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An Overview of Nursing Home Characteristics: Provisional Data from the 1977 National Nursing Home Survey[1]

This report presents provisional statistics on an estimated 18,300 nursing homes in the coterminous United States. The data are from the 1977 National Nursing Home Survey (NNHS). This nationwide sample survey of nursing homes—their residents, their discharges, and their staff—was conducted by the National Center for Health Statistics from May through December 1977. The survey is the second in an ongoing NNHS system. The first survey was conducted between August 1973 and April 1974. The estimates presented here are provisional, since they are based on a subsample of about 340 of the 1,700 facilities in the national survey.

Nursing homes included in the survey were those classified by the 1973 Master Facility Inventory (MFI) as nursing care homes, personal care homes (with and without nursing), and domiciliary care homes as well as all nursing homes opened for business between the time the 1973 MFI was conducted and December 1976.[2] This represents a broadening of the scope of coverage over that of the 1973-74 NNHS. The earlier survey excluded facilities providing only personal care or domiciliary care. Since the impact of including these facilities in the 1977 NNHS is expected to be small (they comprised only about 2 percent of all nursing homes in the 1973 MFI and housed only about 1 percent of the beds and residents), no special adjustments are made in this report when comparing data from the 1977 NNHS with the 1973-74 NNHS. Provisional estimates of the characteristics of residents and discharges are presented in Advance Data Number 29.[3]

The focus of this report is facility characteristics with the estimates presented by type of ownership, certification status, facility bed size, and geographic region. Estimates of the number of facilities, beds, residents, full-time equivalent employees, and the average monthly charge are based on 1977 data and reflect the situation on any day during the survey period. Estimates of the annual occupancy rate, median duration of stay, admissions, discharges, resident days, and cost per resident day are for 1976. In most cases they reflect the calendar year, although for the latter two types of estimates fiscal year data were acceptable.

The sample design for the 1977 NNHS was a stratified two-stage probability sample. The first stage was a selection of facilities and the second stage was a selection of residents, discharges, and staff from the sample facilities. Data on the characteristics of the facility were collected by interviewing the administrator. Data on costs were obtained from the facility's accountant,

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[1] This report was prepared by Mark R. Meiners, formerly with the Division of Health Resources Utilization Statistics.

[2] National Center for Health Statistics: Inpatient health facilities as reported from the 1973 MFI Survey, by A. Sirrocco. *Vital and Health Statistics,* Series 14-No. 16. DHEW Pub. No. (HRA) 76-1811. Health Resources Administration. Washington. U.S. Government Printing Office, May 1976.

[3] National Center for Health Statistics: A comparison of nursing home residents and discharges from the 1977 National Home Survey: United States, by E. Hing and A. Zappolo, *Advance Data from Vital and Health Statistics,* Number 29, DHEW Pub. No. (PHS) 78-1250. Public Health Service. Hyattsville, Md., May 17, 1978.

who completed the questionnaire and returned it by mail. Data for a sample of residents on the facility's roster at the time of the survey were collected by interviewing the nurse most familiar with the care provided to the resident. When necessary, the nurse referred to the resident's medical record. Data for a sample of discharges in 1976 were also collected by interviewing the nurse most familiar with the medical record of the discharged resident. Data on a sample of employees were collected by leaving a questionnaire for the sampled person to complete and to return by mail.

Since all the estimates are based on a sample of nursing homes rather than on a complete enumeration, they are subject to sampling variability. Information on sampling variability is presented in the Technical Notes.

FACILITY CHARACTERISTICS

For the period May to December 1977, the provisional national estimates indicated some 18,300 nursing homes had a total of 1,383,600 beds and served 1,287,400 residents (table 1). Proprietary ownership continued to be dominant in the nursing home segment of the health care delivery system with an estimated 74 percent of the facilities operated for profit. Although the nonprofit and Government nursing homes comprised only about 26 percent of the facilities, their greater capacity (average size 97 beds compared to 68 beds for proprietary facilities) enabled them to serve as a partial offset to the difference in the number of residents served. About 34 percent of all residents were served by

Table 1. Provisional number and percent distribution of nursing homes, beds, and residents, by selected nursing home characteristics: United States, 1977

Nursing home characteristics	Nursing homes		Beds		Residents	
	Number	Percent distribution	Number	Percent distribution	Number	Percent distribution
All nursing homes	18,300	100.0	1,383,600	100.0	1,287,400	100.0
Ownership						
Proprietary	13,600	74.3	926,100	66.9	851,700	66.2
Nonprofit and Government	4,700	25.7	457,600	33.1	435,700	33.8
Certification						
Skilled nursing facility	3,600	19.9	271,700	19.6	252,100	19.6
Skilled nursing and intermediate care facility	3,900	21.1	484,300	35.0	462,200	35.9
Intermediate care facility	6,200	33.7	455,700	32.9	414,300	32.2
Not certified	4,600	25.3	171,900	12.4	158,800	12.3
Bed size						
Less than 50 beds	7,800	42.5	205,700	14.9	193,500	15.0
50-99 beds	5,200	28.5	376,600	27.2	353,000	27.4
100-199 beds	4,600	24.9	590,600	42.7	547,400	42.5
200 beds or more	*	*	210,800	15.2	193,500	15.0
Geographic region						
Northeast	4,300	23.4	302,100	21.8	274,600	21.3
North Central	5,800	31.8	472,300	34.1	446,700	34.7
South	4,200	22.9	404,000	29.2	377,800	29.3
West	4,000	21.9	205,300	14.8	188,300	14.6

NOTE: Figures may not add to totals due to rounding.

nursing homes operated under nonprofit or Government auspices.

Nursing homes can also be classified according to their certification status. Facilities in the 1977 NNHS were comprised of

- Those certified as skilled nursing facilities (SNF's) by Medicare (Title XVIII of the Social Security Act).
- Those certified as SNF's by Medicaid (Title XIX of the Social Security Act).
- Those certified as intermediate care facilities (ICF's) by Medicaid (Title XIX of the Social Security Act), and
- Those not certified by either program.

The SNF regulations were identical under Medicare and Medicaid and nursing homes could be certified under both these programs. Furthermore, nursing homes that were certified could be certified under both the SNF and ICF regulations.

About 75 percent of the nursing homes in the 1977 NNHS were certified either as SNF's, ICF's or both. The largest share of the certified facilities (45 percent) were certified only as ICF's. Facilities certified as both an SNF and an ICF were larger (124 beds per facility) than the other facilities. They comprised about 21 percent of all the nursing homes but housed about 35 percent of the beds and 36 percent of the residents. Nursing homes which were not certified by Medicare or Medicaid were generally small, averaging about 37 beds per facility. These facilities comprised about 25 percent of all nursing homes but housed only about 12 percent of the beds and residents.

The distribution of facilities, beds, and residents by bed size and geographic region is also presented in table 1.

Employees

The employee data in this report are presented in terms of full-time equivalent (FTE) employees. Thirty-five hours of part-time employees' work are conventionally taken as equivalent to one full-time employee. Part-time employees were converted to FTE employees by dividing the number of hours worked by 35. By using the number of FTE employees rather than total employees, the variation between facilities in the proportion of part-time staff is held constant. The procedures used to estimate the number of FTE employees differed slightly from those used in the previous NNHS in that the 1977 estimates are based on a *sample* of employees from each sample facility while the 1973-74 estimates are based on *all* staff in each sample facility. Although the effect on the estimate is not expected to be great, this caveat of the data should be recognized.

The employee survey covered individuals employed full-time, part-time, or under contract who provided direct or health-related services to nursing home residents. This group consists of nursing, administrative, medical, and therapeutic personnel. Clerical, food service, housekeeping, and maintenance personnel as well as any other employee not performing nursing, administrative, medical or therapeutic functions were not surveyed.

In 1977 there were an estimated 624,600 FTE employees providing direct or health related services to nursing home residents (table 2). This was about 45 employees per 100 beds. The majority of this group (66 percent) were employed as nurses' aides. An additional 13 percent were licensed practical nurses; 11 percent were administrative, medical, or therapeutic personnel; and 10 percent were registered nurses.

Differences in staffing patterns are most noticeable on the basis of certification status. Nursing homes certified by Medicare or Medicaid to provide skilled nursing care had significantly more employees per 100 beds than the other types of facilities. The SNF-only group had about 59 FTE employees per 100 beds to provide health-related services and the SNF and ICF group had about 48 FTE employees per 100 beds. In contrast, nursing homes certified only as ICF's had about 38 employees per 100 beds and the nursing homes not certified had about 35 employees per 100 beds.

Utilization

The most important single measure of nursing home utilization from the standpoint of nursing home administrators is probably the occupancy rate. In 1976 the Nation's nursing homes used about 90 percent of their available bed

capacity to provide an estimated 440,195,000 days of care (table 3). Although this does not represent a statistically significant change from the 87 percent occupancy rate of 1972, the *number* of days of care provided during 1976 increased by about 19 percent. Also during 1976 an estimated 1,112,000 residents (81 per 100 beds) were admitted for care and 973,000 (71 per 100 beds) were discharged. Most of these people (74 percent) were discharged alive to either a private or semiprivate residence or, more commonly, to another health facility. (See Advance Data Number 29 for more detailed estimates of the characteristics of discharges.)

Caution is recommended when comparing estimates of admission with estimates of discharges from the 1977 NNHS, since the procedures for collecting these statistics differed. The number of admissions in 1976 was determined by directly asking the administrator for this information. Estimates of the number of discharges and their characteristics were made from a sample of the patients formally discharged from the nursing home during 1976. The survey

Table 2. Provisional number and rate per 100 beds of nursing home full-time equivalent (FTE) employees, by occupational categories and selected nursing home characteristics: United States, 1977

Nursing home characteristics	All FTE employees[1]		Occupational category of employee									
			Administrative, medical, and therapeutic		Nursing							
					Total		Registered nurse		Licensed practical nurse		Nurses' aide	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
All employees[2]	624,600	45.1	68,400	4.9	556,200	40.2	60,700	4.4	82,700	6.0	412,800	29.8
Ownership												
Proprietary	395,700	42.7	39,100	4.2	356,600	38.5	34,300	3.7	54,600	5.9	267,700	28.9
Nonprofit and Government	228,900	50.0	29,300	6.4	199,600	43.6	26,400	5.8	28,200	6.2	145,100	31.7
Certification												
Skilled nursing facility	158,900	58.5	17,000	6.3	141,900	52.2	21,000	7.7	19,600	7.2	101,300	37.3
Skilled nursing and intermediate care facility	233,900	48.3	21,500	4.4	212,300	43.8	25,200	5.2	28,800	5.9	158,400	32.7
Intermediate care facility	172,600	37.9	20,600	4.5	152,000	33.4	9,700	2.1	26,700	5.9	115,600	25.4
Not certified	59,300	34.5	9,300	5.4	50,000	29.1	4,800	2.8	7,600	4.4	37,600	21.9
Bed size												
Less than 50 beds	103,100	50.1	18,200	8.9	84,800	41.3	9,400	4.6	14,200	6.9	61,200	29.7
50-99 beds	173,000	45.9	17,200	4.6	155,800	41.2	15,300	4.1	21,400	5.7	119,000	31.6
100-199 beds	262,800	44.5	24,200	4.1	238,600	40.4	25,400	4.3	36,500	6.2	176,700	29.9
200 or more beds	85,700	40.7	8,800	*	77,000	36.5	10,500	5.0	10,500	5.0	55,900	26.5
Geographic region												
Northeast	153,300	50.7	17,800	5.9	135,500	44.8	21,800	7.2	20,800	6.9	92,900	30.7
North Central	220,300	46.6	24,300	5.1	196,000	41.5	19,100	4.0	24,200	5.1	152,700	32.3
South	159,600	39.5	15,100	3.7	144,600	35.8	9,200	2.3	27,100	6.7	108,200	26.8
West	91,400	44.5	11,300	5.5	80,200	39.1	10,500	5.1	10,500	5.1	59,100	28.8

[1] 35 hours of part-time employees' work is considered equivalent to one full-time employee. Part-time employees were converted to full-time equivalent employees by dividing the number of hours worked per week by 35.

[2] Includes only employees providing direct health-related services to residents.

NOTE: Figures may not add to totals due to rounding.

of discharges represents an addition to the earlier NNHS design and provides the information necessary to determine the duration of a completed nursing home stay. For those discharged in 1976, the median duration of stay was 84 days or 12 weeks.

Nursing home utilization patterns are particularly influenced by certification status. The regulations distinguishing SNF care and ICF care followed different models. SNF care is oriented to rehabilitation (the medical model adapted to a less intensive need for services than is present in hospitals). ICF care is oriented to maintenance (the health care related service model with emphasis on personal rather than medical care).

The effect of this difference on duration of stay and patient turnover rates is significant. Nursing homes certified only as SNF's had a substantially shorter median duration of stay (39 days) than did nursing homes certified only as ICF's (181 days). In addition, nursing homes certified only as SNF's had 133 admissions and about 116 discharges per 100 beds, while nursing homes certified only as ICF's had about 59 admissions and 54 discharges per 100 beds.

Table 3. Selected provisional measures of nursing home utilization, by selected nursing home characteristics: United States, 1976

Nursing home characteristics	Resident days in thousands	Annual occupancy rate[1]	Median duration of stay in days	Admissions		Discharges				
						Total		Live		
				Number in thousands	Rate per 100 beds	Number in thousands	Rate per 100 beds	Number in thousands	Rate per 100 beds	Percent of total
Total	440,195	89.6	84	1,112	81.4	973	71.2	722	52.9	74.2
Ownership										
Proprietary	293,071	90.2	89	778	85.2	686	75.1	508	55.7	74.1
Nonprofit and Government	147,124	88.6	65	334	73.7	287	63.4	214	47.3	74.6
Certification										
Skilled nursing facility	87,419	91.3	39	357	133.0	310	115.7	247	92.2	79.8
Skilled nursing and intermediate care facility	158,452	90.1	83	400	83.2	335	69.7	237	49.3	70.7
Intermediate care facility	138,541	88.1	181	260	58.5	240	53.8	173	38.7	72.1
Not certified	55,783	89.7	94	*	*	*	51.5	*	*	*
Bed size										
Less than 50 beds	65,194	90.5	65	140	68.1	134	65.2	*	*	*
50-99 beds	127,146	93.6	73	283	76.1	252	67.7	179	48.2	71.2
100-199 beds	181,411	86.8	72	532	92.2	449	77.9	333	57.8	74.2
200 beds or more	66,443	89.6	188	157	74.4	137	65.0	*	*	*
Geographic region										
Northeast	99,972	88.6	86	237	78.5	204	67.7	145	47.9	70.7
North Central	152,361	91.9	116	313	66.9	271	58.0	193	41.2	71.1
South	121,956	87.8	96	290	74.2	252	64.4	172	44.1	68.5
West	65,906	89.5	43	272	132.6	246	119.7	213	103.6	86.5

[1] $\frac{\Sigma \text{ Aggregate number of days of care provided to residents in 1976} \times 100}{\Sigma \text{ Estimated number of beds in 1976} \times 366}$

NOTE: Figures may not add to totals due to rounding.

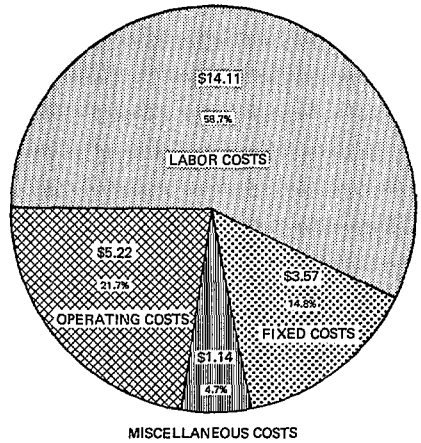
Cost of Providing Care

In 1976 the Nation's nursing homes spent an estimated $10.6 billion providing services to their residents. This amounted to a cost per resident day of $24.04, the majority (59 percent) of which went for labor costs (figure 1). Operating, fixed, and miscellaneous costs accounted for an additional 22 percent, 15 percent, and 5 percent of the total, respectively. Although the total cost per resident day for all nursing homes was $24.04, only about 30 percent of the facilities had an average cost of $25.00 or more (figure 2). Another 32 percent of the facilities had an average cost of less than $15.00 per resident day.

The procedures for collecting the cost data in the 1977 NNHS differed somewhat from those used in the 1973-74 NNHS. In the earlier survey the Expense Questionnaire was only given to those facilities in business for 2 years or more; in the current survey *all* facilities received the Expense Questionnaire. The effect of this change on the cost per resident day estimates is minimal, however, since the 1976 total cost per resident day for nursing homes in business 2 years or more was $23.86. Therefore there is little problem with direct comparisons between the estimates for 1972 and 1976. During this period the average cost to nursing homes of providing care increased 45-46 percent, a rate exceeding the general inflation rate of 36 percent indicated by the U.S. Bureau of Labor Statistics' Consumer Price Index. However, it is in line with the 46-percent increase in the hospital service charges component of that index. The basic patterns of variability in average total cost by ownership, certification, size, and region found in the previous NNHS are substantiated by the 1976 data. Total cost per resident day tends to be highest in nonprofit and Government facilities, in facilities certified only as SNF's, in facilities with 200 beds or more, and in facilities located in the Northeast (table 4).

Presented along with the cost data in table 4 is some information, not collected in the previous NNHS, concerning the distribution of resident days of care among the alternative certification programs. These data highlight the substantial involvement of the Medicaid program in the financing of nursing home care. About 60 percent of all the days of care provided in 1976 were financed either totally or partially by the Medicaid program (22.5 percent under the SNF regulations and 37.2 percent under the ICF regulations). These data, along with the national

Figure 1. PROVISIONAL AMOUNT AND PERCENT DISTRIBUTION OF TOTAL COSTS PER RESIDENT DAY TO NURSING HOMES BY MAJOR COMPONENTS: UNITED STATES, 1976.



Total costs per resident day to nursing homes: $24.04

Figure 2. PROVISIONAL PERCENT DISTRIBUTION OF NURSING HOMES BY TOTAL COST PER RESIDENT DAY: UNITED STATES, 1976.

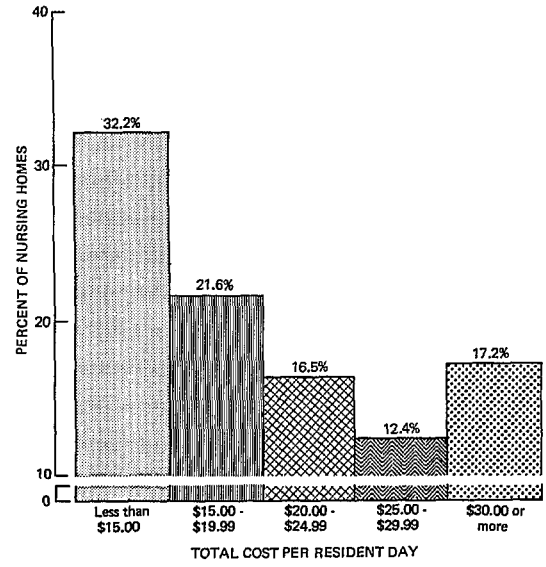


Table 4. Provisional total cost per resident day to nursing homes, number, and percent distribution of resident days by type of certification, according to selected nursing home characteristics: United States, 1976

Nursing home characteristics	Total cost per resident day	Resident days in thousands	Resident days by type of certification				
			Total	Skilled nursing facility		Medicaid intermediate care facility	Not certified
				Medicare	Medicaid		
All nursing homes	$24.04	440,195	100.0	2.4	22.5	37.2	38.0
Ownership							
Proprietary	22.32	293,071	100.0	*	23.5	37.8	37.0
Nonprofit and Government	27.52	147,124	100.0	*	20.5	36.0	39.8
Certification							
Skilled nursing facility	33.80	87,419	100.0	*	56.7	...	38.9
Skilled nursing and intermediate care facility	25.75	158,452	100.0	*	32.7	36.7	26.5
Intermediate care facility	19.44	138,541	100.0	...	...	72.1	27.9
Not certified	15.59	55,783	100.0	...	...	...	100.0
Bed size							
Less than 50 beds	21.58	65,194	100.0	*	*	34.0	52.4
50-99 beds	22.18	127,146	100.0	*	16.0	40.5	42.1
100-199 beds	23.64	181,411	100.0	*	26.0	36.3	35.5
200 beds or more	31.08	66,443	100.0	*	35.0	36.3	*
Geographic region							
Northeast	36.17	99,972	100.0	*	31.4	30.4	33.1
North Central	19.30	152,361	100.0	*	16.4	41.2	40.8
South	19.37	121,956	100.0	*	*	49.3	35.0
West	25.68	65,906	100.0	*	37.3	*	44.2

NOTE: Figures may not add to totals due to rounding.

health expenditure estimates from the Social Security Administration, indicate that in 1976 the Medicaid program spent approximately $20.41 per resident day on nursing home care while the Medicare program spent approximately $28.87.[4] Although the resident days of care not financed by either Medicaid or Medicare are in the minority, they do represent a substantial proportion (38 percent) of all days. At least a fourth of all the days of care provided in the certified nursing homes were not financed by Medicaid or Medicare. For facilities certified only as SNF's the proportion was about 39 percent.

Charges for care

Facility-related information concerning the charges made to residents for their care is presented in table 5. In 1977 the average total monthly charge was estimated to be $669. About 11 percent of the residents had monthly charges of less than $400 and about 25 percent were charged $800 or more per month. One of the most noticeable differences in these data is that the average charge to residents in nonprofit and Government nursing homes ($722) appears to be higher than the average charge to residents

[4] Gibson, R. M. and Mueller, M. S.: National Health Expenditures, Fiscal Year 1976. *Social Security Bulletin*, HEW Pub. No. (SSA) 77-11700. April 1977.

in proprietary nursing homes ($641). Although the provisional standard errors of these estimates are such that the difference is not statistically significant, the data do imply a different relationship than was found in the 1973-74 NNHS. In the earlier survey, residents in proprietary facilities had higher monthly charges, on the average, than those in the nonprofit and Government facilities. The change is likely to be related to the fact that the disparity in costs between the profit group and the nonprofit and Government group has widened and the decreasing impact of donations and subsidies has necessitated more reliance on user charges by nonprofit and Government nursing homes. The data on charges also show that it continues to be substantially more costly for residents using nursing homes in the Northeast than in any other area of the country. The average monthly charge for residents in Northeastern nursing homes was $864 compared to an average of $614 to $643 in the other regions.

Table 5. Provisional average total monthly charges for care in nursing homes, number of residents, and percent distribution of residents by monthly charge intervals, according to selected nursing home characteristics: United States, 1977

Nursing home characteristics	Average total charge[1]	Number of residents	Monthly charges					
			Total	No charge or unknown	$0-$399	$400-$599	$600-$799	$800 or more
			Percent distribution of resdients					
All residents	$669	1,287,400	100.0	3.1	11.2	31.4	29.5	24.7
Ownership								
Proprietary	641	851,700	100.0	*	11.5	34.4	31.2	20.4
Nonprofit and Government	722	435,700	100.0	*	10.5	25.7	26.2	33.3
Certification								
Skilled nursing facility	852	252,100	100.0	*	*	14.0	31.0	46.6
Skilled nursing and intermediate care facility	752	462,200	100.0	*	*	21.7	39.0	32.9
Intermediate care facility	565	414,300	100.0	*	8.6	55.2	24.5	9.2
Not certified	409	158,800	100.0	*	44.3	25.5	12.8	*
Bed size								
Less than 50 beds	593	193,500	100.0	*	30.5	23.7	22.4	21.5
50-99 beds	628	353,000	100.0	*	9.9	39.8	31.4	15.9
100-199 beds	689	547,400	100.0	*	6.8	31.5	31.2	27.7
200 beds or more	764	193,500	100.0	*	*	23.8	28.7	35.5
Geographic region								
Northeast	864	274,600	100.0	*	*	14.1	20.3	56.3
North Central	614	446,700	100.0	*	13.6	35.8	31.0	18.6
South	603	377,800	100.0	*	*	47.3	25.4	14.1
West	643	188,300	100.0	*	19.1	14.5	47.8	*

[1] Includes life-care residents and no-charge residents but excludes the residents for whom the charge was not known.

NOTE: Figures may not add to totals due to rounding.

TECHNICAL NOTES

Since the statistics presented in this report are based on a sample, they will differ somewhat from figures that would have been obtained if a complete census had been taken using the same schedules, instructions, and procedures. The standard error is primarily a measure of the variability that occurs by chance because only a sample, rather than the entire universe, is surveyed. The standard error also reflects part of the measurement error, but it does not measure any systematic biases in the data. The chances are about 95 out of 100 that an estimate from the sample differs from the value which would be obtained from a complete census by less than twice the standard error.

Rather than present specific errors for a particular statistic, the provisional approximate relative standard errors and standard errors for a wide variety of estimates have been provided. Provisional estimates of relative standard errors for the estimated numbers of admissions, beds, residents, discharges, total FTE employees, administrative, medical, and therapeutic FTE employees, RN FTE employees, LPN FTE employees, nurses' aide FTE employees, and facilities are presented in figure I. Provisional relative standard errors for resident days are presented in figure II, provisional standard errors for average cost per resident day are presented in table I, and provisional standard errors for average monthly charges are presented in table II.

The relative standard error of an estimate is the standard error of the estimate divided by the estimate itself and is expressed as a percentage of the estimate. In this report, an asterisk is shown for any estimate with more than a 25-percent relative standard error. Because of the relationship between the relative standard error and the estimate, the standard error of an estimate can be found by multiplying the estimate by its relative standard error. For example, curve B of figure I shows the relative standard error for beds. Table 1 gives the total number of beds in all facilities with less than 50 beds as 205,700.

Figure I. PROVISIONAL RELATIVE STANDARD ERRORS FOR ESTIMATED NUMBERS OF ADMISSIONS, BEDS, RESIDENTS, DISCHARGES, FULL-TIME EQUIVALENT (FTE) EMPLOYEES, AND FACILITIES

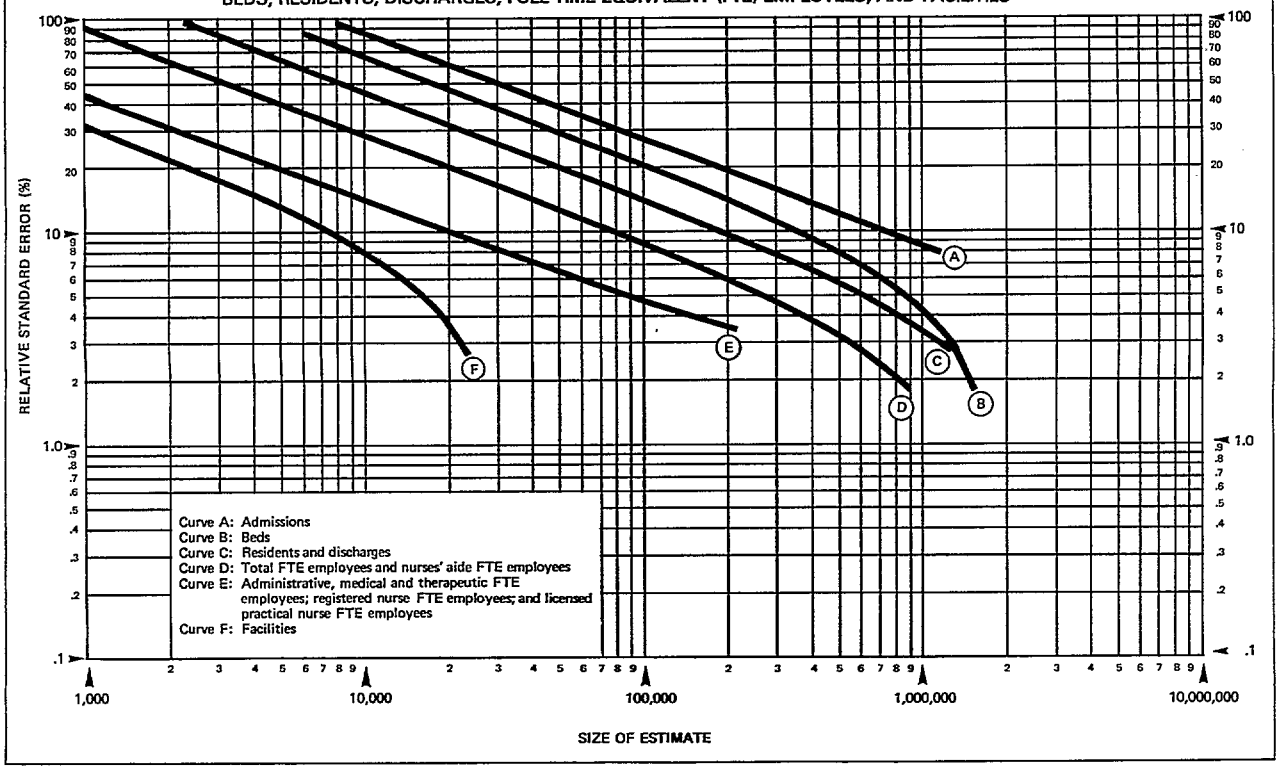


Table I. Provisional standard errors of percentages for average cost per resident day

Resident days (base of ratio)	Average cost per resident day							
	$1.00	$4.00	$8.00	$12.00	$16.00	$20.00	$30.00	$40.00
	Standard error in dollars							
50,000,000	*0.59	*1.11	1.35	1.79	2.20	2.62	2.84	3.38
60,000,000	*0.54	*1.01	1.23	1.62	1.99	2.36	2.55	3.04
70,000,000	*0.50	0.93	1.14	1.49	1.82	2.16	2.33	2.77
80,000,000	*0.46	0.87	1.06	1.38	1.68	1.99	2.15	2.55
90,000,000	*0.44	0.82	0.99	1.29	1.57	1.85	1.99	2.37
100,000,000	*0.42	0.78	0.94	1.21	1.47	1.73	1.86	2.20
200,000,000	*0.30	0.54	0.64	0.78	0.91	1.02	1.09	1.25
300,000,000	0.25	0.44	0.51	0.58	0.62	0.64	0.64	0.69
350,000,000	0.23	0.41	0.47	0.52	0.52	0.48	0.45	*0.46

The relative standard error corresponding to this estimate on curve B of figure I is approximately 14.0 percent. The standard error is 205,700 (.14) = 28,798.

Approximate standard error of ratios such as full-time equivalent employees per 100 beds can be calculated as in the following example: Suppose the standard error ($\sigma_{R'}$) for the ratio of total FTE employees per 100 beds is desired for nursing homes with less than 50 beds. In table 2 the total FTE employees per 100 beds for

Figure II. PROVISIONAL RELATIVE STANDARD ERRORS FOR ESTIMATED NUMBER OF RESIDENT DAYS

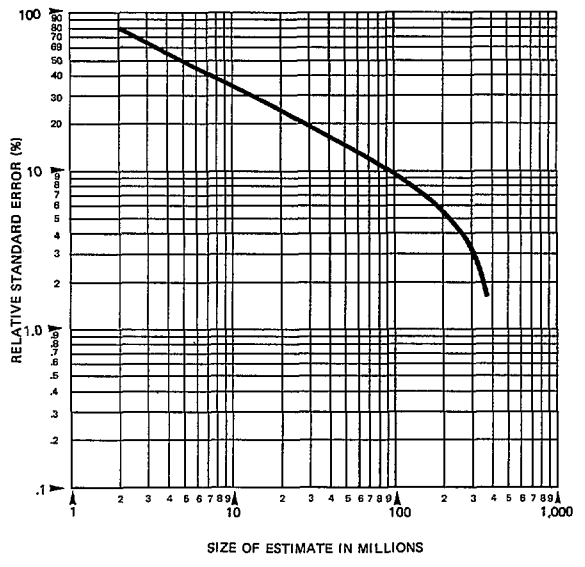


Table II. Provisional standard errors of average monthly charges

Number of residents or discharges (base of ratio)	Average monthly charge						
	$400	$500	$600	$700	$800	$900	$1,000
	Standard error in dollars						
90,000	84	100	116	131	147	162	178
100,000	80	95	110	124	139	154	168
200,000	56	67	77	88	98	109	119
400,000	40	47	55	62	69	76	84
600,000	32	38	44	50	56	62	68
800,000	28	33	38	43	49	54	59
1,000,000	25	30	34	39	43	48	52
1,200,000	23	27	31	35	39	43	48

homes with less than 50 beds is 50.1 which is equal to a total of 103,100 FTE employees divided by 205,700 beds times 100. The relative standard error of 103,100 total FTE employees is (from figure I, curve D) approximately 8.7 percent, and the relative standard error of 205,700 beds (from figure I, curve B) is approximately 14.0 percent. The square root of the sum of the squares of these two relative standard errors minus their covariance provides an approximation for the relative standard error of the ratio. In other words, if $V_{X'}$ is the relative standard error of number of total FTE employees, $V_{Y'}$ is the relative standard error of number of beds, r is the sample correlation coefficient between total FTE employees and beds (conservatively estimated to be 0.5) and $V_{R'}$ is

the relative standard error of the ratio $R'=X'/Y'$:

$$V_{R'}^2 = V_{X'}^2 + V_{Y'}^2 - 2\,r\,V_{X'}\,V_{Y'}$$
$$= (.087)^2 + (.140)^2 - 1.00\ (.087 \times .140)$$
$$= .0076 + .0196 - .0122 = .0150$$
$$V_{R'} = \sqrt{.0150} = .1225$$

The approximate standard error of the ratio of total FTE employees per 100 beds may now be obtained by multiplying the relative standard error by the ratio as done below:

$$\sigma_{R'} = R' \times V_{R'} = 50.1 \times .1225 = 6.14$$

The sample correlation coefficient (r) for calculating the standard error estimates of the ratios presented in this report is assumed to be zero except in the case of full-time equivalent employees per 100 beds, occupancy rate, and cost per resident day ratio estimates where the correlation coefficient used was .5.

The Z-test with a 0.05 level of significance was used to test all comparisons mentioned in this report. Since all observed differences were not tested, lack of comment in the text does not mean that the difference was not statistically significant.

SYMBOLS

Data not available	---
Category not applicable	...
Quantity zero	-
Quantity more than 0 but less than 0.05	0.0
Figure does not meet standards of reliability or precision	*

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