SPECIAL STUDY No. 13

Canadian Hospital Costs and Efficiency

by

R. D. Fraser

prepared for the
Economic Council of Canada

CANADIAN HOSPITAL COSTS AND EFFICIENCY

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January 1971

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ACKNOWLEDGMENTS

I am indebted to the following:

-- Mr. W. E. Duffet, Dominion Statistician, and Mr. J. B. Davis, Chief, Institutions Section of the Dominion Bureau of Statistics, for making available financial and other data for individual hospitals in Canada in 1966. The ready help offered by, and sought from, Mr. Davis and his former colleague, Mr. Ross Bradley, in digging up and providing other data and in answering often naive questions about the definitions of the data is much appreciated.

-- Mr. John Miron, for his excellent research assistance and in particular for his expert programming which was required in order to use the massive amount of data on individual hospitals in Canada.

-- Queen's University, through the offices of the School of Graduate Studies, for the provision of computer time.

-- Dr. Wm. Haviland, and other members of the staff of the Economic Council of Canada, for their advice and comments at various stages of the project.

CHAPTER 1

INTRODUCTION AND SUMMARY OF CONCLUSIONS

The Rising Cost of Health Care

The high absolute level of expenditure on health care in Canada is well documented. In a recently completed, comprehensive study of such expenditures in several countries, the proportion of Canadian resources allocated to the provision of health care in 1961 was estimated at 5.5 per cent of Gross National Product (GNP).[1] Of the 17 countries studied, only two allocated a larger percentage of their resources to the health sector.

In a similar manner, there is substantial evidence indicating the rapid rate of growth of the health care sector. The volume of real health goods and services provided increased at an average annual rate of 3.7 per cent over the period from 1947 to 1961.[2] This rate of increase was greater than that for the economy at large, with the result that the relative size of the health care sector also increased. In 1947, total expenditures on health care accounted for 3.48 per cent of GNP; this proportion had increased to 4.71 per cent by 1961.[3] By 1967, some 6.0 per cent of Canada's resources were allocated to the provision of health care.[4]

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[1] B. Abel-Smith, *An International Study of Health Expenditures*, Public Health Papers, No. 32 (Geneva: World Health Organization, 1967), Table 6, p. 41.

[2] Report of the *Royal Commission on Health Services*, vol. I (Ottawa: Queen's Printer, 1964), p. 454.

[3] *Ibid.*, Table 11-14, p. 453. These percentages differ from those calculated by Abel-Smith because of the attempt of Abel-Smith to derive a measure of expenditures that could be compared with that of other countries. Data limitations thus guided the definition of expenditures that was used in the two studies.

[4] Economic Council of Canada, *Sixth Annual Review* (Ottawa: Queen's Printer, 1969), pp. 15, 32 and 54.

Nor indeed is this recent level of growth expected to diminish. In 1975, expenditures on health care are projected to be 7.4 per cent of GNP.[5]

Now the overall role of government in the provision of health care has increased even more dramatically. The introduction of universal, provincially run but federally sponsored, hospitalization plans was completed early in the last decade; the introduction of universal medicare plans will in turn be completed early in the present decade.[6] In fact, the average annual change in government expenditures on health over the period 1967-75 is projected by the Economic Council to be 9.3 per cent; this is larger than the growth rate projected for any other component of government expenditure.[7]

There are thus two principal reasons for studying the way in which health care is provided in Canada. First, the proportion of our resources devoted to the provision of health care is not only high absolutely but is projected to increase even further. It is thus incumbent upon us, in our world of scarce resources, to inquire if these resources are employed efficiently. Second, the health care sector is now largely within the public economy. Lack of competition may thus impede attempts to achieve more efficiency in the provision of health care.

Our study is concerned with the cost and efficiency of the hospital sector. For not only is the hospital the largest subsector of the health care sector but it has grown the fastest.[8] For example, in Ontario in 1966 it accounted for 58.6 per cent of all expenditures on personal health care. Furthermore, with these expenditures totalling $1,651.1 million in absolute terms in 1966, it had grown 15.3 per cent from $1,432 million in 1965.[9]

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[5] *Ibid.*

[6] Prince Edward Island and Quebec were to join the federal program in 1970; New Brunswick, on January 1, 1971.

[7] *Ibid.*, p. 32.

[8] See the first section of Chapter 2 of this study.

[9] Province of Ontario, *Report of the Committee on the Healing Arts*, vol. 1 (Toronto: Queen's Printer, 1970), Table 6.1, p. 145.

Study Outline

In Chapter 2 we present an historical overview of hospitals and hospital care in Canada in the post-Second World War period. Provincial comparisons of hospital facilities, manpower, costs and utilization are also presented.

The nature of hospital costs and the existence of a close relationship between them and several economic factors is the second and major concern of our study. In particular, we would like to know if hospital costs, per unit of output, decrease, increase, or remain the same as output expands, or whether they exhibit a U-shaped relationship. In this latter case, they would first decline as output grew, then reach a stage in which they were roughly constant, and finally begin to increase as output grew further. This second task also involves consideration of the efficiency of hospitals from the viewpoint of the production function. We wish to know if a set of economic forces appears to systematically determine output. We are also interested in the effect on output of such factors as hospital size and the relative proportion of labour and capital employed to produce hospital care.

Of particular interest is our use of 1966 data on each of 1,266 public hospitals in Canada for the estimation of cost and production functions. Also of major interest and importance is our attempt to control for wide variations in the output of hospitals. This has been done by the calculation of a composite measure of output for each hospital. In this composite measure, the services provided by the hospital are weighted by their average cost and summed.

Our findings and the policy implications that can be drawn from our analysis of hospital costs are presented in Chapter 3.

Summary of Conclusions

Conclusions based on the detailed results of our analysis are noted at various stages in the following two chapters. There are several general conclusions that we might emphasize:

1. There appears to be a systematic set of forces that influences the level of hospital costs in relation to output, and output in relation to input. It has not been possible, however, to determine how effective these forces are in minimizing costs for given levels of output or -- what is the same thing -- maximizing output for given levels of input.

2. With regard to the nature of the relationship between costs and output, there is little substantial evidence of traditional U-shaped average cost curves -- curves that initially exhibit declining average costs per unit of output, as output (size of hospital) grows and the factors of production are able to specialize; constant and minimum average costs over a second range; and finally, as output grows still larger, exhibit increasing costs per unit of output. Indeed, the evidence seems to suggest the existence of continually declining, though not sharply declining, average costs. This result is perhaps more in line with *a priori* expectations that follow a study of the nature of hospitals; hospitals involve not only large amounts of physical capital, as seen in land, buildings and equipment, but also increasingly large amounts of human capital.

3. Use of hospitals for geriatric patients should be carefully studied. Hospital resources are highly specialized, and the use of hospitals for providing one type of care when they were designed to provide another is costly. Greater dependence on hospitals designed specifically to care for the aged might prove beneficial.

4. A more general regional network of hospitals is also probably warranted. Such a network would involve hospitals specializing in intensive care and those specializing in nursing care.

5. Detailed study should be made of those hospitals exhibiting costs substantially higher or lower than predicted, on the basis of a statistical analysis of costs in relation to output, capacity utilization, and the existence of medical training programs. Pressure to explain and, if possible, reduce costs could be exerted on hospitals with costs much higher than expected. In contrast, hospitals with lower costs than expected might be studied to determine if there were systematic reasons for the low costs, such as employment of especially highly qualified hospital administrators. The problem

is that with this present study we have not been able to determine if hospital administrators successfully minimize the costs of producing a given quantity and quality of output. We have only been able to determine that a set of socio-economic factors appear to bear systematically on output and cost decisions.

6. Incentives, such as travel subsidies, should be employed to increase the extent to which existing hospitals are used before new hospitals are built. This recommendation stems from our finding that costs per unit of output tend to fall as the capacity utilization of hospitals increases. And indeed there would appear to be scope for action in this regard, as average capacity utilization varies from 66 per cent in Newfoundland to 83 per cent in New Brunswick.

Research in the field of health care economics has expanded rapidly. Its relative newness as a research area suggests that the results of particular studies will often be tentative and perhaps will conflict with those of other studies. This may well be true of some of the results of our own study. The lack of definitive conclusions and the potential for controversy should be expected; studies done in this field will probably be so characterized for some time to come.

Our own analysis on the determinants of hospital costs is far from exhaustive. For example, our data relate to a single year only. Furthermore, we have confined ourselves to an exploration of simple, usually linear, relationships between the factors analysed. Finally, though we do on occasion relate and compare our results to those of similar studies carried out in the United States and Britain, our study in no way claims to present a review of all the relevant literature on past and on-going research in this area.

CHAPTER 2

HISTORICAL REVIEW OF HOSPITAL USE, COSTS AND EFFICIENCY[1]

Components of the Health Care Sector

The health care sector is itself composed of several subsectors. One possible classification[2] of these would involve six subsectors: hospital services, physicians' services, dentists' services, prescribed drugs, general (nonpersonal) public health services, and education and research. Information describing the relative size of all but the latter two of these subsectors is presented in Table 2-1. We note that the hospital is by far the largest subsector; it accounts for well over 50 per cent of expenditures on personal health care. Also of interest is the proportion of expenditures accounted for by physicians' services -- less than 25 per cent. Dentists' services, prescribed drugs, and other health services each account for approximately 7 per cent of total expenditures.

The changes over time in the relative sizes of these subsectors are of equal interest. We note that only one of them is characterized by rapid growth. In 1953, the hospital subsector accounted for 55 per cent of expenditures on personal health services; by 1969, the proportion had grown to 63 per cent. Of the remaining

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[1]We have tried to present our historical data for a common period, 1954 to 1967. In some instances, however, the data source has permitted inclusion of comparable data for 1953; in others, for as far back as 1946. In these latter cases, we have included the earlier data in an attempt to give the reader a longer historical preview. In general, however, the variety of sources makes reporting for a single set of years difficult unless that set is made arbitrarily small.

[2]Another classification including the hospital, the direct nonhospital medical, nonmedical, and education and research subsectors has been used in a recently completed study of the economic structure of the health sector. See Province of Ontario, *Final Report of the Committee on the Healing Arts*, vol. I, Chapter V, "Economic Structure" (Toronto: Queen's Printer, 1970).

Table 2-1

PER CAPITA EXPENDITURES ON PERSONAL HEALTH CARE,[1] CANADA, 1953-69

Year	Hospital Services					Physicians' Services	Dentists' Services	Prescribed Drugs[6][7]	Total[5]
	Active Treatment[2]	Mental[3]	Tuber-culosis[3]	Federal[4]	All Hospitals[5]				
	(Dollars)								
1953	18.89	3.89	1.98	2.45	27.21	11.90	4.08	3.29	49.50
1954	20.54	4.22	1.99	2.48	29.23	12.34	4.34	3.41	52.59
1955	21.81	4.39	1.90	2.47	30.58	13.15	4.37	3.79	55.40
1956	23.68	4.83	1.90	2.54	32.95	14.93	5.07	4.46	61.46
1957	25.37	5.25	1.90	2.72	35.24	16.31	5.10	5.07	61.72
1958	27.00	5.78	1.80	2.83	37.42	17.60	5.29	5.27	65.58
1959	31.03	6.37	1.71	2.87	41.98	18.59	5.65	6.08	72.29
1960	35.77	6.80	1.75	3.01	47.33	19.82	6.12	5.67	78.94
1961	39.52	7.38	1.54	3.50	51.94	21.25	6.39	6.72	86.30
1962	43.61	7.76	1.48	3.78	56.63	21.82	6.53	6.73	91.70
1963	47.97	8.60	1.49	3.89	61.95	23.91	7.22	7.43	100.51
1964	52.53	9.42	1.36	3.97	67.28	25.65	7.65	7.99	108.57
1965	58.16	10.75	1.32	4.05	74.29	27.70	8.13	8.61	118.75
1966	65.79	12.06	1.29	4.09	83.23	30.18	8.80	9.49	131.71
1967	73.81	13.89	1.27	4.08	93.05	33.57	9.16	11.72	147.49
1968[6]	84.52	15.39	1.30	4.35	105.57	37.94	10.29	12.08	165.88
1969[6]	93.44	16.64	1.38	4.57	116.02	43.15	10.97	12.64	182.79

(1) Excluding expenditures on public health, and for capital purposes.

(2) Including gross expenditures of public and private acute, chronic, and convalescent hospitals in 1953-57 and, in nonparticipating provinces, in 1958-60; including gross expenditures of budget review and contract hospitals in 1961-65 and, in participating provinces, in 1958-60; excluding expenditures of mental, tuberculosis, and federal hospitals.

(3) Including gross expenditures of public and private hospitals; excluding expenditures of federal hospitals.

(4) Including acute, chronic, convalescent, mental and tuberculosis hospitals of the Department of National Health and Welfare and the Department of Veterans Affairs; excluding hospitals of the Department of National Defence.

(5) Items may not add to totals because of rounding.

(6) Sold by retail drugstores only.

(7) Estimated.

Source: "Expenditures on Personal Health Care in Canada, 1953-1961" (Health Care Series No. 16, Research and Statistics Division) and unpublished data supplied by Mr. John E. Osborne, Director, Research and Statistics, Department of National Health and Welfare, 1970.

subsectors, the two whose relative size has decreased most over the same period are those of dentists' services and physicians' services; expenditures on these services fell, respectively, from 8 to 6 per cent and from 24.2 to 23.9 per cent of total expenditures on personal health care.

The relative size of the general (nonpersonal) public health care subsector grew and then declined again over the period from 1947 to 1961. In 1947, expenditures of $38 million on general (nonpersonal) public health care represented 5.7 per cent of total health care expenditures; in 1955, the corresponding figures were $77 million and 7.8 per cent; in 1961, they were $91 million and 5.8 per cent, respectively.[3]

Comprehensive information on the size of expenditures on health care education and research is not readily available. The Hall Commission estimated expenditures on the latter to be $15.1 and $16.5 million in 1961 and 1962, respectively.[4] This would suggest that the research expenditures account for less than 1 per cent of total health care expenditures.

In studying the hospital subsector we are thus studying only a part of the total health care sector. The hospital subsector is, however, by far the largest subsector and, moreover, has been growing rapidly in the postwar period.

Our next task involves setting forth an overview of the changing size and nature of the hospital subsector itself over the last two decades.

Overview of the Hospital Subsector

The picture of the hospital subsector since the Second World War is one of change and rapid growth. Some of the more interesting aspects of this picture are now

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[3]Report of the *Royal Commission on Health Services*, 1964, vol. I, Table 11-14, p. 453.

[4]*Ibid.*, vol. II, Table 4-6, p. 106.

briefly presented[5] within the loose framework of relative size, inputs, production processes, outputs, and Canada-U.S. comparisons.

Relative Size of the Hospital Subsector[6]

In addition to growing absolutely, the hospital subsector has grown in relation to the whole economy. For example, in 1953, hospital personnel accounted for 2.5 per cent and, in 1966, for some 4.3 per cent of the total labour force in Canada.[7] Similarly, expenditures on hospital care, private-duty nurses, accident and sickness insurance, and prepaid medical care, as a percentage of total personal medical care and death expenses, grew from approximately 26.1 per cent in 1946 to 49.1 per cent in 1966.[8]

Inputs

Physical Hospital Facilities -- The total number of operating hospitals in Canada grew from 1,335 in 1954 to 1,423 in 1967; this represents an increase of only 6.6 per cent over the 14-year period.[9] Masked in these total figures, however, is the absolute decline in the number of private hospitals from 267 to 173 in the same period. The number of public and federal hospitals thus grew more rapidly than the overall growth rate suggests; the former increased in number by approximately 17 per cent and the latter by about 28 per cent over the same period.

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[5]For detailed information on these and other aspects of the hospital subsector in Canada in each province, see Dominion Bureau of Statistics, *Hospital Statistics*, (Ottawa: Queen's Printer, annually). We have selected information from that publication for use in both the text and Appendix A of our own study.

[6]For detailed annual data, see Appendix Tables A-24 to A-27.

[7]See Appendix Table A-24.

[8]See Appendix Table A-27.

[9]Dominion Bureau of Statistics, *Hospital Statistics, 1967*, Volume I - Hospital Beds (Ottawa: Queen's Printer, 1969), p. 38, contains annual data on the number of operating public, private, and federal hospitals, by type of hospital, for the years 1954 to 1967.

Also masked in these overall figures is the change in the types of hospitals. Most significantly, the number of tuberculosis hospitals declined from 72 in 1954 to 38 in 1967. In contrast, the number of chronic, convalescent, and rehabilitation hospitals increased by 27 per cent from 167 to 212 over the same period, and the number of mental hospitals grew 35 per cent from 80 in 1954 to 108 in 1967. General and allied special hospitals accounted for about 90 per cent of all hospitals in both 1954 and 1967 and thus grew at about the same rate as that noted above for all hospitals. Information on the number of public hospitals, by type of hospital, is presented in Table 2-2.

Because the average size of hospitals has not remained constant, data on numbers of hospitals may be misleading; these data must thus be supplemented with data on the rated bed capacity of the hospitals.[10] We might first note that the rated bed capacity of all operating hospitals in Canada increased quite sharply over the period, by about 24 per cent from 169,088 in 1954 to 209,616 in 1967.

In contrast with the absolute decline in the number of private hospitals, their rated bed capacity increased slightly from 5,162 in 1954 to 6,453 in 1967. In a similar way, the growth in the number of federal hospitals noted above was matched by a sharp decline in their rated bed capacity from 13,851 in 1954 to 8,814 in 1967.

The precipitous fall in the number of tuberculosis hospitals is matched by an even sharper fall in their rated bed capacity from 16,851 in 1954 to 4,605 in 1967. The sharp increase in the number of chronic, convalescent, and rehabilitation hospitals is also matched by an equally sharp increase in their rated bed capacity from 10,628 beds in 1954 to 20,172 in 1967. On the other hand, the increase in the number of mental hospitals must be qualified by data on the rated bed capacity of these hospitals.

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[10] Annual data on the rated bed capacity of operating public, private and federal hospitals, by type of hospital, for the years 1954 to 1967 is also presented in Dominion Bureau of Statistics, *Hospital Statistics, 1967*, Volume I - Hospital Beds (Ottawa: Queen's Printer, 1969), p. 39.

Table 2-2

HISTORICAL SUMMARY OF THE NUMBER OF OPERATING PUBLIC HOSPITALS, BY TYPE OF HOSPITAL
CANADA, 1953-67

Year	All Public Hospitals	General and Allied Special				Mental	Tuberculosis
		Total	General	Chronic, Convalescent and Rehabilitation	Other Special		
1953	993	857	778	39	40	74	62
1954	1,008	870	790	42	38	76	62
1955	1,028	897	807	51	39	73	58
1956	1,040	909	819	55	35	76	55
1957	1,054	924	832	58	34	76	54
1958	1,084	955	848	77	30	77	52
1959	1,109	982	864	86	32	74	53
1960	1,098	972	864	76	32	71	55
1961	1,075	946	856	63	27	79	50
1962	1,086	963	832	75	57	79	43
1963	1,098	976	838	79	59	83	39
1964	1,129	996	845	96	55	91	42
1965	1,149	1,011	852	103	56	96	42
1966	1,164	1,027	869	104	54	99	38
1967	1,173	1,036	874	108	54	100	37

Source: Dominion Bureau of Statistics, *Hospital Statistics, 1967*, Volume I - Hospital Beds (Ottawa: Queen's Printer, 1969), p. 38.

It first increases from 56,334 beds in 1954 to a peak of 68,674 beds in 1961; it then falls slowly to 64,488 beds in 1967. Finally, rated bed capacity in general and allied special hospitals grew much more rapidly than did the number of such hospitals -- namely, by about 64 per cent from 85,903 beds in 1954 to 140,523 in 1967. As a percentage of all hospital beds, those in general and allied special hospitals grew from about 50 per cent in 1954 to about 67 per cent in 1967. Representing over 60 per cent of all hospital beds in 1967 are those 126,182 beds in *public* general and allied special hospitals. Information on the rated bed capacity of public hospitals by type of hospital is presented in Table 2-3.

As an indicator of the availability of hospital facilities in the provinces, we present in Table 2-4 information on the rated bed capacity per 1,000 persons of operating public general and allied special hospitals for the period 1953 to 1967.[11] Of interest is the very high level of hospital facilities available in Alberta. It had the largest rated bed capacity per 1,000 persons of any province, namely, 8.25; this compares with the average for Canada of 6.18 in 1967. In contrast, British Columbia and Quebec had the lowest level of rated bed capacity per 1,000 persons, at 5.66 and 5.62 in 1967 respectively. An analysis of the social, economic, and demographic determinants of the availability of hospital facilities would likely prove worthwhile.

Additional information on the nature of the physical capital employed in the hospital subsector is available in the form of the distribution of beds by category of service for public general and allied special hospitals.[12] The proportion of beds allocated to the provision of medical and surgical care has increased from 48.5 per cent in 1954 to 57 per cent in 1966. Pediatric beds have also become relatively more numerous; in 1954 they accounted for 8.7 per cent of all beds and in 1966 for 13.5 per cent.

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[11] Provincial data on the number of operating public general and allied special hospitals and their rated bed capacity, for the years 1953 to 1967, are presented in Appendix Tables A-1 and A-2. We might note that the growth of rated bed capacity is highest in Alberta and second highest in Ontario.

[12] This information is set out by province in Appendix Table A-9.

Table 2-3

HISTORICAL SUMMARY OF THE RATED BED CAPACITY OF OPERATING PUBLIC HOSPITALS, BY TYPE OF HOSPITAL
CANADA, 1953-67

Year	All Public Hospitals	General and Allied Special				Mental	Tuberculosis
		Total	General	Chronic, Convalescent and Rehabilitation	Other Special		
1953	146,721	76,224	65,005	7,062	4,157	55,017	15,480
1954	150,075	79,281	67,779	7,381	4,121	55,903	14,891
1955	157,618	84,761	72,402	8,167	4,192	58,444	14,413
1956	158,991	86,976	75,592	8,911	2,473	58,066	13,949
1957	162,517	90,154	77,992	9,618	2,544	58,641	13,722
1958	167,975	94,665	80,438	11,549	2,678	60,414	12,896
1959	172,718	100,059	84,276	12,407	3,376	60,692	11,967
1960	175,461	101,352	85,864	11,711	3,777	61,822	12,287
1961	178,465	100,506	88,625	9,975	1,906	67,802	10,157
1962	182,217	106,718	92,359	11,422	2,937	66,245	9,254
1963	184,543	111,165	95,029	12,737	3,399	65,347	8,031
1964	185,442	114,545	98,825	13,469	2,251	64,914	5,983
1965	187,820	117,021	100,602	14,253	2,166	65,249	5,550
1966	191,708	122,315	105,501	14,731	2,083	64,562	4,831
1967	194,349	126,182	108,503	15,339	2,340	63,712	4,455

Source: Dominion Bureau of Statistics, *Hospital Statistics, 1967*, Volume I - Hospital Beds (Ottawa: Queen's Printer, 1969), p. 39.

Table 2-4

HISTORICAL SUMMARY OF THE RATED BED* CAPACITY PER 1,000 POPULATION
OF OPERATING PUBLIC GENERAL AND ALLIED SPECIAL HOSPITALS
CANADA, BY PROVINCE, 1953-67

Year	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
1953	5.13	4.77	6.29	5.12	4.18	4.72	4.73	6.00	5.91	6.67	5.86
1954	5.19	4.68	6.22	5.22	4.17	4.77	4.88	5.92	5.92	6.56	5.74
1955	5.40	4.64	6.41	5.41	4.34	4.84	5.20	5.81	6.60	6.87	6.00
1956	5.37	4.50	6.65	5.10	4.28	4.78	5.31	5.91	6.64	6.75	5.78
1957	5.43	4.23	6.46	4.81	4.43	5.00	5.32	5.86	7.43	6.84	5.29
1958	5.54	4.44	6.90	4.68	4.65	5.68	5.33	5.50	7.40	6.67	5.27
1959	5.72	4.44	6.83	4.85	5.25	5.88	5.23	5.48	7.50	6.60	5.76
1960	5.67	4.32	6.69	4.66	5.26	5.99	5.28	5.70	7.53	6.46	5.36
1961	5.51	3.78	6.83	4.94	5.20	5.02	5.53	5.96	7.41	6.59	5.60
1962	5.74	3.98	6.77	5.18	5.57	5.46	5.67	6.18	7.43	6.85	5.55
1963	5.87	4.69	6.64	5.21	5.72	5.50	5.89	6.21	7.58	7.03	5.55
1964	5.94	5.27	6.62	5.35	5.89	5.39	6.02	6.11	7.75	7.50	5.45
1965	5.96	5.43	6.62	5.67	5.85	5.43	5.97	6.21	7.61	7.48	5.60
1966	6.11	6.27	6.61	5.78	5.91	5.52	6.16	6.18	7.56	8.05	5.60
1967	6.18	6.24	6.77	5.88	6.02	5.62	6.18	6.30	7.66	8.25	5.66

* Beds and cribs.

Source: Dominion Bureau of Statistics, *Hospital Statistics, 1967*, Volume I - Hospital Beds (Ottawa: Queen's Printer, 1969), p. 53.

Hospital Manpower -- Complementing the above information on the nature of the input of physical capital in the hospital subsector is information on the input of health care manpower in public general and allied special hospitals. Total personnel in these hospitals more than doubled from 102,495 in 1954 to 255,523 persons in 1966.[13] At the same time there was a decline in the average number of hours of work per hospital employee from 2,039 hours in 1954 to 1,857 hours in 1966.[14]

Expenditure on Hospitals -- Perhaps the most comprehensive information on the volume of inputs in the hospital subsector, however, is data on the total expense incurred by hospitals during their annual operation. Total expenditure in all operating public hospitals increased by over 350 per cent from $389.4 million in 1954 to $1,782.3 million in 1967.[15]

Reflecting the trends noted above in the type of hospitals in Canada are data on the distribution of expenditures by type of hospital. Public general and allied special hospitals accounted for 83.1 per cent of expenditures in all public hospitals. This proportion had increased from 74.1 per cent in 1954. In a similar way the decline in the number of tuberculosis hospitals and beds is reflected by a change in the proportion of total expenditures accounted for by these hospitals -- from 8.5 per cent in 1954 to 1.5 per cent in 1967.

Equally dramatic was the increase in the average costs of caring for a patient for one day. As shown in Table 2-5, these amounted in 1954 to $7.72 in operating public hospitals; by 1967, the corresponding figure was $29.61. This represents an increase of some 300 per cent.

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[13] Total part- and full-time personnel employed in public general and allied special hospitals, by provinces, for the period 1954 to 1966 is presented in Appendix Table A-10.

[14] Appendix Table A-11 contains similar information for each province.

[15] Detailed financial data are presented in Appendix Tables A-6, A-7 and A-8. Because accurate indexes of the price changes in the various components of hospital costs are not readily available, our data are presented in current dollars.

Table 2-5

HISTORICAL SUMMARY OF THE COST PER PATIENT-DAY
OF ALL OPERATING PUBLIC HOSPITALS, BY TYPE OF HOSPITAL
CANADA, 1954-67

Year	All Public Hospitals	General and Allied Special				Mental	Tuberculosis
		Total	General	Chronic, Convalescent and Rehabilitation	Other Special		
				(Dollars)			
1954	7.72	12.85	13.78	5.09	11.38	2.92	6.84
1955	8.45	14.05	15.21	5.46	10.99	3.05	7.42
1956	9.10	14.91	15.95	5.59	15.37	3.37	7.90
1957	10.05	16.11	17.36	5.94	17.41	3.70	8.84
1958	11.19	17.84	19.05	7.28	19.85	4.14	9.57
1959	12.16	18.88	20.45	6.47	22.42	4.66	10.23
1960	13.66	21.32	22.75	8.63	22.86	4.99	10.76
1961	14.23	23.10	24.34	10.65	28.72	5.37	12.77
1962	16.32	24.82	26.36	11.43	24.15	5.67	14.02
1963	17.89	26.87	28.58	13.23	26.17	6.34	15.64
1964	19.76	29.18	31.00	14.77	37.38	7.13	16.67
1965	22.19	31.92	34.05	15.99	43.90	8.36	18.72
1966	25.71	36.06	38.56	17.94	54.57	10.08	21.76
1967	29.61	40.38	43.40	19.52	57.78	12.23	23.41

Source: Dominion Bureau of Statistics, *Hospital Statistics, 1967*, Volume VI - Hospital Expenditures (Ottawa: Queen's Printer, 1969), p. 41.

Interestingly, the rate of increase in costs per patient-day is roughly the same for all types of hospital including mental, tuberculosis, chronic, convalescent, rehabilitation and public general and allied special hospitals.

Though the rate of increase in costs per patient per day may be roughly similar in the different types of hospitals, the same is not true of the absolute level of these costs. In 1967, costs per patient-day were highest for the category of "other special hospitals"; at $57.78 they were 372 per cent higher than the lowest cost per patient-day of $12.23 experienced in mental hospitals.

Provincial variations in the cost per patient-day to operate general and allied special hospitals, as shown in Table 2-6, are not nearly so large as those noted by type of hospital. They were highest in Quebec at $47.62 compared with the Canadian average of $40.38; and they were lowest in Prince Edward Island at $29.43 in 1967. But the variation between the lowest and the highest cost per patient-day amounted to only 62 per cent.

Among hospitals within a province, costs per patient-day once again are subject to wide variation. In 1967, the variation in approved net allowable costs among operating public hospitals in Ontario ranged from a low of $12.67, through the average of $34.76, to a high of $80.64 per patient-day.[16]

Production Processes[17]

Average Size and Occupancy Rates -- The average bed size of public general and allied special hospitals grew less than 30 per cent from 92.3 beds in 1946 to 119.1 beds in 1966.[18] Interestingly, of 871 budget review general hospitals in 1965, 592 or almost 70 per cent of the total had a rated bed capacity of less than 100.

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[16] Province of Ontario, Ontario Hospital Services Commission, *1967 Annual Report*, Statistical Supplement, Table 18.

[17] Detailed information on production processes of public general and allied special hospitals by provinces for selected years from 1946 to 1966 is contained in Appendix Tables A-14 to A-20, and A-28 to A-31.

[18] Average bed size varies a great deal among provinces. In 1966 it ranged from a high of 198.4 beds in Ontario and 193.6 beds in Quebec to a low of 54.4 beds in Saskatchewan and 65.7 in Newfoundland. See Appendix Table A-14.

Table 2-6

HISTORICAL SUMMARY OF COST PER PATIENT-DAY
OF OPERATING PUBLIC GENERAL AND ALLIED SPECIAL HOSPITALS
CANADA, BY PROVINCE, 1954-67

Year	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
					(Dollars)						
1954	12.85	10.61	9.49	11.34	12.45	11.43	13.85	11.19	11.48	13.28	15.20
1955	14.05	12.96	11.65	13.83	14.21	12.70	14.79	12.18	13.29	14.56	16.33
1956	14.91	14.15	11.29	14.20	15.00	13.54	15.78	13.88	14.55	14.76	16.71
1957	16.11	17.70	12.19	15.08	16.35	14.42	17.02	15.22	15.91	16.69	18.08
1958	17.84	16.59	12.86	17.19	18.21	16.66	18.51	17.33	17.74	18.19	19.26
1959	18.88	17.55	13.90	18.52	19.89	16.39	20.30	19.31	19.14	17.33	21.58
1960	21.32	19.74	16.74	21.39	21.34	20.66	22.49	20.98	20.39	18.48	22.45
1961	23.10	19.92	19.06	23.64	23.66	23.18	24.26	21.94	21.16	19.90	23.48
1962	24.82	21.15	18.81	25.37	25.55	25.16	26.22	22.82	22.82	21.32	24.89
1963	26.87	23.01	20.46	27.31	27.46	28.45	28.00	24.25	23.40	23.08	26.07
1964	29.18	26.27	22.69	29.35	28.68	32.39	29.84	25.63	25.62	24.27	27.45
1965	31.92	28.34	24.43	32.05	30.03	36.82	32.15	27.90	27.65	25.89	29.37
1966	36.06	32.22	26.61	34.00	32.25	43.96	35.69	31.33	30.52	29.07	31.54
1967	40.38	38.56	29.43	40.25	36.02	47.62	40.41	35.54	33.94	33.87	35.50

Source: Dominion Bureau of Statistics, *Hospital Statistics, 1967*, Volume VI - Hospital Expenditures (Ottawa: Queen's Printer, 1969), p. 42.

In contrast, the number of beds set up in these hospitals accounted for only 21.6 per cent of all beds set up in the 871 budget review general hospitals.[19]

The average percentage occupancy of operating public general and allied special hospitals in Canada was 80.2 per cent in 1967 as shown in Table 2-7. This figure has remained relatively constant since 1953. The lowest point reached was 78.7 per cent in 1955 and the highest was 83.2 per cent in 1961.

Similarly, percentage occupancy does not vary a great deal by province.[20]

In 1967, the highest percentage occupancy in operating public general and allied special hospitals was 83.8 per cent in British Columbia, and the lowest was 69.6 per cent in Prince Edward Island.

In contrast, percentage occupancy does vary a great deal by size and type of hospital. Small hospitals usually have the lowest occupancy rates. For example, in budget review general hospitals in 1965, the percentage occupancy was 53.1 per cent in hospitals with a rated bed capacity of 1 to 9 beds and was 86.3 per cent in hospitals with 500 to 999 beds. Finally, of budget review hospitals in Canada in 1965, those called chronic hospitals had an occupancy rate of 91.4 per cent; general hospitals, 80.5 per cent.

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[19] For similar information for each province, see Appendix Tables A-28 to A-31; for other years, see Department of National Health and Welfare, *Annual Report: Hospital Insurance and Diagnostic Services Act* (Ottawa: Department of National Health and Welfare), *1964*, *1965* and *1966*.

Budget review hospitals are all but the same as operating public general and allied special hospitals.

[20] For detailed provincial data on occupancy rates, by size and type of hospital, see Appendix Tables A-32 and A-33 respectively; for other years, see footnote 21.

Table 2-7

HISTORICAL SUMMARY OF PERCENTAGE OF OCCUPANCY
OF OPERATING PUBLIC GENERAL AND ALLIED SPECIAL HOSPITALS
CANADA, BY PROVINCE, 1953-67

Year	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
1953	81.2	73.1	55.7	62.6	78.6	80.6	86.1	79.9	94.9	72.8	79.7
1954	79.8	72.3	57.9	67.0	81.9	79.0	80.9	75.1	92.8	76.6	83.1
1955	78.7	77.2	56.7	64.2	77.9	77.8	81.2	72.9	87.7	73.7	84.6
1956	78.9	75.8	58.1	68.8	79.9	78.1	80.0	73.0	87.3	77.2	84.5
1957	80.2	78.7	58.9	72.3	79.9	78.1	82.8	73.9	86.5	75.5	87.0
1958	80.1	79.1	61.7	72.7	75.1	77.1	83.6	78.4	85.5	77.4	84.4
1959	80.4	78.8	63.6	81.2	77.1	76.5	84.2	81.1	84.2	82.8	79.4
1960	82.0	94.6	59.7	83.9	88.2	76.2	84.8	81.6	85.1	83.7	82.4
1961	83.2	91.5	64.3	79.2	89.6	81.2	85.4	81.9	83.6	81.0	82.6
1962	82.3	88.2	67.3	76.4	82.9	81.4	84.8	80.7	81.0	80.2	82.7
1963	81.8	83.4	67.1	77.7	82.9	81.6	83.3	82.2	82.8	78.2	82.5
1964	81.1	73.6	66.4	78.9	82.3	80.3	83.3	82.6	81.9	76.2	83.2
1965	82.3	78.3	66.8	75.1	83.1	82.2	84.5	81.1	82.9	79.0	83.8
1966	81.4	70.6	70.0	76.4	83.9	79.4	84.4	82.1	82.5	77.2	85.1
1967	80.2	69.7	69.6	77.1	82.7	78.1	83.7	80.2	79.4	75.0	83.8

Source: Dominion Bureau of Statistics, *Hospital Statistics, 1967*, Volume I - Hospital Beds (Ottawa: Queen's Printer, 1969), p. 55.

Factors of Production within the Hospital -- Accompanying the slowly increasing bed size of the average Canadian public general and allied special hospital has been fairly sharp increases in the volume of inputs in the average hospital.[21] The average number of hours worked per hospital has increased from 273,100 hours in 1954 to 464,800 hours in 1966, and gross wages and salaries have increased from $156.8 million to $836.1 million over the same period.[22] This corresponds to an increase in the number of hospital personnel per 100 beds from 119.8 in 1946 to 211 in 1966 as shown in Table 2-8. Similarly, the number of X-ray machines and attachments increased from 2.30 per hospital in 1954 to 4.96 in 1966.[23]

These increases in the quantity of resources used in the average hospital are matched by apparent changes in the quality of resources used. The proportion of graduate nurses (registered) of all nurses in public general and allied special hospitals increased from 51.7 per cent in 1946 to 68.2 per cent in 1966 as shown in Table 2-9. One factor that might have tended to offset these changes in quality is the slow trend towards the use of more part-time personnel in hospitals. In 1954, full-time personnel accounted for 93.1 per cent of the hospital labour force; by 1966, the corresponding figure was 88.6 per cent.[24]

In total, however, gross wages and salaries represent an increasing percentage of hospital expenditures. The data presented in Table 2-10 indicate that the payments to hospital manpower accounted for 58.8 per cent of expenditures in 1954 and for 65.5 per cent in 1966. Indeed, the salary component of expenditures in public general and allied special hospitals increased over 400 per cent from $156.8 million in 1954 to $836.1 million in 1966, while the value of plant fund assets grew by some 400 per cent from $371.6 million to $1,990.3 million over the slightly longer period from 1951 to 1966. It would thus seem that the cost of hospital manpower has been growing at a somewhat faster rate (a crudely estimated average of 36 per cent yearly) than has physical capital (a crudely estimated average of 29 per cent yearly).[25]

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[21] Appendix Tables A-15 to A-20 contain provincial data on these changes.

[22] See Appendix Tables A-10, A-11 and A-12.

[23] See Appendix Table A-16.

[24] See Appendix Table A-20.

[25] See Appendix Tables A-12 and A-13.

Table 2-8

PART- AND FULL-TIME PERSONNEL PER 100 RATED BEDS
IN REPORTING PUBLIC GENERAL AND ALLIED SPECIAL HOSPITALS
CANADA, BY PROVINCE, 1946 TO 1966

	1946	1951	1956	1961	1966
Canada	119.8	117.1	142.2	186.2	211.0
Newfoundland			109.7	179.0	175.4
Prince Edward Island	95.3	80.2	88.9	134.5	162.1
Nova Scotia	118.5	106.9	133.6	227.1	208.1
New Brunswick	112.8	115.4	144.2	214.1	211.8
Quebec	122.8	111.4	129.1	196.1	240.9
Ontario	124.6	134.0	162.9	199.4	219.6
Manitoba	115.3	100.5	126.3	188.1	215.9
Saskatchewan	105.2	102.1	151.9	172.0	175.5
Alberta	107.3	97.6	131.8	158.2	162.8
British Columbia	129.1	133.9	150.5	161.2	176.8

Source: Dominion Bureau of Statistics, *Hospital Statistics*, Volume I - General Information, *1946*, *1951* and *1956*; Volume I - Hospital Beds, *1960* and *1966*; Volume III - Hospital Personnel, *1961* and *1966* (Ottawa: Queen's Printer).

Table 2-9

GRADUATE NURSES AS PERCENTAGE OF THE SUM OF NURSES AND NURSES-IN-TRAINING
IN REPORTING PUBLIC GENERAL AND ALLIED SPECIAL HOSPITALS
CANADA, BY PROVINCE, 1946 TO 1966

	1946	1951	1956	1961	1966
Canada	51.7	51.7	60.3	60.6	68.2
Newfoundland	--	--	55.5	45.7	62.1
Prince Edward Island	25.8	51.3	40.2	46.8	56.5
Nova Scotia	40.9	42.0	50.6	54.5	65.0
New Brunswick	35.9	34.5	51.8	60.6	60.7
Quebec	51.8	49.5	53.1	51.5	64.1
Ontario	54.5	55.0	63.8	66.0	68.8
Manitoba	41.8	45.1	60.4	55.7	66.0
Saskatchewan	44.1	49.6	56.2	58.3	65.0
Alberta	53.4	79.0	62.6	60.3	64.8
British Columbia	63.0	61.0	69.8	69.4	75.2

Source: Dominion Bureau of Statistics, *Hospital Statistics*, Volume I - General Information, *1954* and *1957*; Volume III - Hospital Personnel, *1960*, *1963* and *1966* (Ottawa: Queen's Printer).

Table 2-10

PERCENTAGE DISTRIBUTION OF REVENUE FUND EXPENDITURES
IN REPORTING PUBLIC GENERAL AND ALLIED SPECIAL HOSPITALS
CANADA, 1954 TO 1966

	1954	1957	1960	1963	1966
			(Thousands of dollars)		
Revenue Fund Expenditures	293,799	420,956	622,413	884,392	1,281,757
			(Per cent)		
Gross wages and salaries	58.8	60.2	63.6	63.8	65.5
Medical and surgical supplies	4.0	8.2	3.4	3.1	3.0
Drugs	4.2		4.5	3.9	3.7
Other supplies and expenses	25.4	23.6	20.5	21.9	21.4
Other nondepartmental expenses	7.6	8.0	8.0	7.3	6.4

Note: Revenue Fund Expenditure for 1954 is a net figure. The others are gross.

Source: Dominion Bureau of Statistics, *Hospital Statistics*, Volume II - Financial Information, *1954* and *1957*; Volume VI - Hospital Expenditures, *1960*, *1963* and *1966* (Ottawa: Queen's Printer).

These increases in the quantity and quality of resources used in the average hospital should, when taken together, be reflected in a very sharp rise in the total dollar value of resources employed in the average hospital. This is indeed the case. The value of these resources increased slightly less than 700 per cent over the period 1946 to 1966, from $164,700 to $1,295,000 per hospital. The individual hospital plant has thus become a much more capital- and labour-intensive unit than it was in the early 1950's.

Outputs

There would appear to be at least two principal ways in which the output of hospitals could be measured -- by the quantity or dollar value of goods and services rendered, and by changes in the level of health. Since changes in the latter are due to a number of factors, we concentrate on the former.[26] We have already looked at the dollar value of hospital services rendered; it has increased rapidly in the postwar period.

Comprehensive indicators of the quantity of hospital goods and services are somewhat more difficult to obtain for the postwar period.[27] We might look at four rough indicators. First, the average daily number of patients receiving care in Canadian public general and allied special hospitals has increased over 60 per cent from 59,912 persons in 1953 to 100,841 in 1967. Relevant annual data for Canada and the provinces are presented in Table 2-11. We might note that the 60 per cent increase in the average daily number of patients receiving care, as noted above, translates into an increase in patient-days per capita of 1.4 to 1.8 days.

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[26] An evaluation of the social, economic, and demographic determinants of the level of mortality in Canada in the postwar period is the subject of my recently completed research project, "Health, Health Care Resources and Levels of Living in Canada, 1946-64" (Queen's University, unpublished).

[27] The annual DBS publication, *Hospital Statistics*, Volume II - Hospital Services, contains excellent data on the quantity of different services provided. These data, however, relate by and large to a single year only. It is thus somewhat difficult to obtain a historical perspective of changes in output.

Table 2-11

HISTORICAL SUMMARY OF AVERAGE DAILY NUMBER OF PATIENTS
IN OPERATING PUBLIC GENERAL AND ALLIED SPECIAL HOSPITALS
CANADA, BY PROVINCE, 1953-67

Year	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
1953	59,912.4	1,306.7	352.4	2,148.3	1,728.3	14,966.8	19,861.9	3,521.1	4,868.8	4,770.2	5,941.8
1954	64,191.5	1,347.7	368.1	2,208.5	1,821.7	16,881.6	21,099.7	3,436.6	4,807.2	5,235.6	6,389.7
1955	65,827.9	1,423.5	356.7	2,280.5	1,850.3	16,734.1	22,050.1	3,500.6	4,960.0	5,490.2	6,654.4
1956	69,336.0	1,427.3	406.5	2,332.8	1,954.2	18,178.3	23,167.2	3,688.7	5,103.9	5,882.2	6,777.4
1957	71,834.1	1,425.3	405.6	2,430.5	1,992.1	19,116.7	24,336.7	3,418.7	5,656.5	5,866.7	6,794.5
1958	76,007.1	1,521.5	425.6	2,413.6	1,993.8	21,727.2	24,970.4	3,773.7	5,634.4	6,248.5	6,909.6
1959	79,017.1	1,544.7	438.8	2,734.3	2,354.6	22,045.9	26,506.2	3,977.9	5,643.8	6,830.1	6,658.6
1960	80,227.1	1,571.2	439.7	2,823.0	2,668.4	20,620.1	27,934.2	4,208.8	5,714.0	6,962.6	7,235.6
1961	81,919.9	1,583.5	459.9	2,883.8	2,738.1	20,253.6	29,260.1	4,501.3	5,707.3	7,004.3	7,482.9
1962	87,619.1	1,644.0	487.1	2,953.6	2,795.1	23,700.2	30,536.7	4,668.3	5,592.0	7,522.8	7,616.5
1963	90,940.9	1,862.0	480.9	3,040.3	2,887.7	24,583.0	31,781.6	4,844.0	5,851.2	7,703.2	7,777.8
1964	92,884.7	1,871.1	479.7	3,189.2	2,960.1	24,156.2	33,233.6	4,839.6	5,972.4	8,164.2	7,903.8
1965	95,707.6	2,021.9	482.5	3,214.9	2,989.8	25,145.0	34,221.3	4,856.5	5,990.0	8,510.7	8,162.4
1966	98,372.0	1,998.1	503.7	3,335.7	3,029.8	25,024.8	35,982.3	4,882.4	5,950.9	8,671.6	8,882.2
1967	100,840.8	2,156.1	513.2	3,430.0	3,083.4	25,646.3	36,775.2	4,866.6	5,813.2	9,213.2	9,238.9

Source: Dominion Bureau of Statistics, *Hospital Statistics, 1967*, Volume I - Hospital Beds (Ottawa: Queen's Printer, 1969), p. 55.

Second, the mean stay of adults and children leaving these hospitals has increased slowly over the same period, from 10.9 days in 1953 to 11.5 days in 1967.[28] Of course, changes in the average length of stay can, and perhaps in this case does, reflect a change in the *type* of care provided rather than in the *quality* of care provided. For example, the increasing use of hospitals for geriatric care may increase average length of stay in a direct way. In contrast, the increased length of stay of patients in given illness categories -- for example, maternity patients -- probably reflects an increase in the quality of care provided.

Third, almost all births now take place in hospitals. In 1946, 67.6 per cent of all births took place in hospital; by 1966, the corresponding figure was 99.2 per cent. Furthermore, there was almost no variation in this latter figure among the provinces; in every province in 1966 more than 99 per cent of all births took place in hospital.[29]

Finally, the number of deaths occurring in hospital is rising rapidly. As shown by the data in Table 2-12, in 1946 only 46 per cent of all deaths took place in hospital. By 1966, the corresponding figure was 66.6 per cent. The scope for a continued rise in the use of hospitals for geriatric care, and the possibility that hospitals so used are not designed specifically to provide such care, seems to suggest the paramount need of a detailed study of the social, economic, and demographic determinants of the percentage of deaths occurring in hospital.[30]

We might note briefly the data on infant mortality and life expectancy in Canada and the provinces in the postwar period.[31] Infant deaths per 1,000 live births decreased from 47.8 to 23.1 in 1966. In contrast, average life expectancy at 40 years of age, for males, has increased only very slowly from 31.9 years in 1941 to 33 years in 1961.

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[28] For provincial data for the years 1953 to 1967, see Appendix Table A-5.

Similar data on the number of admissions per bed are presented in Appendix Table A-3.

[29] See Appendix Table A-21.

[30] Provincial and Canadian data on the number of deaths per 1,000 separations annually, for the period 1953 to 1967, are presented in Appendix Table A-4.

[31] For the detailed data, see Appendix Tables A-22 and A-23.

Table 2-12

HISTORICAL SUMMARY OF PERCENTAGE OF DEATHS OCCURRING IN HOSPITAL
CANADA, BY PROVINCE,* 1946-67

Year	Canada	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
1946	46.0	31.0	35.5	33.4	36.7	48.7	53.1	58.9	59.7	58.3
1947	46.1	36.8	37.8	37.1	37.2	46.2	53.0	61.2	60.8	60.5
1948	47.4	38.2	37.4	39.9	38.6	47.9	53.8	64.0	60.8	60.0
1949	48.1	41.1	39.7	42.0	38.3	48.8	54.8	64.9	59.1	61.9
1950	48.7	38.6	40.0	40.6	40.2	48.7	56.7	67.7	61.2	60.7
1951	50.1	41.4	42.6	41.0	41.3	50.1	58.5	67.9	62.4	62.9
1952	50.0	36.5	40.9	41.6	39.5	50.6	59.8	68.5	64.2	63.5
1953	51.4	39.1	44.7	43.8	40.2	52.2	62.6	71.4	64.4	62.3
1954	52.9	43.6	44.2	43.1	41.6	53.9	62.2	70.7	64.8	66.8
1955	53.8	45.2	45.8	45.3	43.2	55.5	58.5	69.1	65.8	66.2
1956	55.6	46.0	47.5	44.9	46.0	57.1	61.2	70.6	67.4	66.5
1957	57.1	50.1	48.3	48.8	47.8	58.3	63.6	71.8	69.4	66.5
1958	57.8	49.0	50.1	47.4	48.2	59.2	65.6	73.6	70.4	66.8
1959	59.4	48.7	53.3	51.0	49.6	61.4	68.1	73.4	70.8	66.3
1960	62.1	55.8	55.6	57.1	52.3	63.8	69.7	74.1	72.5	69.2
1961	63.0	55.5	56.1	58.5	55.5	64.1	72.4	75.1	71.1	68.1
1962	63.7	56.3	56.5	60.2	57.7	65.0	72.3	75.1	70.9	65.1
1963	64.9	54.6	59.7	61.7	59.2	66.3	71.3	75.4	70.9	66.0
1964	65.2	58.5	58.7	62.8	58.9	68.0	73.6	75.4	70.6	63.1
1965	66.5	57.4	58.0	62.8	59.3	68.8	72.7	74.4	72.7	70.9
1966	66.6	61.8	58.7	63.7	58.5	69.2	73.3	73.4	72.8	72.0
1967	67.1	60.6	58.6	63.3	60.0	70.1	73.8	70.4	71.8	72.1

* Data for Newfoundland not available.

Source: Dominion Bureau of Statistics, *Vital Statistics, 1967* (Ottawa: Queen's Printer, 1969), p. 99.

Table 2-13

COMPARISON OF HOSPITAL COSTS AND UTILIZATION
CANADA AND UNITED STATES, 1950-67

	Canada	United States
Hospital Expenditures:		
Average annual percentage increase, 1950-67, in:		
Total hospital costs	13.8	10.8
Population	2.3	1.6
Use per person	1.5	1.4
Cost of living[1]	2.4	2.0
Hospital costs not due to increased use[2] or cost of living	6.9	5.5
Length of Stay:		
Average length of stay (days)		
-- 1950	10.4	8.1
-- 1967	10.2	8.3
Personnel:		
Ratio of total professional personnel per 100 hospital beds, 1966	42.67	34.70
Ratio of graduate nurses per 100 hospital beds, 1966	26.54	18.41
Relative Size of the Health Sector:		
Total health care expenditures[3] as percentage of GNP, 1955	3.2	4.0
Total health care expenditures as percentage of GNP, 1965	4.7	5.1
Hospital expenditures as percentage of GNP		
-- 1955	1.8	1.5
-- 1965	2.8	2.0

(1) Indicated by Consumer Price Indexes.

(2) Included are increases in population and increases in use per person.

(3) Excludes expenditures on nonprescription drugs in Canada and expenditures on nonpersonal public health care in both countries.

Source: R. Anderson and J. T. Hull, "Hospital Utilization and Cost Trends in Canada and the United States", *Health Services Research*, vol. 4, Fall 1969, pp. 198-222.

Canada-U.S. Comparisons

In Table 2-13 we set forth comparisons of some of the more important aspects of hospital costs and utilization in Canada and the United States.[32] The apparently greater quantity and quality of manpower per 100 beds in Canada is noteworthy. So also is the relatively larger size of the Canadian hospital subsector in contrast with the relatively larger U.S. health care sector worthy of consideration.

Conclusions

The number of patient-days of care in hospitals has increased not only absolutely but also on a per capita basis. Though these changes account for part of the increase in costs, probably an equally, if not more, important reason for the dramatic increases in hospital costs is the apparent increased quantity and quality of the human and nonhuman resources that are used to provide a given hospital service. Noting that the health of Canadians, as measured in terms of life expectancy for example,[33]

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[32] Because the task of compiling the information presented in this table is a formidable one in itself, we have used the data presented by the authors noted in the source of Table 2-11.

[33] Ideally, one would also like a measure of aspects of health other than mortality, such as morbidity. Accurate and comparable data on the latter are simply not available. For example, days spent in hospital seem to be largely a function of the availability of hospital beds; the number of notifiable communicable diseases reported seems to be closely dependent on the availability of physicians and on their customary habits; suicides are most likely to be a less-than-adequate indicator of the mental well-being of the individuals in a community because reporting is dependent on the cultural, religious character of individual communities. Casual observation of the available data seems to suggest that, though the nature of morbidity has changed from that caused by physical ill-health to that caused by mental ill-health, the absolute level of morbidity may not have fallen any more quickly, if indeed as quickly, as the level of mortality.

has changed only slowly, there is reason to believe that hospital resources are not employed efficiently or, if they are, they are allocated to the provision of care that, rather than prolong life, makes the given life span a healthier one.[34]

[34] There are, of course, at least two other possibilities. First the environment in which we live might have become much more unhealthy. Thus an increasing bundle of health care resources would be required to maintain the present health status. Second, there might of course be increasing costs (decreasing returns) associated with achieving further reductions in the level of mortality. The substantially higher levels of health found in several European countries, however, suggests that there is room for a great deal of improvement yet before we reach the stage whereat further improvements are achieved only with large resource expenditures. Moreover, the rate of improvement in these levels -- for example, in lowering infant mortality -- is much higher in several countries other than Canada. Finally, there would seem to be little information to verify that the Canadian environment had changed for the worst while that of other countries had not.

CHAPTER 3

HOSPITAL COSTS AND EFFICIENCY

Two methods of approach are employed in our exploration of hospital costs and efficiency: the estimation of cost functions, and the estimation of production functions.[1] Two principal goals are sought in both cases. First, we are interested in determining if there appears to be a set of forces that bear systematically on the cost and output decisions of those persons responsible for administering hospitals. Second, we seek information on the nature of any such systematic relationships between cost and output and between output and input that are found to exist.

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[1]Studies of hospital costs based on U.S. data include the following: R. E. Berry, Jr., "Returns to Scale in the Production of Hospital Sources", *Health Services Research*, vol. 2 (Summer 1967), pp. 123-139; M. L. Ingbar and L. D. Taylor, *Hospital Costs in Massachusetts* (Cambridge: Harvard University Press, 1968); P. J. Feldstein, *An Empirical Investigation of the Marginal Cost of Hospital Services* (Chicago: Graduate Program in Hospital Administration, 1961); W. J. Carr and P. J. Feldstein, "The Relationship of Cost to Hospital Size", *Inquiry*, vol. 4 (June 1967), pp. 45-65; and K. K. Ro, "Determinants of Hospital Costs", *Yale Economic Essays*, vol. 8 (Fall 1968), pp. 185-257.

A major study of both cost and production functions based on data for hospitals in the United Kingdom is that of M. S. Feldstein, *Economic Analysis and Health Service Efficiency* (Chicago: Markham Publishing Company, 1968). Finally, there are at least four studies based on Canadian data that are at various stages of completion. J. Krushna has studied hospital costs in total and by different departments among Ontario hospitals; the Econometric Research Staff (D. R. Allen and D. Featherstone), Dominion Bureau of Statistics, has completed a study of costs in Ontario public general hospitals of 50 beds or more; K. Hay and H. J. Kieferle have been directing a study of costs in some 75 teaching hospitals in Canada for the Association of Canadian Medical Colleges; and Robert Evans, *"Behavioural" Cost Functions for Hospitals*, Discussion Paper No. 38, Department of Economics, University of British Columbia, April 1970.

We also use the first approach, that of estimating cost functions, to examine the direction and size of the effect on hospital costs of several variables other than output. Among the additional variables considered are capacity utilization, intern and nurses' training programs, average length of stay, etc.

With regard to both methods of approach, our data relate to all general and special hospitals in Canada in 1966.[2] There were 1,266 such hospitals in that year. And for each hospital there were some 1,603 variables describing inputs, production processes and outputs in either physical or financial terms.[3]

Cost and production functions were generally estimated for different subgroups of the total number of hospitals. These subgroups were formed by alternately classifying hospitals by province, by type of ownership, by type of operation, and by bed size.

Cost Functions

Introduction

Our first task is to determine whether a close relationship exists between costs and output. Success in this direction would seem to suggest the existence of a set of forces that systematically bear on cost and output decisions. In order to conduct this first test, however, we must postulate the nature of the relationship that we expect to exist between costs and output. Depending on the goodness of this choice, then, the results used to test for the existence of a relationship may also be those required to determine the nature of the relationship.

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[2]Dominion Bureau of Statistics, Institutions Section, "Hospital Statistics, 1966", HS-1 and HS-2 Computer Tapes (Ottawa).

[3]These variables and their definitions are set out in: Dominion Bureau of Statistics and Department of National Health and Welfare, *1966 Instructions and Definitions for the Annual Return of Hospitals*, Part I: Facilities and Services, Form HS-1; and Part II: Financial Return, Form HS-2 (Ottawa: Queen's Printer).

Postulated Relationship

The most general relationship between costs and output that might be estimated as a starting point is one traditionally set out in economic theory textbooks. It allows for the possibility that average costs -- that is, cost per unit of output -- might decline over some initial range of output as output increased, would then perhaps be constant over a second range as output increased further, and finally would increase over a third range as output increased still further.

The economic significance of this relationship is that it allows for the presence of internal economies and diseconomies of the scale of output. For example, over the initial range, as output grows, the division and specialization of labour, along with the use of capital equipment more compatible with the requirements of the particular production process, may result in falling average costs. As output grows further, internal diseconomies may appear in the form of proportionately larger labour-management costs and the like. At some stage, diseconomies associated with increased levels of production may just offset economies associated with the increased use of capital. Finally, as output grows in some third stage, the diseconomies begin to outweigh the economies, and as a result average costs begin to rise.

Following this general approach to the nature of the relationship between costs and output, we have estimated the cost functions of the following form:

$$TC = a_0 + a_1 x + a_2 x^2$$

where TC represents total costs, a_0 is a constant, x represents total output, and a_1 and a_2 are parameters which indicate the change in total costs following a change in output.

By dividing both sides of the above equation once estimated by x, we are able to obtain a crude average cost function of the following form:

$$AC = \frac{a_0}{x} + a_1 + a_2 x$$

where AC represents average costs. If the first and third terms on the right-hand side of this equation are positive, then the traditional U-shaped average cost

curve would obtain. Strictly, the relative magnitudes of the parameters should also be considered. For example, they might be such that either increasing or decreasing costs were indicated by positive first and third terms. This qualification must also be attached to the following statements. Continually decreasing average costs (increasing returns to scale of output) would be in evidence if the first term were positive and the third negative. In contrast, continually increasing average costs (decreasing returns to scale of output) would be indicated by a negative first term and a positive third term. The unexpected inverted U-shaped average cost curve would be found to exist if the estimated total cost function when divided by x contained a negative first and third term along with, of course, a positive second term. Finally, constant average costs (constant returns to scale of output) would be indicated by first and third terms which were both small and insignificant.

We have also chosen to estimate a simple linear function relating total costs to output. It has the following form:

$$TC = a_0 + a_1 x_0 \ .$$

If we divide all terms of the above equation by x, we obtain the following average cost function:

$$AC = \frac{a_0}{x} + a_1 \ .$$

In this case, we preclude the possibility of obtaining either traditional U-shaped or unexpected inverted U-shaped average cost curves. Indeed, there are only three possible types of average cost curves that can be found. If the first term of the right-hand side of this equation is positive, decreasing average costs are indicated; if it is negative, increasing average costs are indicated; and if it is small and insignificant, constant average costs are indicated.

Our decision to employ the above form in addition to the more traditional one follows from a review of the nature of the process of providing hospital care. First of all, a hospital with its beds and specific medical equipment represents a fairly substantial input of physical capital. Second, a large number of the personnel who work in hospitals have substantial amounts of human capital. For example, interns, residents and graduate

nurses have a number of years of formal education and specific training. Taken together, these two facts about the nature of hospitals lead to an expectation that the provision of hospital care should be characterized by decreasing average costs of production.[4]

Some newly constructed or enlarged hospitals may be operating at much less than full or optimal capacity. Such a situation is of course not necessarily suboptimal in the longer run. Such hospitals may be designed efficiently to reach full capacity in the future. For the present however they may be in some sense underused. Accordingly, average costs may be higher than they might otherwise be if the hospital were older. In order to account for this influence on costs, we have usually included in our cost function a variable that indicates the percentage of rated bed capacity that is normally occupied.

Measures of Total Cost

We have used the following three measures of total cost: total operating costs plus the sum of estimated depreciation on buildings, land, improvements, and major equipment; total operating costs plus one-tenth of the total value of plant assets including land, buildings and major and minor equipment; and total operating costs alone.[5] We might note that success in obtaining estimates of capital plant has permitted a more thorough study of hospital costs than has been possible in many studies carried out previously. The last measure has been included in an attempt to produce results that are comparable to

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[4]This expectation was set out in 1967 when the outlines of what has become this present research project were first drafted.

We might note that the empirical evidence from the studies noted above is mixed; those by Berry, by Carr, by P. Feldstein, and by Ro, generally support the hypothesis of decreasing average costs per unit of output.

[5]Tables which contain the mean values of the different variables employed will be made available to the reader on request.

those stemming from projects in which an estimate of capital plant was unavailable.[6]

Measures of Output

Four measures of output have been used in our estimation of cost functions.[7] We have used the number of patient-days, the number of admissions, and rated bed capacity in order to obtain results that are comparable with those of other studies. In addition, however, we have calculated a measure of composite output.[8] It is obtained by summing the weighted quantities of 13 different hospital services. These include, in turn, adult- and pediatric-patient-days, newborn-patient-days, diagnostic X-rays, laboratory examinations, electrocardiograms, electroencephalograms, therapeutic X-ray treatments, minor operations, major operations, obstetrical deliveries, physiotherapy treatments, emergency visits, and organized outpatient visits. The weights, estimated by H. A. Cohen,[9] relate the average cost in dollars, including overhead, of each service relative to the cost of an adult-patient-day.

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[6]An attempt to adjust the wage and salary component of total costs by using available data on salary ranges was unsuccessful. So also was an attempt to use recently published and unpublished data on nurses' salaries; see Dominion Bureau of Statistics, *Annual Salaries of Hospital Nursing Personnel*, 1968 (Ottawa: Queen's Printer, 1969). The problem was that data are not available giving an average salary for a given quality (age, educational background, years of experience) of nurses who could be found working in sufficient numbers in every hospital. As it turns out, the quality of nurses of a given occupational grouping such as graduate general duty nurses probably varies more than does wage rates for a given quality of nurse.

[7]Appendix Table B-1 contains the simple correlation coefficients estimated among 25 different measures of the quantity and quality of hospital care.

[8]The estimated relationship between this measure of composite output and rated bed capacity is set out in Appendix Tables B-33 and B-34.

[9]H. A. Cohen, "Variations in Cost Among Hospitals of Different Sizes", *Southern Economic Journal*, vol. 33 (January 1967), pp. 355-366.

Again, success in obtaining data on these different hospital services has permitted a more thorough evaluation of hospital costs than has commonly been possible.

Because our output measure relates to the quantity of output only, we have included on occasion dummy variables to indicate the existence of health care education and training programs. The presence of such programs usually results in the provision of both a larger quantity and a higher quality of health goods and services to a patient with a given complaint than would be provided in other hospitals.[10] One dummy variable indicates the presence of a program for educating and training interns; the second indicates the existence of a nurses' training program.

The Overall Statistical Relationship Between Costs and Output

All of approximately 310 estimated cost functions indicated the existence of a significant overall relationship between costs and output.[11] Though the calculated $\overline{R}^2$ ranged from .434 to .998, the vast majority of them were above .700. The equations estimated from the subgroups of hospitals by province, type of service, and type of operation had the highest $\overline{R}^2$, usually over .850. In contrast, those estimated from the subgroups of public general hospitals by bed size had $\overline{R}^2$ in a lower range, from .435 to .812. Without question, these results suggest the existence of a set of systematic forces that bear on the cost and output decisions of hospital administrators.

The Nature of the Average Cost Curve

When rated bed capacity, patient-days, or admissions were used as the measure of output, increasing average cost curves were generally indicated for subgroups of hospitals classified by province.[12] This was so,

[10] L. Lipworth, F.A.H. Lee, and F. N. Morris, "Case-Fatality in Teaching and Non-Teaching Hospitals, 1956-59", *Medical Care*, vol. 1 (April-June 1963), pp. 71-76.

[11] See Appendix Tables B-2 through B-32 for the detailed statistical results.

[12] See Appendix Tables B-2 through B-6. The only explanatory variables contained in these equations were the selected measure of output and this variable squared.

regardless of whether costs were measured by total operating costs only or by these plus estimated depreciation. In contrast, when our measure of composite output was included, the average cost curves indicated a variety of shapes: constant, U-shaped, inverted U-shaped, and decreasing costs.[13]

The addition of the capacity utilization variable to composite output, and composite output squared, gave rise to decreasing average cost curves and U-shaped curves.[14] The further addition of the two dummy variables indicating the presence of either or both an intern training program and a nurses' training program gave rise to predominantly U-shaped average cost curves.[15]

Employing the alternative linear form of the total cost function, we obtained results that suggested the existence of decreasing average cost curves.[16] This was so, for the equation that included composite output and capacity utilization and for that including these two variables and also the two dummy variables indicating the existence of health care educational and training programs.[17] Interestingly, when capacity utilization is omitted from the latter equation, the results are mixed; they suggest the presence of predominantly increasing cost curves.[18]

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[13] See Appendix Table B-7.

[14] See Appendix Table B-8. Small, insignificant regression coefficients for composite output squared have been considered in arriving at the above result; for example, of eight positive regression coefficients for this variable, most are small and all but two are significant.

[15] See Appendix Table B-9.

[16] See Appendix Tables B-10 through B-19.

[17] In particular, see Appendix Tables B-10 and B-12.

[18] See Appendix Table B-11. The problem of multicollinearity among the explanatory variables of these and the other cost functions estimated is generally not thought to be serious; caution must be used, however, in interpreting the size and significance of individual regression coefficients.

Our estimation of cost functions using data on public general hospitals classified by bed size produced results that suggested more firmly the existence of decreasing average cost curves.[19] This was generally so, whether the quadratic form or the linear form of the cost function was used; whether any one of the three measures of total costs was used; and whether the capacity utilization and/or two education dummy variables were also included as explanatory variables.

The estimation of cost function for subgroups of hospitals classified by type of operation and type of service also supported the hypothesis of decreasing average cost.[20] When classified by type of operation, the three major groups of hospitals (those classified as lay corporations, 373; as religious organizations, 249; and as municipal organizations, 300) all appeared to be characterized by decreasing average cost curves. Similarly, all groups of hospitals classified by type of service, including the 851 general hospitals, appeared to have decreasing average costs.

Though our results are not conclusive, the weight of the evidence is in support of the existence of decreasing average cost curves in Canadian hospitals.

Capacity Utilization

Theoretically, we would expect average costs per unit of output to fall as the level of output grew in a given hospital over some initial range. Over a second range, we would expect average costs to rise as output grew still further. The size of this second range may in practice be quite small, however, if there are fairly rigid patterns of patient movement through a hospital. For example, hospital administrators under the direction of boards of directors, trustees, physicians, and the like, may find it difficult to increase the flow of patients through hospital, even if the demand for hospital care far outstrips the availability of hospital facilities. To the extent that such rigidities exist, the second range may, if it exists at all, be very small.

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[19] See Appendix Tables B-20 through B-29.

[20] See Appendix Tables B-30 to B-32.

On the whole, it seems reasonable to predict a negative relationship between average costs and capacity utilization. If the second range noted above is of greater significance, we would perhaps find a positive relationship for hospitals in provinces with high levels of capacity utilization, and for large hospitals.[21]

The regression coefficient for capacity utilization was negative in the vast majority of some 230 estimated cost functions in which it was included. It was usually significantly negative. In those cases in which it was positive, it was frequently insignificant. Interestingly, it was positive in a number of equations relating to British Columbia and Manitoba; both of these provinces have higher average percentage occupancy -- 83.8 and 82.7, respectively -- than the Canadian average of 80.2 per cent in 1967.[22] In a similar manner, the effect of capacity utilization on costs was sometimes estimated as positive for public general hospitals of 500 to 999 beds, and more often for this same type of hospital with 1,000 beds and over. In contrast, however, it was estimated as negative for chronic and convalescent hospitals, even though chronic hospitals have very high levels of occupancy -- 91.4 per cent in 1965.[23] The rate of turnover in these hospitals is also much lower, however, which may tend to offset the effect on costs of high occupancy levels.

Health Care Education and Training Programs

There seems little doubt that the existence of either or both intern and nurses' training programs in a hospital will result in greater quantities and a higher quality of care being provided to a patient with a given complaint. Our composite measure of output probably controls adequately for the effect on costs of increased quantities of health care. The dummy variables, which take a value of zero if there is no such program and a value of one if there is, represent our attempt to evaluate the effect on costs of, among other things, a higher quality of health care associated with the presence of such education and training programs -- in particular, with the presence of a better quality of all types of health

[21] See Appendix Table A-32 for data on the high levels of capacity utilization in large hospitals.

[22] See Table 2-7.

[23] See Appendix Table A-33.

care personnel. Clearly, we expect to find a positive relationship between costs and the presence of these programs. Significant positive regression coefficients will then in turn reflect consistency of the data with the proposition that these programs do result in a higher quality of hospital care.

Of some 100 estimated cost functions in which the two dummy variables were included, both were shown to have a positive relationship with costs in more than 75 per cent of the cases. The dummy variable relating to the presence of an intern program was positive marginally more often than was the one relating to the presence of a nurses' training program. In almost all of these cases, the regression coefficient was significantly positive.

Average Length of Stay

Though longer stays in hospital for the care of a given complaint may in some sense represent a higher quality of care, they probably also indicate the inefficient use of hospital resources. Once a patient has received the health goods and services that can only be obtained from well-equipped and well-staffed hospitals, he should probably be transferred to a less-intensive-care unit for the "hotel" type care required during convalescence. The extent to which a hospital provides hotel care in addition to intensive hospital care will be reflected in average costs. The hospital that has a high rate of flow of patients can be expected to have higher average costs per unit of output than one with a lower rate of patient flow. Notwithstanding its higher costs, the former may of course be the more efficient provider of hospital care. We thus expect to find a negative relationship between average length of stay and average costs.

Average length of stay was included as an explanatory variable in three sets of equations.[24] Its estimated regression coefficient was negative in 16 of 29 possible cases; it was often significantly negative. In the 13 positive cases, it was seldom significantly positive.

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[24] See Appendix Tables B-13, B-19 and B-27.

The Quality of Hospital Care

As we have noted above, our composite measure of output does not include a consideration of the quality of the hospital care provided. Similarly, while our health care education and training dummy variables may account for some of the differences in the quality of care provided in "teaching" and "nonteaching" hospitals, they cannot, for example, account for differences in quality between each of these two groups of hospitals taken separately. We have thus included in turn, as explanatory variables, three measures of the quality of hospital care; these are the number of staphylococcal infections among newborn plus the number of postoperative infections, the number of deaths occurring in the hospital, and the number of deaths occurring during and after operations.

There would appear to be two counterbalancing hypotheses that could be advanced on the nature of the relationship between quality of care and costs. On the one hand, a high quality of care will probably involve the use of a proportionately large volume of hospital resources; thus we might expect a negative relationship between costs and the measures of quality set out above. On the other hand, a poor quality of health care may be the result of an inefficiently designed, equipped, staffed, or organized hospital; in this case, a poor quality of care might be associated with proportionately high costs.

Of the 34 equations in which one of these measures of quality was included as an explanatory variable, the estimated regression coefficient for quality was positive in 24 cases.[25] Moreover, it was often significantly positive. These results are consistent with the hypothesis that poor quality of health is associated with inefficiency and thus, in turn, with high costs of production.

Nature of Hospital Personnel

The labour market in a particular community might well be such that there is either a high ratio of part-time to full-time personnel or a high ratio of staff separations to the total number of full-time staff. If either or both of these ratios are relatively high in a hospital, we can expect in turn the average costs per unit of output to be relatively high in these hospitals.

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[25] See Appendix Tables B-15 to B-17, and B-29.

In the 10 equations in which each of these was added separately as an explanatory variable, the estimated regression coefficient was positive in 8 of 10 cases.[26] There would thus seem to be substantial support for the above hypothesis.

Diseconomies of Scale of Output

Introduction

We now attempt to throw more light on aspects of the production process that might give rise to internal diseconomies of scale of output. In particular, we examine the linear relationship between a varying set of explanatory factors and each of administration expenses, staff separations, and accumulated paid hours of hospital personnel.

Administration Expenses

Traditionally, there are thought to be internal diseconomies associated with overall administrative activities as the level of output increases. When these exist, they probably result from increasing costs associated with the management and organization of the labour input. A firm prediction of a positive relationship between output and administrative expenses per unit of output can probably not be made for the whole range of levels of output; but certainly as large hospitals grow yet larger and output yet greater, per-unit administration expenses can probably be expected to increase also.

The first equation estimated related administration expenses to composite output and composite output squared for hospitals classified by province.[27] With $\bar{R}^2$ ranging from .901 to .993, the overall relationship was decidedly significant. In six provinces, the average administration expenses per unit of output were estimated to be U-shaped; in two, to be inverted U-shaped; and in the last two, one to be increasing and the other decreasing.

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[26]See Appendix Tables B-18 and B-19.

[27]See Appendix Table B-35.

The second equation related administration expenses to composite output for hospitals classified by province.[28] Again the overall relationship was highly significant, with $\bar{R}^2$ ranging from .736 to .992. In six provinces the relationship between average administration expenses and output was estimated to be positive; in the others, to be negative.

Our final equation in this section related administration expenses to composite output, average length of stay, staff separations, and the extent of part-time employment for the same provincial grouping of hospitals.[29] With $\bar{R}^2$ ranging from .905 to .997, the overall relationships were decidedly significant. Moreover, in seven provinces, a positive relationship was estimated between composite output and average administration expenses.

As we discuss staff turnover in the following subsection, we might confine our discussion to the results for average length of stay and the extent of part-time employment. High levels of the latter would presumably involve a proportionately large amount of paperwork. Accordingly, we would expect a positive relationship between administration expenses and the ratio of part-time to full-time personnel. In seven provinces, these expectations were confirmed, though the regression coefficient was significantly positive in only one province, New Brunswick.

The effect of average length of stay on administration costs should probably be postulated as being negative; as the rate of flow of patients through a hospital increases, so also should the amount of paperwork increase. Interestingly, the estimated relationship was negative in only four provinces; it was generally significantly negative, however. In the remaining provinces, it was significantly positive in only one of the six possible cases.

Staff Separations

Clearly, proportionately high rates of turnover of hospital personnel are expected to raise costs -- in particular, administration costs. The results of the last equation discussed in the preceding subsection confirm

[28] See Appendix Table B-36.

[29] See Appendix Table B-37.

this hypothesis. In six provinces, a positive relationship is found between the ratio of staff separations to full-time hospital personnel and administration expenses.

Furthermore, proportionately high levels of staff turnover are likely to be associated with fairly large sizes of hospitals.[30] For example, as the hospital becomes larger, communications between staff and administrators are likely to become less personal. Our test of this proposition involved estimating the linear relationship between the ratio of separations to total staff and composite output for hospitals classified by province.[31] The overall relationship was insignificant for all provinces. Interestingly, the regression coefficient for composite output was positive in six provinces and was significantly positive in four of these.

Accumulated Paid Hours of Hospital Personnel

Traditionally, internal diseconomies are thought to be associated with the use of proportionately large quantities of labour. If this is so, a given unit of output may require a larger input of labour as the overall level of output grows. In any event, it is interesting to find out if the labour-output ratio varies systematically as output grows. The proposition is supported by the results of two sets of estimated equations for hospitals classified by province -- one in which the total of accumulated paid hours of hospital personnel was related to composite output alone,[32] and the other in which this total was related to composite output, average length of stay, staff separations as a percentage of the number of staff, and part-time personnel as a percentage of full-time personnel.[33] In both sets of equations, the overall relationship between the dependent and explanatory variables was highly significant, with $\bar{R}^2$ ranging from .939 to .993.

[30] Speculative and empirical results on the effect of hospital size on productivity, as seen through turnover of nurses, communications problems, etc., is reviewed by J.H.F. Brotherston, "The Use of the Hospital Review of Research in the United Kingdom", *Medical Care*, vol. 1 (October-December 1963), pp. 225-231. The work reviewed is that of R. W. Revans, *Physics in Medicine and Biology*, vol. 7, no. 2, p. 147.

[31] See Appendix Table B-38.

[32] See Appendix Table B-39.

[33] See Appendix Table B-40.

The relationship between the dependent variable and the three additional explanatory variables included in the second set of equations is expected to be negative for the first of these, and positive for the second and third. Labour input should increase as average length of stay decreases, as the ratio of staff separations increases, and as the proportion of part-time personnel increases. The first expectation would seem to be confirmed with eight negative regression coefficients being estimated. The second expectation is left unconfirmed with an equal number of positive and negative estimated regression coefficients. Finally, the third expectation is probably also confirmed with eight positive regression coefficients.

Economies of Scale of Output

Introduction

In a way similar to that of the preceding section we explore in this section selected aspects of the nature of providing health care that might be reasonably associated with internal economies of scale of output. In particular, we look at asset value, numbers of medical staff, and the number of accumulated paid hours of graduate nursing personnel.

Asset Value

In the same way that we examined the relationship between levels of overall labour input and levels of output, it is interesting to find out if the capital-output ratio varies systematically with changes in the level of output. Our analysis of this question involved estimating a set of equations relating asset value to composite output for hospitals classified by province.[34] With $\bar{R}^2$ ranging between .665 and .950, the overall relationship was found to be highly significant. Moreover, in seven provinces, the average value of plant assets per unit of output is found to decrease as output grows. Only in Prince Edward Island, Quebec and Alberta was this not the case.

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[34] See Appendix Table B-41.

The Number of Medical Staff

The proportionately large amounts of human capital embodied in medical personnel lead one to suspect that the number of such personnel per unit of output might decline as output grows. This would result from success in the specialization and division of such labour services. The set of equations estimated for hospitals classified by province related numbers of medical staff to composite output.[35] The calculated $\bar{R}^2$ ranged from -.132 to 1.000; the results are thus somewhat mixed. Interestingly, however, the average number of medical staff per unit of output was found to increase as output grew in nine of ten provinces. This result may reflect, however, nothing more than the fact that large hospitals tend to have a proportionately large amount of their physicians' services supplied by physicians in full-time, salaried hospital positions.

Accumulated Paid Hours of Graduate Nursing Personnel

Such personnel also embody a substantial amount of human capital, though probably not nearly so much on an individual basis as do physicians. The relationship between the average input of this resource per unit of output and output itself is more difficult to predict. In order to throw light on this matter, we have estimated with data on subgroups of provincial hospitals a set of equations relating this variable to composite output.[36] Calculated $\bar{R}^2$ ranged from .891 to .985. In six provinces the relationship between output and the average input of graduate nurse hours per unit of output was found to be negative.

Generally, it would appear that the average input of physical and human capital per unit of output declines as the level of output grows. This does not mean, of course, that the ultimate quality of care provided falls as output grows. More likely, it means that capital resources can generally be employed more efficiently as the level of output grows.

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[35] See Appendix Table B-42.

[36] See Appendix Table B-43.

The Use of Drugs

Introduction

It seems reasonable to expect that drugs could in some general way represent both a substitute and a complement for physicians' services. On the one hand, they might, in some hospitals in rural communities, play the role of a substitute for relatively scarce physicians' services. On the other hand, in large urban hospitals, they might well be used predominantly as complements to the services provided by physicians generally, and specialists in particular.

Statistical Results

In order to throw some light on the use of drugs, we estimated two equations -- one with hospitals classified by province, and the other with public general hospitals classified by bed size. In the first, we related drug expenditures to composite output, by itself and squared.[37] With $\overline{R}^2$ ranging from .896 to .993, the overall relationship was highly significant. In four provinces, a U-shaped relationship between output and average drug expenses per unit of output was estimated; in the other six provinces, the estimated relationship appeared to be positive.

In the second equation, we related drug expenditures to composite output alone.[38] $\overline{R}^2$ was much lower; it ranged from .202 to .633. In five cases, the relationship between output and average drug expenditures per unit of output was negative; in the other four, it was positive.

A Production Function for Hospitals

Introduction

A second and related way of examining the nature and efficiency of the process of producing hospital services is through the estimation of a production function. Thus, instead of looking at the relationship between overall costs and overall levels of output, one can examine the relationship between overall levels of output and the level of various resource inputs measured in physical terms.

[37] See Appendix Table B-44.

[38] See Appendix Table B-45.

This we have done, using 1966 data for 1,266 general and allied special hospitals.[39]

Form of the Production Function To Be Estimated

We have used the Cobb-Douglas form of the production function for our analysis:

$$Y = AL^aK^b$$

where Y is our measure of output; A is a constant; L and K are variables indicating the input of labour and capital, respectively (both measured in physical units); and a and b are the output elasticities with respect to a change in the quantity of labour and capital, respectively. If the estimated sum of these elasticities is less than one, there are decreasing returns to scale; if equal to one, there are constant returns to scale; and if the sum is greater than one, then there are increasing returns to scale.

Measures of Output

Our measure of adjusted output has been the sole measure of output used in our estimation of the production functions. At one stage, we had contemplated using measures of output other than adjusted output. However, an analysis of the relationships among 25 different measures of the quantity and quality of output indicated a high degree of interdependence.[40]

Measures of Inputs

Three sets of labour and capital input variables have been used to estimate production functions. In the first set, the quantity of labour employed was measured by the total number of paid hours of hospital personnel and the quantity of capital by rated bed capacity. In the second set, the quantity of labour employed was indicated by two variables -- the number of accumulated paid hours of graduate nursing personnel and the number of accumulated paid hours of other nursing personnel. The input

[39] Dominion Bureau of Statistics, Institutions Section, "Hospital Statistics, 1966", HS-1 and HS-2 Computer Tapes (Ottawa).

[40] See Appendix Tables B-1, B-33 and B-34.

of capital was measured by the number of beds set up. Finally, in the third set, capital was again measured by the number of beds set up; and labour, by the number of medical staff.

Statistical Results

With respect to all production functions estimated from various samples of hospitals, there has been a highly significant overall relationship between output and the chosen indicators of input.

The results concerning the nature of the production functions are consistent with those discussed in the previous section concerning the nature of the cost functions. (Again, the probable existence of multicollinearity precludes use of the estimated parameters as precise estimates of the relevant elasticities.) There appear to be increasing returns to scale; that is, a 10 per cent increase in resources inputs is able to accomplish an increase in output of more than 10 per cent. Again, these increasing returns are not sharply increasing returns.

With regard to the first set of input variables, $\bar{R}^2$ ranged from .468 to .992 in the 46 production functions estimated from samples of hospitals drawn by size, by ownership, and type of service, and by ownership and size.[41] With calculated F-values ranging up to 7.965, all but one of the overall estimated production functions was significant. The calculated sum of the output elasticities was greater than one in 30 of the 46 possible cases. Though these sums were usually not shown to be significantly greater than one, the predominance of calculated signs greater than one gives support to the contention that there are increasing returns to scale in the provision of hospital care.

Interestingly, of the 16 cases in which the sum of the output elasticities was less than one, it was significantly so in 3 cases; 2 of these were for chronic convalescent and rehabilitation hospitals.

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[41] In Appendix Table B-46, which will be supplied to the reader on request, we have presented our detailed results.

With regard to the second set of input variables, $\bar{R}^2$ ranged from .978 to .998 for production estimated for hospitals classified by province; from .644 to .989, for those by bed size; and, excluding six Department of Veterans Affairs hospitals, from .985 to .990 for hospitals classified by type of ownership.[42] For the first grouping of hospitals, the calculated sum of the three output elasticities was greater than one in every case, and usually significantly greater than one. For the second grouping, the sum of the output elasticities was greater than one in 10 of the 12 possible cases; it was not usually significantly greater than one, however. Finally, for the third grouping, the sum of the output elasticities was greater than one in 6 of 7 cases and was significantly greater than one in 3 of these cases. Again there would appear to be support for the contention that the provision of hospital care is subject to increasing returns to scale of output.

With regard to the third set of input variables, $\bar{R}^2$ ranged from .967 to .996 for the production functions for hospitals classified by province; from .650 to .988 for those classified by bed size; and from .970 to .999 for those classified by type of ownership.[43] For the first grouping of hospitals by province, the sum of the calculated output elasticities was greater than one in every case, and usually significantly greater than one; for the second grouping, it was greater than one in 9 of 11 cases and significantly greater than one in only 2 cases; and for the third grouping, the sum of the output elasticities was greater than one in 6 of 9 cases, and significantly greater than one in 3 of these cases. Again, though the evidence is not conclusive, it does offer strong support for the contention that there are increasing returns in the production of hospital services.

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[42] Similarly, Appendix Tables B-47, B-48, and B-49, respectively, which contain our detailed results, will be made available to the reader on request.

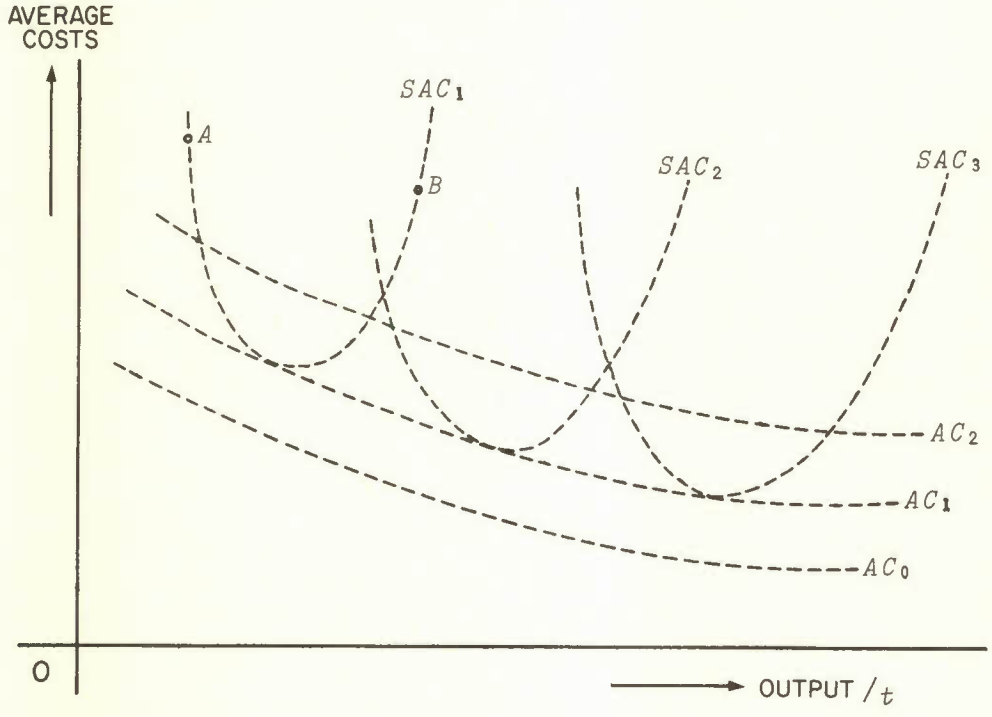
[43] In Appendix Tables B-50, B-51, and B-52, respectively, we have presented our detailed results. These will be made available to the reader on request.

Conclusions

There are a number of important conclusions that seem to flow from our analysis of hospital costs. The foremost of these would probably be that the average costs per unit of output appear to fall as output increases. The curve labeled AC_2 in Diagram 3-1 illustrates this result. We should emphasize however that our analysis does not indicate that the "average", average cost curve is as low as it might be; for example, a position such as that indicated by AC_0 in the diagram might be possible if hospital resources were more efficiently organized. Our analysis has merely indicated that a set of forces seems to bear systematically on the cost and output decisions of hospital administrators; we have not been able to test whether these forces are effective in minimizing costs for a given level of output.

Diagram 3-1

POSITION OF THE AVERAGE COST CURVE



Source: See text.

With regard to ways in which hospital costs might be substantially reduced, a detailed study of those hospitals exhibiting costs substantially higher or lower than those expected on the basis of our statistical analysis of costs in relation to composite output, capacity utilization and the existence of health care training programs would seem to be in order.[44] Some of these differences might be explained by special factors unearthed by a study of particular hospitals.[45] For example, a hospital exhibiting relatively high costs might be a newly constructed hospital operating at very low capacity, so low in fact that our capacity utilization variable was unable to wholly account for the effect on costs of the actual level of capacity use; or in contrast, an old one operating at full capacity (as at positions *A* and *B*, respectively, on SAC_3 in Diagram 3-1). Pressure to explain and, if possible, reduce costs could be exerted on hospitals with relatively high costs not readily accounted for by a study of the particular hospital.[46] Perhaps more important, those hospitals with lower costs than expected might be studied to determine if there were factors leading to low costs that might be systematically introduced into other hospitals.

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[44]Our statistical analysis could be improved by, among other things, finding some way to adjust the wage and salary component of costs for regional differences in wages and analysing the effect on costs of differences in the basic health status of the population served by different hospitals. Both of these matters were originally planned for the present project but were abandoned because of the limitations of data and time.

[45]Such a study would be greatly facilitated by the newly introduced "Quarterly Hospital Statistics Series" of the Institutions Section of the Dominion Bureau of Statistics.

[46]Obviously there are many factors other than the ones that we have analysed that affect costs. These might be examined qualitatively for a given hospital. Alternatively more of these might be included as explanatory variables in an analysis of costs such as our own. There would still remain, however, a number of factors where effect on costs would still have to be assessed in a qualitative way.

The economies of scale of output that appear to characterize the provision of particular kinds of hospital services would seem to indicate that there are substantial benefits to be derived from planning a regional system of hospitals. Such a system would involve hospitals specializing in providing intensive hospital care and others specializing in the provision of nursing care.[47]

With regard to the size and number of hospitals that should be constructed in a given region, the general existence of decreasing average costs of providing hospital care means that recourse must be taken to an evaluation of the costs imposed on physicians, patients, and the patient's family as the distance between home and hospital increases. In Diagram 3-2, we have attempted to illustrate the nature of this decision. On the one hand, average hospital costs are shown to decline as the level of output, and thereby the size of hospital, increases; on the other hand, as the number of persons served by a given hospital facility increases, the average cost of "travel", very broadly defined, increases. For a medium-sized centre of population, such costs might be represented by T_1 and for a sparsely populated community, by T_0. Combining direct hospital costs with these travel costs, we can hypothetically determine the "optimal" size of hospital facility as H_0 for the sparsely populated, and H_1 for the more densely populated community. The task of determining these "travel" costs will, of course, be a most difficult one.

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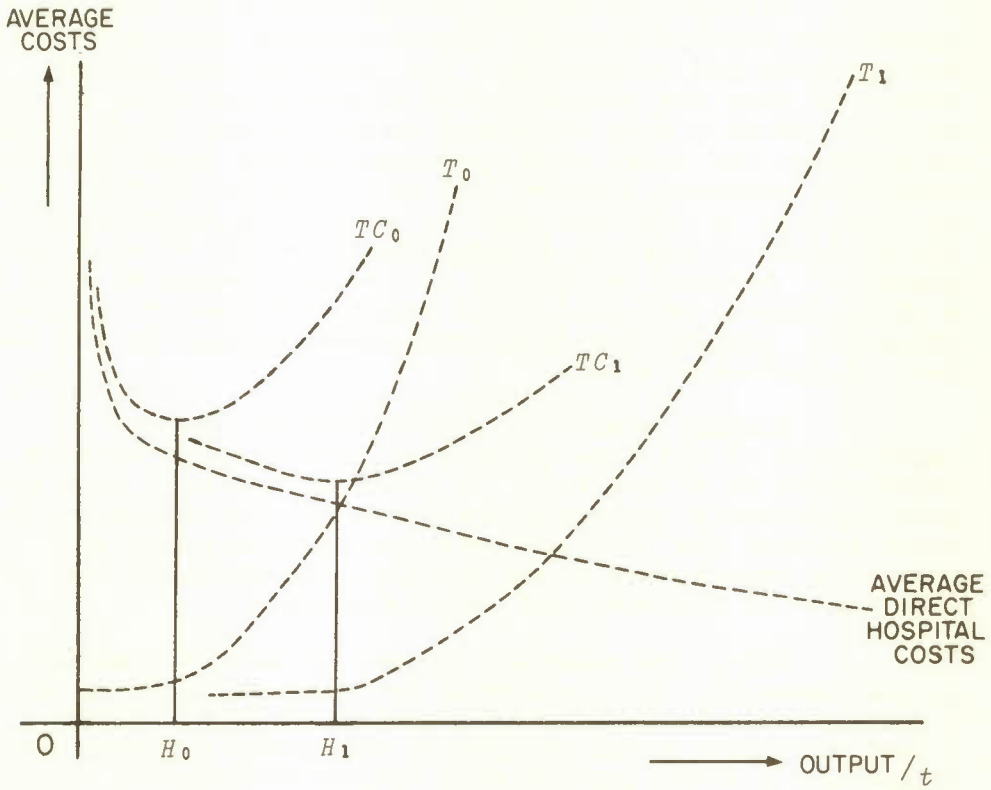
[47] The proportion of hospital patients that require "hotel" care only or, indeed, care that could be provided on an ambulatory basis appears to be substantial. D. L. Crombie and K. W. Cross report in *The Medical Practitioner*, vol. 259 (1959), p. 216, that at least 12.5 per cent and possibly as many as 43 per cent of patients admitted to "medical" beds required only hotel care; the absence of family and other psycho-social reasons were cited as prime reasons for hospitalization. Similarly, Drs. Forsyth and Logan report in *The Demand for Medical Care* (London: Oxford University Press, 1960) that one-quarter of male patients and two-fifths of female patients require hotel care only. Though these data relate to Britain, it is likely that data for Canada would indicate the same or even a greater proportion of patients requiring hotel care only.

Diagram 3-2

THE OPTIMAL SIZE OF HOSPITAL



Source: See text.

Our finding that costs per unit of output fall as the capacity utilization of a hospital increases yields the conclusion that methods of increasing the use of existing hospitals should be systematically explored before new hospitals are built. To the extent that existing hospital facilities are presently being used to capacity,[48] attention must be focused on ways of reducing the length of hospital stay required for different illnesses. Data on

[48] Data noted in Chapter 1 and presented in Appendix Tables A-57 and A-58 suggest that while hospitals on average have about 80 per cent of their beds occupied, there is a substantial degree of variation among different provinces and different types of hospitals.

Table A-1

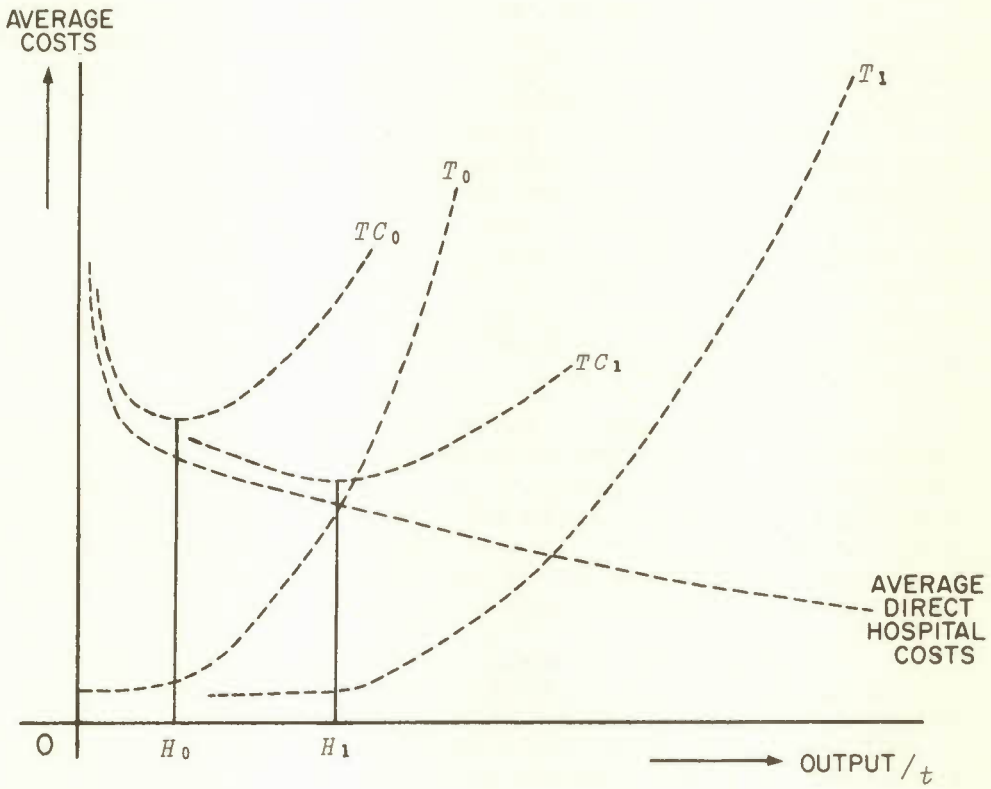
HISTORICAL SUMMARY OF NUMBER OF OPERATING PUBLIC GENERAL AND ALLIED SPECIAL HOSPITALS
CANADA, BY PROVINCE, 1953-67

Year	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
1953	857	41	7	47	33	116	189	73	150	103	88
1954	870	42	7	47	33	120	191	75	150	103	90
1955	897	43	8	47	34	122	198	79	152	105	97
1956	909	44	8	46	34	127	201	80	152	106	99
1957	924	47	9	47	36	134	206	76	153	107	97
1958	955	49	9	47	37	154	209	74	154	110	99
1959	982	49	9	47	37	169	214	74	158	112	101
1960	972	47	9	47	36	177	206	77	157	113	96
1961	946	41	9	47	39	146	211	78	154	116	99
1962	964	42	9	47	38	155	212	79	154	119	100
1963	976	43	9	47	39	157	212	80	153	127	99
1964	996	45	9	47	38	164	216	81	152	133	101
1965	1,011	46	9	47	38	169	218	81	152	133	108
1966	1,027	47	9	47	39	170	221	82	151	142	109
1967	1,036	47	9	47	40	177	224	82	151	142	108

Source: Dominion Bureau of Statistics, *Hospital Statistics, 1967*, Volume I - Hospital Beds (Ottawa: Queen's Printer, 1969), p. 53.

Diagram 3-2

THE OPTIMAL SIZE OF HOSPITAL



Source: See text.

Our finding that costs per unit of output fall as the capacity utilization of a hospital increases yields the conclusion that methods of increasing the use of existing hospitals should be systematically explored before new hospitals are built. To the extent that existing hospital facilities are presently being used to capacity,[48] attention must be focused on ways of reducing the length of hospital stay required for different illnesses. Data on

[48] Data noted in Chapter 1 and presented in Appendix Tables A-57 and A-58 suggest that while hospitals on average have about 80 per cent of their beds occupied, there is a substantial degree of variation among different provinces and different types of hospitals.

the average length of stay of patients in Canadian budget review general hospitals in 1965 indicate a range of stay of from 8.9 days in Alberta to 11.0 days in Newfoundland.[49]

Information on the average length of stay required for different major illnesses shows even more dramatic provincial variations. For example, the average length of stay for patients with diabetes mellitus in 1964 varied from 14.0 days in Prince Edward Island to 32.5 days in Alberta; for those with arteriosclerotic heart disease including coronary disease from 18.2 days in British Columbia to 35.1 days in Alberta; and for those with bronchopneumonia varied from 9.9 days in Prince Edward Island to 15.6 days in Quebec.[50] Similar variations in average length of stay for a given illness may well exist among hospitals of a given province. Reasons for these variations should be the subject of intensive study.

Another avenue of approach would involve an examination of the time pattern of care through various departments of a hospital. It might be the case that certain departments represent bottlenecks. For example, it could be that the 24-hour operation of laboratory and radiology departments would quicken substantially the time taken to diagnose and treat a patient.

Given the presence now of, or having created, excess capacity, the problem of bringing patients to the hospital could be tackled in a number of ways. First, travel subsidies might be used to encourage patients from relatively distant centres with either no hospital facilities or with facilities operating at full capacity. The more extensive use of ambulance services might also be considered. And, indeed, there would appear to be scope even now for action in this regard, since average capacity utilization varied from 69.6 per cent in Newfoundland to 83.8 in British Columbia in 1967.

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[49] Department of National Health and Welfare, *Annual Report: Hospital Insurance and Diagnostic Services Act, 1965* (Ottawa: Department of National Health and Welfare), Table A-4, p. 72.

[50] Dominion Bureau of Statistics, *Hospital Morbidity, 1964* (Ottawa: Queen's Printer, 1967), Table 5, pp. 90-119.

APPENDIX A

SUPPLEMENTARY DATA ON HOSPITAL USE, COSTS AND EFFICIENCY

Table A-1

HISTORICAL SUMMARY OF NUMBER OF OPERATING PUBLIC GENERAL AND ALLIED SPECIAL HOSPITALS CANADA, BY PROVINCE, 1953-67

Year	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
1953	857	41	7	47	33	116	189	73	150	103	88
1954	870	42	7	47	33	120	191	75	150	103	90
1955	897	43	8	47	34	122	198	79	152	105	97
1956	909	44	8	46	34	127	201	80	152	106	99
1957	924	47	9	47	36	134	206	76	153	107	97
1958	955	49	9	47	37	154	209	74	154	110	99
1959	982	49	9	47	37	169	214	74	158	112	101
1960	972	47	9	47	36	177	206	77	157	113	96
1961	946	41	9	47	39	146	211	78	154	116	99
1962	964	42	9	47	38	155	212	79	154	119	100
1963	976	43	9	47	39	157	212	80	153	127	99
1964	996	45	9	47	38	164	216	81	152	133	101
1965	1,011	46	9	47	38	169	218	81	152	133	108
1966	1,027	47	9	47	39	170	221	82	151	142	109
1967	1,036	47	9	47	40	177	224	82	151	142	108

Source: Dominion Bureau of Statistics, *Hospital Statistics, 1967*, Volume I - Hospital Beds (Ottawa: Queen's Printer, 1969), p. 53.

Table A-2

HISTORICAL SUMMARY OF THE RATED BED* CAPACITY OF OPERATING PUBLIC GENERAL AND ALLIED SPECIAL HOSPITALS CANADA, BY PROVINCE, 1953-67

Year	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
1953	76,224	1,825	635	3,393	2,229	20,147	23,366	4,858	5,085	6,749	7,313
1954	79,281	1,849	628	3,516	2,251	20,948	24,966	4,876	5,171	6,936	7,431
1955	84,761	1,883	641	3,698	2,374	21,844	27,373	4,877	5,797	7,497	8,047
1956	86,433	1,868	658	3,542	2,374	22,119	28,679	5,020	5,852	7,575	8,082
1957	90,154	1,792	640	3,371	2,492	23,827	29,976	5,050	6,541	7,965	7,836
1958	94,665	1,916	690	3,321	2,655	27,843	30,018	4,811	6,593	8,050	8,100
1959	100,059	1,960	690	3,490	3,053	29,518	31,794	4,880	6,804	8,237	9,021
1960	101,352	1,935	689	3,390	3,101	30,786	32,275	5,161	6,891	8,334	8,579
1961	100,506	1,730	715	3,641	3,107	26,417	34,505	5,497	6,855	8,776	9,124
1962	106,718	1,864	724	3,864	3,371	29,315	36,019	5,783	6,907	9,376	9,211
1963	111,165	2,232	717	3,914	3,484	30,125	38,141	5,893	7,071	9,857	9,430
1964	114,545	2,544	722	4,042	3,597	30,074	39,886	5,859	7,296	10,716	9,506
1965	117,021	2,649	722	4,283	3,600	30,851	40,506	5,989	7,229	10,842	10,067
1966	122,315	3,089	720	4,366	3,645	31,913	42,857	5,947	7,222	11,784	10,502
1967	126,182	3,122	738	4,449	3,735	32,976	44,192	6,069	7,334	12,292	11,020

* Beds and cribs.

Source: Dominion Bureau of Statistics, *Hospital Statistics, 1967*, Volume I - Hospital Beds (Ottawa: Queen's Printer, 1969), p. 53.

Table A-3

HISTORICAL SUMMARY OF ADMISSIONS PER BED IN OPERATING PUBLIC GENERAL AND ALLIED SPECIAL HOSPITALS CANADA, BY PROVINCE, 1953-67

Year	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
1953	26.3	17.4	21.1	22.9	32.6	21.6	27.5	26.6	34.3	29.7	28.5
1954	25.4	17.2	21.3	25.4	34.3	19.5	26.2	25.6	34.0	30.7	27.0
1955	25.3	19.7	21.5	24.8	32.4	20.8	26.2	25.1	31.4	29.9	27.6
1956	25.8	20.0	21.2	27.0	32.9	21.6	26.1	24.6	30.9	32.0	28.5
1957	26.3	22.7	21.5	28.2	33.4	21.2	26.9	29.0	31.7	30.8	29.4
1958	25.8	24.9	22.5	28.7	32.0	19.6	27.3	29.8	28.6	31.6	29.0
1959	25.6	23.0	21.9	30.2	31.3	19.9	26.5	30.1	29.7	29.9	29.3
1960	26.7	28.4	21.7	31.4	32.8	22.5	26.4	29.5	29.2	30.4	29.8
1961	26.5	28.8	22.7	28.9	32.9	23.3	26.0	27.9	28.6	28.8	28.8
1962	26.1	28.8	23.4	27.5	29.8	23.9	25.4	26.9	28.0	27.6	30.1
1963	25.7	24.8	23.8	27.4	29.4	23.3	24.9	27.3	29.5	27.1	30.4
1964	25.7	22.4	24.1	27.2	29.0	24.3	24.6	27.7	28.7	26.0	30.8
1965	25.8	24.5	24.5	25.9	29.2	24.4	24.6	26.8	29.0	26.0	31.2
1966	25.4	23.0	25.2	26.1	29.0	23.5	24.5	27.7	29.0	25.2	30.1
1967	24.6	22.5	25.1	25.7	28.1	22.5	23.8	27.1	27.8	24.3	29.7

Source: Dominion Bureau of Statistics, *Hospital Statistics, 1967*, Volume I - Hospital Beds (Ottawa: Queen's Printer, 1969), p. 54.

Table A-4

HISTORICAL SUMMARY OF DEATHS PER 1,000 SEPARATIONS IN OPERATING PUBLIC GENERAL AND ALLIED SPECIAL HOSPITALS CANADA, BY PROVINCE, 1953-67

Year	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
1953	25.5	18.9	24.5	25.3	21.1	25.3	29.6	26.7	20.5	18.1	26.3
1954	24.7	20.3	25.5	22.4	18.8	25.0	28.3	25.8	19.6	17.5	27.3
1955	24.8	20.5	24.2	24.1	20.2	23.9	27.9	26.1	20.3	18.6	27.8
1956	24.4	21.0	23.3	23.6	20.1	23.0	27.9	27.9	21.2	16.2	27.2
1957	24.6	18.9	26.9	24.4	20.1	23.6	28.3	26.1	20.3	16.5	27.3
1958	23.9	17.3	26.1	24.4	19.3	23.1	27.3	25.3	20.4	15.9	26.9
1959	24.9	18.9	26.8	26.1	19.5	22.8	28.8	25.8	21.8	19.3	26.4
1960	25.4	15.6	26.7	25.9	21.2	24.2	29.5	26.4	20.9	19.7	26.4
1961	24.3	16.7	27.2	26.4	21.6	20.8	28.4	26.8	21.6	19.5	25.3
1962	24.6	17.0	29.4	26.6	22.6	20.1	29.2	27.8	21.6	20.1	25.6
1963	24.9	18.6	26.6	28.3	23.2	20.9	29.7	27.7	21.5	19.8	25.2
1964	24.5	16.4	28.4	27.2	23.1	21.1	28.5	28.4	21.2	19.5	25.8
1965	25.1	17.7	28.9	27.1	23.3	21.7	30.1	27.8	21.5	20.1	24.8
1966	25.6	17.3	30.6	27.4	24.3	22.5	30.1	28.9	21.5	20.3	25.2
1967	25.9	17.1	30.2	29.1	24.9	24.0	30.4	27.2	22.3	19.1	24.9

Source: Dominion Bureau of Statistics, *Hospital Statistics, 1967*, Volume I - Hospital Beds (Ottawa: Queen's Printer, 1969), p. 54.

Table A-5

HISTORICAL SUMMARY OF MEAN STAY OF SEPARATIONS FROM OPERATING PUBLIC GENERAL AND ALLIED SPECIAL HOSPITALS CANADA, BY PROVINCE, 1953-67

Year	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
1953	10.9	15.3	9.8	9.4	10.7	12.5	11.0	10.5	10.2	8.8	10.1
1954	11.1	15.4	9.6	9.4	8.6	13.4	10.9	10.3	10.1	9.0	11.3
1955	10.9	13.2	9.5	9.4	8.6	10.9	10.9	10.9	10.1	8.9	11.0
1956	11.0	14.6	9.5	9.3	8.7	12.6	11.3	10.3	10.4	8.8	10.7
1957	10.7	12.5	10.1	9.3	8.4	12.3	11.0	9.1	10.0	8.8	10.5
1958	10.9	11.9	10.0	9.2	8.3	13.2	10.9	9.5	10.7	8.8	10.6
1959	11.2	15.2	11.9	9.4	7.6	15.3	11.3	9.9	10.1	9.7	9.9
1960	11.1	11.4	9.3	9.6	9.8	12.0	11.9	10.2	10.4	9.6	10.2
1961	11.1	14.9	10.4	9.8	9.9	11.6	11.8	11.1	10.4	9.9	10.1
1962	11.3	..	10.3	10.1	10.0	11.8	12.3	10.4	10.4	10.2	10.2
1963	11.5	..	10.4	10.3	10.3	12.7	12.2	10.1	10.1	10.1	10.0
1964	11.5	12.5	9.8	10.6	10.3	12.0	12.3	10.8	10.3	10.7	9.8
1965	11.6	11.7	10.3	10.6	10.3	11.9	12.6	11.0	10.2	10.9	9.9
1966	11.7	11.1	10.2	10.6	10.6	12.4	12.6	10.9	10.2	10.9	9.7
1967	11.5	11.1	10.4	11.0	10.6	12.1	12.5	10.8	10.4	10.7	9.8

Source: Dominion Bureau of Statistics, *Hospital Statistics, 1967*, Volume I - Hospital Beds (Ottawa: Queen's Printer, 1969), p. 55.

Table A-6

HISTORICAL SUMMARY OF REVENUE FUND EXPENDITURE*
OF ALL OPERATING PUBLIC HOSPITALS, BY TYPE OF HOSPITAL
CANADA, 1954-67

Year	All Public Hospitals	General and Allied Special				Mental	Tuberculosis
		Total	General	Chronic, Convalescent and Rehabilitation	Other Special		
				(Thousands of dollars)			
1954	389,405	293,799	269,991	12,593	11,215	64,086	31,520
1955	439,602	337,065	312,456	15,032	9,577	69,892	32,645
1956	486,894	373,950	348,679	16,172	9,099	79,449	33,495
1957	541,102	420,956	391,380	20,291	9,285	86,796	33,350
1958	613,147	483,883	443,660	30,792	9,431	97,709	31,555
1959	681,760	541,730	498,324	24,619	18,787	109,335	30,695
1960	776,589	622,413	576,138	25,597	20,678	121,216	32,960
1961	865,536	699,137	650,200	34,865	14,072	132,936	33,463
1962	959,662	781,766	718,442	42,819	20,505	144,781	33,115
1963	1,078,276	884,392	808,649	52,709	23,034	163,223	30,661
1964	1,195,900	987,931	906,864	61,272	19,795	181,492	26,477
1965	1,344,118	1,113,200	1,017,655	73,526	22,019	204,611	26,307
1966	1,546,399	1,281,787	1,170,390	85,502	25,895	238,382	26,230
1967	1,782,268	1,480,410	1,349,278	99,167	31,965	274,942	26,916

* Net expenditure for 1954 and gross expenditures for 1955-67.

Source: Dominion Bureau of Statistics, *Hospital Statistics, 1967*, Volume VI - Hospital Expenditures (Ottawa: Queen's Printer, 1969), p. 40.

Table A-7

HISTORICAL SUMMARY OF PERCENTAGE DISTRIBUTION OF REVENUE FUND EXPENDITURE OF ALL OPERATING PUBLIC HOSPITALS, BY TYPE OF HOSPITAL CANADA, 1954-67

Year	All Public Hospitals	General and Allied Special				Mental	Tuberculosis
		Total	General	Chronic, Convalescent and Rehabilitation	Other Special		
				(Per cent)			
1954	100.0	74.1	69.2	2.9	2.1	17.4	8.5
1955	100.0	75.9	71.2	3.2	1.5	16.4	7.7
1956	100.0	76.2	71.7	3.1	1.4	16.7	7.1
1957	100.0	77.3	72.7	3.1	1.5	16.4	6.3
1958	100.0	78.1	73.2	3.3	1.6	16.6	5.3
1959	100.0	78.5	73.5	3.1	1.9	16.8	4.7
1960	100.0	79.7	74.7	3.3	1.7	15.9	4.4
1961	100.0	80.3	75.3	3.5	1.5	15.7	4.0
1962	100.0	81.4	74.8	4.5	2.1	15.1	3.5
1963	100.0	82.1	75.1	4.9	2.1	15.1	2.8
1964	100.0	82.6	75.8	5.1	1.7	15.2	2.2
1965	100.0	82.8	75.7	5.5	1.6	15.2	2.0
1966	100.0	82.9	75.7	5.5	1.7	15.4	1.7
1967	100.0	83.1	75.7	5.6	1.8	15.4	1.5

Source: Dominion Bureau of Statistics, *Hospital Statistics, 1967*, Volume VI - Hospital Expenditures (Ottawa: Queen's Printer, 1969), p. 41.

Table A-8

HISTORICAL SUMMARY OF REVENUE FUND EXPENDITURE* OF OPERATING PUBLIC GENERAL AND ALLIED SPECIAL HOSPITALS CANADA, BY PROVINCE, 1954-67

Year	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
						(Thousands of dollars)					
1954	293,799	4,859	1,275	8,739	8,282	69,553	105,560	14,177	20,170	25,395	35,789
1955	337,065	7,023	1,514	11,456	9,835	78,417	119,500	15,635	24,099	29,789	39,797
1956	373,950	6,808	1,858	12,134	10,867	89,786	134,369	17,275	27,240	32,063	41,550
1957	420,956	10,313	1,800	13,299	12,007	99,966	151,154	19,149	32,869	35,492	44,907
1958	483,883	9,722	1,994	15,148	13,329	124,855	168,679	23,947	36,318	41,277	48,614
1959	541,730	9,965	2,286	18,489	17,303	134,154	196,627	28,037	39,091	43,318	52,460
1960	622,413	11,310	2,754	22,042	20,843	154,978	230,139	31,701	41,954	47,229	59,463
1961	699,137	11,628	3,239	24,882	23,964	180,589	260,398	36,039	42,053	51,288	64,334
1962	781,766	12,388	3,344	27,355	26,068	206,683	292,644	38,827	45,775	58,373	69,085
1963	884,392	14,294	3,592	30,512	28,998	250,355	325,181	42,900	48,203	64,892	74,191
1964	987,931	17,903	3,983	34,260	31,077	286,369	362,726	45,379	52,925	72,524	79,501
1965	1,113,200	21,172	4,302	37,603	32,907	339,310	401,412	49,455	57,502	80,356	87,889
1966	1,281,787	24,139	4,892	41,396	35,729	402,149	457,041	55,851	62,381	94,468	102,337
1967	1,480,410	30,290	5,514	50,396	40,535	444,778	542,898	63,123	67,741	113,912	119,788

* Net expenditure for 1954 and gross expenditures for 1955-67.

Source: Dominion Bureau of Statistics, *Hospital Statistics, 1967*, Volume VI - Hospital Expenditures (Ottawa: Queen's Printer, 1969), p. 42.

Table A-9

DISTRIBUTION OF BEDS SET UP BY CATEGORY OF SERVICE
IN PUBLIC GENERAL AND ALLIED SPECIAL HOSPITALS
CANADA, 1954 TO 1966

	1954	1957	1960	1963	1966
Total Rated Beds	90,557	104,694	98,669	112,353	122,555
Medical and surgical	48.5	48.4	56.1	56.5	57.0
Obstetrical	11.3	10.9	12.4	11.8	10.6
Paediatric	8.7	9.5	12.2	13.6	13.5
Psychiatric*	0.9	1.1	1.4	1.6	1.8
Tuberculosis*	1.5	0.8	0.3	0.5	0.1
Isolation	1.3	1.6	1.7	1.3	1.1
Chronic-Convalescent	8.5	9.9	8.3	11.7	13.3
Orthopaedic and other	19.4	17.8	7.5	3.0	2.6

* Does not include psychiatric/tubercular institution bed counts.

Source: Dominion Bureau of Statistics, *Hospital Statistics*, Volume I - General Information, *1949* and *1957*; Volume I - Hospital Beds, *1960*, *1963* and *1966* (Ottawa: Queen's Printer).

Table A-10

TOTAL PERSONNEL, PART-AND FULL-TIME,
EMPLOYED BY REPORTING PUBLIC GENERAL AND ALLIED SPECIAL HOSPITALS
CANADA, BY PROVINCE, 1954 TO 1966

	1954	1957	1960	1963	1966
Canada	102,495	133,287	172,880	208,421	255,523
Newfoundland	1,714	2,254	2,957	3,336	5,284
Prince Edward Island	572	633	918	1,010	1,167
Nova Scotia	4,049	4,840	6,792	7,767	9,087
New Brunswick	3,252	3,888	5,971	7,120	7,705
Quebec	20,705	32,456	42,528	58,315	76,249
Ontario	39,560	49,944	65,786	77,384	92,423
Manitoba	5,401	6,764	9,690	11,325	12,839
Saskatchewan	7,185	9,250	10,602	11,384	12,674
Alberta	8,474	10,509	13,097	15,226	19,384
British Columbia	11,394	12,488	14,425	15,333	18,462

Note: Totals may not add due to exclusion of Northwest and Yukon Territories.

Source: Dominion Bureau of Statistics, *Hospital Statistics*, Volume I - General Information, *1954* and *1957*; Volume III - Hospital Personnel, *1960*, *1963* and *1966* (Ottawa: Queen's Printer).

Table A-11

AVERAGE NUMBER OF HOURS WORKED PER FULL- OR PART-TIME STAFF
IN REPORTING PUBLIC GENERAL AND ALLIED SPECIAL HOSPITALS
CANADA, BY PROVINCE, 1954 TO 1966

	1954	1957	1960	1963	1966
Canada	2,039	1,916	1,865	1,932	1,857
Newfoundland	1,812	2,173	1,617	1,678	1,597
Prince Edward Island	2,573	2,273	2,013	2,097	1,942
Nova Scotia	2,208	2,259	1,991	1,986	1,904
New Brunswick	2,355	2,274	1,978	2,009	1,998
Quebec	1,780	1,682	1,737	1,929	1,837
Ontario	2,137	2,019	1,843	1,891	1,828
Manitoba	2,176	1,984	1,944	1,923	1,874
Saskatchewan	2,180	2,023	2,052	1,991	1,951
Alberta	1,866	1,655	1,984	1,994	1,866
British Columbia	2,017	1,913	1,975	2,034	1,995

Source: Calculated from other tables.

Table A-12

GROSS WAGES AND SALARIES EXPENSE
INCURRED BY REPORTING PUBLIC GENERAL AND ALLIED SPECIAL HOSPITALS
CANADA, BY PROVINCE, 1954 TO 1966

	1954	1957	1960	1963	1966
			(Thousands of dollars)		
Canada	156,835	230,788	376,897	556,363	836,060
Newfoundland	611	2,383	5,049	6,765	12,444
Prince Edward Island	603	813	1,334	1,953	2,906
Nova Scotia	3,601	6,510	12,691	16,985	23,888
New Brunswick	4,216	5,771	11,507	16,650	20,800
Quebec	28,373	49,116	79,037	155,455	276,040
Ontario	61,830	89,100	151,020	211,385	297,208
Manitoba	6,909	10,091	20,528	27,690	36,382
Saskatchewan	12,841	18,828	25,385	29,592	38,749
Alberta	13,886	19,585	29,978	40,047	58,472
British Columbia	23,964	28,592	40,367	49,209	68,484

Note: Totals may not add due to rounding and exclusion of Northwest and Yukon Territories.

Source: Dominion Bureau of Statistics, *Hospital Statistics*, Volume II - Financial Information, *1954* and *1957*; Volume VI - Hospital Expenditures, *1960*, *1963* and *1966* (Ottawa: Queen's Printer).

Table A-13

PLANT FUND ASSETS OF REPORTING PUBLIC GENERAL AND ALLIED SPECIAL HOSPITALS
CANADA, BY PROVINCE, 1946 TO 1966

	1946	1951	1956	1961	1966
	(Thousands of current dollars)				
Canada	231,001	371,554	803,735	1,263,416	1,990,326
Newfoundland	n.a.	n.a.	2,953	21,376	62,991
Prince Edward Island	971	2,493	4,036	7,014	8,375
Nova Scotia	6,933	8,675	20,605	33,568	65,566
New Brunswick	8,557	10,784	29,059	42,205	49,973
Quebec	90,960	123,769	255,740	388,885	653,617
Ontario	79,985	140,632	304,497	462,028	668,244
Manitoba	8,336	13,721	38,086	56,281	77,397
Saskatchewan	8,640	19,256	47,933	60,052	84,227
Alberta	11,284	25,172	54,375	97,529	177,067
British Columbia	15,346	27,133	46,468	94,044	140,038

Note: Some large variations, especially in 1946 and 1951, are due to changes in the percentage of hospitals reporting asset figures. However, in later years the proportion reporting was high and stable.

Totals may not add due to rounding and exclusion of Northwest and Yukon Territories.

Source: Dominion Bureau of Statistics, *Annual Report on Hospitals, 1946* and *1951*; *Hospital Statistics*, Volume II - Financial Information, *1956*; Volume IV - Balance Sheets, *1961* and *1966* (Ottawa: Queen's Printer).

Table A-14

AVERAGE RATED BED CAPACITY
PER REPORTING PUBLIC GENERAL AND ALLIED SPECIAL HOSPITAL
CANADA, BY PROVINCE, 1946 TO 1966

	1946	1951	1956	1961	1966
Canada	92.3	88.2	97.8	106.2	119.1
Newfoundland	n.a.	n.a.	42.1	42.1	65.7
Prince Edward Island	85.3	100.1	87.5	79.4	80.0
Nova Scotia	81.5	72.1	73.7	77.4	92.8
New Brunswick	102.6	90.4	71.9	79.6	93.4
Quebec	178.0	186.4	185.3	180.9	193.6
Ontario	109.8	123.7	147.5	163.6	198.4
Manitoba	94.7	83.6	66.4	70.4	84.7
Saskatchewan	48.5	36.6	38.7	44.5	54.4
Alberta	67.2	54.6	71.8	75.6	90.0
British Columbia	74.7	84.4	92.9	102.2	105.5

Source: Dominion Bureau of Statistics, *Hospital Statistics*, Volume I - Hospital Beds, *1960* and *1966* (Ottawa: Queen's Printer).

Table A-15

AVERAGE NUMBER OF HOURS WORKED
PER REPORTING PUBLIC GENERAL AND ALLIED SPECIAL HOSPITAL
CANADA, BY PROVINCE, 1954 TO 1966

	1954	1957	1960	1963	1966
			(Thousands of hours)		
Canada	273.1	416.1	372.1	403.1	464.8
Newfoundland	345.0	132.3	597.6	136.5	179.5
Prince Edward Island	210.2	205.5	205.3	235.3	251.7
Nova Scotia	218.0	260.2	300.5	350.6	368.0
New Brunswick	232.0	260.0	347.4	376.5	394.7
Quebec	454.9	478.9	610.3	755.0	823.7
Ontario	464.5	496.8	585.7	696.9	764.3
Manitoba	158.8	183.7	247.8	275.6	293.4
Saskatchewan	105.1	124.7	141.2	149.1	163.7
Alberta	161.3	183.0	232.0	255.0	254.7
British Columbia	252.5	254.1	290.6	315.0	337.9

Source: Calculated from other tables.

Table A-16

AVERAGE NUMBER OF X-RAY MACHINES (DIAGNOSTIC AND THERAPEUTIC) AND ATTACHMENTS PER REPORTING PUBLIC GENERAL AND ALLIED SPECIAL HOSPITAL CANADA, BY PROVINCE, 1954 TO 1966

	1954	1957	1960	1963	1966
Canada	2.30	2.59	3.05	4.73	4.96
Newfoundland	1.33	1.16	1.54	2.36	2.46
Prince Edward Island	1.86	2.13	2.00	2.50	2.75
Nova Scotia	2.22	2.49	2.94	3.56	3.46
New Brunswick	2.67	2.71	3.11	3.66	3.51
Quebec	2.93	3.54	4.04	5.39	5.16
Ontario	3.36	3.57	4.51	5.58	5.89
Manitoba	1.62	2.00	1.90	2.66	2.71
Saskatchewan	1.44	1.75	1.95	1.95	1.93
Alberta	1.83	1.94	2.27	2.44	2.45
British Columbia	2.34	2.34	2.95	3.65	3.51

Note: Attachments include photofluorographic and fluoroscopic devices.

Source: Dominion Bureau of Statistics, *Hospital Statistics*, Volume I - General Information, *1954* and *1957*; Volume II - Hospital Services, *1960*, *1963* and *1966* (Ottawa: Queen's Printer).

Table A-17

AVERAGE TOTAL REVENUE FUND EXPENDITURE
PER REPORTING PUBLIC GENERAL AND ALLIED SPECIAL HOSPITAL
CANADA, BY PROVINCE, 1946 TO 1966

	1946	1951	1956	1961	1966
			(Thousands of dollars)		
Canada	164.7	267.3	424.1	789.5	1,295.0
Newfoundland	--	--	--	387.4	660.3
Prince Edward Island	117.6	158.0	213.5	376.8	543.5
Nova Scotia	148.6	162.1	259.8	529.4	880.7
New Brunswick	140.9	181.3	297.4	639.0	941.7
Quebec	310.4	478.3	710.9	1,344.4	2,371.5
Ontario	234.2	407.1	639.7	1,351.0	2,200.5
Manitoba	123.4	141.2	230.9	467.3	700.9
Saskatchewan	84.8	116.3	180.0	286.6	418.0
Alberta	83.1	158.9	304.2	450.0	665.2
British Columbia	142.3	338.0	424.0	723.6	1,012.3

Note: "Revenue fund expense" is the cost, on an accrual basis, of operating and maintaining the hospital during the year, regardless of the amount of disbursements made during the year. The basic data used to calculate the average values for 1946 and 1951 are not strictly comparable to those for 1956, 1961 and 1966.

Source: Dominion Bureau of Statistics, *Hospital Statistics*, Volume I - General Information, *1946* and *1951*; Volume II - Financial Information, *1956*; Volume VI - Hospital Expenditures, *1961* and *1966* (Ottawa: Queen's Printer).

Table A-18

AVERAGE MEDICAL, SURGICAL, X-RAY SUPPLIES AND DRUGS EXPENSE PER REPORTING PUBLIC GENERAL AND ALLIED SPECIAL HOSPITAL CANADA, BY PROVINCE, 1946 TO 1966

	1946	1951	1956	1961	1966
			(Thousands of dollars)		
Canada	17.0	32.3	34.5	59.2	87.7
Newfoundland	--	--	--	36.1	57.7
Prince Edward Island	16.3	22.0	21.2	28.6	38.4
Nova Scotia	13.2	20.9	23.1	40.3	59.4
New Brunswick	17.4	27.0	30.7	49.3	66.3
Quebec	30.9	49.1	67.4	106.2	160.6
Ontario	30.0	52.6	49.1	99.0	146.0
Manitoba	41.4	18.9	22.5	48.8	51.7
Saskatchewan	21.4	14.6	21.5	26.8	35.9
Alberta	10.5	21.5	33.7	33.1	40.4
British Columbia	13.4	32.3	43.4	51.1	75.8

Note: Canada data include Northwest and Yukon Territories. The basic data used to calculate the average values for 1946 and 1951 are not strictly comparable to those for 1956, 1961 and 1966.

Source: Dominion Bureau of Statistics, *Annual Report of Hospitals, 1946* and *1951*; *Hospital Statistics*, Volume II - Financial Information, *1956*; Volume VI - Hospital Expenditures, *1961* and *1966* (Ottawa: Queen's Printer).

Table A-19

AVERAGE VALUE OF PLANT FUND ASSETS
PER REPORTING PUBLIC GENERAL AND ALLIED SPECIAL HOSPITAL
CANADA, BY PROVINCE, 1946 TO 1966

	1946	1951	1956	1961	1966
			(Thousands of dollars)		
Canada	469.6	552.1	1,056.1	1,504.0	2,247.0
Newfoundland	n.a.	n.a.	1,476.5	855.0	2,099.7
Prince Edward Island	971.0	623.3	672.6	876.7	2,791.6
Nova Scotia	283.3	309.8	720.1	762.9	1,425.3
New Brunswick	570.4	399.4	1,037.8	1,172.4	1,315.0
Quebec	1,263.3	1,406.5	2,507.2	3,381.6	4,736.3
Ontario	663.8	817.6	1,530.0	2,462.9	3,324.5
Manitoba	225.2	298.3	601.3	730.7	980.0
Saskatchewan	130.2	134.7	330.5	417.0	591.8
Alberta	173.0	276.6	578.4	870.8	1,253.9
British Columbia	220.8	366.7	527.5	1,044.9	1,439.2

Note: The basic data used to calculate the average values for 1946 and 1951 are not strictly comparable to those for 1956, 1961 and 1966.

Source: Dominion Bureau of Statistics, *Hospital Statistics*, Volume I - General Information, *1946* and *1951*; Volume II - Financial Information, *1956*; Volume IV - Balance Sheets, *1961* to *1966* (Ottawa: Queen's Printer).

Table A-20

FULL-TIME AS PERCENTAGE OF TOTAL PERSONNEL
IN REPORTING PUBLIC GENERAL AND ALLIED SPECIAL HOSPITALS
CANADA, BY PROVINCE, 1954 TO 1966

	1954	1957	1960	1963	1966
Canada	93.1	97.3	90.8	90.2	88.6
Newfoundland	96.8	96.4	95.3	96.9	95.8
Prince Edward Island	97.0	96.8	93 5	93.3	93.1
Nova Scotia	93.8	95.8	93.7	93.2	88.5
New Brunswick	96.9	94.6	91.9	94.5	92.6
Quebec	93.0	96.1	95.1	95.3	91.3
Ontario	92.1	91.4	89.0	86.9	86.2
Manitoba	91.7	90.4	86.8	86.3	82.8
Saskatchewan	94.2	93.4	94.0	91.7	89.1
Alberta	97.5	95.1	93.3	92.2	89.4
British Columbia	91.6	88.9	88.7	89.2	87.5

Source: Dominion Bureau of Statistics, *Hospital Statistics*, Volume I - General Information, *1954* and *1957*; Volume III - Hospital Personnel, *1960*, *1963* and *1966* (Ottawa: Queen's Printer).

Table A-21

HISTORICAL SUMMARY OF PERCENTAGE OF LIVE BIRTHS OCCURRING IN HOSPITAL
CANADA, BY PROVINCE,* 1946-67

Year	Percentage of Total Live Births									
	Canada	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
1946	67.6	66.0	74.5	53.6	36.0	84.7	87.1	86.7	93.1	95.0
1947	71.0	72.7	78.5	58.5	39.3	86.9	88.1	89.9	94.4	95.6
1948	72.3	76.1	80.2	63.6	41.2	88.4	89.2	91.6	94.8	96.1
1949	74.3	81.2	82.2	66.4	44.4	89.2	89.9	93.9	95.6	96.7
1950	76.0	84.3	84.9	67.8	47.8	90.4	91.1	94.6	95.8	96.9
1951	79.1	88.3	87.2	70.7	53.0	93.1	93.1	95.2	93.6	97.3
1952	81.4	87.1	88.8	74.0	56.7	94.6	93.7	96.4	96.4	97.5
1953	83.4	91.9	90.4	77.4	60.3	95.7	94.7	96.4	93.9	97.6
1954	84.6	93.5	91.9	79.9	62.4	96.1	95.8	97.4	94.6	97.9
1955	86.5	93.6	93.3	83.4	66.6	96.7	95.6	97.7	95.0	98.1
1956	88.4	95.2	93.9	84.7	71.2	97.3	95.8	97.6	96.6	98.3
1957	90.2	96.7	95.1	86.8	75.6	97.9	96.4	98.3	97.5	98.5
1958	91.7	99.0	96.2	88.5	79.3	98.0	96.8	98.5	97.7	98.5
1959	93.1	99.2	98.0	93.5	82.3	98.6	97.4	98.5	98.0	98.6
1960	94.6	99.4	98.6	97.7	85.2	99.0	98.0	99.0	98.5	98.8
1961	96.9	99.3	98.9	99.0	92.3	99.3	98.2	98.8	98.6	98.9
1962	97.8	99.6	99.2	99.4	95.0	99.4	98.5	98.8	98.7	98.9
1963	98.3	99.8	99.3	99.4	96.5	99.6	98.2	99.1	98.9	99.1
1964	98.7	99.5	99.4	99.7	97.6	99.6	98.7	98.9	99.0	99.0
1965	99.0	99.9	99.4	99.7	98.4	99.6	98.8	99.3	99.0	99.2
1966	99.2	99.8	99.6	99.8	98.8	99.7	98.9	99.3	99.0	99.2
1967	99.4	99.9	99.6	99.8	99.2	99.7	99.2	99.2	99.3	99.3

* Data for Newfoundland not available.

Source: Dominion Bureau of Statistics, *Vital Statistics, 1967* (Ottawa: Queen's Printer, 1969), p. 72.

Table A-22

INFANT MORTALITY IN CANADA, BY PROVINCE, 1946 TO 1966

(Deaths per 1,000 live births)

	1946	1951	1956	1961	1966
Canada	47.8	38.5	31.9	27.2	23.1
Newfoundland		54.3	43.3	37.7	28.0
Prince Edward Island	34.3	33.8	39.5	32.8	25.9
Nova Scotia	46.0	34.6	29.0	27.8	25.2
New Brunswick	65.4	52.4	39.6	26.2	24.1
Quebec	54.9	48.2	40.8	31.5	25.3
Ontario	37.6	30.9	25.2	23.0	20.2
Manitoba	47.1	33.2	30.8	25.2	21.3
Saskatchewan	46.6	30.7	28.3	25.8	24.2
Alberta	42.8	32.9	24.6	26.8	20.9
British Columbia	37.6	30.0	26.0	24.5	24.0

Note: Infant deaths are deaths of children under one year of age.

Source: Dominion Bureau of Statistics, *Vital Statistics* (corresponding years), (Ottawa: Queen's Printer).

Table A-23

HISTORICAL SUMMARY OF AVERAGE LIFE EXPECTANCY (YEARS), AT SELECTED AGES, BY SEX
CANADA, BY REGION, 1931 TO 1961

	Males						Females					
Year	Canada	Atlantic Provinces	Que.	Ont.	Prairie Provinces	B.C.	Canada	Atlantic Provinces	Que.	Ont.	Prairie Provinces	B.C.
						At birth						
1931	60.0	60.2	56.2	61.3	63.5	62.2	62.1	61.9	57.8	63.9	65.5	65.3
1941	63.0	61.7	60.2	64.6	65.4	63.7	66.3	64.6	63.1	68.4	68.2	69.0
1951	66.3	66.6	64.4	66.9	68.4	66.7	70.8	70.5	68.6	71.9	72.3	72.4
1956	67.6	67.9	66.1	67.8	69.3	68.1	72.9	72.9	71.0	73.6	74.2	73.9
1961	68.4	68.6	67.3	68.3	69.8	68.9	74.2	73.9	72.8	74.4	75.7	75.4
						1 year						
1931	64.7	64.8	62.5	65.1	67.2	64.6	65.7	65.4	62.6	66.8	68.3	67.2
1941	66.1	65.7	64.5	66.7	68.0	65.4	68.7	67.8	66.3	70.1	70.2	70.2
1951	68.3	69.1	67.2	68.3	69.9	68.0	72.3	72.4	70.7	72.9	73.4	73.3
1956	69.0	69.7	68.1	68.8	70.5	69.2	74.0	74.2	72.6	74.3	75.1	74.7
1961	69.5	70.1	68.7	69.1	71.0	69.8	75.0	75.1	73.8	75.0	76.4	76.0
						20 years						
1931	49.1	49.2	47.8	48.8	51.0	48.7	49.8	49.6	47.7	50.1	51.7	51.2
1941	49.6	49.4	48.4	49.6	51.3	49.0	51.8	51.3	49.9	52.4	53.1	53.1
1951	50.8	51.6	49.8	50.6	52.2	50.4	54.4	54.5	52.9	54.8	55.5	55.5
1956	51.2	52.0	50.4	50.8	52.6	51.3	55.8	56.0	54.4	56.0	56.9	56.5
1961	51.5	52.2	50.8	51.0	52.9	51.9	56.7	56.8	55.5	56.5	58.1	57.6
						40 years						
1931	32.0	32.7	31.0	31.6	33.3	32.2	33.0	33.7	31.8	32.9	34.4	34.3
1941	31.9	32.2	30.9	31.5	33.3	31.7	34.0	34.2	32.7	34.1	35.0	35.1
1951	32.5	33.5	31.5	32.0	33.9	32.5	35.6	36.0	34.4	35.8	36.6	36.7
1956	32.7	33.6	31.9	32.2	34.1	33.1	36.7	37.0	35.4	36.7	37.7	37.5
1961	33.0	33.8	32.3	32.4	34.4	33.6	37.5	37.7	36.4	37.3	38.8	38.5
						60 years						
1931	16.3	17.0	15.8	15.9	17.1	16.7	17.2	18.0	16.4	16.9	18.0	18.0
1941	16.1	16.4	15.6	15.8	16.8	16.2	17.6	18.1	16.8	17.6	18.3	18.5
1951	16.5	17.3	15.9	16.2	17.3	16.7	18.6	19.1	17.7	18.6	19.3	19.7
1956	16.5	17.3	16.0	16.1	17.4	16.9	19.3	19.7	18.3	19.4	20.1	20.0
1961	16.7	17.5	16.3	16.2	17.7	17.2	19.9	20.2	19.0	19.7	21.0	20.8

Source: Dominion Bureau of Statistics, *Vital Statistics, 1967* (Ottawa: Queen's Printer, 1969), pp. 214-215.

Table A-24

TOTAL FULL- AND PART-TIME PERSONNEL IN THE HOSPITAL SECTOR
CANADA, BY REGION, 1953-66

	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966
	(Thousands of persons)													
Canada	136	145	158	168	181	195	209	225	234	245	266	285	301	318
Atlantic	13	14	15	17	16	17	19	23	27	24	25	26	29	29
Quebec	29	32	36	40	43	46	50	54	56	63	72	81	89	93
Ontario	51	55	58	62	66	71	78	85	88	95	99	105	109	113
Prairies	27	29	30	33	35	38	40	42	46	43	49	49	51	55
British Columbia	16	17	18	19	19	20	20	20	21	20	20	21	22	24
	(As percentage of total labour force)													
Canada	2.5	2.6	2.8	2.9	3.0	3.2	3.4	3.5	3.6	3.7	3.9	4.1	4.2	4.3
Atlantic	2.6	2.8	2.9	3.3	3.0	3.2	3.5	4.2	4.7	4.2	4.3	4.4	4.8	4.9
Quebec	1.9	2.1	2.3	2.5	2.6	2.7	2.8	3.0	3.1	3.4	3.8	4.2	4.3	4.4
Ontario	2.6	2.7	2.8	2.9	3.1	3.1	3.4	3.6	3.7	3.9	4.0	4.1	4.2	4.1
Prairies	2.8	3.1	3.1	3.3	3.4	3.6	3.7	3.8	4.0	3.7	4.2	4.1	4.3	4.5
British Columbia	3.6	3.8	3.8	3.8	3.5	3.7	3.6	3.5	3.7	3.4	3.3	3.3	3.3	3.3

Note: Some total figures may not add due to rounding.

Source: Dominion Bureau of Statistics, *Labour Force*, Catalogue No. 71-001 (supp.); *Mental Health Statistics*, Volume III, *1966*; *Tuberculosis Statistics*, Volume II, *1966*; *Hospital Statistics*, Volume I - General Information, *1953* to *1958*; Volume III - Hospital Personnel, *1959* to *1966* (Ottawa: Queen's Printer).

Table A-25

GROSS FIXED CAPITAL FORMATION IN THE HOSPITAL SECTOR
AS PERCENTAGE OF THAT OF SERVICE SECTOR AND OF TOTAL BUSINESS
CANADA, 1946 TO 1966

	1946	1948	1950	1952	1954	1956	1958	1960	1962	1964	1966
	(Millions of current dollars)										
Gross Fixed Capital Formation in Hospital Sector	28	56	73	93	122	129	161	156	198	183	223
	(Per cent)										
As percentage of service sector	36.8	33.5	34.8	40.7	44.4	37.6	37.0	30.7	33.2	24.2	19.2
As percentage of total business	2.1	2.1	2.2	2.1	2.6	1.9	2.3	2.3	2.8	2.0	1.8

Source: Dominion Bureau of Statistics, unpublished data; *National Accounts, Income and Expenditure*, Catalogue Nos. 13-502 and 13-201 (various years).

Table A-26

NET GENERAL EXPENDITURES* ON HOSPITAL CARE, BY ALL LEVELS OF GOVERNMENT
AS PERCENTAGE OF TOTAL RESPECTIVE GOVERNMENT EXPENDITURES
CANADA, 1952-65

	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965
	(Millions of current dollars)													
Municipal	27	27	35	32	32	41	35	31	36	40	49	28	31	46
Provincial	167	183	206	214	228	265	287	391	454	543	589	582	713	956
Federal	20	21	22	24	26	24	89	181	221	317	371	430	471	356
All	214	231	264	270	286	339	412	603	711	900	1,009	1,040	1,215	1,357
	(Percentage of total respective expenditures)													
Municipal	2.9	2.7	2.9	2.5	2.2	2.5	2.1	1.6	1.6	1.7	2.0	1.1	1.1	1.6
Provincial	14.1	14.9	15.3	13.9	13.2	13.3	13.2	15.8	16.2	17.9	17.5	15.9	17.1	18.8
Federal	0.5	0.5	0.5	0.5	0.5	0.5	1.6	3.2	3.8	4.9	5.4	5.9	6.3	4.4
All	3.4	3.6	3.9	3.8	3.6	3.8	4.4	6.0	6.6	7.7	8.0	7.7	8.4	8.5

* Net general revenue is gross general revenue less (a) all revenue of related government institutions, (b) revenue in the form of interest, premiums, discount and exchange, and (c) grants-in-aid and shared-cost contributions. These revenues are then deducted from the related items of expenditure to arrive at net general expenditure.

Note: Totals may not add due to rounding.

Source: Dominion Bureau of Statistics, *Historical Review, Financial Statistics of Governments in Canada*, Catalogue No. 68-503; *Consolidated Government Finance*, Catalogue No. 68-202 (various years).

Table A-27

HOSPITAL CARE COMPONENT OF GROSS NATIONAL EXPENDITURE
CANADA, 1946 TO 1966

	1946	1948	1950	1952	1954	1956	1958	1960	1962	1964	1966
	(Millions of current dollars)										
Expenditure on hospital care, private-duty nurses, accident and sickness insurance, and prepaid medical care	125	181	231	315	406	490	626	818	995	1,250	1,512
As a percentage of total personal, medical care, and death expenses	26.1	29.4	31.0	33.7	37.2	37.2	38.9	42.5	45.1	47.8	49.1
Total personal, medical care, and death expenses, as a percentage of gross national expenditure	6.0	6.1	6.2	6.3	6.7	7.0	7.6	8.2	8.5	8.8	8.8

Source: Dominion Bureau of Statistics, *National Accounts, Income and Expenditure*, Catalogue Nos. 13-502 and 13-201 (various years).

Table A-28

NUMBER OF BUDGET REVIEW GENERAL HOSPITALS, BY SIZE OF HOSPITAL
CANADA, BY PROVINCE, 1965

	Size of Hospital (Rated Bed Capacity)									
	1-9	10-24	25-49	50-99	100-199	200-299	300-499	500-999	1,000 and over	Total
					(Number)					
Newfoundland	8	14	9	4	4	1	1	1	--	42
Prince Edward Island	--	2	2	1	2	1	--	--	--	8
Nova Scotia	4	10	9	7	8	4	1	1	--	44
New Brunswick	1	7	9	6	7	4	1	1	--	36
Quebec	1	8	14	19	44	18	14	9	2	129
Ontario	4	16	32	45	33	23	25	11	3	192
Manitoba	6	37	15	9	3	3	1	1	1	76
Saskatchewan	22	76	29	8	6	2	3	2	--	148
Alberta	3	23	40	26	5	3	3	2	1	106
British Columbia	--	15	27	20	17	1	3	2	1	86
Yukon	--	2	--	--	--	--	--	--	--	2
Northwest Territories	--	1	1	--	--	--	--	--	--	2
CANADA	49	211	187	145	129	60	52	30	8	871

Source: Department of National Health and Welfare, *Annual Report: Hospital Insurance and Diagnostic Services Act, 1967* (Ottawa: Department of National Health and Welfare), Table A-10, p. 79.

Table A-29

PERCENTAGE DISTRIBUTION OF BUDGET REVIEW GENERAL HOSPITALS
BY SIZE OF HOSPITAL, CANADA, BY PROVINCE, 1965

	Size of Hospital (Rated Bed Capacity)									
	1-9	10-24	25-49	50-99	100-199	200-299	300-499	500-999	1,000 and over	Total
	(Per cent)									
Newfoundland	19.0	33.3	21.4	9.5	9.5	2.4	2.4	2.4	--	100.0
Prince Edward Island	--	25.0	25.0	12.5	25.0	12.5	--	--	--	100.0
Nova Scotia	9.1	22.7	20.5	15.9	18.2	9.1	2.3	2.3	--	100.0
New Brunswick	2.8	19.4	25.0	16.7	19.4	11.1	2.8	2.8	--	100.0
Quebec	.8	6.2	10.9	14.7	34.1	14.0	10.9	7.0	1.6	100.0
Ontario	2.1	8.3	16.7	23.4	17.2	12.0	13.0	5.7	1.6	100.0
Manitoba	7.9	48.7	19.7	11.8	3.9	3.9	1.3	1.3	1.3	100.0
Saskatchewan	14.9	51.4	19.6	5.4	4.1	1.4	2.0	1.4	--	100.0
Alberta	2.8	21.7	37.7	24.5	4.7	2.8	2.8	1.9	.9	100.0
British Columbia	--	17.4	31.4	23.3	19.8	1.2	3.5	2.3	1.2	100.0
Yukon	--	100.0	--	--	--	--	--	--	--	100.0
Northwest Territories	--	50.0	50.0	--	--	--	--	--	--	100.0
CANADA	5.6	24.2	21.5	16.6	14.8	6.9	6.0	3.4	.9	100.0

Source: Department of National Health and Welfare, *Annual Report: Hospital Insurance and Diagnostic Services Act, 1967* (Ottawa: Department of National Health and Welfare), Table A-10, p. 79.

Table A-30

NUMBER OF BEDS IN BUDGET REVIEW GENERAL HOSPITALS
BY SIZE OF HOSPITAL, CANADA, BY PROVINCE, 1965

	Size of Hospital (Rated Bed Capacity)									
	1-9	10-24	25-49	50-99	100-199	200-299	300-499	500-999	1,000 and over	Total
	(Number of beds set up)									
Newfoundland	56	289	380	260	541	210	230	538	--	2,504
Prince Edward Island	--	34	63	50	288	164	--	--	--	599
Nova Scotia	47	182	360	536	1,131	819	479	568	--	4,122
New Brunswick	14	114	353	443	831	884	367	536	--	3,542
Quebec	7	167	514	1,347	5,929	4,365	5,225	5,226	2,056	24,836
Ontario	36	308	1,310	3,311	4,657	5,649	9,118	7,573	3,758	35,720
Manitoba	61	713	575	654	389	690	408	656	966	5,112
Saskatchewan	223	1,359	1,071	650	923	495	1,136	1,293	--	7,150
Alberta	42	460	1,350	1,756	708	699	1,048	1,745	1,106	8,914
British Columbia	--	320	1,006	1,493	2,421	243	1,211	1,063	1,594	9,351
Yukon	--	26	--	--	--	--	--	--	--	26
Northwest Territories	--	24	44	--	--	--	--	--	--	68
CANADA	486	3,996	7,026	10,500	17,818	14,218	19,222	19,198	9,480	101,944

Source: Department of National Health and Welfare, *Annual Report: Hospital Insurance and Diagnostic Services Act, 1967* (Ottawa: Department of National Health and Welfare), Table A-11, p. 80.

Table A-33

OCCUPANCY* OF HOSPITALS LISTED IN HOSPITAL INSURANCE AGREEMENTS
BY STATUS OF HOSPITAL, CANADA, BY PROVINCE, 1965

	Budget Review						
	General	Chronic	Convalescent	Other	Total	Contract	Government of Canada
Newfoundland	78.0	--	--	96.4	78.3	32.9	14.7
Prince Edward Island	77.1	--	--	77.5	77.1	--	--
Nova Scotia	75.6	--	84.3	63.4	75.3	--	83.8
New Brunswick	81.4	96.2	--	73.5	81.6	--	77.7
Quebec	81.5	93.9	74.0	66.9	82.4	89.6	79.4
Ontario	82.9	91.6	90.2	84.1	83.9	81.8	76.2
Manitoba	78.5	87.3	--	90.3	80.0	56.7	65.5
Saskatchewan	75.9	95.1	--	--	77.5	54.3	80.3
Alberta	74.4	86.2	--	72.8	76.5	79.7	71.6
British Columbia	81.8	96.5	--	69.8	81.4	27.8	86.0
Yukon	30.0	--	--	--	30.0	--	43.0
Northwest Territories	55.5	--	--	--	55.5	26.6	40.2
CANADA	80.5	91.4	82.4	71.6	81.4	80.3	76.3

* Patient-days during 1965 as percentage of available bed-days during the year.

Source: Department of National Health and Welfare, *Annual Report: Hospital Insurance and Diagnostic Services Act, 1967* (Ottawa: Department of National Health and Welfare), Table A-14, p. 83.

Table A-30

NUMBER OF BEDS IN BUDGET REVIEW GENERAL HOSPITALS
BY SIZE OF HOSPITAL, CANADA, BY PROVINCE, 1965

	Size of Hospital (Rated Bed Capacity)									
	1-9	10-24	25-49	50-99	100-199	200-299	300-499	500-999	1,000 and over	Total
	(Number of beds set up)									
Newfoundland	56	289	380	260	541	210	230	538	--	2,504
Prince Edward Island	--	34	63	50	288	164	--	--	--	599
Nova Scotia	47	182	360	536	1,131	819	479	568	--	4,122
New Brunswick	14	114	353	443	831	884	367	536	--	3,542
Quebec	7	167	514	1,347	5,929	4,365	5,225	5,226	2,056	24,836
Ontario	36	308	1,310	3,311	4,657	5,649	9,118	7,573	3,758	35,720
Manitoba	61	713	575	654	389	690	408	656	966	5,112
Saskatchewan	223	1,359	1,071	650	923	495	1,136	1,293	--	7,150
Alberta	42	460	1,350	1,756	708	699	1,048	1,745	1,106	8,914
British Columbia	--	320	1,006	1,493	2,421	243	1,211	1,063	1,594	9,351
Yukon	--	26	--	--	--	--	--	--	--	26
Northwest Territories	--	24	44	--	--	--	--	--	--	68
CANADA	486	3,996	7,026	10,500	17,818	14,218	19,222	19,198	9,480	101,944

Source: Department of National Health and Welfare, *Annual Report: Hospital Insurance and Diagnostic Services Act, 1967* (Ottawa: Department of National Health and Welfare), Table A-11, p. 80.

Table A-31

PERCENTAGE DISTRIBUTION OF BEDS IN BUDGET REVIEW GENERAL HOSPITALS
BY SIZE OF HOSPITAL, CANADA, BY PROVINCE, 1965

	Size of Hospital (Rated Bed Capacity)									
	1-9	10-24	25-49	50-99	100-199	200-299	300-499	500-999	1,000 and over	Total
	(Percentage of beds set up)									
Newfoundland	2.2	11.5	15.2	10.4	21.6	8.4	9.2	21.5	--	100.0
Prince Edward Island	--	5.7	10.5	8.3	48.1	27.4	--	--	--	100.0
Nova Scotia	1.1	4.4	8.7	13.0	27.4	19.9	11.6	13.8	--	100.0
New Brunswick	.4	3.2	10.0	12.5	23.5	25.0	10.4	15.1	--	100.0
Quebec	*	.7	2.1	5.4	23.9	17.6	21.0	21.0	8.3	100.0
Ontario	.1	.9	3.7	9.3	13.0	15.8	25.5	21.2	10.5	100.0
Manitoba	1.2	13.9	11.2	12.8	7.6	13.5	8.0	12.8	18.9	100.0
Saskatchewan	3.1	19.0	15.0	9.1	12.9	6.9	15.9	18.1	--	100.0
Alberta	.5	5.2	15.1	19.7	7.9	7.8	11.8	19.6	12.4	100.0
British Columbia	--	3.4	10.8	16.0	25.9	2.6	13.0	11.4	17.0	100.0
Yukon	--	100.0	--	--	--	--	--	--	--	100.0
Northwest Territories	--	35.3	64.7	--	--	--	--	--	--	100.0
CANADA	0.5	3.9	6.9	10.3	17.5	13.9	18.9	18.8	9.3	100.0

* Approximately .03 per cent.

Source: Department of National Health and Welfare, *Annual Report: Hospital Insurance and Diagnostic Services Act, 1967* (Ottawa: Department of National Health and Welfare), Table A-11, p. 80.

Table A-32

OCCUPANCY OF BUDGET REVIEW HOSPITALS, BY SIZE OF HOSPITAL
CANADA, BY PROVINCE, 1965*

	Number of Hospitals Reporting	Size of Hospital (Rated Bed Capacity)									
		1-9	10-24	25-49	50-99	100-199	200-299	300-499	500-999	1,000 and over	Total
		(Per cent)									
Newfoundland	42	33.5	58.3	64.4	71.9	82.5	93.5	78.8	94.5	--	78.0
Prince Edward Island	8	--	51.4	87.3	50.6	81.9	77.9	--	--	--	77.1
Nova Scotia	44	39.4	63.9	75.7	73.6	74.2	72.7	76.5	90.3	--	75.6
New Brunswick	36	89.1	66.7	77.1	74.9	81.8	81.9	89.4	85.6	--	81.4
Quebec	129	42.8	70.5	74.0	79.4	79.3	77.1	82.8	84.7	90.3	81.5
Ontario	192	43.4	61.5	69.7	78.7	79.5	83.1	83.3	87.6	86.7	82.9
Manitoba	76	63.0	64.0	69.1	76.1	79.5	81.0	84.2	90.5	84.5	78.5
Saskatchewan	148	56.6	68.4	75.6	76.1	76.7	78.2	83.9	78.7	--	75.9
Alberta	106	58.9	56.6	67.0	69.1	74.2	74.0	84.7	84.4	74.6	74.4
British Columbia	86	--	61.6	65.9	78.5	80.0	89.2	87.0	88.7	92.2	81.8
Yukon	2	--	30.0	--	--	--	--	--	--	--	30.0
Northwest Territories	2	--	54.8	55.9	--	--	--	--	--	--	55.5
CANADA	871	53.1	63.8	70.2	76.1	79.0	80.1	83.4	86.3	86.8	80.5

* Patient-days during 1965 as percentage of available bed-days during year.

Source: Department of National Health and Welfare, *Annual Report: Hospital Insurance and Diagnostic Services Act, 1967* (Ottawa: Department of National Health and Welfare), Table A-15, p. 84.

Table A-33

OCCUPANCY* OF HOSPITALS LISTED IN HOSPITAL INSURANCE AGREEMENTS
BY STATUS OF HOSPITAL, CANADA, BY PROVINCE, 1965

	Budget Review						
	General	Chronic	Convalescent	Other	Total	Contract	Government of Canada
Newfoundland	78.0	--	--	96.4	78.3	32.9	14.7
Prince Edward Island	77.1	--	--	77.5	77.1	--	--
Nova Scotia	75.6	--	84.3	63.4	75.3	--	83.8
New Brunswick	81.4	96.2	--	73.5	81.6	--	77.7
Quebec	81.5	93.9	74.0	66.9	82.4	89.6	79.4
Ontario	82.9	91.6	90.2	84.1	83.9	81.8	76.2
Manitoba	78.5	87.3	--	90.3	80.0	56.7	65.5
Saskatchewan	75.9	95.1	--	--	77.5	54.3	80.3
Alberta	74.4	86.2	--	72.8	76.5	79.7	71.6
British Columbia	81.8	96.5	--	69.8	81.4	27.8	86.0
Yukon	30.0	--	--	--	30.0	--	43.0
Northwest Territories	55.5	--	--	--	55.5	26.6	40.2
CANADA	80.5	91.4	82.4	71.6	81.4	80.3	76.3

* Patient-days during 1965 as percentage of available bed-days during the year.

Source: Department of National Health and Welfare, *Annual Report: Hospital Insurance and Diagnostic Services Act, 1967* (Ottawa: Department of National Health and Welfare), Table A-14, p. 83.

APPENDIX B

ESTIMATED COST FUNCTIONS*

* The basic data used, relating to 1,266 general and allied special hospitals (excluding mental hospitals and tuberculosis sanatoria) in 1966 in Canada, are taken from the Dominion Bureau of Statistics, Institutions Section, "Hospital Statistics: 1966", HS-1 and HS-2 Computer Tapes (Ottawa: Dominion Bureau of Statistics), not available for general distribution. The detailed definitions of the variables used can be found in Dominion Bureau of Statistics and Department of National Health and Welfare, *1966 Instructions and Definitions for the Annual Return of Hospitals*, Part I: Facilities and Services, Form HS-1, and Part II: Financial Return, Form HS-2 (Ottawa: Queen's Printer).

Table B-1

SIMPLE CORRELATION COEFFICIENTS AMONG DIFFERENT INDICATORS OF THE QUANTITY AND QUALITY OF HOSPITAL CARE FOR OPERATING GENERAL AND ALLIED SPECIAL HOSPITALS, CANADA, 1966

Variable	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13
X1. No. of Patient-Days	----												
X2. No. of Admissions	.871	----											
X3. No. of Discharges	.858	.999	----										
X4. No. of Lab Units in Hospitals	.796	.838	.833	----									
X5. No. of Chest X-rays	.844	.932	.930	.846	----								
X6. No. of X-ray Films Taken	.828	.902	.899	.824	.945	----							
X7. No. of Operations	.781	.917	.917	.759	.881	.867	----						
X8. Total Elapsed Time of Operations	.803	.882	.879	.851	.877	.807	.819	----					
X9. No. of Operations of 15 Minutes or Less	.558	.679	.681	.492	.650	.636	.647	.500	----				
X10. No. of Operations of More than 15 but Less than 30 Minutes	.703	.833	.834	.697	.789	.794	.786	.707	.707	----			
X11. No. of Deliveries	.699	.865	.868	.690	.794	.745	.798	.759	.607	.688	----		
X12. No. of Emergency Visits	.713	.846	.847	.739	.854	.827	.858	.755	.626	.711	.762	----	
X13. No. of Electrocardiographs	.835	.874	.870	.865	.936	.891	.809	.876	.583	.712	.717	.759	----

Table B-1 (continued)

Variable	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13
X14. No. of Electro-encephalographs	.652	.699	.697	.648	.727	.743	.658	.703	.476	.659	.481	.622	.695
X15. No. of Outpatient Visits	.551	.521	.515	.629	.607	.548	.421	.578	.344	.395	.334	.421	.672
X16. No. of Deaths within 48 Hours of Admission	.829	.929	.925	.829	.869	.868	.850	.827	.619	.770	.812	.815	.836
X17. No. of Deaths Occurring 48 Hours or More after Admission	.927	.856	.841	.812	.819	.820	.766	.806	.530	.681	.688	.701	.826
X18. No. of Deaths Occurring in Hospitals	.928	.905	.893	.841	.860	.862	.821	.837	.583	.729	.745	.760	.851
X19. No. of Deaths Occurring during Operations	.609	.633	.629	.732	.616	.616	.580	.671	.353	.500	.432	.557	.658
X20. No. of Post-Op. Deaths Occurring within 48 Hours of Operating	.735	.775	.770	.784	.723	.785	.725	.723	.484	.661	.553	.658	.739
X21. No. of Death during and after Operation	.792	.840	.834	.856	.803	.814	.781	.823	.516	.693	.630	.715	.823
X22. No. of Maternal Deaths	.322	.368	.368	.315	.387	.399	.356	.313	.249	.265	.374	.373	.360
X23. No. of Neonatal Deaths	.672	.837	.841	.630	.761	.720	.784	.709	.595	.692	.911	.746	.680
X24. No. of Post-Op. Infections	.658	.705	.701	.674	.722	.714	.667	.717	.480	.547	.560	.589	.726
X25. No. of Newborn with Staphylococcal Infections	.267	.331	.332	.256	.303	.254	.315	.323	.304	.250	.459	.283	.293

cont'd. . .

Table B-1 (concluded)

Variable	X14	X15	X16	X17	X18	X19	X20	X21	X22	X23	X24	X25
X14. No. of Electro-encephalographs	----											
X15. No. of Outpatient Visits	.615	----										
X16. No. of Deaths within 48 Hours of Admission	.666	.487	----									
X17. No. of Deaths Occurring 48 Hours or More after Admission	.618	.530	.864	----								
X18. No. of Deaths Occurring in Hospitals	.645	.530	.920	.983	----							
X19. No. of Deaths Occurring during Operations	.611	.564	.656	.610	.643	----						
X20. No. of Post-Op. Deaths Occurring within 48 Hours of Operating	.723	.510	.807	.758	.796	.809	----					
X21. No. of Deaths during and after Operation	.715	.565	.845	.811	.850	.827	.952	----				
X22. No. of Maternal Deaths	.239	.127	.388	.320	.354	.249	.322	.327	----			
X23. No. of Neonatal Deaths	.489	.255	.794	.648	.709	.373	.542	.608	.414	----		
X24. No. of Post-Op. Infections	.588	.511	.683	.669	.703	.587	.641	.682	.278	.497	----	
X25. No. of Newborn with Staphylococcal Infections	.237	.146	.310	.262	.283	.146	.194	.228	.160	.413	.276	----

Note: Twenty hospitals that reported past-year operations only are excluded; the number of hospitals analysed is thus 1,246.

Source: See text.

Table B-2

ESTIMATED TOTAL COST FUNCTIONS (OPERATING COSTS ONLY)
IN RELATION TO THE NUMBER OF BEDS AND ONE OTHER EXPLANATORY VARIABLE FOR HOSPITALS
CANADA, BY PROVINCE, 1966

Province	Number of Hospitals*	Intercept (*S.E.E.*)	Number of Beds (*T*-Value)	Number of Beds^2 (*T*-Value)	$\bar{R}^2$ (*F*-Value)
Newfoundland	35	19063.574 (35579.969)	76.134 (.384)	1.972 (4.294)	.895 (146.471)
Prince Edward Island	9	-13876.332 (10856.727)	1124.342 (4.596)	-2.037 (-1.961)	.959 (95.341)
Nova Scotia	47	10719.000 (3673.523)	336.127 (2.539)	2.089 (7.471)	.937 (345.205)
New Brunswick	38	-9296.000 (16502.195)	984.899 (14.454)	.216 (1.537)	.980 (921.775)
Quebec	167	658.438 (91005.500)	858.042 (8.378)	1.013 (8.337)	.919 (941.878)
Ontario	205	-18263.875 (83761.125)	1055.355 (16.952)	.179 (3.191)	.919 (1151.768)
Manitoba	81	-4229.875 (25613.910)	834.666 (15.979)	.346 (5.609)	.976 (1653.879)
Saskatchewan	143	-4117.207 (15973.133)	805.931 (18.996)	.633 (7.585)	.975 (2825.772)
Alberta	133	-5745.480 (28066.535)	683.927 (14.401)	.445 (8.708)	.972 (2277.251)
British Columbia	99	-18180.500 (24945.004)	1063.079 (31.861)	.093 (4.319)	.988 (4193.582)

* In those cost functions in which dummy variables taking the value of one or zero were not included, hospitals reporting a zero value for a particular variable were excluded from the calculations. The number of hospitals thus varies somewhat among the different cost functions.

Source: See text.

Table B-3

ESTIMATED TOTAL COST FUNCTIONS (INCLUDING DEPRECIATION)
IN RELATION TO THE NUMBER OF BEDS AND ONE OTHER EXPLANATORY VARIABLE FOR HOSPITALS
CANADA, BY PROVINCE, 1966

Province	Number of Hospitals	Intercept *(S.E.E.)*	Number of Beds *(T-Value)*	Number of Beds^2 *(T-Value)*	$\bar{R}^2$ *(F-Value)*
Newfoundland	35	18207.848 (38380.340)	166.065 (.777)	1.876 (3.787)	.890 (138.715)
Prince Edward Island	9	-14352.891 (10721.320)	1165.943 (4.826)	-2.026 (-1.976)	.965 (111.074)
Nova Scotia	47	9845.313 (33683.039)	401.205 (3.305)	2.025 (7.894)	.949 (430.828)
New Brunswick	38	-9806.813 (16942.750)	1042.473 (14.901)	.229 (1.586)	.981 (979.783)
Quebec	167	-345.438 (93311.063)	911.996 (8.685)	1.001 (8.040)	.919 (942.947)
Ontario	205	-19491.813 (88766.813)	1120.289 (16.980)	.170 (2.854)	.916 (1118.827)
Manitoba	81	-3978.563 (26781.324)	856.904 (15.690)	.372 (5.760)	.976 (1631.769)
Saskatchewan	143	-4109.086 (17799.844)	859.548 (18.181)	.615 (6.615)	.972 (2461.593)
Alberta	133	-7732.938 (30391.746)	778.975 (15.147)	.370 (6.690)	.969 (2039.046)
British Columbia	99	-17783.000 (26055.672)	1105.231 (31.712)	.102 (4.552)	.988 (4209.840)

Source: See text.

Table B-4

ESTIMATED TOTAL COST FUNCTIONS (OPERATING COSTS ONLY)
IN RELATION TO THE NUMBER OF PATIENT-DAYS OF CARE AND ONE OTHER EXPLANATORY VARIABLE FOR HOSPITALS
CANADA, BY PROVINCE, 1966

Province	Number of Hospitals	Intercept (*S.E.E.*)	Number of Patient-Days of Care (T-Value)	Number of Patient-Days of Care^2 (T-Value)	$\bar{R}^2$ (F-Value)
Newfoundland	35	-902.449 (13387.781)	2658.270 (12.786)	5.980 (4.408)	.985 (1131.544)
Prince Edward Island	9	4353.367 (4054.961)	1250.453 (2.192)	28.567 (2.670)	.996 (701.954)
Nova Scotia	47	9005.938 (20659.754)	1801.543 (7.460)	15.741 (10.469)	.980 (1138.680)
New Brunswick	38	-5564.313 (8417.465)	3052.914 (26.959)	2.697 (3.543)	.995 (3592.550)
Quebec	167	-2178.563 (100949.188)	3293.919 (9.124)	9.039 (6.503)	.900 (750.105)
Ontario	205	-4652.188 (85531.750)	3016.010 (14.177)	3.198 (4.947)	.915 (1100.437)
Manitoba	81	-910.625 (24211.445)	2531.937 (15.482)	4.602 (7.117)	.979 (1855.681)
Saskatchewan	143	-7769.793 (20853.816)	3397.292 (19.799)	.701 (.693)	.958 (1628.922)
Alberta	133	-1081.301 (35658.594)	2231.647 (10.944)	5.039 (6.821)	.955 (1386.050)
British Columbia	99	-13330.313 (25369.410)	3293.220 (31.890)	.706 (3.510)	.988 (4052.856)

Source: See **text.**

Table B-5

ESTIMATED TOTAL COST FUNCTIONS (INCLUDING DEPRECIATION)
IN RELATION TO THE NUMBER OF PATIENT-DAYS OF CARE AND ONE OTHER EXPLANATORY VARIABLE FOR HOSPITALS
CANADA, BY PROVINCE, 1966

Province	Number of Hospitals	Intercept (*S.E.E.*)	Number of Patient-Days of Care (T-Value)	Number of Patient-Days of Care^2 (T-Value)	$\bar{R}^2$ (F-Value)
Newfoundland	35	-1355.234 (15357.465)	2937.746 (12.318)	5.317 (3.417)	.982 (950.296)
Prince Edward Island	9	5152.664 (4118.188)	1200.607 (2.072)	32.818 (3.020)	.995 (770.164)
Nova Scotia	47	7694.688 (19183.465)	2086.735 (9.305)	14.518 (10.399)	.984 (1374.054)
New Brunswick	38	-5681.000 (9101.922)	3221.886 (26.312)	2.907 (3.531)	.995 (3438.073)
Quebec	167	-2925.000 (104171.188)	3480.193 (9.342)	8.863 (6.180)	.899 (740.380)
Ontario	205	-5092.750 (91241.750)	3206.355 (14.129)	3.153 (4.572)	.912 (1053.550)
Manitoba	81	-520.625 (25432.723)	2595.007 (15.105)	4.919 (7.242)	.978 (1813.656)
Saskatchewan	143	-7975.012 (22796.855)	3615.994 (19.277)	.200 (.181)	.954 (1473.393)
Alberta	133	-2485.688 (37782.469)	2538.439 (11.748)	4.236 (5.412)	.952 (1296.400)
British Columbia	99	-12723.063 (26595.676)	3423.388 (31.622)	.787 (3.731)	.988 (4038.695)

Source: See text.

Table B-6

ESTIMATED TOTAL COST FUNCTIONS (INCLUDING DEPRECIATION)
IN RELATION TO THE NUMBER OF ADMISSIONS AND ONE OTHER EXPLANATORY VARIABLE FOR HOSPITALS
CANADA, BY PROVINCE, 1966

Province	Number of Hospitals	Intercept (*S.E.E.*)	Number of Admissions (*T*-Value)	Number of Admissions^2 (*T*-Value)	$\overline{R}^2$ (*F*-Value)
Newfoundland	35	25633.391 (40475.559)	-15.720 (-1.160)	.010 (5.413)	.878 (123.112)
Prince Edward Island	9	11042.902 (10864.551)	.661 (.062)	.006 (2.719)	.964 (108.086)
Nova Scotia	47	6132.000 (44374.297)	18.746 (3.001)	.002 (4.984)	.912 (238.912)
New Brunswick	38	10698.188 (31563.098)	13.568 (2.268)	.003 (5.046)	.936 (269.860)
Quebec	167	25225.813 (89941.563)	30.595 (8.648)	.002 (10.210)	.925 (1021.182)
Ontario	205	32946.375 (90809.438)	24.014 (8.299)	.001 (9.411)	.912 (1064.570)
Manitoba	81	8312.473 (41978.555)	17.747 (4.747)	.001 (6.932)	.941 (641.026)
Saskatchewan	143	-18830.129 (36027.484)	40.554 (12.555)	.000 (.319)	.885 (547.957)
Alberta	133	-1546.438 (49310.676)	27.936 (8.925)	.000 (3.361)	.917 (734.254)
British Columbia	99	-3761.875 (34510.023)	26.738 (18.077)	.001 (13.236)	.980 (2379.189)

Source: See text.

Table B-7

ESTIMATED TOTAL COST FUNCTIONS (INCLUDING DEPRECIATION)
IN RELATION TO COMPOSITE OUTPUT AND ONE OTHER EXPLANATORY VARIABLE FOR HOSPITALS
CANADA, BY PROVINCE, 1966

Province	Number of Hospitals	Intercept (*S.E.E.*)	Composite Output (*T*-Value)	Composite Output^2 (*T*-Value)	$\bar{R}^2$ (*F*-Value)
Newfoundland	35	-4923.797 (13924.598)	2242.068 (17.034)	-.204 (-.430)	.986 (1159.396)
Prince Edward Island	9	8086.676 (7354.523)	561.424 (.970)	11.260 (1.804)	.984 (239.424)
Nova Scotia	47	5674.500 (15091.570)	1514.143 (15.303)	2.670 (8.494)	.990 (2233.732)
New Brunswick	38	-327.313 (9458.945)	2022.231 (27.002)	.260 (.888)	.994 (3182.140)
Quebec	167	-14041.813 (76085.375)	2625.394 (21.608)	.098 (.489)	.946 (1459.587)
Ontario	205	-8400.938 (48384.770)	2159.520 (35.998)	.136 (1.533)	.975 (4004.659)
Manitoba	81	-1322.313 (17994.672)	1976.504 (28.968)	-.041 (-.325)	.989 (3661.775)
Saskatchewan	143	-6006.203 (20744.887)	2610.619 (20.364)	.092 (.168)	.962 (1793.821)
Alberta	133	-2392.125 (17791.820)	1855.390 (32.834)	.263 (2.525)	.989 (6074.398)
British Columbia	99	-4828.313 (24378.988)	2016.473 (37.147)	-.062 (-1.172)	.990 (4815.656)

Source: See Table C-1 and text.

Table B-8

ESTIMATED TOTAL COST FUNCTIONS (INCLUDING DEPRECIATION)
IN RELATION TO COMPOSITE OUTPUT AND TWO OTHER EXPLANATORY VARIABLES FOR HOSPITALS
CANADA, BY PROVINCE, 1966

Province	Number of Hospitals	Intercept *(S.E.E.)*	Composite Output *(T-Value)*	Composite Output^2 *(T-Value)*	Capacity Utilization *(T-Value)*	$\bar{R}^2$ *(F-Value)*
Newfoundland	35	18584.800 (12373.379)	2175.414 (18.291)	.061 (.142)	-284.950 (-3.068)	.989 (982.054)
Prince Edward Island	9	17378.754 (6514.621)	1541.573 (1.948)	.843 (.100)	-267.714 (-1.626)	.987 (204.308)
Nova Scotia	47	7510.813 (15259.750)	1515.204 (15.121)	2.671 (8.403)	-25.472 (-.190)	.990 (1456.522)
New Brunswick	38	15724.188 (8691.809)	2058.542 (29.370)	.150 (.554)	-206.981 (-2.729)	.995 (2514.906)
Quebec	167	68668.688 (74644.375)	2667.232 (22.192)	.054 (.276)	-1094.999 (-2.718)	.948 (1013.448)
Ontario	205	39934.188 (47845.727)	2178.298 (36.395)	.113 (1.287)	-593.219 (-2.362)	.976 (2732.127)
Manitoba	81	7351.590 (17990.430)	1984.719 (28.897)	-.054 (-.422)	-110.998 (-1.024)	.989 (2442.679)
Saskatchewan	143	7876.418 (20601.922)	2621.968 (20.567)	.073 (.135)	-176.487 (-1.716)	.962 (1213.519)
Alberta	133	26367.754 (16740.547)	1907.600 (34.944)	.187 (1.873)	-414.910 (-4.221)	.990 (4580.125)
British Columbia	99	11377.813 (24212.207)	2043.946 (35.988)	-.084 (-1.545)	-219.276 (-1.538)	.990 (3255.593)

Source: See text.

Table B-9

ESTIMATED TOTAL COST FUNCTIONS (INCLUDING DEPRECIATION)
IN RELATION TO COMPOSITE OUTPUT AND FOUR OTHER EXPLANATORY VARIABLES FOR HOSPITALS
CANADA, BY PROVINCE, 1966

Province	Number of Hospitals	Intercept (*S.E.E.*)	Composite Output (*T*-Value)	Composite Output^2 (*T*-Value)	Capacity Utilization (*T*-Value)	Intern Program (*T*-Value)	Nurses' Training Program (*T*-Value)	$\bar{R}^2$ (*F*-Value)
Newfoundland	46	3864.438 (10691.406)	2281.952 (21.495)	-.541 (-1.490)	-129.207 (-2.406)	33337.609 (2.490)	-12868.695 (-1.483)	.990 (852.393)
Prince Edward Island	9	20959.797 (7016.297)	318.156 (.235)	53.927 (1.203)	-247.206 (-1.388)	-60847.238 (-1.181)	-241096.688 (-1.219)	.985 (105.944)
Nova Scotia	49	40529.477 (43260.121)	43.576 (.109)	6.207 (6.283)	-221.204 (-.584)	-18145.270 (-.546)	84557.125 (4.291)	.914 (102.800)
New Brunswick	39	8037.188 (34578.957)	496.488 (1.436)	4.057 (3.449)	121.331 (.397)	36902.305 (1.636)	68632.875 (3.909)	.922 (90.596)
Quebec	257	32800.750 (84890.375)	1900.620 (12.483)	.738 (3.338)	-528.137 (-2.099)	63188.535 (2.655)	84757.500 (4.155)	.913 (537.582)
Ontario	307	6563.188 (63954.551)	1456.572 (14.451)	.660 (5.401)	-76.812 (-.381)	101097.375 (4.818)	38955.000 (6.224)	.944 (1042.092)
Manitoba	99	543.926 (32498.848)	842.063 (5.677)	1.356 (5.791)	120.658 (.993)	76825.438 (2.515)	87516.563 (3.499)	.958 (448.465)
Saskatchewan	153	14576.070 (27862.977)	1198.557 (5.938)	2.689 (3.479)	-152.291 (-1.337)	121004.375 (4.626)	49405.445 (4.693)	.927 (388.128)
Alberta	141	9533.176 (31440.238)	844.194 (5.829)	1.431 (6.936)	18.593 (.120)	133458.313 (5.240)	38309.227 (3.055)	.965 (766.477)
British Columbia	114	-9710.250 (64813.422)	-2.339 (-.014)	1.327 (8.960)	719.488 (2.976)	140582.250 (3.053)	255154.250 (6.253)	.920 (260.134)

Source: See text.

Table B-10

ESTIMATED TOTAL COST FUNCTIONS (INCLUDING DEPRECIATION)
IN RELATION TO COMPOSITE OUTPUT AND ONE OTHER EXPLANATORY VARIABLE FOR HOSPITALS
CANADA, BY PROVINCE, 1966

Province	Number of Hospitals	Intercept *(S.E.E.)*	Composite Output *(T-Value)*	Capacity Utilization *(T-Value)*	$\bar{R}^2$ *(F-Value)*
Newfoundland	35	18099.633 (12182.211)	2191.316 (55.089)	-282.328 (-3.170)	.989 (1519.668)
Prince Edward Island	9	17492.949 (5948.383)	1620.196 (27.103)	-280.135 (-2.852)	.989 (367.583)
Nova Scotia	47	-12566.563 (24520.113)	2301.536 (39.982)	-6.201 (-.029)	.973 (832.499)
New Brunswick	38	15402.875 (8605.992)	2094.978 (87.107)	-213.169 (-2.870)	.995 (3847.807)
Quebec	167	67752.500 (74434.125)	2697.459 (55.107)	-1104.044 (-2.758)	.948 (1528.734)
Ontario	205	38831.438 (47922.520)	2248.356 (90.234)	-628.021 (-2.511)	.976 (4084.245)
Manitoba	81	7498.754 (17894.660)	1957.425 (85.859)	-106.623 (-.994)	.989 (3703.256)
Saskatchewan	143	7741.375 (20529.488)	2638.080 (60.415)	-176.769 (-1.725)	.963 (1833.137)
Alberta	133	26835.125 (16901.602)	2004.615 (115.004)	-448.303 (-4.593)	.990 (6738.156)
British Columbia	99	9659.938 (24383.688)	1961.912 (96.468)	-160.826 (-1.162)	.990 (4813.781)

Source: See text.

Table B-11

ESTIMATED TOTAL COST FUNCTIONS (INCLUDING DEPRECIATION)
IN RELATION TO COMPOSITE OUTPUT AND TWO OTHER EXPLANATORY VARIABLES FOR HOSPITALS
CANADA, BY PROVINCE, 1966

Province	Number of Hospitals	Intercept (*S.E.E.*)	Composite Output (*T*-Value)	Intern Program (*T*-Value)	Nurses' Training Program (*T*-Value)	$\bar{R}^2$ (*F*-Value)
Newfoundland	46	-2332.039 (11356.227)	2114.414 (36.964)	34502.355 (2.585)	-10348.426 (-1.182)	.988 (1257.005)
Prince Edward Island	9	5745.238 (8480.277)	935.691 (1.698)	12786.805 (1.130)	42885.242 (1.137)	.978 (119.888)
Nova Scotia	49	-19661.875 (58589.867)	2291.869 (9.530)	-89029.375 (-2.110)	29458.141 (1.232)	.842 (86.220)
New Brunswick	39	-1918.125 (39176.574)	1563.601 (9.272)	44537.566 (1.767)	41201.324 (2.329)	.900 (114.536)
Quebec	257	-22072.500 (87275.313)	2331.593 (30.680)	59974.602 (2.462)	60115.473 (3.062)	.908 (842.494)
Ontario	307	-13361.313 (66827.750)	1917.158 (34.851)	94190.625 (4.316)	49233.852 (3.975)	.939 (1581.575)
Manitoba	99	-1547.156 (37507.809)	1615.546 (21.846)	77009.688 (2.185)	41122.758 (1.504)	.944 (552.745)
Saskatchewan	153	-1444.238 (29048.734)	1711.231 (12.844)	150972.688 (5.809)	37086.641 (3.594)	.921 (590.561)
Alberta	141	-3653.754 (36617.973)	1729.288 (23.564)	102629.750 (3.533)	-3704.255 (-.290)	.952 (929.247)
British Columbia	114	559.250 (84796.625)	1414.634 (16.095)	45728.484 (.780)	-182015.625 (3.481)	.863 (237.655)

Source: See text.

Table B-12

ESTIMATED TOTAL COST FUNCTIONS (INCLUDING DEPRECIATION)
IN RELATION TO COMPOSITE OUTPUT AND THREE OTHER EXPLANATORY VARIABLES FOR HOSPITALS
CANADA, BY PROVINCE, 1966

Province	Number of Hospitals	Intercept (*S.E.E.*)	Composite Output (*T*-Value)	Capacity Utilization (*T*-Value)	Intern Program (*T*-Value)	Nurses' Training Program (*T*-Value)	$\bar{R}^2$ (*F*-Value)
Newfoundland	46	5004.535 (10850.559)	2147.312 (37.939)	-121.342 (-2.238)	27952.414 (2.137)	-8927.668 (-1.065)	.989 (1033.923)
Prince Edward Island	9	17457.918 (7240.348)	1747.521 (2.595)	-300.103 (-1.685)	-605.596 (-.048)	-8825.512 (-.198)	.984 (124.065)
Nova Scotia	49	-12140.375 (59224.148)	2294.234 (9.426)	-104.530 (-.202)	-88237.250 (-2.060)	29630.988 (1.226)	.838 (63.297)
New Brunswick	39	2059.500 (39736.305)	1568.472 (8.994)	-49.667 (-.143)	44037.242 (1.706)	41072.945 (2.286)	.897 (83.504)
Quebec	257	22693.688 (86580.313)	2344.519 (31.008)	-577.294 (-2.254)	57006.922 (2.356)	60871.133 (3.125)	.909 (643.326)
Ontario	307	271.438 (66869.313)	1920.333 (34.793)	-165.025 (-.786)	93099.813 (4.254)	49175.961 (3.968)	.939 (1184.861)
Manitoba	99	-637.207 (37705.012)	1616.094 (21.671)	-12.914 (-.093)	77074.313 (2.175)	41105.727 (1.495)	.944 (410.236)
Saskatchewan	153	13026.418 (28888.508)	1739.058 (13.017)	-191.632 (-1.630)	147755.938 (5.700)	36916.316 (3.597)	.922 (448.512)
Alberta	141	13730.281 (36470.156)	1746.004 (23.598)	-253.340 (-1.454)	99704.063 (3.438)	-3963.508 (-.312)	.953 (703.124)
British Columbia	114	192.750 (85184.563)	1414.353 (15.766)	5.310 (.018)	45758.648 (.777)	181994.813 (3.463)	.861 (176.622)

Source: See text.

Table B-13

ESTIMATED TOTAL COST FUNCTIONS (INCLUDING DEPRECIATION)
IN RELATION TO COMPOSITE OUTPUT AND TWO OTHER EXPLANATORY VARIABLES FOR HOSPITALS
CANADA, BY PROVINCE, 1966

Province	Number of Hospitals	Intercept *(S.E.E.)*	Composite Output (*T*-Value)	Capacity Utilization (*T*-Value)	Average Length of Stay (*T*-Value)	$\bar{R}^2$ (*F*-Value)
Newfoundland	35	16239.492 (11998.832)	2189.385 (55.848)	-240.609 (-2.599)	-64.444 (-1.410)	.989 (1044.977)
Prince Edward Island	9	12474.984 (5073.063)	1638.675 (31.511)	-263.981 (-3.133)	234.695 (1.803)	.992 (337.999)
Nova Scotia	47	-15058.375 (24644.492)	2301.350 (39.777)	-41.939 (-.190)	485.909 (.746)	.973 (549.597)
New Brunswick	38	14926.188 (8666.938)	2095.114 (86.498)	-221.391 (-2.926)	99.928 (.717)	.995 (2529.427)
Quebec	167	35360.688 (72689.125)	2674.593 (55.251)	-524.055 (-1.201)	-355.593 (-2.995)	.951 (1071.665)
Ontario	205	27182.063 (47486.750)	2243.302 (90.458)	-434.502 (-1.650)	-148.891 (-2.175)	.976 (2774.607)
Manitoba	81	7457.441 (17969.230)	1959.499 (84.639)	-96.870 (-.889)	-68.503 (-.602)	.989 (2448.507)
Saskatchewan	143	-2173.387 (20464.148)	2603.607 (51.856)	-179.710 (-1.759)	1373.314 (1.377)	.963 (1230.540)
Alberta	133	18187.219 (16515.191)	1998.178 (116.166)	-291.061 (-2.599)	-71.234 (-2.677)	.991 (4707.156)
British Columbia	99	6879.875 (24151.961)	1958.710 (96.810)	-99.574 (-.702)	-74.823 (-1.693)	.990 (3272.014)

Source: See text.

Table B-14

ESTIMATED TOTAL COST FUNCTIONS (INCLUDING DEPRECIATION)
IN RELATION TO COMPOSITE OUTPUT AND FOUR OTHER EXPLANATORY VARIABLES FOR HOSPITALS
CANADA, BY PROVINCE, 1966

Province	Number of Hospitals	Intercept (*S.E.E.*)	Composite Output (*T*-Value)	Capacity Utilization (*T*-Value)	Intern Program (*T*-Value)	Nurses' Training Program (*T*-Value)	Average Length of Stay (*T*-Value)	$\bar{R}^2$ (*F*-Value)
Newfoundland	46	4016.309 (10420.172)	2143.067 (39.401)	-82.165 (-1.486)	29874.160 (2.372)	-10436.797 (-1.291)	-83.385 (-2.113)	0.990 (897.767)
Prince Edward Island	9	12452.512 (6349.238)	1895.208 (3.165)	-307.396 (-1.967)	-2196.851 (-0.199)	-17339.570 (-0.440)	245.047 (1.488)	0.988 (129.507)
Nova Scotia	49	3168.625 (55761.031)	2365.212 (10.248)	187.494 (0.374)	-84615.313 (-2.097)	18624.621 (0.804)	-3425.029 (-2.576)	0.857 (58.450)
New Brunswick	39	6507.688 (39609.191)	1611.574 (9.046)	-5.207 (-0.015)	40736.301 (1.573)	36441.297 (1.981)	-692.969 (-1.104)	0.897 (67.476)
Quebec	257	2094.125 (84934.813)	2340.090 (31.544)	-103.642 (-0.358)	51691.824 (2.172)	51972.617 (2.693)	-293.335 (-3.295)	0.913 (536.967)
Ontario	307	-6438.125 (66804.938)	1913.666 (34.548)	-24.246 (-0.102)	94130.750 (4.303)	46205.285 (3.666)	-71.904 (-1.261)	0.939 (950.034)
Manitoba	99	-669.141 (37904.656)	1613.269 (20.398)	-16.116 (-0.113)	77717.688 (2.154)	41375.711 (1.492)	26.864 (0.112)	37904.656 (324.743)
Saskatchewan	153	9838.516 (24295.906)	2148.417 (17.360)	-107.739 (-1.034)	84819.625 (3.654)	20549.348 (2.315)	-360.659 (-7.889)	0.945 (24295.906)
Alberta	141	7864.035 (36393.664)	1748.444 (23.672)	-134.404 (-0.678)	96084.188 (3.304)	-4316.262 (-0.340)	-71.455 (-1.252)	0.953 (565.181)
British Columbia	114	-1293.063 (85364.875)	1413.330 (15.720)	64.963 (0.209)	46297.668 (0.784)	179435.313 (3.400)	-114.001 (-0.734)	0.861 (140.809)

Source: See text.

Table B-15

ESTIMATED TOTAL COST FUNCTIONS (INCLUDING DEPRECIATION)
IN RELATION TO COMPOSITE OUTPUT AND FOUR OTHER EXPLANATORY VARIABLES FOR HOSPITALS
CANADA, BY PROVINCE, 1966

Province	Number of Hospitals	Intercept (*S.E.E.*)	Composite Output (*T*-Value)	Capacity Utilization (*T*-Value)	Intern Program (*T*-Value)	Nurses' Training Program (*T*-Value)	Post-Operative and Newborn Infections (*T*-Value)	$\bar{R}^2$ (*F*-Value)
Newfoundland	46	4731.785 (10973.414)	2143.329 (36.488)	-119.094 (-2.152)	26447.121 (1.870)	-9986.586 (-1.088)	71.568 (.302)	.989 (808.738)
Prince Edward Island	9	19307.914 (8086.063)	1530.101 (1.724)	-309.529 (-1.548)	2544.389 (.164)	3308.693 (.059)	397.573 (.462)	.980 (79.618)
Nova Scotia	49	1039.313 (47431.563)	1342.491 (4.956)	-32.645 (-.079)	-16443.016 (-.443)	45873.266 (2.337)	785.755 (5.059)	.896 (84.067)
New Brunswick	39	3161.563 (35533.285)	833.437 (2.927)	96.199 (.307)	24511.598 (1.024)	32770.078 (2.012)	4053.261 (3.086)	.917 (85.445)
Quebec	257	21367.188 (86542.750)	2313.632 (28.707)	-555.100 (-2.161)	50222.637 (2.012)	59043.848 (3.021)	280.469 (1.103)	.909 (515.351)
Ontario	307	-508.125 (65220.125)	1757.012 (26.139)	-120.049 (-.585)	83670.563 (3.897)	48997.984 (4.053)	715.602 (4.057)	.942 (999.728)
Manitoba	99	-77.273 (32233.398)	1093.735 (10.101)	83.297 (.697)	65710.563 (2.165)	57683.809 (2.438)	1513.299 (5.969)	.959 (456.190)
Saskatchewan	153	11007.891 (27712.809)	1701.966 (13.240)	-168.507 (-1.492)	79537.875 (2.574)	28273.164 (2.795)	1178.113 (3.718)	.928 (392.665)
Alberta	141	14220.559 (36364.625)	1771.614 (23.244)	-259.481 (-1.493)	122696.938 (3.648)	-3382.947 (-.267)	-319.677 (-1.338)	.953 (566.127)
British Columbia	114	2441.188 (80544.688)	1126.171 (9.817)	-34.119 (-.120)	13924.586 (.247)	106801.688 (1.992)	2028.666 (3.731)	.876 (160.829)

Source: See text.

Table B-16

ESTIMATED TOTAL COST FUNCTIONS (INCLUDING DEPRECIATION)
IN RELATION TO COMPOSITE OUTPUT AND FOUR OTHER EXPLANATORY VARIABLES FOR HOSPITALS
CANADA, BY PROVINCE, 1966

Province	Number of Hospitals	Intercept (*S.E.E.*)	Composite Output (*T*-Value)	Capacity Utilization (*T*-Value)	Intern Program (*T*-Value)	Nurses' Training Program (*T*-Value)	Deaths During or After Operations in Hospital (*T*-Value)	$\bar{R}^2$ (*F*-Value)
Newfoundland	46	2735.727 (10215.570)	2362.249 (23.362)	-121.814 (-2.386)	26976.477 (2.189)	-9836.727 (-1.245)	-1492.536 (-2.501)	.990 (934.413)
Prince Edward Island	9	21302.547 (7345.234)	1596.335 (2.276)	-347.774 (-1.854)	4541.395 (.329)	-21815.445 (-.463)	1996.066 (.950)	.984 (96.615)
Nova Scotia	49	-6738.313 (59775.734)	2269.606 (9.007)	-154.968 (-.289)	-74433.875 (-1.392)	36061.625 (1.266)	-1143.735 (-.438)	.835 (49.746)
New Brunswick	39	66.438 (39695.207)	1384.367 (5.559)	2.347 (.007)	47272.727 (1.820)	32225.785 (1.621)	2366.328 (1.034)	.897 (67.156)
Quebec	257	22329.813 (78661.125)	1869.459 (19.844)	-465.058 (-1.994)	29345.633 (1.316)	62648.484 (3.539)	4672.125 (7.368)	.925 (634.362)
Ontario	307	2262.438 (61858.152)	1596.627 (23.476)	-96.753 (-.497)	72040.938 (3.522)	45913.316 (1.002)	2524.716 (7.205)	.948 (1118.072)
Manitoba	99	-477.473 (35655.484)	1738.738 (22.056)	-24.503 (-.187)	94650.938 (2.793)	64043.047 (2.388)	-2280.961 (-3.481)	.949 (369.426)
Saskatchewan	153	12046.875 (21939.605)	928.271 (7.273)	-100.115 (-1.116)	62396.480 (2.928)	41055.109 (5.261)	6720.469 (10.469)	.955 (644.015)
Alberta	141	7610.867 (29752.961)	889.788 (7.462)	7.113 (.049)	86185.688 (3.635)	27297.758 (2.475)	4283.738 (8.327)	.968 (859.024)
British Columbia	114	-7594.125 (54692.387)	-612.329 (-3.560)	659.610 (3.305)	-54580.320 (-1.412)	-1354.888 (-.037)	12062.707 (12.506)	.943 (374.053)

Source: See text.

Table B-17

ESTIMATED TOTAL COST FUNCTIONS (INCLUDING DEPRECIATION)
IN RELATION TO COMPOSITE OUTPUT AND FOUR OTHER EXPLANATORY VARIABLES FOR HOSPITALS
CANADA, BY PROVINCE, 1966

Province	Number of Hospitals	Intercept (*S.E.E.*)	Composite Output (*T*-Value)	Capacity Utilization (*T*-Value)	Intern Program (*T*-Value)	Nurses' Training Program (*T*-Value)	Total Deaths in Hospital (*T*-Value)	$\bar{R}^2$ (*F*-Value)
Newfoundland	46	4798.316 (10959.070)	2267.061 (10.017)	-120.132 (-2.192)	25141.129 (1.773)	-10049.578 (-1.153)	-89.069 (-0.547)	.989 (810.877)
Prince Edward Island	9	17594.047 (8156.254)	2056.645 (1.920)	-317.833 (-1.548)	3833.420 (.215)	-16216.504 (-.304)	-116.829 (-.409)	.980 (78.243)
Nova Scotia	49	-19247.938 (57315.672)	1747.881 (4.839)	-116.453 (-.232)	-88039.938 (-2.124)	20857.645 (.876)	494.341 (1.995)	.849 (54.862)
New Brunswick	39	-6973.125 (33426.504)	496.384 (1.586)	30.261 (.104)	48149.715 (2.215)	25031.176 (1.598)	801.345 (3.879)	.927 (97.414)
Quebec	257	22209.625 (86358.000)	2177.965 (16.341)	-597.501 (-2.335)	58029.395 (2.403)	45030.367 (2.709)	182.680 (1.516)	.910 (517.773)
Ontario	307	-383.813 (65607.375)	1529.755 (12.526)	-159.734 (-.775)	98711.000 (4.585)	44315.770 (3.622)	281.698 (3.568)	.942 (987.251)
Manitoba	99	-1281.688 (37366.906)	2055.309 (7.506)	17.868 (.129)	71190.125 (2.017)	44177.441 (1.618)	-286.653 (-1.666)	.945 (334.696)
Saskatchewan	153	11794.383 (28404.426)	1218.810 (4.919)	-192.657 (-1.667)	109948.625 (3.700)	26249.105 (2.393)	424.376 (2.476)	.924 (372.362)
Alberta	141	14239.285 (36292.145)	1589.858 (12.626)	-271.158 (-1.560)	85468.813 (2.819)	-505.530 (-.039)	148.107 (1.529)	.953 (568.498)
British Columbia	114	6057.750 (76755.188)	-443.178 (-1.194)	-25.944 (-.096)	-20085.699 (-0.368)	128301.625 (2.646)	1254.978 (5.126)	.888 (179.288)

Source: See text.

Table B-18

ESTIMATED TOTAL COST FUNCTIONS (INCLUDING DEPRECIATION)
IN RELATION TO COMPOSITE OUTPUT AND FOUR OTHER EXPLANATORY VARIABLES FOR HOSPITALS
CANADA, BY PROVINCE, 1966

Province	Number of Hospitals	Intercept (*S.E.E.*)	Composite Output (*T*-Value)	Capacity Utilization (*T*-Value)	Intern Program (*T*-Value)	Nurses' Training Program (*T*-Value)	Part-Time as Percentage of Full-Time (*T*-Value)	$\bar{R}^2$ (*F*-Value)
Newfoundland	46	6252.895 (10858.746)	2141.028 (37.557)	-124.178 (-2.285)	28617.418 (2.183)	-9089.418 (-1.083)	-95.504 (-0.973)	.989 (826.079)
Prince Edward Island	9	19186.184 (8310.277)	1670.740 (1.936)	-296.412 (-1.444)	266.750 (.018)	-4553.410 (-.082)	-51.279 (-.200)	.979 (75.348)
Nova Scotia	49	-28422.250 (58971.145)	2299.630 (9.487)	-11.058 (-.021)	-86101.938 (-2.017)	31692.469 (1.313)	483.114 (1.174)	.840 (51.349)
New Brunswick	39	-3766.625 (40218.348)	1584.279 (8.793)	-27.451 (-.077)	43517.117 (1.664)	42260.164 (2.299)	178.261 (.437)	.894 (65.250)
Quebec	257	20801.688 (86741.813)	2346.793 (30.773)	-565.188 (-2.167)	56882.613 (2.346)	61079.813 (3.127)	28.859 (.259)	.909 (512.758)
Ontario	307	-2970.813 (66932.875)	1925.449 (35.514)	-159.570 (-0.759)	92189.313 (4.200)	50058.270 (4.012)	60.994 (0.659)	.939 (946.175)
Manitoba	99	-344.027 (37712.012)	1632.274 (21.369)	-95.610 (-.590)	75953.813 (2.142)	41734.332 (1.518)	133.610 (.982)	.943 (328.260)
Saskatchewan	153	9963.719 (28904.539)	1758.096 (12.996)	-189.649 (-1.612)	145186.438 (5.565)	37987.816 (3.676)	94.195 (0.915)	.922 (358.579)
Alberta	141	11260.410 (36557.633)	1750.662 (23.472)	-243.793 (-1.390)	98390.563 (3.375)	-3232.205 (-0.252)	62.681 (0.591)	0.952 (559.881)
British Columbia	114	-6094.125 (85531.625)	1416.959 (15.676)	55.970 (0.167)	46042.367 (0.779)	182019.250 (3.450)	62.848 (0.346)	0.860 (140.176)

Source: See text.

Table B-19

ESTIMATED TOTAL COST FUNCTIONS (INCLUDING DEPRECIATION)
IN RELATION TO COMPOSITE OUTPUT AND FOUR OTHER EXPLANATORY VARIABLES FOR HOSPITALS
CANADA, BY PROVINCE, 1966

Province	Number of Hospitals	Intercept (*S.E.E.*)	Composite Output (*T*-Value)	Capacity Utilization (*T*-Value)	Intern Program (*T*-Value)	Nurses' Training Program (*T*-Value)	Staff Separations as Percentage of Staff (*T*-Value)	$\overline{R}^2$ (*F*-Value)
Newfoundland	46	4086.676 (10960.492)	2147.874 (37.559)	-115.519 (-2.046)	27968.969 (2.116)	-8906.488 (-1.051)	7.275 (0.426)	0.989 (810.665)
Prince Edward Island	9	17636.375 (8358.801)	1776.773 (1.697)	-304.110 (-1.338)	-1007.907 (-0.058)	-10500.059 (-0.161)	-18.440 (-0.042)	0.979 (74.468)
Nova Scotia	49	-20272.188 (59221.617)	2259.496 (9.191)	-134.180 (-0.259)	-87435.500 (-2.041)	24612.566 (0.997)	429.656 (1.002)	0.839 (50.843)
New Brunswick	39	-20249.563 (39393.813)	1525.592 (8.659)	73.575 (0.206)	38412.125 (1.479)	39936.941 (2.239)	570.558 (1.263)	0.899 (68.289)
Quebec	257	22321.500 (86752.188)	2344.545 (30.947)	-577.798 (-2.251)	56897.160 (2.343)	60996.383 (3.115)	11.969 (0.079)	0.909 (512.623)
Ontario	307	-2604.500 (66912.500)	1912.178 (34.025)	-173.663 (-0.825)	93626.125 (4.274)	48356.234 (3.885)	151.938 (0.784)	0.939 (946.789)
Manitoba	99	-15024.926 (37461.836)	1607.034 (21.617)	28.751 (0.205)	77899.000 (2.212)	37346.285 (1.362)	335.338 (1.491)	0.944 (332.908)
Saskatchewan	153	10933.734 (28851.434)	1748.995 (13.082)	-218.634 (-1.828)	146922.625 (5.673)	34737.168 (3.335)	117.696 (1.174)	0.922 (360.009)
Alberta	141	18522.777 (36505.008)	1744.322 (23.544)	-249.987 (-1.433)	98637.563 (3.395)	-2511.262 (-0.196)	-88.285 (-0.859)	0.952 (561.574)
British Columbia	114	-1583.375 (85555.438)	1414.288 (15.697)	-8.411 (-0.027)	46460.094 (0.785)	181111.938 (3.423)	75.437 (0.239)	0.860 (140.086)

Source: See text.

Table B-20

ESTIMATED TOTAL COST FUNCTIONS (OPERATING COST ONLY)
IN RELATION TO COMPOSITE OUTPUT AND TWO OTHER EXPLANATORY VARIABLES
FOR HOSPITALS BY BED SIZE, CANADA, 1966

Bed Size of Hospital	Number of Hospitals	Intercept (*S.E.E.*)	Composite Output (*T*-Value)	Composite Output^2 (*T*-Value)	Capacity Utilization (*T*-Value)	$\bar{R}^2$ (*F*-Value)
1-9	32	2118.861 (838.467)	1774.595 (2.713)	-129.533 (-1.470)	-3.798 (-.502)	.529 (12.613)
10-24	200	4672.227 (2230.258)	1527.200 (6.937)	-4.916 (-.397)	-39.622 (-3.826)	.696 (153.118)
25-49	190	4293.695 (4787.293)	2389.472 (6.634)	-18.616 (-1.720)	-120.261 (-4.065)	.698 (146.325)
50-99	146	-4998.137 (9541.219)	2657.668 (5.187)	-9.710 (-1.322)	-130.531 (-1.848)	.761 (154.956)
100-199	127	18696.813 (25848.195)	1941.799 (2.842)	-.282 (-.060)	-142.404 (-.588)	.672 (86.994)
200-299	62	-55416.375 (43428.977)	4539.129 (2.612)	-8.862 (-1.339)	-1290.758 (-2.095)	.609 (32.635)
300-499	54	179082.500 (76577.875)	1088.561 (.888)	2.814 (1.015)	-1254.910 (-1.077)	.691 (40.443)
500-999	29	1465702.000 (172761.125)	-402.590 (-.170)	2.936 (1.014)	-10374.832 (-2.368)	.580 (13.909)
1000+	8	-6227196.000 (169674.500)	13803.828 (2.857)	-7.173 (-2.595)	19893.363 (1.409)	.755 (8.208)

Source: See text.

Table B-21

ESTIMATED TOTAL COST FUNCTIONS (INCLUDING ASSET VALUE)
IN RELATION TO COMPOSITE OUTPUT AND TWO OTHER EXPLANATORY VARIABLES
FOR HOSPITALS BY BED SIZE, CANADA, 1966

Bed Size of Hospital	Number of Hospitals	Intercept (*S.E.E.*)	Composite Output (*T*-Value)	Composite Output^2 (*T*-Value)	Capacity Utilization (*T*-Value)	$\bar{R}^2$ (*F*-Value)
1-9	32	2148.543 (905.178)	2197.495 (3.112)	-197.662 (-2.078)	-3.832 (-.469)	.495 (11.145)
10-24	200	4794.070 (3348.503)	2108.129 (6.378)	-27.284 (-1.468)	-52.084 (-3.346)	.569 (88.492)
25-49	190	6356.574 (6593.813)	2874.004 (5.793)	-21.814 (-1.464)	-166.282 (-4.081)	.631 (108.716)
50-99	146	3490.367 (12660.117)	3214.026 (4.727)	-10.512 (-1.079)	-313.353 (-3.343)	.718 (123.812)
100-199	127	54667.000 (31784.387)	2338.709 (2.784)	-.254 (-.044)	-645.696 (-2.167)	.640 (75.740)
200-299	62	-36545.438 (57039.563)	4820.684 (2.112)	-9.305 (-1.070)	-1347.908 (-1.666)	.507 (21.878)
300-499	54	372484.313 (95717.875)	474.249 (.310)	5.210 (1.503)	-2519.939 (-1.730)	.656 (34.676)
500-999	29	2346514.000 (231463.750)	-432.653 (-.137)	3.351 (.864)	-19772.000 (-3.368)	.553 (12.539)
1000+	8	-7706258.000 (305685.500)	15970.441 (1.834)	-8.522 (-1.771)	30081.520 (1.183)	.454 (2.943)

Source: See text.

Table B-22

ESTIMATED TOTAL COST FUNCTIONS (INCLUDING DEPRECIATION)
IN RELATION TO COMPOSITE OUTPUT AND TWO OTHER EXPLANATORY VARIABLES
FOR HOSPITALS BY BED SIZE, CANADA, 1966

Bed Size of Hospital	Number of Hospitals	Intercept (*S.E.E.*)	Composite Output (T-Value)	Composite Output^2 (T-Value)	Capacity Utilization (T-Value)	$\bar{R}^2$ (F-Value)
1-9	32	2302.512 (928.181)	1856.214 (2.564)	-152.421 (-1.563)	-2.303 (-.275)	.461 (9.855)
10-24	200	4847.953 (2449.945)	1721.902 (7.120)	-12.150 (-.893)	-43.181 (-3.796)	.677 (140.296)
25-49	190	5376.344 (5026.414)	2601.207 (6.878)	-23.137 (-2.037)	-138.603 (-4.462)	.687 (139.581)
50-99	146	-3391.969 (9866.438)	2790.269 (5.266)	-10.094 (-1.329)	-154.340 (-2.113)	.765 (158.417)
100-199	127	22692.625 (26208.449)	2165.858 (3.127)	-1.228 (-.257)	-237.644 (-.967)	.681 (90.842)
200-299	62	-50139.813 (44772.750)	4678.184 (2.611)	-9.140 (-1.339)	-1344.899 (-2.118)	.608 (32.531)
300-499	54	179933.500 (77070.625)	1463.163 (1.186)	2.137 (.766)	-1579.182 (-1.347)	.700 (42.222)
500-999	29	1472917.000 (174255.063)	83.606 (.035)	2.425 (.835)	-11294.164 (-2.556)	.595 (14.690)
1000+	8	-6440534.000 (157731.000)	14120.984 (3.143)	-7.265 (-2.828)	20798.121 (1.585)	.812 (11.050)

Source: See text.

Table B-23

ESTIMATED TOTAL COST FUNCTIONS (INCLUDING DEPRECIATION)
IN RELATION TO COMPOSITE OUTPUT AND TWO OTHER EXPLANATORY VARIABLES
FOR HOSPITALS BY BED SIZE,* CANADA, 1966

Bed Size of Hospital	Number of Hospitals	Intercept (*S.E.E.*)	Composite Output (T-Value)	Composite Output^2 (T-Value)	Capacity Utilization (T-Value)	$\bar{R}^2$ (F-Value)
1-9	32	2302.512 (928.181)	1856.214 (2.564)	-152.421 (-1.563)	-2.303 (-.275)	.461 (9.855)
10-24	200	4533.727 (2712.735)	1627.448 (6.261)	-9.429 (-.643)	-34.127 (-2.756)	.629 (115.607)
25-49	190	3661.461 (5035.691)	2776.159 (7.568)	-28.683 (-2.620)	-132.642 (-4.305)	.697 (146.944)
50-99	146	-3391.969 (9866.438)	2790.269 (5.266)	-10.094 (-1.329)	-154.340 (-2.133)	.765 (158.427)
100-199	127	22692.449 (26208.449)	2165.858 (3.127)	-1.228 (-.257)	-237.644 (-.967)	.681 (90.842)
200-299	62	-50139.813 (44772.750)	4678.184 (2.611)	-9.140 (-1.339)	-1344.899 (-2.118)	.608 (32.531)
300-499	54	179933.500 (77070.625)	1463.163 (1.186)	2.137 (.766)	-1579.182 (-1.347)	.700 (42.222)
500-999	29	1556763.000 (171736.313)	-290.553 (-.130)	2.836 (1.026)	-11316.090 (-2.598)	.595 (15.213)
1000+	8	-6440534.000 (157731.000)	14120.984 (3.143)	-7.265 (-2.828)	20798.121 (1.584)	.812 (11.050)

* Those hospitals having a zero value for one or more variables are included in these regressions.

Source: See text.

Table B-24

ESTIMATED TOTAL COST FUNCTIONS (INCLUDING DEPRECIATION)
IN RELATION TO COMPOSITE OUTPUT AND FOUR OTHER EXPLANATORY VARIABLES
FOR HOSPITALS BY BED SIZE, CANADA, 1966

Bed Size of Hospital	Number of Hospitals	Intercept (*S.E.E.*)	Composite Output (*T*-Value)	Composite Output^2 (*T*-Value)	Capacity Utilization (*T*-Value)	Intern Program (*T*-Value)	Nurses' Training Program (*T*-Value)	$\bar{R}^2$ (*F*-Value)
1-9	32							
10-24	200							
25-49	190							
50-99	146	-3707.629 (9890.809)	2274.497 (5.188)	-9.868 (-1.287)	-148.476 (-2.019)	11418.328 (1.146)	374.918 (.097)	.764 (94.843)
100-199	127	11628.938 (24774.508)	2282.457 (3.473)	-3.836 (-.840)	-111.842 (-.477)	39659.445 (3.031)	13417.055 (2.501)	.715 (64.327)
200-299	62	-39508.188 (45481.496)	4480.898 (2.394)	-8.345 (-1.166)	-1293.685 (-1.900)	-5806.059 (-.380)	-2695.170 (-.199)	.595 (18.956)
300-499	54	167290.625 (73530.500)	1192.812 (1.008)	2.118 (.793)	-1269.435 (-1.113)	52687.773 (2.295)	21573.254 (.825)	.727 (29.217)
500-999	29	-1244.359 (21091.629)	816.809 (1.888)	36.282 (7.432)	44.939 (.320)	16242.047 (1.120)	-12564.766 (-.787)	.951 (205.535)
1000+	8							

Source: See text.

Table B-25

ESTIMATED TOTAL COST FUNCTIONS (INCLUDING DEPRECIATION)
IN RELATION TO COMPOSITE OUTPUT
FOR HOSPITALS BY BED SIZE, CANADA, 1966

Bed Size of Hospital	Number of Hospitals	Intercept *(S.E.E.)*	Composite Output (*T*-Value)	$\bar{R}^2$ (*F*-Value)
1-9	32	3717.021 (935.005)	807.656 (5.170)	.454 (267.728)
10-24	200	3488.844 (2525.538)	1332.222 (19.558)	.657 (382.511)
25-49	190	4294.246 (5270.836)	1561.585 (19.025)	.656 (361.957)
50-99	146	-769.266 (9987.754)	1966.486 (21.409)	.759 (458.348)
100-199	127	14008.250 (26096.230)	1926.029 (16.551)	.684 (273.935)
200-299	62	12139.000 (46047.926)	2115.719 (9.332)	.585 (87.095)
300-499	54	-4069.813 (78520.750)	2203.989 (10.872)	.689 (118.200)
500-999	29	178374.438 (193439.063)	1962.023 (5.390)	.500 (29.050)
1000+	8	395818.000 (241450.125)	1728.252 (3.139)	.558 (9.855)

Source: See text.

Table B-26

ESTIMATED TOTAL COST FUNCTIONS (INCLUDING DEPRECIATION)
IN RELATION TO COMPOSITE OUTPUT AND ONE OTHER EXPLANATORY VARIABLE
FOR HOSPITALS BY BED SIZE, CANADA, 1966

Bed Size of Hospital	Number of Hospitals	Intercept (*S.E.E.*)	Composite Output (*T*-Value)	Capacity Utilization (*T*-Value)	$\bar{R}^2$ (*F*-Value)
1-9	32	3715.373 (950.974)	801.196 (2.987)	.251 (.030)	.435 (12.920)
10-24	200	5376.027 (2448.695)	1519.088 (18.254)	-40.834 (-3.691)	.678 (210.259)
25-49	190	9382.000 (5068.539)	1862.950 (17.150)	-122.104 (-4.038)	.682 (203.866)
50-99	146	6275.707 (9892.926)	2102.666 (18.307)	-140.941 (-1.943)	.764 (235.476)
100-199	127	27118.625 (26109.102)	1991.556 (14.661)	-222.113 (-.936)	.684 (137.271)
200-299	62	85947.313 (45071.918)	2300.601 (9.498)	-1199.559 (-1.904)	.603 (47.267)
300-499	54	115945.563 (76754.688)	2392.205 (10.739)	-1958.291 (-1.850)	.702 (63.561)
500-999	29	1157944.000 (173209.125)	2043.548 (6.244)	-11964.305 (-2.770)	.599 (21.953)
1000+	8	-992977.000 (244309.875)	1469.774 (2.360)	18830.754 (.928)	.548 (5.243)

Source: See text.

Table B-27

ESTIMATED TOTAL COST FUNCTIONS (INCLUDING DEPRECIATION)
IN RELATION TO COMPOSITE OUTPUT AND TWO OTHER EXPLANATORY VARIABLES
FOR HOSPITALS BY BED SIZE, CANADA, 1966

Bed Size of Hospital	Number of Hospitals	Intercept (*S.E.E.*)	Composite Output (*T*-Value)	Capacity Utilization (*T*-Value)	Average Length of Stay (*T*-Value)	$\bar{R}^2$ (*F*-Value)
1-9	32	4620.191 (927.528)	714.438 (2.673)	2.373 (.285)	-100.892 (-1.576)	.462 (9.882)
10-24	200	7416.223 (2395.313)	1506.814 (18.489)	-38.937 (-3.592)	-282.942 (-3.143)	.692 (149.782)
25-49	190	9484.406 (5050.727)	1839.055 (16.814)	-114.569 (-3.752)	-38.774 (-1.524)	.684 (137.645)
50-99	146	6098.977 (9923.465)	2111.868 (17.867)	-150.313 (-1.937)	69.155 (.348)	.762 (156.059)
100-199	127	20849.000 (26057.223)	1991.558 (14.691)	-247.755 (-1.043)	858.719 (1.223)	.685 (92.377)
200-299	62	73755.750 (45416.637)	2318.723 (9.267)	-1216.531 (-1.910)	1112.199 (.328)	.597 (31.071)
300-499	54	108550.438 (77479.375)	2397.019 (10.611)	-2008.066 (-1.840)	948.537 (.225)	.697 (41.602)
500-999	29	1073604.000 (176306.375)	2056.444 (6.125)	-11784.844 (-2.658)	5481.938 (.307)	.585 (14.158)
1000+	8	1323349.000 (272887.313)	1396.998 (1.286)	21337.750 (.583)	13682.883 (.087)	.436 (2.804)

Source: See text.

Table B-28

ESTIMATED TOTAL COST FUNCTIONS (INCLUDING DEPRECIATION)
IN RELATION TO COMPOSITE OUTPUT AND THREE OTHER EXPLANATORY VARIABLES
FOR HOSPITALS BY BED SIZE, CANADA, 1966

Bed Size of Hospital	Number of Hospitals	Intercept (*S.E.E.*)	Composite Output (*T*-Value)	Capacity Utilization (*T*-Value)	Intern Program (*T*-Value)	Nurses' Training Program (*T*-Value)	$\bar{R}^2$ (*F*-Value)
1-9	32						
10-24	200						
25-49	190						
50-99	146	5754.313 (9913.316)	2102.264 (18.266)	-135.775 (-1.860)	11643.840 (1.166)	953.605 (.248)	.763 (117.607)
100-199	127	25532.750 (24744.738)	1744.456 (11.971)	-67.942 (-.298)	38313.945 (2.953)	13129.180 (2.456)	.716 (80.426)
200-299	62	84085.063 (45625.340)	2316.944 (9.338)	-1141.078 (-1.702)	-9707.996 (-.650)	-4109.734 (-.303)	.593 (23.208)
300-499	54	103972.438 (73249.125)	2111.618 (8.836)	-1630.127 (-1.565)	53471.277 (2.340)	19953.320 (.768)	.729 (36.645)
500-999	29	1244.793 (30614.563)	3778.193 (15.440)	-372.446 (-1.992)	-24164.414 (-1.238)	31627.277 (1.471)	.896 (115.389)
1000+	8						

Source: See text.

Table B-29

ESTIMATED TOTAL COST FUNCTIONS (INCLUDING DEPRECIATION)
IN RELATION TO COMPOSITE OUTPUT AND FOUR OTHER EXPLANATORY VARIABLES
FOR HOSPITALS BY BED SIZE, CANADA, 1966

Bed Size of Hospital	Number of Hospitals	Intercept *(S.E.E.)*	Composite Output (*T*-Value)	Capacity Utilization (*T*-Value)	Intern Program (*T*-Value)	Nurses' Training Program (*T*-Value)	Newborn & Post-Operative Infections (*T*-Value)	$\overline{R}^2$ (*F*-Value)
1-9	32							
10-24	200							
25-49	190							
50-99	146	6976.863 (9856.082)	2145.743 (18.260)	-155.502 (-2.113)	10621.695 (1.067)	1981.166 (.511)	-290.073 (-1.625)	.766 (95.710)
100-199	127	25926.438 (24835.773)	1759.482 (11.477)	-76.699 (-.333)	38523.121 (2.955)	13053.461 (2.430)	-55.923 (-.327)	.714 (63.891)
200-299	62	89141.563 (45902.066)	2238.233 (7.818)	-1103.369 (-1.628	-11072.820 (-.727)	-5975.305 (-.426)	125.816 (.561)	.588 (18.406)
300-499	54	102621.438 (69252.000)	2227.794 (9.674)	-1596.087 (-1.621)	65927.438 (2.980)	17062.344 (.694)	-625.073 (-2.611)	.758 (34.162)
500-999	29							
1000+	8							

Source: See text.

Table B-30

ESTIMATED TOTAL COST FUNCTIONS (INCLUDING DEPRECIATION)
IN RELATION TO COMPOSITE OUTPUT AND TWO OTHER EXPLANATORY VARIABLES FOR HOSPITALS
BY TYPE OF OPERATION, CANADA, 1966

Type of Operation	Number of Hospitals	Intercept (*S.E.E.*)	Composite Output (*T*-Value)	Composite Output^2 (*T*-Value)	Capacity Utilization (*T*-Value)	$\bar{R}^2$ (*F*-Value)
Lay Corporation	373	39593.063 (59912.484)	2606.101 (44.549)	-.393 (-5.349)	-757.286 (-3.970)	.960 (2990.702)
Religious Organization	249	30683.500 (55076.055	2178.365 (20.822)	0.301 (1.115)	-468.005 (-2.246)	.937 (1222.118)
Municipal	300	6694.836 (13842.051)	1959.711 (68.032)	0.471 (8.736)	-105.694 (-2.191)	.993 (13238.969)
Provincial	27	-5304.125 (65352.086)	2686.372 (9.674)	-1.138 (-2.321)	44.304 (0.065)	.961 (211.741)
D.N.H.W.	7	-35306.813 (28905.336)	-630.312 (-.703)	15.719 (4.672)	1700.287 (2.143)	.990 (194.544)

Source: See text.

Table B-31

ESTIMATED TOTAL COST FUNCTIONS (INCLUDING DEPRECIATION)
IN RELATION TO COMPOSITE OUTPUT AND ONE OTHER EXPLANATORY VARIABLE FOR HOSPITALS
BY TYPE OF OPERATION, CANADA, 1966

Type of Operation	Number of Hospitals	Intercept (*S.E.E.*)	Composite Output (*T*-Value)	Capacity Utilization (*T*-Value)	$\overline{R}^2$ (*F*-Value)
Lay Corporation	373	43239.750 (62106.867)	2322.376 (90.825)	-643.703 (-3.276)	.957 (4161.340)
Religious Organization	249	28174.750 (55102.984)	2287.113 (60.436)	-486.692 (-2.342)	.937 (1830.765)
Red Cross	4	-152604.750 (11392.000)	692.232 (3.033)	2635.295 (4.984)	.958 (34.894)
Municipal	300	6186.691 (15498.551)	2191.890 (176.165)	-146.063 (-2.717)	.991 (15809.891)
Provincial	27	-20267.438 (71074.000)	2072.932 (22.376)	427.027 (.592)	.953 (266.254)
D.N.H.W.	7	18391.062 (72029.376)	3480.525 (8.127)	-1041.189 (-.782)	.936 (45.236)

Source: See text.

Table B-32

ESTIMATED TOTAL COST FUNCTIONS (INCLUDING DEPRECIATION)
IN RELATION TO COMPOSITE OUTPUT AND ONE OTHER EXPLANATORY VARIABLE FOR HOSPITALS
BY TYPE OF SERVICE, CANADA, 1966

Type of Service	Number of Hospitals	Intercept (*S.E.E.*)	Composite Output (*T*-Value)	Capacity Utilization (*T*-Value)	$\bar{R}^2$ (*F*-Value)
General	851	16614.750 (50117.609)	2287.259 (146.762)	-286.376 (-2.748)	.963 (10986.715)
Chronic-Convalescent	80	29611.016 (19310.320)	1626.423 (35.097)	-366.367 (-1.819)	.941 (623.788)
Rehabilitation	13	58048.113 (35516.063)	2523.746 (6.437)	-668.901 (-1.168)	.815 (27.412)
Miscellaneous	17	12580.688 (79754.813)	3419.581 (9.653)	-455.361 (-.504)	.862 (50.815)

Source: See text.

Table B-33

ESTIMATED FUNCTIONS OF COMPOSITE OUTPUT
IN RELATION TO RATED BED CAPACITY FOR HOSPITALS
BY PROVINCE, CANADA, 1966

Province	Number of Hospitals	Intercept *(S.E.E.)*	Rated Bed Capacity *(T-Value)*	$\bar{R}^2$ *(F-Value)*
Newfoundland	46	-1.091 (20.501)	.419 (14.075)	.814 (198.115)
Prince Edward Island	9	1.416 (11.450)	.422 (8.360)	.896 (69.898)
Nova Scotia	49	-7.991 (15.967)	.547 (27.602)	.941 (15.967)
New Brunswick	39	-5.196 (12.021)	.529 (30.218)	.960 (913.110)
Quebec	257	-9.426 (39.120)	.549 (40.063)	.862 (1605.050)
Ontario	307	-5.455 (32.336)	.540 (62.898)	.928 (3956.147)
Manitoba	99	-4.976 (21.907)	.536 (35.803)	.929 (1281.822)
Saskatchewan	153	-1.873 (5.136)	.429 (93.498)	.983 (8741.844)
Alberta	141	-8.738 (17.829)	.536 (54.834)	.956 (3006.797)
British Columbia	114	-8.799 (22.263)	.585 (58.265)	.968 (3394.796)

Source: See text.

Table B-34

ESTIMATED LOGARITHMIC FUNCTIONS OF COMPOSITE OUTPUT
IN RELATION TO RATED BED CAPACITY FOR HOSPITALS
BY PROVINCE, CANADA, 1966

Province	Number of Hospitals	Intercept (*S.E.E.*)	Rated Bed Capacity (*T*-Value)	$\overline{R}^2$ (*F*-Value)
Newfoundland	46	4.526 (.728)	1.342 (14.385)	.821 (206.925)
Prince Edward Island	9	5.536 (.418)	1.112 (7.659)	.878 (58.653)
Nova Scotia	49	5.728 (.286)	1.074 (30.694)	.951 (942.124)
New Brunswick	39	5.812 (.275)	1.061 (25.272)	.944 (638.673)
Quebec	257	5.120 (.47)	1.194 (49.178)	.904 (2418.448)
Ontario	307	5.354 (.311)	1.157 (80.382)	.955 (6461.328)
Manitoba	99	4.786 (.615)	1.786 (26.569)	.878 (705.930)
Saskatchewan	153	5.490 (.347)	1.112 (41.645)	.919 (1734.270)
Alberta	141	5.443 (.236)	1.110 (56.113)	.957 (3148.677)
British Columbia	114	3.933 (.528)	1.477 (37.302)	.925 (1391.454)

Source: See text.

Table B-35

ESTIMATED FUNCTIONS OF ADMINISTRATION EXPENSES
IN RELATION TO COMPOSITE OUTPUT AND ONE OTHER EXPLANATORY VARIABLE FOR HOSPITALS
BY PROVINCE, CANADA, 1966

Province	Number of Hospitals	Intercept (*S.E.E.*)	Composite Output (*T*-Value)	Composite Output^2 (*T*-Value)	$\overline{R}^2$ (*F*-Value)
Newfoundland	35	782.510 (926.844)	50.061 (5.714)	.078 (2.454)	.941 (272.432)
Prince Edward Island	9	210.880 (135.990)	30.971 (2.893)	.184 (1.596)	.994 (627.340)
Nova Scotia	47	652.398 (983.228)	46.790 (7.258)	.153 (7.461)	.974 (852.982)
New Brunswick	38	364.071 (376.508)	34.384 (11.534)	.173 (14.848)	.993 (2770.046)
Quebec	167	-456.855 (3784.153)	90.999 (15.059)	.009 (.891)	.901 (756.314)
Ontario	205	415.402 (4283.012)	107.128 (20.174)	.033 (4.167)	.942 (1652.500)
Manitoba	81	240.729 (1327.546)	83.974 (16.683)	-.009 (-.961)	.965 (1109.930)
Saskatchewan	143	41.471 (1117.544)	102.012 (14.771)	.002 (.078)	.930 (938.595)
Alberta	133	-72.339 (1125.717)	77.433 (21.657)	-.002 (-.351)	.971 (2224.930)
British Columbia	99	-148.969 (1657.397)	101.733 (27.567)	-.014 (-3.839)	.978 (2139.918)

Source: See text.

Table B-36

ESTIMATED FUNCTIONS OF ADMINISTRATION EXPENSES
IN RELATION TO COMPOSITE OUTPUT FOR HOSPITALS
BY PROVINCE, CANADA, 1966

Province	Number of Hospitals	Intercept *(S.E.E.)*	Composite Output *(T-Value)*	$\bar{R}^2$ *(F-Value)*
Newfoundland	46	278.401 (886.593)	71.492 (25.723)	.736 (661.678)
Prince Edward Island	9	48.991 (150.078)	47.925 (32.064)	.992 (1028.108)
Nova Scotia	49	-370.196 (2698.219)	81.607 (13.734)	.796 (188.633)
New Brunswick	39	-562.054 (1733.450)	70.753 (15.124)	.857 (228.728)
Quebec	257	-875.816 (3862.352)	92.506 (40.409)	.864 (1632.921)
Ontario	307	-874.227 (4895.348)	123.292 (53.162)	.902 (2826.209)
Manitoba	99	180.797 (1967.921)	75.988 (31.411)	.910 (986.629)
Saskatchewan	153	-21.077 (1503.803)	97.114 (31.277)	.865 (978.223)
Alberta	141	-133.327 (1700.868)	73.883 (43.438)	.931 (1886.896)
British Columbia	114	365.178 (4448.953)	76.369 (22.631)	.819 (512.155)

Source: See text.

Table B-37

ESTIMATED FUNCTIONS OF ADMINISTRATION EXPENSES IN RELATION TO COMPOSITE OUTPUT AND THREE OTHER EXPLANATORY VARIABLES FOR HOSPITALS BY PROVINCE, CANADA, 1966

Province	Number of Hospitals	Intercept (*S.E.E.*)	Composite Outcome (*T*-Value)	Average Length of Stay (*T*-Value)	Staff Separations as Percentage of Staff (*T*-Value)	Part-Time as Percentage of Full-Time (*T*-Value)	$\overline{R}^2$ (*F*-Value)
Newfoundland	28	-969.127 (1063.787)	62.771 (9.239)	144.918 (1.378)	8.921 (0.868)	-1.407 (-0.072)	0.934 (96.183)
Prince Edward Island	8	-363.185 (83.586)	49.716 (32.061)	6.850 (2.688)	7.789 (4.113)	3.172 (0.419)	0.997 (672.328)
Nova Scotia	37	-745.496 (1595.970)	96.135 (22.329)	52.526 (1.181)	-24.134 (-1.523)	12.875 (1.002)	0.942 (148.420)
New Brunswick	35	-1208.960 (1076.369)	78.348 (22.544)	0.142 (0.006)	4.848 (0.381)	23.382 (1.950)	0.949 (160.234)
Quebec	158	-1488.910 (3741.267)	96.018 (37.464)	-16.180 (-2.929)	37.810 (2.237)	2.030 (0.224)	0.905 (374.348)
Ontario	202	-465.828 (4481.773)	127.189 (51.011)	-10.672 (-1.741)	-1.203 (-0.056)	2.211 (0.150)	0.937 (745.561)
Manitoba	79	-141.731 (1322.628)	77.974 (42.672)	5.157 (0.571)	17.842 (1.694)	-4.073 (-0.611)	0.966 (558.184)
Saskatchewan	132	-583.308 (1150.915)	100.734 (34.542)	88.183 (1.487)	-2.006 (-0.467)	1.775 (0.384)	0.931 (444.006)
Alberta	129	555.271 (1083.055)	76.163 (67,859)	-4.942 (-3.309)	-7.666 (-2.304)	0.477 (0.129)	0.974 (1201.972)
British Columbia	95	663.305 (1714.794)	87.904 (60.537)	-10.049 (-3.272)	4.129 (0.554)	-6.561 (-1.190)	0.977 (993.929)

Source: See text.

Table B-38

ESTIMATED FUNCTIONS OF STAFF SEPARATIONS AS PERCENTAGE OF FULL-TIME HOSPITAL PERSONNEL IN RELATION TO COMPOSITE OUTPUT FOR HOSPITALS BY PROVINCE, CANADA, 1966

Province	Number of Hospitals	Intercept (*S.E.E.*)	Composite Output (*T*-Value)	$\bar{R}^2$ (*F*-Value)
Newfoundland	41	85.235 (103.054)	-.269 (-.823)	-.008 (.677)
Prince Edward Island	8	33.455 (19.164)	-.135 (-.675)	.084 (.456)
Nova Scotia	42	29.686 (18.851)	.111 (2.506)	.114 (6.282)
New Brunswick	37	24.566 (14.361)	.076 (2.045)	.081 (4.184)
Quebec	220	41.687 (35.688)	-.036 (-1.630)	.008 (2.658)
Ontario	242	33.909 (16.486)	.027 (3.275)	.039 (10.724)
Manitoba	96	35.418 (16.491)	.036 (1.783)	.022 (3.181)
Saskatchewan	145	37.481 (23.385)	.035 (.719)	.003 (.517)
Alberta	138	59.145 (29.502)	-.008 (-.255)	-.007 (.065)
British Columbia	103	40.793 (24.429)	.000 (.017)	-.010 (.000)

Source: See text.

Table B-39

ESTIMATED FUNCTIONS OF ACCUMULATED PAID HOURS OF HOSPITAL PERSONNEL IN RELATION TO COMPOSITE OUTPUT FOR HOSPITALS BY PROVINCE, CANADA, 1966

Province	Number of Hospitals	Intercept *(S.E.E.)*	Composite Output *(T-Value)*	$\overline{R}^2$ *(F-Value)*
Newfoundland	27	-.339 (123.682)	9.107 (22.823)	.952 (520.910)
Prince Edward Island	9	-22.850 (38.498)	7.810 (20.369)	.981 (414.878)
Nova Scotia	48	-24.212 (105.621)	8.838 (37.823)	.968 (1430.548)
New Brunswick	39	13.125 (65.794)	8.555 (48.179)	.984 (2321.207)
Quebec	253	-55.674 (213.225)	9.249 (71.884)	.953 (5167.355)
Ontario	267	-33.550 (142.628)	8.223 (118.967)	.982 (14153.086)
Manitoba	98	-9.803 (65.375)	8.707 (106.178)	.991 (11273.797)
Saskatchewan	153	-33.734 (97.635)	10.585 (52.505)	.948 (2756.777)
Alberta	139	-18.024 (59.024)	7.689 (129.379)	.992 (16738.949)
British Columbia	113	-25.191 (109.400)	7.394 (83.600)	.984 (6988.883)

Source: See text.

Table B-40

ESTIMATED FUNCTIONS OF ACCUMULATED PAID HOURS OF HOSPITAL PERSONNEL IN RELATION TO COMPOSITE OUTPUT AND THREE OTHER EXPLANATORY VARIABLES FOR HOSPITALS BY PROVINCE, CANADA, 1966

Province	Number of Hospitals	Intercept (*S.E.E.*)	Composite Output (*T*-Value)	Average Length of Stay (*T*-Value)	Staff Separations as Percentage of Staff (*T*-Value)	Part-Time as Percentage of Full-Time (*T*-Value)	$\overline{R}^2$ (*F*-Value)
Newfoundland	17	191.345 (162.233)	10.090 (8.719)	-20.656 (-1.008)	-1.075 (-0.521)	0.052 (0.056)	0.939 (63.068)
Prince Edward Island	8	-125.288 (40.434)	8.478 (10.061)	1.742 (1.471)	0.953 (0.789)	1.860 (0.451)	0.980 (87.558)
Nova Scotia	38	-13.761 (111.063)	9.252 (31.008)	2.826 (0.934)	-1.804 (-1.733)	0.063 (0.071)	0.969 (290.514)
New Brunswick	36	77.705 (76.117)	8.380 (36.390)	-2.180 (-1.416)	-0.625 (-0.654)	-0.942 (-1.050)	0.980 (440.607)
Quebec	215	-27.684 (226.306)	9.216 (61.871)	-0.811 (-3.309)	0.078 (0.169)	0.204 (0.424)	0.952 (1054.398)
Ontario	235	-19.789 (151.415)	8.242 (101.167)	-0.238 (-1.535)	-0.381 (-0.619)	0.150 (0.395)	0.981 (2994.637)
Manitoba	88	-29.214 (69.040)	8.684 (93.207)	-0.360 (-0.821)	0.738 (1.549)	-0.091 (-0.279)	0.991 (2494.459)
Saskatchewan	135	-35.501 (80.833)	11.061 (61.099)	-2.958 (-7.734)	0.063 (0.214)	0.720 (2.259)	0.968 (1016.381)
Alberta	133	23.572 (53.655)	7.691 (138.917)	-0.375 (-5.088)	-0.537 (-3.392)	0.101 (0.645)	0.993 (5004.762)
British Columbia	99	-37.277 (117.499)	7.403 (74.728)	-0.193 (-0.919)	0.294 (0.577)	0.039 (0.105)	0.984 (1488.256)

Source: See text.

Table B-41

ESTIMATED FUNCTIONS OF PLANT ASSET VALUE
IN RELATION TO COMPOSITE OUTPUT FOR HOSPITALS
BY PROVINCE, CANADA, 1966

Province	Number of Hospitals	Intercept *(S.E.E.)*	Composite Output *(T-Value)*	$\bar{R}^2$ *(F-Value)*
Newfoundland	30	11839.625 (179015.000)	5890.348 (9.978)	.773 (99.553)
Prince Edward Island	8	-16388.250 (28324.941	3152.763 (10.749)	.942 (115.538)
Nova Scotia	46	821.750 (63615.305)	3799.932 (18.299)	.881 (334.863)
New Brunswick	37	7861.063 (71913.500)	2637.449 (13.245)	.829 (175.442)
Quebec	136	-45888.750 (481275.063)	5334.844 (16.397)	.665 (268.851)
Ontario	200	66414.125 (219145.125)	2531.409 (22.197)	.712 (492.692)
Manitoba	80	7889.500 (94699.688)	2506.337 (20.834)	.846 (434.063)
Saskatchewan	143	9003.570 (69204.063)	2717.645 (18.547)	.707 (343.984)
Alberta	132	-11551.813 (63223.695)	3210.673 (50.016)	.950 (2501.627)
British Columbia	96	53016.313 (89287.375)	1621.767 (22.166)	.838 (491.354)

Source: See text.

Table B-42

ESTIMATED FUNCTIONS OF NUMBERS OF MEDICAL STAFF
IN RELATION TO COMPOSITE OUTPUT FOR HOSPITALS
BY PROVINCE, CANADA, 1966

Province	Number of Hospitals	Intercept (*S.E.E.*)	Composite Output (*T*-Value)	$\bar{R}^2$ (*F*-Value)
Newfoundland	8	2.934 (3.526)	.019 (.430)	-.132 (.185)
Prince Edward Island	3	-19.729 (.405)	.268 (116.004)	1.000 (13456.992)
Nova Scotia	18	-11.942 (10.218)	.246 (8.526)	.808 (72.700)
New Brunswick	14	-3.604 (6.070)	.131 (6.002)	.729 (36.026)
Quebec	103	-16.902 (26.062)	.354 (18.902)	.777 (357.285)
Ontario	91	-16.334 (20.509)	.177 (13.466)	.667 (181.345)
Manitoba	14	-8.856 (10.344)	.197 (11.882)	.915 (141.185)
Saskatchewan	13	-14.440 (16.990)	.235 (3.622)	.502 (13.115)
Alberta	14	-12.547 (21.091)	.154 (5.080)	.656 (25.806)
British Columbia	25	-9.134 (10.211)	.157 (17.440)	.127 (304.153)

Source: See text.

Table B-43

ESTIMATED FUNCTIONS OF ACCUMULATED PAID HOURS OF GRADUATE NURSING PERSONNEL IN RELATION TO COMPOSITE OUTPUT FOR HOSPITALS BY PROVINCE, CANADA, 1966

Province	Number of Hospitals	Intercept *(S.E.E.)*	Composite Output (*T*-Value)	$\bar{R}^2$ (*F*-Value)
Newfoundland	27	8.522 (31.649)	1.494 (14.585)	.891 (212.727)
Prince Edward Island	9	-2.181 (7.394)	1.693 (22.996)	.985 (528.809)
Nova Scotia	48	18.730 (26.465)	1.678 (28.653)	.946 (821.020)
New Brunswick	39	10.966 (23.844)	1.675 (26.036)	.947 (677.891)
Quebec	168	-11.651 (59.216)	1.634 (42.329)	.915 (1791.719)
Ontario	224	10.152 (56.161)	1.823 (64.648)	.949 (4179.328)
Manitoba	84	1.922 (25.626)	1.598 (49.190)	.967 (2419.621)
Saskatchewan	152	-3.086 (22.751)	2.134 (45.404)	.932 (2061.494)
Alberta	136	-4.065 (31.310)	1.721 (54.496)	.957 (2969.787)
British Columbia	110	5.768 (34.422)	1.736 (62.250)	.973 (3875.020)

Source: See text.

Table B-44

ESTIMATED FUNCTIONS FOR DRUG EXPENDITURES
IN RELATION TO COMPOSITE OUTPUT AND ONE OTHER EXPLANATORY VARIABLE FOR HOSPITALS
BY PROVINCE, CANADA, 1966

Province	Number of Hospitals	Intercept *(S.E.E.)*	Composite Output *(T-Value)*	Composite Output^2 *(T-Value)*	$\bar{R}^2$ *(F-Value)*
Newfoundland	35	1260.088 (1418.329)	57.869 (4.316)	.082 (1.693)	.896 (147.598)
Prince Edward Island	9	-115.989 (194.182)	60.211 (3.939)	.080 (.486)	.993 (610.716)
Nova Scotia	47	419.634 (1293.845)	38.691 (4.561)	.191 (7.088)	.959 (534.692)
New Brunswick	38	-77.611 (595.627)	80.008 (16.966)	-.008 (-.439)	.984 (1125.569)
Quebec	167	-632.809 (3215.226)	97.270 (18.945)	-.001 (-.094)	.928 (1067.127)
Ontario	205	-766.438 (3465.340)	82.480 (19.197)	.006 (.943)	.919 (1152.027)
Manitoba	80	108.094 (984.700)	69.240 (18.544)	.047 (6.837)	.986 (2805.000)
Saskatchewan	143	-170.452 (1333.499)	96.361 (11.693)	.000 (.007)	.891 (583.026)
Alberta	132	168.716 (801.898)	45.483 (17.843)	.054 (11.544)	.984 (4123.305)
British Columbia	99	-223.919 (1000.864)	69.245 (31.072)	.009 (4.240)	.989 (4549.570)

Source: See text.

Table B-45

ESTIMATED FUNCTIONS OF DRUG EXPENDITURES
IN RELATION TO COMPOSITE OUTPUT FOR HOSPITALS
BY SIZE OF HOSPITAL, CANADA, 1966

Size of Hospital	Number of Hospitals	Intercept *(S.E.E.)*	Composite Output *(T-Value)*	$\overline{R}^2$ *(F-Value)*
1-9	32	93.375 (91.767)	45.543 (2.970)	.202 (8.823)
10-24	199	-25.843 (457.175)	94.238 (7.631)	.224 (58.230)
25-49	188	123.257 (530.938)	72.114 (8.539)	.278 (72.906)
50-99	146	-314.158 (639.135)	86.762 (14.761)	.599 (217.881)
100-199	127	490.367 (1421.475)	72.146 (11.382)	.505 (129.547)
200-299	62	-1033.996 (1983.256)	90.490 (9.268)	.582 (85.890)
300-499	54	-2170.359 (3554.396)	88.233 (9.615)	.633 (92.448)
500-999	29	466.762 (9545.625)	93.033 (5.179)	.480 (26.821)
1000+	8	15797.535 (7972.766)	64.802 (3.565)	.626 (12.707)

Source: See text.

LIST OF TABLES AND DIAGRAMS

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Appendix Tables

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Diagram

PUBLICATIONS OF ECONOMIC COUNCIL OF CANADA

* * * *

PUBLICATIONS DU CONSEIL ÉCONOMIQUE DU CANADA

Annual Reviews	Author—Auteur	Exposés annuels
First Annual Review: Economic Goals for Canada to 1970 (EC21-1/1964, $3.50)	Council – Conseil	Premier exposé annuel: Objectifs économiques du Canada pour 1970 (EC21-1/1964F, $3.50)
Second Annual Review: Towards Sustained and Balanced Economic Growth (EC21-1/1965, $2.75)	Council – Conseil	Deuxième exposé annuel: Vers une croissance économique équilibrée et soutenue (EC21-1/1965F, $2.75)
Third Annual Review: Prices, Productivity and Employment (EC21-1/1966, $2.75)	Council – Conseil	Troisième exposé annuel: Les prix, la productivité et l'emploi (EC21-1/1966F, $2.75)
Fourth Annual Review: The Canadian Economy from the 1960's to the 1970's (EC21-1/1967, $2.75)	Council – Conseil	Quatrième exposé annuel: L'économie canadienne des années 1960 aux années 1970 (EC21-1/1967F, $2.75)
Fifth Annual Review: The Challenge of Growth and Change (EC21-1/1968, $2.75)	Council – Conseil	Cinquième exposé annuel: Défi posé par la croissance et le changement (EC21-1/1968F, $2.75)
Sixth Annual Review: Perspective 1975 (EC21-1/1969, $2.75)	Council – Conseil	Sixième exposé annuel: Perspectives 1975 (EC21-1/1969F, $2.75)
Seventh Annual Review: Patterns of Growth (EC21-1/1970, $2.50)	Council – Conseil	Septième exposé annuel: Les diverses formes de la croissance (EC21-1/1970F, $2.50)
Performance and Potential: Mid-1950's to Mid-1970's (EC21-1/1970-1, $1.50)	Council – Conseil	La tenue et le potentiel de l'économie: du milieu des années 1950 au milieu des années 1970 (EC21-1/1970-1F, $1.50)

Staff Studies	Author—Auteur	Études préparées par le personnel
1. Population and Labour Force Projections to 1970 (EC22-1/1, $.75)	Frank T. Denton Yoshiko Kasahara Sylvia Ostry	1. Projections de la population et de la main-d'œuvre jusqu'à 1970 (EC22-1/1F, $.75)
2. Potential Output, 1946 to 1970 (EC22-1/2, $1.00)	B. J. Drabble	2. Potentiel de production, 1946 à 1970 (EC22-1/2F, $1.00)
3. An Analysis of Post-War Unemployment (EC22-1/3, $.75)	Frank T. Denton Sylvia Ostry	3. Une analyse du chômage depuis la fin de la guerre (EC22-1/3F, $.75)
4. Housing Demand to 1970 (EC22-1/4, $.75)	Wolfgang M. Illing	4. Demande d'habitations pour 1970 (EC22-1/4F, $.75)
5. Business Investment to 1970 (EC22-1/5, $1.00)	Derek A. White	5. Investissements privés pour 1970 (EC22-1/5F, $1.00)
6. Special Survey of Longer Range Investment Outlook and Planning in Business (EC22-1/6, $.25)	B. A. Keys	6. Enquête spéciale sur les intentions et la programmation à moyen terme des entreprises privées (EC22-1/6F, $.25)
7. Canada and World Trade (EC22-1/7, $.50)	M. G. Clark	7. Le Canada et le commerce mondial (EC22-1/7F, $.50)
8. Export Projections to 1970 (EC22-1/8, $.75)	J. R. Downs	8. Projections des exportations jusqu'à 1970 (EC22-1/8F, $.75)
9. Federal Tax Revenues at Potential Output, 1960 and 1970 (EC22-1/9, $.50)	D. J. Daly	9. Rendement des impôts fédéraux dans l'hypothèse de la réalisation du potentiel de production, 1960 et 1970 (EC22-1/9F, $.50)
10. National Saving at Potential Output to 1970 (EC22-1/10, $.50)	Frank W. Wildgen	10. L'épargne nationale dans l'hypothèse de la réalisation du potentiel de production pour 1970 (EC22-1/10F, $.50)
11. Changes in Agriculture to 1970 (EC22-1/11, $.50)	John Dawson	11. Changements dans le secteur agricole jusqu'à 1970 (EC22-1/11F, $.50)
12. The Contribution of Education to Economic Growth (EC22-1/12, $1.50)	Gordon W. Bertram	12. Apport de l'éducation à la croissance économique (EC22-1/12F, $1.50)
13. Internal Migration in Canada, 1921-1961 (EC22-1/13, $1.60)	Isabel B. Anderson	13. Migration à l'intérieur du Canada, 1921-1961 (EC22-1/13F, $1.60)
14. Interregional Disparities in Income (EC22-1/14, $1.75)	S. E. Chernick	14. Disparités interrégionales du revenu (EC22-1/14F, $1.75)
15. An Analysis of Interregional Differences in Manpower Utilization and Earnings (EC22-1/15, $1.00)	Frank T. Denton	15. Analyse des différences interrégionales dans l'utilisation de la main-d'œuvre et le revenu gagné (EC22-1/15F, $1.00)

Staff Studies (*continued*)	Author—Auteur	Études préparées par le personnel (*suite*)
17. Business Cycles in Canada (EC22-1/17, $2.25)	Derek A. White	17. Les cycles économiques au Canada (EC22-1/17F, $2.25)
18. Manpower Planning in Industry: A Case Study (EC22-1/18, $1.00)	B. A. Keys H. H. Wright	18. La planification de la main-d'œuvre dans l'industrie (Étude de cas) (EC22-1/18F, $1.00)
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