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Adjustment of Rural Resource Use and Characteristics to Economic Growth

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Adjustment of Rural Resource Use and Characteristics to Economic Growth

by H.A. Henderson

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Agricultural Experiment Station

Knoxville

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U. S. Department of Agriculture

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Summary, Conclusions and Implications

THE general purpose of this study was to determine the nature of the contribution of resources by rural households to general economic growth and the influence of this contribution on the amount and quality of resources the rural households retained.

- An enumerative survey of 506 randomly-selected rural households in a 7-county area of the Upper East Tennessee Valley provided primary data for the study.

- Industrial growth of the sample counties has been almost twice as rapid as in the nation as a whole. This industrial growth gave rural households opportunities to make rapid adjustments from farming to nonfarm activities. In spite of these adjustments, low farm incomes have persisted.

- Resources of rural households in the sample area in 1958 had many characteristics that limited their earnings and restricted their transfer to other uses. The people had limited formal schooling; a small percentage were of the usually employable ages; many had handicaps that prevented their employment; and a high percentage were surviving widows and other aged people. Capital was largely in farm land and other investments that could not be easily changed to enterprises that appear more profitable. Land was in small ownership units and in small soil mapping units that were difficult to combine into larger units suitable for farm mechanization.

- The characteristics of the present people arose, at least in part, from selective transfer of employable persons to other areas, and to urban parts of the sample area. About half of the youth leave the area at about age 20—when they complete school—and enter the productive labor force of other areas.

- Both youths who leave the area and those who obtain local nonfarm jobs have considerably more formal schooling than those in local farm employment. The selective migration of educated youth also removes from the area much of the capital invested in their rearing and education. The amount of this capital contribution to other areas was \$660 to \$990 per household annually. This annual contribution was equal to from 6% to 10% of their entire net worth and from one-sixth to one-fourth of their net family earnings in 1957.

● Resources for potential development are much greater than the present inventory indicates. Youth with a median education of 12 years is entering the labor force at about the annual rate of 2.1% of the total population or one-eighth of the present nonfarm labor force. Capital could apparently be increased 50% by borrowing. Land could be used more intensively without exceeding normally accepted conservation tolerances. Many former residents will return if economic opportunity becomes available to them locally.

● Although some emigration may persist for several years, it cannot continue indefinitely at past rates. Birth rates in the area have historically been considerably higher than in the nation as a whole, which has permitted rapid local population growth as well as emigration of large numbers. Birth rates have recently changed from higher to lower than the nation as a whole because of removal of much of the child-bearing population.

● The process of using resources from farming to expand the nonfarm sector is not without end. As the farm sector continues to be smaller in number of people—especially those of child-bearing age—resources it is able to furnish to other sectors will likewise diminish. Resources for continued economic development must then come from other industries.

Adjustment of Rural Resource Use and Characteristics To Economic Growth

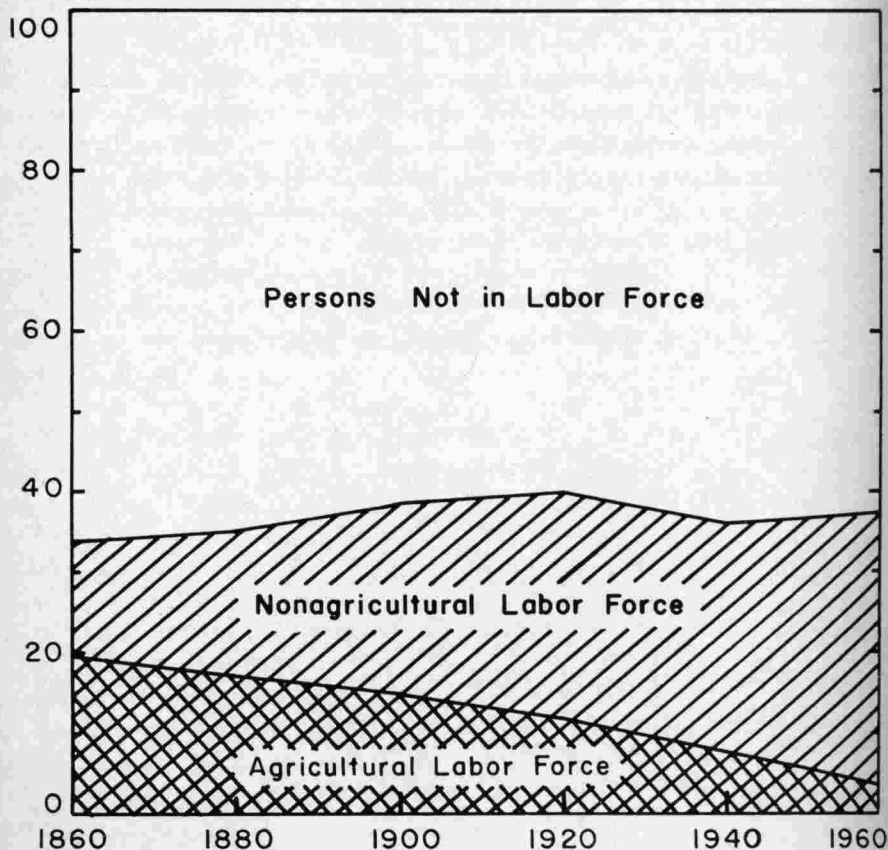
by H. A. Henderson*

General Background of Problem

AS increases in efficiency of agriculture and other "old" industries take place, some of the resources formerly used in these "old" industries may be used to produce new products in new industries. As industrial activities expand, the amount of resources used in nonfarm industries likewise usually expand (Fig. 1).

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PERCENT



Source of data: *The Farm Index*, Jan. 1963, p. 7.

Figure 1. Labor force by industry, United States, 1860-1960.

As more products per person are produced—either through more efficient production in the established industries or the production of new goods in new industries—economic growth or prosperity may be achieved and the level of living may be raised.

Purpose of the Study

The general purpose of this study was to determine the nature of the contribution of resources of rural households to general economic growth of this and other areas of the nation and the influence of this contribution on the amount and quality of resources the rural households retained. The area studied is one that has had rapid growth in nonfarm activities—yet where low-farm incomes have persisted. For such an area, the specific objectives were to determine:

1. The kind and amounts of resources that were furnished by rural households to other sectors in the process of development.
2. How the kind and amount of resources held by rural households after a period of rapid development were influenced by this adjustment.
3. Potential resources for further development of the area.
4. The process of resource adjustment during economic development.

Procedure

A 7-county area that has made rapid adjustments from farming to nonfarm activity was selected as the sample area. The general area and the specific counties were selected by subjective methods as being a low farm-income area that has had considerable recent development in local and nearby nonfarm activities.

Within these counties a random block sample of rural areas was drawn at the rate of about 1 to 80¹. The sample was, therefore, statistically representative of only the rural areas of the seven counties in 1957 and 1958, and the area as a case study. However, the general findings should be useful in other areas with similar conditions. General characteristics of the area and the nature of development are described briefly here and more elaborately elsewhere².

¹The sample was drawn in the Statistical Standards Division, Agricultural Marketing Service, U. S. Department of Agriculture, now in the Economic Research Service.

²Harold Alpheus Henderson, *Economic Progress and Resource Adjustments of Rural Households in the Upper East Tennessee Valley*, Ph.D. Thesis, Purdue University, Lafayette, Indiana, January, 1963, Chapter II.

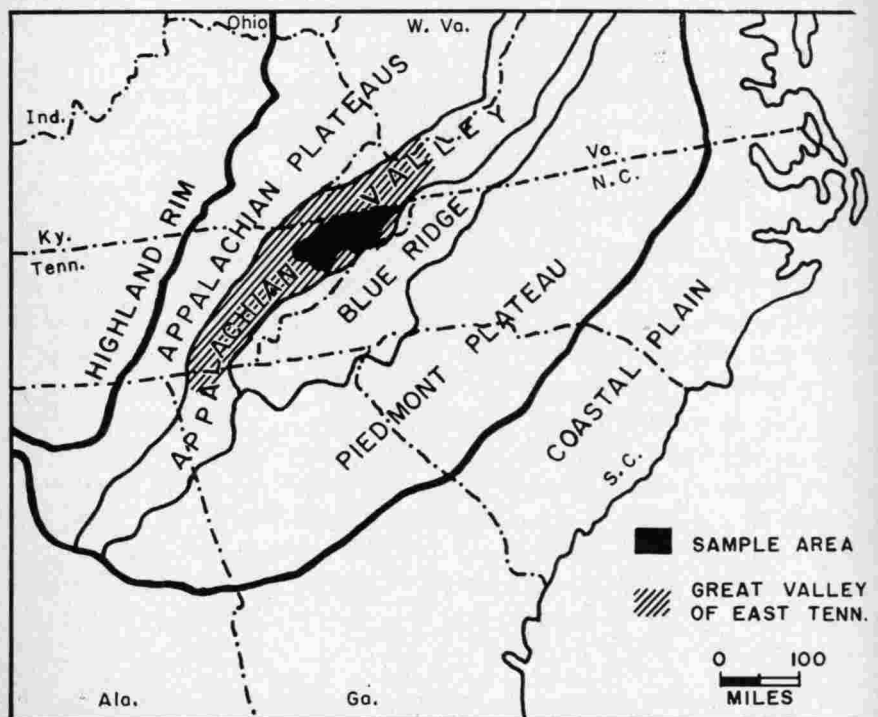
An enumerative survey of rural household heads completed in 1958 provided 506 usable field schedules. Only part of the data is reported here.

Data on the schedules were summarized by a combination of methods using punched cards and manual procedures. Tennessee State Life Tables, 1949-51, were used to predict future age-specific mortality rates.

It is recognized that this procedure will give only the changes of resources from rural to urban and from farm to nonfarm and not the reverse. There are resource flows in both directions, but the one direction reported here is obviously large in comparison to the return flow in areas that have had rapid nonfarm expansion and a decline in agriculture.

Physical Setting

The problem area consists of almost 1.8 million acres. It is located in the Great Valley of East Tennessee in the Southern Appalachians (Fig. 2.) The sample area included the Tennessee



(Adapted from H. C. Amick's "The Great Valley of East Tennessee," *Economic Geography*, Jan. 1934.)

Figure 2. Location of sample area.

counties of Grainger, Greene, Jefferson, Hamblen, Hawkins, Sullivan, and Washington. This area is referred to in this report as the Upper East Tennessee Valley.

The area is typical of the general region. The sample area varies in elevation from 900 to more than 4,800 feet above sea level and includes a pattern of major and minor parallel ridges and valleys. Land quality varies from almost inaccessible cliffs of sandstone on the ridges to very fertile soils along the streams. Climate varies considerably with elevation, providing a growing season range of 157 to 180 days.

The area is served by institutional and physical facilities which provide markets for a wide range of agricultural commodities. These include firms with national and international markets in dairy products, processed vegetables, tobacco, and livestock. Transportation facilities include 8 railroad lines, 11 federal aid highways, several state highways, and 2 commercial airports. There is, however, some evidence that a price disadvantage exists in the area when it is compared to national markets³.

Economic Growth of Area

Before the coming of white men in 1768, Cherokee Indians carried out a somewhat developed form of agriculture that included many practices now considered to be modern. These practices included successive planting, interplanting, strip cropping, crop rotation, fertilization, and seed improvement selection.

The white man learned from the Indian and began coming to the area in greater numbers so that a settled white culture was well established by the early 1800's. Because of recurring economic cycles, people from the north and east continued to come to this area seeking economic opportunity. This caused some of the more aggressive people in this area to push farther west in search of better opportunities there. Such migration has continued to the present time, although the nature and direction of it has varied.

Except for one major economic reversal related to the Civil War and its aftermath, the rate of economic growth has been more rapid, and less erratic, than that of the nation as a whole. The annual economic growth (per capita value added by manufacturing, 1879-1958) was at the average rate of 6.9% compared with the national average of 4.0%. It was \$935 in 1958 or 15% greater than the average for the United States.

³Irving Dubov, *Manufacturing Milk Prices in Tennessee and Other Areas*, Tennessee Agricultural Experiment Station Bulletin No. 318, August, 1960.

Much of the development is in small towns and rural areas rather than concentrated in large urban centers. The high birth rate here has permitted population growth of about 2.5% annually—compared with a national average of 1.6% from 1940 to 1960—in addition to providing for a substantial net emigration. Although the industrial growth was rapid, it was not fast enough to prevent low incomes in some sectors.

Recent adjustments in agriculture have been characterized by three major substitutions in production: tobacco has replaced grain as a cash crop; cattle (primarily dairy) have replaced hogs; and mechanization and technology have replaced animal and human power. With this development, investment and income per worker in agriculture have increased somewhat but are still below those of the United States as a whole. The improvements have been due more to the reduction in number of farm workers than to increases in investment and income.

General economic changes can be summarized as growth in total population, total employment, and the percentage employed in secondary and tertiary industries and a decline in the percentage employed in agriculture (Table 1).

Table 1. Characteristics of the population, 7 Upper East Tennessee Valley counties, 1930-60

Item	1930	1940	1950	1960
Total population, number	202,675	240,232	283,305	318,693
Total number employed in all industry	66,808	73,277	96,022	108,638
Percentage employed in:				
Agriculture and forestry	46.0	38.2	25.1	13.3
Manufacturing	17.4	22.1	27.1	32.0
Construction	3.6	3.9	6.8	6.9
Wholesale and retail trade	8.1	9.9	15.4	16.2
Service	15.7	19.0	18.3	22.2
Other	9.2	6.9	7.3	9.4
Total employed in all industry	100.0	100.0	100.0	100.0

Source of data: U. S. Census of Population.

Human Resources Were Limited But Not Fully Employed

At the time of the survey, many members of the households had characteristics that are generally believed to limit earning ability. Forty-one percent of the household heads had at least one of the

following characteristics that seriously limited their ability to earn a living: more than 64 years of age, physical handicap, widowhood, or less than 5 years of schooling. Eighteen percent had two or more of these characteristics.⁴ Many of the characteristics are age-related; therefore, a detailed examination of ages of the population and causes of the present age distribution follows.

Age Distribution and Earning Capacity

Birth rate declining. There were 13% fewer people in the sample under 5 years of age than were between the ages of 10 and 14. This was in contrast with United States population and any stationary population which had progressively fewer in each older group. The difference suggests a declining crude birth rate of about 1.2% per year for the sample during the recent period. The crude birth rate of the area has recently changed from one higher than the nation's to one lower.⁵

Many potential workers entering labor force. Within the next few years a high percentage of the sample population will become of age to enter the labor force. Twenty-one percent of the sample population, but only 16% of the national population, were in the age group 10 to 19. About 2.1% of the sample, but only 1.6% of the national population, will become of normal employable age each year during the immediate future. If all of it is used in the local labor force, this force can be doubled or replaced in 7.5 years. This potential new labor force is a "flow" resource that can be employed in the area or outside the area, or may remain unemployed.⁶

Half of children left area at productive age. Individuals had left the sample households in numbers equal to about 1.6% of the present population each year during the 7-year period before the

⁴For more detailed discussion of this classification, see H. A. Henderson, "Resources and Incomes of Rural Upper East Tennessee People," Tenn. Agric. Expt. Station Bul. No. 312, p. 28. Additional comment and detail are also given in the latter part of this report.

⁵The percentage of persons under 5 years of age in the United States and the sample area by census years were:

Year	U. S.	Sample counties
1940	8.1	11.0
1950	11.7	10.7
1960	11.7	10.6

This is also true of the entire Southern Appalachian Region. See Thomas R. Ford, *The Southern Appalachian Region*, University of Kentucky Press, Lexington, 1962, p. 50.

⁶The "flow" characteristic is particularly important to the area because if available labor is either employed outside the area or unemployed it is lost as a contribution to the production or income of the area.

survey. The 1957 locations of migrants were:

Location	Percent
In the same county	43
Elsewhere in Tennessee	23
Other Southeastern states	10
Midwestern states	12
Other states	12
Total	100

Only a small percentage of those in the same county were in rural parts of the area. Only 8% of them had rural-type occupations. The number leaving rural areas was over half of those who had become of employable age during the period.⁷ Most of the migrants left in their early 20's, as their average age in 1957 was 24. Ages of the migrants at the time of the survey were:

Age	Percent
17-20	9
20-24	47
25-29	31
30-34	9
35-61	3
Not reported	1
Total	100

Few productive workers left in area. The percentage of the population in the most productive ages of 20 to 44 was smaller in the sample area than in the United States as a whole: 29% compared with 34%. The unfavorable age distribution existing in the area was largely a result of the absence of younger people who had left for other areas (Fig. 3). Almost a fourth of the households had furnished a nonfarm worker to areas more than 100 miles from their homes during the period. If those who had left during the previous 7-year period had remained, there would have been more than 41% in the productive age group.

Farmers tended to be older than nonfarmers. Most of the younger persons employed in productive work were in nonfarm jobs while the older persons tended to remain in farming. By age, the ratio of nonfarm workers—the nonfarm wage and salary work-

⁷There was some underenumeration of migrants. For example a child might have left for college or taken a temporary job, and later taken a permanent job outside the area. This type of migration has little drama compared with a complete break at one time and may not have been recognized or recalled at the time of the interview. Also, there was no effort to enumerate whole-family migrations from the area.

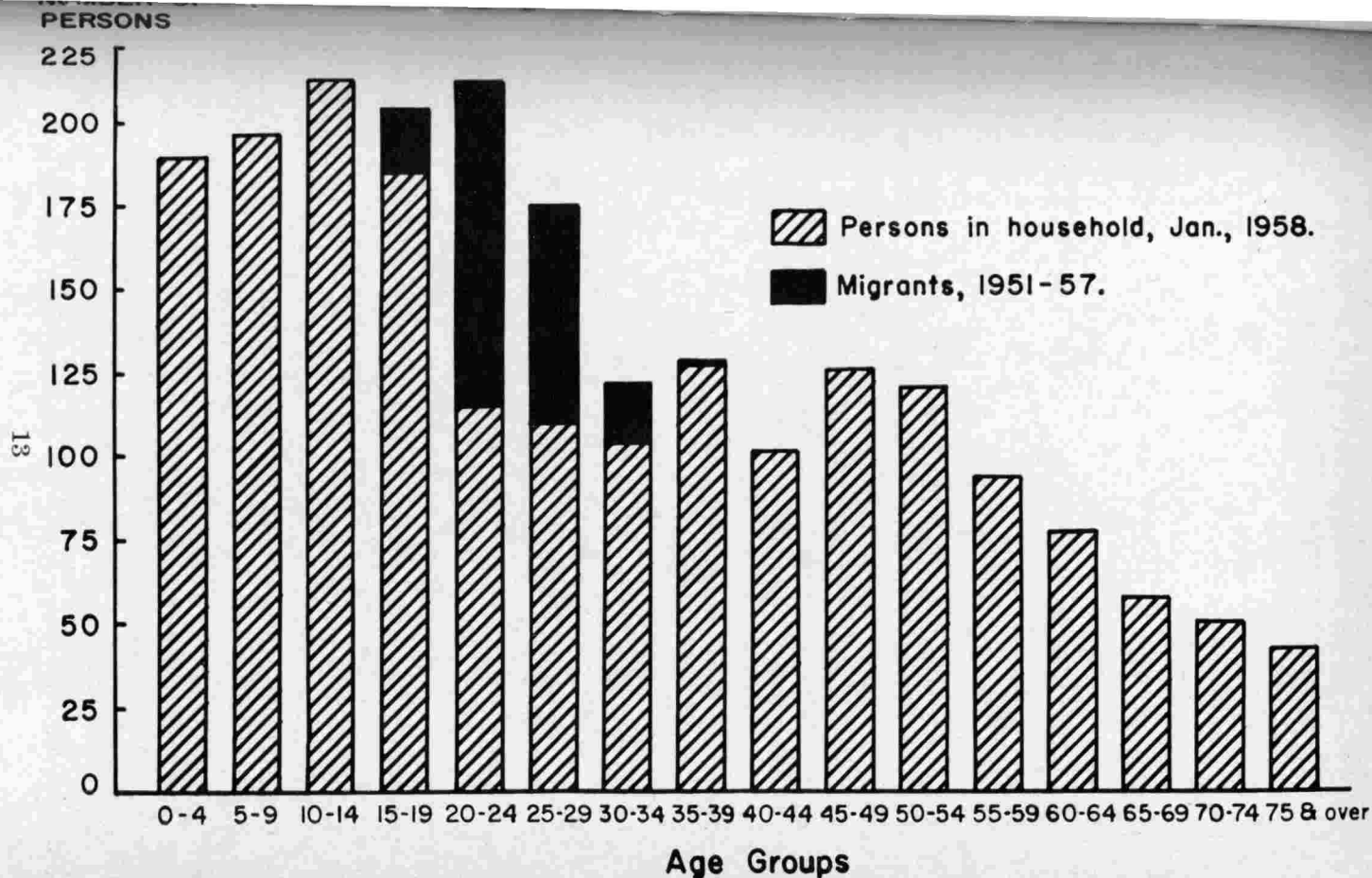


Figure 3. Ages of residents and migrants from 506 rural households, Upper East Tennessee Valley, 1958.

ers and nonfarm self employed—to farm workers, farm operators, and farm wage workers was:

Age	Nonfarm workers per farm worker
14-19	16.0
20-29	5.8
30-39	3.0
40-49	1.6
50-59	1.0
60-69	0.3
70 and over	0.0
<hr/>	
All ages	1.5

School attendance was the major activity of the males 14 to 20 years of age (Table A1). Most of these will get at least 8 years of schooling and many of them will complete high school, which will make most of them potential nonfarm workers. Likewise, few of the younger unemployed persons will likely enter agricultural work except as temporary employment and will, therefore, eventually increase the ratio of nonfarm to farm workers.

Migration rates major influence on future population. Projections of age distribution for the future illustrate the importance of migration in determining the characteristics of the population. A high rate of population growth with a rapid increase in persons of productive ages can be realized if no migration takes place and birth rates continue as at present.⁸ However, if the birth rates continue to decline and the present rates of emigration continue, the proportion of persons of productive ages will continue to decline.

The above statements may be illustrated with a 20-year projection of the present population. If the high rate of migration and lower birth rate continue, the total population is expected to decline by 7% and only 28% of the people will be in the productive ages of 20 to 44 years within 20 years (Fig. 4). On the other hand, if the birth rate remains constant at present rates, and emigration ceases, the total population will increase by about 19%, and the percentage in the most productive ages will increase to 38% (almost the United States average). Unless some unforeseen changes in trends develop, a decreasing birth rate, constant rate of migration,

⁸The birth rates are related to the migration rates, because a loss of young people is a loss of the immediate reproduction capacity. The two are so closely related and of such magnitude in this area that other determinants of the birth rate are ignored.

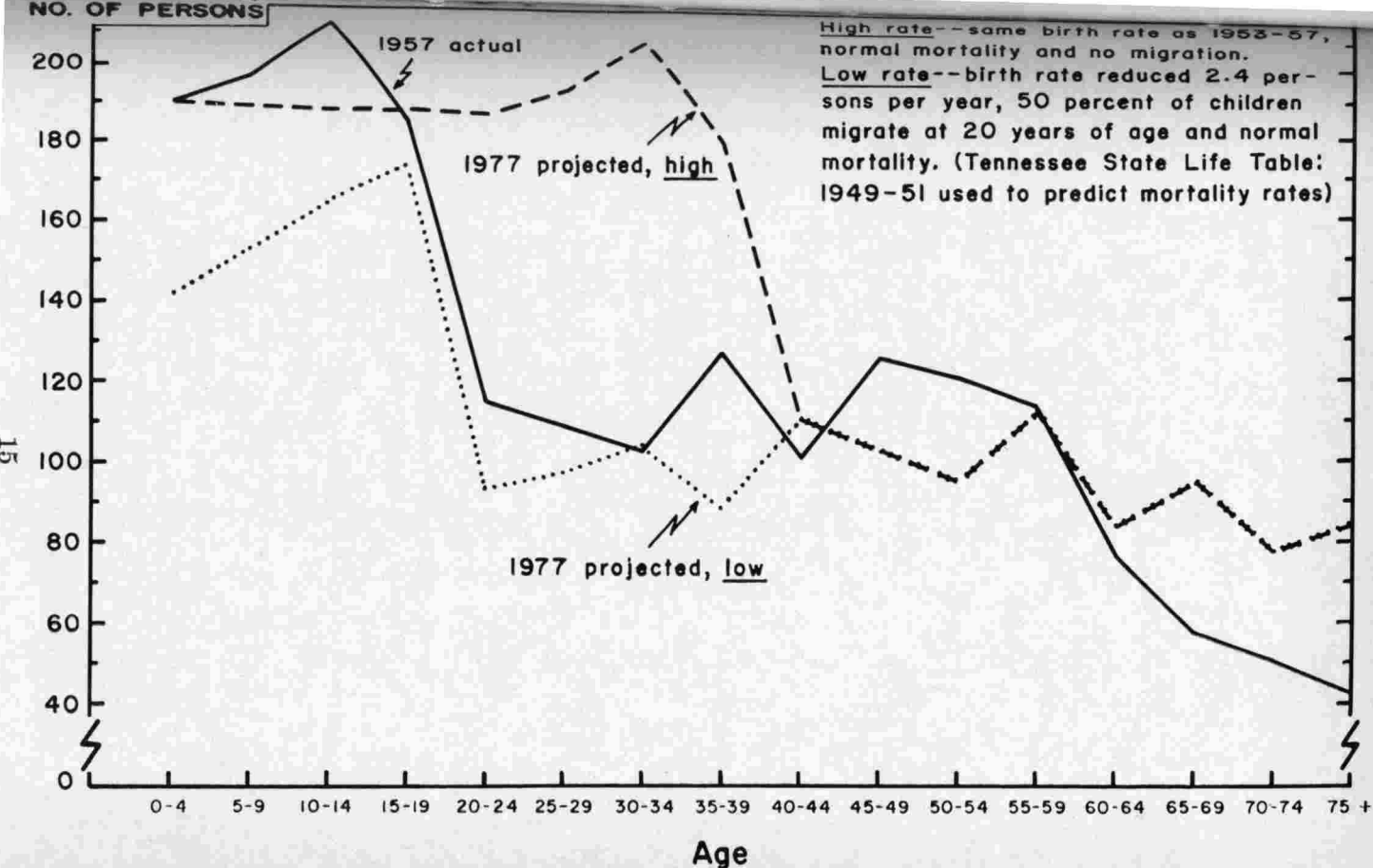


Figure 4. Age distribution 1957 and projected 20 years later, 1911 Rural Persons, Upper East Tennessee Valley.

and a decrease of about 7% in total population can be expected. This will also mean an increase in median age of about 8 years and a further net decrease in the proportion of persons in the most productive ages.

Labor Available for Employment

Substantial underemployment. An average of 223 days of work was reported for each man equivalent of labor, including both actual nonfarm work and estimated farm work based on man work units. By other comparisons, there were 102 days for each person age 14 and over, and 325 days for each male 20 to 60 years of age. If total work done was increased and shared equally by all man equivalents, the total work done could be increased with days of work per man equivalent as follows:

Days worked per man equivalent ^a	Percent increase in present work to give indicated amount
230	3
250	12
270	21
290	30

^aIn Tennessee practical limits of farm work per man equivalent per year are generally considered to be from 260 to 300, depending on type of farm. In commercial farming areas of Middle Tennessee, work units per man approached 300 for dairy farms and 270 for nondairy farms. See W. P. Ranney, *The Labor Force on Tennessee Farms*, Tennessee Agricultural Experiment Station Bulletin No. 304, Knoxville, 1959, Table 14.

About half of the households did not have enough work to keep all employable members fully employed.⁹ However, only about one-fourth of the households had one full-time worker in excess of their present work load. This meant that someone from 1 of 4 households could have obtained a nonfarm job without reducing farm output or changing the farm organization. Underemployment was almost as prevalent in households with nonfarm workers as in households with none.

Others desire nonfarm work. Almost a tenth (9.7%) of the residents wanted to obtain a full-time nonfarm job.¹⁰ These were

⁹Available labor in man equivalents (adjusted for age, sex, and physical handicaps) was greater than estimated labor used for producing farm products and actual days worked at nonfarm jobs.

Full-time farm work was 2,400 hours per man equivalent per year or, if less than 2,400 hours per year, 300 hours per month for 3 or more months. Adjustments were made for the mechanization level on individual farms.

Full-time nonfarm work was 120 days for seasonal occupations and 220 days for nonseasonal occupations.

¹⁰This number had actively attempted to obtain a nonfarm job or had indicated to the household head (at any time) or to the enumerator (during the interview) that they would be interested in obtaining some job under any conditions that they might reasonably expect to find.

in one-fourth of the households. Only about half of these households could have furnished a full-time worker without reducing the amount of work being done at that time,¹¹ but only 3.5% of the males were reported as unemployed.

Persons who had indicated a desire for nonfarm work were in general about 20 years of age; better educated than the average adult; not working in 1957 (or worked less than 3 months); about equally divided by sex; and engaged in activities of a noncommercial nature—either in school, housekeeping, or unpaid family work.¹² Almost half of those desiring work (44%) were 14 to 30 years of age, had 8 or more years of schooling, and did no commercial work.

Other sources of labor. The potential labor supply of an area is not confined to those in an area at a given time. It has already been shown that a large and continuous supply of potential workers is entering the labor force by birth and maturity. Another potential supply is those who would immigrate from other areas. For example, it has been shown that in a small South Carolina community the labor supply came directly from a large area, and that jobs vacated by some in that area made opportunities for others as many as three commuting distances from the place where the jobs were created. Expanded employment of a small textile mill, for example, created opportunities measurable for an area of 6,000 to 10,000 square miles.¹³

Results of other studies indicate that many former residents would return if opportunity for employment existed, or if there

¹¹In another study it was shown that farms that gave up family labor to nonfarm work seldom replaced it with other labor. See Joe A. Martin, *Off-Farm Migration: Some of Its Characteristics and Effects upon Agriculture in Weakley County, Tennessee*, Tennessee Agricultural Experiment Station Bulletin No. 290, August, 1958.

¹²Characteristics of those desiring nonfarm jobs compared with those in the sample that were 14 years and over were:

Characteristic	All age 14 and over Percent	Those desiring nonfarm work Percent
Age, years		
14-19	20	43
20-29	15	24
30-49	33	27
50 and over	32	6
Education, years		
Under 8	39	24
8	34	26
9-11	13	31
12 and more	14	19

¹³J. M. Stepp and J. S. Plaxico, *The Labor Supply of a Rural Industry*, South Carolina Agricultural Experiment Station Bulletin No. 376, July, 1948.

should be economic or social strife at their present location.¹⁴ Migration from rural areas is less in periods of slow economic growth than in periods of general prosperity.¹⁵

That the potential labor force is much greater than the presently available one was illustrated in another area with surplus labor in northwest Arkansas. There the number of workers available for and seeking nonfarm work increased after a period of rapid expansion in employment that absorbed more people than was believed to be available in the area at the beginning of the expansion.¹⁶

Management Outlook and Potential

The decision-making process is conditioned by characteristics of the household head as its leader. Characteristics of household heads in the area indicate that they will be primarily concerned with short-range problems with limited risks.

Short planning periods due to age of household heads. Sixty-two percent of the sample, but only 54% of the household heads in the United States, are over 45 years of age. With normal mortality, at least one-fourth of the present households will be dissolved by death of the head during the next 10 years. Retirements before death will likely take many more than that number out of active production. The median age is expected to increase during the immediate future.

Farm household heads averaged about 7 years older than non-farm heads—52 compared with 45 at the time of the study. Almost a fifth were widows.

Education of residents. The educational level of the residents may be limiting the earnings of people in the area, but migrants from the area have educational requirements for higher earnings. Only 19% of the residents 25 years and over had completed high school compared with 35% of all United States residents 25 and over. Those with less than 5 years of schooling made up twice as

¹⁴A. Elliot Williams, Tennessee Department of Employment Security, unpublished data; Wayne T. Gray, "Population Movements in the Kentucky Mountains," *Rural Sociology*, 10:4, pp. 380-386; Charles E. Allred et al., *Mobility of Rural Relief Families in Tennessee*, Report No. 14, Cooperative Plan of Rural Research, Tennessee Agricultural Experiment Station, 1936; Tennessee Department of Employment Security, *22nd Annual Report*, p. 17.

¹⁵Joe A. Martin, *Off-Farm Migration: Some of Its Characteristics and Effects upon Agriculture in Weakley County, Tennessee*, Tennessee Agricultural Experiment Station Bulletin No. 290, August, 1958.

¹⁶Kornelis J. Walraven, *Impact of New Plants on Local Labor Supply: Northwest Arkansas*, Industrial Research and Extension Center, University of Arkansas, April, 1962; also see Martin Segal, *The Labor Market and Plant Location*, Tuck Bulletin No. 25, Dartmouth College, Hanover, N. H., Nov. 1960.

large a percentage of the sample as did that group in the United States.¹⁷ The educational limitation was more prevalent in the older generations than in the younger ones. Almost four times as great a percentage of the parents of household heads had not completed eight grades of schooling as had children 14 years and older of household heads; children over 14 years of age were about six times as likely to have completed 12 or more years of schooling (Fig. 5).

¹⁷Eighteen percent of the residents over 25 and 9% of all persons in the United States over 25 had less than 5 years of schooling. This should not be construed to mean that educational opportunities are unavailable to local children, nor that local children do not take advantage of these facilities. The percentage of school-age residents who are in public schools is higher in Tennessee than in the nation as a whole. See Department of Health, Education and Welfare, *Biennial Survey of Education in the United States, 1955-56*, Washington, 1959, especially pp. 62-3, Chapter II. Some of this apparent inconsistency is explained later.

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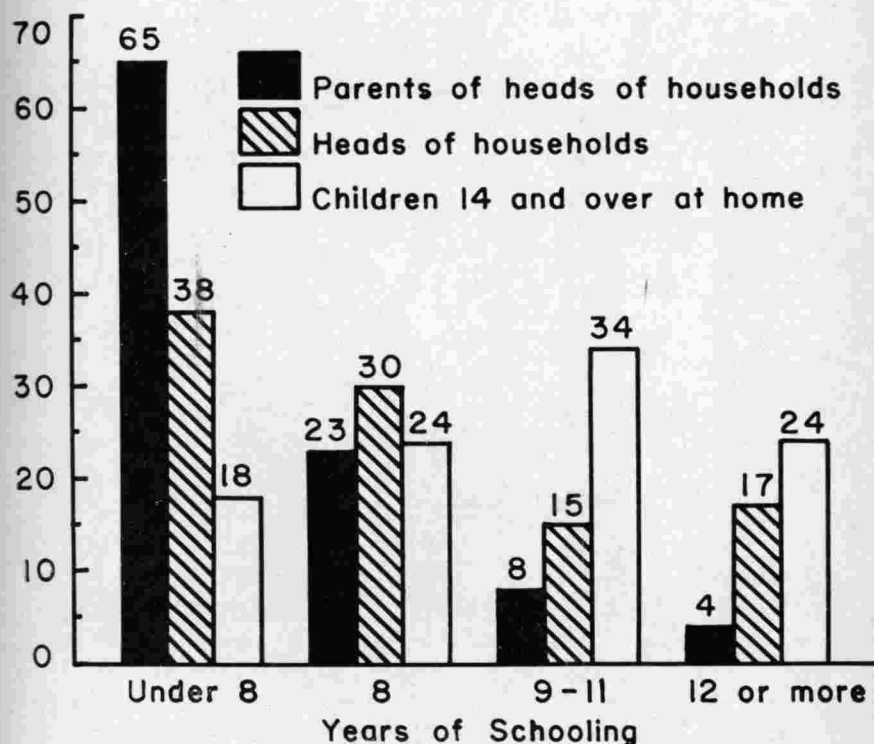


Figure 5. Years of formal schooling of three generations, 506 rural households, Upper East Tennessee Valley, 1957.

Persons who had migrated from these households had had more education than those who remained in the area. Migrants between 1951 and 1957 were five times more likely to have had some college education than were comparable persons in the area (Fig. 6). Also migrants were only one-third as likely not to have had at least 8 years of formal schooling.

In another study area, it was shown that there was less difference in differential rates of migrations related to education during periods of high general economic activity and employment than in relative recession.¹⁸

Nonfarm workers have more education than farmers. The non-farm workers in the area attended school more years than did the

¹⁸Joe A. Martin, *op. cit.*, p. 20.

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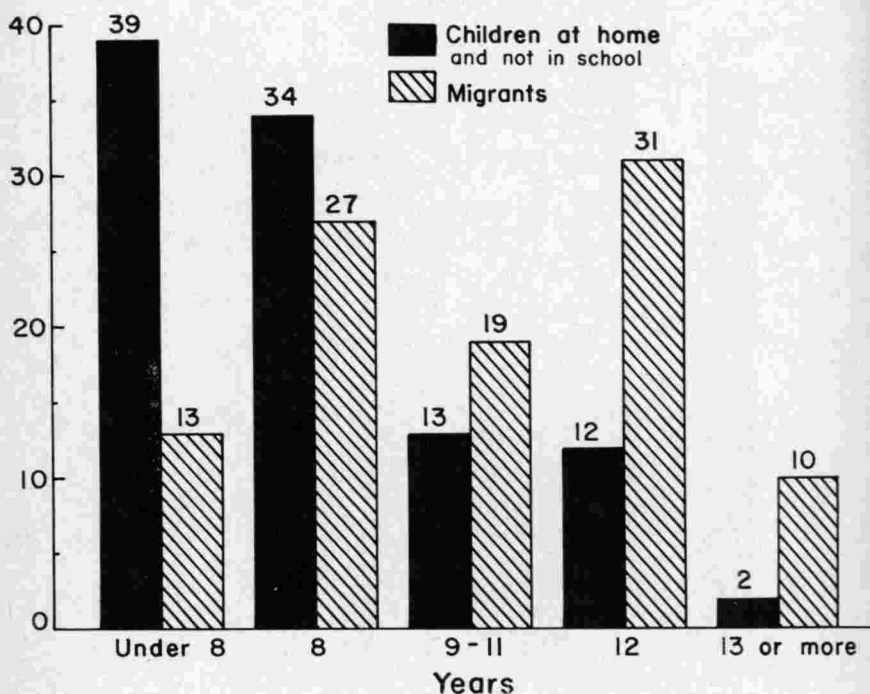


Figure 6. Years of formal schooling of migrants from area and children 14 and over at home and not in school, 506 rural households, Upper East Tennessee Valley, 1957.

farmers. The educational level of farm and nonfarm male workers in 1957 was as follows:

Years of schooling	Farm operator and wage hand	Nonfarm worker
	Percent	Percent
Less than 8	49	30
8	29	33
9 to 12	20	33
Some college	2	4
	<hr/>	<hr/>
Total	100	100

Capital Position

People in the area have limited capital resources but have not fully used available credit to gain control of assets. Median net worth per family was about \$7,000 and average net worth was \$10,200. Households varied widely as far as net worth was concerned. For example, reported liabilities were larger than reported assets in 8% of them, but 18% reported net worths of over \$16,000. Farm households had larger net worths than nonfarm households. Sixty-one percent of the farm households, but only 20% of the nonfarm households, had \$8,000 or more net worth.

Few People in Debt

Households varied considerably in amount of debt load. Almost half had no debts, one-fourth had debts of less than \$1,000, while others owed up to \$18,000. Only 21% had debts secured by real estate mortgages and only 41% had other loans.

The average size of real estate loan was \$3,100 for those with real estate debt and the average size of other debt was \$1,100 for those with other loans. The ratio of debt to total assets was about 1 to 10. Farm households owed more dollars but a smaller percentage of their total assets (Table A2).

Few Liquid Assets

Over three-fourths in land. Most of the assets of rural people in the area were tied up in long-term investments and were unavailable for immediate change to investments that might appear to be more profitable. Over two-thirds of the assets enumerated were invested in agricultural production—farm land owned and operated by the household, and livestock and equipment. Eighty percent was invested in land alone when both nonfarm real estate and farm land operated by other households was included.

Few assets were in cash or other forms that were readily convertible into cash. Less than 4% of the total investment, or \$400 per household, was reported as "other investments." All liquid assets, as well as miscellaneous nonliquid investments, were included in this figure. While an individual may sometimes liquidate his holdings in these fixed assets, such assets are nevertheless committed with respect to adjustments of the area as a whole.

Migration of children drains area of wealth. One factor that keeps assets low is the export of capital through migration of educated children. The private costs of rearing and educating a child through grade 12 in Tennessee have been estimated to range from \$6,700 to \$10,000 at present prices.¹⁹ An average of .099 children per household migrate from these households to other areas each year, based on the rates from 1950 to 1957. This means that private capital leaves in the form of educated children at the rate of \$660 to \$990 per household per year. Stated another way, in from 11 to 17 years the people in the area will contribute as much capital as their net worth at the time of the survey to other areas through migrating children.

Another loss of wealth from the area is through inheritance. If estates are distributed equally among children regardless of location, about half of the capital inherited will go to outside areas each generation. Because land and other fixed assets cannot be easily exported, the flight is in liquid capital, including claims on fixed assets. Liquid assets will continue to be exported to satisfy these claims.

Capital Available for Adjustment

Three percent available annually by retirement. Capital for operating a business may come from many sources, including retained profits, borrowing, gifts, and inheritance. About 2.5% of the capital will be transferred annually as a result of retirement or death of present household heads (Table A3). This amount may be increased by gifts or other transfers in anticipation of death, or

¹⁹Based on data in Peter Paul Dörner's *Excess Farm Population and Loss of Farm Wealth*, Masters thesis, University of Tennessee, 1953. Basic data of 1949 estimate in thesis adjusted to January 1962 with Consumer Price Index; also, Austin Atkinson's *Statement to Senate Hearings on Unemployment Problems*, 86th Congress, Part 5, p. 2,103, gives average of cost to be more than \$10,000.

By comparison, the average rural (county) school system in Tennessee spends about \$2,700 for one pupil through the 12th grade. Of this, about \$50 is federal revenue and \$1,500 is state revenue allocated to the counties. From data in Joe Morgan, *Annual Statistical Report of the Department of Education for the Scholastic Year Ending June 30, 1962*, Nashville, Tennessee.

This capital has been described by Schultz as "human capital." See T. W. Schultz, "Investment in Human Capital," *The American Economic Review*, Vol. 51, March, 1961, p. 1.

may be decreased because of sales in order to pay high medical and other expenses necessary to care for the household heads during their last years. It does, however, give a crude estimate of the availability of capital from this source to younger household heads and individuals.

Few debts will likely be transferred with this equity since the percentage equity of all households is high and those households with older heads have higher percentage equities than those with younger heads. Those households having heads 65 and over have 98% equity in their investments.

Borrowing can be expanded. Three representatives of farm loan agencies operating in the sample area were given balance sheets of different groups of households and asked to estimate the amount of credit that the average household could obtain on the basis of their 1958 financial condition. Results indicate that the total investment of the households could be expanded about 50% by borrowing. The amount of expansion by kind of household is as follows:

Expansion possible by borrowing

Kind of household	Amount	Percent of 1958
		total assets
Full-time farm	\$12,300	66
Part-time farm	8,100	58
Nonfarm	2,600	41
	<hr/>	<hr/>
All households (weighted average)	\$ 6,400	56

While this was not an actual commitment to loan, it does clearly illustrate that the possibility of obtaining additional credit by borrowing does exist. To further indicate that borrowing potential is not used as fully as it could be, only half of the households used any credit—even merchant credit.

An apparent reluctance of the people to borrow has been observed by sociologists to be part of their culture.²⁰

Of the farm household heads who recognized that with additional capital, they could make changes in their operations that would improve their income position, half indicated that they would not give a real estate mortgage in order to obtain a loan. A third would not give any mortgage, and a tenth said they would not use credit under any circumstance. All of these indicated that

²⁰For example, see B. H. Luebke, "Problems Created by the Douglas Reservoir in East Tennessee," *Journal of the Tennessee Academy of Science*, Vol. 29, October, 1956, p. 246.

they thought they could obtain credit if they tried to get it. With this attitude the effective limit on expansion is net worth rather than credit available.

Land Available for Expansion Land in Small Units

Small units of land characterized the study area. Almost half (47%) of the households controlled (leased or owned and not rented out) less than 10 acres each. Only 13% had 100 acres or more. The median-size of unit was about 12 acres, and the average was 38. The average size of farm was 69 acres and of nonfarm 6 acres.

The total acreage per household may seem to be more adequate for farming than it was because much of the land was suitable only for forest or recreational use. In 1957, two-thirds of all households, and over half of the farm households, had less than 10 acres of cropland, including idle land and land in long rotation but not in crops.

The cropland in much of the area is in small "patches" and "strips." These are often separated by mountains or ridges, and consist of widely differing soil types. The small size of ownership units and the small size of homogeneous areas make recombination into larger units difficult.²¹ Many of the tracts, while too small for large-scale mechanized farming, are of suitable size for rural nonfarm residential use or for part-time farming.

Land Tenure Flexible

Home ownership common. Seventy-nine percent of the homes were owned by the heads of the households and 3% additional were owned by other members of the household. Of those who owned their homes, 3 out of 4 had no mortgage on the home. Freedom from mortgages, as stated earlier, expresses a well-known cultural trait of the people who avoid being in debt.

Owners dominate farming. More than 82% of all farm operators owned some of the land they operated—but about 60% were involved in land rental contracts and half of them either "rented in" additional land or "rented out" some land. Only 13% of the

²¹Average size of soil mapping units on Soil Conservation Service maps were computed from a sample in each of 3 counties in the area and 2 other representative counties for comparison. The average size in acres of mapping units were: Washington County, Tennessee, 6.2; Greene County, Tennessee, 6.8; Hamblen County, Tennessee, 6.7; Shelby County, Iowa, 12.1; and Nicolett County, Minnesota, 18.8. If measurements had been restricted to open agricultural land, the contrast would have been much greater.

farm operators were tenants or croppers. Classifications by major tenure status were as follows:

Tenure	Percent
Owner-operator-landlord	23
Owner-operator	42
Part owner	17
Partners (some land owned)	5
Tenants	8
Croppers	5
	<hr/>
All farm operators	100

No well-defined divisions existed between the usual classifications of farm laborer, cropper, or tenant. One contract might have features of all tenancy groups while the "tenant" also owned some land. One man might "rent" from several land owners with a different arrangement with each one. About 5% of the operators could not be classified into the traditional tenure groups, even with the combinations noted; this group was referred to as "partners" and the term was fairly descriptive of the existing practices.

Age related to tenure. The average ages of household heads in each tenure group were in the same order as the traditional tenure ladder:

Tenure group	Age
Wage hand	45
Cropper	46
Tenant	47
Part owner	49
Owner-operator	51
Owner-operator-landlord	59

That the older household heads are now owners of land indicates that in the natural order of events, as they retire, the younger ones will soon be able to acquire much land by inheritance and otherwise. It may be either recombined or further subdivided in response to existing needs expressed in the market.

Land Quality

In this study the land was divided into five classes by quality,

based primarily on topography.²² Its present or past use was not considered in determining its quality classification, but only those factors contributing to future use.

Over half of the land operated was Class III: gently to moderately rolling land suitable for rotation cropland with a productivity index of 100 (Table 2). Most of the rest was steeper land that must be kept under permanent cover if erosion losses are to be kept to generally-accepted tolerances. Much of the two poorest classes of land in the area are public property or are held in large tracts by absentee land owners; they were not included in this study unless they were rented by a resident in the sample.

There was considerable variation in quality of land held by households. There was a tendency for households, especially non-farm households, to be located on land with an index of 100. The distribution of households and farms by productivity index of land was:

Index	All households	Farms
	Percent	Percent
Under 50	6	8
50—59	11	10
60—79	12	18
80—99	14	24
100	46	25
Over 100	11	15
Total	100	100

Land operated by owners was of poorer quality, but higher priced, than land involved in rental arrangements (Table A4). The average estimated value of land owned by reporting households was \$270 per acre and the land rented was about \$200 per acre.

²²After discussions with agronomists familiar with the soils in the area, it was believed that topography of upland and the respondent's observation of productivity of bottomland was an acceptable indication of the general quality of the land resources. Enumerators carried with them a photograph of a representative site with the various grades of upland delineated. The respondents were asked to estimate the number of acres of bottomland in two classes, based on their observations of how it would produce, and three classes of upland comparable in topography to those outlined on the photograph. They were asked if any of the land had characteristics that would make it unproductive other than topography, such as excessive outcropping of rocks. If yes, it was placed in class V. Maxwell E. Springer, Agronomist at the University of Tennessee, helped determine enumeration procedures for the land and assigned productivity ratings and use capabilities to the five classes.

Table 2. Quality of land operated, 506 rural households, Upper East Tennessee Valley, 1957

Land quality	Productivity index	Description	Conservation limitation	Percent of land	Average acres operated			
					Full-time farm	Part-time farm	Nonfarm	All households
I	200	Good, well-drained bottomland	Intensive crops	5.8	5.4	2.9	.3	2.2
II	100	Other bottomland	Crops with special risk	0.9	0.4	0.9	.1	0.3
III	100	Gently to moderately rolling	Crops in rotation	58.2	57.8	23.2	3.5	22.1
IV	50	Strongly rolling to moderately hilly	Close-growing crops with occasional cultivation of some. Some limited to forest only	24.1	18.3	15.1	1.4	9.2
V	25	Steep, hilly, rocky, mountainous, etc.	Woodland. Contains some small patches suitable for more intensive use.	11.0	9.2	5.6	.9	4.2
Total	85 ^a			100.0	91.1	47.7	6.2	38.0

^aComputed by: 1) determining the percentage of each quality, 2) multiplying percentage in each class by productivity rating, 3) adding the results, and 4) multiplying by 100. See footnote 22 in Text page 26.

Land Use

About a third of the land was normally used in each of the following ways: 1) cropland, including rotation pasture and idle cropland; 2) permanent pasture, both improved and unimproved; and 3) other uses, including homestead, woodland, and waste (Table 3). Full-time and part-time farms had about the same proportion of land in each major use.

Table 3. Land use and value, 506 rural households,
Upper East Tennessee Valley, 1957

Item	Full-time farm	Part-time farm	Nonfarm	All households
Land use, acres				
Cropland	32.7	16.5	1.0	12.8
Pasture	35.6	18.9	2.3	14.9
Other	22.8	12.3	2.9	10.3
Total land operated	91.1	47.7	6.2	38.0
Value per acre	\$174	\$248	\$924	\$258

Projected Availability

Death and retirement transfer 3% annually. A little less than 3% of the land will be available annually by transfer from the present land owners due to death, if normal mortality rates are experienced within the near future (Table A5). Actual land transfer because of age will likely be at a more rapid rate than this mechanical projection indicates because of transfers at retirement, in anticipation of death, and in order to obtain cash for subsistence during the later nonproductive life of the household heads. Even if the land is not sold when a land owner reduces his activity, due to age, it will be available for renting to others if it appears desirable for the owner and prospective tenant. The availability of Social Security for retired farmers may accelerate the rate of transfer before death as compared to past practices.

Land not used to capacity. In 1957, over 95% of the land classed as cropland²³ was in crops and almost 5% was double-cropped. This indicated that practically all of the land maintained as cropland was cropped continuously. If more intensive use of the cropland is to be made, it will result from planting more intensive crops and an increase in double cropping, rather than reducing the amount of cropland idle and cropland used for pasture and other uses.

²³"Cropland" included all land that was in crops in 1957 plus all land that is "sometimes" used for crops. The term refers to use rather than potential of the land.

On the other hand more land could be used for cropland if it should be desirable to do so. About twice as much land was in Classes I, II, and III (bottomland and gently to moderately rolling upland) as was used for cropland. While all of this land could not be used for cropland, certainly there is a possibility of changing much of it to more intensive use. Also, much of Class IV and small portions of Class V land which were evaluated as marginal pasture in the classification could be used for improved pasture and a small percentage used for crops should this become desirable.

Appendix

Table A1. Occupational activity of males 14 years of age & over, by age groups, 257 farm households and 249 nonfarm households,

Upper East Tennessee, 1957

Kind of household and age	Major occupational activity							
	All activities	Farm operator or wage worker	Nonfarm wage or salary worker	Self-employed	Looking for work	In school	Unpaid family worker	Other
		Number of persons						
Farm households:								
14—19	85		11		2	44	28	
20—29	43	8	21		8	2	3	1
30—39	49	24	19	2			2	2
40—49	66	38	25	3				
50—59	64	46	13	1				4
60—69	45	40	4				1	
70—79	18	14					1	3
80 and over	6	4					1	1
Total	376	174	93	6	10	46	36	11
Nonfarm households:								
14—19	46	1	5		4	34	2	
20—29	60	4	45	3	4		2	2
30—39	59	1	53	1	2			2
40—49	45	3	38		1			3
50—59	40	3	30	4	1			2
60—69	21	2	5	2	1			11
70—79	11							11
80 and over	5	1						4
Total	287	15	176	10	13	34	4	35
All households:								
14—19	131	1	16		6	78	30	
20—29	103	12	66	3	12	2	5	3
30—39	108	25	72	3	2		2	4
40—49	111	41	63	3	1			3
50—59	104	49	43	5	1			6
60—69	66	42	9	2	1		1	11
70—79	29	14					1	14
80 and over	11	5					1	5
Total	663	189	269	16	23	80	40	46

Table A2. Assets and liabilities^a by kind of household,
500 rural households, Upper East Tennessee, 1958

Item	Full-time farm	Part-time farm	Non-farm	All house- holds
A. ASSETS				
Farm land operated ^b	\$13,200	\$ 9,800	\$ 100	\$ 5,800
Livestock	2,000	900	—	700
Farm equipment	2,600	2,000	—	1,200
Total farm operated	(17,800)	(12,700)	(100)	(7,700)
Farm land not operated ^c	300	200	400	400
Other real estate	100	400	5,400	2,800
Other investment	200	400	500	400
Total investment	\$18,400	\$13,700	\$6,400	\$11,300
B. CLAIMS				
Real estate debt	\$ 700	\$ 700	\$ 600	\$ 600
Other debt	700	400	300	500
Total debt	(1,400)	(1,100)	(900)	(1,100)
Net worth	17,000	12,600	5,500	10,200
Total claims	\$18,400	\$13,700	\$6,400	\$11,300
C. DEBT, percent of total assets				
	7.6	8.1	14.1	9.7

^aThe assets included all farm and nonfarm real estate, livestock, farm machinery, and all nonfarm investments. All debts, regardless of kind, were included as liabilities. The net worth estimate, therefore, underestimated the true net worth by the value of materials on hand, personal property not used in the business, and probably some underenumeration of liquid assets.

In addition to the assets enumerated, the households owned an undetermined amount of personal property not used for production purposes. Claims on these assets were, however, reported in the previous section as liabilities. Real estate used for producing consumption services was included as investments because of the dual use of providing consumption service and speculative income. The speculative income from real estate may be substantial during a lifetime of land price increases in an area with growing population.

^bOperated by household head.

^cNot operated by household head.

Table A3. Investments, projected equity of survivors, and projected equity transferred by death, 506 rural households, by age of head of household, Upper East Tennessee Valley, 1957

Present age of house- hold head	House- holds	Total invest- ment	Total debts	1957 equity		Projected equity			
						By surviving households		Transferred by death	
						In 1967	In 1977	By 1967	By 1977
Years	No.	\$100	\$100	\$100	%	\$100	\$100	\$100	\$100
Under 25	20	\$ 860	\$ 155	\$ 705	82	\$ 690	\$ 667	\$ 15	\$ 38
25—34	77	4,403	902	3,501	80	3,396	3,187	105	314
35—44	97	10,957	1,699	9,258	84	8,688	7,495	570	1,763
45—54	128	16,119	1,874	14,245	88	12,289	8,941	1,956	5,304
55—64	92	13,577	672	12,905	95	9,614	4,617	3,291	8,288
65—74	72	7,863	169	7,694	98	3,695	700	3,999	6,994
75 and over	20	2,658	43	2,615	98	501	24	2,114	2,591
Total	506	\$56,437	\$5,514	\$50,923	90	\$38,873	\$25,631	\$12,050	\$25,292
Change from 1957, percent		XX	XX	XX	XX	XX	XX	23.7	49.7
Annual transfer, percent				X	X	X	X	2.37	2.48

NOTE: Tennessee State Life Tables: 1949-51 used in projecting deaths of household heads.

Table A4. Land quality and value, 506 rural households,
Upper East Tennessee Valley, 1957

	Land owned	Land rented in	Land rented out ^a	Land operated ^b
Land quality, acres ^c				
I	867	289	33	1,123
II	171	19	13	177
III	9,424	2,308	536	11,196
IV	4,092	674	123	4,643
V	1,862	267	17	2,112
Total	16,416	3,557	722	19,251
Land quality, percent				
I	5.3	8.1	4.6	5.8
II	1.0	0.5	1.8	.9
III	57.4	64.9	74.2	58.2
IV	24.9	19.0	17.0	24.1
V	11.4	7.5	2.4	11.0
Total	100.0	100.0	100.0	100.0
Land quality, percent of land operated				
I	4.5	1.5	.2	5.8
II	.9	.1	.1	.9
III	49.0	12.0	2.8	58.2
IV	21.2	3.5	.6	24.1
V	9.7	1.4	.1	11.0
Total	85.3	18.5	3.8	100.0
Average index	84	100	94	85
Value \$1,000	4,412	712	149	4,975
Value, dollar/a.	269	200	206	258

^aSome tracts which were separate from the main tract and were rented out were not enumerated as to land quality. The value was reported as "other investments" only. The land rented in and land rented out, therefore, differs by this amount as well as the amount of absentee ownership and sampling errors.

^bLand owned + rented in — rented out = land operated.

^cSee Table 2 page 27 for description of land quality.

Table A5. Holdings of land by age of household head, projected holdings and transfers by death^a, 506 rural households, Upper East Tennessee Valley, 1957

Present age of owner	Land owned 1957	Projected land owned by surviving household heads ^a		Projected land transferred to others by death of pre- sent household heads ^b	
		Until 1967	Until 1977	By 1967	By 1977
Under 25	81	79	77	2	4
25—34	763	740	695	23	68
35—44	2,358	2,213	1,909	145	449
45—54	4,690	4,046	2,944	644	1,746
55—64	4,473	3,332	1,600	1,141	2,873
65—74	2,800	1,345	255	1,455	2,545
75 and over	1,256	241	11	1,015	1,245
Total	16,421	11,996	7,491	4,425	8,930
Percent	100	73.1	45.6	26.9	54.4
Average percent annually	XX	XX	XX	2.69	2.72

^aTennessee State Life Tables: 1949-51 used for making projections.

^bThis is an underestimation of transfers due to death during the second period because some of that which is transferred during the first period will be transferred again during the second period.

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