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THE BENCHMARK HOUSE

(By Gertrude S. Fish, Ph.D.,* College of Human Ecology, University of Maryland)

INTRODUCTION

The group known as S-95 is more officially named the southern regional research project on Quality Housing Environment for Rural Low-Income Families. The Agricultural Experiment Stations at 10 land-grant universities fund the research. Dr. Betsy Davis is the representative from the Science and Education Administration (SEA) and Dr. Donald Steward is the representative from the Economic Development Division, both of USDA. Dr. Neal Boyd of Virginia Polytechnic Institute is the administrator of the project; I am the chairperson of the technical committee; Dr. Tariq Durrani of VPI is the vice chairperson, and Dr. William Boles of Auburn University is the secretary. Other active members are Drs. Kay Stewart from Oklahoma State; Alice Stubbs from Texas A. & M.; James Montgomery from the University of Georgia; Savannah Day and Faye Plowman from Florida State; Homer Hurst and Betty Campbell from VPI; Baird Gentili from the University of North Carolina at Greensboro; Harold Allen from Clemson University in South Carolina; Jaquelyn McCray from the University of Arkansas at Pine Bluff, and Cora McKown from Texas Tech.

There are three other agencies which have participated in the work of S-95. The Rural Housing Research Unit at Clemson University in South Carolina supports the participation of Jerry Newman, Luther Godbey, and Harold Zornig; the Tennessee Valley Authority supports the participation of Al Henderson, John Culp, and Alice Underwood; and the Appalachian Regional Commission supports the participation of Charles Hayes. Some new members are joining the new project which begins in 1979

THE BENCHMARK HOUSE

One of the objectives of the southern regional research project (S-95) was to "determine the acceptability and economic feasibility of innovative designs in rural housing."¹ One way to determine the acceptability and economic feasibility of innovations in housing is to pick one house as a basis for comparison and compare innovative houses to it. The house picked as such a Benchmark was the Farmers Home Administration plan H5-41a, a house that has been built all

*The results in this paper are based on analysis of data obtained from a survey conducted as part of the Southern Regional Research Project S-95, *Quality Housing Environments for Low-Income, Rural Families* funded by USDA Agricultural Experiment Station regional research funds under the Hatch Act. The content of this report is the sole responsibility of the author, who is the principal investigator from Maryland.

¹*Quality Housing Environment for Rural Low-Income Families*, Southern Regional Project Proposal, March 1973.

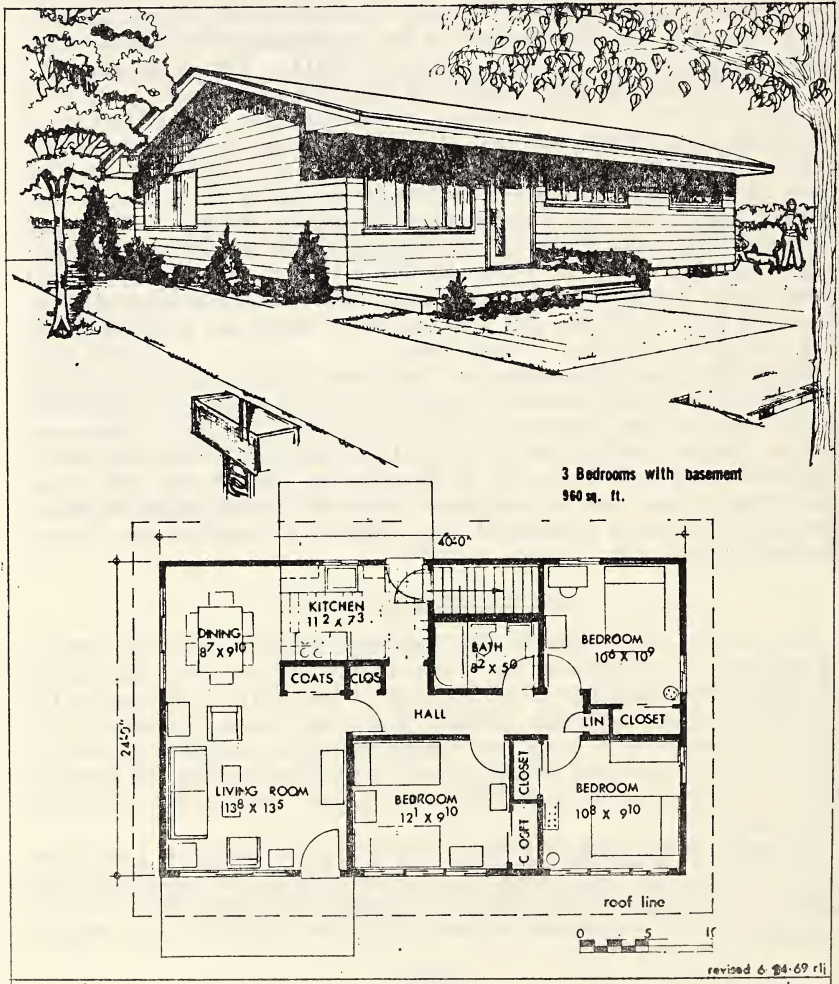
over the country in nonmetropolitan areas, and one which is modest in size and cost (see fig. 1).

The diagram of house plan H5-41a shows that it is a ranch-style three-bedroom house with about 960 square feet of floor space. If there is a basement, some of that space must be used for a stairway down to it, but some of the houses surveyed in Maryland did not have basements. Residents of 173 such houses not more than 7 years old were interviewed. Because income data was missing for 22 households those cases are eliminated in this discussion, and the paper is based on 151 cases.

HOUSE PLAN NO. H5-41A

U.S. DEPARTMENT OF AGRICULTURE—FARMERS HOME ADMINISTRATION

FIGURE 1.—The “yardstick” house selected by the S-95 prototype evaluation committee



PURPOSE

If the Benchmark house is to be used as a basis of comparison for rural housing it is important to describe it in relation to other rural housing. The purpose of this paper is to compare the housing experienced by residents of the Benchmark house with that experienced by a national sample of rural low-income families. The measures upon which the comparison will be made include physical conditions of deterioration, a measure of crowding, and a measure of housing deprivation that relates housing cost to household income.² The attitudinal responses of the residents of the Benchmark houses will also be considered. All of these measures will result in a partial description of the Benchmark house in relation to all rural low-income housing in the United States and will also suggest modifications of the Benchmark house to alleviate the conditions noted during the investigation.

DEFICIENCY INDICATORS FROM THE URBAN INSTITUTE STUDY

In September 1977 two researchers, Jeanne Goedert and John Goodman at the Urban Institute in Washington, D.C., published the results of a study that produced a list of deficiencies found normally in low-income rural nonfarm housing. They chose factors which varied by income level, saying:

If there is an inverse relationship between the occurrence of a housing deficiency (e.g., lacking complete plumbing) and household income, that characteristic is selected as a housing quality indicator. The quality indicators are thus based on the actual housing consumption of U.S. households, and not on a pre-established standard of decent, safe, and sanitary housing.³

The indicators were chosen to measure conditions of deterioration "that tend to be present in the dwellings of households with low long-run expected income."⁴ Their indicators, then, measure actual housing conditions experienced by rural low-income households.

The national sample used by Goedert and Goodman had been divided on the basis of income using the poverty income levels derived from the cost of a nutritionally adequate food plan in 1973. The poverty level incomes depend on the sex of the head of household and number of persons in the household. For instance, table 1 shows that the poverty threshold for households headed by men with four persons in the family was \$4,542 in 1973. By 1975, when the data on the Benchmark house was gathered, that amount had been raised to \$5,502, but for the comparisons that are to be made here, all incomes have been translated into terms of poverty levels. The average number of persons in the Benchmark houses was 4.2.

The incomes of the households in the first column of table 2 were at the poverty level or below it; the second column of figures represents data from households with incomes between the poverty level and twice that amount; the third column gives data for households with incomes between twice the poverty level income and four times the poverty level income; and the next column gives data for households with incomes over four times the poverty level.

² Gertrude S. Fish, "Variables Correlating with Housing Quality: A Search for a Statistical Measurement of Substandard Housing," paper for the course, Housing Market Analysis, Cornell University, December 1971.

³ Jeanne E. Goedert and John L. Goodman, Jr., *Indicators of the Quality of U.S. Housing*, Working Paper 249-2, the Urban Institute, Washington, D.C., 1977, p. ix.

⁴ *Ibid.*, p. xi.

TABLE 1.—POVERTY INCOME LEVELS, NONFARM RESIDENCE

Number of persons in household	Sex of head of household			
	Male		Female	
	1973	1975	1973	1975
1	\$2,390	\$2,851	\$2,215	\$2,635
2	2,999	3,515	2,908	3,460
3	3,565	4,317	3,447	4,175
4	4,542	5,502	4,521	5,473
5	5,364	6,504	5,299	6,434
6	6,034	7,322	5,965	7,270
7	7,455	9,056	7,288	8,818

Source: Bureau of the Census, 1974 and 1976 Current Population Surveys.

The average income of all the Maryland households was \$10,902. There were only three Maryland households with incomes at or below the poverty line so no division seemed useful. There were 92 households with incomes between the poverty level and twice that amount and the three below the poverty level are included in this category; 57 households had incomes between two and four times the poverty level; 2 had incomes above four times the poverty level.

Data was available from the S-95 questionnaire for 10 of the 23 indicators developed by Goedert and Goodman. Because the Farmers Home Administration (FmHA) requires housing which it finances to meet FHA minimum property standards, we can assume that the Benchmark houses all have complete and private plumbing and kitchen facilities, so we can compare the Maryland Benchmark houses to all rural nonfarm low-income housing in the United States on those two additional indicators.

The average income of the Maryland households in the first column was \$8,451.39; at incomes between two and four times the poverty level the average was \$12,996.63; and the two households with incomes above four times the poverty level averaged \$18,978. The incidence of the deficiencies decreases as income increases for all rural nonfarm households in the United States and for the Benchmark houses.

The incidence of deficiencies in the housing experienced by residents of the Benchmark houses is generally lower than that of the national sample of households at the same income levels except for cracks or holes in the walls or ceiling, holes in the floor covering, and the lack of air-conditioning. Because Farmers Home Administration policy stipulates that their mortgage loans be used for modest houses, some States discourage the installation of air-conditioning. The condition of floor coverings does not necessarily indicate the condition of the floors. However, walls and ceilings need improvement, especially since the houses were less than 7 years old.

JOINT CENTER FOR URBAN STUDIES INDICATORS

A study of housing quality from the Joint Center for Urban Studies in Cambridge used three indicators of housing deprivation, as follows: More than 1.01 persons per room, incomplete plumbing, and a cost of

TABLE 2.—INCIDENCE OF HOUSING DEFICIENCY OR HOUSING DEPRIVATION AMONG LOW-INCOME RURAL NONFARM HOUSEHOLDS IN THE UNITED STATES AND IN LOW-INCOME RURAL NONFARM HOUSEHOLDS IN BENCHMARK HOUSES IN MARYLAND, BY INCOME¹

Indicator	United States				Maryland		
	Y<P n=1,400	P<Y<2P	2P<Y<4P	Y>4P	P<Y<2P n=92	2P<Y<4P n=57	Y>4P n=2
Average income.....					\$8,451.39	\$12,996.63	\$18,978
Must pass through bedroom to enter other room.....	25.2	15.4	8.8	5.2	0	0	0
Water source other than public or private system or individual well.....	11.6	6.7	4.3	3.2	4.3	1.8	0
"Other" means of sewage disposal.....	22.3	7.5	2.6	.7	0	0	0
Lack air-conditioning.....	77.6	65.5	54.8	45.6	78.7	73.2	100.0
Leaky roof.....	20.8	10.9	7.0	5.2	4.4	1.8	0
Cracks or holes in walls or ceiling (other than hairline).....	14.3	6.7	3.7	2.1	12.0	8.8	0
Holes in floor (covering).....	8.2	2.4	1.4	.7	12.0	1.8	0
Peeling paint on walls or ceiling.....	16.9	11.0	7.5	4.9	6.5	3.6	0
Rodent or insect damage.....	29.2	20.3	14.7	12.1	5.4	0	0
More than 1 person per room.....	17.9	11.6	3.7	.3	6.5	0	0
Lacking complete and private plumbing facilities.....	28.6	10.0	3.4	.9	0	0	0
Lacking complete and private kitchen facilities.....	17.3	4.5	1.4	.6	0	0	0
Paying more than 25 percent of income for housing.....					78.3	26.3	0

¹ Sources: "Indicators of Quality of U.S. Housing," by Jeanne E. Goedert and John L. Goodman, Jr., working paper 249-2, the Urban Institute, Washington, D.C., 1977, p. 53, and data from the southern regional research project S-95 "Quality Housing Environment for Low Income Rural Families."

more than 25 percent of income.⁵ Table 2 shows that 6.5 percent of the Benchmark houses are crowded. The houses have six rooms, so some of the families must have had seven or more persons in the household. That would mean that either three persons slept in one of the bedrooms or that one person slept in a room other than a bedroom; and, given the minimum size of the bedrooms and the living space, one could conclude that overcrowding was indeed taking place.

All Benchmark houses had complete plumbing and kitchen facilities.

The amount spent on housing includes the mortgage payment, insurance, taxes, and utilities. The Farmers Home Administration 502 program has an income cut-off and gives the lower income families an interest subsidy, so the mortgage payment is controlled to some extent. Still, table 2 shows that 78.3 percent of the households with incomes below twice the poverty level are paying more than 25 percent of their income for housing. At incomes between twice and four times the poverty level 26.3 percent of the households are paying over 25 percent of their incomes for housing. According to the Joint Center study, households which pay more than 25 percent of income for housing are depriving themselves of other necessities such as food or clothing in order to pay for their housing.

It is interesting to note that only at incomes at least twice the poverty level does the incidence of deficiencies approach zero. According to the 1975 poverty levels a family of four would have had an income of about \$11,000. The residents of the Benchmark house in the twice-to-four times poverty level income column averaged \$12,996, and 26 percent of them were spending more than 25 percent of their

⁵ Joint Center for Urban Studies, *America's Housing Needs: 1970 to 1980*. Cambridge, Mass.; M.I.T. and Harvard University, December 1973.

incomes on housing. In other words, at an income of twice that allowed by the much used poverty-level income the family still experienced deficiencies in housing common to low-income households and some of the families were depriving themselves of other necessities in order to pay for their housing costs.

CRITICISMS OF RESIDENTS

One further test of the Benchmark house is the data collected from the residents. Table 3 shows the average ratings on a scale from one to nine for several factors and indicates general satisfaction with the housing. However, the amount of storage space outside and inside the Benchmark house was criticized by the residents as was the overall size of the house. When asked what changes they would make to improve their housing, one-third of the families expressed a desire for additional space. The greatest dissatisfaction was expressed on an item measuring their feelings about the cost of utilities. The majority of the houses had electric heating, and the utility bills had increased alarmingly. The average monthly utility bill was \$77 and was a source of concern to the families. Table 4 shows the range of the monthly utility costs with 23 percent of the households owing over \$100 a month for utilities.

TABLE 3.—*Housing adequacy ratings*

Characteristic rated:	Households (n=161) mean rating *
Location of your home in relation to where your children go to school..	8. 1
Fire protection that is available.....	7. 7
Quality of the schools.....	7. 5
Location of your home in relation to where you go most often for church and social activities.....	7. 5
Location of your home in relation to where the main wage earner works.....	7. 0
Location of your home in relation to where you shop.....	6. 9
Police protection that is available.....	6. 6
Location of your home in relation to medical services.....	6. 6
Conditions of the streets/roads that lead to your home (excludes driveway).....	5. 7
The amount of storage that you have outside (not storage for farm equipment).....	4. 9
The amount that you pay for utilities (water, lighting, heat, etc.)....	3. 5

* Ratings are based on a 1 to 9 scale; 9 is the most satisfactory, 1 is the least satisfactory.

TABLE 4.—*Monthly utility costs*

Monthly utility payment:	Households (n=161) percent
\$32 to 40.....	3. 3
41 to 50.....	4. 0
51 to 60.....	11. 3
61 to 70.....	13. 2
71 to 80.....	19. 2
81 to 90.....	15. 2
91 to 100.....	10. 6
101 to 110.....	7. 9
111 to 120.....	5. 3
121 to 205.....	9. 9

FINDINGS

The responses of the residents would suggest modifications in the Benchmark house to increase outside and inside storage, the overall

size of the home, and changes to decrease the utility bills. The comparison of the Benchmark house to all low-income rural nonfarm housing in the United States suggested that either the materials or the construction methods for the walls and ceilings should be improved; analysis of the cost of housing as a percentage of income suggests that the cost of utilities should be lowered.

The conditions of deterioration, deprivation, and crowding found normally in the housing of rural low-income families were also found in the Benchmark houses when income was below twice the poverty level. Since the Benchmark houses were 7 or less years old one could conclude that either the construction methods and materials need improvement or that at incomes lower than twice the poverty level families do not spend money on maintenance. Further analysis of the data may yield more information on this question.

APPLICATIONS

The percentage of income spent on housing is directly related to the cost of utilities, so lowering the cost of heat and hot water would be one way to modify the Benchmark house to lessen housing deprivation. The researchers in S-95 have helped builders in the Appalachian region obtain grants for solar attic heating systems on 15 Benchmark houses. These houses are under construction now and all costs are being recorded. The operating costs will be collected during the next 3 years while families live in them to see whether utility bills and the percentage of income spent on housing are reduced.

Outside storage space in these houses has been increased by the addition of a garage, and the overall size of the houses has been increased to 1,124 square feet. Research in the next 5 years will assess the problems with the walls and ceilings and modify them.

By determining the satisfaction of the residents of the solar attic houses and comparing their criticisms with those of the residents of the Benchmark houses we will be able to "determine the acceptability of innovations in housing." By comparing utility costs we will determine the economic feasibility of the innovation in the heating system. By comparing the percentage of income spent on housing for both groups we will make one other measure of the economic feasibility of the solar attic houses. By using the indicators developed by Goedert and Goodman we will be able to compare the incidence of deficiencies in the housing produced by the Farmers Home Administration section 502 program in Maryland with that of the innovative solar attic houses. The comparisons should be of interest to all mortgage lenders faced with requests for mortgages on houses with similar solar attic heating systems.

The Benchmark house is not meant to be a "minimum standard." It is intended to be used as a basis of comparison for other houses. In this paper we have compared it to housing of other rural families of matched income levels on 13 conditions of deterioration, deprivation, and crowding found in housing of rural low-income families nationwide. The dissatisfactions expressed by residents of the house have been taken into account in the design of a similar house with a solar heating system. The information derived from the S-95 project will help make better housing available to rural low-income families.