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Iowa. Population

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Iowa's Population Prospect

By P. K. WHELFTON

AGRICULTURAL EXPERIMENT STATION
IOWA STATE COLLEGE OF AGRICULTURE
AND MECHANIC ARTS

R. E. BUCHANAN, Director

AGRICULTURAL ECONOMICS SECTION
(Rural Sociology)



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CONTENTS

Foreword	116
Births and birth rates	118
Causes of the decline in birth rates	129
Future birth rates	139
Deaths and death rates	141
Natural increase	154
Interstate migration	155
Future population of Iowa	161
Changes in age	165
Planning for the future	167

FOREWORD

A STATE can be no greater than its people. In an agricultural state such as Iowa where the importance of soil conservation and land utilization programs is recognized and where pathological social problems are relatively few, population adjustments are usually taken for granted. In agriculture, however, the union between land and people is closest. Farmers should be most appreciative of the slogan, "Under all, the land, but on the land, the people."

Fundamental long time adjustments are taking place not only in business, industry and agriculture, but also in the number of population. People in Iowa and in the United States are engaged in an unplanned population adjustment program characterized by a continued reduction in the number of births, increase in the length of life and movement of population from place to place. The rural birth rate is higher than the city rate. Rural people are maintaining the population of Iowa; Iowa cities would decrease in population were it not for the incoming rural young people who bolster up the lower city birth rate.

Realizing the importance of population changes for Iowa, Mr. P. K. Whelpton of the Scripps Foundation for Research in Population Problems was secured to analyze the various factors affecting Iowa population and to forecast the probable population of the state 50 years hence. That Iowa in 1980 will not have 3,000,000 population and may actually have a slightly smaller population than at present is one of his challenging conclusions.

Business and professional men, manufacturers, workers and farmers must consider necessary adjustments to this situation. Obviously, schools will have proportionally fewer children to educate and old age dependency will increase. Expansion will cease to be a virtue; people will move less frequently and less emphasis upon numbers will open the way for a belated consideration of population quality. Towns and villages, no longer prospective cities, will of necessity foster closer cooperation with farming people.

Farmers with no expanding markets will turn to a more stabilized system of farming, and conservation measures will be commonly accepted. Such changes demand careful planning but they do not imply stagnation. Rather, with stabilized population, effective plans can be made with added assurance of fulfillment.

Ray E. Wakeley,

AGRICULTURAL ECONOMICS SECTION (Rural Sociology).

Iowa's Population Prospect¹

By P. K. WHELPTON

(Scripps Foundation for Research in Population Problems)

The first federal census of Iowa, taken in 1840, showed a population of 43,112 persons. Forty years later the population was nearly 40 times as large, amounting to 1,624,615. Had this rate of growth been maintained to 1930, Iowa would have had 151,700,000 inhabitants, which is one-fourth more than the 1930 census count of 122,775,000 for the entire United States. But the rapid gains that were occurring in Iowa while the fertile farm land was being settled could not be expected to continue after this process was well advanced, unless the state had been blessed with much greater mineral wealth or advantages of location than it possesses.

In the last 50 years, growth in population has progressed at a much slower rate than formerly, the 1930 population of 2,470,939 being about 1.5 times as large as that of 1880. Most of this gain of 846,324 persons took place between 1880 and 1900, for there was a small decline in numbers from 1900 to 1905, and a rise of only about 261,000 from 1905 to 1930.

Such a slowing up of population growth during recent decades is not peculiar to Iowa; it has occurred in several other states as well. From 1880 to 1930 the population of the United States increased by 145 percent, and that of 18 states by over 200 percent; the increase in Maine, New Hampshire, Vermont, Indiana and Iowa, however, was less than 65 percent. Contrasting 1930 with 1910 the 11 percent gain in number of inhabitants in Iowa is similar to that in Maine, New Hampshire, Missouri, Kansas, Georgia, Kentucky and Nevada.

But what is going to occur in Iowa during the next 50 years? In some states a period of slow growth in the past has been followed by one of rapid expansion. Will this be the case in Iowa, so that the 1980 population will exceed that of today by 500,000 or 1,000,000? Or will growth slow up more rapidly so that a high point will soon be reached, perhaps 50,000 larger than the present population, and a decline then ensue? To know the answer to these questions would be worth much individually to many citizens of the state, and should be basic in the preparation of a planned program for developing Iowa's various activities and interests. An examination of the curve of population

¹Project No. 357 of the Iowa Agricultural Experiment Station. Much of the statistical material for the United States and of the discussion of general causes of the decline in the birth rate is taken from Warren S. Thompson and P. K. Whelpton, "Population Trends in the United States," Monograph in Social Trends Series, New York, McGraw-Hill Book Company, Inc., 1932. Permission to use this material is gratefully acknowledged.

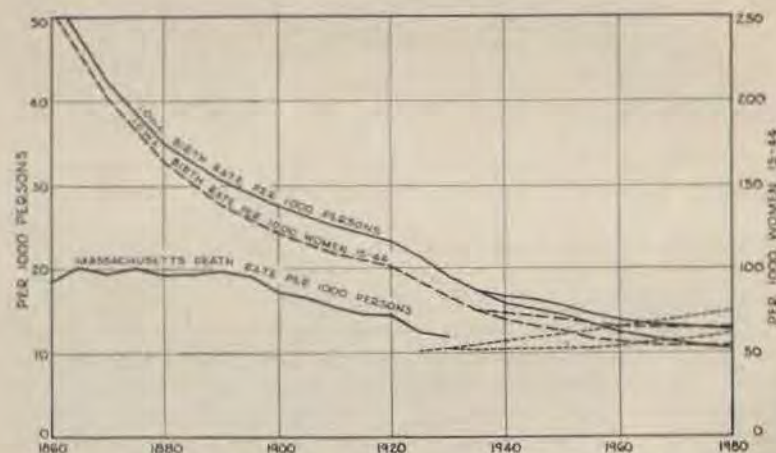


Fig. 1. Birth and death rates, Iowa and Massachusetts, with estimates for Iowa to 1980. (See table 1.)

during past decades indicates that growth will cease gradually. (See fig. 4.) To form a more exact opinion it is desirable to study changes that have been taking place in the factors which have directly governed population increase in the past, namely birth rates, death rates and migration.

BIRTHS AND BIRTH RATES

Although Iowa was not admitted to the Federal Birth Registration Area until 1924, it is possible to estimate the trend of births and birth rates fairly accurately as far back as 1840 by means of the number of children under 5 years of age enumerated in each census. In the pioneer Iowa population of 1840 the birth rate was far higher than at present. It was then about 92 per 1,000 persons, or 474 per 1,000 women of the ages 15-44, which includes practically the entire childbearing period. This high birth rate means that Iowa women of these ages bore a child every 25 months on the average. Because some women were single and some married couples were sterile, the interval between births to fertile couples was somewhat under 2 years. These high birth rates were only temporary, however, for from 1840 to 1933 they have experienced a very large and almost uninterrupted drop. (See table 1 and fig. 1) From 1840 to 1850 the rate per 1,000 women 15-44 declined over one-fifth, from 1850 to 1860 the decline was almost one-third, and during each of the next two decades it was again about one-fifth. By 1880, then, the rate had fallen to 163 per 1,000 women as compared with 474 in 1840, a decline of almost two-thirds in 40 years. After 1880

the downward pace slowed up rapidly, so that from 1910 to 1920 the decline was scarcely 7 percent. The 1920 rate of 101 was almost two-thirds the 1880 rate of 163, the decline in this 40-year period being at a pace only about half as rapid as in the preceding 40 years. During the last decade, however, the decrease has been accelerated, amounting to almost one-fifth, or at the same rate as in decades prior to 1880. The 1930 rate of 83 is only a little over one-sixth the 1840 rate of 474.

If birth rates for the United States could be computed back to an early date it is almost certain that declines could be found as large as those in Iowa from 1840 to 1850. But adequate records for the United States are not available for years before 1800, at which time the bulk of the population lived in areas that had been settled much longer than had Iowa in 1840. The birth rate per 1,000 white women 15-44 in the United States² was about 278 in 1800; by 1840 it had only declined one-fifth, to 222, but was less than half the Iowa rate of 474. (See table 1.) After 1840 the much more rapid fall of the Iowa rate brought the two together quickly; in 1890 the United States figure was 137 and that for Iowa 138. From 1890 to 1920 the decline continued somewhat more rapidly in Iowa than in the nation as a whole

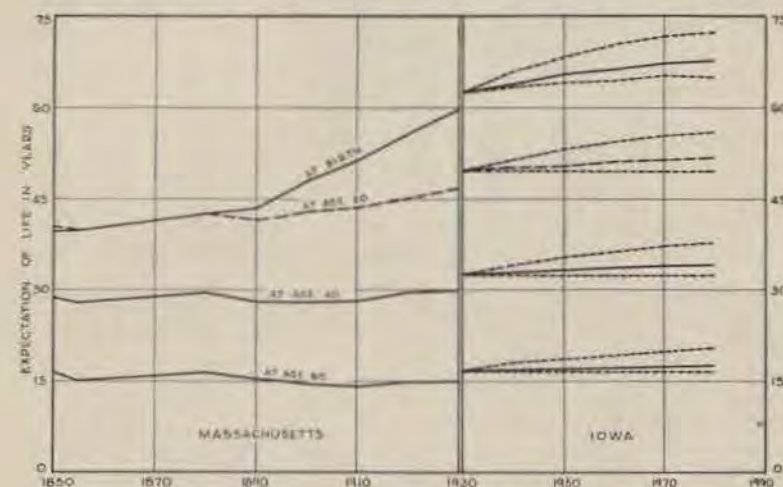


Fig. 2. Expectation of life at selected ages in Massachusetts, with estimates for Iowa to 1980. (See table 9.)

In 1920 white persons made up 99.1 percent of the total population in Iowa, hence the birth rates for the total population and the white population are practically identical. In the United States, however, 11.3 percent of the population was not white, hence the birth rate for the total population differs somewhat from that of the white group. For this reason the birth rate for the total population in Iowa is compared here with that for white persons in the United States, and other rates for these groups will be compared in following sections of this publication.

TABLE 1. RATIO OF CHILDREN TO WOMEN AND BIRTH RATES, IOWA AND UNITED STATES (WHITE POPULATION).

Year	Children 0-4 per 1,000 women 15-44		Estimated birth rate			
			Per 1,000 persons		Per 1,000 women 15-44	
	Iowa*	U. S.** (White)	Iowa***	U. S.** (White)	Iowa***	U. S.** (White)
1800		990		55.0		278
1810		991		54.3		274
1820		941		52.8		260
1830		868		51.4		240
1840	1,048	829	91.7	48.3	474	222
1850	962	685	76.9	43.3	376	194
1860	915	702	53.4	41.4	256	184
1870	787	634	42.1	38.3	201	167
1880	681	609	35.0	35.2	162	155
1890	571	538	30.5	31.5	138	137
1900	541	528	27.4	30.1	121	130
1910	478	503	25.2	27.4	109	117
1920	472	490	23.2	26.1	101	113
1930	418	402	19.0	20.1	83	87

Future as Calculated for Iowa:

Year	Children 0-4 per 1,000 women 15-44			Estimated birth rate					
				Per 1,000 persons			Per 1,000 women 15-44		
	Low†	Med- ium††	High‡	Low†	Med- ium††	High‡	Low†	Med- ium††	High‡
1935	354	357	357	17.3	17.4	17.4	76	76	76
1940	328	344	364	16.0	16.9	17.9	70	74	79
1945	316	340	371	15.3	16.4	18.2	66	72	80
1950	306	337	376	14.5	15.7	17.8	63	70	79
1955	292	329	371	13.4	14.8	17.0	58	67	78
1960	279	321	363	12.5	14.0	16.2	56	66	77
1965	270	318	360	11.8	13.5	15.7	55	66	77
1970	268	328	366	11.3	13.2	15.4	54	66	77
1975	268	327	371	10.9	13.0	15.2	54	66	77
1980	267	325	370	10.6	12.8	15.1	54	66	77

*From 1840 to 1930 children 0-4 are from current census reports increased by 4 percent to allow for underenumeration. This percentage is based on studies of the Scripps Foundation for Research in Population Problems for recent censuses, but is probably too low for earlier censuses.

**From "Population Trends in the United States," p. 263, increased by 4 percent to allow for underenumeration of children 0-4.

***Birth rates for 1840 to 1920 are 10-year averages centering on year specified. Births are estimated from children 0-4 in current census reports increased by 4 percent to allow for underenumeration, and with allowance for deaths based on mortality rates in table 8. Rate for 1930 is average of 1928-32 based on births registered increased by 12 percent to allow for those not registered.

†Based on the future population in which the expectation of life increases from 62.7 in 1930 to 67.7 in 1980, specific birth rates decline 33 percent from 1930 to 1980, and net migration from the state amounts to 75 percent of the excess of births over deaths in each 5-year period as was approximately the case from 1920 to 1930.

††Based on the future population in which the expectation of life increases from 62.7 in 1930 to 72.7 in 1980, specific birth rates decline 20 percent from 1930 to 1980, and net migration from the state amounts to 25 percent of the excess of births over deaths.

‡Same expectation of life and migration as in "Medium," but 1930-34 specific birth rates continued without a decrease. The fluctuations in birth rates per 1,000 persons and per 1,000 women 15-44 are due to changes in age composition; the fluctuations in children per 1,000 women 15-44 are also due to this factor and to the decline in infant and child mortality.

(the 1920 rate for Iowa being 101 compared with 113 for the United States). But in the last decade the national rate has fallen faster, its value of 87 in 1930 being little above that of 83 for Iowa. It is altogether probable that birth rates will be similar in Iowa and the United States during the next few decades, so that changes which are likely to occur in these rates will have the same effect on population growth in one case as in the other.

In both Iowa and the United States the decline in the birth rate per 1,000 women 15-44 has been associated with an increase in urbanization and industrialization. This can be shown for white women in the United States from early censuses down to 1930 by using the ratio of children under 5 to women 15-44. The downward trend of this ratio has been less rapid than that of births to women 15-44 because of the decline in the death rate of children under 5. (See table 8, p. 142.) But in any given census year the differentials in this ratio between communities represent chiefly differentials in birth rates, although some allowance should be made for higher death rates in urban than in rural areas. In 1820 the ratio of children under 5 to women 15-44 was 975 for the rural population, which was 54 percent above the ratio of large cities as a group. (See table 2.) In 1840 the rural ratio was 875, or 57 percent above that of the large city

TABLE 2. RATIO OF CHILDREN TO WOMEN BY SIZE OF COMMUNITY, IOWA AND UNITED STATES.

Size of community	Children under 5 per 1,000 women 15-44*						
	1820	1840	1890	1900	1910	1920	1930
Iowa, total			571	541	478	472	413
Cities of 25,000 and over			432	384	344	352	329
Cities of 2,500 to 25,000			584	561	550	572	536
Rural communities					547	544	475
United States, white**	941	829	528	528	503	490	402
Cities of 25,000 and over	634	559	424	421	385	393	312
Cities of 2,500 to 25,000	688	585	581	584	424	442	371
Rural communities	975	875			625	604	524
Ratio in cities of 25,000 and over equal 100 percent							
Iowa, total			182	141	139	134	126
Cities of 25,000 and over			100	100	100	100	100
Cities of 2,500 to 25,000			135	146	132	136	102
Rural communities					159	155	144
United States, white**	149	148	127	125	131	125	129
Cities of 25,000 and over	100	100	100	100	100	100	100
Cities of 2,500 to 25,000	109	105	137	139	110	112	119
Rural communities	154	157			162	154	168

*Iowa data compiled from current census reports. United States data from tabulations made for "Population Trends in the United States," table 78. An allowance of 4 percent is made for underenumeration of children. Data on age by size of community were not published in the census reports for 1850 to 1880, inclusive, nor for places of less than 25,000 in 1890 and 1900.

**Includes Mexicans prior to 1930 in accordance with current census classification.

group. The rural ratio in these years was similar to the ratio for the entire population since the proportion of persons living in cities was small. Ratios for rural communities and for cities of different sizes cannot be calculated for census years between 1840 and 1890, nor can rural communities be separated from places of 2,500 to 25,000 in 1890 and 1900. In 1910, 1920 and 1930 the differentials between rural communities and cities were similar to those in 1820 and 1840, the rural ratio being from 54 to 68 percent above that of the group of large cities. But by 1910 the proportion of persons living in cities had so increased that the ratio for the total population was about midway between the rural and urban ratios.

In Iowa, from 1890 to date, the ratio of children to women in places of less than 25,000 has been from 34 to 47 percent higher than the ratio in larger cities, and the rural ratio from 44 to 59 percent higher than the urban since 1910. (See table 2.) No doubt a similar situation would be found in earlier years if the relevant facts could be secured from the census. From 1890 to 1930 the proportion of Iowa's population living in cities of 25,000 or over increased steadily from 7.6 percent to 22.2 percent, and the proportion in rural communities decreased steadily from 78.8 percent to 60.4 percent. These changes in conjunction with the differences between rural and urban birth rates account for an important part of the decrease in birth rate for the entire state. (See table 1.)

Since 1910 a decrease in the proportion of foreign-born white women 15-44 has been a cause of the decrease in births per 1,000 white women 15-44 in both Iowa and the United States. If information about this matter were available for earlier censuses it is probable that a similar statement could be made for other periods. The census figures for Iowa show that the ratio of children to native white women has been well below the ratio to foreign-born white women in rural areas and in cities grouped by size. (See table 3.) In 1910 and 1920 the foreign-born ratios were from 65 to 90 percent higher than the native-born ratios in each size of community. In 1930 the differentials were smaller because of the restriction of immigration since the beginning of the World War and the consequent aging of the foreign-born women, but even so the foreign-born ratios were from 26 to 53 percent above the native ratios. These differentials coupled with the fact that the proportion of Iowa women 15-44 who were foreign-born decreased from 22.7 in 1870 to 3.5 in 1930 do much to explain why the birth rate in terms of all Iowa women 15-44 has been declining, as shown in table 1.

Greater significance may be given to differentials in birth rates between the nativity and size of community groups by comparing

the actual ratios of children to women with those necessary to maintain a stationary population. With death rates as they were in 1930 a ratio of about 356 children under 5 per 1,000 women 15-44 was necessary to maintain a stationary population.* This ratio no doubt is slightly low for cities as compared with rural areas and for foreign-born as compared with native-born whites, because of differences in death rates; nevertheless, comparisons based on it are significant. In none of the city groups were native white birth rates high enough in 1930 to maintain a stationary population, the largest deficit (65 children per 1,000 women) being found in the largest cities. (See table 3.) In contrast, birth rates for rural native whites not on farms were sufficiently high to provide a small surplus above maintenance (35 per 1,000) and for those on farms to

TABLE 3. CHILDREN UNDER 5 PER 1,000 WOMEN 15-44 BY RACE AND NATIVITY, BY SIZE OF COMMUNITY, IOWA.*

Size of community	1910			1920		
	Native white women	Foreign-born white women	Negro women	Native white women	Foreign-born white women	Negro women
Cities of 100,000 and over				313	592	309
Cities of 25,000-100,000	313	577	284	335	625	305
Cities of 10,000-25,000	328	560	286	354	672	318
Cities of 2,500-10,000	339	565	314	357	684	367
Rural-nonfarm	410	931	477	423	804	462
Rural-farm				477	954	497
Total urban	323	571	291	342	659	317
Total rural	310	931	477	522	904	416
Total Iowa	447	799	349	452	782	333
Size of community	1930			Surplus above requirements for stationary population, 1930**		
	Native white women	Foreign-born white women	Negro women	Native white women	Foreign-born white women	Negro women
Cities of 100,000 and over	281	445	357	-65	89	
Cities of 25,000-100,000	324	422	323	-22	66	
Cities of 10,000-25,000	334	491	364	-22	125	
Cities of 2,500-10,000	324	476	310	-32	120	
Rural-nonfarm	391	554	358	35	195	
Rural-farm	509	780	***	153	424	
Total urban	324	445	342	-32	89	
Total rural	467	712	481	111	355	
Total Iowa	496	580	350	50	224	

*Children under 5 per 1,000 women 15-44 compiled from data in current census reports and from unpublished data furnished by the Bureau of the Census. An allowance of 4 percent is made for underenumeration of children.

**According to a 1930 life table computed for the total population of Iowa by the Scripps Foundation for Research in Population Problems, 356 children under 5 per 1,000 women 15-44 were needed to maintain a stationary population. This requirement has been used in each group, although it probably minimizes slightly the nativity differentials and the spread from the rural-farm to the large cities.

***Less than 100 women 15-44.

*Stationary population as used here may be defined as the population that would exist if 100,000 births occurred annually, with death rates at each age as in Iowa during 1930. Because of its peculiar age composition the actual 1930 population in Iowa could be maintained for a few years with a somewhat lower ratio of children to women.

provide a large surplus (153 per 1,000). Foreign-born white women in all groups had birth rates sufficiently high to allow for a fair to large increase, with a marked tendency for the excess above maintenance requirements to decrease as size of city increased. When it is remembered that Iowa's population has been gradually becoming more urban and rapidly becoming more native, the significance of the surpluses or deficits shown in table 3 can hardly be overemphasized.

Many readers may have wondered why the birth rate, or number of children, per 1,000 women 15-44 has been discussed in these pages much more than the birth rate per 1,000 persons, for the latter rate is used almost exclusively in popular articles. The reason for the present choice is that the birth rate, or the number of children, per 1,000 women 15-44 is a more accurate measure of changes in the fertility of the population than the birth rate per 1,000 persons. Practically all births occur to women between 15 and 44, hence in two populations the number of children borne by each woman during her lifetime and the birth rate per 1,000 women 15-44 may be identical, yet if women 15-44 constitute a higher proportion of one population than of the other, the former will have a higher birth rate per 1,000 persons. The effect of this may be seen in the Iowa birth rates in table 1. The 1930 rate per 1,000 persons was 20.7 percent of the 1840 figure but the 1930 rate per 1,000 women 15-44 was only 17.5 percent of the 1840 figure, because women 15-44 made up 22.5 percent of the population in 1930 compared with 19.2 percent in 1840. The rate per 1,000 persons thus understates by about one-sixth the decline in fertility that has occurred in the population of Iowa, by not allowing for the rise in the proportion of the population made up of women in the childbearing ages. Because of such inaccuracies the birth rate per 1,000 persons is commonly called the crude birth rate, and will be used but little in this discussion.

Although the birth rate per 1,000 women of childbearing age is more accurate than the crude birth rate per 1,000 persons as a measure of changes in human fertility, it would be even better to use rates per 1,000 women 15-19, 20-24, and older 5-year periods up to 40-44, keeping native-born and foreign-born white women separate in each age group. Such rates will be referred to hereafter as specific birth rates. The advantage of specific birth rates is that they are not affected by the variations that are found in the age and nativity composition of different groups of women 15-44. Thus many more births occur per 1,000 native white women 20-24 than 15-19, chiefly because a much smaller proportion of the latter is married. Native white women 25-29 bear children about as frequently as those 20-24, but after the

25-29 age period the birth rate declines, partly because most women desiring small families already have enough children and partly because of physiological changes associated with rising age.

In 1840 the proportion of Iowa women 15-44 who were 20-29 years old (the most fertile ages) was 45.8 percent, but by 1930 it had fallen to 34.6 percent. In contrast, the proportion 30-44 (the less fertile ages) rose from 29.2 percent to 45.4 percent. Such an increase in average age of women in the childbearing period would lower the birth rate per 1,000 women 15-44 even though the same number of children is born to each woman reaching the age of 45 years. On this account the decline in the birth rate to women 15-44 shown in table 1 exaggerates somewhat the decrease in fertility that occurred, particularly during the early decades when age changes were most rapid. The large differences between rates to native and foreign-born women shown in table 3 have already illustrated the importance of eliminating differences in nativity composition in studying fertility trends. Unfortunately, it is only in recent years that states have begun to compile the accurate records of births by age of mother which are necessary in conjunction with census data on age of women to compute specific rates.

Several facts stand out clearly from an examination of specific birth rates in Iowa during 1925 and 1930. (See table 4.) In the first place, rates declined in all groups during this period, the smallest fall being 3.6 percent in the rate to native white women 20-24 and the largest 19.3 percent to the foreign-born women 40-44. Secondly, with two minor exceptions the decline in rate became larger with increasing age. For native whites, the smallest drop was 3.6 percent at the age 20-24, but at each older age group the drop increased, reaching a maximum of 15.8 percent at age 40-44. For foreign-born whites the variation in decline was from a low of 4.2 percent at the age 15-19 to a high of 19.3 percent at 40-44. Thirdly, the birth rate to foreign-born women declined more than the rate to native women, 11 percent compared with 9 percent for all age groups combined, and with larger declines in four of the six 5-year age groups. But in spite of these larger declines, foreign-born women were considerably more fertile than native women in 1930, the standardized foreign birth rate being 121, or 40 percent above the native rate of 86. In the fourth place, Negro rates were well below white rates in 1930 in every case except the 15-19 age period, averaging only 92 percent of native white rates at ages 15-44. Negro women marry younger than white women, as a rule, so their higher standing at 15-19 is not surprising.

Although these specific rates take care of differences in age,

race and nativity between Iowa and the other areas as well as from year to year in each area, they do not allow for differences in rural-urban distribution. Unfortunately, the Division of Vital Statistics does not tabulate births by age of mother for rural and urban areas, hence specific rates for each cannot be calculated. This difference is particularly important in comparing the native white and Negro rates in table 4. On first thought it seems reasonable to conclude that there is an important racial difference in fertility of women in Iowa. It must be remembered, however, that only 43 percent of Iowa's native white women 15-44 lived in urban areas in 1930, compared with 90 percent of the Negro women of this age. It must also be remembered that in table 3 the ratios of children to Negro women were decidedly higher than

TABLE 4. SPECIFIC BIRTH RATES BY RACE AND NATIVITY OF WOMEN, IOWA, SEVEN NORTH CENTRAL STATES, AND UNITED STATES.*

Race and nativity	Year	Births per 1,000 women aged:						
		15-19	20-24	25-29	30-34	35-39	40-44	15-44**
Iowa***								
Native-born white women	1925	45	140	150	118	74	31	95
	1930	42	135	136	103	64	26	86
Percentage change		-6.1	-3.6	-9.4	-12.3	-13.8	-15.8	-9.0
Foreign-born white women	1925	73	232	194	148	96	47	136
	1930	70	206	178	128	82	38	121
Percentage change		-4.2	-11.2	-8.5	-13.6	-15.0	-19.3	-11.0
Negro	1930	109	117	101	88	41	12	79
7 North Central States†								
Native-born white women	1920	44	152	150	112	74	33	96
	1930	45	135	131	95	61	25	85
Percentage change		2.7	-11.0	-12.8	-14.9	-18.4	-22.9	-12.4
Foreign-born white women	1920	79	235	218	164	113	55	148
	1930	65	174	152	107	68	33	103
Percentage change		-18.3	-25.8	-30.5	-34.6	-39.8	-41.0	-30.1
United States††								
Native-born white women	1920	50	157	155	119	82	37	102
	1930	48	123	126	93	59	25	83
Percentage change		-3.4	-15.7	-19.0	-22.0	-27.8	-32.2	-18.8
Foreign-born white women	1920	70	220	221	170	114	50	144
	1930	51	147	146	109	69	29	94
Percentage change		-27.3	-33.3	-34.1	-35.8	-38.9	-41.8	-34.5

*Mexicans are included with whites.

**A standardized birth rate; that is, specific rates are averaged using as weights the age distribution of all women 15 to 44 in the 1930 census.

***Births from "Birth, Stillbirth, and Infant Mortality Statistics," 1925 and 1930 increased by 12 percent to allow for nonregistered births. Number of women by age for 1930 from "Fifteenth Census of the United States;" for 1925 from women 10-44 in "Census of Iowa, 1925," page 682, distributed by 5-year periods based on age distribution in Fourteenth and Fifteenth censuses. Births by age of mother are not available for Iowa prior to 1924.

†From current birth statistics and census reports; registered births increased by 4.9 percent to allow for those not registered.

††From current birth statistics and census reports; registered births increased by 6.7 percent to allow for those not registered. For method of estimating births in nonregistered states see "Population Trends in the United States," table 76, note d.

those to native white women in urban Iowa, though lower in rural Iowa. Combining these facts indicates that place of residence is far more important than race in accounting for the specific rates in table 4 being lower for Negroes than for native whites. If specific rates could be shown for urban areas there is no question but that those for Negroes would exceed those for native whites. The rural-urban distribution of Iowa's foreign-born white women was so nearly like that of the native-born white that this factor does not upset the nativity differentials shown in table 4.

Judging from the ratio of children to women in tables 2 and 3 it is certain that rural birth rates to native and foreign-born white women and to Negro women in most if not all age periods would be higher than urban rates. Furthermore data for other states indicate that the rural-urban differences would be considerably larger relatively at ages 15-19 and 30-44 than at the ages 20-29. In other words, the lower ratios of children to women in urban than in rural areas shown in tables 2 and 3 probably result from a shortening of the childbearing period to a greater extent than from fewer births in the most fertile ages.

On the whole the changes in birth rates by age of mother in Iowa were like those in the north central states and the United States in table 4, the chief exception being that the percentage declines in Iowa were for 5 years, and hence were smaller than the declines for 10 years shown for the other areas. In each age period rates for native white in 1930 were about the same in Iowa as in the north central states and the United States, but rates for foreign-born whites were somewhat higher in Iowa than in the other areas.

During the first decades of Iowa's settlement the increase of population was so large that the number of births rose in spite of the declines in birth rates that have been described. This is indicated by the number of native-born children under 5 counted by the census, although the number of births has not increased as rapidly as the number of children because of the decrease which has taken place in death rates of infants and children. From 8,800 children under 5 in 1840 there was a large gain to 274,100 or more than 30 times as many in 1900, a period in which the birth rate per 1,000 women 15-44 declined 75 percent. (See table 5.) After 1900, however, the continued decline in the rate showed its effect—the high mark in the number of births and children of that time not being equalled since.

During recent years the drop in births has been large. (See table 6.) During 1915-19 there were about 288,500 births but during 1925-29 only 250,500, a fall of over 13 percent in 10 years. Considering single years, there has been a steady decline from

TABLE 5. NUMBER OF NATIVE-BORN CHILDREN UNDER 5, IOWA AND UNITED STATES (WHITE POPULATION).

Year	Number of native-born children under 5*		Year	Number of native-born children under 5*	
	Iowa	United States** (white)		Iowa	United States** (white)
1800		851,000	1870	194,200	4,821,400
1810		1,160,000	1880	237,600	5,967,300
1820		1,510,000	1890	241,000	6,767,000
1830		1,971,000	1900	274,100	8,199,700
1840	8,800	2,573,000	1910	244,500	9,604,400
1850	35,200	2,976,200	1920	260,600	10,690,300
1860	127,400	4,215,000	1930	228,100	10,502,900

*Native-born children under 5 in current census reports increased by 4 percent to allow for underenumeration. In 1850 and 1860 it is assumed that the proportion of children under 5 who were foreign-born varies from 1870 as the proportion of all persons who were foreign-born. In 1840 and earlier, total children are used in Iowa and total white children in the United States. Only 11.5 percent of the United States white population of all ages was foreign-born in 1850 and less than 1.8 percent of those under 5 in 1870. Data on immigration shows these percentages decrease rapidly from 1850 back to 1800. (See "Population Trends in the United States," p. 303.)

**Mexicans are not included with white in 1920 and 1930. In 1920 it is assumed that the percentage of Mexicans under 5 is the same as in 1930.

55,100 births in 1924 (the first year Iowa was in the Birth Registration Area) to 44,100 in 1933—a decline of 20 percent. With

TABLE 6. NUMBER OF BIRTHS BY RACE AND NATIVITY OF MOTHERS, IOWA AND UNITED STATES. (thousands)

Year	IOWA*				UNITED STATES**				
	Total	White mothers			Total	White mothers			Negro
		Native	Foreign-born	Negro		Total	Native	Foreign-born	
1910-14					13,218.5	11,738.5			
1915-19	288.5	256.5	29.8	1.2	18,906.6	12,371.8	9,448.3	2,923.5	
1920-24	276.0				14,316.0	12,515.2	10,095.9	2,419.3	1,790.9
1925-29	250.5	236.0	15.0	1.4	13,467.0	11,689.0	9,838.7	1,850.3	1,698.5
1920					2,850.8	2,498.3	1,989.7	508.6	334.2
1921					2,956.2	2,587.8	2,072.5	515.3	348.2
1922					2,792.0	2,443.8	1,969.7	474.1	328.2
1923					2,823.7	2,469.2	2,006.3	462.9	333.5
1924	55.1	51.2	3.5	.3	2,893.3	2,516.1	2,037.7	478.4	356.8
1925	53.5	50.0	2.2	.3	2,829.4	2,448.6	2,023.8	424.8	360.1
1926	51.2	48.0	2.9	.3	2,767.0	2,387.5	1,992.3	395.2	362.8
1927	50.1	47.3	2.5	.3	2,733.0	2,373.9	1,999.6	374.3	342.9
1928	48.6	46.0	2.3	.3	2,612.1	2,278.6	1,935.8	342.8	320.1
1929	47.2	44.8	2.1	.3	2,526.5	2,200.4	1,887.2	313.2	312.6
1930	47.9	45.5	2.0	.3	2,503.5	2,188.1	1,911.5	276.6	318.2
1931	47.0	44.9	1.8	.3	2,458.5	2,091.9	1,853.0	238.9	311.4
1932	45.0	43.6	1.5	.2	2,309.1	2,028.1	1,821.0	207.1	318.9
1933	44.1				2,288.1	1,934.3	1,764.4	169.9	304.1

*For 1915-19 and 1920-24 estimated from native children under 5 in the "Fourteenth Census of the United States, 1920," v. 2, p. 214, and in the "Census of Iowa, 1925," p. xviii, increased by 4 percent to allow for underenumeration. For other years births registered are increased by 12 percent to allow for those not registered.

**From "Population Trends in the United States," p. 266, with white births 1915-19 distributed to native and foreign-born mothers in the same ratio as native-born white children 0-4 in 1920. (See Thompson, W. S., "Ratio of Children to Women, 1920," Washington, G. P. O., 1931, p. 201.)

†Preliminary.

the decrease in the foreign-born population and an increase in their average age, the decline in births to foreign-born mothers has been more than four times as large as that of total births, amounting to 60 percent from 1915-19 to 1925-29.

In the United States, births and the number of children under 5 continued to increase longer than in Iowa. The largest number of children was reached in the 1920 census, the decline from then to 1930 amounting to 1.1 percent. (See table 5.) Considering births by single years, there was an upward trend until 1921 when 2,956,000 births occurred. Since then there has been a rapid decline, births in 1933 amounting to 2,288,000—23 percent under the 1921 peak. As in Iowa, the decline in births to foreign-born women has been much larger than that to other groups.

CAUSES OF THE DECLINE IN BIRTH RATES

The discussion of births and birth rates in Iowa and the United States has brought out several important facts so far, namely that the number of births has been declining during recent years, that the birth rate has fallen steadily for nearly a century, that the downward pace of the decline was decreasing up to 1920 but rose during 1920-30, that urban rates have been lower than rural rates, that foreign-born white women have been more fertile than native-born, that birth rates to women 20-24 and 25-29 are higher than those at other ages, and that the increase in the proportion of persons living under urban conditions and the decrease in the proportion of women 15-44 who are foreign-born or who are 20-29 have helped to bring about the large drop in the state and federal birth rate.

It is realized, however, that little has been said about certain fundamental causes of the decrease in human fertility. Has the decline of specific birth rates been due to biological changes affecting fecundity, to certain diseases (particularly venereal) becoming more widespread, to the nervous strain of city life becoming more intense and affecting more people, to changes in diet, to more persons being at sedentary occupations and fewer living an active outdoor life, to more pregnancies being terminated by induced abortions, or to more married couples practicing contraception? How important has each of these causes been in lowering specific birth rates? Unfortunately no data exist upon which to base an accurate and conclusive answer to such questions. An attempt will be made, however, to present the more important facts bearing on them, and to indicate the conclusions which these facts justify in the opinion of the writer.

That the low birth rate of today is due in part to biological and physiological causes is certain. The experience of physicians shows that there are a number of infecund or sterile married

couples in the population, that is couples who have tried to have children but to whom no live births have occurred.* Such couples should be distinguished from those who are fecund but infertile, that is who have had no children simply because they have practiced continence, abortion or contraception. According to Reynolds and Macomber, two of the leading gynecologists of Boston, the percentage of married couples in Massachusetts who are infertile is between 10 and 13 percent, and most infertile couples are infecund. This is based on their general impressions:

"... First, that among the intelligent proportion of the community regulation of the size of the family by artificial prevention is so far general as to be the rule. Second, that the entire prevention of children by such means is very infrequent. We have seen but few married women who did not wish at least for one child, and but few married men who did not wish at least one son to carry on the name... we have submitted this opinion as derived from our own experience to a considerable number of gynecologists of wide experience, and have found them unanimous in their assent to it."

In cases among their private practice infecundity was found to result from a variety of causes, such as arrested development, diseases, infections, lesions, injuries, insufficient exercise, faulty diet and "the strain and mental worry of modern life."† Nothing is said as to the relative importance of these causes, however. Some of them also explain why certain couples who have had one child are unable to have a second.

Although the writer does not question the statements of Reynolds and Macomber with regard to causes of infecundity and methods of treating it, he thinks that their estimate of the proportion of infertile couples who are infecund is too high. This is based primarily on the belief that the couples with whom they came in contact were not typical of the population as a whole. These physicians have built up a reputation for helping sterile couples to become fertile. The childless couples coming to them would thus be those unable to bear children previously; couples childless from choice probably would go to a birth control clinic instead. It is likely, therefore, that childless couples who did not want children would be much less numerous among their patients than in the general population.

The most accurate information available on the proportion of infertile couples in a large part of the United States is found in a study of the Milbank Memorial Fund. The data they obtained should be typical of the native white population of native parentage north of the Mason and Dixon line and distributed between farm owners and four broad social classes in cities. Out

*The terms infecund, sterile and fertile are used in correspondence with definitions adopted by the Population Association of America. (See "Human Biology," V. 6, No. 1, p. 238, February, 1934.)

†Reynolds, Edward and Macomber, D. Fertility and Sterility in Human Marriages. W. B. Saunders Company, Philadelphia and London, p. 33, 1924.

‡Ibid., p. 123.

of a total of 13,558 families studied, in which the wife was 40 years of age or over in 1910 and hence the family was practically complete, 1,891 or 13.9 percent were childless. This is slightly higher than the estimate of Reynolds and Macomber for Massachusetts 15 years later. Unfortunately for the question at issue here, the Milbank study was based on census schedules which gave no clue as to whether childlessness resulted from choice or from infecundity.

That childlessness varies among social classes, and that it has been increasing in each social class are important facts shown by the Milbank study. Wives 60-64 in 1910 probably had completed their families 20 years earlier on an average than those 40-44 in 1910. During this 20-year interval the proportion of couples who were childless increased in each of the five social classes studied. (See table 7.) The change was small among farm owners, from 9.0 to 10.6 percent, but was large among unskilled laborers, from 4.4 to 16.3 percent. Because the sample is sufficiently large and representative to indicate the trends in a large part of the United States there seems little question but that an increase in infertility has caused some of the decrease in the birth rate previously described. But because infertility may be due to voluntary prevention of births as well as to biological or physiological causes, these data throw little light on the part played by the latter causes in lowering the birth rate.

TABLE 7. PERCENTAGE OF WIVES AGED 40-44 AND 60-64 IN CERTAIN SOCIAL CLASSES WHO HAD BORN SPECIFIED NUMBER OF CHILDREN.*

Total children born	Professional		Business		Skilled		Unskilled		Farm owner	
	60-64	40-44	60-64	40-44	60-64	40-44	60-64	40-44	60-64	40-44
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
0	14.7	19.8	9.6	17.9	8.8	17.4	4.4	16.3	9.0	10.6
1	13.5	19.6	14.9	21.5	13.3	17.0	12.4	14.9	8.8	10.1
2	19.8	24.5	21.1	22.9	16.7	18.0	12.4	16.1	11.8	16.0
3	15.5	18.4	16.7	17.1	15.3	16.2	16.8	14.4	14.8	16.4
4	14.1	9.6	13.0	9.7	12.2	11.0	13.1	9.9	12.7	13.2
5	8.8	4.0	9.8	5.0	9.9	7.2	9.5	6.9	12.5	9.6
6	6.5	2.5	6.8	3.0	7.9	5.2	10.2	5.9	7.9	7.8
7	4.2	0.5	4.2	1.4	5.2	3.0	5.8	4.7	6.3	5.0
8	2.0	0.8	1.8	0.8	4.3	2.3	4.4	4.0	4.9	3.7
9	0.6	0.2	1.7	0.3	2.7	1.9	4.4	2.6	3.9	3.0
10 and over	0.6	0.2	1.2	0.5	3.6	0.7	6.6	4.3	7.5	4.1

*From Notestein, Frank W.: "The Decrease in Size of Families from 1890 to 1910," The Quarterly Bulletin of the Milbank Memorial Fund, Vol. ix, No. 4, p. 184, Oct., 1931.

Based on a sample drawn from the 1910 census returns and containing 13,558 families in which the husband and wife were living together north of the Mason and Dixon Line in 1910, and "in which both the husband and wife were of native-white parentage and only once married. Within this group samples were obtained for each of the broad social classes in 23 cities having total populations of between 100,000 and 500,000 in 1910, and for the wives of farm owners in the rural parts of 74 counties adjacent to those cities."

Beyond question a second cause of the present low birth rate in Iowa and the United States is the practice of abortion. Only induced abortions will be considered here, that is the abortions brought on willfully as distinguished from spontaneous or involuntary miscarriages. As was the case with infecundity, the frequency of induced abortions in recent years can only be indicated roughly, and nothing shown about increases or decreases in past years. Current information about the number of abortions is meager and entirely inadequate; information for past decades is practically non-existent and cannot now be supplemented.

"Estimates on the frequency of abortions in relation to total pregnancies are numerous in medical literature, and such estimates vary from one abortion in five pregnancies as the lowest estimate found. Supporting data on these estimates have not been found in medical or sociological literature."¹

Physicians performing abortions in hospitals frequently enter them under related headings instead of as abortions, and keep no record at all of those they perform elsewhere. Needless to say self-induced abortions are not recorded, although some indication of their frequency can be had from the large number of hospital records of patients suffering from sepsis as a result of such action.²

Probably the best sources of information regarding the frequency of induced abortions in certain groups of people are the records of birth control clinics. A recent study based on the records of 10,000 women who went to the Birth Control Clinical Research Bureau in New York City from 1925 to 1929 shows that prior to their first clinic visit 38,985 pregnancies had occurred to these women, with 7,677 or 19.7 percent ending in induced abortions.³ This excludes 340 abortions which were deemed necessary to save the mother's life. Sixty percent of the 7,677 abortions were performed by a physician, 15 percent by a midwife, and 25 percent were self-induced.

"the physician's help was sought to terminate pregnancies in three percent of the total first pregnancies, in the second pregnancies two and one-half times as often as in the first (7.7 percent), in the third pregnancies four times as often as in the first pregnancies (13 percent) and in the fourth pregnancies five times as often as in the first (16.2 percent)."

"In the first pregnancies the midwife's help was sought in one-half of one percent, while in the second pregnancies she was the helping agent three times as often as in the first, in the third five and one-half times as often, and in the fourth more than eight times as often as in the first."

"Somewhat less than half the self-induced abortions occurred in

¹Kopp, Marie E. *Birth control in practice*. Robert M. McBride and Company, New York, p. 121. 1934.

²*Ibid.*, p. 122.

³*Ibid.*, pp. 123-4.

the first four pregnancies. In the later pregnancies the group of self-induced abortions is large if compared with the terminations for which the patient had to make financial sacrifices."⁴

Summing up the New York study, less than 4 percent of first pregnancies were terminated by induced abortion, but about 20 percent of third pregnancies and nearly 30 percent of fourth pregnancies were so ended.

This group is not typical of all women in the United States, for it includes only those living in or about New York City, wishing to limit the size of their families, and going to a birth control clinic for contraceptive information. It is likely that in the population as a whole the inducing of abortions is not as common as in this group. The probability is, however, that the situation found among these New York women could be duplicated closely in certain parts of the population of Iowa and other states, particularly in the larger cities. Because abortion was so common in the New York group the chances are that it is an important cause of the present low birth rate in the United States as a whole. But the expectation is that it will decline in importance because of the influence of birth control clinics.

A third and probably the most important cause of the present low birth rate and of the rapid decline in past decades is the practice of contraception.⁵ This has long been the belief of various students of population. Thirty years ago J. S. Billings wrote regarding causes of the lessening birth rate: "It is probable that the most important factor... is the deliberate and voluntary avoidance or prevention of childbearing on the part of a steadily increasing number of married people, who not only prefer to have but few children, but who know how to obtain their wish."⁶

Similar statements have been made by others based on their judgment and experience, but it is only recently that factual data have become available. These are still inadequate for the United States, but additions to the fund of knowledge are continually being made. Katherine B. Davis found in her study, "Factors in the Sex Life of Twenty-Two Hundred Women," that 730 of each 1,000 married women returning questionnaires stated they practiced contraception.⁷ In general these women were "of good standing in the community, with no known physical, mental, or moral handicap, of sufficient intelligence and education to understand and answer in writing a rather ex-

⁴*Ibid.*, pp. 124-5.

⁵In this discussion no attempt will be made to differentiate between the various methods of contraception—continence, the "safe period," mechanical appliances, or chemical preparation—but simply to consider all methods combined.

⁶Billings, John S. *The diminishing birth rate in the United States*. Forum, 15:475, June, 1893.

⁷Davis, Katherine Bement. *Factors in the sex life of twenty-two hundred women*. Harper and Bros., New York and London, p. 14. 1929.

haustive set of questions as to sex experience,¹¹ and well distributed over the United States. But since only 1,073 filled-in questionnaires were received from 10,000 women circularized, those replying may not be typical of the entire group. No statements were made on the questionnaires by these women as to the extent to which their practice of contraception had been successful in preventing pregnancies.

Information on the practice of contraception and success attained has recently been gathered by the Milbank Memorial Fund from women coming to the Birth Control Clinical Research Bureau in New York City.

"Two-thirds of the women are Jewish, one-sixth Catholic, and only one-tenth Protestant. Almost all of them have lived in New York City since their marriage, but more than half are foreign-born and only one-sixteenth native-born of native parents. They represent for the most part middle and working class families whose annual incomes in 1929 ranged from \$400 to \$20,000, with a median income of \$2,300. In 1932 the median income had dropped to \$1,200, about a fifth of the families were destitute or supported by organized relief, and the highest income was less than \$6,000."¹²

These women may not be typical of their religious and economic groups because of the fact that they were sufficiently interested in limiting the size of their families to attend the clinic. This in turn may indicate that they were above average in ease of becoming pregnant, or below average in their knowledge of effective methods of preventing conceptions. Some information about contraception was widespread in this group, however, for

"before they attended the clinic 95 percent of these women had made some effort to limit their families by the practice of what they believed to be contraception. Forty percent of the families in the group used contraceptives immediately after marriage and an additional 40 percent started their use at some time before the beginning of the second pregnancy."¹³

Comparing the frequency of pregnancies among women who have been practicing contraception with their frequency among those who had not done so indicates that the former group lowered the chance of becoming pregnant by 73.6 percent.¹⁴ Such a decrease is remarkable in view of the fact that these families presumably had received no technical information about contraception prior to the visit to the clinic. Most of them were using methods that are generally assumed to be matters of rather common knowledge in the population, and which may be widely practiced and quite efficacious among other groups of families. After these women had received instruction at the clinic it is probable that the risk of pregnancy among those practicing the

clinic methods was lowered more than 73.6 percent, for the experience of other clinics indicates that 90 percent effectiveness in reducing births is common among women who have learned the clinic technique and who follow it carefully.¹⁵ The extent to which contraceptive methods can reduce the birth rate is thus seen to be enormous.

Insofar as known, no studies have been made regarding the proportion of Iowa families which practice contraception to any extent, nor of the degree of success in preventing pregnancy which they achieve. Some of the women in the Davis study were from Iowa, but data from their questionnaires were not tabulated separately. It is probable, however, that certain groups in Iowa do not differ greatly from groups in the studies cited as regards the knowledge and practice of contraceptive methods. This would be true particularly of groups in the larger Iowa cities.

The indications are clear that infecundity from biological or physiological causes, the ending of pregnancy by induced abortion, and the practice of contraception have all played a part in reducing the birth rate in Iowa and the United States. But because definite facts are inadequate concerning each, is there any means of judging their comparative importance? An examination of certain trends and differentials in birth rates seems to the writer to indicate that infecundity—the inability of married couples to have children—has been much less important than voluntary causes. For one thing, the large decreases in specific birth rates at the older ages than the younger from 1920 to 1930¹⁶ are what would be expected to result from voluntary control. Among the great mass of the working classes, older married couples with all the children they could care for would almost certainly make more effort to prevent additional conceptions than younger couples still childless or having only one or two children. This might not be so true during years like 1931 to 1934 when many young married men could not find employment and were supported by their wives or parents, but it should hold true for 1920-1930 and for other long periods.

Considering another factor, the differentials between urban and rural specific birth rates seem explainable to an important extent by voluntary action. Children have been less of an economic burden on the farm than in the city, particularly because much of the family food is raised at home instead of being bought for cash at the store, and because there is productive work at which children can help after school hours and during vacations.

From the standpoint of personal freedom, farming is an exacting occupation because livestock require care twice a day or

¹¹Ibid., p. xi.

¹²Stix, Regine K. and Notestein, Frank W. Effectiveness of birth control. Milbank Memorial Fund Quarterly, Vol. 12, No. 1, pp. 58-9. January, 1934.

¹³Ibid., p. 59.

¹⁴Ibid., p. 67.

¹⁵Kopp, op. cit., p. 176.

¹⁶Shown in table 4.

oftener. Farm women usually look after the chickens and often help with other stock; hence if they feel tied down, it may be because of these duties rather than because of children. With city women, on the other hand, the husband's business is usually at some distance from the residence, so that there is only house-keeping to do at home. This is easier than in the country because near-by grocery or delicatessen stores simplify cooking, and restaurants may not be far distant. Home duties in childless families, therefore, are much less confining in the city than in the country. Partly on this account many city women seek full-time occupations outside the home and independent of their husband's business, which gives an additional reason for postponing childbearing temporarily and sometimes permanently. This situation has no counterpart on the farm. Again, social or recreational life in the country has been organized around families to a much greater extent than in cities, the tendency in the latter being to individualize and commercialize it. For these reasons there may be less desire to restrict the size of family among farmers than among city dwellers, less use of abortion or of contraceptive measures, and hence a higher birth rate. Because contraception is so much simpler and safer than abortion, the conclusion seems justified that it has been the more important method used.

It is probable, too, that the spread of knowledge regarding contraception has been slower in the country than in the city. Almost all of the 121 birth control clinics now operating are located in cities. Except for the work of these clinics most of the spread of birth control information has been by word of mouth, partly because of federal and state laws, and partly because of social customs. Under these conditions contraceptive knowledge no doubt has been passed along most rapidly in places where large numbers of people come together in close daily contact. Factories and stores are ideal for this purpose. If the employees are women rather than men, contraceptive information probably spreads more rapidly because preventing an excessive number of births may ease a woman's life much more than that of her husband.

All this does not mean that there are no differences in diet, in type of work, in amount of time spent outdoors, and in the practice of abortion which may be partially responsible for higher birth rates in rural than in urban communities; it simply means, however, that these factors are less important than differences in birth control. Neither is it implied that the rural-urban birth rate differential may not disappear in time if factory methods are applied to farming or if country-city ties are strengthened in other ways. The movement back to the land that has gone on

during the depression may hasten the disappearance of this differential.²⁸

In both city and country it seems reasonable that birth control would be practiced first among the so-called upper classes, made up chiefly of professional and business men (as distinguished from unskilled or skilled workers) in the city and farm owners (as distinguished from renters or laborers) in the country. Members of the upper classes have usually progressed further in their education; hence they would know more about the various means of preventing conception.²⁹ Many of them have acquired upper-class standing as a result of their own efforts in business or the professions, their parents having been unskilled workers with little property. Their success in this matter may have been due in part to the deliberate avoidance of many children, which lessens family cares and expenses and allows more energy to be devoted to economic and social striving. The results of certain studies of the Milbank Memorial Fund are in accord with this hypothesis, for they show a marked relation between fertility and social class in the native white population of 1910. In the urban sample studied, the standardized cumulative birth rate by classes was 129 for professional, 140 for business, 179 for skilled workers and 223 for unskilled workers. In the rural sample the rate was 247 for farm owners, 275 for farm renters and 299 for farm laborers.³⁰ When the age of the wife at marriage was from 14 to 19, the inverse relation between birth rate and social class was even more marked; but when marriage took place from the age 25 to 29 the birth rate differed little among the urban classes, although the inverse relation was apparent to some extent in the farm groups.³¹ In discussing this matter Notestein states:

"The cause of this shift from an inverse to a direct association between fertility and social status as marriage age advances cannot be determined from our data. Probably a number of factors were involved. As pointed out in the English Census Report, 'Fertility of Marriage,' the fact that the upper-class birth rates were relatively high for women whose late marriages offered slight inducement to family limitation, and relatively low for those whose early and perhaps impetuous marriages made family limitation most desirable, suggests that for early marriages birth is increasingly subject to voluntary control as social status rises."

²⁸Whelpton, P. K. The extent, character and future of the new landward movement. *Journal of Farm Economics*. Vol. 15, No. 1, pp. 57-66, January, 1933.

²⁹In the Davis study the percentage of women employing contraceptive methods was 76.48 among university and college graduates, 71.29 among college undergraduates and high school and normal school graduates, 64.51 among less than high school, and 63.63 among the private school or tutor groups. Katherine B. Davis, loc. cit., p. 14.

³⁰Sydenstricker, Edgar, and Notestein, Frank W. Differential fertility according to social class. *Journal of the American Statistical Association*, Vol. 35, n. s., No. 169, pp. 2-32, March, 1930.

³¹Notestein, Frank W. The relation of social status to the fertility of native-born married women in the United States. G.H.L.F. Pitt-Rivers, editor, *Problems of Population*. George Allen and Unwin, Ltd., London, 1932.

The decrease in standardized birth rates found in going from unskilled laborers to professional people results from fewer large families rather than from more childless families. The proportion of urban wives aged 40 to 49 in 1910 who had borne no children varied from 16.3 percent for unskilled to 19.8 percent for professional, whereas the proportion who had borne five or more children varied from 28.4 percent for unskilled to 8.2 percent for professional.²⁴ Complete infertility, whether involuntary or otherwise, thus appears to be of considerably less importance than the factors holding the number of births per wife below five with contraception probably much more important than abortion.

Differences in age at marriage probably explain to a small extent why the proportion of large families decreases with a rise in social status, because the modal age at marriage of brides under 40, who were married between 1900 and 1905, increased from 18.5 for unskilled laborers to 23.5 for professional persons.²⁵ But most of the decrease in the proportion of large families as social status rises remains to be accounted for by causes of infecundity after one or more births have occurred, by the practice of abortion or by the use of contraceptive methods. For reasons already indicated, the last named seems the most important.

Since writing the above, results have become available from a study just completed which so strongly support the argument that birth control is the primary means by which the decrease in the birth rate has been brought about as to make it almost incontrovertible. Under the direction of Dr. Raymond Pearl of the Johns Hopkins University, information regarding size of family and practice of birth control has been obtained from 4,945 married women in 13 states. These women were not selected because of their interest in contraception; in fact, hardly any of them had ever been to a birth control clinic.

²⁴They are a fair sample of run-of-mine urban dwellers in religion, occupation, wealth, and education. Fifty-nine percent of the whites and 66 percent of the negroes never got more than elementary schooling. Thirty-two percent of the whites and 27 percent of the negroes attended high school, while only 6 percent of the whites and 3 percent of the negroes went to college or university. The white women studied had been married 5.7 years, and the negro women 6.4 years, on the average.

²⁵...among the well-to-do and rich white women over 78 percent had practiced birth control... [In this group] the average birth rate was lowered some 73 percent below its natural biological level... Among the very poor and poor classes of whites (who make up a large proportion of the whole population) only a few more than one-tenth of the women prac-

²⁴Notestein, Frank W. The decrease in size of families from 1890 to 1910. The Quarterly Bulletin of the Milbank Memorial Fund, Vol. 9, No. 4. pp. 181-188, October, 1931.

²⁵Notestein, Frank W. The relation of social status to the fertility of native-born married women in the United States. *op. cit.*

ticed birth control really intelligently... [These women] succeeded in lowering their average birth rate below the natural biological level by 57 percent.

"If birth control were not practised the birth rate would be approximately the same in various social levels and for white and colored races which indicates that the innate natural fertility [fecundity] of married couples is probably substantially similar in all economic classes, and in the white and colored races... Apparent differential fertility observed between social and economic classes, and between the races, appears on the basis of the more refined and accurate computations of this investigation to be due almost wholly to those artificial alterations of natural innate biological fertility which are collectively called birth control, at least in the sample of American women so far studied."²⁶

If it is true that the increased practice of contraception has been the means by which much of the decline in the birth rate has been brought about, there still remains the important question as to why contraceptive methods are used to a greater extent now than formerly. A number of hypotheses have been advanced to answer this question, among them the emancipation of women, the lessening influence of the church, the change in the attitude toward sex relations (the abandonment of the double standard), the desire for a higher economic and social standard of living, and the influence of city life. No doubt all of these and others as well have had some influence, but the exact importance of each is undeterminable at the present time.²⁷

FUTURE BIRTH RATES

In the light of past trends of births and birth rates in the United States and of the available knowledge about the causes of these trends, what may be expected in the future? If the rapid decline in rates in the past had resulted largely from an increase in childlessness due to causes not subject to human control, it might well be expected that a rapid decline would continue in the future until most families were childless, unless some effective means of overcoming sterility were discovered. But because the past decline has resulted more from a decrease in the proportion of large families than from an increase in the proportion of childless families, which in turn has probably been due chiefly to an increase in the use of contraceptive methods, the future trend of birth rates appears subject to human control in large measure.

²⁶Milbank Memorial Fund (John A. Kingsbury, Secretary) press release, March 14, 1934.

²⁷For a discussion of these factors, see the following: Ungern-Sternberg; Roderich von, "The Causes of the Decline in Birth-rate within the European Sphere of Civilization," Cold Spring Harbor, Eugenics Research Association (Monograph Series IV), August, 1931. Kulka, Ernst, "The Causes of Declining Birth-Rate," same series, No. V. Nearing, Nellie S., "Education and Fecundity," American Statistical Association, Publications, Vol. 14, n. s., No. 106, pp. 154-174, June, 1914. Englemann, George J., "Education Not the Cause of Race Decline," Popular Science Monthly, Vol. 63, pp. 172-184, June, 1903. Thompson, Warren S., "Population Problems," McGraw-Hill, N. Y., Chap. VIII, 1930.

A large majority of married couples seem to want some children and to be physiologically able to have them. On this account it is not believed that birth rates will continue to drop at the rapid rate of the past; it seems much more reasonable to assume that the downward trend will gradually flatten out, and no further drop occur. How quickly this will take place, and how low birth rates will be when they reach the bottom are questions on which there are differences of opinion.

As an upper limit above which specific birth rates are not likely to go between now and 1980, the 1933 rates may be used. A rising birth rate is such a rare thing in the history of a settled country that there appears no probability of these rates being exceeded appreciably. In fact, there is little likelihood that specific rates of native white women will rise sufficiently above the 1933 figures to compensate for the decrease in numbers of foreign-born white women with their higher birth rates—a decrease which seems sure to occur.

As a lower limit for the future, specific birth rates which will give two births per Iowa family on the average may be a reasonable assumption. This number is suggested because of the extent to which two-child families have come to be the most common size in the population. It will mean a fair proportion of families with 3, 4 or 5 births to compensate for those which are childless or in which only one birth occurs. According to the birth rates and proportion of women married in Iowa in 1930, the average native white woman marrying and living to the age of 45 would bear 2.8 children. A decrease to 2 births per native married couple with no change in marriage rates would mean a decline of 29.2 percent from the specific birth rates of 1930, about 8 percent of which has already occurred. Because specific birth rates to foreign-born mothers are larger than those to native-born, the decrease for the total population will be larger as foreign-born women pass out of the childbearing ages. The lower assumption as to the future trend of the birth rate, then, is that specific rates to all Iowa women will decline at a decreasing rate and by 1980 will be one-third below the 1930 level. As a medium assumption, a gradual decline to one-fifth below the 1930 rates has been assumed. These assumptions are shown graphically in fig. 1, based on table 1.

When it is remembered that the number of births registered dropped almost one-fifth in the 9 years from 1924 to 1933, a decline of one-fifth in specific birth rates during the 50 years, 1930 to 1980, seems rather small, and even a decline of one-third does not seem large. These assumed trends may thus be optimistic rather than pessimistic.

With a decrease of 33 percent in specific birth rates from 1930

to 1980 the crude birth rate (births per 1,000 persons) will decline about 45 percent, that is from 19.0 during 1928-32 to about 10.6 during 1978-82. This larger decline in the crude birth rate will result from the decrease in the proportion of the population consisting of women 15-44 (and particularly in the most fertile ages 20-29) which is sure to come. If specific birth rates decline 20 percent, the crude birth rate will decline from 19.0 per 1,000 to about 12.8, or about 33 percent. Even if present specific rates remained in effect, the rising average age and increasing nativeness of the white population would lower the crude birth rate by at least 12 percent by 1980.

DEATHS AND DEATH RATES

Accurate information regarding deaths and death rates for Iowa is available for each year since 1923, the date Iowa was admitted to the Death Registration Area. Although the census data on population enable the trend of births and birth rates to be shown fairly accurately before Iowa's admission to the Birth Registration Area, they are of little help in ascertaining mortality trends. For years prior to 1923 probably the best assumption regarding mortality conditions in Iowa is that they were similar to those in nearby states. Among the adjoining states Wisconsin was admitted to the Death Registration Area in 1908, Minnesota in 1910 and Missouri in 1911. Indiana and Michigan are the nearest states admitted to the area as early as 1900. Between 1850 and 1900 a few states registered deaths, but most of these were not successful in obtaining relatively complete registration. It is generally believed that the early mortality records of Massachusetts were more accurate than those of other states; hence death rate trends in Massachusetts provided probably the best indication of what was taking place in the United States during the nineteenth century.

The crude death rate (deaths per 1,000 persons) like the crude birth rate varies considerably with the age of the population, because deaths are much more common relatively among infants and old people than among young adults. Much more accurate than the crude death rate as measures of mortality conditions are specific death rates, (death rates at each age of life), and the expectation of life (the average number of years of life remaining for persons of a certain age according to given specific death rates). Because of differences in the age composition of the population in Iowa and Massachusetts, past trends of specific death rates and of the expectation of life in the two states are almost certain to be much more alike than past trends in the crude death rate.

Two facts stand out from a study of specific death rates and

of the expectation of life in Massachusetts, namely that there has been a large decrease in death rates at younger ages and almost no change in death rates at older ages during a century or more. Persons 60 years of age in Massachusetts could expect to live 15.0 years under the mortality conditions of 1855 but slightly less than 14.7 years under mortality conditions of 1929, because death rates at ages over 60 were slightly higher in 1929 than in 1855. (See tables 8 and 9 and fig. 2, p. 119.) During this period the expectation of life of persons aged 40 rose on the whole (being 29.6 years in 1929 compared with 27.9 in 1855) because death rates at ages 40 to 60 decreased about one-fourth

TABLE 8. DEATH RATES AT SELECTED AGES, IOWA, MINNESOTA, MASSACHUSETTS, UNITED STATES AND NEW ZEALAND.

Exact age	Deaths per 1,000 persons						
	Massachusetts*						
	1855	1878-82	1890	1900-02	1909-11	1919-20	1929
0	155.1	167.0	157.9	145.3	125.3	89.7	61.8
2	40.0	29.4	26.6	17.2	11.3	8.6	5.5
7	7.2	7.8	6.8	4.3	3.3	3.0	2.1
12	4.1	3.9	3.8	2.6	2.2	1.9	1.5
17	8.9	6.9	6.4	4.3	3.3	3.2	2.3
22	10.8	9.4	8.3	6.1	4.7	4.5	3.2
32	12.0	10.1	10.0	7.9	6.8	6.5	4.4
42	13.4	11.2	12.4	11.1	9.8	8.1	6.8
52	15.0	14.9	17.4	17.1	16.1	14.1	13.5
62	30.6	24.9	29.2	33.0	35.1	29.2	31.0
72	51.5	55.8	61.0	65.8	71.2	68.9	65.8
82	153.1	124.0	133.0	147.2	151.4	146.5	148.5
92	297.2	260.2	314.3	292.0	281.2	287.9	
Age interval	Minnesota		Iowa	United States**		New Zealand	
	1916***	1920***	1930†	1920†	1900††	1930†	1930‡
Under 1	92.4	75.7	56.5	54.7	162.4	64.2	34.5
1-4	9.6	6.1	3.9	4.5	19.8	5.1	3.2
5-9	3.5	2.6	1.8	1.6	4.7	1.8	1.0
10-14	2.5	2.0	1.3	1.6	3.0	1.4	
15-19	3.5	3.2	2.0	2.2	4.8	2.3	2.1
20-24	4.8	4.8	3.1	2.6	6.8	3.3	
25-34	5.5	6.3	3.5	3.3	8.2	3.9	3.1
35-44	6.9	6.8	5.3	4.8	10.3	5.9	4.4
45-54	10.6	9.9	9.8	8.7	15.0	10.9	8.2
55-64	19.5	20.2	20.2	18.3	27.3	23.0	17.6
65-74	42.2	45.4	45.2	43.4	56.5	51.1	41.8
75 and over	129.7	124.8	121.2	120.6	142.4	130.4	133.0

*From "Population Trends in the United States," p. 236. These rates are for a life table population of the exact age specified.

**The registration states included the New England States, New York, New Jersey, Washington, D. C., Indiana and Michigan in 1900 and all states except Texas in 1950.

***U. S. Bureau of the Census: Mortality Rates, 1910-1920. Washington, D. C., G.P.O., p. 484, 1923.

†Calculated from data in "Mortality Statistics, 1930" and the "Fifteenth Census of the United States, 1930."

††Mortality Rates, 1910-1920, p. 23.

‡New Zealand Official Yearbook, 1932, p. 120.

TABLE 9. EXPECTATION OF LIFE AT SELECTED AGES, IOWA, MASSACHUSETTS AND UNITED STATES (WHITE POPULATION).

Massachusetts*	Average years of life remaining at age							
	0	10	20	30	40	50	60	70
1789	35.5	43.2	34.2	30.2	26.0	21.2	15.4	10.1
1850	39.4		40.1		28.8		16.3	
1855	39.8	47.1	39.9	34.0	27.9	21.3	15.0	9.4
1878-82	42.6	50.0	42.5	36.2	29.6	22.8	16.3	10.8
1890	43.5	49.0	41.3	34.7	28.1	21.4	15.2	9.8
1893-97	45.3	50.0	42.0	35.1	28.2	21.3	15.1	9.9
1900-02	47.7	51.1	42.8	35.3	28.6	20.9	14.5	9.2
1909-11	51.2	52.3	43.7	35.7	28.0	20.7	14.1	9.1
1919-20	55.3	53.8	46.0	37.1	29.4	21.8	14.8	9.2
1929	59.7	55.6	46.6	38.0	29.6	21.8	14.7	9.2
United States** 1930	61.2	56.5	47.5	38.9	30.5	22.6	15.5	9.7
Iowa*** 1910	56.1	55.9	47.7	39.7	31.8	24.1	16.7	10.5
1920	58.4	56.1	47.6	39.5	32.0	24.2	16.7	10.5
1930	62.7	58.6	49.6	40.9	32.4	24.2	16.7	10.5
Future as estimated								
"Low"								
1940	63.6	58.6	49.6	40.9	32.4	24.2	16.7	10.5
1950	64.2	58.6	49.6	40.9	32.4	24.2	16.7	10.5
1960	64.8	58.6	49.6	40.9	32.4	24.2	16.7	10.5
1970	65.2	58.6	49.6	40.9	32.4	24.2	16.7	10.5
1980	65.4	58.6	49.6	40.9	32.4	24.2	16.7	10.5
"Medium"								
1940	64.1	59.2	50.2	41.5	32.8	24.5	16.9	10.6
1950	65.4	59.8	50.8	41.9	33.2	24.8	17.1	10.7
1960	66.5	60.4	51.3	42.4	33.6	25.1	17.2	10.7
1970	67.3	60.8	51.6	42.7	33.8	25.3	17.3	10.8
1980	67.7	61.1	51.9	42.8	34.0	25.4	17.4	10.8
"High"								
1940	65.9	60.7	51.6	42.7	34.0	25.6	17.8	11.0
1950	68.5	62.3	53.1	44.2	35.3	26.7	18.6	11.4
1960	70.5	63.6	54.4	45.4	36.5	27.7	19.3	11.7
1970	72.9	64.7	55.4	46.3	37.3	28.5	19.9	11.9
1980	72.7	65.3	56.0	46.8	37.8	28.8	20.1	12.0
New Zealand*** 1930	66.1	59.3	49.9	40.9	32.2	24.0	16.5	9.9

*From sources given in "Population Trends in the United States," pp. 231, 236 and 240. A simple average of male and female values is used in 1850 and 1878-82, and a weighted average in 1890 and later years.

**Furnished by Louis I. Dublin and Alfred J. Lotka "from advance information, drawn from a book prepared in this Bureau (the Statistical Bureau of the Metropolitan Life Insurance Company), the publication of which is planned some time this year."

***Estimated by the Scripps Foundation for Research in Population Problems from death rates in table 8. It is assumed that Iowa rates have the same relation to Minnesota rates in 1910 and 1920 as in 1930.

which more than offset the small rise in rates at older ages. At ages 20 to 40 the decline in Massachusetts' death rates exceeded 60 percent, and the expectation of life at age 20 rose fairly steadily from 39.9 to 46.6 years. This gain of 6.7 years in life expectancy at age 20 was scarcely one-third of that for new-born infants, however, since the expectation of life at birth rose almost uninterruptedly from 39.8 in 1855 to 59.7 in 1929. Much of this increase of 19.9 years resulted from the drop in infant

mortality (deaths under 1 year of age per 1,000 births), from 155.5 in 1855 to 61.8 in 1929, but an important part came from lower death rates at ages 1 to 4.

The trend in Minnesota since 1910 has been similar to that in Massachusetts, but with smaller declines in the death rates at most ages, and hence with smaller increases in the expectation of life. No doubt the changes in Iowa since 1910 have been much like those in Minnesota, for conditions are similar in these adjoining states. Although it cannot be proved that specific death rates and life expectancy followed the same trend in Iowa before 1910 as in Massachusetts, the probability is that the differences were not important. During the last 25 years specific death rates have been declining with greater rapidity in the more industrial and urban states than in the more agricultural and rural states, partly because they were higher in the former and therefore had farther to fall, and partly because the public health movement developed more rapidly in cities than in the country. It is likely, therefore, that the trend of specific death rates was more similar for Iowa and Massachusetts before 1910 than it has been for Minnesota and Massachusetts since 1910.

Part of the decline in specific death rates has been due to the increase in the proportion of the population composed of native-born white persons. As shown in table 10 death rates of foreign-born white persons have been well above those of native-born whites in Iowa and Minnesota during the years for which data are available. Some of this difference may result from problems connected with adapting life to the different conditions found in the adopted country, but the most important causal factor probably is the lower average earnings of the foreign-born than of

TABLE 10. SPECIFIC DEATH RATES PER 1,000 PERSONS FOR NATIVE-BORN WHITES AND FOREIGN-BORN WHITES, IOWA AND MINNESOTA.*

Age period	MINNESOTA						IOWA	
	1910		1920		1930		1930	
	Native-born	Foreign-born	Native-born	Foreign-born	Native-born	Foreign-born	Native-born	Foreign-born
Under 1	92.2	129.9	74.8	**	55.3	**	54.2	**
1-4	9.4	23.1	5.9	25.2	3.7	15.3	4.4	**
5-9	3.5	3.5	2.5	5.0	1.8	4.5	1.6	1.7
10-14	2.4	3.2	2.0	2.6	1.2	2.3	1.5	5.1
15-19	3.5	6.2	3.2	3.9	1.9	3.1	2.2	2.7
20-24	4.3	6.5	4.7	5.5	2.9	5.5	2.5	2.6
25-34	5.0	6.5	6.0	7.2	3.4	5.5	3.2	3.7
35-44	6.3	7.6	6.5	7.3	5.0	6.2	4.0	5.4
45-54	10.3	10.8	9.6	10.0	9.2	10.6	8.6	8.4
55-64	19.4	19.5	20.6	19.8	19.8	20.5	18.0	19.3
65-74	43.0	42.2	46.4	44.6	46.5	43.8	43.2	43.5
75+	112.9	123.9	124.7	125.0	114.0	124.4	119.3	132.7

*Calculated from deaths in "Mortality Statistics" for 1910, 1920 and 1930, and the census population for the same years.

**No rate shown for groups of less than 100 persons.

TABLE 11. SPECIFIC DEATH RATES PER 1,000 PERSONS IN URBAN AND RURAL COMMUNITIES, IOWA AND MINNESOTA.

Age period**	MINNESOTA				IOWA	
	1920		1929		1929	
	Urban	Rural	Urban	Rural	Urban	Rural
Under 1	76.1	73.2	51.8	53.5	69.5	45.9
1-4	6.6	5.6	4.5	3.6	4.8	3.2
5-9	3.1	2.2	2.2	1.5	2.4	1.3
10-14	2.3	1.8	1.6	1.1	2.0	1.2
15-19	3.4	2.9	2.4	2.1	2.9	1.8
20-44	6.3	5.4	4.0	3.7	4.6	2.9
45 and over	25.7	25.2	27.6	27.5	31.5	27.6
45-54					11.3	6.7
55-64					24.6	15.6
65-74					50.3	42.1
75+					136.9	127.2
Crude rate***	10.9	10.0	9.9	9.6	12.1	9.8
Standardized rate†	10.9	10.1	9.4	9.1	10.6	7.6

*The urban-rural classification used in "Mortality Statistics" is followed, i. e., cities of 10,000 or over in 1920 are urban and the remainder of the state is rural. The population by age periods July 1, 1920 and 1929, is estimated from United States censuses of 1920 and 1930 by straight line interpolations. Deaths of urban and rural residents are from "Mortality Statistics" for 1920 and 1929, table 1B. It is estimated that these deaths are distributed by age in the same proportion as urban and rural deaths in table 3 of "Mortality Statistics."

**The population for urban and rural communities as defined in note 1 is given only by broad age periods in the 1920 census.

***Deaths at all ages divided by the population at all ages.

†A weighted average of specific death rates, the weights are the population by age periods in the United States in 1920.

the natives. Since the proportion of foreign-born whites in the population of Minnesota declined from 26.2 in 1910 to 15.1 in 1930, specific death rates of this group had a diminishing influence in determining specific rates for the state as a whole. On this account the latter would have declined even though rates for native and foreign-born whites had remained unchanged. As the population of Iowa becomes still more native in the future, specific death rates should decline and the expectation of life should increase simply because of this change in composition.

Comparisons of urban and rural specific death rates in Iowa cannot be made with absolute accuracy from published data because deaths by age are shown by place of occurrence of death rather than by place of residence of the person dying. The number of rural residents dying in cities exceeds considerably the number of urban residents dying in the country, which exaggerates urban specific rates calculated from published figures and understates rural specific rates. However, the correction for non-resident deaths at all ages can be applied to deaths at each age, which should eliminate most of the error. In 1929 (the most recent year for which urban and rural deaths by age have been published) rural rates in Iowa were lower than urban rates calculated on such a basis. This was true of rates for each age as

well as of the crude and standardized rate for the total population.¹⁰ (See table 11.) In Minnesota the rural-urban differential was much smaller, rural people having the advantage at some ages and urban people at others. The largest numerical difference in Iowa was for persons under 1, the urban rate (69.5) exceeding the rural (45.9) by 23.6 points. At age 5-9 the rural rate (1.3) was only a little more than half the urban rate (2.4), but the numerical difference was small because both rates were low.

With lower rural death rates at all ages of life in Iowa, the expectation of life would be considerably higher at birth and older ages for rural people than for urban. In fact, the rural values are so low as to suggest that further decreases in specific death rates for the state as a whole must come about largely through progress in improving mortality conditions in cities. If the population of Iowa continues to become more urban as it has in the past, urban rates will apply to a larger proportion of the total population. This emphasizes the importance of lowering urban rates in the future.

To understand how the declines in death rates at most ages have been achieved, it is desirable to consider each of the more important causes of death. A few diseases have been almost wiped out and the mortality from others greatly reduced because of special public health campaigns aimed at their prevention or because of the perfecting of modes of treatment. The best examples are seven contagious or infectious diseases—typhoid fever, smallpox, measles, scarlet fever, whooping cough, meningitis and diphtheria. Deaths from smallpox have been almost negligible in the United States for several years. Deaths from the other six are fast becoming negligible, their rates in Minnesota having declined from 66 to 95 percent during the years from 1910-14 to 1928-32. (See table 12.) In Iowa the death rate for these seven diseases combined was only 13.6 per 100,000 persons during 1928-32 compared with 24.2 during 1923-27.¹¹ Within another decade or two it should be reduced 10 to 12 points and be almost down to zero. This may be overly optimistic, however, for in New Zealand, the nation with the highest expectation of life in the world, the death rate for these seven diseases was 16.1 in 1926-30. Wiping out these diseases will cause a small reduction compared with that of 52 points in Minnesota since 1910-14, but because most deaths from these causes occur among infants and children (see table 13) more years will be added to the expecta-

¹⁰See notes *** and †, table 11, for an explanation of crude and standardized rates. The latter is far more accurate for comparing groups because it eliminates the effect of differences in age composition.

¹¹Death rates by cause of death are shown per 100,000 persons, except rates for malformations and diseases peculiar to early infancy which are deaths under 1 per 1,000 births. Other death rates are shown per 1,000 persons.

TABLE 12. DEATH RATES PER 100,000 PERSONS BY IMPORTANT CAUSES OF DEATH IN IOWA, MINNESOTA AND NEW ZEALAND.

Cause	MINNESOTA*				IOWA*		NEW ZEALAND**	
	1910-14	1915-20 ***	1923-27	1928-32	1923-27	1928-32	1900-04	1926-30
Typhoid and paratyphoid fever	15.4	4.5	1.6	.7	2.7	1.8	8.7	1.1
Smallpox	.4	.5	4.1	†	.6	.2	.1	†
Measles	6.2	6.5	2.3	1.6	5.7	2.1	7.5	.8
Scarlet fever	10.4	4.9	6.7	1.8	3.0	2.1	5.2	1.8
Whooping cough	8.1	7.6	5.0	2.8	5.5	3.4	10.5	2.3
Meningitis	6.9	2.5	1.0	1.8	.7	1.8	.7	4.1
Diphtheria	15.0	10.0	7.1	1.9	6.1	2.2	5.3	6.0
Influenza and pneumonia (excl. bronchopneumonia)	58.2	98.6	62.9	69.1	75.3	81.7	92.4	43.3
Tuberculosis of the respiratory system and acute disseminated tuberculosis	91.7	83.8	57.9	42.2	34.7	28.1	73.9	39.6
Other forms of tuberculosis	18.7	14.7	9.3	6.5	5.8	4.1	23.5	9.2
Syphilis, locomotor ataxia, and general paralysis of the insane	8.5	11.6	11.1	9.2	10.7	9.2	1.8	6.8
Cancer and other malignant tumors	71.3	86.9	107.1	120.8	103.8	115.5	85.8	100.1
Diabetes mellitus	13.0	15.8	18.0	20.6	18.8	21.4	10.0	13.5
Cerebral hemorrhage and softening of the brain	48.3	58.6	69.5	75.6	94.9	99.2	37.5	50.0
Diseases of the heart	102.3	117.2	137.0	181.6	151.5	189.3	103.2	171.7
Diseases of the arteries	13.8	17.2	22.2	25.0	22.3	23.3	9.1	22.7
Bronchitis and bronchopneumonia	46.5	43.0	37.9	41.3	35.3	31.7	39.2	37.3
Diarrhea and enteritis††	31.4	32.5	15.5	10.0	17.0	11.0	59.7	6.7
Appendicitis and typhlitis	15.7	17.3	17.0	16.3	16.0	17.6		7.1
Hernia, intestinal obstruction†††	10.2	10.3	10.6	10.4	11.9	12.0	10.1	7.6
Cirrhosis of the liver	7.9	8.4	8.8	6.7	5.4	5.1	5.8	3.2
Acute and chronic nephritis	67.4	72.2	61.3	53.1	67.2	65.7	25.8	34.5
Puerperal septicemia and other puerperal causes	13.2	14.5	11.5	9.2	11.4	9.1	3.2	9.5
Early infancy and malformations†	29.5	35.1	32.2	32.1	28.5	27.4	28.9	24.4
Senility	28.2	13.8	9.5	7.0	24.6	18.4	58.8	45.9
Suicide	13.6	15.1	15.0	16.1	14.8	19.4	12.3	15.9
Homicide	3.5	3.2	2.9	2.9	2.5	2.7	.4	.9
Automobile accidents††	2.0	6.4	14.1	30.3	10.5	18.8		
Other accidents††	69.2	61.1	53.3	53.9	49.8	54.7	72.5	51.8
All other causes	145.7	134.8	142.6	131.0	146.0	135.9	207.3	117.2
All causes	1,038.0	1,048.7	1,013.9	1,000.0	1,018.2	1,040.9	994.5	859.8

*The population at the mid-point of each group of years is estimated by straight line interpolation between censuses. Deaths by cause are from current issues of "Mortality Statistics."

**From "New Zealand Official Year Book." Acute disseminated tuberculosis is included with other forms of tuberculosis.

***Excluding 1918.

†Less than 0.05 per 100,000.

††Includes ulcer of the duodenum, from 1910 to 1920.

†††Includes adhesions of intestines, from 1910 to 1920.

†††The rates for these causes are expressed as deaths of infants under 1 per 1,000 births.

†††Deaths from collision of automobiles with railroad trains and street cars are included in other accidents.

tion of life at birth than from an equal numerical decrease in the death rate for causes affecting elderly persons chiefly. Life expectancy at ages over 15 should be little affected, however.

Although deaths from tuberculosis and diarrhea are still far too numerous, much of the decline in specific death rates and increase in life expectancy in past years has come about because of the progress made in controlling these causes. The tuberculosis rate has been reduced in Minnesota from 110.4 to 48.7 in 18 years, and in Iowa from 40.5 to 32.2 in 5 years, the latter rate being well below that of 48.8 in New Zealand. (See table 12.) Gains have been made at all ages, but have been somewhat larger relatively among younger people. (See table 13.) Although it may be more difficult to eliminate deaths from tuberculosis than from the seven contagious or infectious diseases discussed above, a rate of 10 or less should be possible of attainment if sufficient effort is made. This should increase life expectancy at most ages.

The death rate for diarrhea and enteritis has been reduced from 51.6 to 10.0 in Minnesota and from 17.0 to 11.0 in Iowa during the years for which data are available. (See table 12.) By far the greater part of this drop occurred at ages under 1, the Minnesota rate for infants being 2,346 in 1910 but only 363 in 1930. (See table 13.) Largely because of her public health program New Zealand has made considerably more progress in controlling this cause of death, the 1932 rate for infants being only 76, about one-fifth of the Iowa figure. If proper measures are taken in Iowa it should be possible to lower both the total and the infant rates below the present New Zealand figures, with most of the gain being made by reducing infant deaths. This will have almost a maximum effect in lengthening life expectancy at birth, but comparatively little effect on the life expectancy of adults.

Although the death rate of all persons from influenza and pneumonia has been rising in Iowa and Minnesota (table 12) specific rates have declined considerably at younger ages and risen at older ages. (See table 13.) What will happen in the future is difficult to foresee. The fact that the New Zealand rate formerly exceeded the present Iowa rate but has been more than cut in half is encouraging. The program for controlling these diseases is not worked out as definitely as for tuberculosis, diarrhea and the seven contagious or infectious diseases discussed above, but the suggestion may not be too optimistic that rates for Iowa will be lowered (at the younger ages particularly) and the present level of New Zealand finally attained.

In the case of nephritis the general trend was upwards to about 1920, and then downward. Death rates at most ages in

1930 were well under the figures of 1920, but not much under those of 1910. Here as with influenza and pneumonia the encouraging fact is the low rate of New Zealand, barely half that of Iowa. This should be possible of achievement.

With malformations and causes peculiar to early infancy the recent trend has been slightly downward, but the present rate in Minnesota (32.1) is above that for 1910-14 (29.5).^{*} (See table 12.) Prospects of further improvement in Iowa do not seem especially favorable, however, for the New Zealand rate (24.4) is only a little below the Iowa rate (27.4), and only a slight decrease has occurred in New Zealand in 26 years. Perhaps the most that can be accomplished in Iowa is a reduction in injuries at birth which accounts for about 10 percent of the deaths under this heading.

So much for the favorable part of the mortality prospect. The unfavorable part includes those causes where rates have risen significantly in the past, and the experience of New Zealand is not encouraging. Most important in this class are cancer and diseases of the heart and arteries. The death rate for cancer and other malignant tumors rose from 71.3 to 120.8 in Minnesota in 18 years, most of the increase being at ages over 65. (See tables 12 and 13.) Iowa rates are similar to those for Minnesota, but the New Zealand rates are slightly lower. The fact that the trend has been upward in New Zealand is not a hopeful sign that the Iowa rate will be lowered to the New Zealand figure. Part of the past rise in the cancer death rate is the result of improved classification—many deaths due to cancer in years gone by being erroneously credited to other causes—but much of it undoubtedly is a real increase. The steady progress that has been made in diagnosing, and treating cancer indicates that further increases may be checked, but no great decrease brought about unless important discoveries are made. The latter is more than a remote possibility, for the great amount of research being done in this field may at any time yield results which will enable deaths from cancer to be reduced with somewhat the same rapidity that deaths from tuberculosis are being reduced.

Death rates for diseases of the heart and arteries have likewise followed a sharply upward course, with most of the increase at ages over 65. At ages over 75 the 1930 rate in Minnesota is 85 percent above that for 1910. (See tables 12 and 13.) Only a small part of this can be ascribed to improved classification, such as deaths formerly credited to senility now being listed under chronic myocarditis. In contrast to the prospect for controlling cancer, there is little chance that rates for diseases of the heart and arteries will be lowered appreciably. In large

^{*}These rates represent deaths under 1 per 1,000 births. Rates for other causes are shown per 100,000 persons.

TABLE 12. DEATH RATES PER 100,000 PERSONS BY AGE PERIODS FOR IMPORTANT CAUSES OF DEATH, IOWA AND MINNESOTA.*

Cause	Under 1	1-4	5-9	10-14	15-19	20-24	25-34	35-44	45-54	55-64	65-74	75+	All ages
Measles, scarlet fever, whooping cough and diphtheria													
Minnesota 1910	449	261	136	56	28	15	8	7	4	4			60
Minnesota 1930	159	43	13	6	2	4	2	1	2	1			9
Iowa 1930	214	95	28	13	5	1	1	1	2	2	2		15
Influenza and pneumonia													
Minnesota 1910	1,100	189	22	17	23	20	31	46	74	151	331	914	92
Minnesota 1930	870	81	25	14	20	19	28	42	77	142	337	1,181	93
Iowa 1930	848	93	26	11	17	24	29	48	68	136	319	1,297	102
Tuberculosis (all forms)													
Minnesota 1910	143	59	23	30	93	151	171	147	140	135	128	95	109
Minnesota 1930	30	21	7	11	30	65	73	66	63	68	78	74	49
Iowa 1930	21	11	5	5	25	37	48	42	42	51	65	56	33
Cancer and other malignant tumors													
Minnesota 1910	2	3	2	3	1	2	9	48	144	359	596	798	67
Minnesota 1930	7	5	5	4	6	7	19	64	169	400	832	1,227	122
Iowa 1930	2	4	2	3	4	10	11	51	133	329	720	1,186	116
Diabetes mellitus													
Minnesota 1910		2	4	6	7	4	5	6	24	43	77	94	12
Minnesota 1930	2	3	4	4	3	3	4	5	20	69	129	180	19
Iowa 1930		3	2	5	4	3	5	7	26	54	135	205	21
Cerebral hemorrhage and softening of the brain													
Minnesota 1910	22		1	1	2	1	5	14	56	166	451	1,018	43
Minnesota 1930	9	1	1		2	3	4	16	63	215	609	1,851	87
Iowa 1930	12	2			1	1	5	14	62	216	618	1,933	104

150

TABLE 13.—Continued

Diseases of the heart and arteries													
Minnesota 1910	52	7	15	12	13	22	33	62	130	338	903	2,311	107
Minnesota 1930	16	7	7	8	20	21	25	65	171	461	1,324	4,276	208
Iowa 1930	29	3	7	11	15	14	26	52	150	396	1,236	3,792	215
Diarrhea and enteritis													
Minnesota 1910	2,346	221	12	2	1	2	1	2	5	14	48	224	79
Minnesota 1930	363	50	6		1	1	1	3	3	8	6	41	13
Iowa 1930	330	61	2	1	1		2	1	2	4	15	82	14
Acute and chronic nephritis													
Minnesota 1910	26	10	6	5	7	13	16	39	95	194	432	1,653	57
Minnesota 1930	2	2	3	2	6	7	7	19	42	109	334	980	51
Iowa 1930	12	3		4	4	4	12	25	56	141	350	1,043	66
Violent deaths (suicide excluded)													
Minnesota 1910	117	70	30	34	48	82	78	93	86	107	113	376	75
Minnesota 1930	70	53	39	22	51	74	58	75	103	133	219	626	83
Iowa 1930	100	57	31	42	55	65	59	63	80	115	182	689	84
All other causes**													
Minnesota 1910	2,176†	197	98	82	125	167	194	227	307	440	1,145	5,183	390
Minnesota 1930	605†	121	71	57	63	105	128	174	264	617	655	1,691	268
Iowa 1930	605†	114	61	61	90	98	130	174	252	388	702	1,081	290

*From "Mortality Rates 1910-20;" also deaths from "Mortality Statistics" 1910, 1920 and 1930 divided by census population in those years.

**For all causes combined see table 8.

†Excludes deaths from early infancy (list numbers 158 to 161 in "Mortality Statistics 1930") and from malformations. The rates for these causes are as follows: Minnesota, 1910—2,898, and 1930—3,518; Iowa, 1930—3,297.

151

measure these diseases are degenerative, and subject to human control only as individuals live more intelligently. In fact, as death rates from causes more subject to human control are decreased, it will be difficult to keep rates from heart and artery diseases from rising, for death must occur from some cause.

Cerebral hemorrhage and softening of the brain have been responsible for a rapidly increasing number of deaths. This is particularly true among older people, the rate at ages 75 and over rising by more than 80 percent in 20 years in Minnesota. (See tables 12 and 13.) Here, too, the trouble is largely degenerative, but the fact that New Zealand has a rate about half that of Iowa gives some encouragement. Perhaps conditions of life can be so modified in this country that the wear and tear on the nervous system will be reduced appreciably, but at present this seems only a rather vague hope.

Future prospects for lowering rates for most of the other causes of death in tables 12 and 13 are uncertain. Death rates for diabetes are still rising in spite of the use of insulin, but the lower rate of New Zealand may eventually be attained in Iowa. With bronchitis and broncho-pneumonia, neither past trends nor the present New Zealand rates furnish a basis for expecting significant declines in the future. New Zealand has lower rates for syphilis and related causes, appendicitis, hernia and intestinal obstructions, and cirrhosis of the liver, which suggests the possibility of lower Iowa rates for these causes at some later date. The death rate for all accidents combined has been relatively unchanged in the United States, but in Iowa the recent trend has been upward, with automobile accidents contributing heavily to the rise. In Minnesota accidental deaths were relatively lower at younger ages in 1930 than 1910, but higher at ages over 45, especially over 65. Although many accidents are preventable it is a question whether the American desire for speed will permit the Iowa rate for accidents (73.5) to fall as low as that for New Zealand (51.8).

In view of the foregoing facts about death rates and their trends, what developments may be expected to occur between 1933 and 1980? This question can be answered with more assurance than the similar one for birth rates, because death rates are less subject to human control and have fluctuated less violently in Iowa and the United States during past decades. The universal practice of the best methods now known for preventing conception would practically eliminate births and reduce the birth rate almost to zero. Although there is a little chance of this extreme being reached, there is room for considerable difference of opinion as to the degree of change which the desire for small families will bring about.

Insofar as deaths are concerned, however, the bringing about of the best conditions hoped for in the fields of medicine and public health would not eliminate deaths entirely and keep people alive forever, but would simply postpone many deaths from younger ages to older ages. There is nothing in history to suggest that the human mechanism can be repaired and kept in operation indefinitely, but only that accidents, diseases and undue wear may be avoided to a greater extent than at present. On this account a continuation of past trends of death rates and expectation of life is likely to forecast the next 50 years more accurately than a similar continuation of birth rate trends. In addition, the achievements of New Zealand in securing the lowest death rate and highest expectation of life of any nation in the world may serve as a guide to the progress that can be made here.

As has been pointed out in the discussion of causes of death, past trends and the experience of New Zealand give good reasons for expecting specific death rates of children under 5 in Iowa to be lowered from 40 to 60 percent and perhaps even more between 1930 and 1980. Rates at ages 5-25 are already so low that only minor numerical gains can be made, although percentage changes should be fairly large. Among adults aged 25-45 declines of 20 to 40 percent may be obtained at ages 45-75 there seems little probability of declines averaging as large as 10 percent and at ages 75 and over increases appear more likely than decreases. Expressed in terms of expectation of life, there seems sure to be a marked increase in life expectancy at birth, and little if any increase at age 70, with intermediate gains at ages in between.

The trends that are assumed up to 1980 are shown definitely in table 9 and fig. 2. The lowest assumption is that the expectation of life at birth will increase from 62.7 years in 1930 to 65 years in 1980 because of lowered infant mortality, but that death rates and life expectancy at ages above 10 will remain as at present. The most optimistic assumption is that decreases in death rates will be large at younger ages but decline as age increases so that the expectation of life at birth will increase from 62.7 years in 1930 to 72.7 years in 1980, with gains at age 20 from 49.6 to 56.0, at age 40 from 32.4 to 37.8, at age 60 from 16.7 to 20.1 and at other ages in proportion. An intermediate assumption of medium decreases in death rates at younger ages but only slight decreases at older ages seems more probable to the writer, and places the life expectancy in 1980 at 67.7 years at birth, 51.9 years at age 20, 34.0 years at age 40 and 17.4 years at age 60. It should be emphasized, however, that the figures shown for future years are only assumptions, and that persons who believe the high or low assumptions are more probable than the medium may have as good grounds for this belief as the writer has for preferring the medium assumptions.

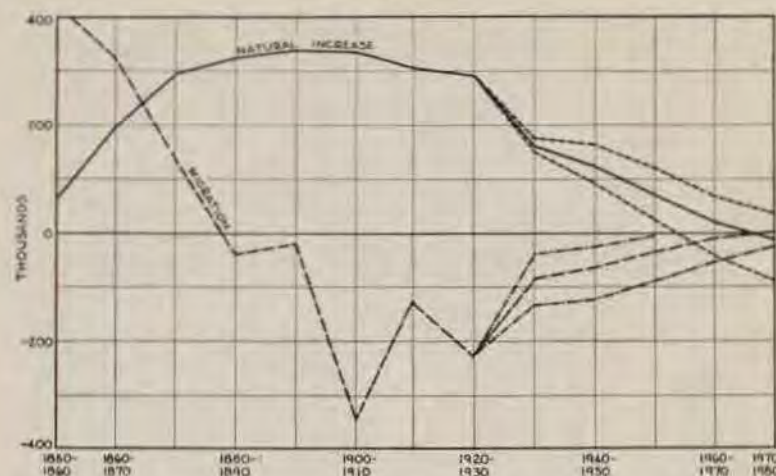


Fig. 3. Natural increase and migration of Iowa population, with estimates to 1980. (See table 15.)

NATURAL INCREASE

In 1932 there were approximately 45,300 births in Iowa and 25,786 deaths, leaving a natural increase of 19,500. Expressed in rates per 1,000 persons of all ages (the crude rates which are so commonly used) the birth rate was 18.3 the death rate 10.4 and the rate of natural increase 7.9. From these figures it would appear that the population of Iowa is capable of growing rapidly if the movement of Iowans to California and other states could be stopped, and present birth and death rates maintained. But this is another case of appearances being misleading, for the true rate of natural increase in 1933 was less than 1 per 1,000. This true rate of natural increase is the rate at which population growth would become stabilized in Iowa if birth and death rates at each age of life were to remain as they were in 1933, and if no persons moved into or out of the state.⁴¹

The fact that the true rate of natural increase is less than 1 while the crude rate is 7.9 arises chiefly from two causes. In the first place, specific birth rates of foreign-born women are now higher than those of native women (see table 4), but as the present foreign-born women pass out of the childbearing period and are not replaced by immigration the lower native-born rate will apply to the entire population. Secondly and more important, the present age composition of Iowa's population has been determined not only by birth and death rates in the state during several decades past, but by the movement of people between

⁴¹For the method of computing the rate, see Dublin, Louis I. and Lotka, A. J.: "On the True Rate of Natural Increase," *Journal of the American Statistical Association*, Vol. XX, n.s. No. 151, pp. 305-339, September, 1925.

Iowa and other states. This age composition is quite different from the one that would result eventually with the continuance of 1933 birth and death rates at each age, and the stopping of interstate migration. Under these conditions the future population would have a larger proportion of old people so that the crude death rate would be higher than now even though specific death rates remained unchanged. Likewise, such a future population would have fewer persons in the childbearing ages, 15-44, so that the crude birth rate would be lower even though present specific birth rates continued in effect.

It was pointed out earlier in this discussion that birth rates have been falling faster than death rates. If these rates continue to fall during 1934 and 1935 at the same pace followed during 1930-33 the population of Iowa will have a true rate of natural decrease by 1935 rather than of increase, and will not be reproducing itself on a permanent basis thereafter. Some growth would occur for a few years, of course, until all the present foreign-born women grew too old for childbearing, and until the age composition of the entire population completed much of the change pointed out above. But once these processes were finished, growth would end and a small decline in numbers would commence.

INTERSTATE MIGRATION

Past trends of specific death rates in various states and in the nation as a whole have been sufficiently regular to justify the belief that their course in Iowa from 1930 to 1980 can be indicated within a range of 11 percent.⁴² For specific birth rates somewhat wider limits are needed, a range of 32 percent being used between the high and low values in preceding assumptions.⁴³ If population growth within Iowa depended entirely on the births and deaths occurring there, its future trend could be indicated with equal assurance. But Iowa's growth is affected greatly by the movement of people across her boundaries, a process which has taken place on a large scale since the early days of settlement and which has been stimulated during recent years by the tremendous increase in the number of autos and in the mileage of good roads. If this interstate migration had followed definite trends in the past, its future course could be indicated with corresponding accuracy. With Iowa as with most states, however, there has been a large net movement of people into the state during certain decades and an equally large net movement away from the state during others. The rapidity with which such

⁴²The high assumption for expectation of life at birth in 1980 is 7.4 percent above the medium and the low 3.4 percent below the medium.

⁴³The range in assumption for specific birth rates is from a continuation of 1933 rates to a decline of 33 percent from 1930 to 1980. The former is 16 above the medium and the latter 16 percent below it.

TABLE 14. NUMBER OF PERSONS BORN IN IOWA BUT LIVING IN OTHER STATES, AND NUMBER OF PERSONS LIVING IN IOWA BUT BORN ELSEWHERE.*

Decade	Born in Iowa but living in other states		Living in Iowa but born in			Net gain or loss by migration**	
	Number	Percent of total born in Iowa	Other states	Foreign countries	Other states plus foreign countries	Number	In percentage of census population of Iowa
1860	37,535	16.4	376,081	166,681	482,162	444,627	65.9
1870	39,031	17.2	560,276	204,692	764,968	675,957	56.6
1880	217,389	22.8	625,650	261,650	887,300	669,911	41.2
1890	397,985	28.6	577,088	324,069	901,157	593,172	26.3
1900	554,340	29.6	609,355	305,920	906,273	351,933	15.8
1910	801,836	36.1	524,774	273,765	798,539	-3,297	-0.1
1920	919,601	36.1	543,565	225,994	769,559	-150,042	-6.2
1930	1,084,160	37.6	496,579	168,250	664,829	-419,331	-17.0

*From the following census reports:

Eighth Census of the United States, 1860, v. 1, pp. 617 and 623.

Ninth Census of the United States, 1870, v. 1, pp. 328-326.

Tenth Census of the United States, 1880, v. 1, p. 492.

Thirteenth Census of the United States, 1910, v. 1, pp. 700-701 and 832.

Fourteenth Census of the United States, 1920, v. 2, pp. 622 and 697.

Fifteenth Census of the United States, 1930, v. 2, pp. 148 and 234 also v. 1, p. 359.

**There is no way of ascertaining the number of persons born in Iowa but living outside of the United States. Presumably it is small and would decrease these figures but little.

changes have occurred is shown clearly by the population of various states in successive censuses. Decades of slow growth have been followed by others of rapid growth, and *vice versa*, the changes being much larger than could be explained by fluctuations in the excess of births over deaths.

No record is kept of persons crossing state boundaries as is done with those entering or leaving the United States, but censuses since 1860 have shown the state of birth of each person which enables the computation of the net migration during the lifetime of each census population. For example, there were 37,535 persons in 1860 who had been born in Iowa but who were living elsewhere in the United States at that time, and 482,162 living in Iowa who had been born elsewhere. The difference, 444,627, represents what the Iowa population of 1860 had gained from an excess of arrivals over departures in preceding years. (See table 14.) The high point was the gain of 675,957 shown in the 1870 census, after which the gains became smaller until a loss of 419,331 was shown in 1930. Prior to 1900 the decline in the net gain from migration was due to a rapid increase in departures of Iowans for other states, but after 1900 there was a decrease in the number of persons living in Iowa but born in other states, particularly of those born in foreign countries, which came about through the deaths of early migrants in greater numbers than the current inward movement.

The excess of arrivals over departures by decades may be calculated approximately for Iowa from the census population

and from specific birth and death rates estimated from the trends shown in tables 1, 4 and 8. Because specific birth and death rates for Iowa are known more accurately for recent decades than for those earlier, these estimates of migration are more accurate for 1920-30 than for 1840-50. But even for the earlier decades they give a rough indication of what was taking place.

According to the available data, the 1840 population if left to itself would have increased about 14,000 by 1850 from an excess of births over deaths. (See table 15.) Actually, the census showed the total increase was 149,102 or nearly 11 times as large, due to a gain of about 135,000 from an excess of arrivals over departures.²⁴ Natural increase rose rapidly during the next three decades, but so did the movement to the state; hence, up to some time between 1870 and 1880, migration was contributing more to Iowa's population growth than was natural increase. Combining the decades from 1840 to 1880, the estimated natural increase accounts for about 574,000 of the total growth of 1,581,503, leaving over 1,000,000 or almost two-thirds of the growth to be accounted for by migration to the state.

After 1880 the situation was different. By that time two-thirds of the farm land was occupied, hence Iowa was not so much more attractive to prospective farmers than other areas to the north and west. Furthermore, the population of 1,624,615 was so large that natural increase, although smaller relatively than before, was greater in number of persons. Between 1880 and 1890 an excess of births over deaths of about 326,000 was to be expected. (See table 15.) As the population increase was only 287,682, the net movement out of the state was about 38,000. In other words, Iowa, which previously was being settled to a large extent by the surplus growth of more populous states to the east, had begun in her turn to contribute a significant part of her growth to the less developed states to the west and north. The decade 1890-1900 was almost a repetition of its predecessor, but during 1900-1910 migration out of Iowa was so large—about 343,000—that it took not only all the natural increase of the population, but over 7,000 persons in addition. The outward movement dropped off rapidly from 1910 to 1920, amounting to about 126,000, or two-fifths of the natural increase of about 305,000. The decade just past saw a slight decline in excess of births over deaths to about 291,000, and a rise in the net movement to other states to about 224,000, or over three-fourths of the natural increase. Considering the 5 decades since 1880 during which Iowa has been exporting people, natural increase in the state has

²⁴More accurately stated, the gain of 135,000 represents the excess number of persons coming to Iowa from 1840 to 1850 plus births and less deaths in this group after reaching Iowa but prior to 1850, over the number of persons leaving Iowa from 1840 to 1850 plus births and less deaths in this group after departing but prior to 1850.

amounted to about 1,600,000, net migration out of the state to about 750,000, and the gain in population to 846,324.

Will the next few decades see migration out of Iowa absorb a large proportion of the natural increase, or will Iowa hold more of her people and attract more from other states? Iowa is primarily an agricultural state and has become fairly stable from an agricultural standpoint; hence, unless the type of farming changes radically, there is little reason to expect a large gain in

TABLE 15. NATURAL INCREASE AND MIGRATION, IOWA

Decade	Natural increase*		Net migration**	Total increase***
	Amount (thousands)	Per 1,000 persons†	(thousands)	(thousands)
1840-50	14	27.9	135	149
1850-60	65	29.0	418	483
1860-70	198	25.4	321	519
1870-80	297	22.0	184	431
1880-90	326	18.1	— 38	288
1890-1900	340	16.3	— 20	320
1900-10	336	13.9	— 343	— 7
1910-20	305	12.8	— 126	179
1920-30	291	11.3	— 224	67
Future as calculated:				
Low net migration††				
1930-40	153	6.0	— 38	115
1940-50	92	3.6	— 23	69
1950-60	22	.9	— 5	17
1960-70	— 43	— 1.7	none	— 43
1970-80	— 89	— 3.6	none	— 89
Medium net migration‡				
1930-40	162	6.4	— 81	81
1940-50	124	4.7	— 63	61
1950-60	70	2.6	— 35	35
1960-70	26	.7	— 10	16
1970-80	— 11	— .4	none	— 11
High net migration‡‡				
1930-40	177	6.9	— 133	44
1940-50	163	6.1	— 122	41
1950-60	119	4.3	— 90	29
1960-70	68	2.4	— 32	36
1970-80	35	1.2	— 26	9

*Calculated from birth and death rate trends shown in tables 1, 8 and 9.

**For 1840 to 1930 total increase according to the census minus calculated natural increase. For 1930 to 1980 assumed to be a specified percentage of calculated natural increase.

***For 1840 to 1930, from census reports. For 1930 to 1980, calculated from natural increase and net migration.

†One-tenth of decennial increase divided by population as of mid-point in decade.

††Assumes that the expectation of life increases from 62.7 years in 1930 to 67.7 in 1980, that specific birth rates decline 33 percent and that net migration equals 25 percent of the natural increase.

‡Assumes that the expectation of life increases to 67.7 years in 1980, that specific birth rates decline 20 percent from 1930 to 1980 and that net migration equals 50 percent of the natural increase.

‡‡Assumes that the expectation of life increases to 72.7 years in 1980, that specific birth rates decline 20 percent from 1930 to 1980 and that net migration equals 75 percent of the natural increase.

the number of persons on farms. In parts of southern Iowa where sheet erosion is serious under the present cropping system a decrease is more likely than an increase if an effective erosion control program is put into operation and the land is used chiefly for hay and pasture.

During the recent depression the suggestion has been made by some people that the present economic organization is liable to break down, in which case one of the consequences will be that agriculture will revert to peasantry. Should such great changes occur, future peasants will greatly outnumber present farmers since a family cannot handle many acres under primitive hand methods, and the rural population of Iowa will increase rapidly. But it is to be hoped that this chain of events is too improbable to consider seriously.

Much is heard at present of subsistence farms and of the possibility that they will increase rapidly in Iowa and support a much larger farm population. It must be remembered, however, that these will be merely peasant holdings unless there is an opportunity for the occupiers to do other work and thus supplement their incomes. This will not be possible on a large scale unless there is much industrial development within a reasonable distance of the subsistence farms. The future growth of population on subsistence farms, therefore, should be affected by much the same conditions as the future growth of the nonfarm population.

Does Iowa have enough potential water power sites or sufficient undeveloped mineral resources to support a large increase in population either directly by developing them, or indirectly by the manufacturing that could be based on them? Or are these advantages unnecessary? and will great industrial development occur in their absence because Iowa can offer inducements superior to those of other states in such matters as labor supply and location relative to raw materials and markets?

These questions are too complicated to discuss in detail here; the writer can only state his belief that there are enough states in a more favorable position than Iowa in these respects to absorb most of the future population growth of the United States that is likely to occur.³³ This does not mean that there will not be considerable growth of industries processing Iowa farm products—hogs, cattle, milk, corn, and cornstalks—and of industries supplying certain local needs; it only means that much growth of other industries supplying out-of-state markets is not to be expected. It is true, of course, that there was little reason beforehand for expecting the automobile industry to develop in Michigan and to swell its population so greatly since 1910. With most

³³For estimates of future population growth in the United States see table 16.

industries, however, the influence of power, sources of raw materials and labor, and the location of the consuming public are apparent. Having an alluring climate has contributed much to population growth in California and Florida, but Iowa cannot hope to attract many people by this means.

In addition to these rather specific factors affecting migration to Iowa, there are certain general causes at work which should lessen the importance of migration in determining future trends of population growth in most states. These are the restrictions on immigration from foreign countries, and the rapid slowing up of the excess of births over deaths which seems sure to continue in the United States. Many thousands of immigrants have settled in certain states in years past, but the present temper of the nation indicates that strict limitation of the numbers entering will continue indefinitely, ruling out large future gains to a state from this source. Greatly exceeding the arrival of foreigners has been the migration of natives from states where the population was increasing more rapidly than opportunities for making a good living, to states more sparsely populated in relation to their opportunities at the time. With the gradual disappearance of population growth in these states of human overproduction there will be a smaller increase to provide for, hence a lessening of the expulsive force and of the outward movement should follow. Furthermore, the interstate flow of people on such a vast scale in the past no doubt has had an equalizing effect on population density relative to opportunity, so that differentials in the pull of certain states on the decreasing surplus populations of other states should be diminishing.

That Iowa will continue to have an excess of births over deaths for at least 2 or 3 decades in the future is shown rather conclusively by birth and death rate trends. That part of this natural increase will leave the state seems equally certain in view of the fact that the net outward movement amounted to 77 percent of the natural increase during 1920-1930, to 41 percent during 1910-1920, to 102 percent during 1900-1910, and averaged 74 percent during the 3 decades. There seems little likelihood, however, that the outward movement will absorb all of the natural increase, thus preventing any population growth from that source; in fact an outward movement amounting to 75 percent of the natural increase seems high and is the highest used here. (See table 15.) More probable is a lowering of the proportion departing to 50 percent of the natural increase as the latter becomes smaller because the birth rate continues to decline more rapidly than the death rate. Indeed, unless the expectation of life is lengthened rapidly and the fall of the birth rate speedily checked, the excess of births over deaths will disappear between 1955 and 1960 and

comparatively little increase in opportunities for support will be necessary to provide for the gain in population between now and 1955. Under these conditions it would be surprising if migration exceeded 25 percent of the natural increase, the lowest assumption used here.

When deaths finally exceed births in Iowa and there is a natural decrease, will the net outward movement continue or will arrivals exceed departures? Perhaps the most reasonable assumption at the present time is that the two will balance. Conditions which will cause deaths to exceed births in Iowa will affect all states in a similar manner, so that by the time this condition is reached in Iowa few states will have a large excess of births while many will have an excess of deaths.²⁶ The latter group probably will attract persons from the former for a time, but it seems doubtful that Iowa will either receive or contribute on a large scale.

FUTURE POPULATION OF IOWA

In the discussion so far the past trends in birth rates, expectation of life and migration have been described; probable future trends have been indicated within fairly narrow limits, trends in migration have been presented within wider limits. Reasons for expecting these trends have also been presented. The next step is to combine assumptions as to future birth rates, expectation of life and migration and ascertain what population will result.

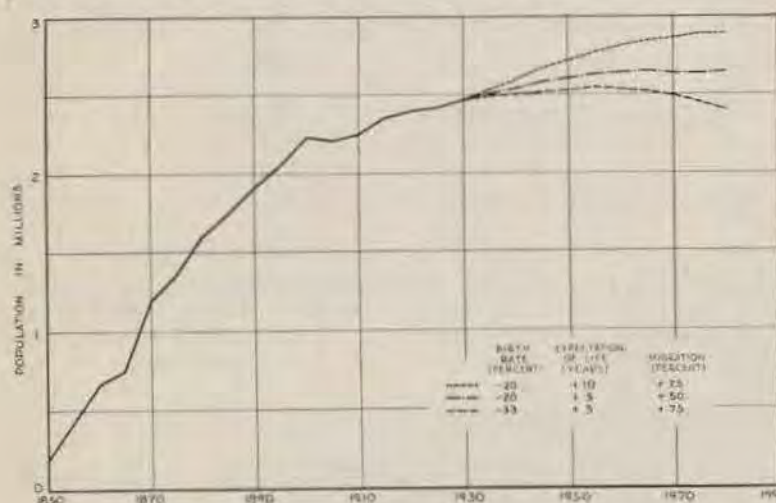


Fig. 4. Population of Iowa, with estimates to 1980. (See table 16.)

²⁶Fewer births than deaths were registered in Nevada in 1932.

With three variables to deal with, the number of combinations that could be made is large. Certain of them are quite improbable, however, and may be dismissed. For example, there is little

TABLE 16. POPULATION, AND AMOUNT AND RATE OF INCREASE, IOWA AND THE UNITED STATES.*

Year	IOWA			United States		
	Population (thousands)	Increase during decade ending in year indicated		Population (millions)	Increase during decade ending in year indicated	
		Number (thousands)	Percentage		Number (millions)	Percentage
1790				3.9		
1800				5.3	1.4	35.1
1810				7.2	1.9	36.4
1820				9.6	2.4	33.1
1830				12.9	3.3	33.5
1840	43.1			17.1	4.2	32.7
1850	193.2	149.1	345.8	23.2	6.1	35.9
1860	674.9	482.7	251.1	31.4	8.3	35.6
1870	1,194.0	519.1	76.9	39.8	8.4	26.6
1880	1,624.6	430.6	36.1	50.2	10.3	26.0
1890	1,911.9	287.3	17.7	62.9	12.8	25.6
1900	2,251.9	340.0	16.7	76.0	13.0	20.7
1910	2,224.8	— 7.1	— .3	92.0	16.0	21.0
1920	2,404.0	179.2	8.1	105.7	13.7	14.9
1930	2,470.9	66.9	2.8	122.8	17.1	16.1

Future as calculated**

Low***						
1940	2,510.0	39.0	1.6	131.0	8.0	6.6
1950	2,533.0	23.0	.9	136.0	5.0	3.6
1960	2,540.0	6.0	.2	136.0	—	.2
1970	2,497.0	— 42.0	— 1.7	132.0	— 3.0	— 2.6
1980	2,408.0	— 89.0	— 3.6	126.0	— 6.0	— 4.5
Medium†						
1940	2,558.0	82.0	3.3	133.0	10.0	8.4
1950	2,616.0	63.0	2.5	143.0	10.0	7.3
1960	2,651.0	36.0	1.4	150.0	7.0	4.9
1970	2,662.0	10.0	.4	154.0	4.0	2.6
1980	2,651.0	— 11.0	— .4	155.0	1.0	.9
High††						
1940	2,605.0	134.0	5.4	135.0	12.0	9.5
1950	2,727.0	122.0	4.7	151.0	14.0	10.6
1960	2,817.0	90.0	3.3	167.0	15.0	9.9
1970	2,869.0	52.0	1.8	184.0	15.0	9.1
1980	2,894.0	26.0	.9	202.0	15.0	8.6

*For 1790 to 1930 from "Fifteenth Census of the United States, 1930," Vol. I, pp. 6 and 10-12, except revised United States data used in 1870 and 1880 from "Fourteenth Census of the United States, 1920," Vol. II, pp. 15, 29.

**For United States from "Population Trends in the United States," table 88, Columns B, H and J.

***For Iowa, assumes expectation of life increases from 62.7 in 1930 to 67.7 in 1980, specific birth rates decline 33 percent from 1930 to 1980 and net migration from the state amounts to 75 percent of the decennial population growth by excess of births over deaths.

†For Iowa, assumes that expectation of life increases from 62.7 in 1930 to 67.7 in 1980, specific birth rates decline 20 percent from 1930 to 1980 and net migration amounts to 50 percent of the excess of births over deaths.

††For Iowa, assumes that expectation of life increases from 62.7 in 1930 to 72.7 in 1980, specific birth rates decline 20 percent from 1930 to 1980 and net migration amounts to 25 percent of the excess of births over deaths.

‡Less than 50,000.

likelihood that birth rates and expectation of life will follow the lowest trend described and migration the highest, for such a combination would reduce Iowa's population at a rate entirely incompatible with the nation's growth and Iowa's resources. Equally improbable is the following of highest trends by birth rates and expectation of life and of the lowest trend by migration and the great expansion of opportunities that would be required to provide for such a rapid increase in the state's inhabitants. Neither of these combinations will be made.

To illustrate the smallest future growth in Iowa's population that seems likely to occur, a 5-year increase in the expectation of life from 62.7 years in 1930 to 67.7 years in 1980 has been combined with a 33 percent decrease in specific birth rates from 1930 to 1980 and the migration of 75 percent of the natural increase. If these trends are followed the population will increase from 2,471,000 in 1930 to a maximum of 2,540,000 between 1955 and 1960. (See table 16.) After that it will decline slowly at first and then more rapidly until it will be down to 2,408,000 in 1980, or about at the 1920 figure. Similarly low trends in the entire United States will result in an increase from 122,800,000 persons in 1930 to a maximum of about 136,500,000 in 1955 followed by a decline to about 126,000,000 in 1980, only slightly in excess of the present population.

The largest increase in the population of Iowa that seems probable may be indicated by assuming that the expectation of life will increase 10 years (twice the above), that birth rates by age will decline 20 percent (three-fifths the above) and that migration outward will amount to 25 percent of the natural increase. According to these trends population growth will diminish slowly, and the population will not reach a maximum until about 1985 when there will be almost 2,900,000 persons in the state. This is 425,000, or 17 percent, in excess of the 1930 population, and it is only half the increase in the 50 years from 1880 to 1930.

The highest assumptions for birth rates, death rates and immigration for the United States that have been combined by the Scripps Foundation for Research in Population Problems show the nation's population amounting to 202,000,000 in 1980 and still increasing fairly rapidly. (See table 16.) But these assumptions are an increase of about 12 years in the expectation of life at birth, the net arrival of 200,000 immigrants annually during 1935-39 and 300,000 annually after 1940, and the maintenance of specific birth rates of native white women at 95 percent of the 1930-34 rates. The 12-year gain in life expectancy may be achieved, but there seems little prospect of so many immigrants being admitted beginning with 1935, and no prospect of

the decline in birth rates being checked so abruptly. It is probable, therefore, that 175,000,000 is much more reasonable as an upper limit of the population of the United States.

More probable in the opinion of the writer than either the high or low trends for Iowa described above is a combination of a 5-year increase in life expectancy (as in the low) with a 20 percent decrease in birth rates by age (as in the high), and with 50 percent of the natural increase migrating. In this event the population will grow at a gradually diminishing rate until it reaches a maximum of about 2,662,000 shortly after 1970, and will then decline to 2,651,000 in 1980 with indications of a somewhat accelerated drop in the future. Total future growth will thus be a little under 200,000, which is less than that from 1910 to 1930. A comparable trend for the United States will mean the slowing up of growth so that by 1980 the population will be about at its maximum—155,000,000 persons.

Although it is practically certain that the actual population growth of Iowa and the United States in the future will not follow exactly any of the courses just described, the evidence presented earlier makes a fairly strong case for expecting it to lie between the high and low figures. Judging from recent events the Iowa population is more likely to be somewhat under the medium figures than above them. From 1900 to 1930 growth averages 79,700 in 10 years, or at the rate of 3.4 percent. The medium trend shows an increase from 1930 to 1940 at about the same rate—3.3 percent—but exceeding 80,000 in numbers. In view of the past downward trend in growth, a lower rate for

TABLE 17. FUTURE POPULATION OF IOWA IF EXPECTATION OF LIFE INCREASES 10 YEARS FROM 1930 TO 1980, SPECIFIC BIRTH RATES DECLINE 20 PERCENT AND NET MIGRATION FROM STATE EQUALS 25 PERCENT OF NATURAL INCREASE. (THOUSANDS)

Age	1930	1935	1940	1945	1950	1955	1960	1965	1970	1975	1980
0-4	220	199	198	200	199	194	186	181	178	177	176
5-9	243	224	202	202	204	204	198	191	186	182	182
10-14	236	239	221	199	199	202	201	196	189	184	182
15-19	224	232	236	218	197	196	199	199	195	188	183
20-24	301	218	228	232	215	193	193	196	197	193	186
25-29	180	195	213	222	226	209	189	190	194	194	191
30-34	175	175	190	207	216	222	205	186	187	191	193
35-39	178	170	171	186	203	212	218	201	183	184	189
40-44	168	172	165	166	181	199	208	214	198	180	182
45-49	145	162	167	160	161	176	194	204	210	194	177
50-54	126	138	146	160	154	156	171	189	199	205	190
55-59	108	118	130	138	153	148	150	165	183	193	206
60-64	92	98	109	121	129	144	140	143	158	176	186
65-69	73	81	87	98	110	118	133	130	134	149	166
70-74	54	59	66	73	83	95	103	117	116	120	134
75+	57	67	76	87	98	112	128	143	162	172	179
All ages	2,471	2,540	2,605	2,668	2,727	2,778	2,817	2,847	2,869	2,885	2,904

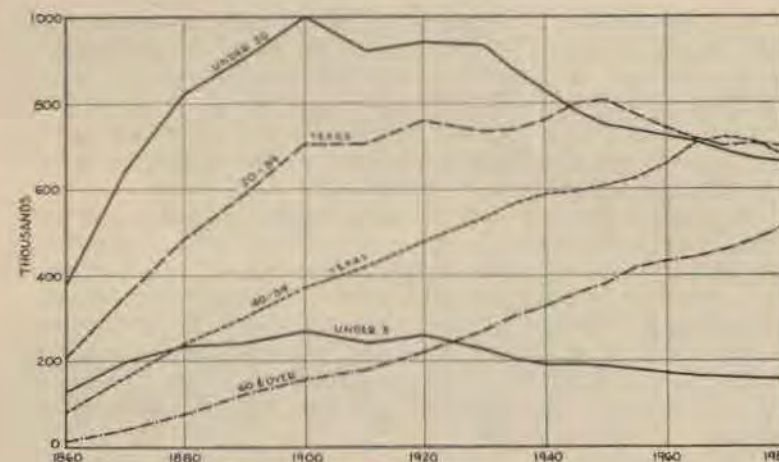


Fig. 5. Age changes in Iowa population, with estimates to 1980. (See table 19.)

these 10 years would be expected. Again, the medium trend assumes birth rates by age will decline only 20 percent in 50 years, in comparison with a drop of 33 percent in the last 30 years. Manifestly the decline will have to be checked sharply within a few years to stay within the 20 percent limit assumed.

CHANGES IN AGE

The slowing up of population growth in Iowa and the United States during coming decades will be accompanied by marked changes in age composition. These will take place regardless of whether the high or low trends previously described are followed, although the changes will be somewhat greater in the former case than the latter. In general, the proportion of persons in the younger age groups will decline, the proportion in the older age groups will increase rapidly, while the middle group will be relatively unchanged. As a result, the average age of the population will rise considerably.

There is no prospect of an increase in the number of children in Iowa, but it is not certain how rapidly they will become less numerous. According to the high assumption, children under 5 will decrease gradually from 220,000 in 1930 to 175,000 in 1980 (table 17), according to the low assumptions the fall will be to 122,000 (table 18), while the medium assumptions give the intermediate figure of 165,000. (See table 19 and fig. 5.) Similar trends will be followed by the number of children 5-9 and 10-14. These changes will have a marked effect on school enrollment and on the demand for things used primarily by children.

At ages 15-24 all three assumptions show increases will occur

for a time, followed by decreases which will make persons of these ages less numerous in 1955 than at present, with further declines in later years. A majority of high school students and almost all college students are in this age group. Moreover, it is during these ages that about half of the women and one-fourth of the men marry, and that most persons enter gainful occupations for the first time.

Persons of the best working ages (25-39) will increase until 1950 or later according to all three assumptions, but will begin to decrease subsequently. In 1980 they will be more numerous than in 1930 if the high or medium trends are followed, but under the low trends they will have declined below 1930 figures before 1970. It is during these ages that the earning power of individuals is likely to be at its maximum, and that marriage is entered into by three-fifths of the men and two-fifths of the women.

Middle-aged persons (40-54) will become more numerous until 1965 or later, and will be holding most of these gains by 1980. The low assumptions show about 20 percent more persons of these ages in 1980 than in 1930, while the high assumptions show a number larger by almost 30 percent. Most of the men in this group are gainfully occupied in normal times, but in recent years much has been heard of "deadlines" in industry, of employees being laid off at 50 for reasons associated with age, and of no new employees being hired who were over 40.

Persons 55 and over show a steady increase in numbers from 1930 to 1980, according to all three assumptions, with the rate of increase going up as the age rises. The high assumptions show

TABLE 18. FUTURE POPULATION OF IOWA IF EXPECTATION OF LIFE INCREASES 5 YEARS FROM 1930 TO 1980, SPECIFIC BIRTH RATES DECLINE 33 PERCENT AND NET MIGRATION FROM STATE EQUALS 75 PERCENT OF NATURAL INCREASE. (THOUSANDS).

Age	1930	1935	1940	1945	1950	1955	1960	1965	1970	1975	1980
0-4	220	193	182	178	172	162	151	142	134	128	122
5-9	242	220	194	183	180	175	166	156	146	138	131
10-14	236	230	214	189	189	177	174	165	155	145	137
15-19	224	230	231	210	188	178	178	172	164	154	144
20-24	201	213	221	224	204	182	176	174	171	162	152
25-29	180	189	203	212	216	200	180	174	172	169	161
30-34	175	176	180	195	206	212	197	177	171	170	167
35-39	178	167	164	174	190	202	208	194	175	169	167
40-44	168	170	160	168	169	185	197	204	190	172	166
45-49	146	160	162	154	152	164	180	192	199	185	169
50-54	126	136	142	154	147	146	158	174	186	193	180
55-59	108	117	127	132	145	139	139	150	166	178	184
60-64	92	97	106	116	122	134	128	139	146	154	165
65-69	73	80	84	92	101	108	117	113	113	123	136
70-74	54	58	64	68	75	82	86	95	92	92	100
75+	57	67	75	83	90	98	107	115	125	128	129
All ages	2,471	2,494	2,510	2,524	2,539	2,539	2,540	2,526	2,497	2,458	2,408

TABLE 19. FUTURE POPULATION OF IOWA IF EXPECTATION OF LIFE INCREASES 5 YEARS FROM 1930 TO 1980, SPECIFIC BIRTH RATES DECLINE 20 PERCENT AND NET MIGRATION FROM STATE EQUALS 50 PERCENT OF NATURAL INCREASE. (THOUSANDS).

Age	1930	1935	1940	1945	1950	1955	1960	1965	1970	1975	1980
0-4	220	196	193	194	191	184	177	171	169	167	165
5-9	242	222	197	195	196	195	188	181	176	174	172
10-14	236	238	217	199	191	193	192	187	180	175	173
15-19	224	231	232	213	190	188	191	191	185	178	174
20-24	201	216	224	227	208	185	185	188	189	184	177
25-29	180	192	207	216	220	202	181	182	185	186	182
30-34	173	173	185	200	210	214	198	178	179	183	184
35-39	178	169	167	179	195	205	210	194	173	176	180
40-44	158	171	163	161	174	190	200	205	190	172	173
45-49	145	161	164	156	156	168	184	194	200	186	168
50-54	126	137	143	156	149	140	162	177	188	194	180
55-59	108	118	128	134	147	141	141	154	169	179	185
60-64	92	98	107	117	123	136	130	131	142	157	167
65-69	73	80	85	93	102	108	119	114	115	125	138
70-74	54	58	64	68	75	83	87	96	93	93	102
75+	57	67	75	83	90	98	108	116	127	130	131
All ages	2,471	2,515	2,553	2,587	2,616	2,638	2,651	2,659	2,662	2,660	2,651

more than twice as many aged 55-74 in 1980 as in 1930, and more than three times as many 75 and older, while the low assumptions show increases of about 75 percent and 125 percent, respectively. At these older ages the ability to work and the openings available decline rapidly, so that after 70 most people are either living on what they have saved earlier in life, or else they are dependent on relatives or friends, are inmates of institutions, or are supported by pensions.

PLANNING FOR THE FUTURE

The slowing up of population growth in Iowa which is to be expected and the rise in average age which will accompany it will have numerous and varied effects. Only a few of these have been hinted at in the preceding discussion; to set them forth in the detail they merit is an important task that should be undertaken soon. Having this information available will make it possible to prepare plans for keeping various developments in Iowa in step with population changes, and at the same time will show to what extent it may be desirable to attempt to influence population changes in certain directions.

Some of the effects of slower growth and rising age may be harmful, particularly if not foreseen and discounted by a planned program. For example, if the number of children of elementary school age is going to decrease by 20 to 45 percent, it is desirable to avoid an over expansion of elementary school buildings relative to children, unless some other use for them can be developed, perhaps in connection with adult education. Similarly, some of the beneficial effects of future changes may not be realized to the fullest degree if the changes are not recognized in advance and

if proper preparations are not made. As an illustration, if it is generally realized that population growth is slowing up rapidly, it may be possible for the worship of size—the largest city, the biggest factory, the tallest building—which is so much an obsession of American people, to be replaced by more consideration for quality, and hence for life to be enriched in many ways.

The working out of plans for keeping developments in Iowa in step with population changes should raise the question as to how large a population would be most desirable for the state. The future course of population growth need not be left entirely to chance, but may be influenced by conscious and concerted effort. This is true with regard to mortality rates, for the decrease in deaths from certain causes will depend largely on the organized public health movement. Less certain is the extent to which birth rates may be affected, but it is possible that certain economic and social pressures can be developed that will accelerate or retard the decline in the birth rate, depending on the goal it is desired to attain.

Probably the easiest to control is the interstate migration of people, which depends to quite an extent on the economic opportunities offered in Iowa as compared with other places. More Iowans can be kept at home and more outsiders attracted to the state as more good jobs are made available. Success in expanding industrial activity and increasing employment openings depends on natural advantages to an important degree, but conditions subject to human control should not be overlooked. For example, the cost of living may be made sufficiently low on well organized subsistence farms projects in Iowa so that employers can secure a better labor force for the same wages here than elsewhere. On this account they may decide to expand their business in Iowa rather than in another state possessing advantages in power or raw materials.

Although a program to stimulate population growth in Iowa may be in line with past ideals and thus sound more attractive than one based on less increase, experiences during the recent depression have made it clear that too large a population may be a burden, particularly when it means more unemployment, more persons dependent on private and public relief agencies, and lowered standards of living.

In making plans for Iowa's future, therefore, careful consideration should be given to the population growth and changes that are likely to occur so that other developments may be kept in balance. At the same time there should be a thorough study of opportunities for supporting population in Iowa in comparison with other states to help in attaining this balance, and as the basis for any attempts to accelerate or retard the speed at which the population changes will take place.

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