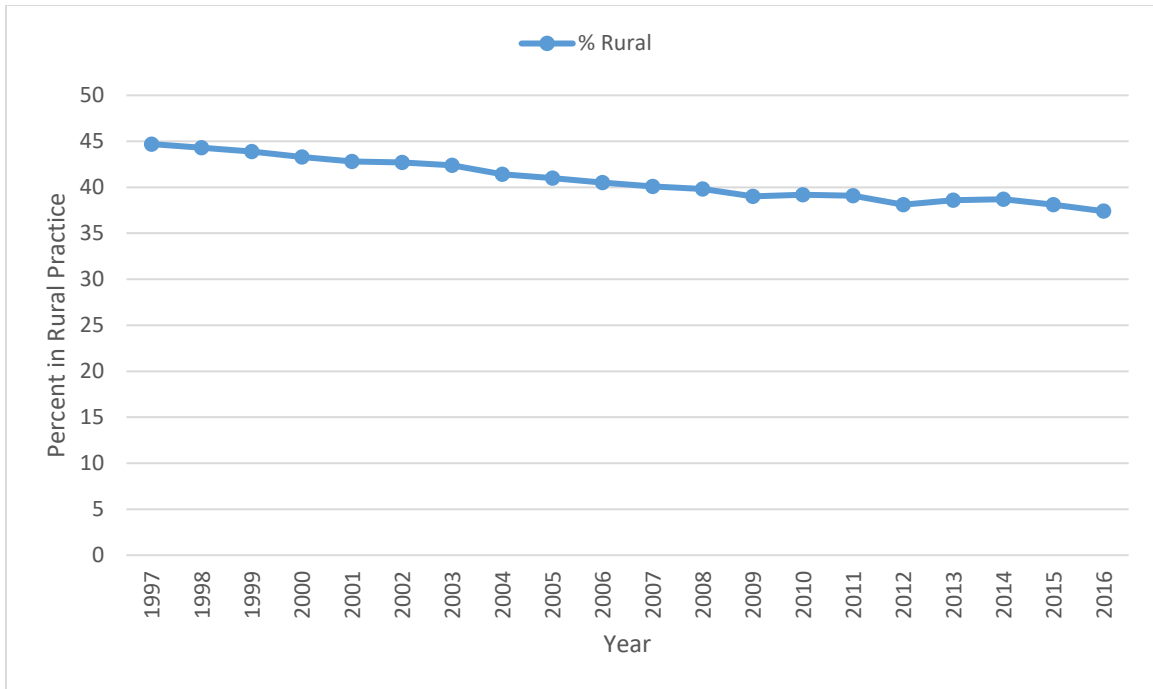


Figure 76. Percent of Iowa dentists in private practice, by rural practice location 1997-2016

There was a decline in the number of private practice dentists who practiced in rural areas from 507 to 424 during this 20-year period coupled with an increase in the number of dentists in urban areas (from 628 in 1997 to a peak of 747 in 2015).

Of all private practice dentists, there was a slow but steady percent decrease from 44.7 in 1997 to 37.4 in 2016.

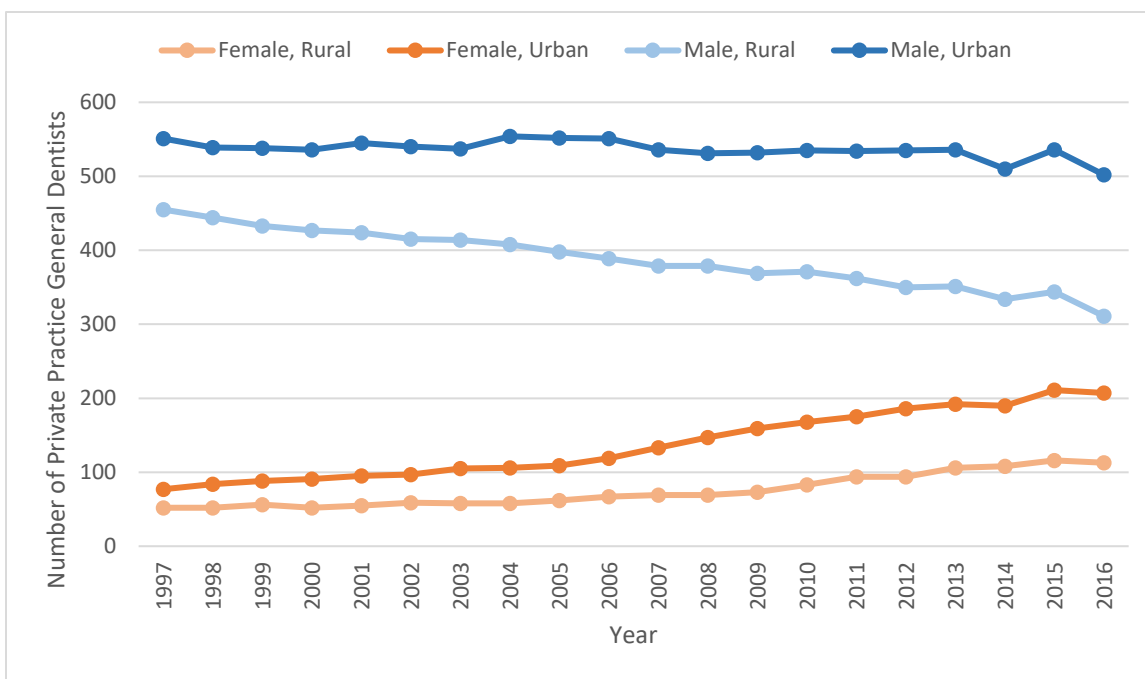


Figure 77. Urban and rural Iowa dentists in private practice, by sex, 1997-2016

The number of males in urban practices peaked at 554 in 2004, with an 8.9% loss by 2016. Similarly, the number of males in rural practices dropped from 455 in 1997 to a low of 311 by 2016, a 31.6% loss.

On the other hand, there was an increase in the number of females in both urban and rural areas. The number of females in urban locations went from 77 in 1997 to a high of 211 in 2015. This translates to an almost 170% increase during this time period. Likewise, females in rural practices rose from 52 to a high of 116 in 2015, a 117% increase during this time. The increase of females in rural areas, however, did not offset the loss of male dentists in rural areas. We should be cautious in overinterpreting this graph because it does not take into account the shift in Iowa's population to more urban centers.

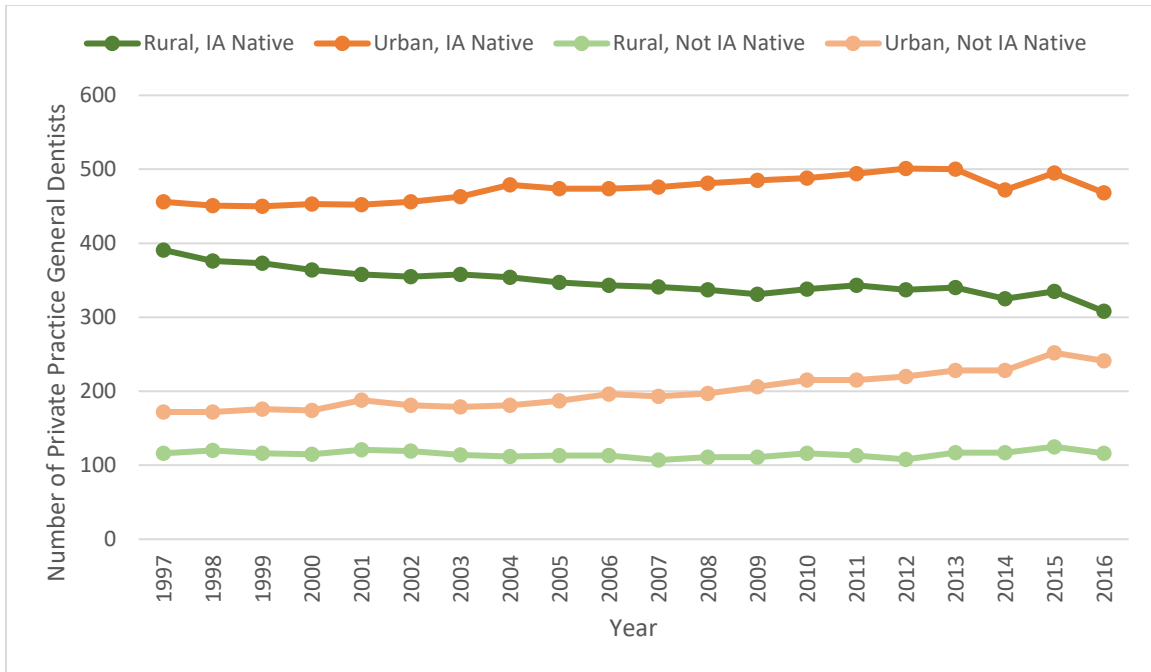


Figure 78. Urban and rural general dentists in private practice, by Iowa nativity, 1997-2016

This graph categorizes general dentists in private practice based on whether they were born in Iowa. Among those born in Iowa, the number of urban practitioners increased from a low of 450 in 1999 to a high of 501 in 2012. The number of Iowa-born dentists who practiced in rural areas decreased from 391 in 1997 to 308 in 2016.

There also was an increase of general dentists from other states found in urban communities, rising from 172 in 1997 to a high of 252 by 2015. Dentists who were born outside of Iowa maintained a steady number in rural practices (between 107 and 125) during these 20 years.

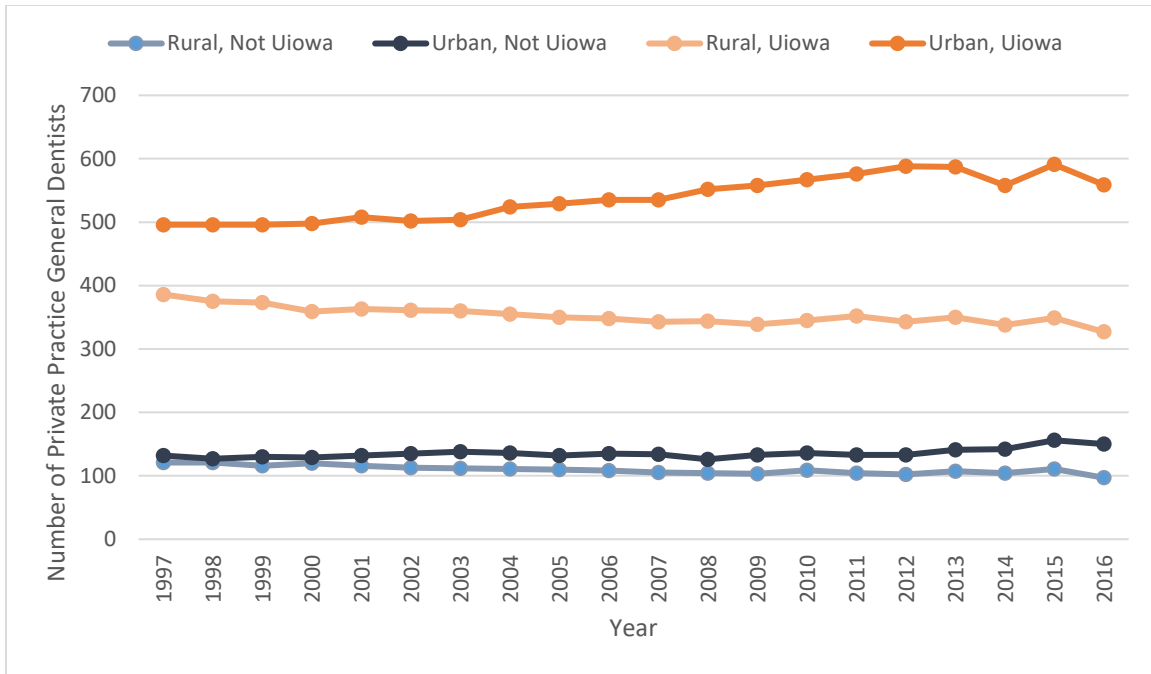


Figure 79. Urban and rural general dentists in private practice, by dental school attended, 1997-2016

This graph displays differences for general dentists in private practice based on whether they graduated from the University of Iowa College of Dentistry. The urban-rural differences were much greater between University of Iowa graduates than those who practiced in Iowa but were educated elsewhere. The number of Iowa graduates who practiced in urban communities rose from 496 in 1997 up to 591 in 2015. In contrast, the number of Iowa graduates in general practice decreased in rural communities from 386 in 1997 to 327 in 2016.

Among those who graduated from other educational institutions, the highest number in urban communities was 156 (in 2015) and the lowest was 126 (in 2008).

There has been a notable decrease in the number of non-Iowa educated dentists during this period who practiced in rural communities, from a high of 121 in 1997 and 1998 to 97 in 2016.

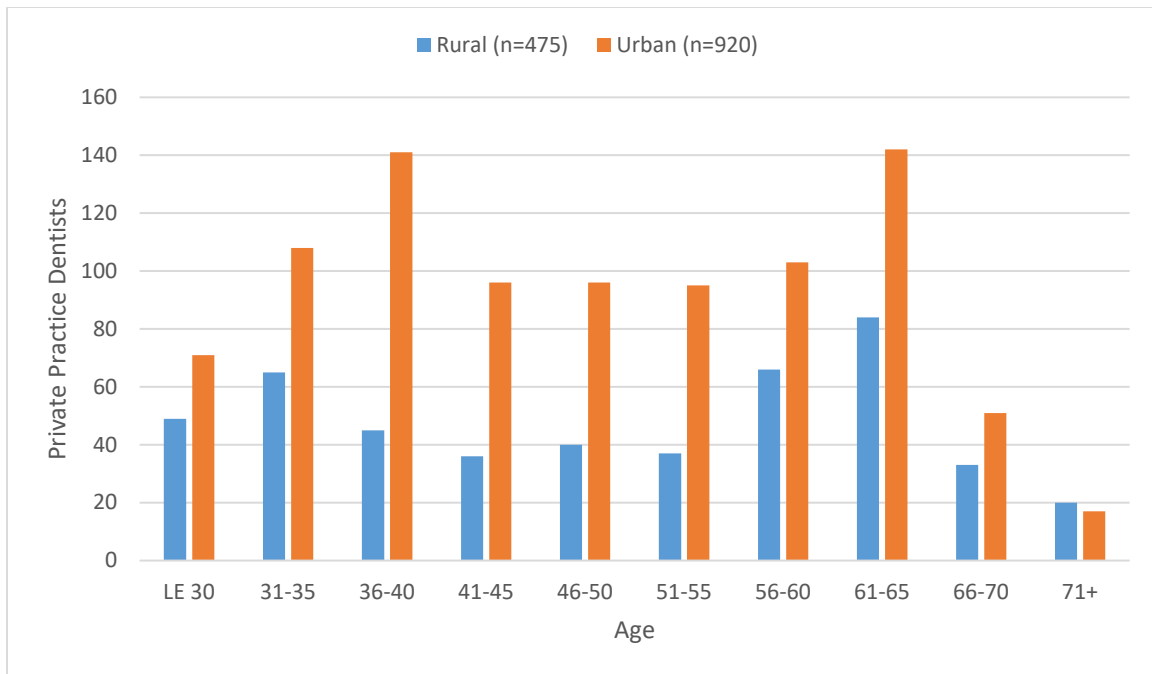


Figure 80. Age of Iowa private practice dentists, by urbanicity, 2016 (N=1,395)

Not surprisingly, for almost all ages the number of active private practitioners in urban locations exceed that of rural counties. However, the mean age was greater for rural practitioners (49.7 versus 48.1).

In 2016, 34% of private practice dentists worked in rural counties, with the lowest proportions between the ages of 36 through 55.

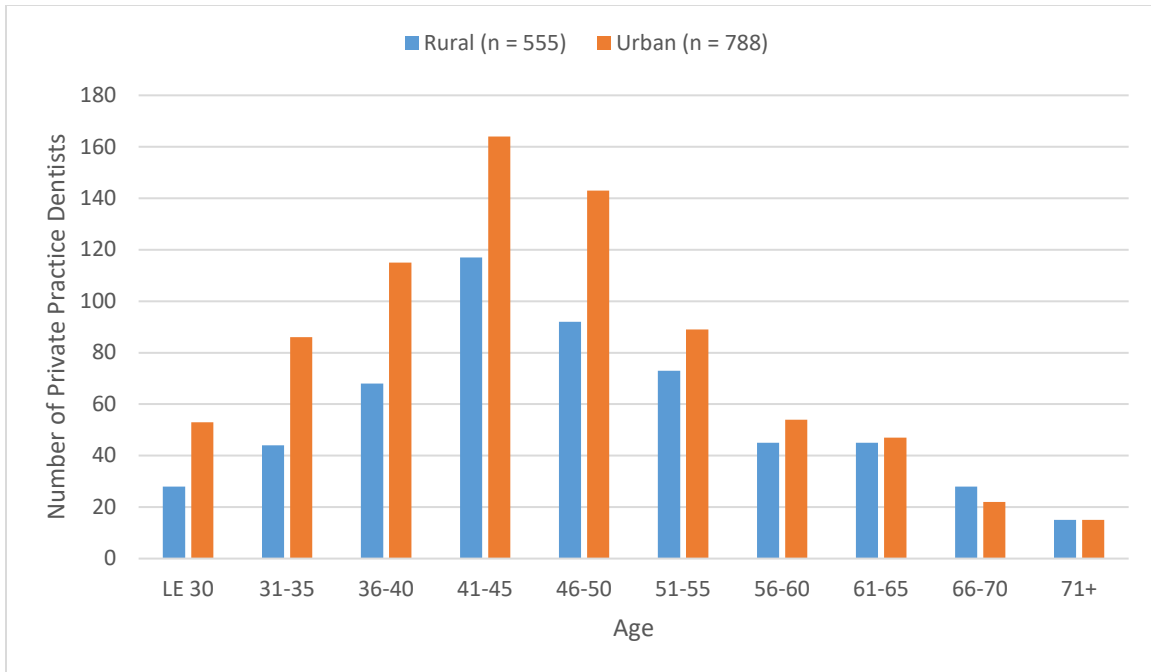


Figure 81. Age of Iowa private practice dentists, by urbanicity, 1997 (N=1,343)

In comparison with data from 2016 (Figure 80), there was a higher proportion of rural dentists for each age group in 1997. Furthermore, the numbers of dentists older than 50 years of age who practice in urban and rural counties were approximately equal.

Graduation Year

There is a high positive correlation between dentist's age and graduation year. However, a small proportion of incoming dental school classes include individuals with some work-related experiences prior to application and enrollment. Thus, we include the following figures for those interested in information based on dentists' graduation years.

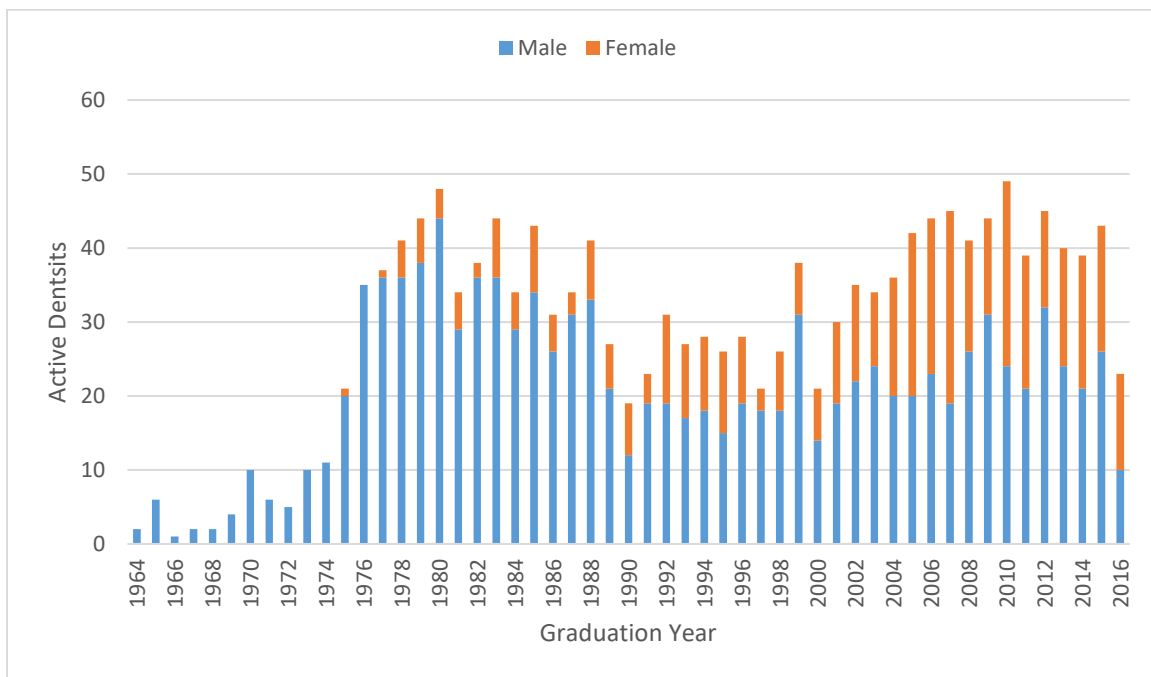


Figure 82. Graduation year for active Iowa dentists, by sex, 2016

Although the largest group of male dentists who practiced in Iowa graduated in 1980 (44), the greatest number of practitioners (49, male and female combined) graduated in 2010.

This figure does not include 2 dentists who graduated prior to 1964.

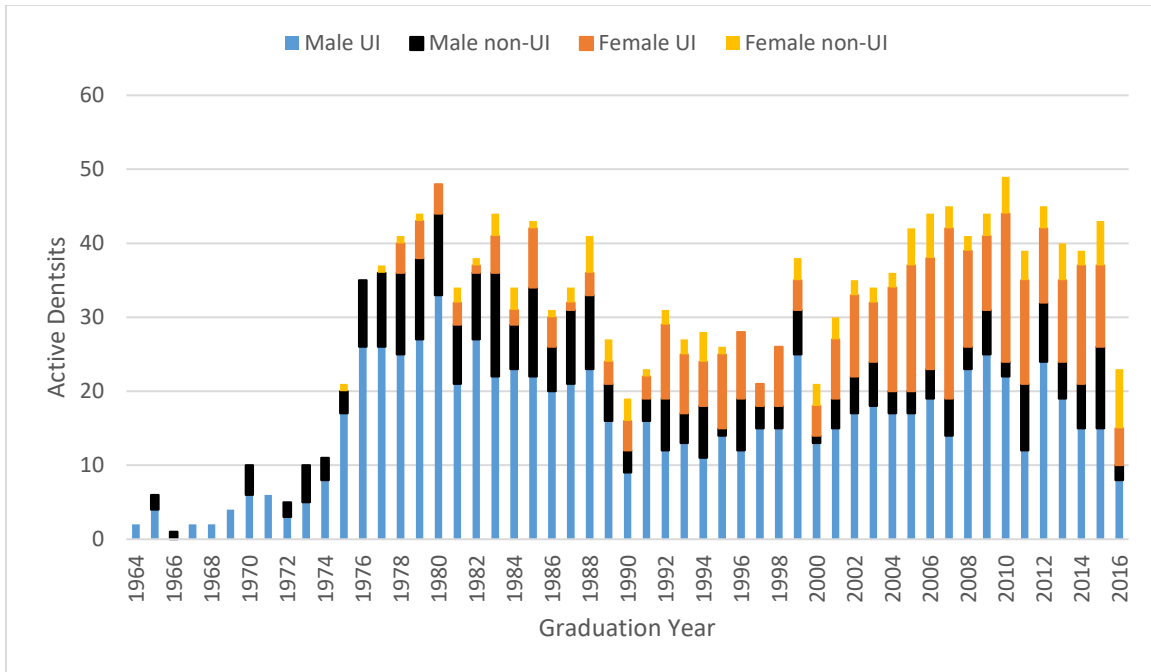


Figure 83. Graduation year for active Iowa dentists, by sex and dental school attended, 2016

For this snapshot view from 2016, the largest number (n=17) of non-University of Iowa graduates who practiced in Iowa graduated in 1983 and 2015. For 5 of the last 6 years of data collection, double-digit numbers of non-University of Iowa graduates have practiced in Iowa. This calls for a more intensive look at this group to determine whether they are shorter term practitioners (i.e., will they practice in Iowa for a relatively brief number of years).

The largest number of graduates (by year) for the 4 groups were:

- Males, University of Iowa: 33 (1980)
- Females, University of Iowa: 23 (2007)
- Males, other dental schools: 14 (1983)
- Females, other dental schools: 8 (2016)

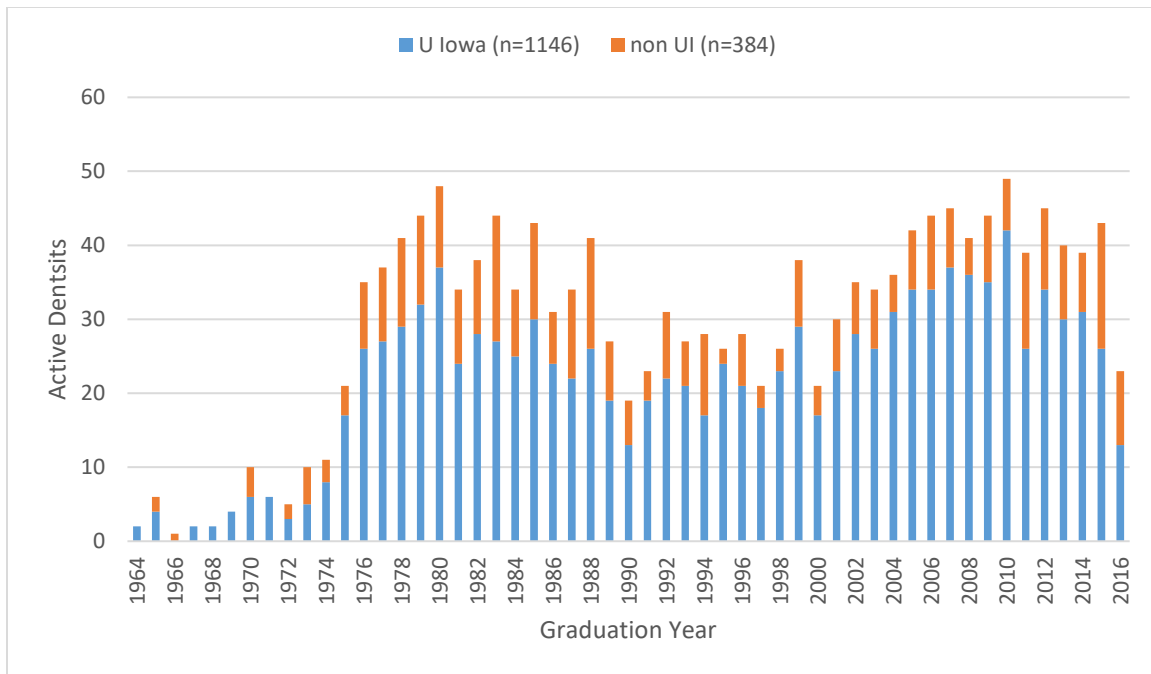


Figure 84. Active Iowa dentists by graduation year, University of Iowa versus other dental schools, 2016

The graduation year with the greatest number of active dentists in Iowa were 2010 for University of Iowa (42 active Iowa dentists) and 1983 and 2015 for other dental schools (17 active Iowa dentists). The number of active Iowa dentists who graduated from dental schools beside University of Iowa was in double-digits between 1977 and 1983.

Impact of the University of Iowa College of Dentistry

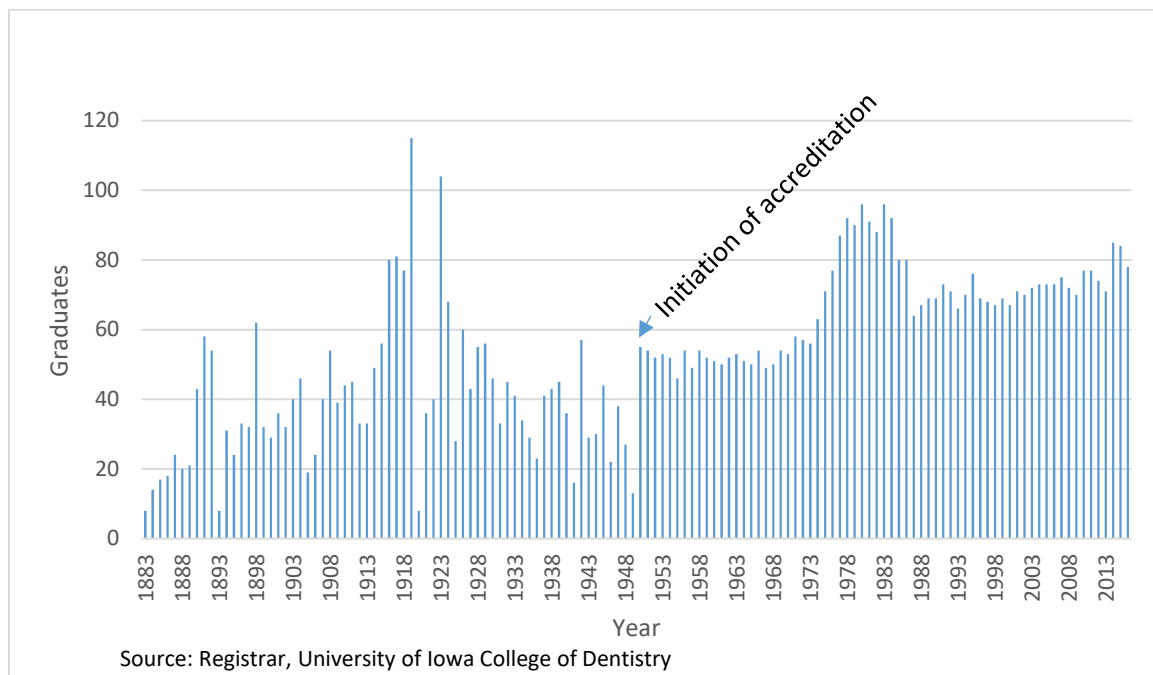


Figure 85. Number of University of Iowa College of Dentistry graduates, 1883-2016

The highest number of University of Iowa College of Dentistry graduates was in 1919, when there were 115 graduates, followed the next year with a tie for the lowest number (8), which also occurred in 1883 and 1893.

Until the introduction of a national accreditation standard, the annual number of graduates varied greatly. Thereafter, increases and decreases have been more gradual. The exception is the spike in the 1970s and early 1980s, which was based on national projections that there would be a great need for physicians and dentists. All but one dental school in the country opted to increase their class size in exchange for federal funds to build new facilities.

Interestingly, the recession of the 1980s led to a cry from within the profession to reduce the number of graduates. Nationally, this was a period when several institutions discontinued their dental programs. The University of Iowa, like many other dental schools, reduced its class size.

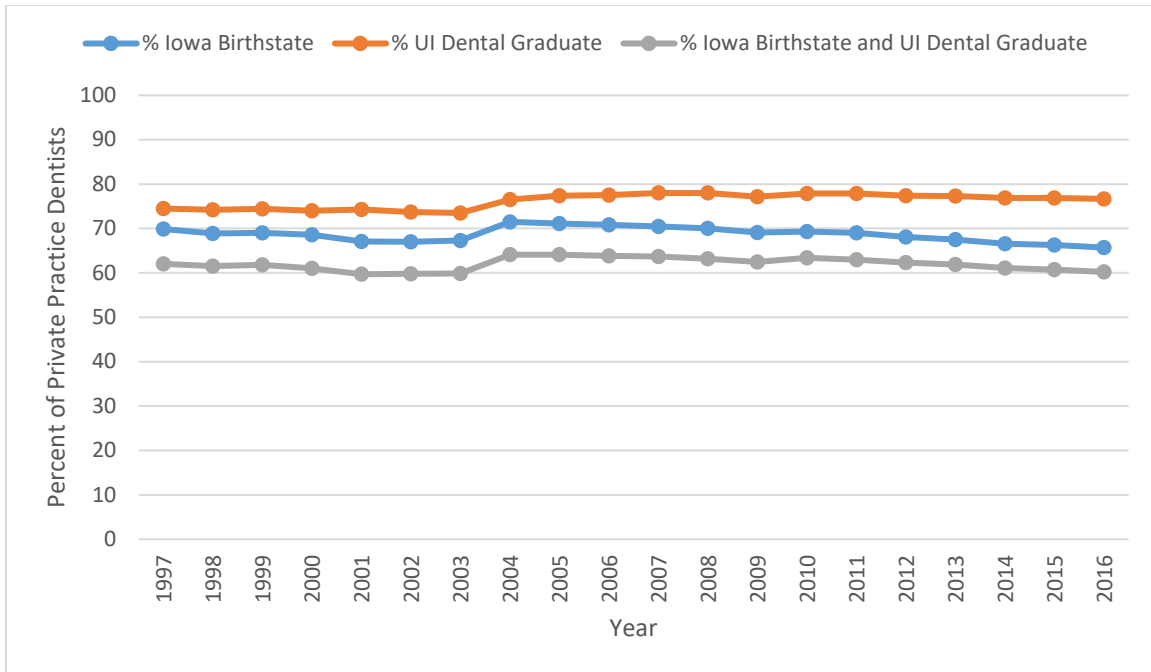


Figure 86. Annual percent of Iowa private practice dentists who are University of Iowa graduates (1997-2016) and/or born in Iowa, 2016

Between 73 and 78 percent of Iowa's dentists were graduates of the University of Iowa College of Dentistry throughout this time period. A slightly smaller percentage of active Iowa dentists were native, ranging from 65.7% to 71.5%.

The percent of Iowa's dentists who were born in the state and graduated from the University of Iowa College of Dentistry ranged from a low of 58.7% in 2001 to 64.1% in both 2004 and 2005.

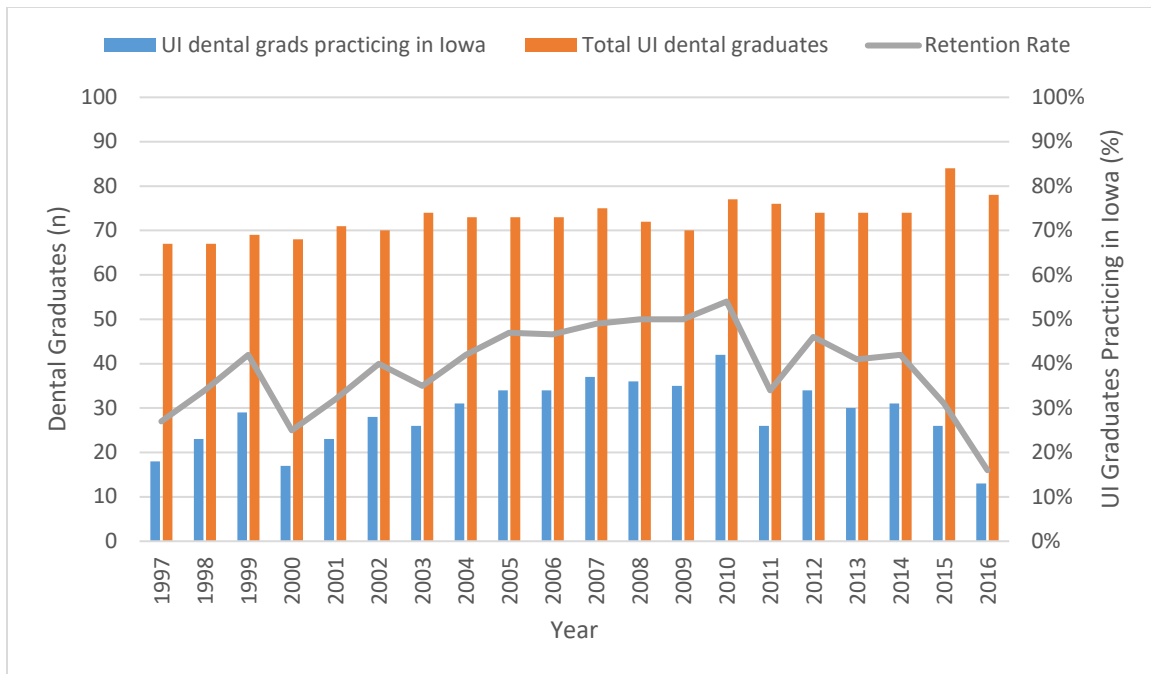


Figure 87. University of Iowa graduates (1997-2016) who were practicing in Iowa in 2016, by graduation year

Historically, there is a lower retention rate for approximately the first 5 years beyond dental school graduation. This is due, in part, because of the limited number of specialty training slots in the state and other immediate commitments (e.g., military obligation). Thus, we present 2 low end figures, one for the entire 20 years and another that discounts the period 2011 through 2016.

For those graduating from the University of Iowa College of Dentistry between 1997 and 2016, the class of 2010 had the most graduates (42) who practice in Iowa. The lowest number is the class of 2016, which only had 13 immediately go into practice in Iowa. When excluding the last few years, the lowest number was from the class of 2000, which had 17 members remain in Iowa.

Retention rates ranged from a high of 54% (class of 2010), to a low of 16% (class of 2016). If one looks only to those classes prior to 2011, the class of 2000 had the lowest percent (25%) who practiced in Iowa.

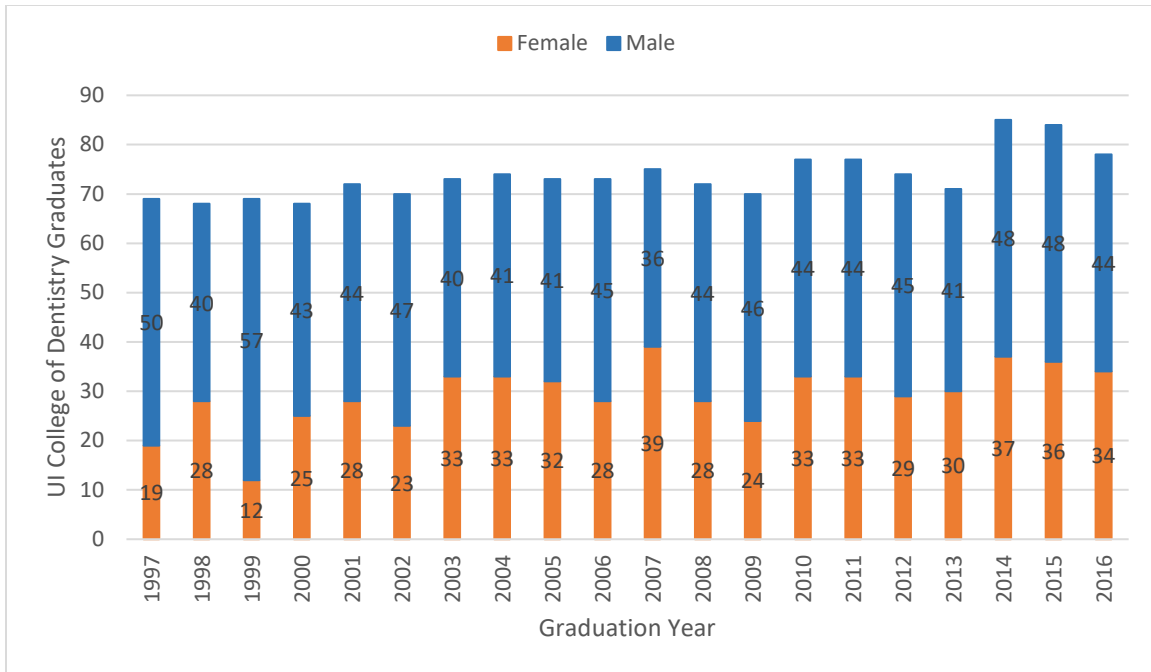


Figure 88. Number of University of Iowa College of Dentistry graduates (1997-2016), by sex

For several years, the number of each graduating class was approximately 70-72 students. In recent years, the College of Dentistry has slightly increased the class size.

There was only one graduating class (2007) in which the number of females exceeded males.

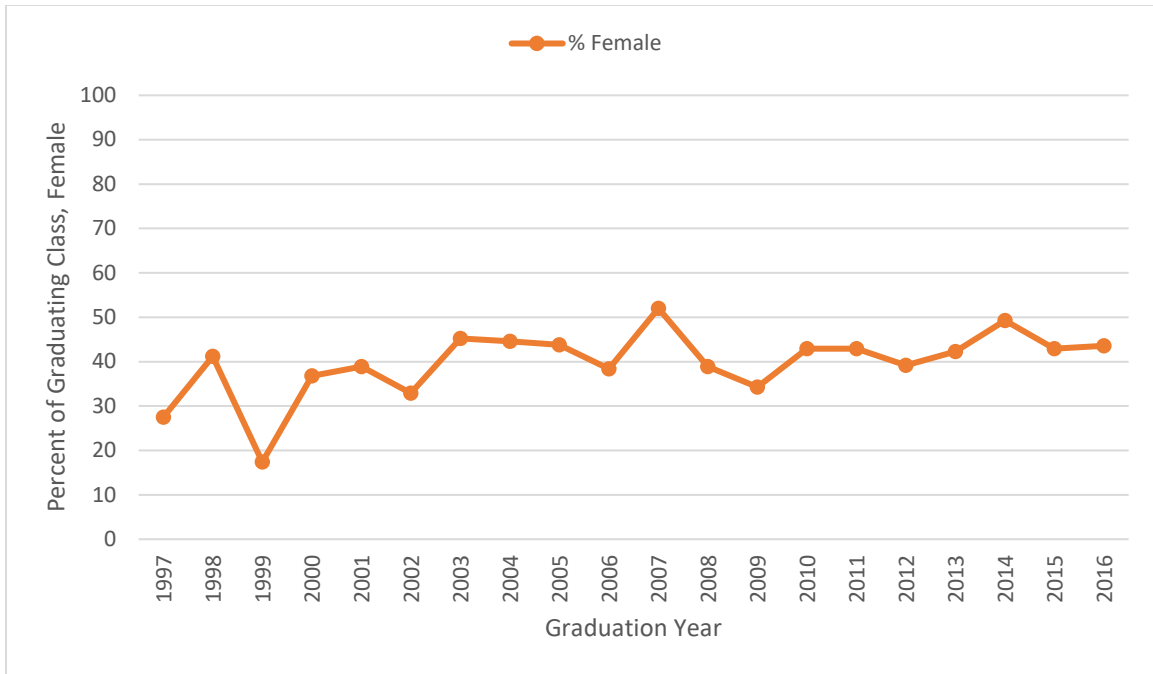


Figure 89. Percent of University of Iowa College of Dentistry graduating class (1997-2016) who were female

The percent of the University of Iowa graduating class who were female ranged from a low of 17.4% (1999) to a high of 52% (2007). In addition, the most recent graduation class (2017) had equal percentages of male and female graduates.

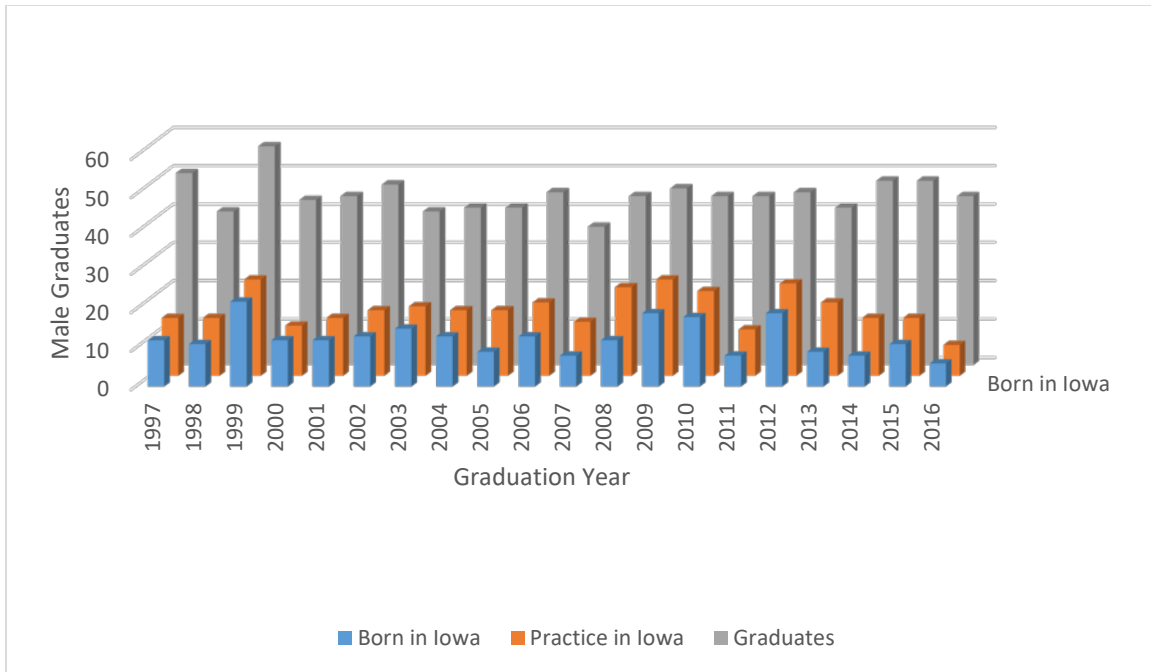


Figure 90. Number of male University of Iowa College of Dentistry graduates (1997-2016) who practice in Iowa and born in the state, 2016

During this 20-year period, the class of 1999 from the University of Iowa had the most male graduates (57) and the class of 2007 had the fewest (36). There was a tie for the greatest number of active practitioners between the classes of 1999 and 2009 with 25 each. Understandably, the class of 2016 had the fewest active practitioners at 8 males.

There was a tie for the largest number of male dentists who were born in Iowa between the classes of 2008 and 2012, with 19 each. The lowest number was again from the class of 2016, with 6 graduates born in Iowa.

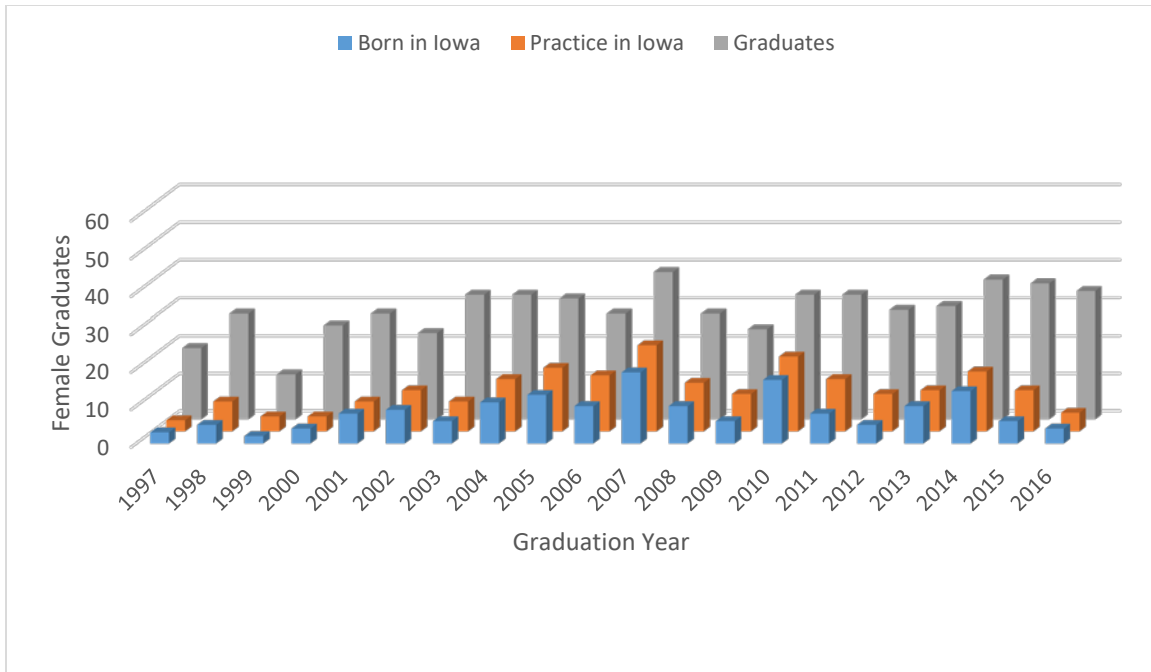


Figure 91. Number of female University of Iowa College of Dentistry graduates (1997-2016) who practice in Iowa and were born in the state, 2016

The class of 2007 had the greatest number of female graduates (39) and the class of 1999 had the fewest female graduates (12). The largest number (23) of active female Iowa practitioners were from the class of 2007 and the lowest (3) were from the class of 1999.

Likewise, the largest number of female dentists born in Iowa were in the class of 2007 (19) and the lowest number (2) were in the class of 1999.

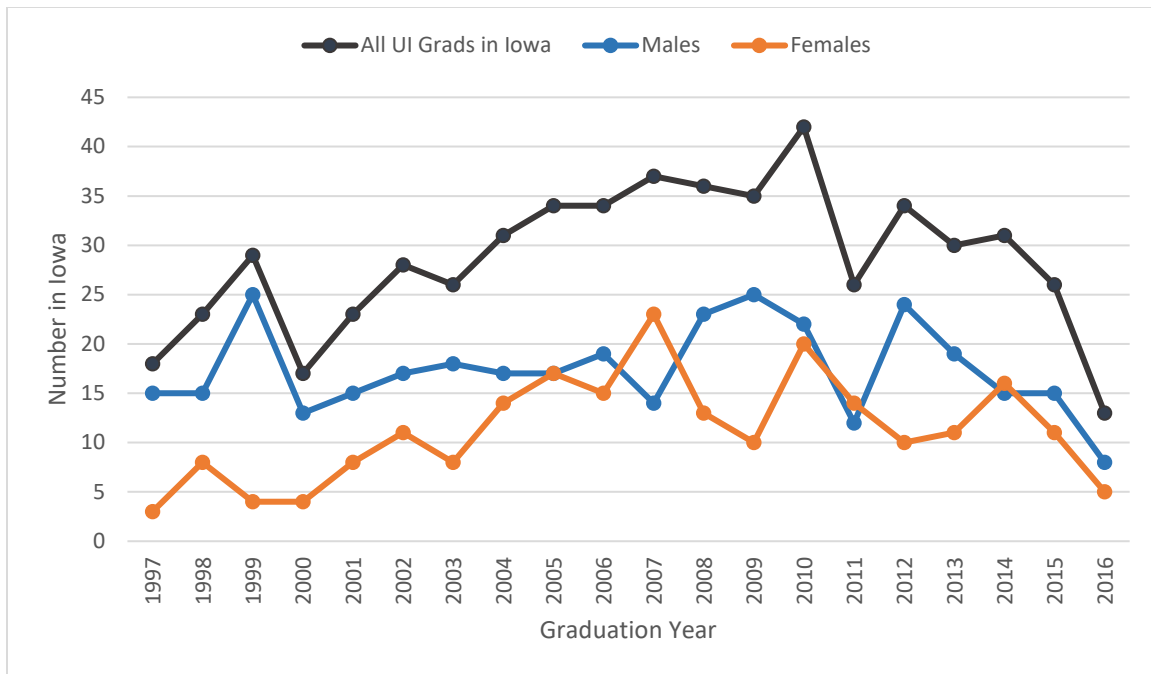


Figure 92. Number of University of Iowa College of Dentistry graduates (1997-2016) practicing in Iowa, by sex, 2016

Between 1997 and 2016, 537 University of Iowa graduates practiced in Iowa.

There is a lag time before many dental school graduates eventually select a permanent practice location due to such issues as additional education, military obligations, spousal education, and educational debt. (Some feel that there may be a 5-year time period between graduation and when a dentist “settles down” in a practice location).

The class with the greatest number of active Iowa dentists was 2010, with 42, and the lowest was the class of 2000, with 17. For males, the greatest number (25) was a tie between the classes of 1999 and 2009 and the lowest number (12) was the class of 2011. For females, the greatest number (23) was the class of 2007 and the lowest (3) was the class of 1997.

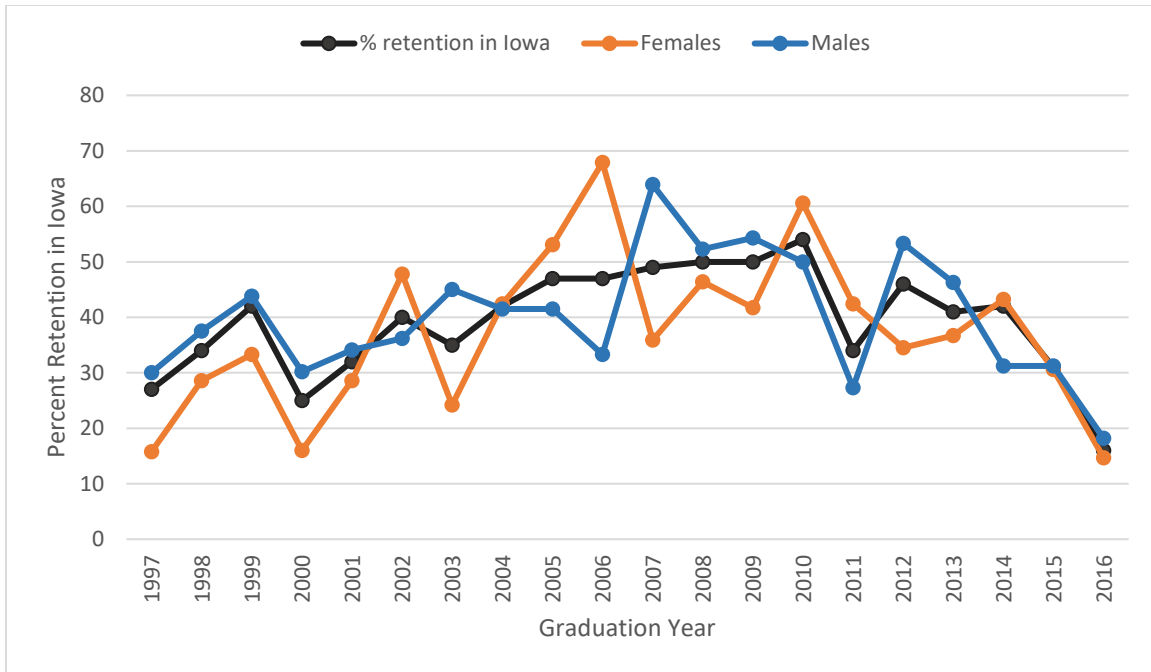


Figure 93. Percent of University of Iowa College of Dentistry graduates (1997-2016) practicing in Iowa, by sex, 2016

This figure accompanies the preceding one. The average retention rate for female and male dentists is 37.7% and 39.8%, respectively. Once again, there is generally a 5-year lag before many graduates return from other obligations (e.g., advanced training, military) to Iowa.

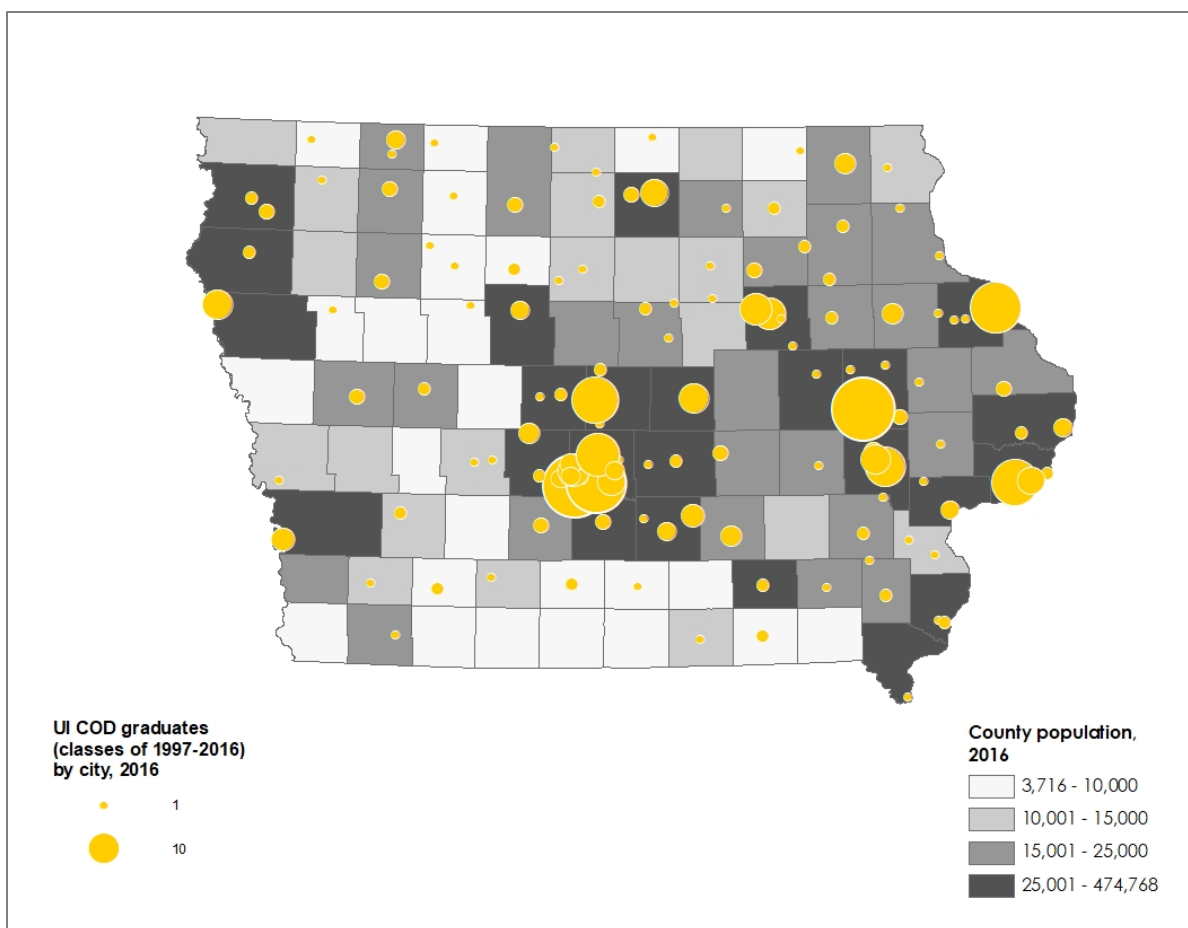


Figure 94. Location of University of Iowa College of Dentistry graduates (1997-2016) in private practice, 2016

This figure displays the location of private practice dentists who graduated from the University of Iowa College of Dentistry from 1997 through 2016 only. The size of the circles represents the relative number of dentists in a community. Each county is categorized into one of 4 groups based on population size. The darker the shade of the county, the more heavily populated the county in 2016.

Hours Worked Per Week

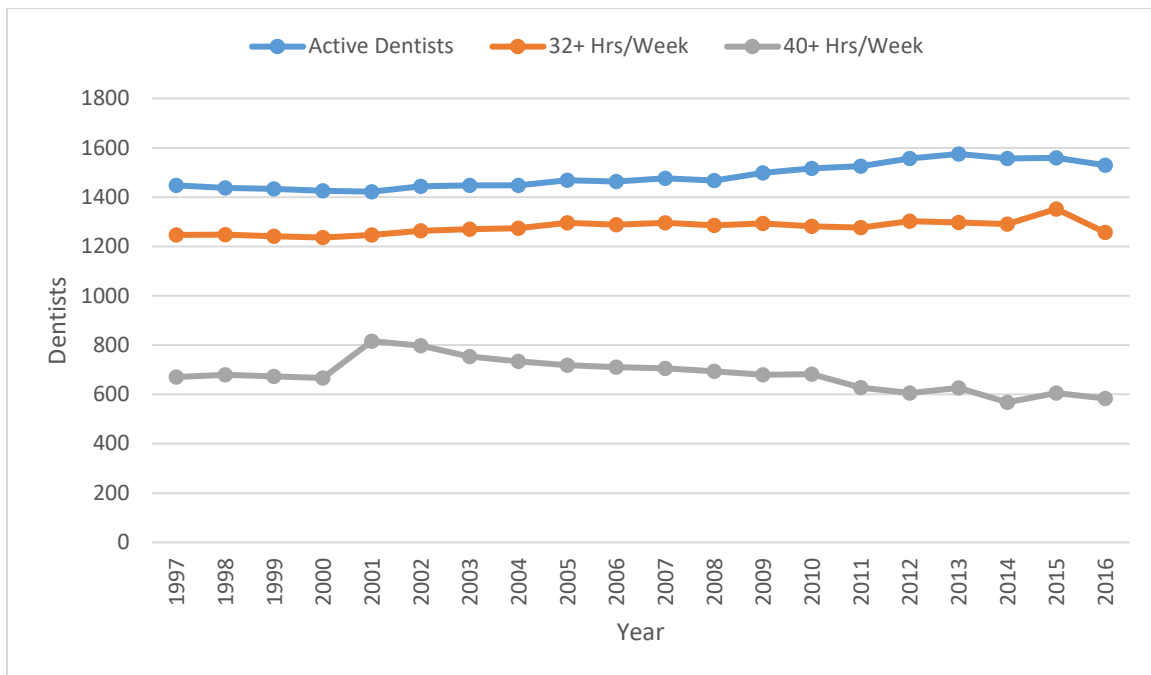


Figure 95. Hours worked per week, on average, for all active Iowa dentists, 1997-2016

Between 1997 and 2000, there was a steady number of active dentists who worked 40 or more hours per week. Then, this number increased considerably at about the same time as the dot-com economic bubble. Subsequently, the number of active Iowa dentists who worked 40 or more hours per week, on average, decreased from 816 (2001) to 568 (2014), a decrease of 30%. The percent of dentists who worked 32 hours or more per week remained fairly consistent relative to the total number of dentists through 2008. After that date, there was a slight divergence between the two lines.

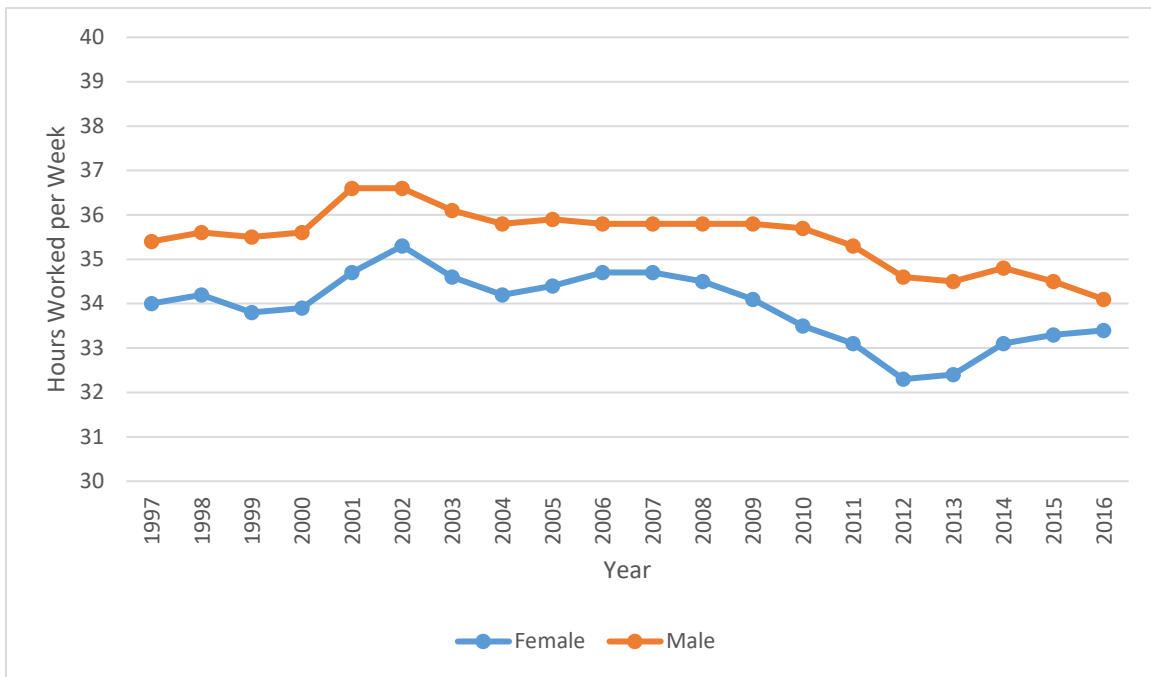


Figure 96. Hours worked per week, on average, all active Iowa dentists, by sex, 1997-2016

Among all active Iowa dentists, males worked more hours per week, on average, than female dentists. On average, males worked between 34.1 hours per week (2016) and 36.6 (2001 and 2002), while female dentists worked between 32.3 hours per week (2012) and 35.3 (2002).

Note that number of hours worked per week starts at 30 on the y-axis for this figure and several of the following figures.

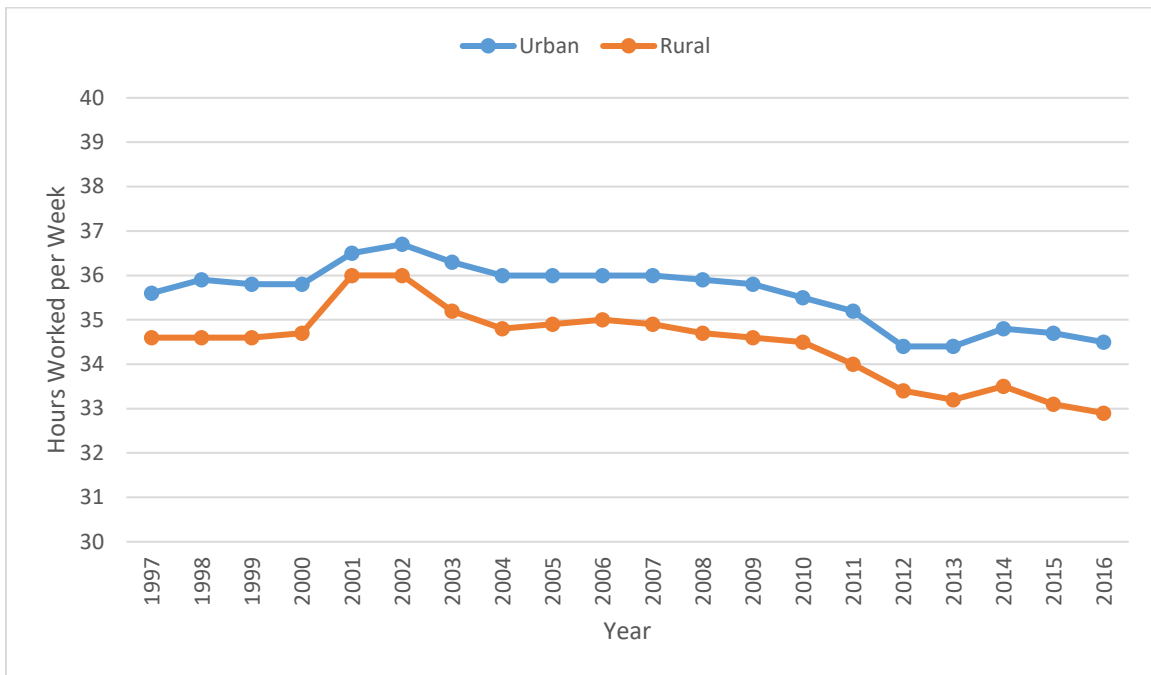


Figure 97. Hours worked per week, on average, by all active Iowa dentists, urban versus rural, 1997-2016

Among all active Iowa dentists, urban dentists worked slightly more hours per week than their rural colleagues. The range of hours per week among urban dentists was between 34.4 (2012 and 2013) and 36.7 (2002). Among rural dentists, hours per week, on average, ranged between 32.9 (2016) and 36.0 (2001).

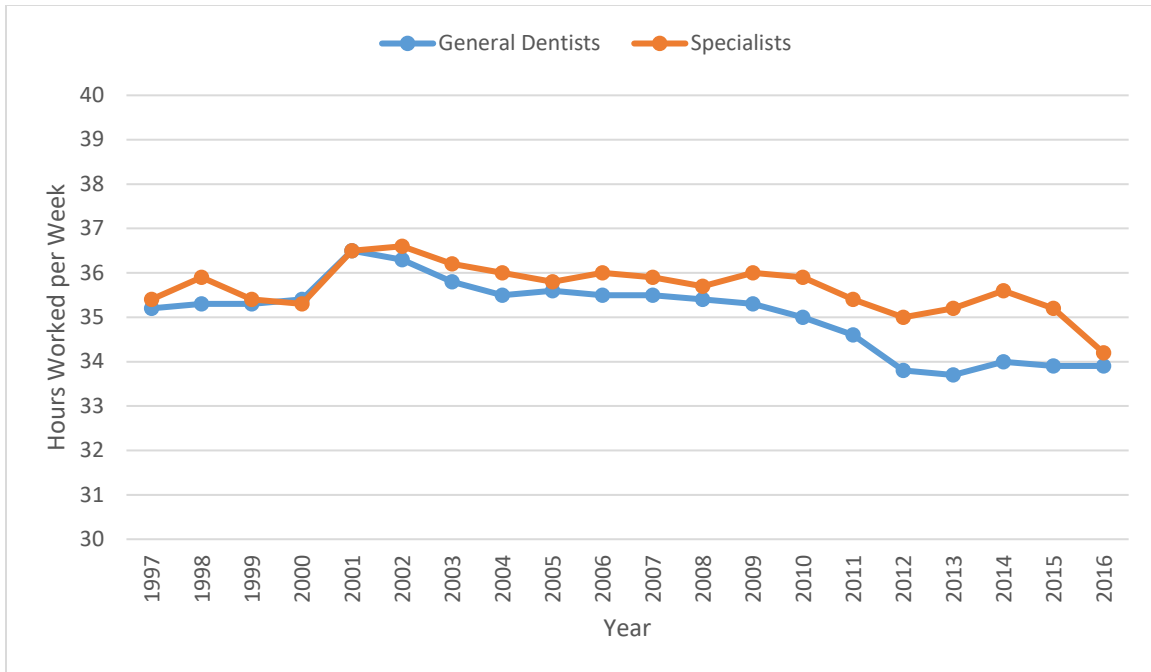


Figure 98. Hours worked per week, on average, by all active Iowa dentists, general dentists versus specialists, 1997-2016

Irrespective of practice activity, dental specialists worked slightly more hours per week than general dentists. General dentist hours per week ranged from 33.7 (2013) to 36.5 (2001), whereas hours worked per week by dental specialists ranged from 34.2 (2016) to 36.6 (2002).

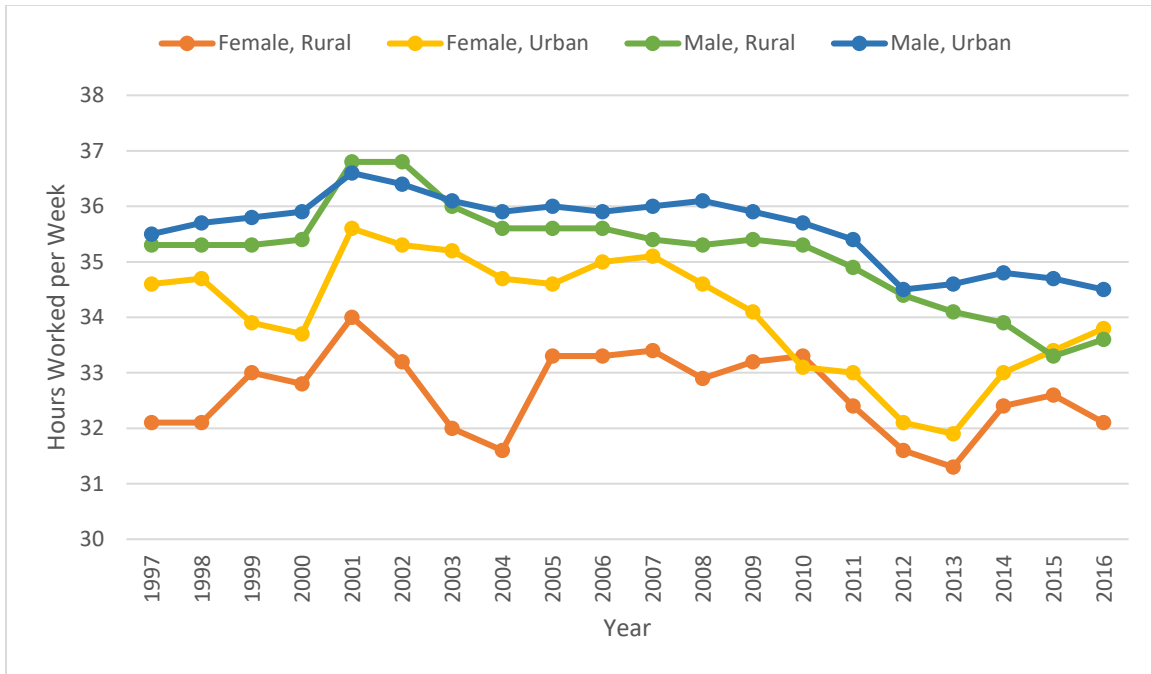


Figure 99. Hours worked per week, on average, by all active Iowa general dentists, by sex and location, 1997-2016

Male general dentists worked more hours per week, on average, than females, regardless of practice location. With a few exceptions, urban dentists of either sex worked more hours per week, on average, than rural general dentists.

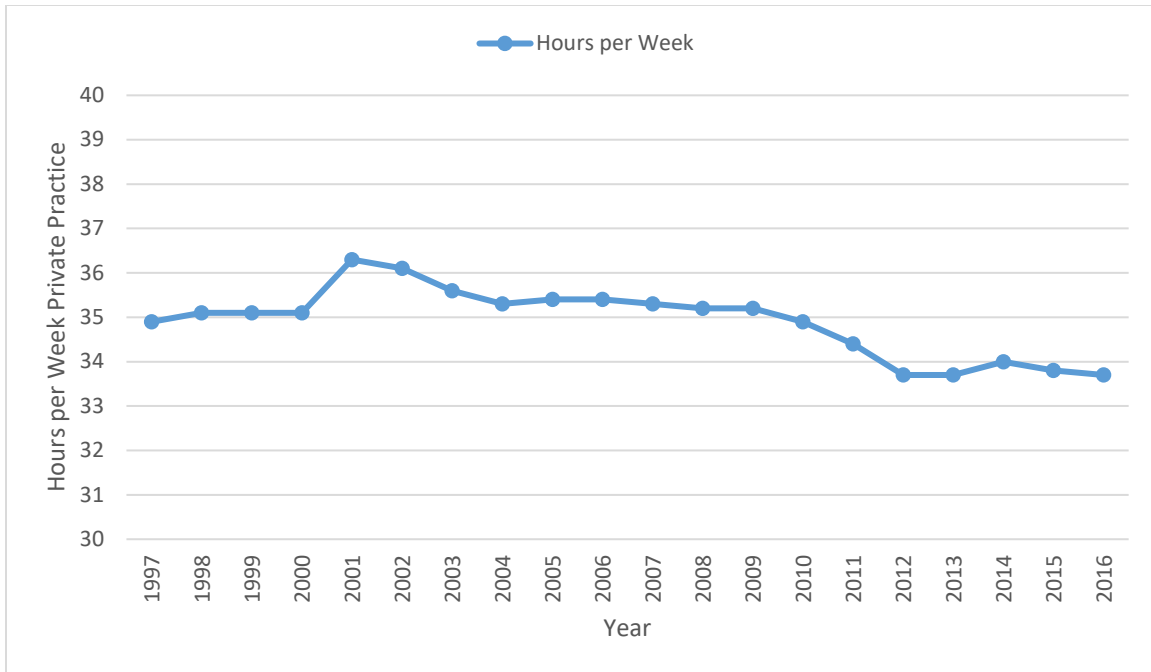


Figure 100. Mean hours per week for Iowa private practice dentists, 1997-2016

After a slight increase in the mean number of hours at the turn of the century, there has been a very gradual decline in the mean number of hours worked by Iowa private practice dentists. During the last 5 years of this review private practice dentists worked, on average, 34.0 hours or less per week.

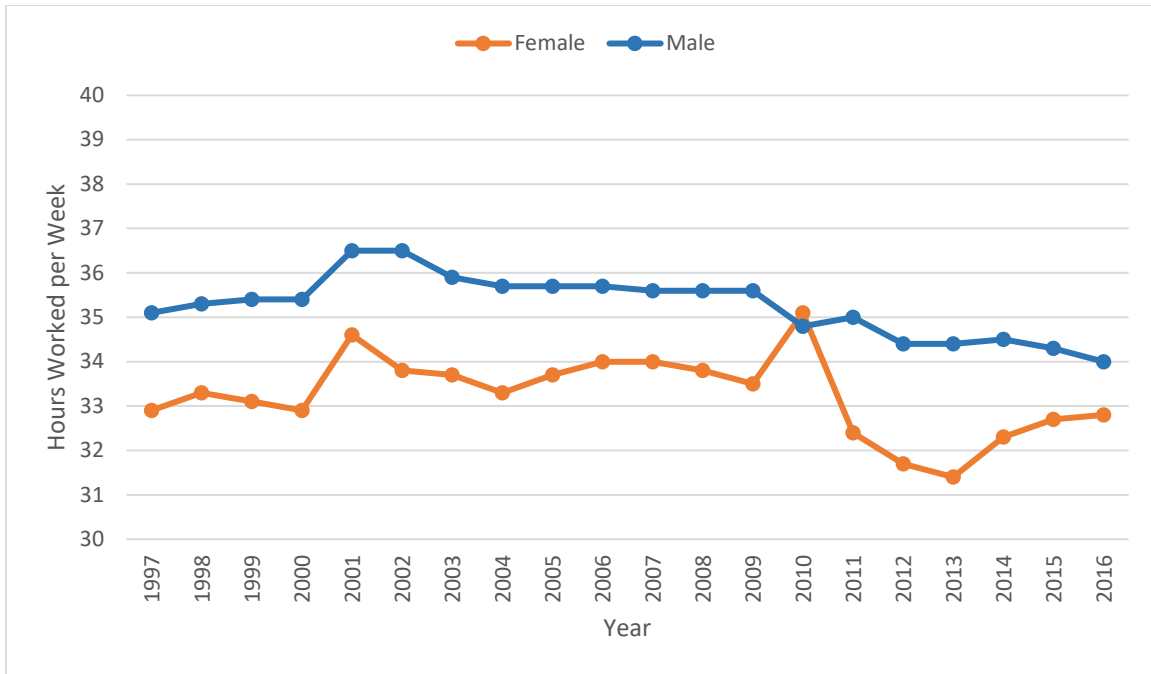


Figure 101. Hours worked per week, on average, by private practice Iowa dentists, by sex, 1997-2016

Except in 2010, male private practice dentists consistently worked a higher average of hours per week than females. For males, hours per week ranged from 34 (2016) to 36.5 (2001). Among female private practitioners, hours per week ranged from 31.4 (2013) to 35.1 (2010).

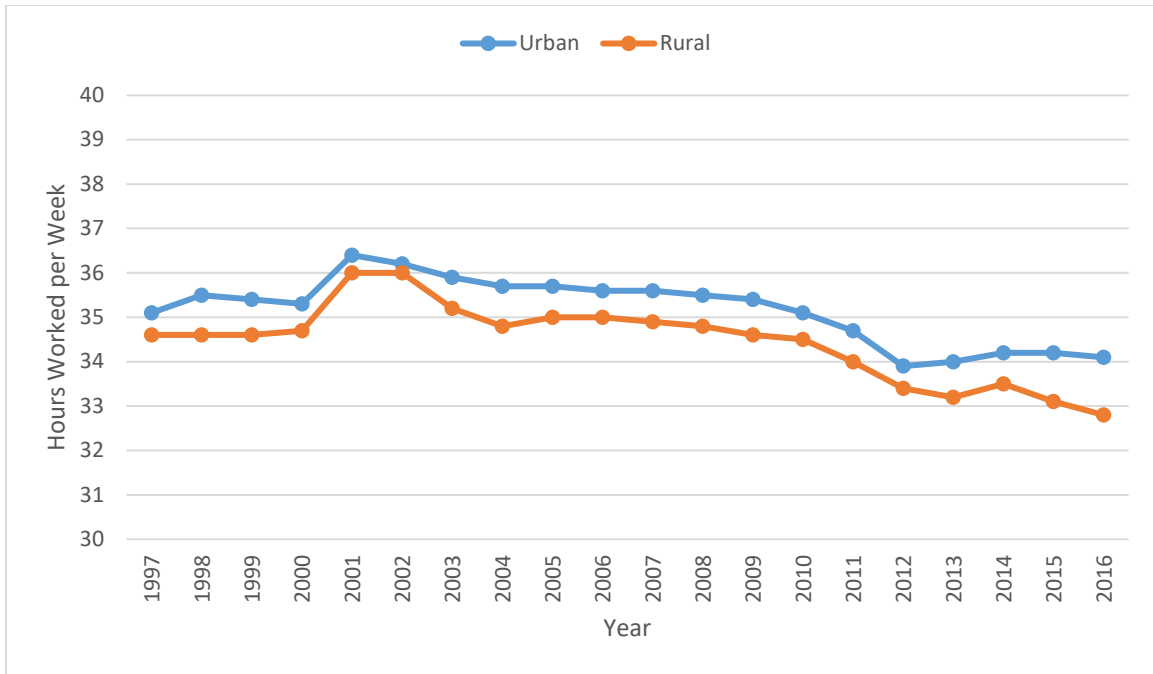


Figure 102. Hours worked per week, on average, by private practice Iowa dentists, by urbanicity, 1997-2016

Urban, private practice dentists consistently worked slightly more hours per week than their rural colleagues. For urban dentists, the range was from an average of 33.9 hours per week in 2012 to 36.4 hours in 2001. Among rural dentists, hours per week ranged from 32.8 (2016) to 36.0 (2001).

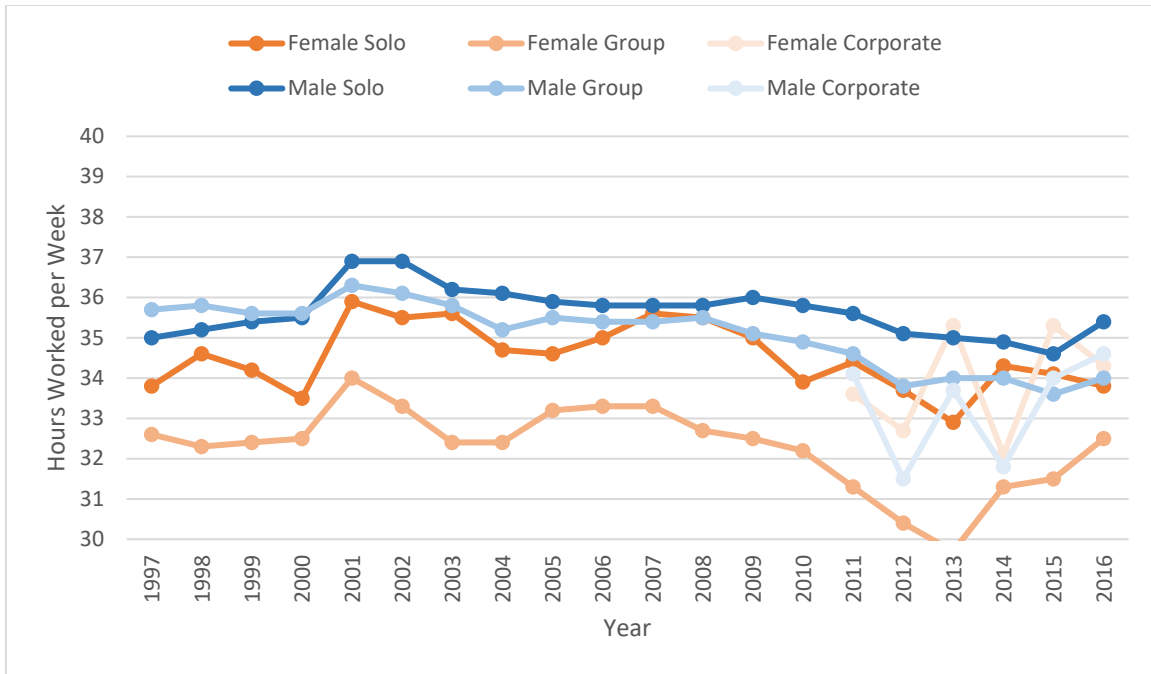


Figure 103. Hours worked per week, on average, by private practice general dentists, by sex and practice arrangement, 1997-2016

Among general dentists in private practice, males in solo practice generally worked more hours per week than any other practice arrangement. Female general dentists in group practice consistently worked the fewest hours on average.

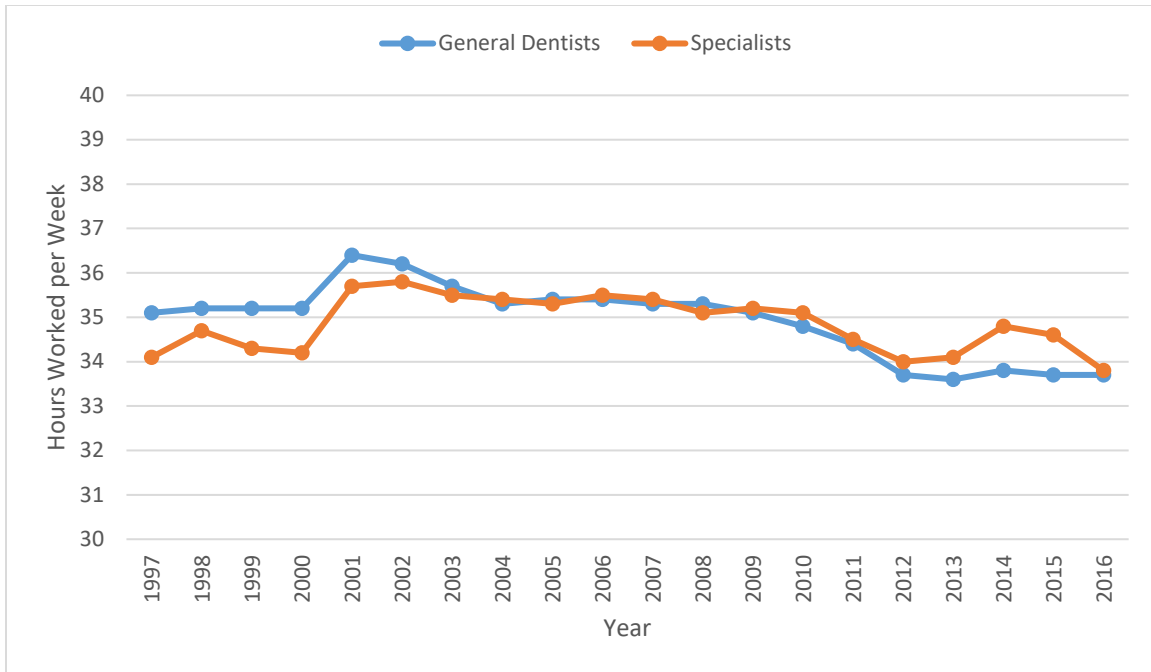


Figure 104. Hours worked per week, on average, by private practice Iowa dentists, by general dentists and specialists, 1997-2016

The number of hours worked per week by general dentists and dental specialists were nearly the same, with general dentists working slightly more hours at the beginning of the Iowa Dentist Tracking System and the reverse occurring during the later years.

The range of hours for general dentists was 33.6 hours per week (2013) to 36.4 (2001). Similarly, the range for clinical dental specialists was 33.8 hours per week (2016) to 35.8 (2002).

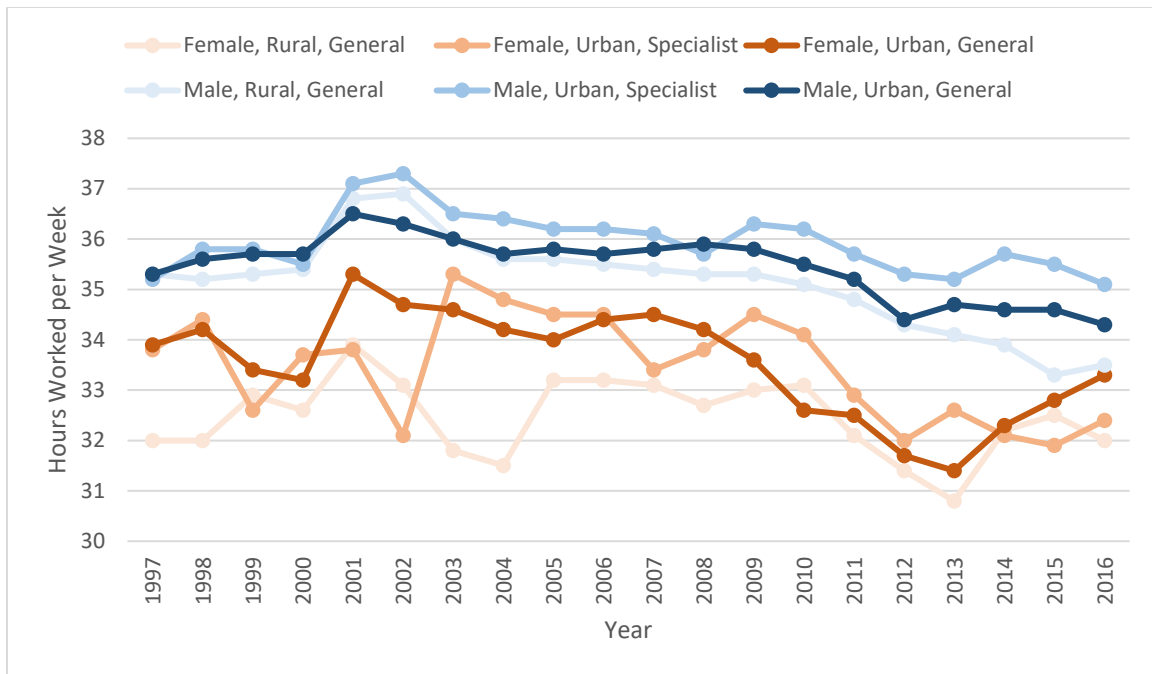


Figure 105. Hours worked per week, on average, by private practice Iowa dentists, by combination of sex, location, and specialty, 1997-2016

Among private practitioners, male dental specialists who practiced in urban areas worked the greatest number of hours per week, on average. Regardless whether they were general dentists or specialists, male dentists in either urban or rural locations worked more hours than their female counterparts. Female dentists in rural areas worked, on average, the fewest hours of any of these groups.

Since there is a paucity of dental specialists in rural areas, the graph above does not include this group.

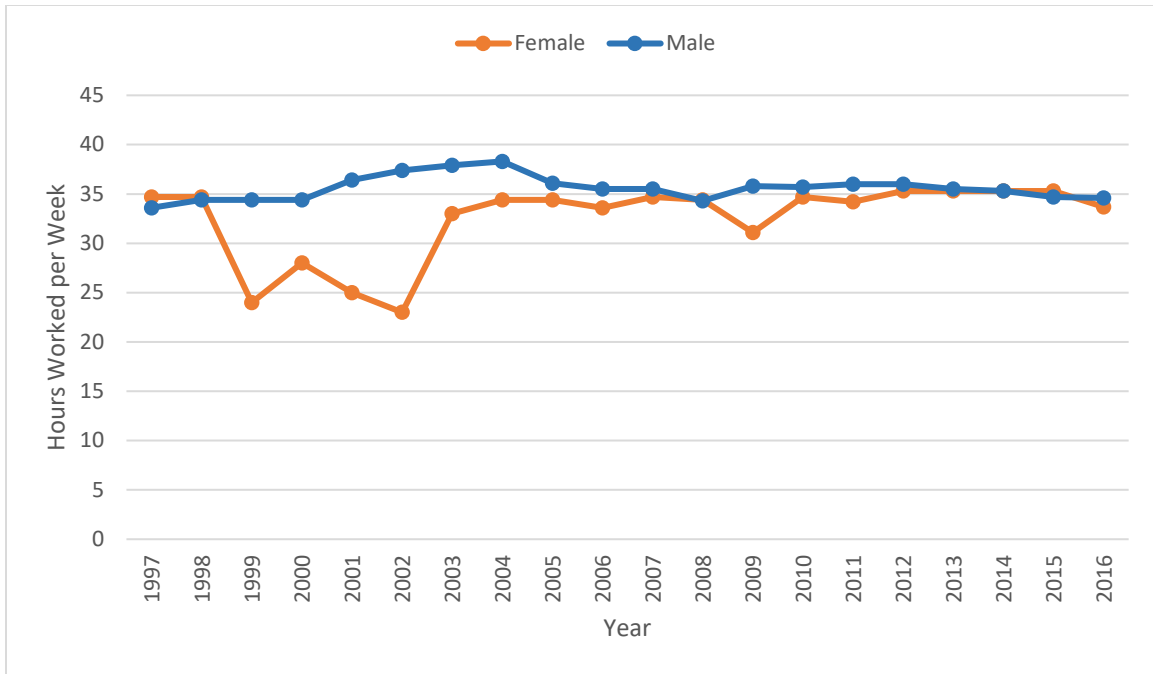


Figure 106. Hours worked per week, on average, by private practice endodontists, by sex, 1997-2016

Among private practice endodontists, males, on average, worked slightly more than females, but the difference has almost been eradicated during the past few years. The number of hours worked per week ranged from 23.0 in 2002 to 35.3 (2012 through 2015) for female endodontists and 33.6 (1997) to 38.3 (2004) for male endodontists.

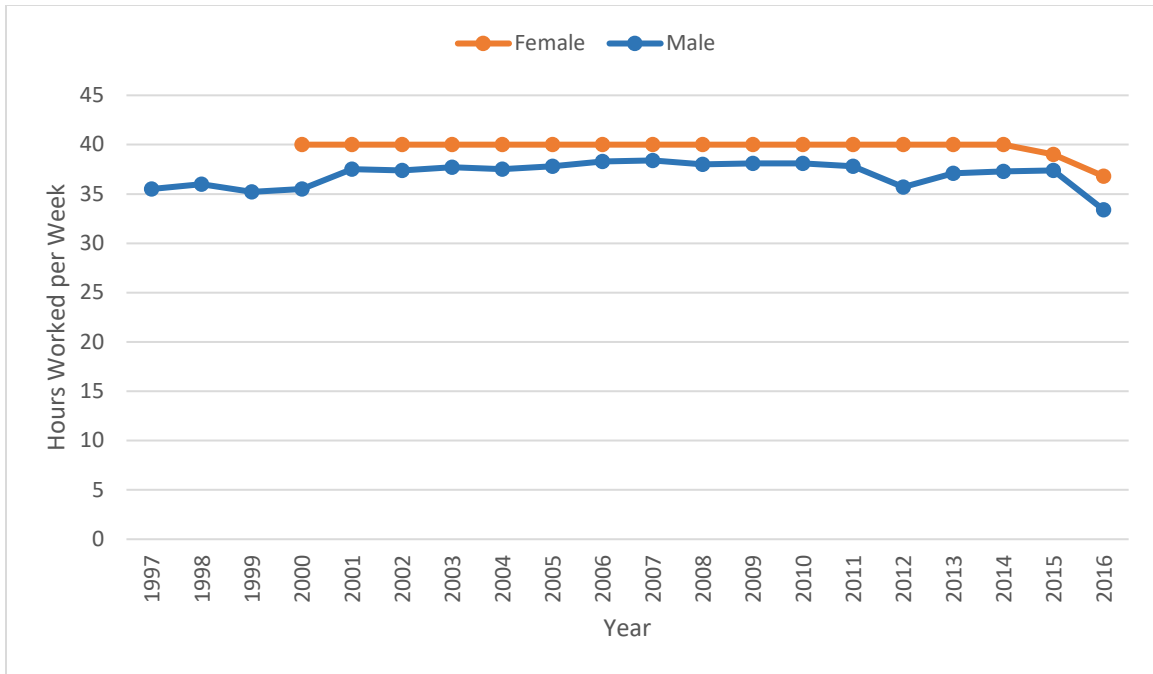


Figure 107. Hours worked per week, on average, by private practice oral and maxillofacial surgeons, by sex, 1997-2016

Male oral surgeons consistently worked in excess of 35 hours until the final year of this review. The highest number of hours worked per week was 38.4 (2007) and the lowest was 33.4 (2016).

Although the number of hours per week was higher for female oral surgeons, there are relatively few of them. The first female oral surgeon in Iowa who was in private practice appeared in 2000.

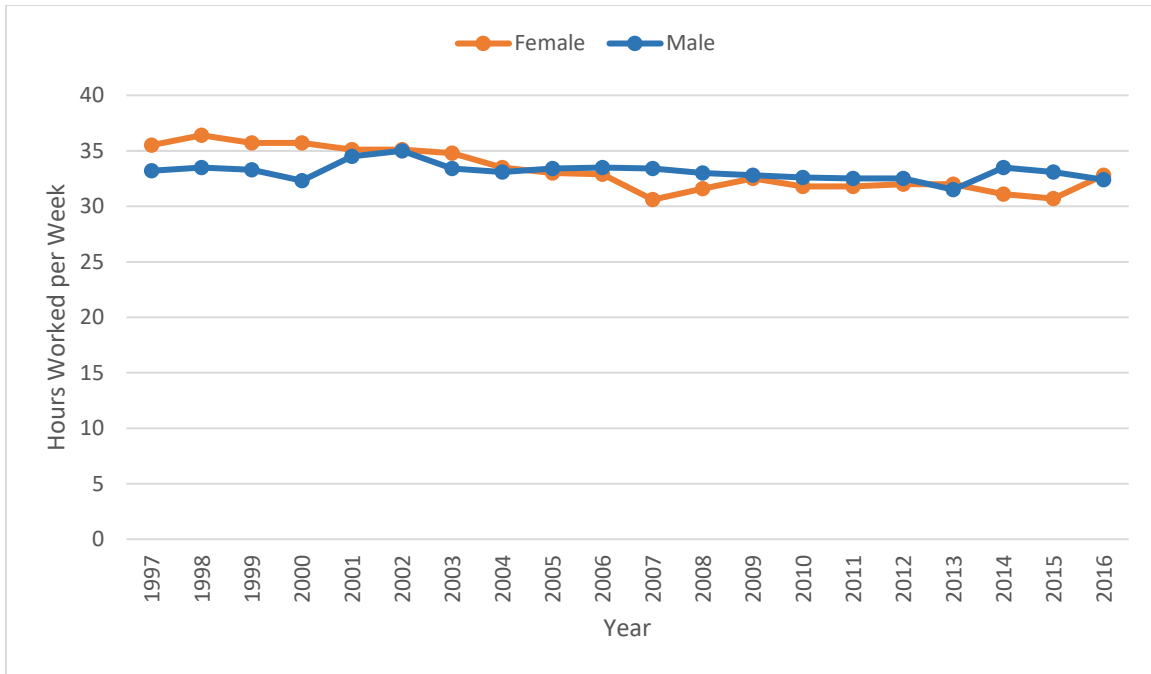


Figure 108. Hours worked per week, on average, by private practice orthodontists, by sex, 1997-2016

Initially, the average number of hours worked per week was greater for female than male orthodontists. Thereafter, males worked slightly more hours.

The number of hours worked by female orthodontists ranged from 30.7 (2015) to 36.4 (1998). For male orthodontists the number of hours worked ranged from 31.5 (2013) to 35.0 (2002).

Orthodontists worked, on average, the least number of hours per week of any of the clinical specialists in private practice.

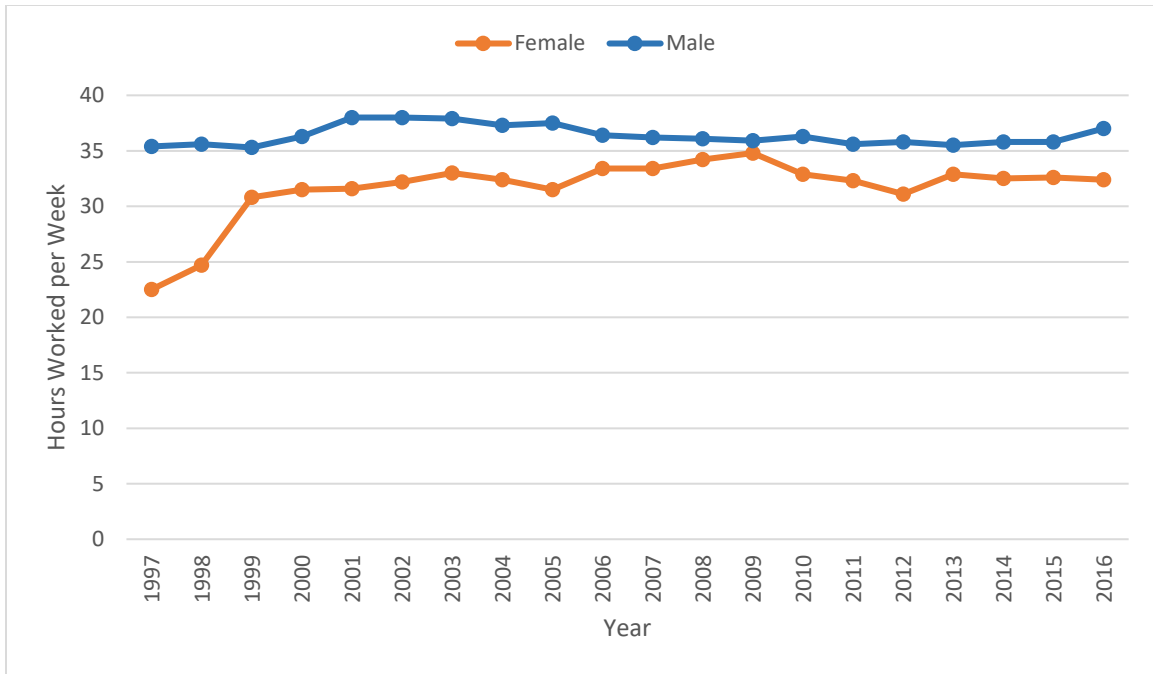


Figure 109. Hours worked per week, on average, by private practice pediatric dentists, by sex, 1997-2016

Male private practice pediatric dentists worked more hours per week, on average, than females. The range of hours for male pediatric dentists was 35.3 (1999) and 38.0 (2001 and 2002). The range of hours worked for females was 22.5 (1997) and 34.8 (2009).

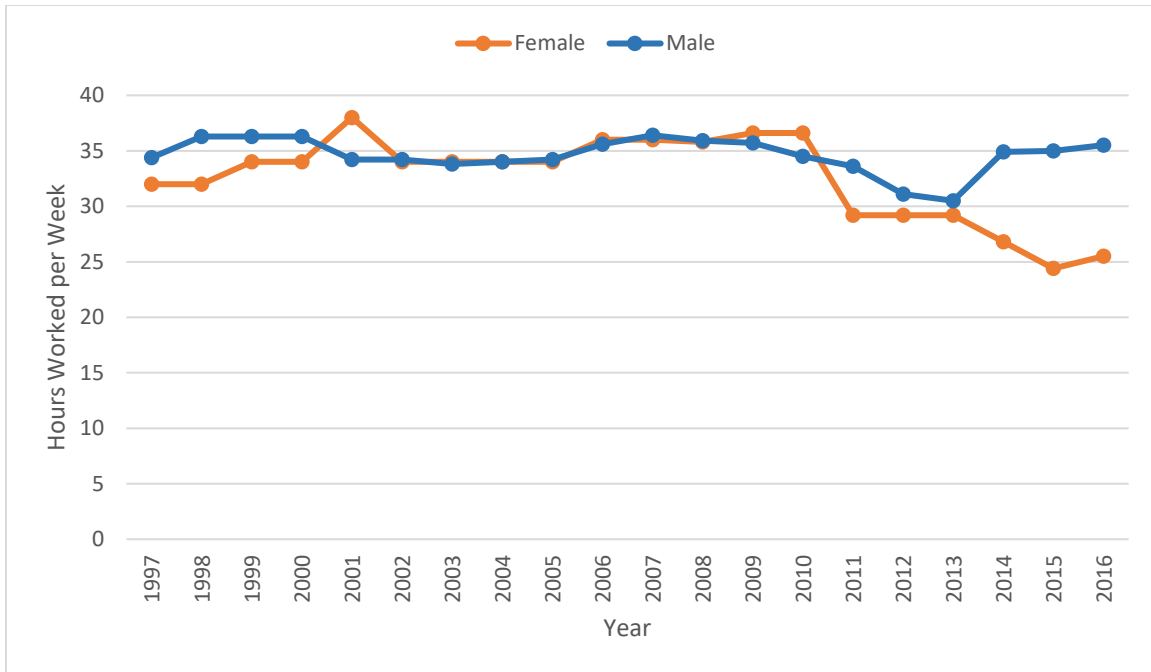


Figure 110. Hours worked per week, on average, by private practice periodontists, 1997-2016

For many years during this review male and female periodontists worked, on average, nearly identical hours per week in private practice. Since 2011, however, the number of hours has dropped off for female periodontists.

The number of hours worked per week for females ranged from 24.4 (2015) to 38.0 (2001). Among males the number of hours ranged from 30.5 (2013) to 36.4 (2007).

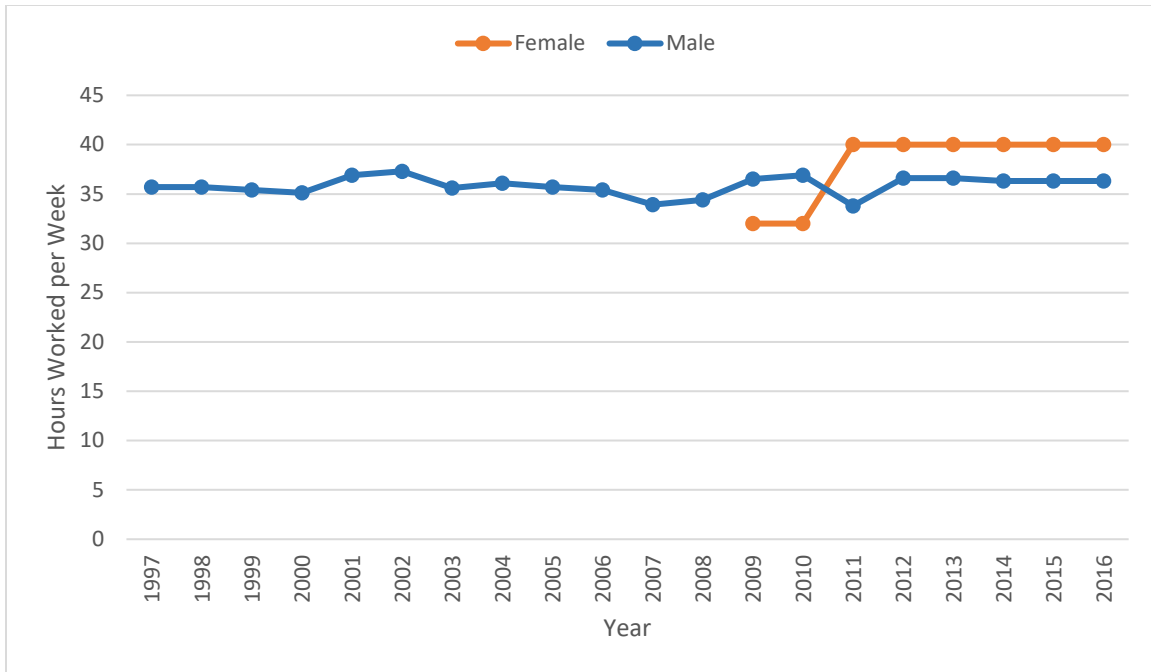


Figure 111. Hours worked per week, on average, by private practice prosthodontists, by sex, 1997-2016

There were no female private practice prosthodontists prior to 2009. From 2009 onward, the average number of hours worked per week for females ranged between 32.0 (2009 and 2010) and 40 (2011 and forward). Male prosthodontics worked between 33.8 (2011) and 37.3 (2002) hours per week.

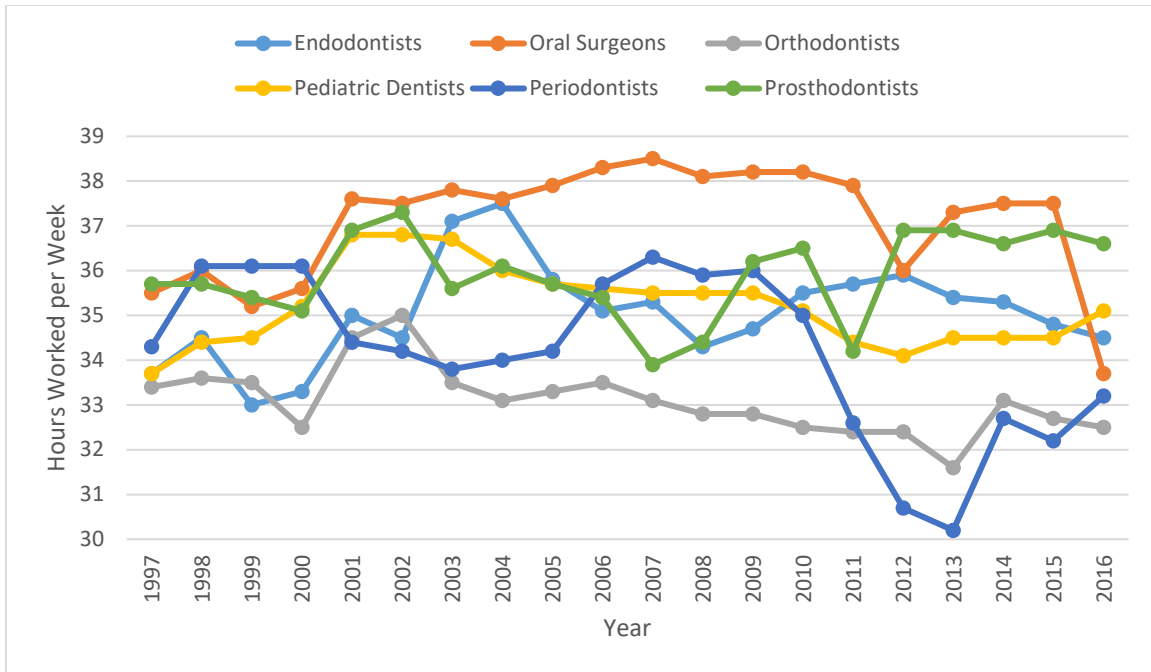
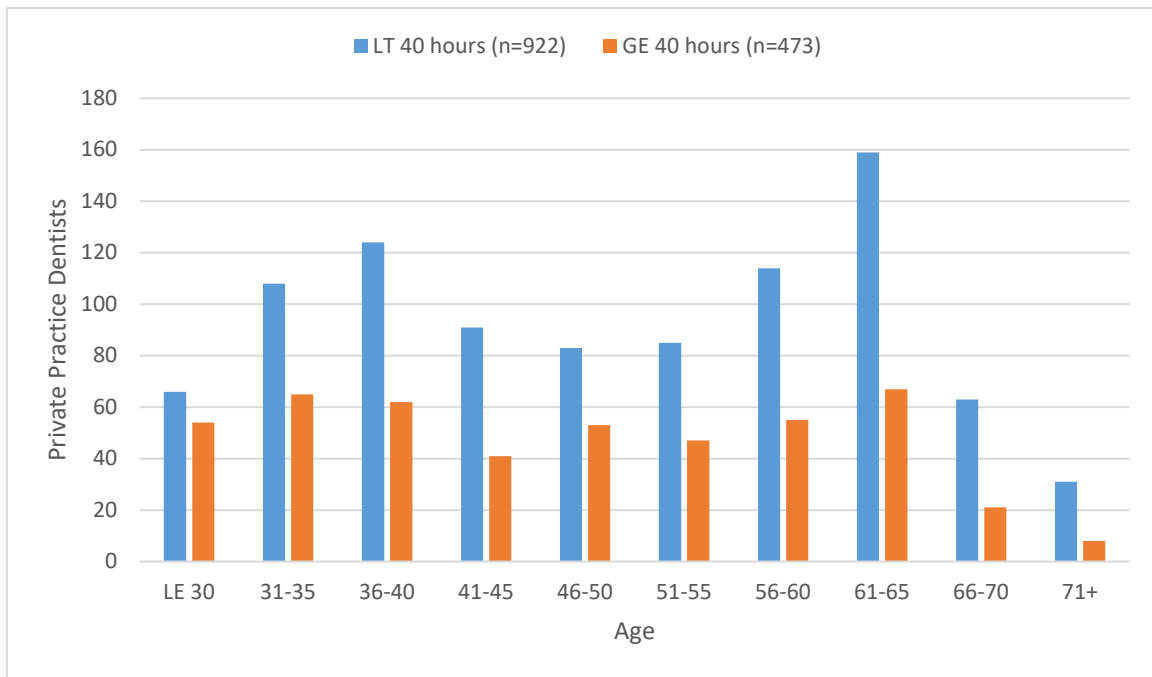


Figure 112. Hours worked per week, on average, by all private practice dental specialists, 1997-2016

Oral and maxillofacial surgeons worked more hours per week, on average, than any of the other clinical specialties in private practice. At the other end of the spectrum, orthodontists consistently worked the fewest hours per week.

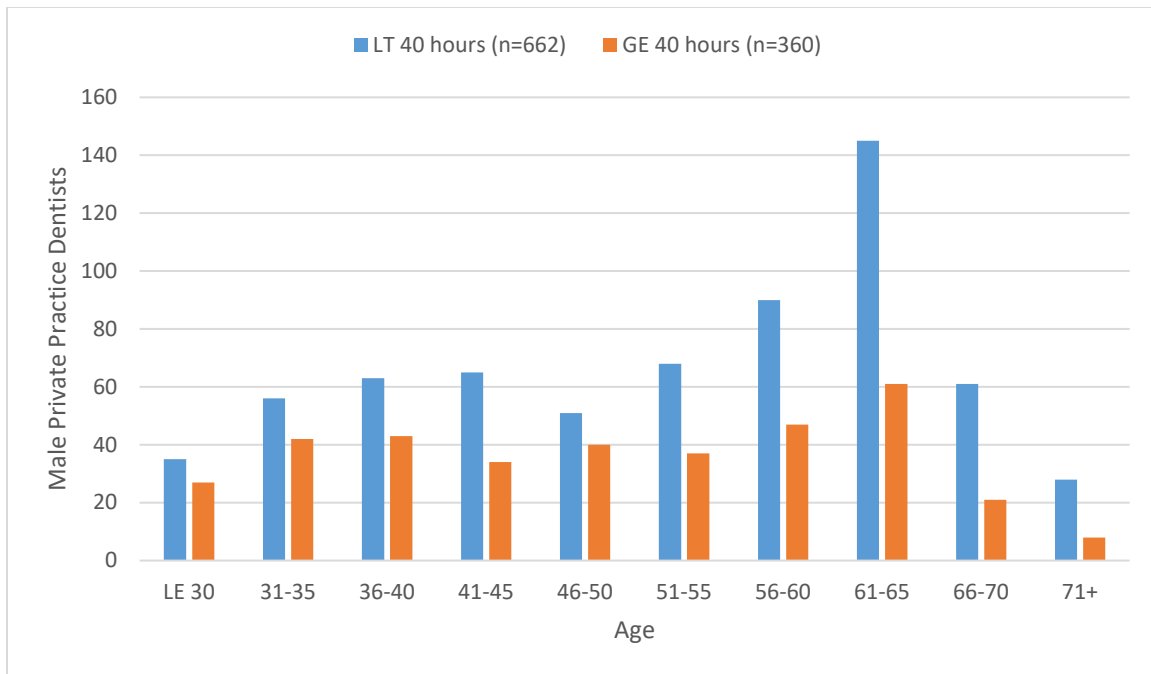


LT = less than; LE = less than or equal to; GE = greater than or equal to

Figure 113. Age of private practice Iowa dentists who work, on average, less than 40 hours per week versus those working 40 or more hours, 2016 (N=1,395)

In 2016, 34% of all private practice Iowa dentists worked 40 or more hours per week. The mean age for those who worked 40 or more hours per week was 47.0, whereas the mean age for those working less than 40 hours per week was 49.5 years of age.

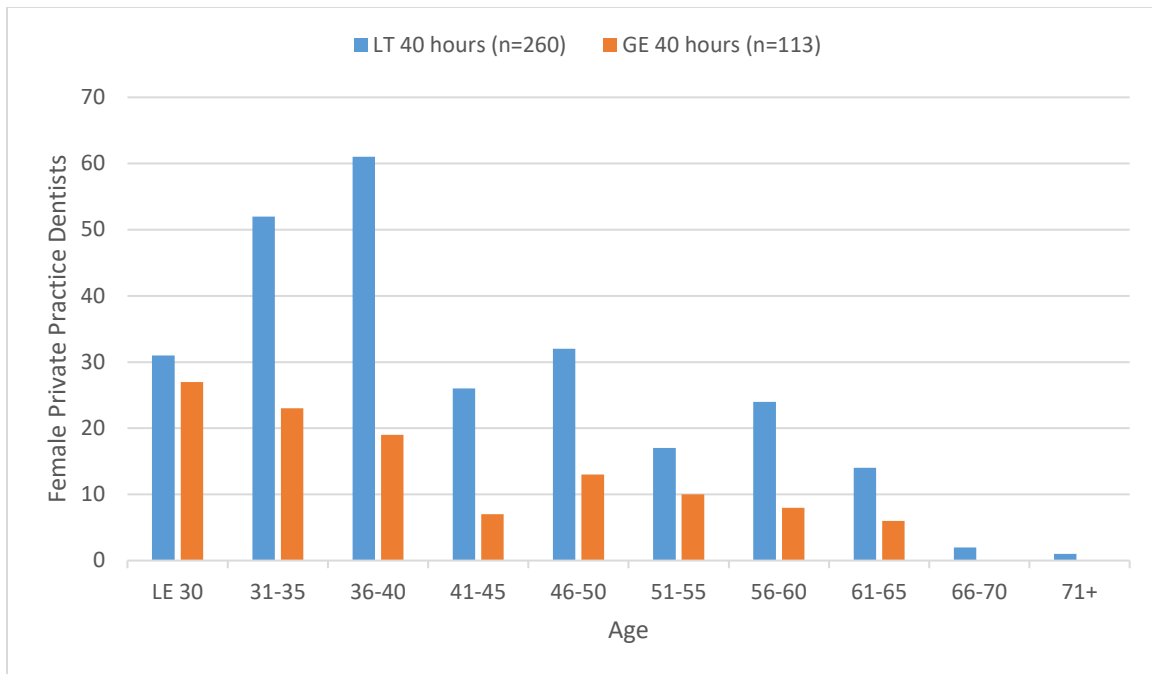
Those aged 30 years or less had the highest percent (45%) working 40 or more hours. Thereafter, the percent drops until the 46-50 age group, where 39% worked 40 or more hours. Beyond age 50, the rate for each group declines.



LT = less than; LE = less than or equal to; GE = greater than or equal to

Figure 1144. Age of male private practice Iowa dentists who work, on average, less than 40 hours per week versus those working 40 or more hours, 2016 (N=1,022)

In 2016, 35% of male private practice dentists worked 40 or more hours per week in 2016. Among this group the mean age was 49.2 years. By comparison, the mean age for male private practice dentists who worked less than 40 hours per week was 52.4 years. Male private practice dentists 50 years of age or less, with the exception of the 41-45 age group, included more than 40% who worked 40 or more hours per week. After age 50, the percent declines for each age group, reaching a low of 22% for those greater than 70 years of age.



LT = less than; LE = less than or equal to; GE = greater than or equal to

Figure 1155. Age of female private practice Iowa dentists who work, on average, less than 40 hours per week versus those working 40 or more hours, 2016 (N=373)

Thirty percent of female private practice dentists worked 40 or more hours per week in 2016. The mean age for this group of women was 40.2 years of age. By comparison, the mean age for female dentists who worked less than 40 hours per week was 42.0 years. Forty-seven percent of those 30 years of age and younger worked 40 or more hours per week. Thereafter, the percent working 40 or more hours per week declined until ages 51-55, where it increased to 37%.

Full-Time Versus Part-Time

The Iowa Dentist Tracking System has consistently defined full-time work as 32 or more hours per week. Part-time is less than 32 hours per week.

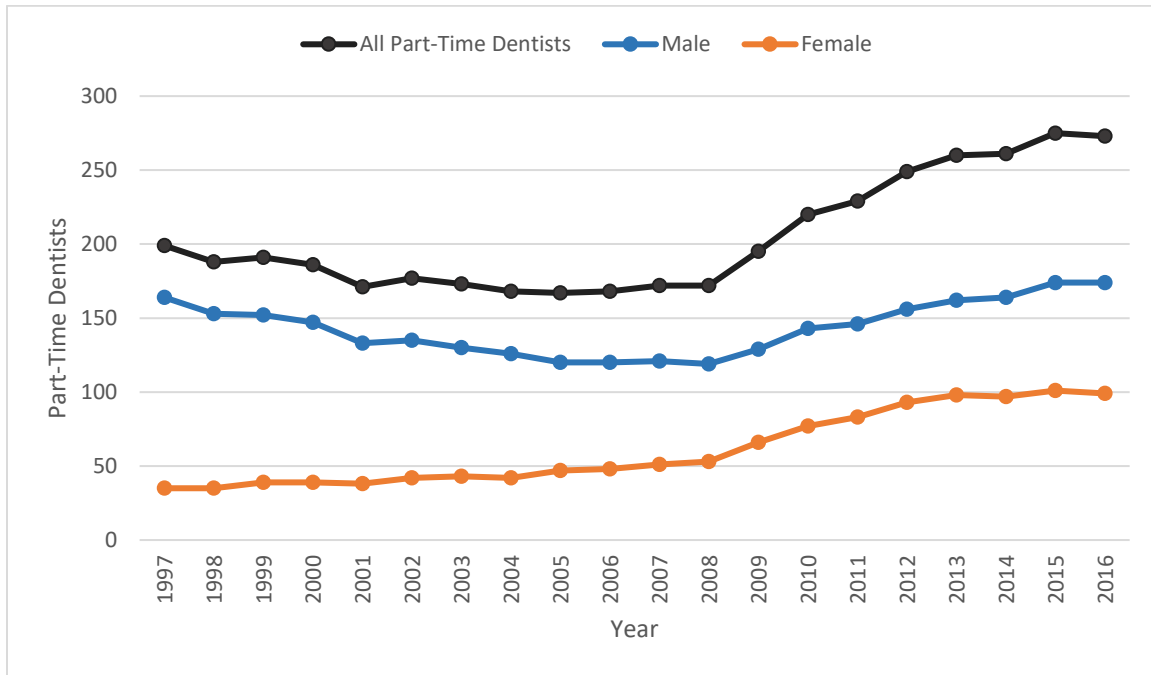


Figure 1166. Number of part-time active Iowa dentists, by sex, 1997-2016

The number of active Iowa dentists who worked part-time ranged from 167 (2005) to 275 (2015). For female dentists the number who worked part-time ranged from 35 (1997 and 1998) to 101 (2015). Among males the number who worked part-time ranged from 119 (2008) to 174 (2015).

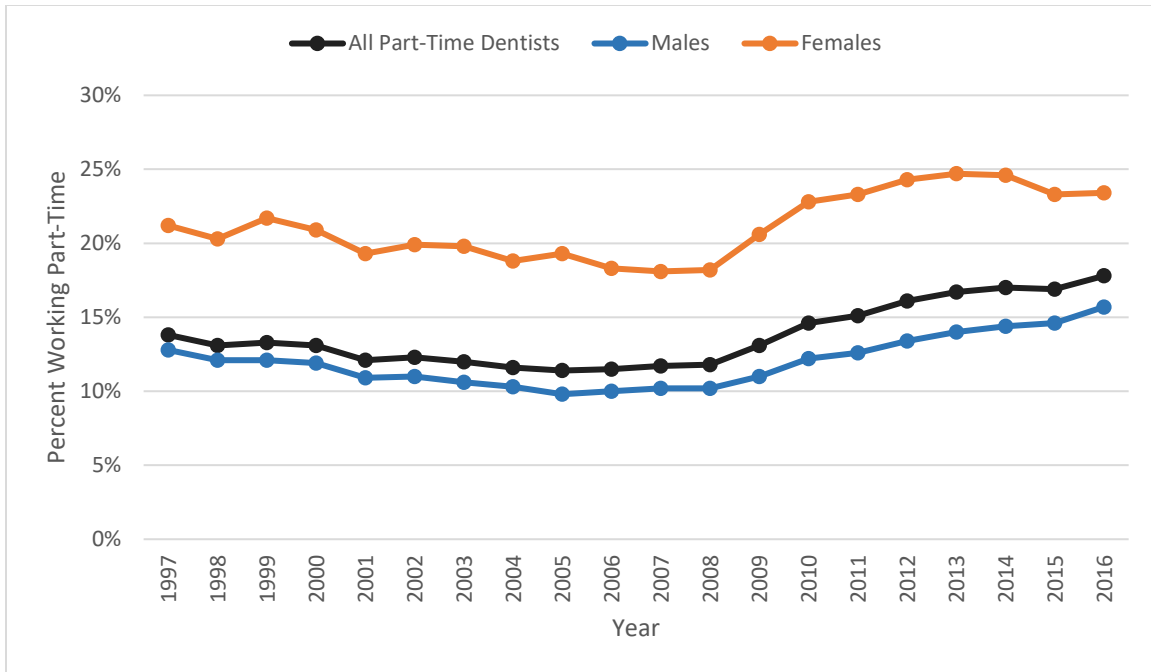


Figure 1177. Percent of active Iowa dentists who work part-time, by sex, 1997-2016

The percent of all active Iowa dentists who worked part-time ranged from 11.5% (2005) to 17.8% (2016). The percent of female dentists who work part-time exceeded their male counterparts for each of the 20 years. The percent of females who worked part-time ranged from 18.1% (2007) to 24.7% (2013), whereas, the percent of males who worked part-time ranged from 9.8% (2005) to 15.7% (2016).

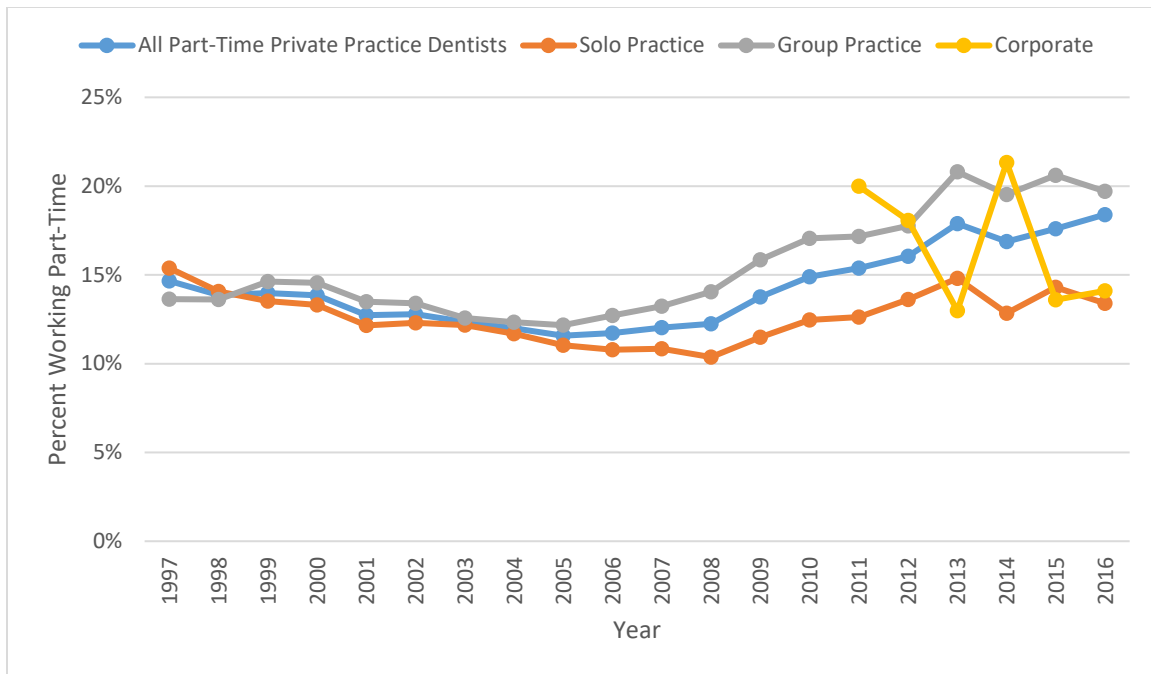


Figure 1188. Percent of private practice Iowa dentists working part-time, by practice arrangement, 1997-2016

Among all practice types, the percent who worked part-time ranged from a low of 12% (2005) to a high of 18% (2016).

Those in group practice tended to have a higher percentage who worked part-time versus those in solo practice, especially after 2005. The percent of group practice dentists who worked part-time ranged from 12% (2005) to 21% (2013 and 2015) and the percent of solo practitioners who worked part-time ranged from 10% (2008) to 15% (2013). The percent for corporate practice is somewhat erratic due to the relatively lower number of practitioners in that category.

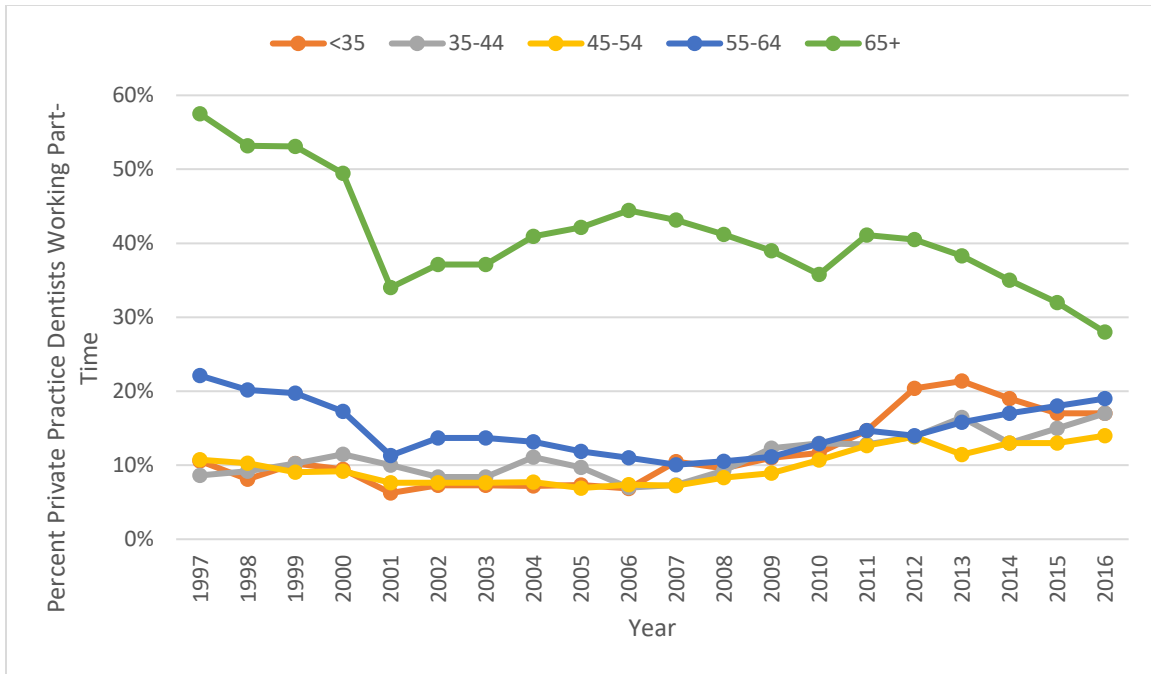


Figure 11919. Percent of private practice Iowa dentists working part-time, by age group, 1997-2016

Those dentists who were 65 years of age and older consistently had the highest percent who worked part-time, ranging from 28% (2016) to 58% (1997). Please note that for this time period almost all dentists in the 65 and older age group were male.

During the period from 2006 to 2016 there was an uptick in the percent of dentists less than 65 years of age who worked part-time; however, the greatest increase was among those less than 35 years of age.

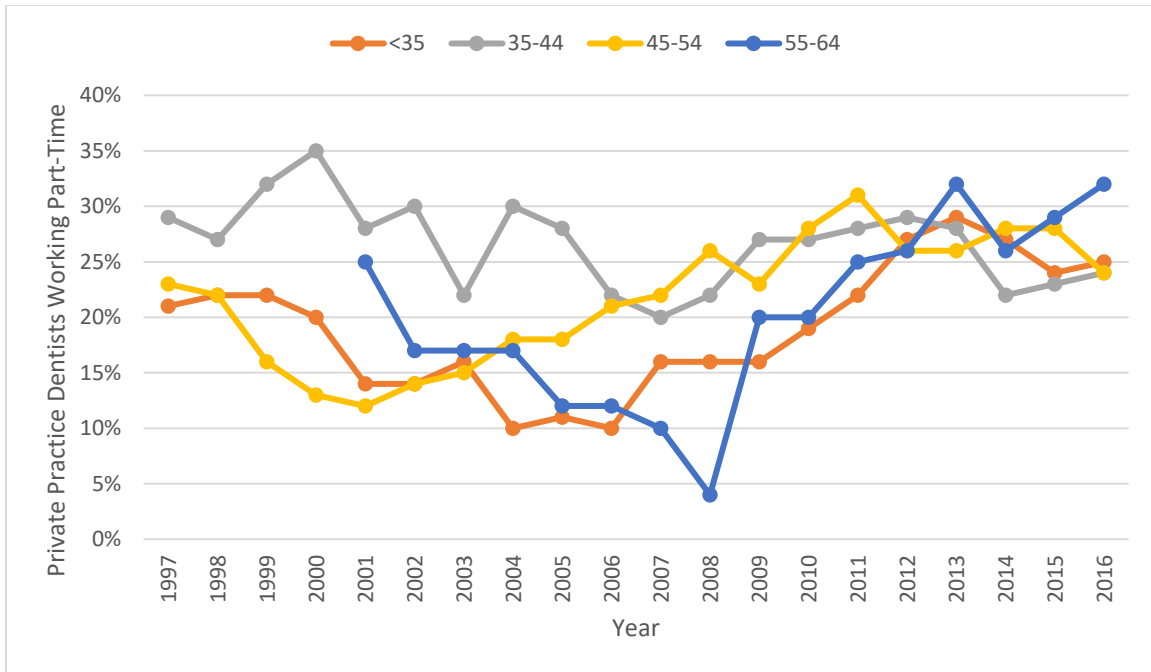


Figure 1200. Female private practice dentists who work part-time, by age category, 1997-2016

For the age groups less than 35 years of age and those 45 through 54, there was an initial decline in the percent of female private practice dentists who worked part-time, followed by an increase in the mid-2000s. For those 55 years and older, a downturn occurred from 2001 through 2008, followed by a rapid rise in the percent who worked part-time.

Prior to 2001 there were no Iowa female dentists older than 54 years of age. We do not display the 65 year and older category because it contained less than 10 female dentists over this time period.

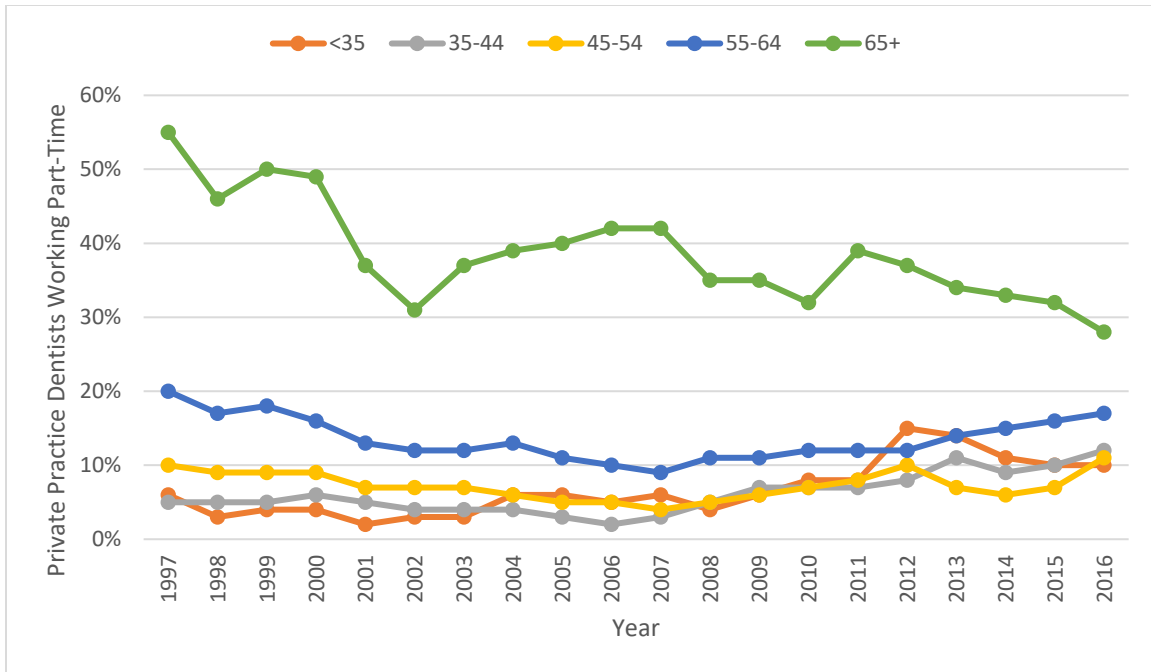


Figure 1211. Male private practice dentists who work part-time, by age category, 1997-2016

The percent of private practice dentists 65 years of age and older who work part-time has trended downward during these 20 years, from a high of 55% in 1997 to a low of 28% in 2016. The percent of private practice dentists who worked part-time increased for both age groups less than 45 years of age.

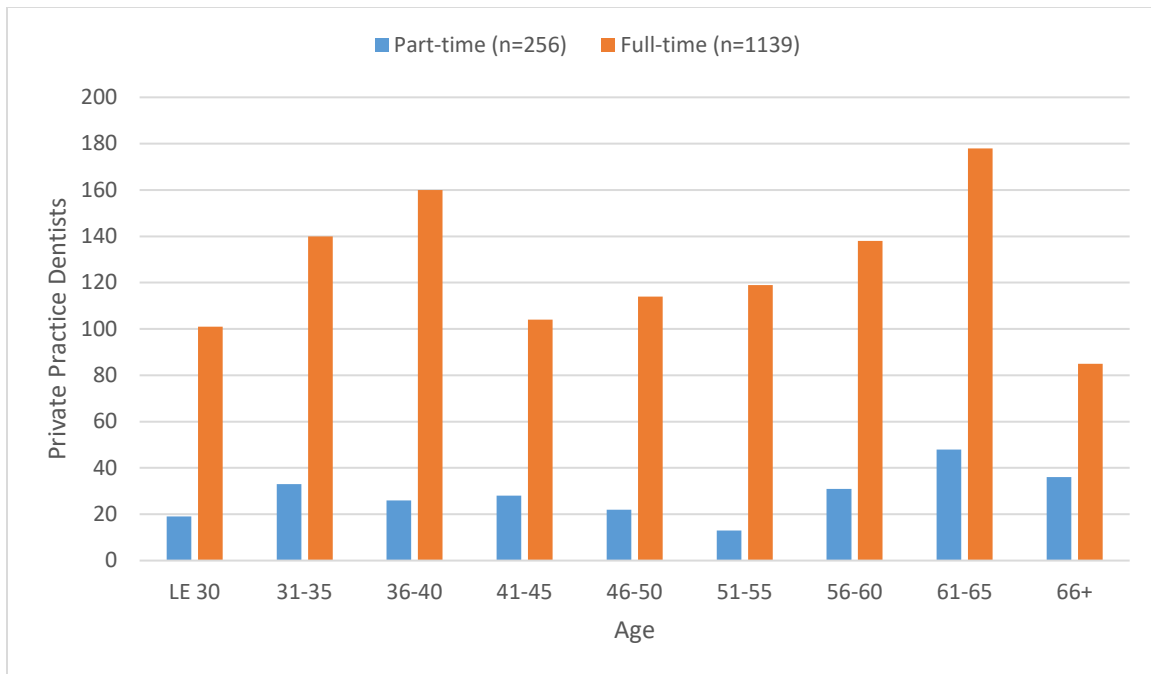


Figure 1222. Age of private practice Iowa dentists, by full- versus part-time status, 2016 (N=1395)

In 2016, 42% of dentists over age 65 worked part-time. The age group with the lowest percent who worked part-time (7.1%) was between 51 and 55 years.

Mean age for those who worked full-time was 48.2. The mean age for those who worked part-time was 50.6 years.

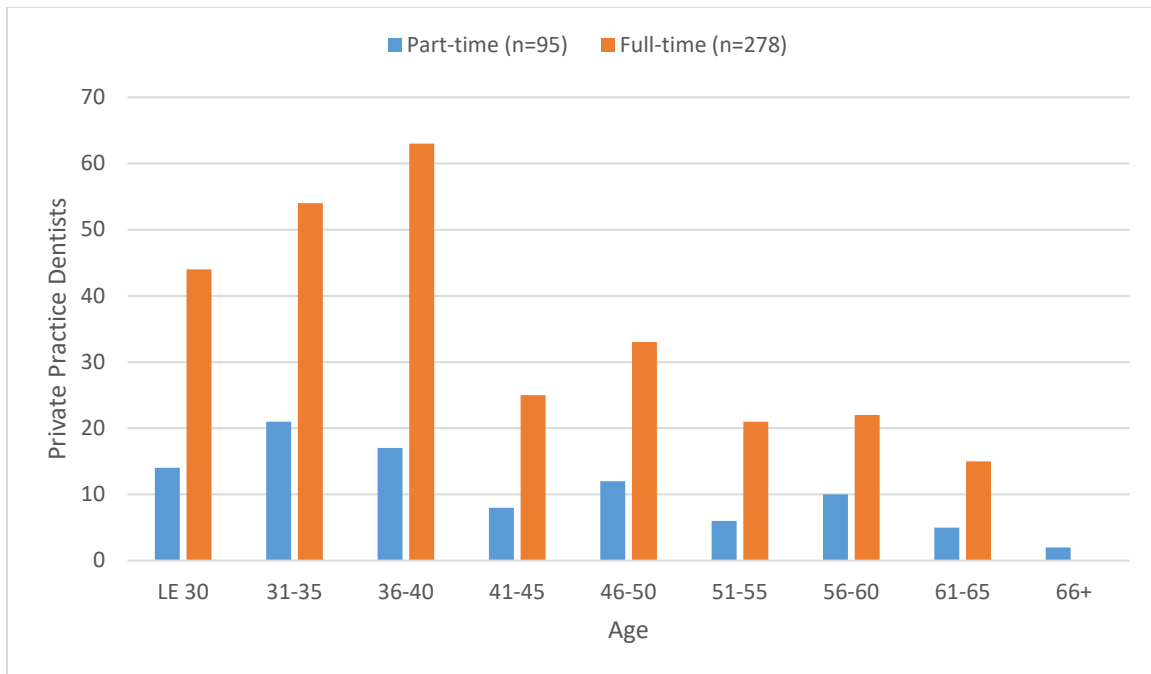


Figure 1233. Age of female private practice Iowa dentists, by full- versus part-time status, 2016 (N=373)

In 2016, at least 25% of each age group of female private practice dentists worked part-time. The lowest part-time percentage was 27% for the age group 36-40 years and the highest (besides the 66+ age group) was for those 55-60 years at 45.5%.

The mean and median ages for female dentists who worked full-time were 41.4 and 42 years, respectively. Among part-time female dentists the mean and median ages were 39 and 40 years, respectively.

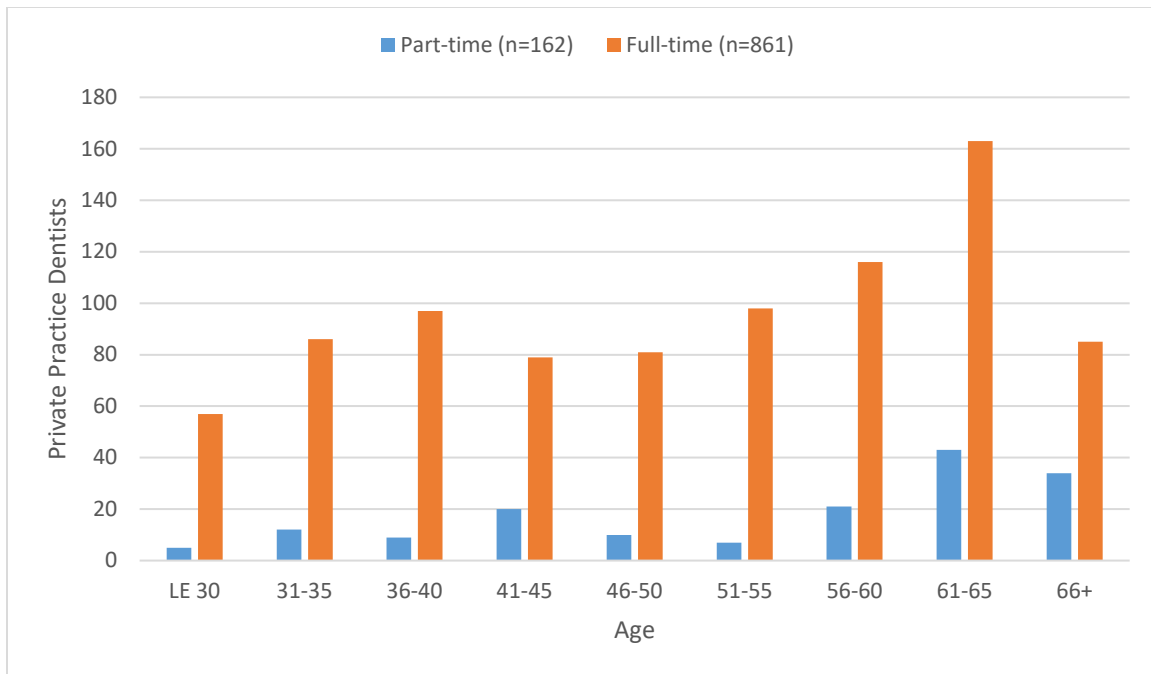


Figure 1244. Age of male private practice Iowa dentists, by full- versus part-time status, 2016 (N=1,023)

In 2016, the age group with the lowest percentage of part-time male dentists was 51-55 years (7.1%). Conversely, the highest percentage (40.0%) was for those 66 years and older. Interestingly, one-quarter of the 41- to 45-year-old age group worked part-time.

The mean and median ages for male dentists who worked full-time were 50.4 and 52 years, respectively. Among part-time male dentists the mean and median ages were 55.1 and 59 years, respectively.

Population-to-Dentist Ratios

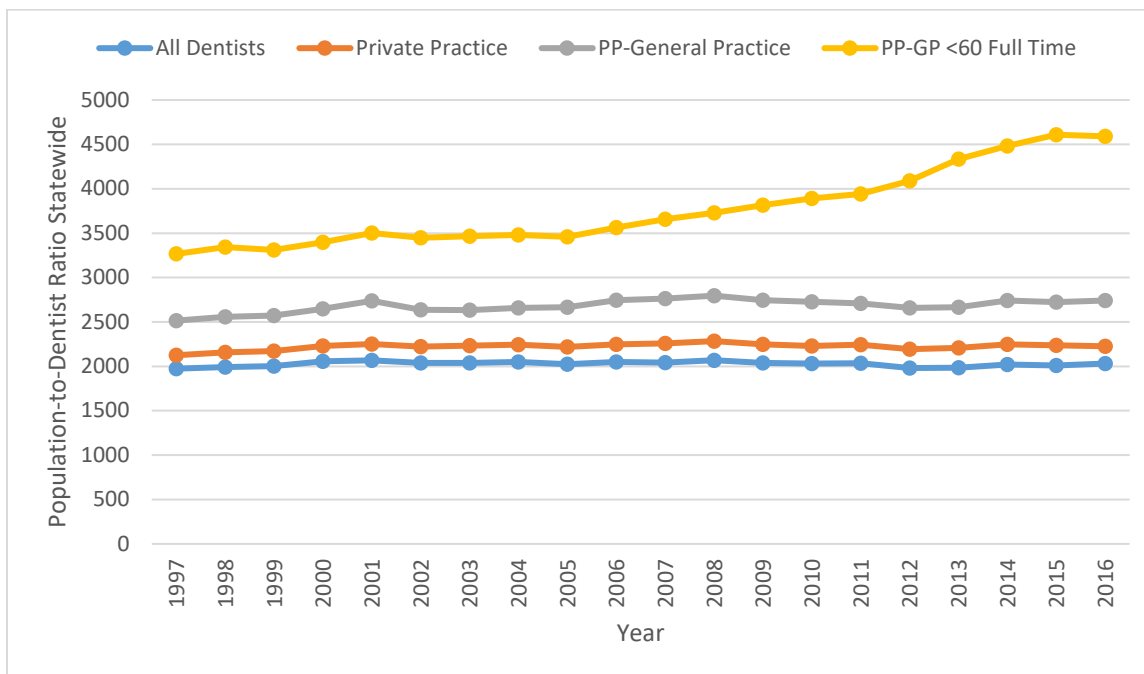


Figure 1255. Population-to-dentist ratios across dentist categories

The population-to-dentist ratio is found using the estimated total population for Iowa (based on US Census Bureau for the respective year), which is divided by the total number of dentists in the state. The ratio is the resulting number to 1 dentist. Thus, a population-to-dentist ratio of 2,020:1 reflects that there is one dentist for every 2,020 individuals in the state. It does not account for the distribution of either the population or the dentists in the state, and it includes all active dentists regardless of their specialty and number of hours worked weekly.

Thus, although the population-to-total dentist ratio is 2,031:1 in 2016, that number increases with each of the following additional criteria.

Population-to-private practice dentist: 2,227:1

Population-to-private practice general dentist: 2,742:1

Population-to-private practice general dentist who is 60 years or less and who works full-time: 4,590:1

Population-to-dentist ratios can be somewhat deceiving because most people incorrectly think that all active dentists are in private practice. However, even if a dentist is in private practice, he or she may not be working either a “normal” business week or at peak efficiency. What follows is an explanation of this ratio for 2016 using various criteria.

There were 1,530 active dentists during that year, which would translate to a population-to-dentist ratio of 2,031:1 using US Census population estimates. Parenthetically, you might see this written as the number of dentists per a selected population size (e.g., 4.9 dentists per 10,000 population).

However, 135 active dentists were either in education (e.g., faculty at the University of Iowa College of Dentistry), research, or an administrative position in government or a non-profit organization. This leaves 1,395 active dentists whose primary function is to provide clinical dental services on a daily basis. Thus, the population-to-dentist ratio for all private practitioners in the state in 2016 was 2,227:1.

However, not all private practitioners were general dentists. In 2016, there were 262 private practice dental specialists who limited their practice to a specific area of expertise (e.g., orthodontics, oral and maxillo-facial surgery). Eliminating private practice dental specialists leaves 1,133 general dentists who were in private practice in Iowa. Now, the population-to-dentist ratio for general dentists in private practice was 2,742:1.

Studies indicate that dentists 60 years and older, even when they work full-time, are not as productive as their younger colleagues. Dentists also vary in the number of hours they work. Although there is no uniformly accepted definition of what constitutes “full-time”, the Iowa Dentist Tracking System defines 32 or more hours of work per week as full-time. Calculating the number of private practice general dentists who were less than 60 years of age and worked 32 hours or more per week leaves 677 Iowa dentists. In 2016, the population-to-dentist ratio for this final group was 4,590:1.

As demonstrated, the population-to-dentist ratio ranges dramatically depending on which groups of dentists are included in the calculation.

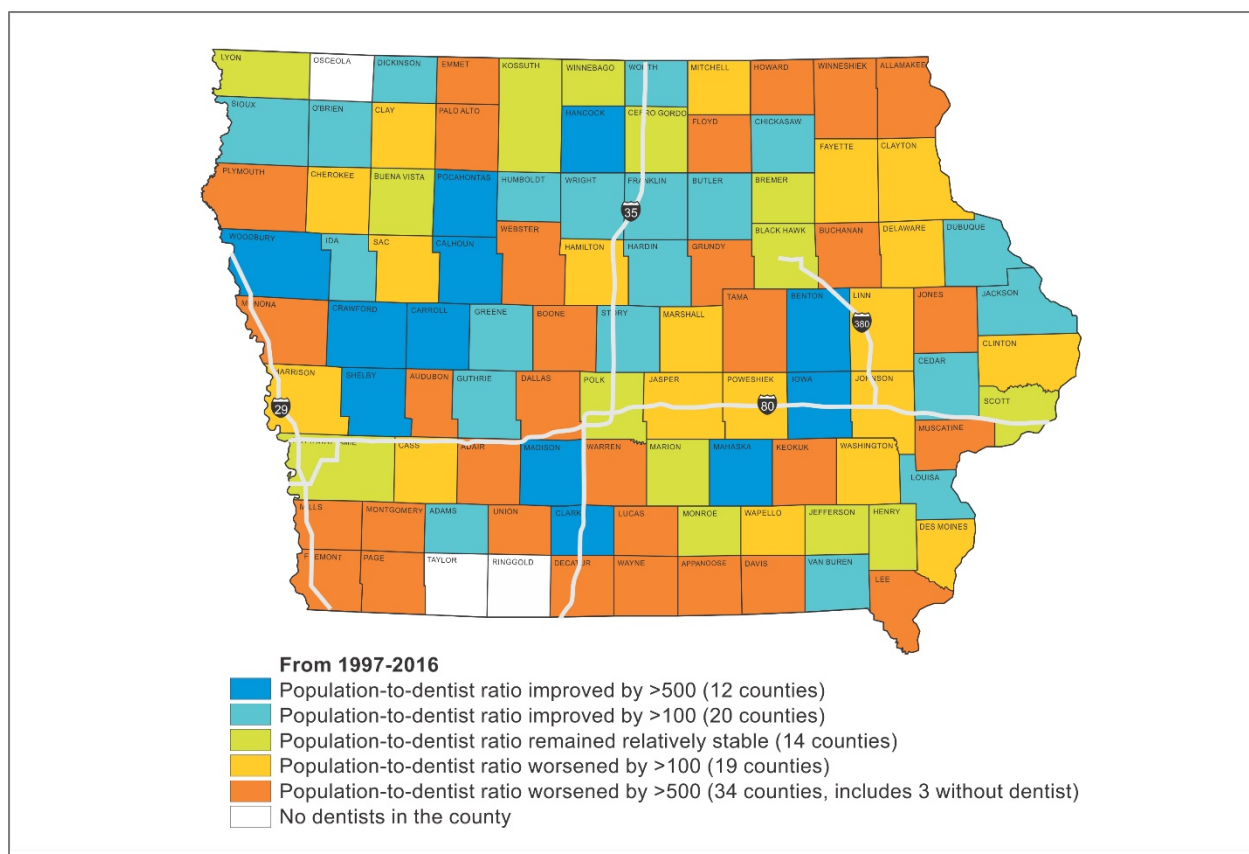


Figure 1266. Iowa population-to-dentist ratio changes, by county, 1997-2016

Although the statewide population-to-dentist ratio remained relatively stable from 1997 to 2016 (i.e., slightly greater than 2,000:1), there have been some major changes in several counties.

In 2016, only Johnson County, where the University of Iowa is located, had a population-to-dentist ratio less than 1,000:1. There were an additional 19 counties that had a range between 1,001 and 2,000:1. Conversely, 18 counties were between 3,001 and 4,000:1, 10 counties between 4,001 and 5,000:1 and 13 greater than 5,000:1, including 3 (Osceola, Ringgold, and Taylor) where there were no dentists.

Surprisingly, there were 4 counties (Benton, Butler, Van Buren, and Worth) that had greater than 4,000:1 ratio but had improved this ratio by more than 100 since 1997.

Conversely, 5 counties (Johnson, Clay, Linn, Clinton, and Page) with population-to-dentist ratios of less than 2,000:1 had a decrease of more than 100 in the ratio since 1997. Page County (in southwest Iowa) was the sole county to decline by more than 500 in its population-to-dentist ratio since 1997.

Table 7. County population-to-dentist (all active) ratios for 1997, 2006, and 2016, listed from lowest to highest for 2016

Area	1997 Ratio	2006 Ratio	2016 Ratio	Change in Population-to-Dentist Ratio
State of Iowa	1,974	2,029	2,031	57
Johnson	728	756	955	227
Winnebago	1,340	1,368	1,320	-20
Dubuque	1,800	1,523	1,417	-383
Pocahontas	2,208	1,910	1,428	-781
Polk	1,657	1,705	1,625	-32
Clay	1,466	1,394	1,652	185
Cerro Gordo	1,654	1,694	1,664	10
Henry	1,652	2,010	1,685	33
Dickinson	2,006	2,078	1,694	-313
Scott	1,643	1,568	1,697	54
Woodbury	2,264	1,914	1,763	-500
Linn	1,607	1,729	1,800	193
Wright	2,019	4,396	1,834	-185
Clarke	4,115	4,537	1,843	-2,271
Clinton	1,728	2,142	1,848	121
Carroll	2,403	2,307	1,869	-533
Page	1,238	1,604	1,937	699
Adams	2,204	4,141	1,938	-266
Black Hawk	2,023	1,947	1,984	-39
Shelby	2,615	2,461	1,991	-623
Iowa	3,864	3,186	2,047	-1,817
Buena Vista	1,964	3,267	2,058	94
Pottawattamie	2,031	2,292	2,070	38
Winneshiek	1,488	1,732	2,077	589
Hamilton	2,005	2,622	2,160	155
Jackson	2,510	2,855	2,165	-345
Jefferson	2,133	1,936	2,166	33
Sioux	2,608	3,568	2,168	-440
Kossuth	2,238	1,958	2,175	-64
Wapello	1,971	1,982	2,201	229
Hancock	3,003	1,914	2,205	-797
Marion	2,222	2,189	2,224	2
Des Moines	2,005	1,926	2,236	232
Story	2,497	2,385	2,240	-258

Area	1997 Ratio	2006 Ratio	2016 Ratio	Change in Population-to-Dentist Ratio
Bremer	2,330	2,615	2,247	-83
Cedar	2,570	2,571	2,301	-269
Webster	1,488	1,752	2,310	822
Poweshiek	2,104	2,068	2,334	230
O'Brien	2,497	2,838	2,343	-154
Harrison	2,184	3,108	2,387	203
Marshall	1,939	2,592	2,404	465
Humboldt	2,591	2,441	2,410	-181
Crawford	3,293	4,122	2,461	-832
Hardin	2,642	2,205	2,473	-169
Franklin	2,727	2,644	2,609	-118
Floyd	2,062	2,334	2,680	618
Cass	2,458	1,987	2,690	232
Mitchell	2,216	2,161	2,695	479
Washington	2,611	2,638	2,759	148
Jasper	2,556	2,449	2,836	281
Delaware	2,635	2,927	2,900	265
Fayette	2,739	2,588	2,906	168
Lyon	2,992	2,833	2,921	-71
Jones	2,261	2,258	2,922	661
Clayton	2,685	2,963	2,949	264
Cherokee	2,673	3,930	2,959	286
Mills	2,390	2,523	2,966	576
Monona	2,028	3,074	2,999	971
Chickasaw	3,357	3,067	3,066	-291
Greene	3,361	3,189	3,067	-294
Plymouth	2,469	2,446	3,109	640
Madison	4,580	5,065	3,122	-1,458
Union	2,500	2,998	3,129	629
Lee	2,417	2,400	3,208	791
Calhoun	3,829	3,367	3,289	-541
Muscatine	2,406	3,016	3,300	894
Emmet	2,740	2,593	3,330	590
Sac	2,979	3,491	3,345	366
Warren	2,842	3,120	3,425	584
Montgomery	2,370	2,784	3,474	1,104
Allamakee	2,001	2,888	3,510	1,509
Ida	4,008	1,755	3,521	-487
Guthrie	3,825	5,547	3,574	-251

Area	1997 Ratio	2006 Ratio	2016 Ratio	Change in Population-to-Dentist Ratio
Louisa	3,965	3,934	3,720	-244
Mahaska	4,362	3,673	3,728	-634
Dallas	3,253	4,963	3,870	617
Monroe	4,041	3,822	4,001	-41
Decatur	2,717	4,186	4,132	1,415
Buchanan	3,527	7,653	4,208	681
Appanoose	3,377	3,290	4,220	843
Benton	4,997	5,314	4,280	-717
Lucas	3,037	4,745	4,351	1,314
Tama	3,536	3,560	4,363	827
Davis	2,820	8,530	4,391	1,571
Boone	3,272	3,749	4,406	1,133
Howard	2,424	9,510	4,725	2,301
Keokuk	3,832	5,364	5,116	1,284
Audubon	2,276	6,179	5,794	3,518
Grundy	4,099	4,076	6,188	2,089
Wayne	3,388	No Dentist	6,395	3,008
Fremont	3,903	7,549	7,022	3,119
Adair	4,073	3,839	7,454	3,381
Van Buren	7,824	7,640	7,468	-356
Butler	7,862	7,316	7,503	-359
Worth	7,772	3,809	7,624	-148
Palo Alto	3,360	No Dentist	9,099	5,739
Taylor	3,561	2,180	No Dentist	Indeterminable
Osceola	3,526	3,286	No Dentist	Indeterminable
Ringgold	5,366	5,101	No Dentist	Indeterminable

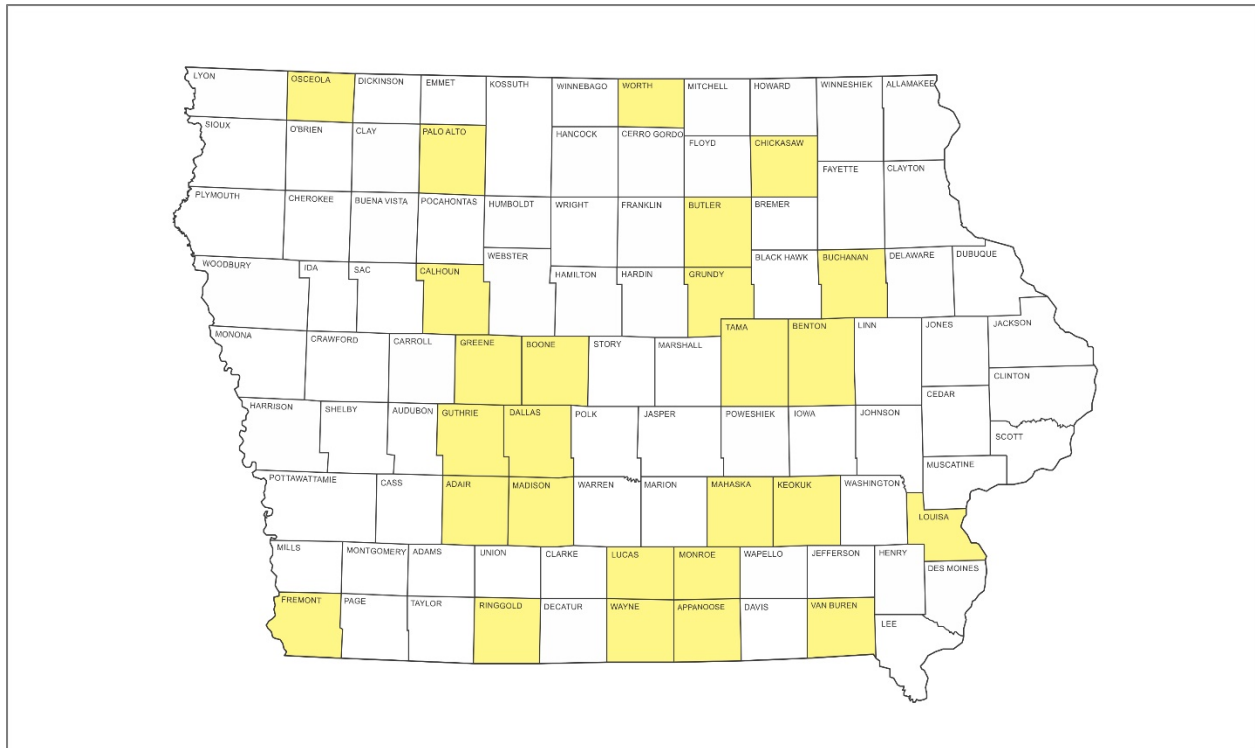


Figure 1277. Counties where the population-to-dentist ratio was greater than 3,000:1 in 1997, 2006, and 2016

Twenty-six counties had a greater than 3,000:1 ratio for each of the sentinel years. Although Dallas County is among this group, it is anticipated that recent economic development, along with its proximity to Polk County, should attract more dentists to this area in the future.

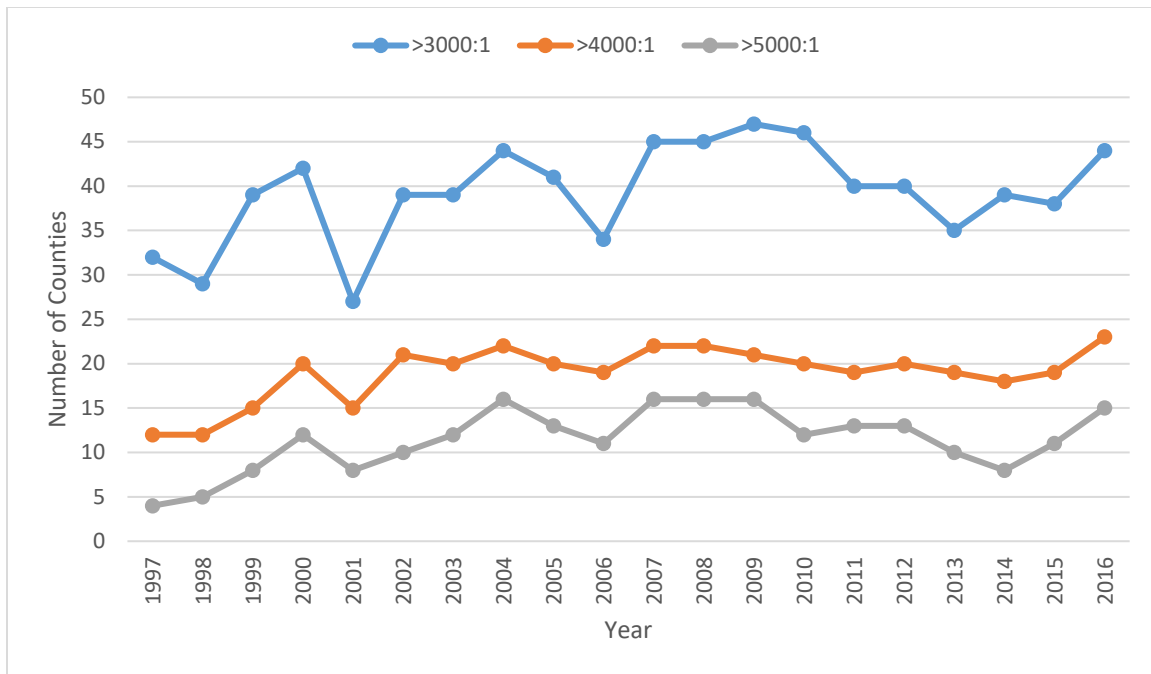


Figure 1288. Number of Iowa counties with greater than 3,000:1 population-to-dentist ratios, 1997-2016 (99 Iowa counties)

This figure presents the number of Iowa counties that have greater than 3,000, 4,000, and 5,000:1 population-to-dentist ratios. The number of counties with a population-to-dentist ratio greater than 3,000:1 ranged from a low of 27 (2001) to a high of 47 (2009). Similarly, the number of counties with a greater than 4,000:1 population-to-dentist ratio ranged from a low of 12 (1997 and 1998) to a high of 23 (2016). Lastly, the number of counties with greater than 5,000:1 population-to-dentist ratio ranged from a low of 4 (1997) to a high of 16 (2004, 2007, 2008, and 2009).

The number of counties with a greater than 3,000:1 population-to-dentist ratio includes both larger categories (i.e., 4,000:1 and 5,000:1). Likewise, the line representing the number of counties with a greater than 4,000:1 population-to-dentist ratio also includes those counties that had a population-to-dentist ratio of greater than 5,000:1.