Oklahoma

Farm Manpower Needs

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Findings of the Study

This study supplies two estimates of the manpower requirements in Oklahoma's agriculture during 1950 to 1960.

1. The first estimate assumes that the number of adult farm males will remain constant throughout the period. Accordingly, Oklahoma will need 34,304, or 57 per cent, of the 60,198 farm males reaching 20 years of age to replace the expected death and retirement losses.

2. The second estimate assumes that the annual rate of decline in numbers of Oklahoma farms during 1950 to 1954 will continue throughout the decade 1950-60. Accordingly, the number of farms in 1960 will decrease to a point which will require not only none of the farm boys reaching age 20 during 1950-60 for replacement, but also that 17,491, or one sixth, of those adult males on farms in 1950, and still living in 1960, must find non-agricultural employment.

3. Both projections reveal an expected future supply of farm youths far in excess of agriculture's manpower requirements during the decade 1950-60. It will be necessary for half, or more, of the young farm boys reaching maturity during the present decade to migrate to towns and cities for employment.

4. Approximately 20,000 boys study vocational subjects in Oklahoma high schools each year. However, only about 21 per cent of all boys taking vocational courses are studying non-agricultural subjects.

5. The Oklahoma high schools located in rural areas, in farming areas and in towns with fewer than 2,500 population, have only about 400 boys in both trade and industrial education and distributive education subjects, while over 12,000 are enrolled in vocational agriculture. In other words, only 3 per cent of the rural high school boys studying vocational subjects are taking non-agricultural subjects.

6. The costs of maintenance and equipment exclude trade and industrial courses, to a large extent, from the small high schools. Hence, high schools offer inadequate vocational training programs for those farm youths who must migrate to towns and cities and do not attend college. Therefore, the need is for a more diversified curriculum to train the young people for a wide variety of occupational outlets. A bill (S. 1298) designed specifically to accomplish this objective by authorizing the establishment of area trade schools was introduced in the United States Senate in the first session of the 85th Congress.

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The size of Oklahoma's agricultural labor force during the decade 1950-60 will be affected by four major factors: **First,** the number of adult farm males dying; **second,** the number retiring; **third,** the number of young men available for replacements; and **fourth,** the number of farm job opportunities.

The number of adult males residing on farms in 1950 who will die by 1960 is predictable, as is also that of boys living on farms in 1950 who will reach working age and still be living in 1960. Then, with some degree of certainty, and upon certain assumptions, one may calculate the number of adult farm males who will retire by 1960.

Unlike the first three factors, the number of farm job opportunities available during 1950 to 1960 is not accurately predictable. Yet, changes will surely occur in business conditions, numbers of farms, and farm technology which will affect manpower requirements.

In this study, the manpower requirements of Oklahoma's agriculture during 1950-60 were computed under two assumptions: **First,** that agriculture's manpower requirements will remain stationary, *i.e.,* the number of adult farm males will remain constant throughout the decade, and **second,** that manpower requirements will decrease proportionately to the projected decline in numbers of farms.

The four major objectives of this study were to determine:

1. The number of adult farm males who will either die or retire between 1950 and 1960.

2. The number of farm boys who will be available as replacements during the decade.

3. The replacement ratios of adult farm males for each state economic area.

4. The relationship between replacement requirements and educational curricula for farm youths.

Number of Men Entering and Leaving Working Age Groups, 1950-60

There were 144,951 males 20-64 years of age living on Oklahoma farms in 1950.[1] During the 1950-60 decade, 10,336 of these will die before reaching age 65, and 23,968 will retire at age 65, making a total loss during the decade of 34,304 males (Table 1).[2] This latter number represents the replacement necessary to maintain the adult farm male population 20-64 years of age at the 1950 level. However, 60,198 farm-reared boys will reach age 20 during the decade and will compete for these 34,304 vacancies.

Assuming no change in the number of males 20-64 years of age on Oklahoma farms during this decade, 25,894 young farm men, or 43 percent of that age group, necessarily, must seek employment in non-farm occupations. Or, if all young men are to stay on farms, it will require the creation of 25,894 new farms or agricultural job opportunities, because the vacancies resulting from death and retirement will be sufficient to absorb only 34,304, or 57 per cent, of the available young farm men.

Table 1 gives the numbers of male workers needed to replace the older men dying and retiring from farming in each of the 11 economic areas of the state. (The map, Figure 1, shows the economic areas used in this analysis.) The proportion of the total death and retirement displacement is approximately the same from one economic area to another, with death accounting for a total of 30 per cent, and retirement for 70 per cent, of all probable vacancies.

Replacement requirements are highest in north-central Oklahoma. Economic Area 2 will need 70 per cent of all farm-reared males reaching age 20 and surviving to 1960 to maintain a stationary agricultural labor force. Economic Area 3 has the second greatest, with 64 per cent of all potential young farm males being needed to replace workers leaving the labor force. However, only 46 per cent of the young men reaching

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[1] The nonwhite male population 55 to 64 years of age was adjusted for errors in misstatement of age. See methodological appendix for a description of the adjustment technique.

[2] It was assumed that the working age farm group included all farm males between the ages of 20 and 64. For the purpose of these computations, it was assumed that a farm male on reaching age 20 begins active work and that a man, on reaching his 65th birthday, retires from work. That some males of working age do not engage in any productive farm work, while some do not cease gainful employment upon reaching retirement age, has no effect on male replacement requirements or ratios.
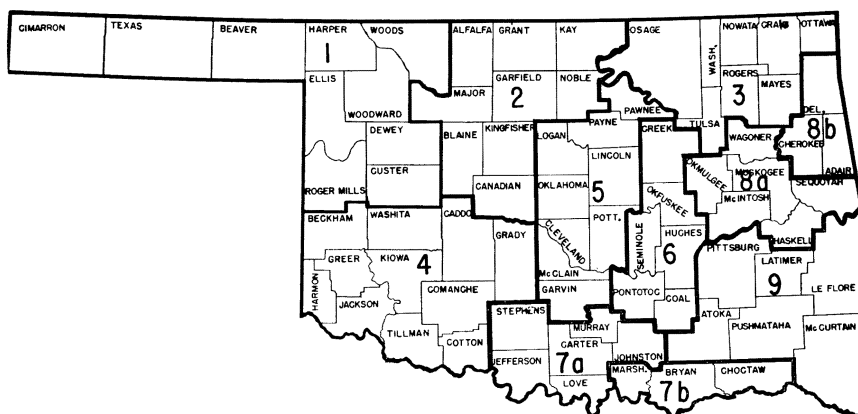
Figure 1—Economic Areas of Oklahoma.

working age in Economic Area 8a and half of those in Economic Area 9 will find opportunities on farms. Obviously, the others have no choice but to pursue other endeavors.

Table 1—Number of Oklahoma Rural-Farm Males Lost by Death and Retirement and Number of Males Arriving at Age 20 Needed for Replacement, 1950-60.

Economic Area	Number of Rural-Farm Males, 20-64 in 1950*	Number of Rural-Farm Males Lost by Death & Retirement, 1950-60	Rural-Farm Males Reaching Age 20 during 1950-60 and Surviving to 1960	
			Number	Per Cent Required for Re-placement
OKLAHOMA	144,951	34,304	60,198	57
1	11,425	2,316	4,077	57
2	16,142	3,751	5,370	70
3	15,188	3,749	5,896	64
4	22,252	4,848	8,885	55
5	18,863	4,727	7,750	61
6	11,810	2,990	5,392	55
7a	8,250	1,993	3,383	59
7b	5,798	1,433	2,681	53
8a	13,601	3,169	6,826	46
8b	7,253	1,842	3,115	59
9	14,369	3,486	6,823	51

* Nonwhite males 55-64 years of age corrected for misstatements of ages. See the appendix for the description of this adjustment.

Replacement Ratios of Farm Males of Working Ages

A statistical measure of replacement requirements is the extent, absolute or relative, to which the population reaching working age exceeds or replaces those who leave the working ages during a given period. This measure is also called a "replacement ratio."[3]

Table 2 shows that Oklahoma had more boys on farms in 1950 than needed subsequently in agriculture during 1950-60. For every 100 men who either die or retire, 175 young men will be ready to enter the farm labor force. In other words, to maintain the number of adult farm males at the 1950 level will require only 100 out of every 175 farm-reared youth maturing during 1950-60. For every 100 youths needed as replacements, 75 may be spared between 1950 and 1960 without reducing the number of farm men of working ages.

Table 2 reveals that for every 100 men dying or retiring in each respective racial group, there will be 189 colored compared to only 174 white boys available as farm replacements. This differential arises from higher natural increase in the colored than in the white farm population.

Variations in Replacement Ratios among Economic Areas

Table 2 also shows the specific areas of Oklahoma in which the greatest and least farm manpower surpluses are likely to develop during the decade 1950-60. Each economic area will have more than a sufficient number of maturing young men to replace the older men

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[3]   The male replacement ratio, as defined here, is the ratio of farm boys reaching age 20 during 1950 to 1960 and surviving to the end of the decade to each 100 farm men 20-64 years of age who die or pass the age of retirement at 65 during 1950-60. This ratio is computed from the number of men entering and leaving working age groups: (1) The number of entrants is the number of farm males 10-19 years of age in 1950, who can be expected to reach their 20th birthday and survive to 1960, and (2) the number of departures is the number of adult farm men 20-64 years of age in 1950 expected to die or reach the retirement age of 65 by 1960.

A replacement ratio of 100 indicates that the number of farm boys entering the labor force equals the number of farm men who will die or retire during 1950-60. Further, it shows that all farm-reared males attaining the age of 20 and surviving to 1960 will be needed to replace the adult farm males lost from death and retirement. A replacement ratio of more than 100 indicates a replacement excess or surplus of young men. while a ratio of less than 100 indicates a deficiency of young men entering the working age to replace the older men who may be expected to leave the farm working force. In other words, if the ratio is greater than 100 there is a larger number of persons entering the working age groups than leaving; and, if the ratio is less than 100, the number of persons leaving the working age groups is larger than the number entering. See methodological appendix for method of determining replacement ratios.

Table 2—Replacement Ratios of Rural-Farm Males, 20-64 Years of Age, by Race, Oklahoma, 1950-60.

Economic Area	Replacement Ratio		
	White	Nonwhite*	Total
OKLAHOMA	174	189	175
1	175	---	176
2	142	164	143
3	157	161	157
4	183	198	183
5	163	184	164
6	175	203	180
7a	171	153	170
7b	185	201	187
8a	221	195	215
8b	168	175	169
9	196	194	196

* Ratios computed only when there were 100 or more departures from the labor force by death or retirement during 1950-60.

dying and retiring. The greatest excesses of young farm men will develop in the east-central and southeastern counties, while the smallest surpluses will occur in north-central and northeastern Oklahoma. In Economic Area 8a, there will be 215 young men entering for every 100 men departing from the labor force. The next highest replacement ratio, 196, occurs in Economic Area 9, which is comprised of six southeastern counties. Economic Area 7b, located in southeastern Oklahoma, ranks third highest with 187.

In contrast, Economic Area 2 has a farm male replacement ratio of 143, which is the lowest in the state. Likewise, this area has the smallest surplus of farm boys above replacements for older men. Economic Area 3, with a ratio of 157, has the second lowest replacement ratio for 1950-60. In general, the low-income areas have higher replacement ratios and greater surpluses of young farm men than those with high incomes.

Replacement Requirements, Based upon Projected Change in Numbers of Farms

The above male replacement ratios were computed upon the assumption of constant job opportunities in Oklahoma's agriculture during 1950 to 1960. In some areas of the state, the farm employment outlook probably has reached a level consistent with the most efficient agricultural operations. As a whole, however, Oklahoma has not attained this level; and, certainly, there are no immediate future prospects

Table 3—Expected Change in Numbers of Farms, 1950-60 by Economic Areas, Oklahoma.

Economic Area	Number of Farms in 1950	Expected Number of Farms in 1960*	Expected Change in Farms, 1950-60 Number	Expected Change in Farms, 1950-60 Per Cent
OKLAHOMA	142,246	92,081	—50,165	—35.3
1	12,424	9,511	— 2,913	—23.4
2	17,466	13,288	— 4,178	—23.9
3	14,618	8,998	— 5,620	—38.4
4	21,891	14,509	— 7,382	—33.7
5	18,656	12,945	— 5,711	—30.6
6	10,894	5,550	— 5,344	—49.1
7a	7,939	4,924	— 3,015	—38.0
7b	5,406	3,010	— 2,396	—44.3
8a	12,667	7,335	— 5,332	—42.1
8b	6,651	3,866	— 2,785	—41.9
9	13,634	8,145	— 5,489	—40.3

* The expected numbers of farms on April 1, 1960 were estimated on the assumption that the change in number of farms, by size groups, in each economic area between April 1, 1950 and November 15, 1954 would continue at the same annual rate during the ten-year period. The average date of enumeration for the 1954 census was assumed to be November 15.

for a numerical increase in the size of the farm labor force. Rather, recent trends indicate a continuation of the decline in number and an increase in the size of farms as agriculture becomes more and more mechanized. Therefore, the anticipated 1960 manpower requirements in Oklahoma agriculture are smaller than for 1950.

The number of Oklahoma farms declined from 142,246 in

Table 4—Expected Change in Number of Farms during 1950-60, by Size, Oklahoma.*

Size of Farms	Number of Farms, 1950	Expected Number of Farms, 1960	Expected Change in Farms 1950-60 Number	Expected Change in Farms 1950-60 Per Cent
OKLAHOMA	142,246	92,081	—50,165	—35.3
Under 3 acres	1,602	2,569	967	60.4
3-9	6,199	4,139	— 2,060	—33.2
10-29	10,365	5,838	— 4,527	—43.7
30-49	11,493	5,512	— 5,981	—52.0
50-69	6,659	2,500	— 4,159	—62.5
70-99	15,866	6,561	— 9,305	—58.6
100-139	12,049	4,734	— 7,315	—60.7
140-179	24,380	10,951	—13,429	—55.1
180-219	7,594	3,941	— 3,653	—48.1
220-259	8,015	5,577	— 2,438	—30.4
260-499	24,676	21,825	— 2,851	—11.6
500-999	9,302	12,080	2,778	29.9
1.000 acres & over	4,046	5,854	1,808	44.7

* The expected numbers of farms in 1960, by size groups, were estimated by assuming the annual rate of change in each economic area, by size, between April 1, 1950, and November 15, 1954 would remain constant during the ten-year period April 1, 1950-April 1, 1960.

Table 5—Expected Change in Rural-Farm Population, 1950-60, by Economic Areas, Oklahoma.

Economic Area	Rural-Farm Population, 1950*	Rural-Farm Population per Farm, 1950	Expected Rural-Farm Population, 1960**	Expected Change in Rural-Farm Population, 1950-60	
				Number	Per Cent
OKLAHOMA	553,066	3.89	353,859	—199,207	—36.0
1	41,046	3.30	31,386	— 9,660	—23.5
2	56,414	3.23	42,920	— 13,494	—23.9
3	56,644	3.87	34,822	— 21,822	—38.5
4	82,389	3.76	54,554	— 27,835	—33.8
5	71,337	3.82	49,450	— 21,887	—30.7
6	47,143	4.33	24,032	— 23,111	—49.0
7a	31,008	3.91	19,253	— 11,755	—37.9
7b	23,122	4.28	12,883	— 10,239	—44.3
8a	56,471	4.46	32,714	— 23,757	—42.1
8b	28,774	4.33	16,740	— 12,034	—41.8
9	58,718	4.31	35,105	— 23,613	—40.2

* Based on 1950 new urban definition.
** The expected 1960 rural-farm population, by economic areas, was estimated by assuming that the average number of rural-farm persons per farm would remain the same as in 1950.

1950 to 118,979 in 1954, a loss of 23,267, or 16 per cent. If this decrease continues at the same annual rate between 1954 and 1960 as from 1950-54, Oklahoma will have only slightly more than 92,000 farms on April 1, 1960, which will be about 50,000 fewer, or 35 per cent less, than in 1950 (Table 3).

Two contrasting trends in the size of farms are expected to occur between 1950 and 1960 (Table 4). On the one hand, the number of farms and ranches 500 acres and over is expected to increase as smaller farms are consolidated into larger ones in order to make more efficient use of machinery. At the same time, a relatively marked growth in the number of small farms under 3 acres in size is also expected, especially in counties having large cities. This signifies a pronounced acceleration in part-time farming and suburban residences.

This 50,000 decline in the number of farms, with no decrease in the average number of persons per farm, will reduce the 1960 Oklahoma farm population to 354,000, or 36 per cent less than in 1950 (Table 5).[4]

[4] During the previous decade, 1940-50, the number of Oklahoma farms decreased from 179,687 in 1940 to 142,246, a loss of 20.8 per cent. This proportionate decline is smaller than that projected for the decade 1950-60. Between 1940 and 1950, the farm population declined from 926,741 to 553,255 persons, a decrease of 40.3 per cent. Therefore, the anticipated decline in farm population between 1950 and 1960 is less than that for the previous decade. However, if the same relationship between farm population and farm decline between 1940 to 1950 continues during 1950 to 1960, a 35 per cent decline in the number of farms will result in a greater loss in farm population than the expected 36 per cent.

Table 6—Expected Change in Numbers of Rural-Farm Males, 1950-60, and Expected Surplus of Farm Males, by Economic Areas, Oklahoma.

Economic Area	(1) Number of Rural-Farm Males, 20-64 Years of Age, 1950	(2) Number of Rural-Farm Males, 20-64 Years of Age per Farm, 1950	(3) Number of Males, 20-64 Lost by Death and Retirement, 1950-60	(4) Number of Rural-Farm Males, 20-64 Surviving to 1960 (Col. 1-3)	(5) Expected Number of Rural-Farm Males, 20-64, April 1, 1960*	(6) Expected Surplus of Farm Males, 20-64 Years of Age, 1950-60 Number (Col. 4-5)	(7) Expected Surplus of Farm Males, 20-64 Years of Age, 1950-60 Per Cent (Col. 6/4)
OKLAHOMA	144,951	1.02	34,304	110,647	93,156	17,491	15.8
1	11,425	.92	2,316	9,109	8,750	359	3.9
2	16,142	.92	3,751	12,391	12,225	166	1.3
3	15,188	1.04	3,749	11,439	9,358	2,081	18.2
4	22,252	1.02	4,848	17,404	14,799	2,605	15.0
5	18,863	1.01	4,727	14,136	13,074	1,062	7.5
6	11,810	1.08	2,990	8,820	5,994	2,826	32.0
7a	8,250	1.04	1,993	6,257	5,121	1,136	18.2
7b	5,798	1.07	1,433	4,365	3,221	1,144	26.2
8a	13,601	1.07	3,169	10,432	7,848	2,584	24.8
8b	7,253	1.09	1,842	5,411	4,214	1,197	22.1
9	14,369	1.05	3,486	10,883	8,552	2,331	21.4

* The expected number of rural-farm males in 1960 was estimated by assuming that the average number of farm males, 20-64 years of age, per farm will remain the same as in 1950.

Assuming that the number of farm males, 20-64 years of age, per farm remains the same in 1960 as in 1950, the 50,000 expected reduction in numbers of farms will shrink the number of farm males of this age group from 144,951 in 1950 to 93,156 in 1960 (Table 6).[5] Although 34,304 of the 144,951 farm males 20-64 years of age in 1950 are expected either to die or to retire during this decade, there will be 110,647 still residing on farms in 1960, if there is no net migration from farms. Hence, 17,491 of the males 20-64 years of age living on farms in 1950 must seek non-farm employment. In other words, one sixth of the 1950 farm males who survive to 1960 will not find farm employment if the adult farm male population declines to 93,156 persons.

Further technological change during the present decade may stimulate an even greater consolidation of farms as compared with 1940-50. With a steadily increasing farm efficiency through 1960, the attrition in the farm population and labor force will be greater than these projections show. The 1960 projection of the number of adult males makes no allowance for an increase in the productivity of workers, such as that experienced between 1924 and 1954, which will result in a further displacement of labor.[6]

Some young potential farmers, of course, will enter farming and ranching in Oklahoma during 1950-60. But, every one remaining on the farm will displace an additional 1950 adult farm male still living in 1960, if the anticipated reduction in the 1960 labor force occurs.

Relationship between Replacement Requirements and Educational Curricula

Nearly twice as many potential farm male workers will reach age 20 during 1950 to 1960 as Oklahoma's agriculture can employ in crop and livestock production without expanding the size of the industry. A similar situation also applies to farm females. If the numbers of

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[5] In 1940, there were 239,219 males 20-64 years of age, residing on the 179,687 Oklahoma farms, an average of 1.33 per farm. By 1950, there were 144,951 males of this age group on the 142,246 farms, an average of 1.02 per farm. If the 1940-50 decline in the number of adult males per farm continues, there will be fewer than 93,156 residing on the 92,081 estimated 1960 farms. Therefore, the 1960 estimate of the number of farm males 20-64 years of age is conservative.

[6] The output per worker in Oklahoma agriculture almost doubled during this 30-year period. See: James D. Tarver and Leo V. Blakley, "Changes in Farm Worker Productivity in Oklahoma," *Oklahoma Current Farm Economics*, Vol. 29, No. 5, October, 1956, pp. 83-93.

farms continue to decline throughout 1950 to 1960 as between 1950 to 1954, agricultural industry can absorb none of the young farm boys reaching age 20 without displacing a similar number of adult farm males. In fact, farm consolidation and technological changes will displace as many as 17,500 of those adult males who were on farms in 1950.

Thus, half, or more, of the young farm people reaching maturity must enter non-farm occupations.[7] These expectations have certain noteworthy implications for educational programs for farm youth.

The task of preparing a large proportion of Oklahoma's farm youth for non-agricultural and specialized agriculturally-related occupations is a major one. Vocational training and guidance programs must be established and strengthened to equip these migrants adequately for non-agricultural work.

Those Oklahoma high school boys studying vocational agriculture who enter college and continue their study in the same field will find ample job opportunities in the various occupations in agriculture. In fact, prospective employers have difficulty hiring college graduates trained in agriculture.[8] However, most jobs are in fields other than farming or ranching.

A recent study shows that throughout the industry, with over 500 distinct occupations in eight major fields, agriculture needs about 15,000 college graduates per year. The colleges produce only 8,500 graduates with agricultural training.[9]

Of the 15,000 college graduates annually needed in agriculture, farming and ranching can employ about 2,000. The majority, then, must enter employment related to agriculture, but necessary thereto. Food processing, manufacturing, and similar industries require about 3,000. Education will take 3,000, while to marketing, transportation, banking, and like businesses another 3,000 will go. This leaves 1,500 for services, 1,000 for research, 1,000 for conservation. and 500 for communication.

High school graduation ends the formal education of many farm children, although some of them go to college. For those youths not

[7] During the decade of 1940 to 1950, there was a net migration from Oklahoma farms of over 70 per cent of the youths 10-19 years of age in 1940. See: James D. Tarver, *Population Change and Migration in Oklahoma, 1940-50,* Oklahoma AES Bull. No. B-485, Jan., 1957, Table 2.

[8] Loren Donelson, "We'd Like to Hire More Farm Boys," *Farm Journal,* June, 1957, pp. 38, 39, and 92.

[9] Association of Land-Grant Colleges and Universities, *Careers Ahead,* 1955, p. 3.

going to college, vocational training for future life and work is particularly significant.

Recent high school vocational enrollment figures reveal that very few farm boys study non-agricultural vocational education subjects. While vocational agriculture classes enroll more than 16,000 Oklahoma high school boys, fewer than 4,000 study vocational trade and industrial education, with only about 400 in vocational distributive education (Table 7). The Oklahoma high schools located in farming areas and in towns with fewer than 2,500 inhabitants have only a little more than 400 boys in both distributive education and trade and industrial education subjects, but have over 12,000 in agriculture. In other words, only 3 per cent of the rural high school boys studying vocational subjects take non-agricultural courses.

A partial solution to this problem, seemingly, would be to modify the content of the vocational agriculture program so as to include the development of more skills which are as useful off as on the farm. All education must meet the needs of the people according to the modes of life which technology forces upon them. Otherwise it may lose its prestige and functional value.

The various economic areas of Oklahoma offer unequal opportunities for farm youth to enter farming itself. Economic Areas 2 and 3 can use a larger percentage of the young farm males without expanding the opportunities in agriculture above the 1950 level. Economic Area 8a can use only 46 per cent of its on-coming boys, while Area 9 can employ only one half of its young potential farmers. These differentials indicate that some variation in educational curricula among the areas is virtually mandatory. Certainly, a need exists for greater stress and emphasis upon vocational courses which prepare youths for careers other than farming and ranching in areas of the state having the greatest surpluses of farm youth than in those with smallest surpluses.

Generally, the areas of lowest farm income have the highest birth rates and farm male replacement ratios. Conversely, replacement requirements are lowest in these areas, and they are precisely where the greatest emigration of farm youths will occur. Such areas have the greatest need for non-agricultural vocational education of farm youth. Yet, very few of their high school students have access to that type of education; and, the reason is obvious. Unless high schools serving farm youth offer such courses, the young people not entering college will have acquired few and meager skills when they migrate to non-farm areas.

Popular interest in this type of vocational education problem

Table 7—High School Boys Taking Vocational Education Courses in the Fields of Agriculture, Trades and Industry, and Distributive Education, by Economic Area, Oklahoma.

Economic Area	Total Enrollment				Enrollment in High Schools Located in Rural Areas			
	Total	Vocational Agricultural Education, 1954-55	Vocational Trade and Industrial Education, 1955-56	Vocational Distributive Education, 1954-55	Total	Vocational Agricultural Education	Vocational Trade and Industrial Education	Vocational Distributive Education
OKLAHOMA	20,634	16,361	3,840	433	12,779	12,358	368	53
1	1,375	1,248	127	---	1,004	1,004	--	--
2	1,870	1,713	134	23	1,301	1,301	--	--
3	2,285	1,406	786	93	990	933	29	28
4	2,730	2,435	244	51	1,836	1,836	--	--
5	4,055	2,511	1,410	134	1,774	1,733	41	--
6	1,387	1,279	92	16	884	884	--	--
7a	1,042	925	102	15	764	764	--	--
7b	918	812	87	19	624	624	--	--
8a	1,744	1,239	463	42	945	900	20	25
8b	665	604	61	--	581	520	61	--
9	2,563	2,189	334	40	2,076	1,859	217	--

is active, although it remains somewhat inarticulate at present. In 1957, Senate Bill S.1298 came up in the First Session of the 85th Congress proposing to establish and maintain area vocational school programs at the secondary level. Thus far, the bill has not become law, however.

A wide occupational range is available to Oklahoma's youth, many of whom will continue to find opportunities to engage in farming, and some future farmers will come from the children of present farm and city families. Therefore, the need for educational curricula to prepare them for a variety of occupations, including farming and homemaking, will continue.

Summary

The major findings of this study are summarized below.

1. In 1950, 144,951 males 20-64 years of age lived on Oklahoma farms. Between 1950 and 1960, the losses from death in this age group will exceed 10,000 and nearly 24,000 will retire at age 65, making a total loss during the decade of slightly more than 34,000.

2. Meanwhile, over 60,000 surviving farm boys will have attained age 20 by 1960 and will compete for these 34,000 vacancies. Unless new demands arise for farm labor, it will be necessary for 26,000 young farm men to enter non-agricultural occupations.

3. The farm male replacement ratio for Oklahoma during the decade 1950-60 is 175. That is, for every 100 farm men who die between the ages of 20 and 64, or reach the age of retirement at 65, there will be 175 young men reaching the age of 20 ready to take their places by 1960.

4. To maintain the number of adult farm males at the 1950 level will require only 100 out of every 175 farm-reared youths maturing during 1950-60. For every 100 youths needed as replacements, 75 may be spared without reducing the number of farm men 20-64 years of age.

5. The male replacement ratio of Oklahoma nonwhites is 189 compared to 174 for whites.

6. Recent trends indicate that the manpower requirements in Oklahoma agriculture will decline during 1950 to 1960. If the number of farms continues to decline at the same annual rate between 1954 to 1960 as from 1950 to 1954, Oklahoma will have only slightly more than 92,000 farms by April 1, 1960, or 50,000 fewer than in 1950.

7. If the farm population decline is proportional to that expected in numbers of farms, there will be nearly 200,000 fewer farm people in 1960, or 36 per cent less, than in 1950.

8. The 50,000 reduction in numbers of farms by 1960 is expected to decrease the number of adult farm males, 20-64 years of age, from roughly 145,000 in 1950 to barely 93,000 in 1960, a decline of almost 52,000.

9. If, during 1950-60, the numbers of farms decline by 50,000, and the numbers of adult farm males by 52,000, none of the 60,000 farm boys who reach age 20 during 1950-60 will be needed in farming and ranching. Furthermore, it will be necessary to eliminate some 17,000 adult males living on farms in 1950 from the anticipated farm manpower supply for 1960.

10. Some young potential farmers will enter the agricultural labor force in Oklahoma during 1950-60, but each one of them will displace an additional 1950 adult farm male still living in 1960, if the anticipated reduction in the 1960 labor force occurs.

11. It will be necessary for half, or more, of the young farm boys reaching maturity during the present decade to migrate to towns and cities for employment.

12. High school vocational education enrollment figures indicate clearly that non-agricultural vocational courses need to be increased and expanded in those areas of the state with the greatest potential surpluses of farm youth.

13. While it would be too costly for small schools to offer vocational trade and industrial education courses, with school busses, larger high schools could give such courses organized on a county basis. Senate Bill S.1298, 1st Session, 85th Congress of the United States, specifically contemplated vocational courses for students by assisting states in establishing and maintaining area trade schools.

Methodological Appendix

Adjustment of Nonwhite Population Data. The decennial censuses of population show evidence of marked misstatements of age, particularly among Negroes 55-69 years of age. Table 8 corrects age misstatements for the 1950 Oklahoma nonwhite male population in this age group. Proportional adjustments were made for the urban, rural-nonfarm, and rural-farm males. This involved, first, obtaining the ratio of the nonwhite to the white male population 50 years of age and over and, second, calculating five other ratios for ages 55 and over, 60 and over, 65 and over, 70 and over, and 75 and over. The computed ratios for ages 60 and over and 65 and over were rejected to assure a regular decline throughout the age span, and corrected values of these ratios were inter-

Table 8—Original and Adjusted Nonwhite Male Population, Oklahoma, 1950 (New Urban Definition).

Age	Enumerated Population, 1950	Adjusted Population, 1950	Adjustments in 1950 Population
OKLAHOMA	20,160	20,160	0
50-54	4,625	4,625	--
55-59	4,028	4,188	+160
60-64	3,242	3,553	+311
65-69	3,497	3,026	—471
70-74	2,189	2,189	--
75 & over	2,579	2,579	--

polated from the four remaining ratios, using Lagrange's (Waring's) formula, which is as follows:

$$\frac{f(x)}{(x-a_0)(x-a_1)\ldots(x-a_n)} = \frac{f(a_0)}{(x-a_0)(a_0-a_1)(a_0-a_2)\ldots(a_0-a_n)}$$
$$+ \frac{f(a_1)}{(x-a_1)(a_1-a_0)\ldots(a_1-a_n)}$$
$$+ \frac{f(a_n)}{(x-a_n)(a_n-a_0)\ldots(a_n-a_{n-1})}$$

Since f(x) is a polynominal of degree n its divided differences of order (n+1) are zero, i.e., $f(a_0, a_1, a_2, \ldots a_n, x) = 0.$[10]

This adjustment for the overstatement of nonwhites 65-69 years of age increased the 1950 Oklahoma rural-farm nonwhite males between 55 and 59 years from 1,133 to 1,178 and those 60-64 years of age from 977 to 1,071. This correction increased the number of rural-farm non-white males 20-64 years of age from 11,572 to 11,711.

Survival Rates for 1950-60. In computing the farm male replacement ratios, it was assumed that mortality rates will continue to decline to 1960. Table 9 shows the 1949-51 age-specific death rates of Oklahoma and U.S. white and nonwhite males and projected 1960 rates. The projected 1960 Oklahoma mortality rates were computed as follows: **First,** it was assumed that the ratio of the 1949-51 Oklahoma age-specific death rate to the U. S. rate will also prevail in 1960. **Second,** the annual 1930-54 U.S. mortality rates were projected to 1960 using the least squares method by fitting both a straight line and quadratic, using

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[10] Edmund Whittaker and G. Robinson, *The Calculus of Observations*, Blackie & Son, Ltd., London and Glasgow, Fourth Edition, 1948, pp. 28-29. Also see: Thomas N.E. Greville, *United States Life Tables and Actuarial Tables, 1939-41, Sixteenth Census of the United States,* 1946, pp. 110-12.

Table 9—Death Rates of White and Nonwhite Males 1949-51 and Projected Rates for 1960, United States and Oklahoma.

	Age-Specific Death Rates per 1,000 Population (nMx's)							
	1949-51*				Projected 1960			
Age	White Male		Nonwhite Male		White Male		Nonwhite Male	
	U.S.	Okla.	U.S.	Okla.	U.S.	Okla.**	U.S.	Okla.**
Under 1	31.63	32.01	51.11	48.63	24.6	24.9	41.6	39.6
1-4	1.34	1.61	2.47	3.39	.7	.9	1.4	2.0
5-9	.70	.81	.99	.91	.5	.5	.6	.6
10-14	.69	.74	1.03	1.35	.5	.5	.6	.8
15-19	1.30	1.46	2.17	1.95	1.0	1.1	1.4	1.3
20-24	1.68	2.00	3.57	3.81	1.6	1.9	2.5	2.7
25-29	1.68	1.69	4.31	4.26	1.3	1.3	2.9	2.8
30-34	2.01	2.17	5.51	5.15	1.5	1.6	3.6	3.4
35-39	2.95	2.98	7.10	6.32	2.2	2.3	5.0	4.5
40-44	4.76	4.10	10.34	8.67	3.7	3.2	7.6	6.4
45-49	7.72	6.69	14.72	12.42	6.5	5.7	11.9	10.0
50-54	12.20	10.63	23.32	16.98	11.3	9.9	21.1	15.4
55-59	18.94	16.57	30.98	23.35	17.5	15.3	27.7	20.9
60-64	27.96	23.58	38.49	29.42	26.7	22.5	35.6	27.2
65-69	40.47	34.56	53.80	38.51	38.4	32.8	50.0	35.8
70-74	59.74	52.60	62.10	58.26	55.0	47.9	55.8	52.3
75-79	90.68	82.42	85.18	78.43	83.9	76.3	71.7	66.0
80-84	131.78	123.80	91.95	112.32	122.8	115.4	91.1	111.3
85 & Over	219.73	223.86	167.53	213.74	200.6	204.4	103.3	131.7

* The July 1, 1950 populations of the United States and Oklahoma under 1 and 1-4 were adjusted for net census undercount.

**These projected age-specific mortality rates have been rounded to four decimal places, or to tenths per one thousand population. Rates containing one additional digit, or five decimal places, were employed in computing the hypothetical 1960 Oklahoma abridged life tables. The life table stationary populations derived from these life tables are shown in Table 10.

Source: The July 1, 1950 U. S. population was obtained from U. S. Dept. of Commerce, Bureau of the Census, *Current Population Reports, Population Estimates*, Series P-25, No. 121. The 1949, 1950, and 1951 recorded deaths were taken from the 1949, 1950, and 1951 annual *Vital Statistics of the United States* Volumes, National Office of Vital Statistics.

logarithms.[11] The 1960 straight line mortality projections of the U.S. males were used for all ages except 0-1 for whites and 1-4 for nonwhites, in which cases the quadratics were chosen; and, in ages 55-59 and 85 and over for the whites and 75-79, 80-84, and 85 and over for nonwhites, where apparent inconsistencies and irregularities were adjusted. **Third,** then the projected 1960 age-specific mortality rates for Oklahoma males were computed, using the ratios of Oklahoma to the comparable U.S. rates during 1949-51.

Fourth, hypothetical 1960 abridged life tables were computed for Oklahoma white and nonwhite males, using the projected 1960 mortality

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[11] Exponential curves were computed by the least squares method using the following equations:
    Straight line: $\log y = a + bx$
    Quadratic: $\log y = a + bx + cx^2$

rates.[12] Greville's method of abridged life table construction was employed.[13]

Table 10 shows the 1949-51 and projected 1960 life table stationary populations and ten-year survival rates. The average ten-year survival rates for the years 1949-51 and 1960 were applied to the farm males 20-54 years of age on April 1, 1950, to determine the number expected to die before April 1, 1960.

Formula for Computing Replacement Ratios for Males 20-64 Years of Age. The 1950-60 Oklahoma farm male replacement ratios were computed by the following equation:

$$R = \frac{r_1\, P_1 + r_2\, P_2}{P_{10} + P_{11} + \sum\limits_{i=3} Pi\, (1-r_i)} \times 100$$

The r_i's denote ten-year survival rates for males by five-year age groups and P_i's denote the 1950 populations by five-year age groups. r_1 is the ten-year survival rate for males 10-14 in 1950; r_2, the survival rate for those 15-19 . . . . r_9, 50-54; P_1 = population 10-14, P_2 = 15-19 . . . . P_9 = 50-54, P_{10} = 55-59, and P_{11} = 60-64. The ratio is expressed in terms of the number of males, age 10-19 in 1950, who will survive to 1960 per 100 males ages 20-64 in 1950 who will either die or reach age 65 by April 1, 1960.

This formula makes no allowance for any net migration from farms between 1950 and 1960. Therefore, inherent in the computations, is the assumption that the number of adult farm males in 1960 will remain equal to the number in 1950.

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[12] The separation factors for Oklahoma white and nonwhite males age 0 were projected to 1960, by the least squares method by fitting a straight line to 1929-31, 1939-41, and 1949-51 fo's from U.S. life tables. For nonwhite males, the fo from 1929-31 U. S. Negro life table was used. The projected 1960 fo for white males was .07254, and that for the nonwhite males, .11525. The separation factors were computed by the following formula:

$$L_0 = f l_0 + (1-f) l_1 \quad \text{where}$$
$$f = \frac{L_0 - l_1}{l_0 - l_1}$$

[13] T.N.E. Greville, "Short Methods of Constructing Abridged Life Tables," *The Record of the American Institute of Actuaries*, Vol. XXXII, Part One, No. 65, June, 1943, pp. 29-42; and, Louis I. Dublin, A. J. Lotka, and Mortimer Spiegelman, *Length of Life*, The Ronald Press Company, New York, Revised Edition, 1949, pp. 312-16.

Table 10—Life Table Stationary Populations and Ten-Year Survival Rates for White and Nonwhite Males, Oklahoma, 1949-51, 1960, and Average of 1949-51 and 1960 in Ages 10-14 to 50-54.

	Stationary Populations (Lx)			
Age	White Male		Nonwhite Male	
	1949-51	Projected 1960	1949-51	Projected 1960
0-4	482,956	487,238	467,557	479,598
5-9	479,959	485,424	461,624	476,173
10-14	478,258	484,180	459,291	474,534
15-19	475,692	482,245	455,689	472,070
20-24	471,507	478,702	449,090	467,561
25-29	467,171	474,922	440,049	461,203
30-34	463,784	471,596	430,152	454,155
35-39	456,927	467,176	418,411	445,415
40-44	449,047	460,909	403,129	433,674
45-49	437,318	450,989	382,682	416,535
50-54	419,051	434,160	355,965	391,273
55-59	391,786	408,092	322,622	357,719
60-64	354,851	371,743	282,759	317,544
65-69	307,622	324,305	236,060	271,624
70-74	248,436	265,715	185,110	218,527
75 +	353,496	404,204	264,620	384,722

Ten-Year Survival Rates (r)

					Average 1949-51 and 1960 Survival Rates, Ages 10-14 to 50-54	
					White Male	Nonwhite Male
0-4 to 10-14	.99027	.99372	.98232	.98944	--	--
5-9 to 15-19	.99111	.99345	.98714	.99138	--	--
10-14 to 20-24	.98588	.98869	.97779	.98531	.98729	.98155
15-19 to 25-29	.98209	.98481	.96568	.97698	.98345	.97133
20-24 to 30-34	.98362	.98516	.95783	.97133	.98439	.96458
25-29 to 35-39	.97807	.98369	.95083	.96577	.98088	.95830
30-34 to 40-44	.96822	.97734	.93718	.95490	.97278	.94604
35-39 to 45-49	.95709	.96535	.91461	.93516	.96122	.92489
40-44 to 50-54	.93320	.94196	.88301	.90223	.93758	.89262
45-49 to 55-59	.89588	.90488	.84306	.85880	.90038	.85093
50-54 to 60-64	.84680	.85624	.79434	.81157	.85152	.80296
55-59 to 65-69	.78518	.79469	.73169	.75932	--	--
60-64 to 70-74	.70011	.71478	.65466	.68818	--	--
65 + to 75 + *	.38865	.40655	.38586	.43975	--	--

$$^* \quad r_{65+} = \frac{T_{75\text{-}79}}{T_{65\text{-}69}} = \frac{L_{75+}}{L_{65+}}$$

Source: The 1949-51 stationary life table populations were obtained from U. S. Department of Health, Education, and Welfare, National Office of Vital Statistics, Vital Statistics—Special Reports Vol. 41, Supplement 35, *Oklahoma State Life Tables, 1949-51.*