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Public Water Supply in Rural Communities

Results from the National Rural Community Facilities Assessment Study

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PUBLIC WATER SUPPLY IN RURAL COMMUNITIES: RESULTS FROM THE NATIONAL RURAL COMMUNITY FACILITIES ASSESSMENT STUDY. Thomas F. Stinson, Patrick J. Sullivan, Barry Ryan, and J. Norman Reid, Agriculture and Rural Economy Division, Economic Research Service, U.S. Department of Agriculture. Staff Report No. AGES 89-4.

ABSTRACT

This report presents final estimates on public water facilities serving rural communities. The data were gathered by the National Rural Community Facilities Assessment Study (NRCFAS), a nationwide sample survey of the availability and conditions of essential public facilities serving rural America. The report presents estimates for the United States, census regions, and by community size and incorporation status.

Keywords: Public facilities, public services, rural development, rural communities, infrastructure, public water systems, drinking water.

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ELECTRONIC DATA BASE AVAILABLE

An electronic data base containing the data in this report is available for sale from the Economic Research Service. This data base is in the form of Lotus 1-2-3 (Release 2) worksheet files on MS-DOS/PC-DOS compatible DSDD, 5-1/4-inch diskettes. To order, write ERS/Data, Room 228, 1301 New York Ave., N.W., Washington, DC 20005-4788. Specify "Rural Public Water Supply" and include a $30 check or money order payable to "ERS/Data." For further information, contact J. Norman Reid, Room 324, 1301 New York Ave., N.W., Washington, DC 20005-4788. Telephone: (202) 786-1542.

The Economic Research Service has no copies of the report or the data base for free distribution.

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INTRODUCTION

The National Rural Community Facilities Assessment Study (NRCFAS) was funded by the Farmers Home Administration (FmHA) to collect information on the availability and condition of essential community facilities serving rural areas of the United States. Field interviews with knowledgable public officials began in the fall of 1981 and were conducted in a stratified random sample of 520 rural communities throughout the 48 contiguous States. The interviews were designed to identify the availability of selected public facilities and services, including fire protection, public water systems, and transportation. The data collected pertain to calendar year 1980.

Both the survey design and data collection phases of the project were conducted by Abt Associates, Inc. The field interviews were completed during the spring of 1982; editing and cleaning functions and preparation of the final data tapes and survey documentation were completed during the fall and winter of 1982. During the winter of 1982, the survey data were turned over to the Economic Research Service (ERS), U.S. Department of Agriculture (USDA), to analyze and report the data.

This report contains estimates for a large selection of detailed data on rural public water supply collected by the NRCFAS. Each variable appears in parallel

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tables; one table contains estimates for individual population size categories of communities and the other presents estimates for the four census regions and by incorporation status of the community. Earlier reports summarized major data for public water supply and other services and presented detailed estimates for fire protection service.1/

SURVEY METHOD

To make estimates about the Nation's 45,000 rural communities, the NRCFAS employed a stratified random sample of 520 communities. The sample was designed to support estimates about the availability and condition of public facilities in four census regions and in six community-size categories.

The survey extended to 520 sample communities, but it was not always possible to complete all the necessary interviews in each community for each service. Thus, the number of responding communities for each service is slightly less than the total number of communities in the sample. The response rates, however, for the survey were extraordinarily high, and, in all cases, more than 95 percent of the intended interviews were conducted.

As defined for the NRCFAS, rural areas consist of all communities outside urbanized areas (using the 1970 Census of Population definition), except communities with a 1978 population of 50,000 or more and communities designated as a central city of a Standard Metropolitan Statistical Area (SMSA).

Because NRCFAS is a survey of facilities serving rural communities, it was necessary to define the term community. So that the survey results would include both cities and open country areas, the sample frame included all incorporated places, minor civil divisions (MCD), and census county divisions (CCD) as defined by the Bureau of the Census. This definition of community has the practical advantage of making it possible to obtain other census information about communities. This sample frame has the disadvantage of defining some areas as communities that are not recognized as such by local residents. This is particularly true for unincorporated communities, some of which may extend to large geographic areas.

Survey information was gathered through field interviews with knowledgable public officials in the 520 sample communities. Three sets of questionnaires

1/ J. Norman Reid, Thomas F. Stinson, Patrick J. Sullivan, Leon B. Perkinson, MonaCheri P. Clarke, and Eleanor Whitehead, Availability of Selected Public Facilities in Rural Communities: Preliminary Estimates, ERS Staff Report No. AGES840113 (ERS, USDA, Mar. 1984). A summary of the findings of the study is given in J. Norman Reid and Patrick J. Sullivan, "Rural Infrastructure: How Much? How Good? Rural Development Perspectives, Vol. 1 (Oct. 1984): pp 9-14. A discussion of the methods used in developing the NRCFAS and issues regarding the evaluation of facility inventory data are given in J. Norman Reid and Patrick J. Sullivan, "Counting Community Capital: The Status of Rural Infrastructure," in Outlook '84: Proceedings of the Annual Agricultural Outlook Conference (USDA, Nov. 1983), pp. 733-746. Detailed estimates for fire protection services are given in Thomas F. Stinson, Fire Protection Facilities in Rural Communities: Results from the National Rural Community Facilities Assessment Study, ERS Staff Report No. AGES860729 (ERS, USDA, Aug. 1986).

were administered: public water systems, fire protection, and general community information, which included transportation and miscellaneous public facilities and community characteristics. Interviews about public water supply were usually conducted with the water system manager or other responsible person knowledgable about public water supply in the community.

Because NRCFAS data are derived from a sample survey, the data in this report are estimates of rural facilities and not exact totals. The figures are, therefore, subject to sampling error. Thus, while the data reported are the best available estimates, they may deviate from the true figures. It is customary when reporting estimated data to test them for statistical significance. A one-tailed test of difference from zero at the 95-percent confidence level was applied to each estimate for this report. Estimates failing the test are indicated by an asterisk. These estimates must be regarded as insufficiently large, or subject to such high variability, that they cannot be reliably distinguished from an estimate of zero.

PUBLIC WATER SUPPLY

The tables in this report give detailed information about public water facilities physically located in and serving rural communities, including the number of communities that have some public water service, the sources of water, the size of provider, treatment processes used, transmission and distribution facilities, and financial data for public water suppliers.

Interviews were attempted with all public water providers serving the communities in the sample. Of the 520 communities sampled, 132 were without any public water service. A total of 516 public water providers were identified as serving all or part of the remaining 388 rural communities in the NRCFAS sample. Usable responses were obtained from 505 of those providers, yielding complete service information for 382 rural communities. The estimating process adjusted the expansion weights used to produce data estimates to account for nonrespondents.2/

The community-based focus of the survey has important implications for the data collected by the NRCFAS. Although most rural communities are served by a public water supply provider that serves the whole community, some communities are served by more than one provider and parts of other communities are not served at all. Some providers serve only a single community, while others serve a larger territory that includes all or part of one or more neighboring communities. Some providers serving rural communities also serve nonrural territory.

Because analysts are interested in making statements about both the number of rural communities with public water supply and also the number of public water systems in rural areas, this report includes separate estimates for both. The tables are divided into two groups. Because the two concepts--estimates for communities and estimates for providers--appear to be so similar, care must be taken to assure that they are interpreted correctly. Tables 1-14 present estimates pertaining to the levels of service and the number of facilities available to residents of rural communities. These numbers represent the number

2/ A document describing in detail the sample frame and the estimation technique, "The NRCFAS Sample Design, Weighting Methodology, and Estimation Techniques," is available from the authors of this report.

of communities that have a particular characteristic, for example, the number of rural communities served by a public water system that produces less than 50,000 gallons of potable water daily.

Tables 15-28 present estimates pertaining to the levels of service and number of facilities provided by public water suppliers located in rural communities. These numbers represent the number of public water providers that have a particular characteristic; for example, the number of water systems located in rural areas that produce less than 50,000 gallons of potable water daily. The difference between the two sets of numbers appears rather subtle, but it is important--for proper interpretation--that they be understood.

In reporting the data for communities (tables 1-14), wherever possible and appropriate, estimates were developed that pertain to the community as a whole. Some data (such as the amount of aid from Federal grants), however, pertain to entire water systems and could not be assigned to a specific portion of the territory served by a provider. When a community was served by more than one provider, the community estimates reflect the facilities or characteristics of the principal provider of public water supply. This method may cause some inaccuracies when the second or third providers of water had characteristics that differed from those of the principal provider. If the principal provider served a significant area outside the sample community, the estimates may overstate the amount of facilities or service actually used by rural communities. We believe, however, that these data, in the aggregate, give a reasonable picture of the state of affairs in rural communities.

The estimates for public water systems in rural communities (tables 15-28) avoid some of these interpretive problems. Since the reporting units were public water systems located in rural communities (no matter how much service they may provide in nonrural areas), overcounting was not a problem. These estimates should be used when one wants to make statements about rural water systems. These estimates for rural water systems will, however, overstate the amount of services or facilities available to rural residents.

It is important to note that the data reported in these tables are the respondents' estimates of prevailing conditions within the sample communities and that respondent error must be considered when interpreting the results. For example, the length of time emergency water supplies will last are as estimated by the respondent. In most cases, we were unable to validate these figures by consulting other data sources. However, respondents sometimes consulted records when responding to the survey, and it is believed that, in the aggregate, these estimates present an accurate picture of the prevailing conditions in rural America.

Table 1--Availability of public water supply in rural communities, by community size and incorporation status, 1980

Item	Unit	United States	Incorporated communities						Unincorporated communities
			Total	Population 1978					
				20,000-49,999	10,000-19,999	5,500-9,999	2,500-5,499	1-2,499	
Communities with public water service	Number	25,138	14,204	296	557	837	1,813	10,701	10,934
Communities served by two or more public water systems	do.	4,862	478	11‡	45	32	66	324‡	4,384
Potable water distributed to rural residential users by a public water system	Mil. gal. per day	9,415	5,316	1,161	1,095	711	786	1,563	4,099
Potable water distributed to rural nonresidential users by a public water system	do.	3,091	1,774	577	476	270	162	289	1,317‡
Active residential service connections in rural communities	Thou.	22,915	12,961	2,419	2,771	1,929	2,165	3,677	9,954
Active nonresidential service connections in rural communities	Thou.	2,299	1,587	350	375	219	273	370	712
Communities served by a primary provider with average daily potable water production of--									
1-50,000 gallons	Number	4,603	3,853	0	0	0	28‡	3,826	749
50,001-100,000 gallons	do.	3,102	2,427	0	0	18‡	0	2,409	676
100,001-500,000 gallons	do.	8,372	4,416	0	0	17‡	694	3,705	3,956
500,001-1,500,000 gallons	do.	5,187	2,065	0	48	513	1,015	490	3,122
Over 1,500,000 gallons	do.	3,874	1,443	296	509	289	76‡	273	2,431
Communities served by a primary provider with active service connections between--									
1-100	do.	1,140	919	0	0	0	28‡	891	221‡
101-500	do.	9,268	6,583	0	0	0	0	6,583	2,685
501-1,000	do.	4,843	2,955	0	0	0	216	2,738	1,888
1,001-5,000	do.	7,450	2,965	8‡	248	792	1,544	372	4,485
Over 5,000	do.	2,437	782	288	309	45	24‡	117‡	1,654
Communities served by a government-owned water system--	do.	19,847	13,374	265	528	751	1,762	10,067	6,473
State and Federal	do.	122‡	0	0	0	0	0	0	122‡
County	do.	438‡	43‡	0	0	19‡	24‡	0	395‡
Municipal	do.	17,737	13,008	258	493	732	1,738	9,787	4,729
Special district, other	do.	1,548	322‡	7‡	35	0	0	280‡	1,226
Communities served by privately-owned water system--	do.	5,291	830	31	29‡	86	50‡	634	4,461
For profit	do.	1,914	361	31	20‡	76	32‡	202‡	1,553
Nonprofit	do.	3,377	469	0	9‡	10‡	18‡	432	2,908

‡ Estimate is not statistically different from zero at the 95-percent confidence level.