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I am submitting herewith a thesis written by Earl Maurice Wimbish entitled "An Evaluation of Low-Cost Minimum Standard Housing in Rural Tennessee." I recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Agricultural Economics.

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AN EVALUATION OF LOW-COST MINIMUM STANDARD HOUSING IN RURAL TENNESSEE

A Thesis

Presented for the

Master of Science

Degree

The University of Tennessee

Earl Maurice Wimbish

December 1974

ACKNOWLEDGMENTS

The author expresses his gratitude to all persons who have made this study possible. The author is especially grateful to Dr. B. R. McManus, committee chairman, for his advice, guidance, and patience in the organization of this thesis. Acknowledgment is granted to Mr. D. O. Baxter for his constructive suggestions and to Mr. D. O. Baxter and the Department of Agricultural Engineering for permitting the use of data collected under Project H-333, Evaluation and Improvement of Low-Cost Rural Housing. Appreciation is also extended to Drs. M. B. Badenhop, D. H. Luttrell, and J. I. Sewell for guidance and constructive criticism.

Gratitude is expressed to the Department of Agricultural Economics and Rural Sociology for granting the author an Assistantship.

The author expresses personal thanks to his parents, Mr. and Mrs. Wilburn Wimbish, for their support and understanding throughout his undergraduate and graduate study.

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ABSTRACT

This study was designed: 1) to determine the present status of rural housing in Tennessee by examining the relationships between selected socioeconomic characteristics of rural residents and characteristics of rural housing, and 2) to develop financial plans of improving housing for low-income families in rural Tennessee.

Data for the study were obtained from a sample of 1,624 households, selected by a random sampling technique, from 68 rural counties in Tennessee. Data were secured from household heads through personal interviews.

Accessibility, condition of yards, exterior conditions of houses, space, water and sanitation facilities, and feasibility of repair were evaluated to determine the condition of houses.

Accessibility of dwellings continues to remain a problem in rural Tennessee. Almost half of the homes included in the study were located on unpaved roads. The condition of yards was less of a problem. Only a fifth of the families permitted their yards to be disorderly and poorly maintained.

The exterior conditions of homes appeared to be reasonably sound in most instances. Serious defects in roofs, exterior walls, foundations, doors, windows, and screens were present in only a few cases. After observing the exterior conditions of homes, enumerators rated each dwelling according to its feasibility of repair. Thirty-five, 43, and

22 percent of the dwellings received high, moderate, and poor feasibility of repair ratings, respectively.

The amount of space inside the dwellings was adequate in most cases. The living space in 80 percent of the dwellings ranged between 400-1,999 square feet. Most dwellings had adequate space available for functional activities.

Water and sanitation facilities inside the dwellings were rated according to the source of water supply, type of water facilities, and type of toilet facilities. A fifth of the families reported springs or dug wells as the source of their water supply. A fifth of the families also reported having no piped running water facilities. A third of the families reported privy-outhouses or chemical toilets as their type of toilet facilities.

Family income was the most important direct factor affecting the quality and adequacy of housing in rural Tennessee. Chi-square analysis was used to test the relationships between family income and selected characteristics of rural residents and rural housing.

Family income was significantly related to race, age, education, employment status, occupation, net worth, and skills of the household heads at the 0.01 level. Family income was also significantly related, at the 0.01 level, to the value of homes and the price homes household heads were most interested in building.

Many families received incomes inadequate to finance new houses and as a result had to reside in substandard housing. A plan whereby the federal government would subsidize the cost of housing these low-income

families was proposed. The estimated subsidy required to provide these low-income families with new low-cost houses was $183,130 per year. The households in the survey represent .003797 percent of all rural households in Tennessee according to the 1970 census. Therefore, under the proposed plan, it would require almost $70 million per year in subsidy to place adequate housing within the reach of all rural Tennesseans.

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CHAPTER I

INTRODUCTION

The substandard condition of rural housing is recognized as a national problem by Congress as well as other branches of the federal government.[1] Jackson, Housing and Urban Development Assistant Secretary, says that 60 percent of the nation's substandard housing is in rural areas.[2] Only 30 percent of the nation's households are located in nonmetropolitan areas. Other researchers like Ruckel (Director for the Rural Housing Alliance) believe that Jackson's 60 percent estimate is conservative. Ruckel estimated a 3.1 million substandard homes in rural America, 67 percent of the nation's total.[3]

A drive along rural roads or a visit to small towns will provide an excellent insight into the magnitude of substandard rural housing. Many of these houses have inadequate ingress and egress, particularly during wet weather. In some areas families, particularly migrant farm workers, live in houses that are in dire need of repair. The conditions of these houses are such that the families are exposed to bad weather, insects, rodents, and unsanitary conditions.

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[1]Joseph P. Fried, Housing Crisis, U.S.A., New York: Praeger Publishers, 1971, p. 17.

[2]Clay Cochran, "Rural Housings: Need and Nonresponse," Poverty and Human Resources Abstract, Vol. 5, No. 6, July-December, 1970, p. 21.

[3]Ibid, p. 48.

Margolis, perhaps one of the most prolific and sensitive of the writers who deals with rural housing, in his book, All Their Days, All Their Nights, sums it up by saying, "The shack . . . is both the medium and the message. Its gloom generates a kind of creeping helplessness that steals upon one."[4]

The federal government has assisted in the construction or rehabilitation of 1.5 million housing units in rural areas and elsewhere over the last 30 years. Yet, in spite of this effort, the quality of rural housing in certain areas has continued to deteriorate. Therefore, it is evident that programs and policies have only been partially able to place adequate housing at the reach of all families who desire it.

I. JUSTIFICATION OF STUDY

A high percentage of rural substandard housing is located in the Southeastern States.[5] Tennessee is located in the Southeast and is one of the areas where rural residents face a critical housing problem. Often economic conditions are somewhat unfavorable in rural areas of the State. This depressed economic condition causes the income of the average rural resident to lag behind that of his urban counterpart.[6]

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[4]Clay Cockran, "Rural Housing: Need and Nonresponse," Poverty and Human Resources Abstract, Vol. 5, No. 6, July-December, 1970, p. 6.

[5]J. H. Yeager, Rural Housing: Situation, Needs, and Financing, Agricultural Experiment Station, Auburn University, Auburn, Alabama, May, 1962, p. 1.

[6]M. B. Badenhop, An Economic Survey of the Upper Cumberland Area, Bulletin No. 428, Agricultural Experiment Station, The University of Tennessee, Knoxville, Tennessee, July, 1967, p. 34.

Hence, some rural residents do not earn sufficient income to repay loans on new houses. This situation of low income contributes to substandard housing conditions and is probably a motivating factor in producing mass migration of low-income families to already overcrowded city ghettos which contribute to additional social unrest and violence in urban areas.

A further aspect of substandard housing is its effect on social conditions within the community. Unsatisfactory sewage disposal systems attract insects and rodents which carry diseases. Inefficient heating systems spew smoke into the air causing air pollution. Broken down shacks decrease the aesthetic features of the area causing further deterioration.

And what about the individual whose pride, hope, self-respect, ambition, and desires are destroyed because of these unfavorable circumstances? How does society go about replacing all that is lost? One fact is clear, the survival of the American society just like all others depends on the well-being of the individuals within it. It, therefore, follows that if society is to continue prospering, then it is a must that newer and better ways be found to provide adequate housing facilities for each member of the human race.

II. THE OBJECTIVES

The objectives of this thesis are:

1. To determine the present status of rural housing in Tennessee

by examining the relationships between selected socioeconomic characteristics of rural residents and characteristics of rural housing.

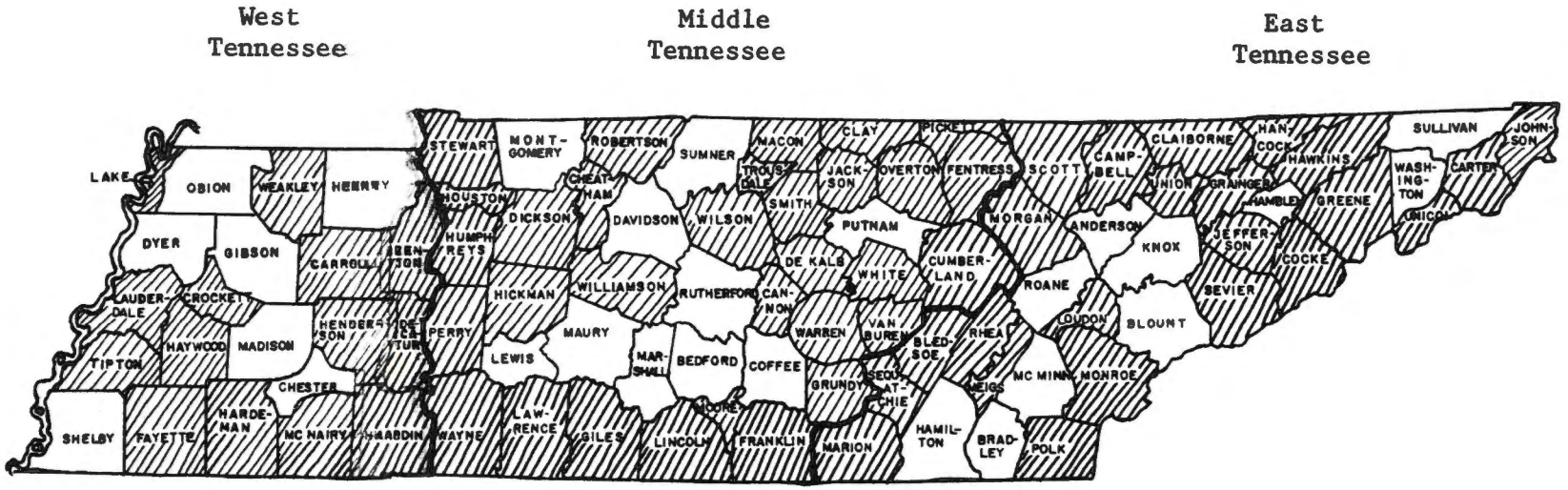
2. To develop financial plans of improving housing for rural low-income families in Tennessee.

III. METHODOLOGY

Data included in this thesis was based on Department of Agricultural Engineering Project H-333, Evaluation and Improvement of Low-cost Rural Housing.[7] Data were obtained from a sample of 1,624 households, selected by a random sampling technique, from 68 rural counties in Tennessee (Figure 1). In order for a county to be included in the study, at least 60 percent of its population was classified as rural according to the 1970 census. All urban areas with populations over 2,500, public lands, and uninhabitable areas were excluded from the sample areas for each county in the survey. There were 23, 31, and 14 counties classified as being rural in East Tennessee, Middle Tennessee, and West Tennessee, respectively. In East Tennessee, 23 counties were classified as being rural, in Middle and West Tennessee there were 31 and 14, respectively, for a total of 68 rural counties in the state.

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[7] D. O. Baxter, Assistant Professor, Department of Agricultural Engineering, University of Tennessee, Knoxville, served as project leader. D. O. Baxter, Lofton Stuart, Donald Knight, Gary Honea, and Gary Miller, personnel of the Department of Agricultural Engineering, served as enumerators to collect the data.



14 Counties
355 Questionnaires

31 Counties
662 Questionnaires

23 Counties
607 Questionnaires

Total Counties - 68

Total Questionnaires - 1,624

Figure 1. Counties included in low-cost rural housing survey, Tennessee, 1972.*

* Counties cross-hatched had 60 percent or more rural population and were included in the survey.

Chi-square analysis was used to test the relationship between selected socioeconomic characteristics of rural residents and rural housing. For an explanation of the Chi-square test, see Appendix A.

IV. REVIEW OF LITERATURE

A recent summary of rural housing was reported by Freeman of the U. S. Department of Agriculture.[8] Freeman drew comparisons between the proportions of substandard housing by region and by race. The data were drawn largely from the 1960 Census of Housing but also included data from the 1968 Census Bureau sample study of housing conditions. Also, national relationships between housing quality and such socio-economic characteristics as household income, housing expenditures, race, tenure, and farm or rural nonfarm location were analyzed. Freeman stated that the quality of rural housing has improved considerably since 1950 when 62 percent was substandard. In 1960, 33 percent was sub-standard. The sample for 1968 indicated 20 percent of the rural housing was substandard and was primarily located in the Southeastern States. Freeman also indicated that farmers had lower quality homes than other rural people and that rural blacks and other minority groups had the lowest quality housing. It was also stated that mortage credit was less available and more expensive in rural areas.

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[8]Robert E. Freeman, Rural Housing: Trends and Prospects, Economic Report 193, Economic Research Service, USDA, September, 1970.

A study of housing in the Appalachian Region by Paulick and Coltrane of the U. S. Department of Agriculture was based on the U. S. Census of Housing, 1960.[9] Comparisons were made within the Region as well as between the Region and other areas of the U. S. according to the urban, rural nonfarm, and farm strata. According to this study, housing in the Appalachian Region from Central Pennsylvania to Central Alabama was inferior to housing of other regions of the nation. Within the Appalachian Region, housing quality was generally highest in the northern part, declined toward the center, and improved further south. Housing in the western segment of the Region was of lower quality than housing of the eastern segment. The lowest quality of housing was in the rural farm and rural nonfarm classes.

Badenhop reported that housing in the Upper Cumberland Area is generally inferior to other housing in Tennessee, the Appalachian Region, and the United States.[10] The 1960 Census data provided information on condition of housing. Among the criteria used for evaluation were soundness and availability or condition of plumbing. Badenhop found that almost half of the resident owned rural nonfarm housing in the Upper Cumberland Area of Tennessee was valued at less than $5,000 per unit.

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[9]Anthony Paulick and Robert Coltrane, Quality of Rural and Urban Housing in the Appalachian Region, Agricultural Economics Report No. 52, Economic Research Service, USDA, April, 1964.

[10]M. B. Badenhop, An Economic Survey of the Upper Cumberland Area, Bulletin No. 428, Agricultural Experiment Station, The University of Tennessee, Knoxville, Tennessee, July, 1967.

A study of housing in the Southeastern Cotton Belt Area of the U. S. has been prepared by the Alabama Agricultural Experiment Station at Auburn University.[11] It was reported that financing for rural housing was readily available but actual conditions told a different story. Although lending policy provides that a house can be financed in a rural area, in practice this was not always done. This was a problem of redefining policy so that actual practice was in line with policy provisions. The study pointed out that loan terms should be drawn in accordance with the needs of the community and the risks of the area, and that appraisals should be based on realistic values, assuming that loan terms are adapted to location and marketability.

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[11] J. H. Yeager, Rural Housing: Situation, Needs, and Financing, Agricultural Experiment Station, Auburn University, Auburn, Alabama, May, 1962.

CHAPTER II

CHARACTERISTICS OF RURAL TENNESSEE HOUSING

The status of housing in rural Tennessee, or any other rural area of the United States, can be determined by examining certain selected characteristics of the housing itself. The U. S. Census of Housing has used this procedure to describe the nation's rural housing for many years. The major problem lies in deciding upon the set of housing characteristics to be used for such an evaluation. Not all researchers agree upon a definite set.

In this survey characteristics pertaining to external, internal, and structural conditions were evaluated. Serious problems or defects in any of these conditions or an aggregate of moderate defects could result in unsatisfactory housing.

I. ACCESSIBILITY

Accessibility is a vital component of rural housing. It includes all facilities which enable a house to have easy ingress and egress. Roads, driveways, and walkways are the three major variables listed under accessibility. Each of these variables was evaluated for the homes included in the survey.

A. Type Roads

The type road on which a house is located is extremely important. Usually it is preferable to be located on a road that offers

accessibility to the dwelling in all types of weather and is free of excess dust and noise. Fifty-six percent of the houses were located on paved rural roads (Table I, Part A). More than one-third of the houses (34 percent) were located on rural gravel roads leaving 9 percent located on rural dirt roads and 1 percent on streets not paved.

B. Type Driveways

Driveways in rural areas have traditionally consisted of dirt surfaces. Thirty percent of the families in the survey reported having driveways of this type and 8 percent of the families reported having no driveways at all. However, 59 percent of the families reported having driveways with crushed rock or gravel surfaces and three percent reported having driveways with brick or concrete surfaces. By combining the last two groups, 62 percent of the families had driveways covered with some type of hard surface material. This percentage has increased tremendously over the years.[12]

C. Type Walkways

The overall condition of walkways in rural Tennessee was worse than the condition of driveways. Of the total number of families interviewed, 80 percent reported either having dirt, grass, or no defined walkways (Table I, Part C). Only 20 percent of the families reported having

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[12]Fred T. Becker, Rural Housing, New York: The Macmillan Company, 1962, p. 84.

TABLE I

CHARACTERISTICS OF ROADS, DRIVEWAYS, AND WALKWAYS FOR SINGLE-UNIT DWELLINGS IN RURAL TENNESSEE, 1972

Characteristics of Lot		Households	
		Number	Percent
Part A.	Type Roads		
1.	Rural road, dirt	148	9
2.	Rural road, gravel	537	34
3.	Rural road, paved	902	56
4.	Street, not paved	18	1
5.	Street, no curb or gutter	8	0[a]
	Total	1,613	100
Part B.	Type Driveways		
1.	Dirt	478	30
2.	Crushed rock or gravel	851	59
3.	Brick or concrete	46	3
4.	No driveway	126	8
	Total	1,601	100
Part C.	Type Walkways		
1.	Dirt or grass	977	61
2.	Crushed rock or gravel	48	3
3.	Brick or concrete	268	17
4.	No defined walkways	309	19
	Total	1,602	100

[a]Less than 0.5 percent.

crushed rock, gravel, brick, or concrete on the surface of their walkways.

II. CONDITION OF YARDS

Landscape design and plantings are influenced by climatic conditions, by the interest of the family in the immediate surroundings of its dwelling, and by the knowledge of some member of the household about the growth and the placing of flowers, shrubs, and trees.

The condition of yards in the survey was rated as follows: 1) well landscaped and neatly maintained, 2) well landscaped but not neatly maintained, 3) not landscaped but neatly maintained, and 4) disorderly and poorly maintained based upon the enumerator's visual evaluation. The results revealed that 19 percent of the yards were listed in the first category, 2 percent in the second category, 59 percent in the third category and 20 percent in the fourth category (Table II).

III. EXTERIOR CONDITION OF HOMES

The outside condition of a house is of vital importance. If repairs are neglected, rusting, rotting, and decay may cause severe damage to the house structure in relatively short periods of time. Once this has occurred, considerable costs are often required for repairs. These repairs may be in excess of the total value of the house; hence, the house may be abandoned.

TABLE II

CHARACTERISTICS OF YARDS FOR SINGLE-UNIT DWELLINGS
IN RURAL TENNESSEE, 1972

Characteristics of Lot	Households	
	Number	Percent
Condition of Yards--		
1. Yard well landscaped and neatly maintained	310	19
2. Yard well landscaped and not neatly maintained	29	2
3. Yard not landscaped but neatly maintained	942	59
4. Yard disorderly and poorly maintained	324	20
Total	1,605	100

In order to gain knowledge about the outside condition of homes in rural Tennessee, data were collected on roofing, exterior walls, foundations, doors, windows, and screens.

A. Type and Condition of Roofing

In past years, roofs in rural areas almost totally consisted of galvanized steel or other metals. These metal roofs generated high levels of heat during warm periods and were almost impossible to keep from leaking during rainy periods. These characteristics are undesirable and as a result, many rural residents replaced metal roofs with more conventional types.

In spite of this, metal roofs are still common in rural Tennessee. Forty percent of the houses had roofs constructed of sheet metal (Table III, Part A-1). The only roofing material more common than sheet metal was composition shingles. More than half (53 percent) of the families reported having roofs constructed of this material. Five and two percent of the families, respectively, reported having roofs constructed of composition roll roofing or tar paper. Wood shingles, tile, slate, and asbestos roofing were each reported by less than 0.5 percent of the families as a roofing material.

The overall condition of roofs was favorable. Evidently the presence of rust, weathering, and missing material was minimal. Forty-six percent of the roofs had no noticeable defects, 46 percent had moderate defects and only eight percent had considerable defects (Table III, Part A-2).

TABLE III

CHARACTERISTICS OF ROOFS, EXTERIOR WALLS, FOUNDATIONS, DOORS, WINDOWS, AND SCREENS FOR SINGLE-UNIT DWELLINGS IN RURAL TENNESSEE, 1972

Characteristics of House	Households	
	Number	Percent
Part A. Type and Condition of Roofing		
1. Type roofing		
a. Wood shingles	4	0[a]
b. Composition shingles	801	53
c. Composition roll roofing	69	5
d. Tar paper and tar	25	2
e. Sheet metal	592	40
f. Tile or slate	6	0[a]
g. Asbestos	2	0[a]
Total	1,499	100
2. Condition of roofs		
a. Has no noticeable defects	684	46
b. Has moderate defects	688	46
c. Has considerable defects	129	8
Total	1,501	100
Part B. Type and Condition of Exterior Walls		
1. Type exterior wall material		
a. Stone	9	1
b. Brick	210	14
c. Partial brick and other	8	1
d. Concrete or cinder block	8	1
e. Stucco	7	1
f. Masonite siding	47	3
g. Aluminum siding	101	7
h. Asbestos siding	187	13
i. Dressed wood siding	449	30
j. Rough wood siding	102	7
k. Tar paper siding	307	21
Total	1,462	100

TABLE III (continued)

Characteristics of House	Households Number	Households Percent
2. Conditions of exterior walls		
a. Has no noticeable defects	768	52
b. Has moderate defects	559	37
c. Has considerable defects	166	11
Total	1,493	100
Part C. Type and Condition of Foundations		
1. Type foundations		
a. continuous concrete or masonry	961	64
b. Rock piers	271	18
c. Brick or concrete block piers	141	10
d. Poured concrete piers	55	4
e. Continuous wood	20	1
f. Wood post	51	3
Total	1,499	100
2. Condition of foundations		
a. Has no noticeable defects	987	66
b. Has moderate defects	430	26
c. Has considerable defects	82	8
Total	1,499	100
Part D. Condition of Doors, Windows, and Screens		
a. Has no noticeable defects	986	66
b. Has moderate defects	388	26
c. Has considerable defects	124	8
Total	1,498	100
2. Condition of windows		
a. Has no noticeable defects	982	66
b. Has moderate defects	384	26
c. Has considerable defects	128	8
Total	1,494	100

TABLE III (continued)

Characteristics of House	Households	
	Number	Percent
3. Condition of screens		
a. Has no noticeable defects	948	65
b. Has moderate defects	348	24
c. Has considerable defects	164	11
Total	1,460	100

[a]Less than 0.5 percent.

B. Type and Condition of Exterior Walls

The type of exterior wall material used when constructing a dwelling is directly related to the life of that dwelling. While brick, stone, and block exterior walls may be more expensive than wood, aluminum, and masonite siding, the first group is more durable thus allowing for a longer life. Many homeowners take this into consideration when selecting the type exterior wall material for their homes.

The most common type of exterior wall material used was dressed wood siding. Thirty percent of the houses had exterior walls constructed of dressed wood (Table III, Part B-1). Tar paper siding was the second most common material reported as an exterior wall material being used on 21 percent of the houses. Brick and asbestos sidings were third and fourth being reported as exterior wall materials on 14 and 13 percent of the houses, respectively. The remaining 21 percent of the houses had exterior walls constructed of the various other wall materials.

The overall condition of exterior walls tended to be good. Weathering, warping, buckling, and decomposition did not pose a serious threat to the walls. Fifty-two percent of the exterior walls had no noticeable defects, 37 percent had moderate defects, and only 11 percent had considerable defects (Table III, Part B-2).

C. Type and Condition of Foundations

Houses were constructed on a variety of foundation materials, the two most common types being continuous concrete and masonry. Sixty-four percent of the houses were constructed on foundations consisting of one

or the other of these two materials (Table III, Part C-1). Rock, brick, and concrete block piers were also commonly used foundation materials. Eighteen percent of the houses were constructed on rock pier foundations and 10 percent were constructed on brick or concrete block pier foundations. Four percent of the houses were constructed on poured concrete piers, 1 percent on continuous wood, and 3 percent on wood post.

Most of the foundations were in good to excellent condition. Defects such as settling, cracks, missing material and decomposition were serious in only a few cases. Two-thirds of the foundations had no noticeable defects, 26 percent had moderate defects and 8 percent had considerable defects (Table III, Part C-2).

D. Condition of Doors, Windows, and Screens

For appropriate housing, it is most important that doors, windows, and screens be kept in good condition and replaced whenever repair is impossible. If doors and windows are allowed to warp, sag, and lean, cracks usually appear letting out warm air in the winter and letting in hot air in the summer. As a result, the cost of heating and cooling a house can be increased tremendously. Screens should be removed during the winter months, cleaned, and stored in a safe, dry place such as the basement, attic, or garage. Dry storage reduces rust accumulation thus allowing screens to last longer.

The condition of doors in the survey was favorable because the degree of defects was minimal. Two thirds of the houses were equipped with doors having no noticeable defects, a fourth with doors

having moderate defects and only 8 percent with doors having considerable defects (Table III, Part D-1).

The overall condition of windows was relatively the same as that of the doors. Two-thirds of the houses were equipped with windows having no noticeable defects, a fourth with windows having moderate defects, and only 8 percent with windows having considerable defects (Table III, Part D-2).

Door and window screens were found to be in good to excellent condition in most cases. Sixty-five percent of the houses were equipped with door and window screens having no noticeable defects, 24 percent with door and window screens having only moderate defects and 11 percent with door and window screens having considerable defects (Table III, Part D-3).

IV. SPACE

Enumerators recorded the number of floors for each dwelling included in the survey. The dwellings were then paced along the outside walls in order to determine the size or square footage of the ground floors. The square footage of the basements, second floors, attics, etc., were estimated and added to that of the ground floors thus giving the approximate total number of square feet of living space in each dwelling.

Also evaluated was the adequacy of space in each dwelling for such functional activities as the preparation of food, meal service, food storage, laundry work, clothing storage, sewing, leisure play, and

sleeping accommodations. This space was rated as being excellent, adequate, or inadequate for each respective activity. The amount of space available for functional activities is one of the most essential characteristics of any household. If there is inadequate space, stress can develop among the family members. This stress distracts from the orderly manner in which households should function.

A. Living Space

The one-level house was the predominant type found in rural Tennessee; 89 percent of the houses in the survey were of this type (Table IV, Part A-1). Seven percent of the houses were two-level, 4 percent were part one-level and part two-level thus leaving less than 0.5 percent that had more than two levels.

After estimating the size of the houses and calculating the number of square feet of living space in each, it was found that 2 percent of the houses had less than 400 square feet; 35 percent, 400-799 square feet; 45 percent, 800-1,199 square feet; 14 percent, 1,200-1,599 square feet; and 4 percent, 1,600 or more square feet (Table IV, Part A-2).

B. Space Available for Functional Activities

1. Food preparation. Food preparation is concerned with the planning and cooking of three meals per day. However, in planning space for this activity, all other food work done in the home must be taken into account. The study revealed that 8 percent of the homes had excellent space available for the preparation of food; 78 percent had adequate space; and 14 percent had inadequate space (Table IV, Part B-1).

TABLE IV

LIVING SPACE AND SPACE AVAILABLE FOR FUNCTIONAL ACTIVITIES FOR SINGLE-UNIT DWELLINGS IN RURAL TENNESSEE, 1972

Characteristics of House	Households	
	Number	Percent
Part A. Living Space		
1. Number of floors		
a. One level	1,408	89
b. Part one level, part two level	58	4
c. Two levels	113	7
d. Over two levels	6	0[a]
Total	1,585	100
2. Number of square feet		
a. Less than 400 square feet	36	2
b. 400-799 square feet	553	35
c. 800-1,199 square feet	709	45
d. 1,200-1,599 square feet	218	14
e. 1,600 square feet or more	61	4
Total	1,577	100
Part B. Space Available for Functional Activities		
1. Preparation of food		
a. Excellent	133	8
b. Adequate	1,259	78
c. Inadequate	218	14
Total	1,610	100
2. Meal service		
a. Excellent	133	8
b. Adequate	1,251	78
c. Inadequate	230	14
Total	1,614	100

TABLE IV (continued)

Characteristics of House	Households Number	Households Percent
3. Food storage		
a. Excellent	133	8
b. Adequate	1,224	76
c. Inadequate	252	16
Total	1,609	100
4. Laundry work		
a. Excellent	104	7
b. Adequate	992	62
c. Inadequate	492	31
Total	1,588	100
5. Clothing storage		
a. Excellent	106	7
b. Adequate	1,031	64
c. Inadequate	474	29
Total	1,611	100
6. Sewing		
a. Excellent	86	5
b. Adequate	1,281	81
c. Inadequate	222	14
Total	1,589	100
7. Leisure play and hospitality		
a. Excellent	112	7
b. Adequate	1,243	78
c. Inadequate	246	15
Total	1,601	100

TABLE IV (continued)

Characteristics of House	Households	
	Number	Percent
8. Sleeping		
a. Excellent	139	9
b. Adequate	1,207	75
c. Inadequate	263	16
Total	1,609	100

[a]Less than 0.5 percent.

2. Meal service. Measured in terms of frequency and number of persons affected, the serving of meals is one of the foremost activities in every home. The meal service area merits special attention to make sure it will be convenient for the homemaker and comfortable for the family. Eight percent of the homes had excellent space available for meal service; 78 percent had adequate space; and 14 percent had inadequate space (Table IV, Part B-2).

3. Food storage. The amount of space devoted to storage of food depends on the frequency of buying. For this reason, it was assumed that as a whole, most of the families purchased groceries once per week. Eight percent of the homes had excellent space available for food storage; 76 percent had adequate space; and 16 percent had inadequate space (Table IV, Part B-3).

4. Laundry work. When determining the amount of space available for laundry work, only general family washing, drying and ironing were considered. Special problems such as hand laundering of fine fabrics and washing for a baby were not included. Of the total number of homes evaluated, 7 percent had excellent space available for laundry work; 62 percent had adequate space; and 31 percent had inadequate space (Table IV, Part B-4).

5. Clothing storage. The number of clothes closets within a household may or may not be sufficient for its occupants. Too many closets take up space that could be used for other purposes while not enough closets cause families to store clothing in undesirable places like behind doors, across chairs, and on hooks in the walls. Closet space

for the storage of clothes was excellent, adequate, and inadequate for 7, 64, and 29 percent of the homes, respectively (Table IV, Part B-5).

6. Sewing. Three out of four rural families do sewing of some type. The proportion of those who sew is usually higher among families with children than among all adult families. The percentages of homes in the study with excellent, adequate, and inadequate sewing space were 5, 81, and 14 percent, respectively (Table IV, Part B-6).

7. Leisure play and hospitality. Leisure play and hospitality entails aspects of a family's social and recreational activities. Such social and recreational activities include overnight guests, entertainment of groups at parties and meetings, and hobbies that are conducted in the household. The percentages of homes with excellent, adequate, and inadequate space for this activity were 7, 78, and 15 percent, respectively (Table IV, Part B-7).

8. Sleeping. The amount of space available for sleeping in a household is very important. Cramped sleeping conditions can lead to many unpleasant domestic problems. The percentages of homes with excellent, adequate, and inadequate space for this activity were 9, 75, and 16 percent, respectively (Table IV, Part B-8).

V. WATER AND SANITATION FACILITIES

Water and sanitation facilities inside the dwellings were evaluated according to the source of water supply, the type of water facility, and the type of toilet facilities.

The source of water supply for the homes consisted of springs, artesian wells, dug wells, drilled wells, rural water mains, and others. The type of water facilities for the homes consisted of hot and cold piped running water inside the house, only cold piped running water inside the house, piped running water outside the house, and no piped running water. The type of toilet facilities consisted of flush toilets, privy-outhouse or chemical toilet, and others.

A. Source of Water Supply

Sixty-four percent of the families reported drilled wells as their source of water supply (Table V, Part A). Springs, particularly important in East Tennessee, rated second with 16 percent of the families reporting them as water sources. Rural water mains rated third with 11 percent of the families reporting their use, thus leaving 9 percent of the families using artesian wells, dug wells, or other water sources.

B. Type of Water Facilities

The majority of the families (71 percent) had hot and cold piped running water inside the house (Table V, Part B). Seven percent of the families reported having only cold running water inside the house, leaving 20 percent of the families with no piped running water.

C. Toilet Facilities

All of the dwellings in the survey had toilet facilities that fitted into one of the following three categories. The three categories were flush toilet, privy-outhouse or chemical toilet, and other.

TABLE V

SOURCE OF WATER SUPPLY, TYPE OF WATER FACILITIES, AND TYPE OF TOILET FACILITIES FOR SINGLE-UNIT DWELLINGS IN RURAL TENNESSEE, 1972

Characteristics of House		Households	
		Number	Percent
Part A.	Source of Water Supply		
1.	Spring	253	16
2.	Artesian well	3	0[a]
3.	Dug well	58	4
4.	Drilled well	1,039	64
5.	Rural water main	187	11
6.	Other	84	5
	Total	1,624	100
Part B.	Type of Water Facilities		
1.	Hot and cold piped running water inside house	1,148	71
2.	Only cold piped running water inside house	111	7
3.	Piped running water outside the house	33	2
4.	No piped running water	314	20
	Total	1,606	100
Part C.	Toilet Facilities		
1.	Flush toilet	1,100	68
2.	Privy-outhouse or chemical toilet	511	32
3.	Other	9	0[a]
	Total	1,620	100

[a]Less than 0.5 percent.

Over two-thirds of the families (68 percent) reported having flush toilets inside the house (Table V, Part C). Unfortunately, over a third of the families reported having privy-outhouses or chemical toilets as toilet facilities. Less than 0.5 percent of the families reported having other types of toilet facilities.

VI. FEASIBILITY OF DWELLING REPAIR

Each house in the survey was rated by the enumerator according to feasibility of repair. The ratings were high, moderate, and poor feasibility of repair. The condition of dwellings was evaluated by visual inspection and ratings were assigned accordingly.

Any given dwelling may have had moderate or considerable defects in the roof, exterior walls, foundations, doors, windows, and/or screens. Based on the condition of the above items, 35 percent of the dwellings were rated as having high feasibility of repair, 43 percent as having moderate feasibility of repair, and 22 percent as having poor feasibility of repair (Table VI). Quality of housing in rural Tennessee can be improved by repair of many of the existing dwellings. However, new housing will be necessary to replace the units which are beyond repair.

TABLE VI

RATING OF SINGLE-UNIT DWELLINGS IN RURAL TENNESSEE ACCORDING TO FEASIBILITY OF REPAIR, 1972

Characteristics of House	Households	
	Number	Percent
Rating of the Dwellings--		
1. High feasibility of repair	517	35
2. Moderate feasibility of repair	654	43
3. Poor feasibility of repair	323	22
Total	1,494	100

CHAPTER III

RELATIONSHIPS BETWEEN INCOME AND CHARACTERISTICS OF RURAL RESIDENTS AND CHARACTERISTICS OF RURAL HOUSING

The most important factor affecting the quality and adequacy of rural housing for individual families is the level of income for the respective families. It is assumed that families with income sufficient to pay for adequate quality housing will spend that needed portion of the income on housing. Those individuals with low incomes most often have to allocate their incomes in such a way that the results are that such families must live in poor quality and inadequate housing.

Since income is the most important factor affecting the quality and adequacy of rural housing, it merits special attention. It is the purpose of this chapter to examine the relationships between income of rural Tennesseans and selected socioeconomic characteristics of rural residents and characteristics of rural housing.

I. RACE

Many studies on rural housing have shown that Blacks generally earn even less income than Caucasians and, therefore, must reside in the worst of substandard housing.[13]

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[13]Fred T. Becker, Rural Housing, New York: The Macmillan Co., 1962, p. 24.

The chi-square test was used with data in Table VII to determine if income and race of individuals in the study were independent. The null hypothesis was that the level of income and the race of household heads were independent of each other. This null hypothesis was rejected.[14] Hence, it was concluded that income and race were not independent but related.

Table VII reveals that 102 Black household heads were interviewed, compared with 1,095 Caucasian household heads which gives a ratio of about one to 10. A higher percentage of the total number of Black household heads were concentrated in low-income categories than for the Caucasian household heads.[15] Eighty-six percent (88) of the Blacks received less than $6,000 income in 1971 compared with only 64 percent of the Caucasians. To place the situation in an even worse perspective, 38 percent (39) of the Blacks received less than $2,000 income in 1971, compared with only 25 percent (270) of the Caucasians.

In high income categories the reverse held true; the percentage of the total number of Caucasian household heads became greater than that of the Black household heads. Thirty-six percent (390) of the Caucasian household heads received $6,000 income or more in 1971 compared with only 14 percent (14) of the Black household heads. Ten percent (104) of the

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[14]Total chi-square value = 23 with three degrees of freedom; significant at the 0.01 level.

[15]Chi-square value = 20 with one degree of freedom; significant at 0.01 level. Income categories below $6,000 were combined and income for $6,000 and above were combined.

TABLE VII

TENNESSEE RURAL RESIDENTS: OBSERVED AND EXPECTED FREQUENCIES AND CELL AND TOTAL CHI-SQUARE VALUES, RACE RELATED TO INCOME, 1972[a]

Family Income	Race		Totals
	Caucasian	Black	
Less than $2,000			
Observed frequency	270	39	309
Expected frequency	283	26	309
Chi-square values	1	6	7
$2,000-$5,999			
Observed frequency	435	49	484
Expected frequency	443	41	484
Chi-square values	0	1	2
$6,000-$9,999			
Observed frequency	281	13	294
Expected frequency	269	25	294
Chi-square values	1	6	6
$10,000 or more			
Observed frequency	109	1	110
Expected frequency	101	9	110
Chi-square values	1	7	8
Totals			
Observed frequency	1,095	102	1,197
Expected frequency	1,095	102	1,197
Chi-square values	2	21	23

Total chi-square = 23 with three degrees of freedom; significant at the 0.01 level.

[a]Cell and total chi-square values were rounded to the nearest whole number. Any discrepancy in the total chi-square value was caused by this rounding.

of the Caucasian household heads received $10,000 income or more in 1971, compared with only 1 percent (1) of the Black household heads.

These relationships reveal that rural Tennessee Blacks receive less income than rural Tennessee Caucasians. Therefore, rural Tennessee Blacks are less likely to be able to afford adequate housing than rural Tennessee Caucasians.

II. AGE

The age of the household head may or may not influence the level of income earned yearly. Table VIII lists the age and income of 1,291 household heads in the study. The majority (786, or 61 percent) of the household heads were over 45 years of age. In examining the age composition further, it was found that 25 percent of the household heads were 65 or over years of age.

The chi-square test was used with data in Table VIII to determine if the income and age of the individuals in the study were independent. The null hypothesis that annual income and age were independent was rejected.[16] Hence, it was concluded that income and age were related.

In Table VIII, the greatest disparity between observed and expected frequencies occurred in the 25-34 and 65 or over age categories. Twenty percent (79) of the total chi-square value occurred in the 25-34 age category and 61 percent (242) of the total chi-square value occurred in the 65 or over age category. Large disparities between observed and

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[16] Total chi-square value = 400 with 15 degrees of freedom; significant at the 0.01 level.

TABLE VIII

TENNESSEE RURAL RESIDENTS: OBSERVED AND EXPECTED FREQUENCIES AND CELL AND TOTAL CHI-SQUARE VALUES, AGE RELATED TO INCOME, 1972[a]

Age	Family Income: Less Than $2,000	$2,000 to $5,999	$6,000 to $9,999	$10,000 or More	Totals
Less than 25 years					
Observed frequency	2	33	20	6	61
Expected frequency	16	25	15	5	61
Chi-square values	12	2	2	0	16
25-34 years					
Observed frequency	16	76	99	33	224
Expected frequency	58	92	55	19	224
Chi-square values	30	3	36	10	79
35-44 years					
Observed frequency	22	85	78	35	220
Expected frequency	57	90	54	19	220
Chi-square values	21	0	11	14	46
45-54 years					
Observed frequency	37	102	59	21	219
Expected frequency	57	90	53	19	219
Chi-square values	7	2	1	0	9
55-64 years					
Observed frequency	58	116	50	14	238
Expected frequency	62	98	58	20	238
Chi-square values	0	3	1	2	7
65 or over					
Observed frequency	199	119	9	2	329
Expected frequency	85	135	80	28	329
Chi-square values	152	2	63	24	242
Totals					
Observed frequency	334	531	315	111	1,291
Expected frequency	334	531	315	111	1,291
Chi-square values	223	13	114	50	400

Total chi-square value = 400 with 15 degrees of freedom; significant at the 0.01 level.

[a]Cell and total chi-square values were rounded to the nearest whole number. Any discrepancy in the total chi-square value was caused by this rounding.

expected frequencies in the 65 or over age category are accounted for by the fact that these individuals are elderly, underemployed or unemployed; hence, most of them are concentrated in low-income categories (less than $6,000) and very few in higher income categories ($6,000 or more). Large disparities between observed and expected frequencies in the 25-34 year old age category are caused for the opposite reasons. These individuals are in the most productive years of their lives; hence, they are very actively employed. As a result, most are concentrated in high income categories ($6,000 or more) and very few in low income categories (less than $6,000).

III. EDUCATION

The level of formal education has been considered to be the indirect solution to low incomes in rural Tennessee and similar areas. Many experts believed if all rural residents of Tennessee had at least a high school education, they could find employment and earn sufficient income to finance good quality low cost houses.

The chi-square test was used with data in Table IX to determine if the number of years of formal education and income of the individuals in the study were independent. The null hypothesis that annual income and years of formal education were independent was rejected.[17] Income and the number of years of formal education were related.

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[17]Total chi-square value = 360 with 12 degrees of freedom; significant at the 0.01 level.

TABLE IX

TENNESSEE RURAL RESIDENTS: OBSERVED AND EXPECTED FREQUENCIES AND CELL AND TOTAL CHI-SQUARE VALUES, EDUCATION RELATED TO INCOME, 1972[a]

Education	Family Income: Less Than $2,000	$2,000 to $5,999	$6,000 to $9,999	$10,000 or More	Totals
None					
Observed frequency	18	8	0	0	26
Expected frequency	7	11	6	2	26
Chi-square values	19	1	6	2	28
1-8 years					
Observed frequency	279	356	107	22	764
Expected frequency	198	315	184	66	764
Chi-square values	33	5	33	29	100
9-11 years					
Observed frequency	20	77	65	20	182
Expected frequency	47	75	44	16	182
Chi-square values	16	0	10	1	27
12 years					
Observed frequency	11	76	118	47	252
Expected frequency	66	104	61	22	252
Chi-square values	46	8	54	30	136
Over 12 years					
Observed frequency	5	13	20	22	60
Expected frequency	16	25	15	5	60
Chi-square values	7	6	2	55	69
Totals					
Observed frequency	333	530	310	111	1,284
Expected frequency	333	530	310	111	1,284
Chi-square values	120	19	105	116	360

Total chi-square = 360 with 12 degrees of freedom; significant at the 0.01 level.

[a]Cell and total chi-square values were rounded to the nearest whole number. Any discrepancy in the total chi-square value was caused by this rounding.

Table IX reveals that more household heads were listed in the one to eight years educational category (764, or 60 percent) than any other educational category. Over four-fifths of the household heads in this educational category received less than $6,000 income in 1971. All individuals reporting no formal education received less than $6,000 annual income.

In Table IX, observed frequencies were greater than expected frequencies for most individuals with low incomes (less than $6,000) and limited education (less than nine years). Observed frequencies were greater than expected frequencies for all individuals with high incomes $6,000 or more) and higher levels of education (12 years or more). This relationship suggests that individuals with limited educations were concentrated in low income categories while individuals with higher levels of education were concentrated in high income categories. Therefore, education could be one alternative to increasing income because the productivity of the human element has been improved.

IV. HEAD OF HOUSEHOLD

The head of a household can be a husband, wife, or some other person.[18] The head of the household was classified as 86 percent "husband," 12 percent "wife," and 2 percent "other." Table X lists the

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[18]The head of a household was classified as a husband if he was married, divorced, or a widower. The head of a household was classified as a wife if she was married, divorced, or a widow. The remaining household heads were classified as other.

TABLE X

TENNESSEE RURAL RESIDENTS: OBSERVED AND EXPECTED FREQUENCIES AND CELL AND TOTAL CHI-SQUARE VALUES, HEAD OF HOUSEHOLD RELATED TO INCOME, 1972[a]

Family Income	Head of Household			Totals
	Husband	Wife	Other	
Less than $2,000				
Observed frequency	233	92	12	337
Expected frequency	290	40	8	337
Chi-square values	11	69	3	82
$2,000-$5,999				
Observed frequency	472	50	10	532
Expected frequency	457	63	12	532
Chi-square values	0	3	0	3
$6,000-$9,999				
Observed frequency	298	10	7	315
Expected frequency	271	37	7	315
Chi-square values	3	20	7	23
$10,000 or more				
Observed frequency	111	1	0	112
Expected frequency	96	13	3	112
Chi-square values	2	11	3	16
Totals				
Observed frequency	1,114	153	29	1,296
Expected frequency	1,114	153	29	1,296
Chi-square values	17	102	5	124

Total chi-square = 124 with six degrees of freedom; significant at the 0.01 level

[a]Cell and total chi-square values were rounded to the nearest whole number. Any discrepancy in the total chi-square value was caused by this rounding.

number of homes headed by each designated category as related to the annual income earned in 1971.

The chi-square value for data in the entire table was significant, which indicated that the distribution of income was different among the head of household categories.[19] The distributions were such that the husband group had significantly higher incomes than the wife or other group. Thirty-seven percent (409) of the household heads classified as husband received $6,000 income or more in 1971, while only 24 percent (7) and 7 percent (11) of the household heads classified as other and wife received such high incomes.

Due to lower income levels, the wife group and other group experience greater difficulty financing new housing than does the husband group.

V. EMPLOYMENT STATUS

All household heads were classified as either full-time, part-time, or not employed based on the number of hours worked per week.[20] Table XI lists the employment status and incomes of 1,289 household heads.

Sixty-seven percent (867) of the household heads were employed full-time, 5 percent (68) were employed part-time, and 28 percent (354) were not employed. Twenty-six percent (333) of the families earned

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[19] Total chi-square value = 124 with six degrees of freedom; significant at the 0.01 level.

[20] Individuals in the study were classified as full-time employed if they worked 40 hours or more per week, part-time if they worked 1-39 hours per week, and unemployed if they worked zero hours per week.

TABLE XI

TENNESSEE RURAL RESIDENTS: OBSERVED AND EXPECTED FREQUENCIES AND CELL AND TOTAL CHI-SQUARE VALUES, EMPLOYMENT STATUS RELATED TO INCOME, 1972[a]

Family Income	Employment Status			Totals
	Full-Time	Part-Time	Not-Employed	
Less than $2,000				
Observed frequency	99	29	205	333
Expected frequency	224	18	91	333
Chi-square values	70	7	141	218
$2,000-$5,999				
Observed frequency	366	31	134	531
Expected frequency	357	28	146	531
Chi-square values	0	0	1	2
$6,000-$9,999				
Observed frequency	296	7	11	314
Expected frequency	211	17	86	314
Chi-square values	34	6	66	105
$10,000 or more				
Observed frequency	106	1	4	111
Expected frequency	75	6	30	111
Chi-square values	13	4	23	40
Totals				
Observed frequency	867	68	354	1,289
Expected frequency	867	68	354	1,289
Chi-square values	117	17	231	365

Total chi-square = 365 with six degrees of freedom; significant at the 0.01 level.

[a]Cell and total chi-square values were rounded to the nearest whole number. Any discrepancy in the total chi-square value was caused by this rounding.

less than $2,000 annual income in 1971, which places these families in a position of having only a meager living. Forty-one percent (531) of the families earned incomes in the range of $2,000 to $5,999. By combining the above two groups, two-thirds (864) of the families in the survey had annual incomes below $6,000 in 1971. These income figures markedly point out the low levels of incomes for many families in rural Tennessee.

The chi-square value for the data in Table XI was significant, which indicated that the distribution of income was different among employment status groups.[21] The greatest disparity difference was for the groups with less than $2,000 annual income. Sixty percent (218) of the total chi-square value occurred in this income category.

When only considering the two groups with less than $6,000 annual income, 21 percent (99) of the full-time employed, 48 percent (29) of the part-time employed, and 60 percent (205) of the not employed earned less than $2,000 annual income. Based on the chi-square test, these percentages are significantly different.[22] These relationships emphasize that low income families are concentrated in the not employed and part-time employed groups.

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[21]Total chi-square value = 365 with six degrees of freedom; significant at the 0.01 level.

[22]Total chi-square value = 130 with two degrees of freedom; significant at the 0.01 level.

VI. OCCUPATION

The occupation of an individual can play a vital role in determining the level of income earned annually. Higher wages are paid in skilled professions than in those requiring limited or no skills. Table XII lists the income and occupation of individuals in the study.

The Chi-square test was used with data in Table XII to determine if income and occupation of the individuals were independent. The Chi-square value for data in the entire table was significant, which indicated that the distribution of income was different among occupational categories.[23] This finding suggests that the income and occupation of individuals in the study were related.

Managers, professional or technical workers, and craftsmen or foremen were the highest paid occupations while full-time farmers, part-time farmers, farm laborers and housewives were among the lowest paid occupations. Sixty-five percent of the individuals classified as managers, professional or technical workers, and as craftsmen or foremen earned $6,000 or more in 1971. Only 16 percent of the individuals classified as full-time farmers, part-time farmers, farm laborers, or housewives earned $6,000 or more during the same time period. Those individuals classified as retired or disabled received lower incomes than any other group. Ninety-five percent of these household heads

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[23]Total chi-square value = 584 with 30 degrees of freedom; significant at the 0.01 level.

TABLE XII

TENNESSEE RURAL RESIDENTS: OBSERVED AND EXPECTED FREQUENCIES AND CELL AND TOTAL CHI-SQUARE VALUES, OCCUPATION RELATED TO INCOME, 1972[a]

Occupation	Family Income: Less Than $2,000	$2,000 to $5,999	$6,000 to $9,999	$10,000 or More	Totals
Manager					
Observed frequency	1	9	14	15	39
Expected frequency	10	16	9	3	39
Chi-square values	8	3	2	40	54
Professional or technical					
Observed frequency	1	14	23	15	53
Expected frequency	14	22	13	5	53
Chi-square values	12	3	8	24	46
Craftsman or foreman					
Observed frequency	3	48	52	21	124
Expected frequency	32	51	30	11	124
Chi-square values	26	0	16	10	52
Kindred worker					
Observed frequency	5	94	102	28	229
Expected frequency	59	94	56	20	229
Chi-square values	50	0	38	3	92
Salesman					
Observed frequency	3	1	5	1	10
Expected frequency	3	4	2	1	10
Chi-square values	0	2	3	0	5
Full-time farmer					
Observed frequency	18	68	19	7	112
Expected frequency	29	46	27	10	112
Chi-square values	4	10	3	1	18
Part-time farmer					
Observed frequency	8	20	5	2	35
Expected frequency	9	14	9	3	35
Chi-square values	0	2	1	0	4

TABLE XII (continued)

Occupation	Family Income: Less Than $2,000	$2,000 to $5,999	$6,000 to $9,999	$10,000 or More	Totals
Farm labor					
Observed frequency	14	13	2	0	29
Expected frequency	8	12	7	3	29
Chi-square values	6	0	4	3	12
Retired or disabled					
Observed frequency	210	129	13	3	355
Expected frequency	92	146	86	31	355
Chi-square values	152	2	62	25	241
Housewife					
Observed frequency	36	22	3	0	61
Expected frequency	16	25	15	5	61
Chi-square values	26	0	9	5	41
Others					
Observed frequency	35	113	76	19	243
Expected frequency	63	100	59	21	243
Chi-square values	12	2	5	0	19
Totals					
Observed frequency	334	531	314	111	1,290
Expected frequency	334	531	314	111	1,290
Chi-square values	296	25	151	112	584

Total chi-square value = 584 with 30 degrees of freedom; significant at the 0.01 level.

[a]Cell and total chi-square values were rounded to the nearest whole number. Any discrepancy in the total chi-square value was caused by this rounding.

received less than $6,000 income in 1971. To place the situation in an even worse perspective, 59 percent of the retired or disabled household heads received less than $2,000 income in 1971.

VII. SKILLS

Learning a skill has been considered to be a partial solution to substandard housing conditions in rural Tennessee and similar areas. Many housing authorities believe if low income families had skills, they could provide labor as part of the cost of improving substandard housing. Table XIII lists the level of income and skills of 1,292 rural Tennessean household heads. Fourteen percent (177) of the household heads had one skill, 66 percent (857) had two or more skills, and 20 percent (258) had no skills.

The chi-square test was used with data in Table XIII to determine if the level of income and skills of the individuals in the study were independent. The null hypothesis that annual income and skills were independent was rejected.[24] Thus income and skills were related.

In Table XIII, low income families were more likely than high income families to have skills that would be useful in home construction and repair. Of the 177 household heads having one skill, 63 percent earned less than $6,000 in 1971. Of the 857 household heads having two or more skills, 73 percent earned less than $6,000 in 1971. This

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[24]Total chi-square value = 85 with nine degrees of freedom; significant at the 0.01 level.

TABLE XIII

TENNESSEE RURAL RESIDENTS: OBSERVED AND EXPECTED FREQUENCIES AND CELL AND TOTAL CHI-SQUARE VALUES, SKILLS RELATED TO INCOME, 1972[a]

Skills	Family Income: Less Than $2,000	$2,000 to $5,999	$6,000 to $9,999	$10,000 or More	Totals
Carpentry					
Observed frequency	27	69	42	13	151
Expected frequency	39	62	37	13	151
Chi-square values	4	1	1	0	5
Plumbing, electrical, masonry, or other[b]					
Observed frequency	6	10	9	1	26
Expected frequency	7	11	6	2	26
Chi-square values	0	0	1	1	2
Two or more[c] of the above skills					
Observed frequency	282	341	177	57	857
Expected frequency	224	352	208	74	857
Chi-square values	15	0	5	4	24
No skills					
Observed frequency	22	110	86	40	258
Expected frequency	67	106	63	22	258
Chi-square values	30	0	9	14	54
Totals					
Observed frequency	337	530	314	111	1,292
Expected frequency	337	530	314	111	1,292
Chi-square values	50	1	15	19	85

Total chi-square value = 85 with nine degrees of freedom; significant at the 0.01 level.

[a]Cell and total chi-square values were rounded to the nearest whole number. Any discrepancy in the total chi-square value was caused by this rounding.

[b]Other means skills other than carpentry, plumbing, electrical and masonry.

[c]Two or more skills means the household head could perform two or more of the following skills: carpentry, plumbing, electrical, masonry and other as defined in footnote b.

relationship indicates that many low income rural Tennessee families could provide labor as part of the cost in improving the quality of housing.

VIII. VALUE OF HOUSE

A distinctive characteristic of rural housing is its unusual low value per unit. Badenhop reported that almost half of the owner occupied rural nonfarm housing in that area was valued at less than $5,000 per unit.[25]

Table XIV reveals that 49 percent (495) of the 1,017 homes appraised were valued at less than $5,000 per unit. These homes are among the poorest in the survey and in most cases were occupied by families receiving less than $6,000 income per year. Eighty-five percent (423) of the 495 families occupying homes valued at less than $5,000 received less than $6,000 income in 1971.

The Chi-square test was used with data in Table XIV to determine if family income and the value of his house were independent. The null hypothesis that annual income of the family and the value of his house were independent was rejected.[26] Hence, it was concluded that annual income and the value of the house were related.

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[25]M. B. Badenhop, An Economic Survey of the Upper Cumberland Area, Bulletin No. 428, Agricultural Experiment Station, The University of Tennessee, Knoxville, Tennessee, July, 1967, p. 35.

[26]Total chi-square value = 320 with 18 degrees of freedom; significant at the 0.01 level.

TABLE XIV

TENNESSEE RURAL RESIDENTS: OBSERVED AND EXPECTED FREQUENCIES AND CELL AND TOTAL CHI-SQUARE VALUES, VALUE OF HOUSE RELATED TO INCOME, 1972[a]

	Family Income				
Value of House	Less Than $2,000	$2,000 to $5,999	$6,000 to $9,999	$10,000 or More	Totals
Less than $2,500					
Observed frequency	140	116	15	1	272
Expected frequency	71	112	66	24	272
Chi-square values	68	0	40	22	129
$2,500-$4,999					
Observed frequency	63	104	49	7	223
Expected frequency	58	92	54	19	223
Chi-square values	0	2	1	8	10
$5,000-$7,499					
Observed frequency	24	82	48	14	168
Expected frequency	43	69	41	15	168
Chi-square values	9	2	1	0	13
$7,500-$9,999					
Observed frequency	16	44	46	15	121
Expected frequency	31	50	29	10	121
Chi-square values	8	1	9	2	20
$10,000-$12,499					
Observed frequency	2	37	42	15	96
Expected frequency	25	39	23	8	96
Chi-square values	21	0	15	5	42
$12,500-$14,999					
Observed frequency	1	20	28	15	64
Expected frequency	17	26	16	6	64
Chi-square values	15	2	10	16	42
$15,000 or more					
Observed frequency	2	20	29	22	73
Expected frequency	19	30	18	6	73
Chi-square values	15	3	7	39	65

TABLE XIV (continued)

Value of House	Family Income: Less Than $2,000	$2,000 to $5,999	$6,000 to $9,999	$10,000 or More	Totals
Totals					
Observed frequency	248	423	257	89	1,017
Expected frequency	248	423	257	89	1,017
Chi-square values	136	10	83	92	320

Total chi-square = 320 with 18 degrees of freedom; significant at the 0.01 level.

[a]Cell and total chi-square values were rounded to the nearest whole number. Any discrepancy in the total chi-square values was caused by this rounding.

Table XIV reveals that as family income increased, a smaller percentage of families occupied low-cost homes (homes valued at less than $10,000). Of the 248 families receiving less than $2,000 income, 98 percent (243) occupied homes valued at less than $10,000 per unit. Of the 423 families receiving $2,000-$5,999 income, 82 percent (346) occupied homes valued at less than $10,000 per unit. Only 62 percent (158) of the 257 families who received $6,000-$9,999 occupied homes valued at $10,000 or less. In the $10,000 or more income category still fewer, 42 percent (37), of the 89 families occupied homes valued at $10,000 or less.

IX. NET WORTH

The difference between the value of items owned and debts of an individual is his net worth. This represents the amount of capital that has been accumulated by the individual or the amount of money he would receive if he sold his assets at current prices and paid off all his debts.

Table XV lists the net worth and income of household heads in the survey. More household heads (23 percent) reported having a net worth in the category of $0-$4,999 than any other net worth category. Over nine-tenths (247) of the household heads in this net worth category earned less than $6,000 in 1971.

The chi-square test was used with data in Table XV to determine if net worth and income of the individuals in the study were independent.

TABLE XV

TENNESSEE RURAL RESIDENTS: OBSERVED AND EXPECTED FREQUENCIES AND CELL AND TOTAL CHI-SQUARE VALUES, NET WORTH RELATED TO INCOME, 1972[a]

Net Worth	Less Than $2,000	$2,000 to $5,999	$6,000 to $9,999	$10,000 or More	Totals
$0-$4,999					
Observed frequency	145	102	14	2	263
Expected frequency	71	110	60	22	263
Chi-square values	78	1	35	18	132
$5,000-$9,999					
Observed frequency	57	107	42	8	214
Expected frequency	58	90	49	18	214
Chi-square values	0	3	1	6	10
$10,000-$19,999					
Observed frequency	56	99	79	13	247
Expected frequency	66	103	56	21	247
Chi-square values	2	0	9	3	14
$20,000$29,999					
Observed frequency	27	81	65	28	201
Expected frequency	54	84	46	17	201
Chi-square values	14	0	8	7	29
$30,000 or more					
Observed frequency	19	84	58	44	205
Expected frequency	55	86	47	17	205
Chi-square values	24	0	3	42	68
Totals					
Observed frequency	304	473	258	95	1,130
Expected frequency	304	473	258	95	1,130
Chi-square values	117	4	56	76	253

Total chi-square = 253 with 12 degrees of freedom; significant at the 0.01 level.

[a]Cell and total chi-square values were rounded to the nearest whole number. Any discrepancy in the total chi-square value was caused by this rounding.

The null hypothesis that annual income and net worth were independent was rejected.[27] Hence, annual income and net worth were related.

Table XV reveals that as family income increased, there was a tendency for net worth to increase also. Most of the families receiving less than $6,000 income per year reported a net worth of $0-$9,999. Most of the families receiving $6,000-$9,000 per year reported a net worth of $10,000-$29,000. Families receiving $10,000 income or more per year were concentrated in the $30,000 or more net worth category.

X. PRICE RANGE

Each household head was asked what price range would he be most interested in if he had decided to build a new house. This information gives insight into the size and quality of homes rural Tennessee residents would construct if the money was readily available.

The chi-square test was used with data in Table XVI to determine whether the income of individuals and the price homes they preferred to build were independent. The null hypothesis was stated that the income of individuals and the price homes they preferred to build were independent. The null hypothesis was rejected.[28] Hence, it was concluded that the income of individuals and the price home they preferred to build were related.

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[27] Total chi-square value = 253 with 12 degrees of freedom; significant at the 0.01 level.

[28] Total chi-square value = 453 with 12 degrees of freedom; significant at the 0.01 level.

TABLE XVI

TENNESSEE RURAL RESIDENTS: OBSERVED AND EXPECTED FREQUENCIES AND CELL AND TOTAL CHI-SQUARE VALUES, PRICE RANGE IF BUILDING A NEW HOME RELATED TO INCOME, 1972[a]

	Family Income				
Price	Less Than $2,000	$2,000 to $5,999	$6,000 to $9,999	$10,000 or More	Totals
$5,000-$9,999					
Observed frequency	193	157	21	2	373
Expected frequency	92	154	93	33	373
Chi-square values	110	0	56	30	196
$10,000-$14,999					
Observed frequency	99	268	170	24	561
Expected frequency	139	231	141	50	561
Chi-square values	11	6	6	14	37
$15,000-$19,999					
Observed frequency	14	69	91	56	230
Expected frequency	57	95	58	21	230
Chi-square values	32	7	19	61	119
$20,000-$24,999					
Observed frequency	2	16	25	18	61
Expected frequency	15	25	15	5	61
Chi-square values	11	3	6	29	50
$25,000 or more					
Observed frequency	1	5	6	12	24
Expected frequency	6	10	6	2	24
Chi-square values	4	2	0	45	52
Totals					
Observed frequency	309	515	313	112	1,249
Expected frequency	309	515	313	112	1,249
Chi-square values	169	19	88	178	453

Total chi-square = 453 with 12 degrees of freedom; significant at the 0.01 level.

[a]Cell and total chi-square values were rounded to the nearest whole number. Any discrepancy in the total chi-square value was caused by this rounding.

Table XVI indicates as individuals earned higher levels of income, they tended to prefer more expensive homes. In the less than $2,000 income category, the majority of the individuals preferred to build a home costing $5,000-$9,999. The majority of the individuals in the $2,000-$5,000 and $6,000-$9,999 income categories preferred to build a home costing $10,000-$14,999. Most of the individuals earning $10,000 or more preferred to build a home costing $15,000-$19,999. When considering the entire number individuals who responded to the question, 75 percent (934) preferred to build a home costing less than $15,000, which is within the maximum loan limit of the Farmers' Home Administration. However, size of family and income may restrict the price of the home that could be built with Farmers Home Administration financing.

CHAPTER IV

A PLAN FOR THE FINANCING OF LOW-COST MINIMUM STANDARD HOUSING IN RURAL TENNESSEE

Over the years, rural residents have frequently complained of the lack of suitable lending institutions available for the financing of low-cost rural homes. Although many of the existing lending institutions finance housing, very seldom are low income rural residents able to take advantage of such programs because of the cost involved.

To determine if rural Tennessee residents in the survey took advantage of housing loans offered by present lending institutions, each household head was asked where he could borrow money to finance a new home. Table XVII lists different lending institutions and the number of household heads who were able to borrow at each. Almost half (47 percent) of the household heads reported that they were unable to obtain loans offered by present lending institutions.

Many rural residents assert that the lack of suitable financing for the construction, purchase and improvement of homes is caused by the limitations and restrictions imposed by lenders and governmental programs and policies. The low and fluctuating incomes of most rural families further complicate attempts to obtain housing loans because a fairly high and stable income is needed to finance long-term investments.

TABLE XVII

TENNESSEE RURAL RESIDENTS: LENDING INSTITUTIONS WHERE NEW HOMES COULD BE FINANCED, 1972

Lending Institutions	Household Heads	
	Number	Percent
Farmers Home Administration	308	19
Federal Land Bank	22	2
Production Credit Association	17	1
Savings and Loan Association	74	5
Federal Housing Authority	7	0*
Commercial Banks	340	21
Other	76	5
Unable to Borrow Money	780	47
Total	1,624	100

*Less than 0.5 percent.

Lenders, on the other hand, contend that it is impossible to offer decent low-cost housing to all rural families and make a reasonable profit at the same time. The following statements taken from chapter one of An Economic Analysis of the Housing and Urban Development Act of 1968 indicates why.[29]

> The national shortage of low-income housing is not due to mysterious malfunctioning of the housing market. Certainly there are discriminations and other external influences, but as a mechanism for equating supply and demand the market is working about as it should. The trouble is that housing suppliers simply find it impossible to reduce cost enough to place satisfactory housing within the reach of lower income families while making such housing a profitable investment. Given our national income distribution, building and operating cost, and alternative investment opportunities, the market cannot satisfy the demand for low-income housing without some form of direct or indirect subsidy. The profit is simply not there. (See Figure 2)

It is evident that not all families can afford standard housing. Rural families with low and fluctuating incomes cannot hope to pay off huge long-term mortgages at today's high interest rates. For these families, a large gap exists between their incomes and the cost of adequate housing. Until a way is found to bridge this gap, these individuals will continue residing in low quality houses.

I. A PLAN

In recent years the federal government has used one percent interest loans to aid flood victims in the reconstruction of homes and

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[29]Robert P. O'Block, An Economic Analysis of the Housing and Development Act of 1968, Graduate School of Business Administration, Harvard University, Boston, Massachusetts, 1970, p. 1.

Note: The demand curve represents different quantities of housing that people will--at any time and with other things held equal--rent at each different price. The supply curve represents the relationship between rent charged and the quantity of housing that builders will produce, all other things being equal. Market equilibrium occurs only at a price where the quantities supplied and demanded are equal. At a price higher than the equilibrium intersection of the supply and demand curves, the amount builders will continue to supply will exceed the quantity consumers will demand; downward pressure on rents will result as some builders undermine the going rent. At prices lower than the equilibrium intersection, builders will stop supplying the market for lack of adequate profit incentive and consumer demand pressure will bid up rents.

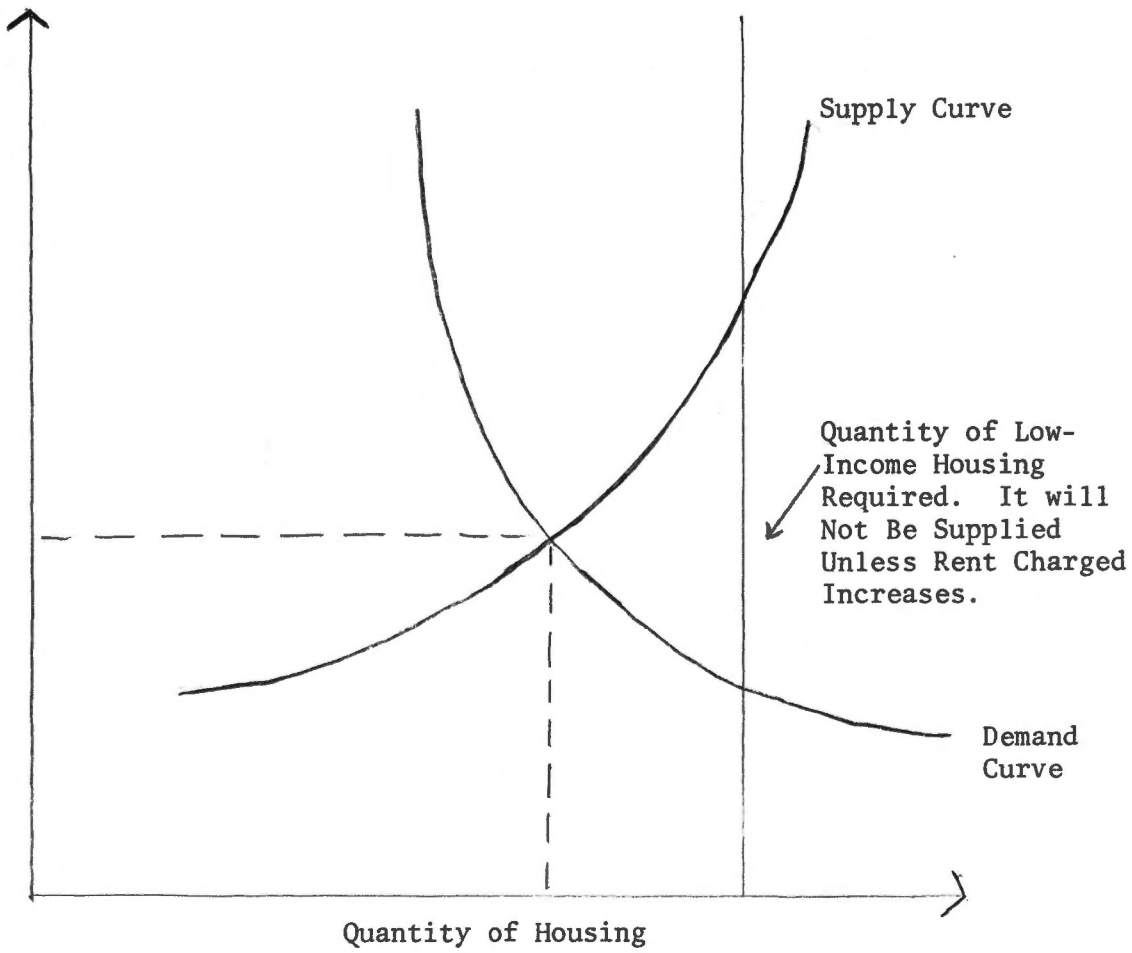


Figure 2. Economist view of the low-income housing market.

businesses. These 1 percent interest loans were directed through Farmers Home Administration by the federal government and on to the flood victims in short periods of time. As a result, the rehabilitation process was speeded up and families were able to return to a normal way of life much sooner.

Many housing authorities believe that the federal government could also use one percent interest loans to help alleviate substandard housing conditions in the nation's rural areas. Even though these low-interest loans would not place standard housing within the reach of all low-income rural families, the loans would still benefit many individuals. The purpose of this chapter is to devise a procedure whereby low-interest loans could be extended to qualifying rural Tennesseans for the purpose of building minimum standard low-cost houses. By extending low-interest housing loans to rural families, the effect would be subsidation of rural housing.

II. EXTENDING CREDIT

The Farmers Home Administration could be the agency which controls and administers the flow of funds from the subsidizing institution to low-income rural residents interested in borrowing to build modest cost homes. Farmers Home Administration could be responsible for establishing and administering rules and regulations for making these type loans. At the present time the agency operates under a set of rules and regulations

which would be ideal for adaptation to new provisions. These existing rules and regulations along with family income influence whether a family is eligible and whether the loan extended is nonsubsidized or subsidized.

A. Nonsubsidized Loans

Farmers Home Administration extends nonsubsidized loans to those low-income rural residents who are capable of paying for the full cost of housing. Interest rates on these loans change from time to time depending on the money market. In this thesis, Farmers Home Administration's rate of interest on nonsubsidized loans will be assumed to be eight percent with a 33-year repayment period.

To qualify for a nonsubsidized loan, rural residents must meet certain criteria. The family receiving the loan must earn sufficient income to pay the principal plus interest. Nonsubsidized loans are extended only to those families who are unable to obtain home financing at reasonable rates and terms from private sources. The house financed must be located in the countryside or in a rural town with a population of 10,000 or less. In addition, the head of the family receiving the loan must have a good credit reference.

Example One illustrates the procedure Farmers Home Administration uses in granting nonsubsidized loans. In Example One a family of four is assumed which includes two children under 18 years of

age. The family receives an income of $9,500 per year. It is further assumed that Farmers Home Administration extends the family a nonsubsidized housing loan at an interest rate of 8 percent with a 33-year repayment period. What price home can the family afford to purchase?

Example One

$9,500	Annual Income for a Family of Four
- 475	Deduct 5% of Annual Income for Real Estate Taxes
$9,025	
- 600	Deduct $300 for Each Child Less than 18 Yrs. of Age
$8,425	Adjusted Family Income
x 0.20	
$1,685	The Amount the Family Can Afford to Spend on Housing Per Year

Farmers Home Administration regulations designate that a low-income rural family spend no more than 20 percent of its annual adjusted income on housing each year. A family's annual adjusted income is equaled to its gross income minus five percent for real estate taxes minus $300 for each child in the household less than 18 years of age. This adjusted income figure is then multiplied by 20 percent in order to arrive at the amount of income the family can afford to repay on a loan.

In Example One, the family's gross income is $9,500 per year. Five percent of the $9,500 is deducted for real estate taxes leaving $9,025. Six hundred dollars is deducted from the $9,025 because there were two children in the household less than 18 years of age. These computations leave $8,425 as the family's adjusted income. This adjusted income figure was multiplied by 20 percent to arrive at the amount of income the family could afford to repay on the loan per year. This amount was

$1,685. Farmers Home Administration could extend this particular family a nonsubsidized loan on a rural home with annual payments no more than $1,685 per year.

B. Subsidized Loans

Farmers Home Administration extends subsidized loans to those low-income rural residents who cannot afford to pay for the full cost of housing on present incomes. The interest rate paid on subsidized loans is a function of family size and income. If a large family receives an unusually low income, the interest rate charged on these loans can range down to a minimum of one percent with a 33-year repayment period.

To qualify for a subsidized loan, low income rural residents must meet all requirements listed under nonsubsidized loans plue one more. The additional requirement states that the maximum income a rural family can earn per year and still qualify for a subsidized loan is $8,500.

The procedure Farmers Home Administration uses in granting subsidized loans can best be understood by observing an example. In Example Two, a family of four is assumed which includes two children under 18 years of age. The family receives an income of $2,992 per year. Payments on a minimum standard low-cost home in rural Tennessee for the family would be $1,090 per year if the home was financed at the rate of eight percent with a 33-year repayment period and $448 per year if it was financed at the rate of one percent with a 33-year repayment period (Table XVIII). How much of the cost of housing would Farmers Home pay assuming a subsidized loan has been granted to the low income family?

TABLE XVIII

ESTIMATED COST OF VARIOUS SIZE BRICK VENEER HOMES IN RURAL AREAS OF TENNESSEE, 1972

Family Size	Minimum Amount of Living Space Required for the Families	Cost Per Square Foot	Structure Cost	Cost of Homesites Including Water and Waste Facilities	Cost of Homes excluding Interest	Annual Cost Homes (8%, 33 yrs.)	Annual Cost Homes (1%, 33 yrs.)
One person	480 sq. ft.	$11	$ 5,280	$2,000	7,280	$ 632	$ 260
A couple	672 sq. ft.	11	7,392	2,000	9,392	815	335
Family with 1 child	864 sq. ft.	11	9,504	2,000	11,504	999	411
Family with 2-4 children	960 sq. ft.	11	10,560	2,000	12,560	1,090	448
Family with 5-6 children	1,056 sq. ft.	11	11,616	2,000	13,616	1,182	486
Family with 7 children	1,152 sq. ft.	11	12,672	2,000	14,672	1,274	524

Example Two

$2,992	Annual Income for a Family of Four
- 150	Deduct 5% for Real Estate Taxes
$2,842	
- 600	Deduct $300 for Each Child Less than 18 Yrs. of Age
$2,242	Adjusted Family Income
x 0.20	
$ 448	The Amount the Family Can Afford to Spend on Housing Per Year
$1,090	Annual Payments on the House at 8% Interest with a 33-Yr. Repayment Period
- 448	The Amount the Family Can Afford to Pay on Housing Per Year
$ 642	Subsidy Per Year

As was the case with nonsubsidized loans, subsidized loans permit a low-income family to spend no more than 20 percent of its annual adjusted income on housing. In Example Two, 20 percent of the family's adjusted income was calculated. The family's annual income was $2,992. Five percent of this amount was deducted leaving $2,842. Since there were two children in the household who were under 18 years of age, $600 was deducted from the $2,842 leaving $2,242 as the family's annual adjusted income. The $2,242 was then multiplied by 20 percent in order to derive the income the family can afford to pay on housing per year. This amount equaled $448. Payments on a minimum standard low-cost house for the family would be $1,090 per year if the house was financed at 8 percent with a 33-year repayment period and $448 per year if it was financed at the rate of 1 percent with a 33-year repayment period (Table XVIII). The family would be unable to qualify for a nonsubsidized loan because payments on such a loan would be $1,090 per year. Therefore, Farmers Home Administration extends a subsidized loan to this low-income family at an interest rate of 1 percent, thereby allowing the family

to purchase the house for $448 per year. Thus, the family receives $642 as housing subsidy per year.

The family discussed in Example One received adequate income to finance a new home at 8 percent interest and was granted a non-subsidized loan. The family discussed in Example Two received adequate income to finance a new home at 1 percent interest and was granted a 1 percent interest subsidized loan. Families receiving incomes adequate to finance new homes at interest rates between one and eight percent would also be granted subsidized loans.

Some rural families receive levels of income that would qualify them for nonsubsidized loans. Others receiving moderate levels of income would be able to qualify for subsidized loans. There are still other rural families whose incomes are inadequate to even qualify for a subsidized loan.

III. DATA

Families in the survey were divided into three groups based on their ability to finance new homes. These three groups of families are referred to as groups I, II, and III. Families in each of the three groups require different types of financing for housing.

Group I consists of those families concentrated in the higher income brackets. Because of their high income levels, families in group I are able to finance new homes without government assistance. Through the use of nonsubsidized loans granted by Farmers Home Administration and other lenders, these families should be able to secure adequate housing.

It is assumed that those families in group I occupy substandard houses because they have a desire to do so, not because they cannot afford adequate housing.

Group II consists of those families who receive moderate levels of income. Due to moderate incomes, these families are unable to pay for the full cost of housing. Extensive use of subsidy programs is required in order to place adequate housing within the reach of this group. When subsidized housing loans are granted to families in group II, they can afford to build new homes because the overall cost involved has been divided between the government and homeowner. An evaluation of group II will be undertaken in order to determine the cost of housing to be paid by government subsidy and the cost to be paid by the families.

Group III consists of those families concentrated in the lower income brackets. Household heads in this group are usually underemployed, unemployed, retired, or disabled. An unusually large percentage of the family's income must be spent on food and clothing leaving small amounts left over for the cost of housing. As a result, families in group III are financially unable to purchase new homes even with the assistance of a subsidized housing loan. The only way to place adequate housing within the reach of these families is in the form of a gift.

The number and percentage of families classified into groups I, II, and III are illustrated in Figure 3. Groups I and II have the same percentage of families (36 percent), whereas group III has a smaller percentage (28 percent).

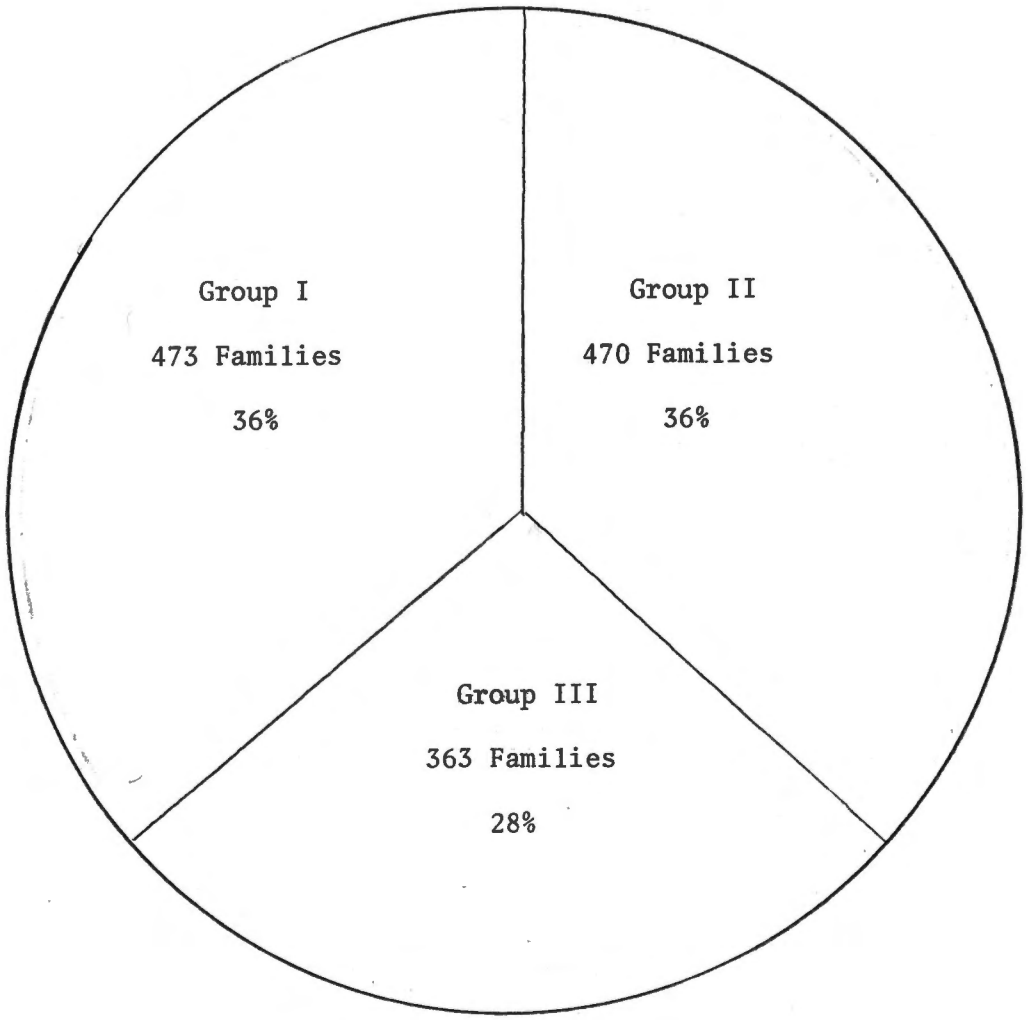


Figure 3. Number and percentage of rural Tennessee families classified into Groups I, II, and III according to family income, 1971.

The purpose of dividing the families into three groups is to identify those families who need financial assistance in purchasing a home. Once this task has been accomplished, it will be possible to establish the amount of government subsidy required to alleviate sub-standard housing conditions among families in the study.

A. Cost of New Housing

The total cost of constructing various size brick veneer homes in rural Tennessee was computed (Table XVIII). The total cost of a home consists of the structure cost, plus the cost of the homesite, plus the cost of water and waste facilities. Each item was calculated separately in Table XVIII and then added in order to arrive at the total cost of constructing brick veneer homes for the families.

For simplification, the structure cost of each size house was obtained by multiplying the square footage of the houses by the estimated cost per square foot. Table XVIII includes the size of families and the minimum amount of living space required for each.[30] The estimated cost per square foot for the construction of a brick veneer home in rural Tennessee was 11 dollars.[31] By multiplying this cost figure by the minimum square feet of living space required for each size family, the structure cost of the houses was obtained.

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[30]The minimum amount of living space required for different size rural families was obtained from Farmers Home Administration, Nashville, Tennessee.

[31]The estimated cost per square foot for the construction of a brick veneer home in rural Tennessee is a 1972 figure obtained from Farmers Home Administration, Nashville, Tennessee.

The estimated cost of a homesite in rural Tennessee was $2,000 (Table XVIII).[32] The cost of water and waste facilities was included in the cost of homesites. Structure and homesite cost were added in order to arrive at the cost of the different size homes excluding interest (Table XVIII).

The annual cost of each size home was calculated at an interest rate of 8 percent with a 33-year repayment period and at 1 percent with a 33-year repayment period (Table XVIII). Any family able to finance a new home at an interest rate of 8 percent or at interest rates in excess of 8 percent will be considered capable of paying the full cost of minimum standard housing and will qualify for a non-subsidized housing loan. Any family able to finance a new home at interest rates from 1 percent up to 8 percent will qualify for a subsidized housing loan. Families unable to finance a new home at an interest rate of 1 percent will be subsidized for the full cost of the home. For example, each couple in the survey must pay $815 annually in order to finance a new home at an interest rate of 8 percent and $335 annually in order to finance a new home at an interest rate of 1 percent (Table XVIII). Any couple able to pay $815 or more annually for a home would qualify for a nonsubsidized housing loan. Any couple able to pay $335-$814 annually would qualify for a subsidized housing loan, and any couple unable to pay $335 annually would be subsidized for the full cost of housing.

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[32]The estimated cost of a homesite in rural Tennessee is a 1972 figure and was obtained from Farmers Home Administration, Nashville, Tennessee.

B. Required Income

The level of income families must receive annually in order to purchase the new homes is listed in Table XIX. To reemphasize, families whose annual incomes are high enough to finance new homes at interest rates of 8 percent and higher, will be considered capable of paying the full cost of minimum standard housing and would qualify for a nonsubsidized housing loan. Families whose annual incomes are adequate to finance new homes at interest rates of 1 percent up to 8 percent would qualify for a subsidized housing loan and families whose incomes are inadequate to finance new homes at an interest rate of 1 percent would be subsidized for the full cost of housing. For example, each couple in the survey must receive $4,191 income annually in order to finance a new home at an interest rate of 8 percent and $1,765 annually in order to finance a new home at an interest rate of 1 percent (Table XIX). Any couple receiving $4,191 income or more annually would qualify for a nonsubsidized loan. Any couple receiving $1,765-$4,190 income annually would qualify for a subsidized housing loan and any couple receiving less than $1,765 income annually would be subsidized for the full cost of housing.

C. Subsidy

Twenty-two percent of the families in the survey occupied substandard housing. These families are classified according to level of family income and condition of houses in Table XX. The condition of houses was measured in terms of feasibility of repair. Houses

TABLE XIX

ESTIMATED ANNUAL INCOME REQUIRED TO PURCHASE VARIOUS SIZE BRICK VENEER HOMES IN RURAL AREAS OF TENNESSEE AT EIGHT PERCENT AND ONE PERCENT INTEREST RATES WITH A 33-YEAR REPAYMENT PERIOD, 1972

Family Size	Annual Income Required to Purchase Homes (8%, 33 years)	Annual Income Required to Purchase Homes (1%, 33 years)
	----------dollars----------	
One person	3,326	1,368
A couple	4,191	1,765
Family with 1 child	5,571	2,477
Family with 2 children	6,370	2,992
Family with 3 children	6,685	3,307
Family with 4 children	7,001	3,623
Family with 5 children	7,799	4,137
Family with 6 children	8,115	4,453
Family with 7 children	8,916	4,968

TABLE XX

RURAL TENNESSEE RESIDENTS: FAMILY INCOME AND FEASIBILITY OF DWELLING REPAIR, 1972

	Feasibility of Dwelling Repair			Totals	
Family Income	High	Moderate	Poor	Number	Percent
None	3	4	3	10	1
< $1,000	7	30	40	77	6
$1,000-$1,999	29	104	111	244	20
$2,000-$3,999	58	146	71	275	24
$4,000-$5,999	96	84	33	213	18
$6,000-$7,999	80	56	8	144	12
$8,000-$9,999	65	58	6	129	11
$10,000-$14,000	49	26	2	77	6
$15,000 or more	18	6	0	24	2
Totals					
Number	405	514	274	1,193	
Percent	35	43	22		100

receiving a high or moderate feasibility of repair rating were assumed to be in good to average condition. It would not be very economical to encourage families to abandon these dwellings by offering them subsidy to build new ones. Only the houses receiving a poor feasibility of repair rating were considered substandard and in need of replacement. The low income families occupying houses with a poor feasibility of repair rating were considered for housing subsidy.

The two hundred and seventy-four families occupying substandard houses were classified according to levels of income and family size (Table XXI). These families were divided into low, moderate, and high income groups. Data in the table reveal that the majority of the families residing in low quality housing were concentrated in income categories of less than $6,000; however, a small percentage were in higher income categories. Table XXII represents Table XXI after Table XXI was divided into the three respective groups. In order to divide the table, frequency cells were split where groups I and II bordered and where groups II and III bordered. It was assumed that the frequency for cells in the table was evenly distributed and the families were proportioned accordingly. Seven percent (20) of the 124 families occupying substandard housing were included in group I, 35 percent (95) were included in group II, and 58 percent (159) were included in group III. Attention will be focused on families in groups II and III because families belonging to group I can afford to purchase adequate housing without subsidy.

TABLE XXI

RURAL TENNESSEE RESIDENTS: FAMILY INCOME AND SIZE OF FAMILIES OCCUPYING SUBSTANDARD HOUSING, 1972

Family Income	Family Size									Totals	
	One	Two	Three	Four	Five	Six	Seven	Eight	Nine or More	Number	Percent
None	0	1	1	0	0	1	0	0	0	3	1
< $1,000	13	11	7	6	3	0	0	0	0	40	15
$1,000-$1,999	26	46	14	7	5	7	3	0	3	111	40
$2,000-$3,999	2	21	9	10	12	6	5	3	3	71	26
$4,000-$5,999	0	3	10	8	3	1	4	1	3	33	12
$6,000-$7,999	0	0	4	1	1	0	0	1	1	8	3
$8,000-$9,999	1	3	1	0	0	1	0	0	0	6	2
$10,000-$14,000	0	0	1	1	0	0	0	0	0	2	1
Totals											
Number	42	85	47	33	24	16	12	5	10	274	
Percent	15	31	17	12	9	6	4	2	4		100

TABLE XXII

RURAL TENNESSEE RESIDENTS: FAMILY INCOME AND SIZE OF FAMILIES OCCUPYING SUBSTANDARD HOUSING BY GROUPS, 1972

Family Income	Family Size									Totals	
	One	Two	Three	Four	Five	Six	Seven	Eight	Nine or More		
None	0	1	1	0	0	1	0	0	0	3	
< $1,000	13	11	7	6	3	0	0	0	0	40	
$1,000-$1,999	10 < $1,368 16 ≥ $1,368	35 < $1,765 11 ≥ $1,765	14	7	5	7	3	0	3	111	Group III
$2,000-$3,999	1 $3,326 1 $3,326	21	2 < $2,477 7 ≥ $2,477	5 < $2,992 5 ≥ $2,992	8 < $3,307 4 ≥ $3,307	5 < $3,623 1 ≥ $3,623	5	3	3	71	
$4,000-$5,999	0	0 < $4,291 3 ≥ $4,291	8 < $5,571 2 ≥ $5,571	8	3	1	0 < $4,137 4 ≥ $4,137	0 < $4,453 1 ≥ $4,453	1 < $4,968 2 ≥ $4,968	33	
$6,000-$7,999	0	0	4	0 < $6,370 1 ≥ $6,370	0 < $6,685 1 ≥ $6,685	0 < $7,001 0 ≥ $7,001	0 < $7,799 0 ≥ $7,799	1	1	8	Group II
$8,000-$9,999	1	3	1	0	0	1	0	0 < $8,115 0 ≥ $8,115	0 < $8,919 0 ≥ $8,916	6	
$10,000-$14,000	0	0	1	1	0	0	0	0	0	2	Group I
$15,000 or more	0	0	0	0	0	0	0	0	0	0	
Totals	42	85	47	33	24	16	12	5	10	274	

The amount of government subsidy required to alleviate substandard housing conditions within group II was estimated (Table XXIII). The subsidy was estimated based on family income, family size, and the rules and regulations of the Farmers Home Administration. This subsidy was estimated to be $33,163 per year.

The amount of government subsidy required to alleviate substandard housing conditions within group III was estimated (Table XXIV). These families must be subsidized for the full cost of housing because their incomes are inadequate to finance minimum standard housing even with the assistance of a 1 percent interest subsidized loan. It would require $149,967 per year in government subsidy to provide the 159 families in group III with minimum standard low-cost new housing.

For both groups it would require $183,130 per year in government subsidy to provide the families with new homes who occupy substandard housing and receive inadequate income to purchase minimum standard housing. One thousand six hundred and twenty-four households were included in the survey but data on the condition of dwellings were obtained on only 1,193. The 1,193 households represent .003797 percent of the total number households in rural Tennessee (314,185).[33] Based on this sample, it would require almost 70 million dollars in government subsidy per year in order to provide all families in rural Tennessee with new homes who occupy substandard housing and receive inadequate income to purchase minimum standard housing.

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[33]The 1970 U. S. Census reveals that there were 314,185 households in rural Tennessee.

TABLE XXIII

RURAL TENNESSEE RESIDENTS: ESTIMATED SUBSIDY PER YEAR TO PROVIDE MINIMUM STANDARD HOUSING FOR FAMILIES IN GROUP II, 1972

Number of Members in Family	Family Income[a]	Number of Families	Average Subsidy Per Family Per Year	Total Subsidy Per Year
1	$1,368-$3,326	17	301	5,118
2	$1,765-$4,191	32	318	10,172
3	$2,477-$5,571	15	287	4,308
4	$2,992-$6,370	13	370	4,810
5	$3,307-$6,685	7	466	3,264
6	$3,623-$7,001	2	493	986
7	$4,137-$7,799	4	519	2,076
8	$4,453-$8,115	2	380	761
9	$4,968-$8,916	3	556	1,668
Totals		95	349	33,163

[a]Families with incomes within the range of the amounts in this column corresponding to each respective family size are unable to make full payments for housing under the existing Farmers Home Administration rules and regulations. These families need a partial subsidy in order to obtain minimum standard new housing.

TABLE XXIV

RURAL TENNESSEE RESIDENTS: ESTIMATED SUBSIDY PER YEAR TO PROVIDE MINIMUM STANDARD HOUSING FOR FAMILIES IN GROUP III, 1972

Number of Members in Family	Family Income[a]	Number of Families	Average Subsidy Per Family Per Year	Total Subsidy Per Year
			----------dollars----------	
1	< $1,368	23	632	14,536
2	< $1,765	47	815	38,305
3	< $2,477	24	999	23,976
4	< $2,992	18	1,090	19,620
5	< $3,307	16	1,090	17,440
6	< $3,623	13	1,090	14,170
7	< $4,138	8	1,182	9,456
8	< $4,454	3	1,182	3,546
9	< $4,968	7	1,274	8,918
Totals		159	943	149,967

[a]Families with incomes below the amounts in this column corresponding to each respective family size are unable to make any payments for housing under the existing Farmers Home Administration rules and regulations.

CHAPTER V

SUMMARY AND CONCLUSIONS

I. SUMMARY

The objectives of this study were: 1) to determine the present status of rural housing in Tennessee by examining the relationships between selected socioeconomic characteristics of rural residents and characteristics of rural housing; and 2) to develop financial plans of improving housing for low-income families in rural Tennessee. The study was based on a survey of 1,624 rural Tennessee families conducted in 1972. The data were collected through personal interviews of the rural families by means of a structured questionnaire. Data collected from each family included information pertaining to the characteristics of rural housing and rural residents. Information pertaining to the characteristics of rural housing included accessibility, condition of yards, exterior condition of homes, space, water and sanitation facilities, feasibility of repair, and value of homes. Information pertaining to the characteristics of rural residents included income, race, age, head of household, education, occupation, employment status, skills, net worth, and price range if building a new home. The study can best be summarized by briefly reviewing these characteristics.

Accessibility of dwellings continues to remain a problem in rural Tennessee. Almost half of the homes included in the study were located

on unpaved roads. Although 62 percent of the driveways were covered with some type of hard surface material, 80 percent of the walkways were either dirt or grass.

The condition of yards was less of a problem. Most (78 percent) of the families kept yards well landscaped and neatly maintained or not landscaped and neatly maintained. However, one-fifth of the families permitted their yards to be disorderly and poorly maintained.

The exterior conditions of homes appeared to be reasonably sound in most instances. Serious defects in roofs, exterior walls, and foundations were present in only a few cases. Eight percent of the roofs, 11 percent of the exterior walls, and 8 percent of the foundations had considerable defects, respectively. A variety of low-cost materials were used to construct roofs, exterior walls, and foundations. Although the cost of constructing a home can be greatly reduced by using low-cost materials, the life span of such buildings tends to be short. This could be one of the factors influencing substandard housing conditions in rural areas.

The overall condition of doors, windows, and screens appeared to be quite sound. Eight percent of the doors, 8 percent of the windows, and 11 percent of the screens had considerable defects, respectively.

After considering the condition of roofs, exterior walls, foundations, doors, windows, and screens, enumerators rated each dwelling in the survey according to its feasibility of repair. Ratings of high, moderate, and poor feasibility of repair were given. Thirty-five, 43, and 22

percent of the dwellings received high, moderate, and poor feasibility of repair ratings, respectively.

The amount of space inside the dwellings was adequate in most cases. Eighty-nine percent of the dwellings in the survey were one story. The living space in 80 percent of the dwellings ranged between 400-1,199 square feet. Most dwellings had adequate space available for such functional activities as the preparation of food, meal service, food storage, laundry work, clothing storage, sewing, leisure play, and sleeping.

Water and sanitation facilities inside the dwellings were rated according to the source of water supply, type of water facilities, and type of toilet facilities. Although 64 percent of the families reported drilled wells as the source of water supply, 20 percent relied on springs and dug wells. Most (71 percent) of the families reported having hot and cold piped running water facilities inside the dwelling; however, 20 percent reported having no piped running water at all. Over two-thirds (68 percent) of the families reported having flush toilets inside the dwelling; the remaining 32 percent relied on privy-outhouses or chemical toilets.

Family income was the most significant direct factor affecting the quality and adequacy of housing. Chi-square analysis was used to test the relationships between family income and selected characteristics of rural residents and rural housing.

The relationships between family income and race was such that a higher percentage of the Black household heads were concentrated in

percent of the Blacks received less than $6,000 income in 1971 compared with only 64 percent of the Caucasians. A further point was that 38 percent of the Blacks received less than $2,000 income in 1971 compared with only 25 percent of the Caucasians.

Age and income of the individual were related. Household heads who were young and in the productive years of life were actively employed and earned high incomes while older household heads who were underemployed and unemployed were concentrated in lower income categories.

The level of formal education was positively related to the level of income received. As the number of years of formal education increased, so did income. Sixty percent of the household heads reported having one to eight years of formal education. Over four-fifths of the household heads in this educational category received less than $6,000 income in 1971.

Household heads were classified as husband, wife, or some other person. The relationship between income and classification was such that the husband group received higher income than did the wife group or other group. Eighty-six percent, 12 percent, and 2 percent of the households were headed by husbands, wives, and other persons, respectively.

The relationship between income and employment status was such that low income families were concentrated in the unemployed and part-time employed groups. Sixty-seven percent of the household heads were employed full-time, 5 percent were employed part-time, and 28 percent were unemployed.

The occupation of individuals was found to be highly related to the level of income received. Managers, professional or technical workers, and craftsmen or foremen were the highest paid occupations, while full-time farmers, part-time farmers, farm laborers and housewives were among the lowest paid occupations. Those individuals classified as retired or disabled received lower incomes than any other group.

Income and skills of the individuals were related. Household heads with skills generally received higher incomes than those with no skills. An unusually important finding was that low income families were more likely than high income families to have skills that would be useful in home construction and repair. Fourteen percent of the household heads reported having one skill, 66 percent reported having two or more skills and 20 percent reported having no skills.

Net worth of the household heads was related to their levels of income. As the income of individuals increased, there was a tendency for net worth to increase also. More household heads reported having a net worth in the category of $0-$4,999 than any other net worth category. Over nine-tenths of the household heads listed in this net worth category received less than $6,000 income in 1971.

The amount of income individuals received was related to the value of their homes. As the incomes of individuals increased, fewer and fewer occupied low-cost homes (homes valued at less than $10,000). Forty-nine percent of the homes appraised were valued at less than $5,000 per unit.

Each household head in the survey was asked what price range would he be most interested in if he decided to build a new home. The results revealed that as individuals earned higher levels of income, they tended to prefer more expensive homes. When considering all household heads who responded to this question, 75 percent preferred to build a home costing less than $15,000.

Many families in the survey received incomes inadequate to finance new homes and as a result had to reside in substandard homes. A plan whereby the federal government would subsidize the cost of building low-cost minimum standard housing for these families was proposed. Under the plan, the federal government would extend housing loans to low-income rural residents at interest rates based on family income and size. The Farmers Home Administration could be the agency controlling and administering the flow of funds from the subsidizing institution to low-income rural residents interested in borrowing to build modest cost homes.

Families in the survey occupying substandard housing and receiving inadequate incomes to build new homes were identified. Government subsidy required per year, under the proposed plan, to alleviate substandard housing conditions within this group of families was estimated. This amount equaled to $183,130 per year. The households in the survey represent .003797 percent of all rural households in Tennessee. Therefore, under the proposed plan, it would require almost 70 million dollars per year in government subsidy to place adequate housing within the reach

of all rural Tennesseans who occupy substandard housing and receive inadequate incomes to finance new homes.

II. CONCLUSIONS

Substandard housing continues to remain a problem in rural areas of Tennessee. Rural residents maintain that the problem lies with lending institutions who impose too many limitations and restrictions on housing loans. Lending institutions maintain that it is impossible to provide all rural residents with adequate housing and make a profit at the same time. Both rural residents and lending institutions maintain that the federal government has not been active enough in establishing programs for the construction and rehabilitation of homes in rural areas.

The solution to the problem lies in better working relations between rural residents, lending institutions, and the federal government. Each of the three groups must be responsive to the other two and make every effort possible to alleviate substandard housing in rural areas of the State.

The primary way rural residents can help alleviate substandard housing is by increasing their incomes. The most effective way to increase income is by increasing the productivity of the individual. It is more essential that rural Tennessee residents strive to obtain formal education and/or technical training to the highest levels consistent with the individual's capability. As more industries move into rural areas of the State, the demand for skilled laborers should increase.

Individuals who have obtained the necessary training should be able to enter skilled professions and earn the high incomes required to purchase better quality housing.

Lending institutions have been very instrumental in expanding their services to include the financing of rural housing in recent years. However, if they are to make further contributions toward solving the rural housing problem, a few changes must be made. Among these are the following:

1. Lending institutions extending rural housing loans should organize their administrative structures in such a manner as to provide at all levels ample staff skilled in and devoted to all of the various methods of serving the needs of low-income rural families.
2. Lending institutions should be willing to take greater risks when extending housing loans to low-income rural residents.
3. The service area of lending institutions extending rural housing loans should be expanded to include towns with a population of 25,000 and under.

Over the years, the federal government has established various programs for the construction and rehabilitation of homes in rural areas. These programs have all met with limited success and, therefore, have only been partially effective in placing adequate housing within the reach of rural families who desire it. If the federal government is to make further contributions toward solving the housing problem, it must be prepared to administer two types of programs.

The short-run solution to the rural housing problem will require governmental subsidy. To decrease substandard housing conditions in the short run, it is most essential that the federal government appropriate funds for the construction and rehabilitation of as many rural homes as possible in the immediate future. The rural residents occupying the worse of substandard housing should be the first to benefit from this program.

Governmental subsidy will not solve the rural housing problem in the long run. The long-run solution to the housing problem will require higher paying jobs coupled with available financing for rural homes.

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APPENDIX

APPENDIX A

THE CHI-SQUARE TEST

Chi-square (χ^2) is used as a test of significance on data that are expressed in frequencies or data that are in terms of percentages or proportions and that can be reduced to frequencies. Many of the applications of chi-square are with discrete data; however, any continuous data may be reduced to categories and the data so tabulated that chi-square may be applied.

Chi-square is used to determine if a certain distribution differs from some predetermined theoretical distribution. A distribution based on the tossing of a die or a series of coins is an example. It is possible to determine whether the observed frequencies differ from the frequencies that would be expected if the distribution followed the shape of the normal distribution. This is an example of testing goodness of fit. Another use of chi-square is in testing null hypotheses of no significant difference between or among the responses of individuals in two or more groups.

No matter what the particular purpose of the test, the value of chi-square is dependent on the relationship between observed and expected frequencies of tabled data. With a given number of categories of data, the larger the differences between observed and expected frequencies, the larger the value of chi-square. This being the case, the null hypothesis suggesting that there is no significant difference between the observed and expected frequencies would be rejected when the computed chi-square is relatively high in value. The critical values of chi-square vary with the degrees of freedom associated with the data. From this standpoint the distribution of chi-square is similar to the Z/t distribution.

The chi-square test can best be understood by observing an example. Data will be used to illustrate the computational procedure connected with the χ^2 (chi-square) test.

Three groups of individuals were asked to respond to a single item of an attitude inventory scale (Table A-1). The responses were recorded as "strongly agree," "agree," "no opinion," "disagree," and "strongly disagree." These frequencies are referred to as the observed frequencies. The observed frequencies will be tested to determine the probability that the set represents a chance deviation from the expected frequencies. For such a goodness-of-fit test the expected frequencies must first be calculated.

TABLE A-1

OBSERVED AND EXPECTED FREQUENCIES AND CELL AND TOTAL CHI-SQUARE VALUES, RESPONSES OF THREE GROUPS OF INDIVIDUALS TO A SINGLE ITEM OF AN ATTITUDE INVENTORY SCALE, 1956

Groups	Responses					Totals
	SA	A	No	D	SD	
Group 1						
Observed frequency	12	18	4	8	12	54
Expected frequency	19	12	7	7	9	54
Chi-square values	3	3	1	0	1	8
Group 2						
Observed frequency	48	22	10	8	10	98
Expected frequency	34	21	13	13	17	98
Chi-square values	6	0	1	2	3	12
Group 3						
Observed frequency	10	4	12	10	12	48
Expected frequency	17	11	6	6	8	48
Chi-square values	3	4	6	3	2	18
Totals						
Observed frequency	70	44	26	26	34	200
Expected frequency	70	44	26	26	34	200
Chi-square values	12	7	8	5	6	38[a]

Total chi-square = 38 with eight degrees of freedom; significant at the 0.01 level.

[a]Cell and total chi-square values were rounded to the nearest whole number. Any discrepancy in the total chi-square value was caused by this rounding.

The expected frequencies were calculated by manipulating the margins of Table A-1. To obtain the expected frequency for the table cell (Group 1, SA) 70 was multiplied by 54 and the results divided by the total number of cases, 200. The expected frequency for table cell (Group 2, No) was obtained by multiplying 26 by 98 and dividing the results by 200. The expected frequency for table cell (Group 3, SD) was obtained by multiplying 34 by 48 and dividing the results by 200. In this manner, all the expected cell frequencies in the contingency table were determined (Table A-1).

Next the null hypothesis was stated that the observed frequencies did not differ from what would be expected by chance or the expected frequencies. In effect, the null hypothesis states there was no significant difference between or among the responses of individuals in the three groups. The hypothesis was tested by using the general formula for chi-square:

$$\chi^2 = \Sigma \frac{(O-E)^2}{E}$$

Where O = Observed frequencies
E = Expected frequencies

By applying the formula to data in Table A-1, the result is

$$\chi^2 = \frac{(12-19)^2}{19} + \frac{(48-34)^2}{34} + \ldots + \frac{(12-8)^{2a}}{8}$$

$$= 3 + 6 + \ldots + 2$$

$$= 38 \text{ (Total chi-square value)}$$

To determine if the total chi-square value is significant, the number of degrees of freedom was first calculated for Table A-1. In a chi-square problem degrees of freedom are determined by the use of the following formula

$$df = (r-1)\ (c-1)$$

Where r = the number of rows in the contingency table

c = the number of columns in the contingency table

For the data in Table A-1 this reduces to:

$$df = (3-1)\ (5-1) = (2)\ (4) = 8$$

With eight degrees of freedom, the total chi-square value must equal to 20.09 or more to be significant at the 0.01 level.* The total chi-square value was equaled to 34; therefore, the null hypothesis of no significant difference among the three groups was rejected. There was strong reason to believe that there was a significant difference among the three groups. But where? Further tests have to be made to see if each group differs from the other or if two of them are similar, both differing from a third. A chi-square test can be made, taking one group at a time versus another group. If the total chi-square value had not been significant, the procedure would have stopped at that point.

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*N. M. Downie and R. W. Heath, Basic Statistical Methods, New York: Harper and Row Publishers, 1965, p. 299.

VITA

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