STUDY PAPERS NOS. 4 AND 5

ANALYSIS OF THE RISING COSTS OF PUBLIC EDUCATION

BY

Werner Z. Hirsch

TRENDS IN THE SUPPLY AND DEMAND OF MEDICAL CARE

BY

Markley Roberts

MATERIALS PREPARED IN CONNECTION WITH THE

STUDY OF EMPLOYMENT, GROWTH, AND PRICE LEVELS

FOR CONSIDERATION BY THE

JOINT ECONOMIC COMMITTEE CONGRESS OF THE UNITED STATES

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STUDY OF EMPLOYMENT, GROWTH, AND PRICE LEVELS

(Pursuant to S. Con. Res. 13, 86th Cong., 1st sess.)

OTTO ECKSTEIN, *Technical Director*
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II

These are part of a series of papers being prepared for consideration by the Joint Economic Committee in connection with their "Study of Employment, Growth, and Price Levels." The committee and the committee staff neither approve nor disapprove of the findings of the individual authors. The findings are being presented in this form to obtain the widest possible comment before the committee prepares its report.

LETTERS OF TRANSMITTAL

NOVEMBER 6, 1959.

To Members of the Joint Economic Committee:

Submitted herewith for the consideration of the members of the Joint Economic Committee and others are study papers 4 and 5, "Analysis of the Rising Costs of Public Education" and "Trends in the Supply and Demand of Medical Care."

These are among the number of subjects which the Joint Economic Committee has requested individual scholars to examine and report on to provide factual and analytic materials for consideration in the preparation of the staff and committee reports for the "Study of Employment, Growth, and Price Levels."

The papers are being printed and distributed not only for the use of the committee members but also to obtain the review and comment of other experts during the committee's consideration of the materials. The findings are entirely those of the authors, and the committee and the committee staff indicate neither approval nor disapproval by this publication.

PAUL H. DOUGLAS,
Chairman, Joint Economic Committee.

NOVEMBER 3, 1959.

Hon. PAUL H. DOUGLAS,
Chairman, Joint Economic Committee,
U.S. Senate, Washington, D.C.

DEAR SENATOR DOUGLAS: Transmitted herewith are the fourth and fifth in a series of papers being prepared for the "Study of Employment, Growth, and Price Levels" by outside consultants and members of the staff. The authors of these papers are Werner Z. Hirsch, Washington University, St. Louis, Mo., and Markley Roberts, American University, Washington, D.C.

All papers are presented as prepared by the authors, for consideration and comment by the committee and staff.

OTTO ECKSTEIN,
Technical Director,
Study of Employment, Growth, and Price Levels.

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STUDY PAPER NO. 4

ANALYSIS OF THE RISING COSTS OF
PUBLIC EDUCATION

(BY WERNER Z. HIRSCH)

STUDY PAPER NO. 4

ANALYSIS OF THE RISING COSTS OF PUBLIC EDUCATION

(By Werner Z. Hirsch)

INTRODUCTION—STATEMENT OF FINDINGS [1]

A study of the relation of the public school sector to the problems of employment, growth, and price levels leads to the following conclusions:

1. The huge increases in current expenditure (plus debt service) for public primary and secondary education since the turn of the century are mainly due to exogenous forces, such as factors raising salary levels and per capita personal income.

2. With the property tax as the main revenue source, general price level increases, and particularly rises in teacher salary level, are likely to lead to continued fiscal school crises.

3. Since the turn of the century, the percentage increases in educational expenditures—more specifically, daily per pupil current expenditure, plus debt service—were on the average about the same as the percentage increases in per capita personal income. The former exceeded the latter by a very small amount. Such low income elasticity of public education must be of deep concern to all those who are convinced that improvements in education are essential if the United States is to remain a leading world power. Since more funds need to be found, serious consideration must be given to policies aimed at changing people's attitude toward public education, and to shifting partial responsibility for financing education from the local school district to the State and possibly to the Federal Government. This will require the combined leadership of all branches of government and the institution of matching Federal funds combined with such eligibility criteria as minimum tax effort and statewide equalization of educational opportunity.

4. It appears that there have been no significant productivity changes in the education sector.

5. During the last 10 years general expenditures of State and local governments increased an average of about 15 percent per annum measured in current dollars and 8 percent if measured in 1954 constant dollars. During the same period the average annual increase of total current expenditures, plus debt service, for public primary and secondary education was about 17 percent in current dollars and 5 percent in 1954 constant dollars.

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6. A "medium" projection suggests that if annual teachers' salary increases of 3 percent are granted—and funds to finance them can be found—total current expenditure, plus debt service, for public primary and secondary education will have advanced in terms of 1958 dollars to about $17.4 billion by 1965; i.e., a 58-percent increase in 7 years. However, if people's attitude toward public education and the way of financing it remain unchanged, a 3-percent annual increase in per capita personal income may produce merely $15.3 billion in revenue in 1965. While this would be an increase of about 39 percent over the 1958 figure, it would be about $2.1 billion below the earlier projected expenditure figure.

CHAPTER 1. GENERAL SUMMARY

INTRODUCTION

This study is designed to shed light on the cost and expenditure level changes of the public primary and secondary education sector of our economy—a sector employing more than 2 million men and women, who serve almost 35 million pupils. This sector in 1958 spent more than 30 percent of all the money spent by State and local governments, an amount representing about 3.3 percent of national income and 3 percent of gross national product. In order to trace and understand changes in the cost of education and relate them to the rest of the State and local government sector, the latter sector is examined first in some detail. This sector, for example, accounts for about 12.3 percent of gross national product, and perhaps 3 to 3½ percent of the Consumer Price Index of the U.S. Department of Labor. There are indications that since 1952 the cost of State and local government services increased up to three times more rapidly than did the other items included in the index.

To shed light on the cost behavior of this sector, a functional service breakdown is attempted, and the question is raised: "Which State and local government services provided the major monetary push?"

STATE AND LOCAL GOVERNMENT SECTOR

In terms of general expenditures, education, highways, public welfare, and health and hospitals have been the four most important State and local government services since the turn of the century. Education expenditures have accounted for an increasingly large share of all expenditures. They increased from about 25 percent in 1902 to about 35 percent in 1958. General expenditures for public primary and secondary education advanced at a somewhat slower pace than did those for higher education.

The relative importance of highway expenditures showed great fluctuations. During the first quarter of this century a steady advance from 17 to 25 percent was registered. From then on until the end of World War II a steady decline set in, which has been reversed only in recent years. Public welfare expenditures, at least in relative terms, grew more rapidly than any of the other main services. Most of their advance took place during the first half of the 1930's. Finally, the relative share of health and hospital expenditures has shown a

very steady, though not rapid, increase. Many other services have lost in importance.

Next, expenditures are examined from a somewhat different viewpoint. The issue at hand is, "Did current or capital expenditures provide the major push"? The answer can be given in unequivocal terms. So far in the 20th century, capital outlays of State and local government advanced at a rate more than twice as fast as did current expenditures. The 1902-58 increase of capital outlays is 76-fold, while that of current expenditures is 37-fold. This not only holds if all services are taken together, but it is also true for single services except public welfare, sanitation, and local parks.

What is the picture of State and local government expenditures if they are adjusted for price level changes; i.e., in constant dollars? The U.S. Department of Commerce has prepared a series of implicit deflators applicable to State and local government purchases of goods and services which goes back to 1929. This series does not make allowance for quality changes. While State and local government expenditures—measured in current dollars—increased from 1929 to 1957 by almost 370 percent, expressed in 1954 constant dollars these expenditures have not even quite doubled. Between 1929 and 1945 the constant dollar expenditures moved relatively little and without definite direction. Since them a pronounced and steady rise has started. The average annual increase of the last 10 years—measured in constant dollars—was about 8 percent.

COSTS OF PUBLIC EDUCATION

What about cost changes in the single most important State and local government sector, i.e., public primary and secondary education? More specifically, what forces have decisively contributed to cost increases in this sector?

A large number of factors can be identified as possibly affecting current expenditures, plus debt service, for public primary and secondary education. Some of them have assumed greatly different values since the turn of the century. Thus, for example, the number of pupils in average daily attendance—ADA—increased almost three times since 1900, high school enrollment relative to total public school enrollment increased about six times, and the percent of pupils living in urban as against rural America has increased about 40 percent.

Turning to some economic factors, it is noteworthy that the average salary of a teacher advanced about 14 times, while per capita personal income increased about 9 times.

Finally, an examination of some characteristics of public education itself reveals that while in 1900 virtually no appreciable auxiliary services were rendered, in 1958 pupils were fed in school cafeterias, attended by school health services, and brought to school in schoolbuses, etc. In 1958, almost 14 percent of current school expenditures, plus debt service, were applied to auxiliary services. In addition, the school term was lengthened an average of 60 percent and the number of principals, superintendents, and consultants per pupil almost doubled.

TEACHERS' SALARIES—THE OVERWHELMING COST FACTOR

Which of these factors have decisively contributed to cost increases? How important a factor is the salary of the average teacher and how important is people's ability to afford good education, i.e., their income? Has the efficiency—or productivity—of the public school system changed much?

These are some of the questions for which answers are sought by relying on multiple correlation and regression techniques.

First an education unit was developed, one that appears to have been fairly uniform over the years. It is so standardized that its variety and scope are held reasonably constant and it is expressed in per pupil in average daily attendance terms. Ever since the turn of the century the costs of this education unit—daily per pupil current expenditures plus debt service minus the cost of auxiliary services—appear to have been overwhelmingly determined by the prevailing salary level of the instruction staff, and perhaps the prices of all goods and services bought by schools. However, they, in turn, are determined by the general demand and supply situation and price level of the rest of the economy, as well as the particular demand for and supply of teachers. There is some evidence that the salary of the average teacher has advanced somewhat more rapidly than the earning of other workers. This suggests that the specific demand for and supply of teachers play an important role in addition to general price level changes. An overwhelming percentage of the 1900–1958 variation of the cost of the standardized education unit can be explained, on the average, in terms of teacher salary level increases, holding constant the effect of changes in the public high school-all public school enrollment ratio, urbanization, and number of specialists per pupil.

If now current expenditures plus debt service are deflated by teachers' salaries, the 1930–57 advance is about 54 percent.. It is less than the 1930–57 advance in all State and local government costs in constant dollars, which was about 88 percent. The average annual increase in constant dollars was 2.0 percent for education and 3.3 percent for all State and local government costs.

The overwhelming importance of teacher salary level in determining the cost of a public education unit raises some intriguing questions of finance, since much of the revenue of schools takes the form of property taxes. The general price level together with specific demand and supply factors for teachers can advance at a more rapid pace than the assessed valuation of real property. Not only may real property increase at a slower pace than the general price level but, more importantly, reassessments are usually at best a slow and belated process. As long as the property tax is the main revenue source of schools, general price level increases, and particularly teacher salary level increases, are likely to create major fiscal problems.

The importance of salary level changes can also be illustrated by comparing 1900–1958 total public school expenditure (minus auxiliary expenditures) in current dollars with those in constant 1954 dollars. In current dollars the 1900–1958 increase was 48-fold, while in constant dollars the increase was merely 2½-fold. If further adjustments are made for the number of pupils in average daily attendance and length of school term, expenditures in real terms are approximated. Expenditures in real terms exhibit amazing stability during 1900–1958. For the years for which data are available, 1922 was the low year with

$1.37 daily expenditure per pupil, and 1913 was the high year with $1.60. Over these 58 years, an overall decline of about 3 percent was registered.

To the extent that the standardization of the education unit has been successful and appropriate data in general were used, the analysis can reflect on the productivity variable as a residual. Apparently, productivity in the public schools has changed very little, if at all.

ABILITY TO AFFORD EDUCATION—INCOME ELASTICITY

Next the effect of per capita personal income on the cost of daily per pupil current expenditure plus debt service is considered. Once more multiple correlation and regression techniques are employed. They point to the importance of income as another determinant. Most likely, income's main impact is twofold—it affects the amount of revenue that is raised for public education as well as its variety and quality. About 76 percent of the 1900–1958 variation in the cost of daily per pupil current expenditure plus debt service can be explained on the average in terms of per capita personal income changes, holding the effect of changes in the public high school-all public school enrollment ratio and urbanization constant. It must be remembered that these 76 percent, and the change associated with salary level, are not additive.

Income elasticity of public education was estimated to have averaged plus 1.09 during 1900–1958. Thus, during 1900–1958 a 1 percent increase in per capita personal income was on the average associated with a 1.09 percent increase in daily total current expenditures for public primary and secondary education per pupil in average daily attendance. It is only slightly above unit elastic and apparently lower than that of some other public services, not to speak of such consumer amenities as air conditioning, automobiles, golf, speedboats, etc. Such low elasticity must be of concern to all those who are convinced that improvements in public education are essential if the United States is to remain a leading world power, and that therefore an increasing portion of the American people's income must be channeled into public education. Certainly, people's attitude toward education and our general tax system are mainly responsible for the prevailing income elasticity of education. If public education is to be improved in the United States and more funds to finance education are to be found, serious consideration must be given to changing both, including further shifts in the responsibility for financing education from the local school district to the State and possibly to the Federal Government.

THE NEAR TERM PROSPECTS

Making projections is at best a hazardous undertaking, particularly in a case where the phenomenon awaiting projection so greatly depends upon exogenous forces, such as personal income and teacher salary levels. How hazardous predictions in the field of education are is well demonstrated by recalling James B. Conant's 1938 prediction:

By 1960 or thereabouts we shall have a stationary population. The expansive pressure on our schools will soon be gone.[2]

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[2] James B. Conant, "The Future of Our Higher Education," Harper's magazine, May 1938.

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Three basic sets of projections for 1960 and 1965 have been prepared in 1958 dollars—low, medium, and high. The medium projections assume a cumulative annual increase of 3 percent in per capita personal income, teachers' salary and length of school term. The number of pupils in average daily attendance is assumed to increase to 32 million in 1960 and 37.2 million in 1965. The other factors are assumed to increase very little.

On the basis of these assumptions, equation 1.1, which emphasizes teachers' salary level, can be used to project expenditures. Equation 1.2, which emphasizes people's income and thus ability to afford good education, helps project revenue. Medium projections suggest that if annual teachers' salary increases of 3 percent are granted—and funds to finance them can be found—total current expenditure plus debt service for public primary and secondary education will have advanced in terms of 1958 dollars to about $12.7 billion by 1960 and $17.4 billion by 1965, compared to $11.0 billion expenditures in 1958. This amounts to about an 8 percent annual increase.

However, if people's attitude toward public education and the way of financing it remains unchanged, a 3 percent annual increase in per capita personal income is projected to produce merely $11.1 billion in revenue (in terms of 1958 dollars) in 1960 and $15.3 billion in 1965. While this would be a 39 percent increase from 1958 to 1965, it would fall short by $2.1 billion in 1965 of what teachers' salary pressure would lead to in terms of expenditure.

Whether the public education sector will in 1965 account for about $17.4 or $15.3 billion will much depend upon whether the income elasticity of public education will change.

SOME IMPLICATIONS

Leadership will play a decisive role. The American people need to be persuaded to spend a larger part of their income for public education. Congress can make an important contribution by voting into existence a system of matching Federal funds combined with carefully designed eligibility criteria. High on the list of these criteria should be the following two: States must make a minimum tax effort to finance education—i.e., a minimum ratio between per capita State and local school tax and per capita income will have to be set; and there should be a statewide equalization program which effectively assures sufficient funds to underwrite a floor below which the scope and quality of education cannot fall anywhere in the State.

CHAPTER 2. THE STATE AND LOCAL GOVERNMENT SECTOR

INTRODUCTION

While it might not be generally recognized, the number of State and local governments in the United States is not only fairly large—102,352 units in 1957—but they also perform a great variety of functions. State and local government direct expenditure in 1958 was $53.9 billion, compared to $81.2 billion spent by the Federal Government. These expenditures amount to 12.3 percent of gross national product and 15 percent of national income. Or, to use another yardstick, State and local governments employed in 1957 a full-time equivalent of 4,793,000 men and women.

NATURE OF DATA

Because of the volatile nature of capital expenditures by State and local governments, for analytical purposes it would be- desirable to let debt service reflect the capital expenditure of these governments. Since these capital expenditures are usually amortized over a 20- to 50-year period through bond issues and sinking funds, debt service would more nearly reflect the current benefits accruing from these capital outlays. However, the U.S. Bureau of the Census, in its census of governments, excludes payments for debt retirement, extension of loans, and purchases of securities from expenditure. Since the U.S. Bureau of the Census is the basic source for many State and local government expenditure data, the concept of debt service as a reflection of capital expenditure cannot be used in connection with census data.

There are three general functional classifications of State and local government expenditure: general expenditure, utility and liquor stores expenditure, and insurance trust expenditure. Included in general expenditure are the services which are commonly associated with State and local government—education, highways, welfare, health and hospitals, police, fire, sanitation, etc. In 1958, these general expenditures accounted for $45.1 billion or 83.7 percent of total expenditures. Utility and liquor store expenditures in 1958 were $4.6 billion or 8.6 percent of total expenditures and include expenditure on such government-owned utilities as water supply, electric power, gas supply, and transit systems. Included in this category are expenditures for running State-owned liquor stores in 16 States and those owned by local governments in a few States. Other commercial-type operations of State and local government are included in general government. State and local government insurance trust expenditure consists chiefly of retirement payments for State and local government employees and unemployment compensation payments to the qualified unemployed, who together with their employers, have contributed to the fund from which payments are made. In 1958, insurance trust expenditures were $4.2 billion and accounted for 7.7 percent of total State and local government expenditures.

It might be helpful to ignore liquor store and insurance trust expenditures. Unemployment compensation, which in 1958 amounted to $2.8 billion or 66.2 percent of insurance trust expenditure, is not generally considered to be a State and local government expenditure since both revenue is received and payments are made by this separate insurance trust fund. The administrative cost of this insurance trust fund is, however, included in general expenditure.

One must keep in mind, then, that the U.S. Bureau of the Census uses the following basic concepts and terminology in its statistics on expenditure of State and local government:

1. State and local government expenditure comprises all amounts of money paid out as between State and local governments and external individuals or agencies (net of correcting transactions such as recoveries or refunds), with the exception of amounts for debt issuance and retirement and for loan and investment, agency, and private trust transactions.

2. Although State and local governments act as agents of the Federal Government in withholding Federal income and social security taxes from their employees' pay, such amounts are excluded from State and local government revenue and expenditure, and are reported as Federal revenue and expenditure.

3. Although the Federal Treasury handles unemployment compensation accounts for the States, these funds are omitted from the Federal figures and are included with the State and local data.

4. The data utilized for each individual government represent a consolidation of amounts for its various funds, and payments between funds have been eliminated for census reporting.

5. Intergovernmental expenditure has been netted out of aggregates comprising the groups of governments concerned. Most of the amounts so classified comprise fiscal aid in the form of Federal and State grants. The value of intergovernmental aid "in kind," such as commodities distributed by the Federal Government for school-lunch purposes, is not treated as intergovernmental revenue or expenditure. Contributions by local governments to State-administered retirement systems that cover their employees are included as part of the "current operation" expenditure of the local governments involved, and are included with State insurance trust revenue.

TABLE 1.—*State and local government expenditures, selected years, 1902–58*

[In millions of dollars]

Year	General expenditure (1)	General expenditure plus employee retirement (2)	Total expenditure (3)	Year	General expenditure (1)	General expenditure plus employee retirement (2)	Total expenditure (3)
1902	1,013	1,013	1,095	1946	11,028	11,265	14,067
1913	2,064	2,071	2,257	1948	17,684	17,981	21,260
1922	5,218	5,248	5,652	1950	22,787	23,148	27,905
1927	7,210	7,760	7,810	1952	26,098	26,628	30,863
1932	7,765	7,840	8,403	1953	27,910	28,495	32,937
1934	7,181	7,277	7,842	1954	30,701	31,380	36,607
1936	7,644	7,757	8,501	1955	33,724	34,446	40,375
1938	8,757	8,886	9,988	1956	36,711	37,536	43,152
1940	9,229	9,369	11,240	1957	40,375	41,318	47,553
1942	9,190	9,359	10,914	1958	45,059	46,132	53,857
1944	8,863	9,058	10,499				

Source: U.S. Bureau of the Census, "Historical Summary of Governmental Finances in the United States," 1959, 23 pp. and "Summary of Governmental Finances in 1958," 1959, p. 14.

AN OVERVIEW

As can be seen from table 1, during the last 56 years or so the annual general expenditure of State and local governments increased from $1 to $45.1 billion, about a 44-fold increase.[3] Furthermore, total government expenditure, i.e., general expenditure plus utility and liquors expenditure plus insurance trust expenditure, advanced from $1.1 to $53.9 billion during this period, that is, about 48-fold.

But, as would be expected, the increase was far from steady. In rough terms, the rate of increase was very high from the turn of the century until the depression of the 1930's—about an average of 25

[3] Actually, although the census definition does not do so, it is appropriate to include in the general expenditure figure government contributions to employees' retirement fund. If this is done, the increase is somewhat higher.

percent per year.   Depression and World War II greatly changed the picture.   In 1944, general State and local government expenditure was only $1.1 billion or about 15 percent higher than it had been 12 years earlier.   But with the end of World War II, a very high average annual rate of advance was resumed, i.e., about 24 percent a year. The rate was slightly higher in the forties than in the fifties of this 12-year period.   No doubt the heavy backlog of demand from the war years was responsible for the exceptionally fast increase in the late forties.

FUNCTIONAL BREAKDOWN

What services are mainly responsible for this rapid advance in State and local government general expenditure?   To supply answers to this queation, the general expenditure figures have been broken down by 16 main categories; 1902–58 data are given in table 2.

TABLE 2.—*General expenditures of State and local government by function, selected years, 1902–58*

[In millions of dollars]

Year	Primary and secondary education [1] (1)	Other education (2)	Total education (3)	Highways (4)	Public welfare (5)	Hospitals (6)	Health (7)	Police (8)	Local fire protection (9)	Sanitation (10)	Natural resources (11)	Local parks and recreation (12)	Housing and community redevelopment (13)	General control (14)	Interest on general debt (15)	Other (16)	Total general expenditures (17)
1902	238	17	255	175	37	43	17	50	40	51	9	29	----------	141	68	98	1,013
1913	522	55	577	419	52	79	29	89	76	97	14	57	----------	211	147	217	2,064
1922	1,541	164	1,705	1,294	119	200	58	190	158	189	61	85	----------	313	382	464	5,218
1927	2,017	218	2,235	1,809	151	279	76	270	203	312	94	153	----------	412	584	632	7,210
1932	2,042	269	2,311	1,741	444	349	107	318	210	223	165	147	----------	470	741	539	7,765
1934	1,616	215	1,831	1,509	889	309	109	291	189	177	159	126	----------	432	739	421	7,181
1936	1,894	283	2,177	1,425	827	351	116	314	205	204	193	104	----------	500	738	490	7,644
1938	2,161	330	2,491	1,650	1,069	400	151	359	231	226	222	130	3	542	673	610	8,757
1940	2,281	357	2,638	1,573	1,156	450	159	365	235	207	218	162	230	561	653	622	9,229
1942	2,213	373	2,586	1,490	1,225	432	159	394	236	229	214	128	236	578	565	718	9,190
1944	2,331	462	2,793	1,200	1,133	468	188	414	251	245	232	123	46	599	499	672	8,863
1946	2,872	484	3,356	1,672	1,409	567	251	479	294	370	302	179	114	703	421	911	11,028
1948	4,347	1,032	5,379	3,036	2,099	937	292	644	406	670	496	243	176	880	399	2,027	17,684
1950	5,879	1,298	7,177	3,803	2,940	1,384	364	776	488	834	670	304	452	1,041	458	2,096	22,787
1952	6,903	1,415	8,318	4,650	2,788	1,745	440	939	586	992	776	324	769	1,193	552	2,024	26,098
1953	7,857	1,533	9,390	4,987	2,914	1,863	427	1,038	598	908	705	374	631	1,263	614	2,198	27,910
1954	8,990	1,567	10,557	5,527	3,060	1,962	447	1,130	653	1,058	762	424	611	1,375	718	2,417	30,701
1955	10,186	1,721	11,907	6,452	3,168	2,053	471	1,229	694	1,142	793	509	499	1,452	838	2,517	33,724
1956	11,250	1,970	13,220	6,953	3,139	[2] 2,164	[2] 608	1,330	737	1,326	906	541	437	1,560	986	2,804	36,711
1957	11,871	2,263	14,134	7,816	3,404	[2] 2,648	[2] 552	1,468	810	1,443	1,031	608	505	1,725	1,106	3,124	40,375
1958	----------	----------	15,782	8,694	3,751	[2] 3,066	[2] 559	1,633	939	1,507	1,121	685	601	1,861	1,235	3,625	45,050

[1] The U.S. Bureau of the Census classifies education expenditure by State institutions of higher education, local schools, and other education. The classification of primary and secondary education of this study is the same as that of the census classification, "local schools." It includes a very minor portion for college level education.

[2] Payments to private hospitals are under "Hospitals" for 1956, 1957, and 1958, and under "Health" for earlier years.

Source: U.S. Bureau of the Census, "Historical Summary of Governmental Finances in the United States," 1959, 23 pages, and "Summary of Governmental Finances in 1958," 1959, 19 pages.

Moneywise, the most important functions are education, highways, public welfare, and health and hospitals, in this order. As can be seen from table 3, education expenditures are responsible for an increasingly large part of all expenditures. Their share increased from about 25 percent in 1902 to 33 percent in 1922; then a gradual decline took place to about 26 percent in 1934. From that time on, education has accounted for an increasingly large share of all expenditures, reaching a peak of 36 percent in 1956.

TABLE 3.—*Percent of general expenditures by service function*

Year	Education	Primary and second- ary edu- cation	Highways	Public welfare	Health and hospitals	Other services
	(1)	(2)	(3)	(4)	(5)	(6)
1902	25.2	23.5	17.3	3.7	5.9	47.9
1913	28.0	25.3	20.3	2.5	5.2	44.0
1922	32.7	29.5	24.8	2.3	4.9	35.3
1927	31.0	28.0	25.1	2.1	4.9	36.9
1932	29.8	26.3	22.4	5.7	5.9	36.2
1934	25.5	22.5	21.0	12.4	5.8	35.3
1936	28.5	24.8	18.6	10.8	6.1	36.0
1938	28.4	24.7	18.8	12.2	6.3	34.3
1940	28.6	24.7	17.0	12.5	6.6	35.3
1942	28.1	24.1	16.2	13.3	6.4	36.0
1944	31.5	26.3	13.5	12.8	7.4	34.8
1946	30.4	26.0	15.2	12.8	7.4	34.2
1948	30.4	24.6	17.2	11.9	6.9	33.6
1950	31.5	25.8	16.7	12.9	7.7	31.2
1952	31.9	26.5	17.8	10.7	8.4	31.2
1953	33.6	28.2	17.9	10.4	8.2	29.9
1954	34.4	29.3	18.0	10.0	7.8	29.8
1955	35.3	30.2	19.1	9.4	7.5	28.7
1956	36.0	30.6	18.9	8.6	7.6	28.9
1957	35.0	29.3	19.3	8.4	7.9	29.4
1958	35.0	¹ 29.3	19.3	8.3	8.0	29.4

¹ Estimate.

Source: U.S. Bureau of the Census.

General expenditure for primary and secondary education behaved about the same way as did that for all education. Yet, its share has grown less rapidly during 1902–58 than has that of all education. For instance, between 1902 and 1956 the share of all education increased by about 40 percent while that of primary and secondary education rose by only 30 percent. Thus, higher education expenditures have increased more rapidly than the rest.

The relative share of highway expenditures showed great fluctuations but no clear trend over the years. Until 1927 their share had steadily increased to reach an all time high of 25 percent. From then on, it rapidly declined and by 1944 it had lost almost half its earlier importance. The postwar period has shown a slow but steady advance to 19 percent in 1958.

During 1902–58, public welfare expenditures grew relatively more rapidly than those of any other major State and local government service. But most of the advance took place during the early days of the Franklin D. Roosevelt administration, when their share jumped from about 2 percent in 1927 to 6 percent in 1932 and 12 percent in 1934. From then on, speaking in rough terms, a decline set in, leading to a low of 8.3 percent in 1958.

Except for the 1920's the relative share of health and hospital expenditures has been increasing, although the pace was not fast.

If all remaining services are lumped together, their relative importance shows a steady decline from 48 percent in 1902 to 29.4 percent in 1958. Nevertheless, such services as housing and community redevelopment, natural resources development, etc., showed a distinctly different trend.

TABLE 4.—*Current general expenditures of State and local government by function*

[In millions of dollars]

Year	All education (1)	Highways (2)	Health and hospitals (3)	Sanitation (4)	Natural resources (5)	Local parks and recreation (6)	Housing and community redevelopment (7)	All other (8)	Total current expenditure (9)
1902	214	116	58	27	9	12	--------	414	850
1913	488	220	91	51	14	22	--------	723	1,609
1922	1,374	508	226	105	61	52	--------	1,508	3,834
1932	2,064	719	370	135	137	110	--------	2,521	6,056
1942	2,411	807	540	191	182	110	--------	3,602	7,868
1957	10,882	2,605	[1] 2,300	[2] 799	760	429	222	11,092	29,089
1958	12,293	2,798	3,208	[2] 840	814	480	235	11,846	32,514
1902–58 change, percent	5,600	2,300	5,400	3,000	8,900	3,900	--------	2,800	3,700

[1] Hospitals only.
[2] Sewers and sewage disposal only.

Source: Special computations in cooperation with the Data Classification and Research Branch of the U.S. Bureau of the Census.

TABLE 5.—*Capital outlay general expenditure of State and local government by function*

[In millions of dollars]

Year	All education (1)	Highways (2)	Health and hospitals (3)	Sanitation (4)	Natural resources (5)	Local parks and recreation (6)	Housing and community redevelopment (7)	All other (8)	Total current expenditure (9)
1902	41	59	2	24	[1]	17	--------	20	163
1913	89	199	17	46	[1]	35	--------	69	455
1922	331	786	32	84	[1]	33	--------	118	1,384
1932	247	1,022	86	88	28	37	--------	201	1,709
1942	175	683	51	38	32	18	211	114	1,322
1957	3,252	5,211	[2] 348	[3] 644	271	156	283	1,121	11,286
1958	3,489	5,896	[2] 417	[3] 667	307	205	366	1,198	12,545
1902–58 change, percent	8,400	9,900	20,700	2,700	--------	1,100	--------	5,900	7,600

[1] Not available.
[2] Hospitals only.
[3] Sewers and sewage disposal only.

Source: Special computations in cooperation with the Data Classification and Research Branch of the U.S. Bureau of the Census.

CURRENT VERSUS CAPITAL EXPENDITURES

It is mainly current expenditure, or mainly capital outlay that is driving up the general expenditure of State and local governments? And if one type of expenditure had advanced more rapidly than the other, what services are responsible for it?

Here is some of the evidence. While total general expenditure of State and local governments increased about 44-fold during 1902–58, the current elements advanced about 37-fold and the capital elements 76-fold. (See tables 4 and 5.)

Capital outlays of the three important services—education, highways, and health and hospitals—which throughout this period accounted for between one-half and two-thirds of general expenditure, advanced at a much more rapid pace than did current expenditures. The 1902–58 increases for education were 84-fold versus 56-fold, for highways 99-fold versus 23-fold, and for health and hospitals 207-fold versus 54-fold.

Sanitation and local parks and recreation behaved in an opposite manner. For natural resources only data since 1932 are available. Housing and community redevelopment is a relatively new function and not enough evidence is on hand to reach a conclusion. But capital outlays of all other services increased about two and a half times as fast as did their current expenditure.

In summary, much of the rapid increase in the general expenditure of State and local government since the turn of the century can, no doubt, be traced to the capital outlay elements of education, highways, and health and hospitals.

COST COMPARISONS IN CONSTANT DOLLARS

An analysis of State and local government general expenditure has revealed major increases. But the entire analysis was in terms of current dollars, in many respects an imperfect yardstick, since the value of the dollar changed substantially during this period. In recognition of this fact the question will now be asked, "How great, if any, were the cost changes of a given bundle of State and local government services during this period?" To answer this question, a deflation procedure must be used so that a cost comparison in real terms becomes possible.

Basically, there are two approaches to the problem of deflating State and local government purchases. As George Cobren has so aptly put it—

In the case of Government purchases, a basic dichotomy exists among national income theorists as to the proper approach to the deflation problem. On the one side it is argued that the deflation procedure should focus on the products which the Government buys; on the other, that the procedure should measure the volume of services which the Government provides.[4]

He goes on to point out that the U.S. Department of Commerce's implicit deflators for the Government sector of gross national product follows the first of these alternatives. With the help of the implicit deflator applicable to the State and local government sector, the value of the goods and services purchased by these governments can be deflated. Apparently this alternative was selected by the Department

[4] George M. Cobren, "The Deflation of the Gross National Product by the Department of Commerce," American Statistical Association proceedings, business and statistics section, 1958, pp. 312–319.

of Commerce, since while it presents formidable difficulties, the other is even more hazardous.

One of the main shortcomings of the deflating procedure followed by the U.S. Department of Commerce stems from the fact that by far the largest expenditure item—employee compensation—is derived "* * * by extrapolating the base-year estimate by man-hours wherever possible, and by employment when man-hours were not available. * * *" [5]   This, admittedly, is equivalent to deflating the current value figures by indexes of average compensation.   The result is a measure which makes no allowance for quality changes—in this case, for changes in the productivity of Government employees.

On this point, Richard Ruggles and Nancy D. Ruggles made some revealing observations in their testimony before the Joint Economic Committee.[6]   They are greatly concerned about the fact that the implicit price deflators do not properly allow for quality and efficiency improvements.   Consequently, they argue that almost every category of expenditure has an upward bias.

In table 6 purchases by State and local governments, both in actual and constant dollars (1954=100), are presented for the period 1929–58. Money expenditures increased from $7.2 billion to $40.5 billion, i.e., slightly more than five times.   In constant dollars the increase was much less, i.e., the 1958 figure is only a little more than double that of 1929.   Expenditures in constant dollars zigzagged from 1929 to 1945.   But with the end of World War II they began a pronounced rise which as yet shows no sign of reversal.   The average annual cost increase in constant 1954 dollars during the last 10 years was about 8 percent.

TABLE 6.—*State and local government purchases of goods and services in current and constant dollars (1954=100), 1929–57*

[In billions of dollars]

Year	Current dollars (1)	Constant dollars (1954=100) (2)	Year	Current dollars (1)	Constant dollars (1954=100) (2)
1929	7.1	15.6	1944	7.5	13.8
1930	7.8	17.1	1945	8.1	14.0
1931	7.7	17.9	1946	9.9	15.8
1932	6.6	16.6	1947	12.7	17.8
1933	6.0	14.6	1948	15.2	19.2
1934	6.8	15.8	1949	17.9	21.9
1935	7.1	16.3	1950	19.7	23.5
1936	7.0	16.6	1951	21.7	24.1
1937	7.2	16.4	1952	23.2	24.5
1938	7.5	17.4	1953	24.9	25.5
1939	8.2	19.1	1954	27.7	27.7
1940	7.9	18.0	1955	30.3	29.7
1941	7.8	16.9	1956	33.2	30.6
1942	7.7	15.4	1957	36.8	32.3
1943	7.4	14.0	1958	40.5	34.4

Source: U.S. Department of Commerce, "U.S. Income and Output," 1958, pp. 118–119.

[5] Ibid., p. 316.
[6] Richard Ruggles and Nancy D. Ruggles, "Prices, Costs, Demand, and Output in the United States, 1947–57," the relationship of prices to economic stability and growth, compendium of papers submitted by panelists appearing before the Joint Economic Committee (Mar. 31, 1958), p. 299.

CHAPTER 3. THE PUBLIC PRIMARY AND SECONDARY EDUCATION SECTOR

INTRODUCTION

As was shown in the preceding section, public expenditures for primary and secondary education are by far greater than those for any other single service performed by State and local governments. Of the 1957 general expenditure of $40.4 billion, almost 30 percent were spent for public primary and secondary education; about 3.3 percent of national income. Education expenditures had increased much faster since the turn of the century than the other State and local expenditures. The pivotal position and importance of public education for the future of this Nation is all too clear and needs no elaboration.

NATURE OF DATA

A major portion of this study is concerned with pricing educational services in constant terms. In this connection it is helpful to clarify the concept of expenditure pertinent to the analysis and then embark upon an inquiry of the factors that in the past appear to have had an impact on them.

The question of how the cost of a given bundle of educational services behaved over time is best answered by talking in terms of current expenditures, plus a reflection of the cost of providing physical facilities. The latter can be approximated by a debt service figure, which can reflect the long-run benefits of capital expenditures. Such data are compiled for education by the U.S. Department of Health, Education, and Welfare (see chart 1).

Chart 1
Total Current Expenditures (plus Debt Service) for Public Primary
and Secondary Education

Selected Years, 1900-58

BILLIONS OF DOLLARS

10.0

1.0

.10

YEARS

1900   10   20   30   40   50   60

PEL
9/19/59
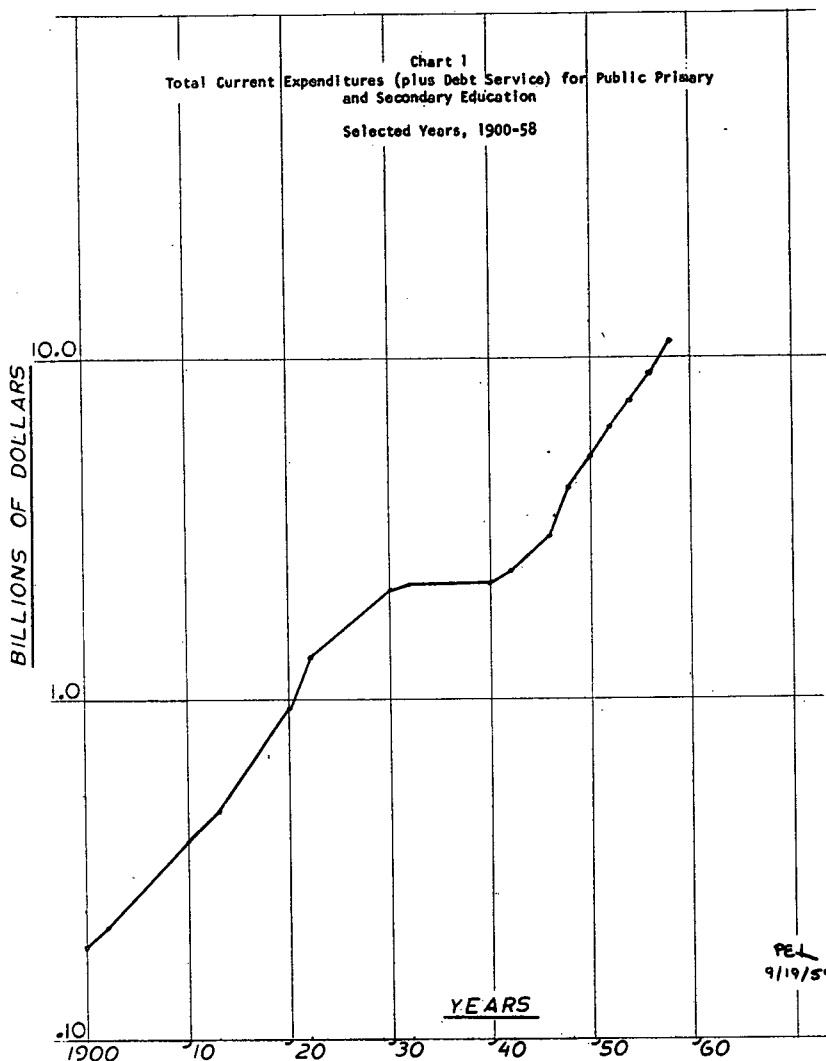
FACTORS AFFECTING EXPENDITURE LEVEL

While, no doubt, a large variety of factors can be expected to deter-
mine expenditure levels, the following are likely to be of particular
significance:
  1. Number of pupils in average daily attendance (ADA).
  2. Sociological characteristics of population:
      (a) Age structure, e.g., primary versus secondary school popu-
  lation.
      (b) Geographical distribution, e.g., urbanization of school
  population.
  3. Economic characteristics:
      (a) Price level of goods and services bought by schools.
      (b) Income level, i.e., ability to afford services.

4. Physical characteristics: (*a*) Productivity of school system.
5. Government characteristics.
6. Variety, scope, and quality of education services:
    (*a*) Addition or deletion of services—variety.
    (*b*) More or less of a given service—scope.
    (*c*) Superior or inferior services—quality.
In the following pages each of these factors will be briefly discussed and an effort made to quantify each.

TABLE 7.—*Pupils in average daily attendance (A DA), selected years, 1900–1958*

[In thousands]

Year:	Pupils in average daily attendance	Year—Con.	Pupils in average daily attendance	Year—Con.	Pupils in average daily attendance
1900	10, 633	1930	21, 265	1950	22, 284
1902	11, 064	1932	22, 245	1952	23, 257
1910	12, 827	1940	22, 042	1954	25, 644
1913	13, 614	1942	21, 031	1956	27, 740
1920	16, 150	1946	19, 849	1958	29, 859
1922	18, 432	1948	20, 910		

Sources: U.S. Department of Health, Education, and Welfare, "Biennial Survey of Education in the United States 1954–56," ch. 2, table 20, p. 66; select years not appearing in table 20 of the 1954–56 Biennial Survey were taken from earlier issues of the survey beginning in 1920, on file at the U.S. Department of Health, Education, and Welfare. All figures for years 1900–1956 are actual attendance data and are not estimates. The 1958 figure is an estimate made by the U.S. Department of Health, Education, and Welfare and is based on their annual fall survey.

1. Number of pupils in average daily attendance

Since most public programs are related to the number of pupils in average daily attendance and not to enrollment, the first will be used, whenever possible, to reflect the public school population in this study. In table 7 the number of pupils in average daily attendance for selected years, 1900–1958, are given. During this period pupils in average daily attendance increased from slightly more than 10 to almost 30 million—that is, about 200 percent.

The nature of the functional relationship between population size and expenditures deserves some consideration. It is possible that population increases lead to economies (or diseconomies) of scale. However, in a scale analysis, both school size and the size of the school district need to be considered.

During 1900–1958, the U.S. population grew rapidly; it became increasingly urban in character. Many school districts consolidated. Thus, during the 15 years from 1942 to 1957, more than half of the local districts disappeared.[7] Likewise, the number of one-teacher schools rapidly declined from 190,655 in 1920 to about 26,000 in 1959—that is, by about 86 percent.[8] Still, it must be remembered that during this period, one-teacher schools educated but a very small percentage of all pupils in average daily attendance in the United States.

There exist no data about the size of the average school district. But there is reason to expect that once the effect of changes in urbanization and the accompanying tendency toward somewhat larger school districts is partialed out—for example, by means of multiple regression techniques—a by and large simple linear relation between per pupil expenditures and number of pupils will result. This contention is considered in some detail in the appendix, which examines the general

[7] U.S. Bureau of the Census, "Governments in the United States," No. 1, vol. 1, 1957, p. 1.
[8] National Education Association, "Status and Trends: Vital Statistics, Education, and Public Finance," Rept. 13, August 1959, p. 14.

problem of economies of scale in public education in a deductive manner and on the basis of a case study, and finds that growth or consolidation of school districts are unlikely to produce significant economies of scale.[9]

2. Sociological characteristics of population

(a) *Age structure.*—Not only does the age structure of the population affect the size of the school-age population, it also affects the percent of pupils in high school as against that in primary schools. Since on the average there are fewer high school pupils per teacher, more expensive equipment is needed, and salaries tend to be higher in secondary education; changes in this ratio can affect overall education costs.

During 1900–1958, the percent of the high school age population has changed and with it also high school enrollment as a percent of total enrollment in public schools.[10] By how much the latter has increased can be seen by referring to table 8, which presents for 1900–1958 high school enrollment relative to total enrollment. The 1900–1958 increase was about 580 percent.

TABLE 8.—*Public high school relative to total public enrollment, selected years, 1900–1958*

Year:	Public high school as a percent of total public enrollment	Year—Con.	Public high school as a percent of total public enrollment	Year—Con.	Public high school as a percent of total public enrollment
1900	3. 3	1930	17. 1	1950	22. 8
1902	3. 5	1932	19. 6	1952	22. 1
1910	5. 1	1940	26. 0	1954	21. 8
1913	6. 1	1942	26. 0	1956	22. 1
1920	10. 2	1946	24. 1	1958	22. 4
1922	12. 4	1948	23. 6		

Sources: Worksheets of historical education series collected by Vance Grant, educational statistician, Division of Statistics and Research Services, Reference, Estimates, and Projections Section, U.S. Department of Health, Education, and Welfare, Office of Education.

(b) *Geographical distribution.*—Rapid urbanization has affected our public schools and possibly their expenditures. For example, in urban communities children live shorter distances from school than they do in rural communities; many urban communities need no school buses, while most rural communities do. Furthermore, in many rural communities school enrollment is alarmingly small; some of them still have one-teacher schools. As a result, per pupil expenditures tend to be high, considering the low quality of education that is offered.

Thus, it stands to reason that increasing urbanization has tended to lead to lower per pupil expenditures, particularly if the scope and quality of education is held constant.

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[9] Werner Z. Hirsch, "Expenditure Implications of Metropolitan Growth and Consolidation," Review of Economics and Statistics (41), August 1959.

[10] This information could only be obtained on the basis of enrollment and not pupils in average daily attendance. However, both series are likely to be highly correlated.

TABLE 9.—*Urbanization of school population, selected years, 1900–1958*

Year:	Percent of pupils in average daily attendance (age 5–19) from urban areas	Year—Con.	Percent of pupils in average daily attendance (age 5–19) from urban areas	Year—Con.	Percent of pupils in average daily attendance (age 5–19) from urban areas
1900	39. 6	1930	53. 3	1950	52. 1
1902	39. 8	1932	53. 6	1952	51. 5
1910	40. 4	1940	54. 6	1954	51. 8
1913	42. 0	1942	55. 1	1956	51. 7
1920	45. 9	1946	55. 5	1958	51. 5
1922	47. 4	1948	54. 3		

NOTE.—The 1940 definition of an urban area was utilized so as to make the series comparable. Since an urban-rural breakdown by age groups was available only for census years 1910–50, the off-census years were estimated by assuming a constant rate of growth between consecutive censuses. Compound interest formulas were utilized in making these estimates. In extending the 1940 definition of "urban area" forward from 1950–58, the rate of increase of the 1950 definition of "urban area" was applied to the 1940 definition. Since much of the area in metropolitan areas as defined by the census in 1950 as "rural" will be redefined as "urban" in 1960, the method used to extend the 1940 definition probably understates the real urban population rate of increase. This fact was pointed out by Conrad Taeuber, Assistant Director, U.S. Bureau of the Census.

Sources: U.S. Department of Commerce, "Statistical Abstract of the United States, 1958," ch. 1: Area and Population. U.S. Department of Commerce, "Population: Characteristics of the Population," U.S. Summary, 16th Census, 1940, tables 7 and 9. U.S. Department of Commerce, "Population: U.S. Summary," 1950 Census, Rept. P–B1, vol. 11, pt. 1, ch. B, table 38.

The extent to which the percent of pupils (5 to 19 years old) in average daily attendance living in urban America has undergone changes since the turn of the century can be learned from table 9. The percentage increased steadily from about 40 percent in 1900 to about 56 percent in 1946. Since then it has slowly declined to about 52 percent in 1958.[11]

In addition to urbanization, other geographic shifts have taken place. The extremely rapid growth of California and industrialization of parts of the Southern States are two of many possible examples. However, because of its complexity, this type of change in the geographic distribution of the United States will not be included in the analysis.

3. Economic characteristics

(a) *Price level of goods and services bought by schools.*—To the extent that the prices paid by schools for teachers, equipment, etc., increase, also the overall cost of operating schools will tend to rise, unless these increases are compensated for by such factors as productivity increases or quality deterioration.

In order to fully gage changes in the prices paid by State and local governments for public education inputs, it is best to separate the various inputs into major categories, establish their importance during the period under consideration, and develop cost data for each major category. Main categories that come to mind are salaries of instruction staff, salaries of maintenance personnel, equipment, etc. Great difficulties are encountered in trying to estimate salaries of school maintenance personnel and equipment. Since by far the overwhelm-

[11] Although in all other instances the 5 to 17 years age group was considered of school age, early census data were only available on a 5- to 19-year basis. For this reason, the latter group was used here.

ing part of all current expenditures take the form of salaries to the instruction staff, and since reasonably good data on annual salaries of instruction personnel are available, these data are used as the main source of information on price level changes.

It is possible to find data on average annual earnings of full-time equivalent State and local government employees in public education. However, this information goes back only to 1930 and these data not only include salaries to the instruction staff but they cover all salaries. At the same time, these data cover salaries paid not only to the personnel of public primary and secondary schools, but also to the personnel of State and city colleges and universities.

In table 10, information on average annual salaries per member of total instruction staff in primary and secondary schools for selected years, 1900–1958, is given. These data are supplemented for selected years from 1930 on by data on the average annual earnings of full-time equivalent State and local employees in public education. To facilitate comparisons, for both series index numbers have been developed with 1954 = 100. Judging by the index numbers, the two series resemble one another rather closely, especially since 1950. Prior to that period, increases in the first series were more rapid than those in the second.

TABLE 10.—*Average annual salaries of public school teachers, selected years, 1900–1958*

Year	Average annual salary per member of instruction staff in primary and secondary shools (1)	Index 1954=100 (2)	Average annual earnings full-time equivalent State and local government public education (3)	Index 1954=100 (4)
1900	$325	8.5		
1902	349	9.1		
1910	485	12.7		
1913	512	13.4		
1920	871	22.8		
1922	1,166	30.5		
1930	1,420	37.1	$1,455	41.5
1932	1,417	37.0	1,399	39.9
1940	1,441	37.7	1,435	40.9
1942	1,507	39.4	1,512	43.1
1946	1,995	52.2	2,025	57.7
1948	2,639	69.0	2,538	72.3
1950	3,010	78.7	2,794	79.6
1952	3,450	90.2	3,169	90.3
1954	3,825	100.0	3,510	100.0
1956	4,139	108.2	3,799	108.2
1958	4,700	122.8	4,343	123.7

Sources: Average annual salary data per member of total instruction staff were computed by Eugene P. McLoone, Division of State and Local School Systems, School Finance Section, U.S. Office of Education.
Average annual earning data of full-time equivalent State-local government public education was taken from: U.S. Department of Commerce, National Income, 1954, a supplement to the Survey of Current Business, table 15.
U.S. Department of Commerce, U.S. Income and Output, a supplement to the Survey of Current Business, 1958, table VI–15.

In 1900, the average teachers' salary in public primary and secondary schools was $325. By 1958, it was about 13 times larger, i.e., about $4,700.

(*b*) *Income level.*—There can be no doubt that throughout the United States the richer communities and States spend on the aver-

age more for education than do the poorer ones. It is true that this is not a perfect linear relationship. Some States and communities make greater tax efforts for education than do others. Nevertheless, by and large, this relationship holds. The relation between income and expenditures is not a simple one. Thus, for example, rich communities will tend to insist on good education, which in turn will add to the cost of education.

In such a case, statistical methods are unlikely to determine whether changes in income level or quality level are originally responsible for expenditure level changes. A good understanding of the impact of income level changes on education is of paramount importance. In spending his income, a person faces a virtually unlimited number of different goods and services. As his income increases, his spending habits are likely to change, too. Under those circumstances, the question is whether the average person, whose annual income increased by a given percent, will increase his education budget by the same percent, by less, or by more. If for simplicity's sake education expenditures are equated, in a rough way, with the amount of education purchased, the concept of income elasticity of public education becomes applicable. Education demand can be unit elastic, inelastic, or elastic. The question, therefore, is, "How elastic or inelastic is the demand for education?"

TABLE 11.—*Per capita personal income, selected years, 1900–1958*

Year:	Per capita personal income	Year—Con.	Per capita personal income	Year—Con.	Per capita personal income
1900	$199. 2	1930	$624. 1	1950	$1, 506. 2
1902	218. 5	1932	401. 4	1952	1, 739. 0
1910	300. 6	1940	595. 5	1954	1, 784. 5
1913	325. 1	1942	915. 7	1956	1, 965. 3
1920	712. 3	1946	1, 268. 1	1958	2, 030. 3
1922	552. 4	1948	1, 435. 1		

Sources: Years 1900–1928. National Industrial Conference Board. Economic Almanac 1958. New York: Thomas Y. Crowell Co., 1958, p. 401.
1929–57. U.S. Department of Commerce, Office of Business Economics. Survey of Current Business 38: pp. 3–17; July 1958. Tables 3 and 4, pp. 6 and 7.
Year 1958. From Economic Indicators, May 1959, pp. 2, 3, and 5.

Personal income data and their index numbers are presented in table 11 for a select number of years from 1900 to 1958. Except for the depression years of the early thirties, per capita personal income steadily increased from about $199 in 1900 to about $2,030 in 1958, i.e., about nine times.

4. Physical characteristics

(a) *Productivity of school system.*—Productivity in general relates output to any or all of the inputs employed in producing goods or service. Since the aim is to learn about the efficiency with which resources are utilized, input as well as output must be measured in physical terms. Perhaps the most common productivity measure is the partial productivity "output per man-hour." Output is related to but one input, i.e., labor, which in the case of education overshadows by far all other inputs. To estimate the net saving of all cost elements, or inputs, and thus the change in overall productive efficiency, output should be related to all inputs, i.e., labor, equipment, physical plant, etc.

Productivity of schools is most difficult to measure. The main measurement problems center around output. An automobile assembly plant turns out on a given day a given number of cars of virtually uniform characteristics. They are the plant's output. The output of education is much less tangible and much less standardized. Everyone will agree that education has changed since the turn of the century, and yet few will be able to say, in quantitative terms, how great the change has been. Whether it is because or in spite of the great difficulties of measuring educational output, relatively little work has been done in this area.

One of the most serious studies of productivity in government was undertaken by Solomon Fabricant in 1952. He concluded that a—

> Review of some factors affecting the trend of government productivity—the use of improved technology and equipment, the spread of the merit system, the introduction of centralized purchasing, and various other advances in public administration—leaves the impression that labor savings have been made. Indeed, it is hard to think of any factor tending in the opposite direction except possibly the very increase in the scale of government operations. Nor does it appear that these savings of labor reflect merely increase in the volume of other resources—capital goods and other purchases—used per worker. Total productivity, output per combined unit of all resources, appears to have risen in government.[12]

An empirical effort to measure the productivity trend of Federal agencies was undertaken by Henry D. Lytton.[13] Lytton estimated changes of the last 10 years for the Commodity Stabilization Service, Social Security Administration, Post Office Department, Veterans' Administration, and Internal Revenue Service. Most of the outputs of these agencies are readily quantified. Thus, for instance, a post office handles a given number of pieces of mail having a given volume and given other characteristics. The productivity advances of these agencies during the last 12 years averaged about 1½ percent a year. The range extended from 1¼ to 8 percent, compounded annually. The Commodity Stabilization Service showed the greatest productivity increase; i.e., of about 8 percent a year. Much of this change apparently was due to the introduction of electronic processing equipment.

The same general view was expressed by Richard Ruggles and Nancy D. Ruggles, in their paper to the Joint Economic Committee when they maintained that—

> There is good reason to believe, however, that the productivity of Government workers has increased substantially in this period. For one thing, the introduction of data handling machines and computers speeds up the operation of many stages of Government work. Statistics in the Government now, in large part, are handled mechanically rather than by clerks. The mechanization which is so characteristic of current development in business is also occurring in Government.[14]

In 1955 Fortune magazine carried an article, "Productivity: The Great Age of 3 Percent." In this article it was stated that—

> Government efficiency, because electronic tabulating and computing can take over the bulk of its clerical work, can and should rise enormously. * * * The productivity of schools and teachers, by contrast, cannot and properly should not increase very much.[15]

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[12] Solomon Fabricant, "The Trend of Government Activity in the United States Since 1900" (New York: National Bureau of Economic Research, Inc., 1952), pp. 98–99.
[13] Henry D. Lytton, "Estimating Recent Federal Agency Productivity Trends" (Washington, D.C., 1959), 46 pages.
[14] Richard Ruggles and Nancy D. Ruggles, op. cit., p. 299.
[15] Gilbert Burck and Sam Ford Parker, "Productivity: The Great Age of 3 Percent," Fortune, November 1955, pp. 249–250.

Instead of measuring the productivity of our public primary and secondary schools in any direct manner, an indirect method might be tried. It would move along the following lines: time series data of current education expenditures plus debt service would be so adjusted and standardized that price level and variety, scope, and quality of education—to the extent that they affect expenditures—are held constant and are expressed in per pupil in average daily attendance terms. This series could be called education costs in constant terms. It could trace over time cost changes of a given bundle of public primary and secondary education. But it can also testify to productivity changes. For example, should education costs in constant terms have consistently fallen, it stands to reason that productivity increases would have occurred and vice versa.

While it is not too clear whether and, if so, how much productivity in Government in general increased, it is even more difficult to assess the productivity increases in public education. Many of the forces that apparently work in general State and local governments do not work in education. Thus, for instance, electronic computers have not been introduced nor do they warrant introduction; likewise, administrative improvements appear to have been minor.

While we cannot identify many steps taken in the past with a view to improving productivity, a few new methods have recently been discussed and tried. Perhaps the most important one is television. The Ford Foundation and the Fund for the Advancement of Education have been instrumental in experimenting with what has been described as the most important new educational tool since the invention of movable type. In their May 1959 report, "Teaching by Television," Ford Foundation and the Fund conclude that—

Today the question is no longer whether television can play an important role in education. That question has been answered in the affirmative not only by the experiments supported by the Fund and the Foundation but also by the many other programs in which the medium is being used successfully for direct classroom instruction. The question that now needs fuller exploration is what kind of a role television can play most effectively. * * *

Television can be used—and in some places is being used—to do the traditional job of education, and to do it well. However, those who have had experience with the medium know that, if wisely and imaginatively used, it also can bring to students educational experiences far beyond what is possible in the conventional classroom. * * *

Also, television makes possible exciting new developments in the team approach to teaching, in which the particular skills and competencies of many teachers are used cooperatively in planning and presenting courses. The status and rewards of teaching can be vastly enhanced by this new medium.[16]

Another method that can possibly increase productivity in schools is the use of teachers' aids, who are employed to relieve teachers of such burdensome and nonteaching chores as compiling attendance records, collecting various kinds of contributions and fees, cleaning blackboards, watering plants, etc.

To make fuller use of the physical plant, the length of the school term has been expanded. Some schools are beginning to have summer sessions. Some are considering a four-quarter system. The entire school year would be divided into four school quarters; schools would be open all year and students would attend any three quarters they choose. If this is successful, the present physical plant could thus accommodate as much as one-third more students.

16 Ford Foundation and Fund for the Advancement of Education, "Teaching by Television" (New York 1959), pp. 60–61.

5. Government characteristics

Governmental structure and relationships can greatly affect the amount of money available for public education.   At the moment not too much is known about the specific governmental characteristics which affect services and expenditures.   But there can be no doubt that State-local fiscal interrelationships can play an important role. Clearly, the more the expenditures are financed by the State, and the more the State subsidies are based on the equalization principle, the more uniform the availability of funds throughout the State will be.

Julius Margolis advanced the thesis in a paper before the 1959 National Bureau of Economic Research's "Conference on Public Finances: Needs, Sources, and Utilization,"[16a] that governments with many functions may find it easier to raise funds by taxation, whereas such single-purpose special districts as school districts may not have sufficient fiscal strength to fulfill their goals.   As is well known, public education is offered by both independent governments, i. e., school districts, and as special functions of other governments, i.e., counties, municipalities, and townships.   Only about 4 percent of the public school systems in the United States are nonindependent school departments.   But they are significant in size—they have 22 percent of the school enrollment.

According to Margolis, the comparison between fiscally independent school districts and fiscally dependent school departments is of interest since it indicates whether the public will spend more for a public service when it is presented as a single unit or as part of a package for which the specific benefit of the marginal tax dollar is uncertain. Agreeing that the evidence is far from conclusive, he reproduced some data that were used first by Henry B. Woodward.[17]   They indicate that fiscally dependent departments spend more per pupil than fiscally independent school districts.   Woodward had made an analysis of expenditures in 85 cities between 100,000 and 1 million population over the period 1929–30 to 1943–44.   During this period the mean per pupil expenditure was highest in the fiscally dependent cities.   They spent about 4 percent more than the independent districts in 1929–30 and nearly 12 percent more in 1943–44.

In addition, Margolis refers to the following census data.   The April 1957 payroll of fiscally dependent school departments was $22.90 per pupil while for fiscally independent school districts it was $20.90. Ten of the forty-one largest cities have municipal school departments, but they spent in 1952–53 $346.11 per pupil in average daily attendance against $293.40 spent in the other 31 largest cities with independent school districts.[18]

Another example given by Margolis relates to New Jersey where there are dependent and independent systems of all size classes.   The cities of over 100,000 had municipal school departments.   They spent $383 per pupil in average daily attendance.   In the remaining cities, the municipal school departments spent $343 per pupil in average daily attendance, while the independent school districts spent $293 per pupil in average daily attendance.

[16a] Public Finances: Needs, Sources, and Utilization—A Conference of the Universities-National Bureau Committee for Economic Research; A Report of the National Bureau of Economic Research to be published by Princeton University Press (1960).

[17] Henry B. Woodward, "The Effects of Fiscal Control on Current School Expenditures," Ph. D. thesis, New York Teachers College, 1948.   Cited in Powell R. Mort and Walter C. Reusser, "Public School Finance," second edition (New York: McGraw-Hill, 1941), p. 60.

[18] U.S. Bureau of the Census, 1957 Census of Government, vol. 2.   No. 1, table 4, and vol. 1. No. 1, table 10. And U.S. Office of Education, Annual Survey of Education, 1953–54. "Statistics of City School Systems," pp. 36–45.

The great shortcoming of these data is that they are not subjected to a multiple correlation and regression analysis. Much more work remains to be done on this score before Margolis' thesis can be accepted or rejected.

6. Variety, scope, and quality of education services

(a) *Addition or deletion of services.*—There are a number of different ways in which an attempt can be made to measure the scope and quality of public education. But before they are explored, it appears desirable to distinguish between two types of services offered by schools, i.e., services directly designed to improve education versus those that do not directly affect educational quality. Among the latter are the transportation of children in schoolbuses, the feeding of children in school cafeterias, health services, etc. No one will claim that these services are not important. However, it is helpful to recognize that they do not directly contribute to the quality of education. From now on, they will be called auxiliary school services. At the turn of the century they were hardly known. Today they amount to almost $1.5 billion, the most rapid advance having taken place during the postwar period. Expenditures for auxiliary school services are given in table 12.

In many respects it is desirable to deduct expenditures for auxiliary school services from total current expenditures (plus debt services). If this is done, current expenditures (plus debt service) data are reduced to a more common denominator.

TABLE 12.—*Auxiliary school service expenditures, selected years, 1900–1958*

[In thousands]

Year:	Auxiliary school service expenditures	Year—Con.	Auxiliary school service expenditures	Year—Con.	Auxiliary school service expenditures
1900____	[1] 0	1930____	$152, 263	1950____	$713, 132
1902____	[1] 0	1932____	144, 273	1952____	917, 440
1910____	[1] $5, 000	1940____	179, 257	1954____	1, 020, 037
1913____	[1] 10, 000	1942____	219, 670	1956____	1, 304, 244
1920____	45, 673	1946____	349, 097	1958____	[1] 1, 490, 000
1922____	69, 266	1948____	526, 999		

[1] Estimate.

Source: U.S. Department of Health, Education, and Welfare, "Biennial Survey of Education in the U.S.—1954–56," chapter 2, pp. 19–21, 80–82, and worksheets made available by the U.S. Department of Health, Education, and Welfare.

TABLE 13.—*Length of school term, selected years, 1900–1958*

Year	Average length of school term (days)	Average number of days attended by pupils enrolled	Year	Average length of school term (days)	Average number of days attended by pupils enrolled
1900_____	144. 3	99. 0	1942_____	174. 7	149. 6
1902_____	144. 7	100. 6	1946_____	176. 8	150. 6
1910_____	157. 5	113. 0	1948_____	177. 6	155. 1
1913_____	158. 1	115. 6	1950_____	177. 9	157. 9
1920_____	161. 9	121. 2	1952_____	178. 2	156. 0
1922_____	164. 0	130. 6	1954_____	178. 6	158. 9
1930_____	172. 7	143. 0	1956_____	178. 0	158. 5
1932_____	171. 2	144. 9	1958_____	178. 7	_____
1940_____	175. 0	151. 7			

Source: U.S. Department of Health, Education, and Welfare, "Biennial Survey of Education in the United States, 1954–56," ch. 2, table 1; for select prior years; these data were taken from earlier biennial survey reports.

(b) *Scope of services.*—As a first approximation it might be claimed that the longer the school term, the more can be learned. Table 13 indicates that, since the turn of the century, major changes have taken place in the length of the school term. In 1900, the school term lasted an average of 144 days; by 1958, it had been lengthened to 179 days, i.e., by about 24 percent. At the moment further lengthening is contemplated by many school boards.

The change in the average number of days attended by pupils enrolled in public schools during the school term has been even more striking during this period. The average increased from 99 days in 1900 to 158 days in 1956, i.e., about 60 percent.

(c) *Quality of services.*—Perhaps the most feasible approach would involve identifying and then measuring ingredients that make for good education. On that basis an index of quality of education could then be developed. Here are some of the factors that might be included in such an index of the quality of public education:

(1) Class size: While the average pupil-teacher ratio in average daily attendance is a reasonably good indication of class size, like any other average it conceals much detail. For instance, since high school classes are smaller than primary school classes, the age distribution is important. Another telling item would be whether the school offers a course in advanced mathematics or a foreign language if only 10 or 15 students are enrolled. Also the number of teachers' aids is to be considered.

(2) Grouping: Many educators maintain that good education requires that, within limits, students of common ability and interest are grouped together.[19] Even after this philosophy is generally adopted, schools will differ as to whether they are able to deal with very small groups of very able students.

(3) Quality of the teaching staff: A good teaching staff has a number of important characteristics, some more tangible than others. The percent of experienced teachers is revealing. Do they tend to stay on for a career in the school system or do they move often? Also, the background of the teaching staff plays a dominating role. What is the percent of teachers who are graduates of strong liberal arts colleges with majors in the field or fields in which they are teaching? The methods used for selecting new teachers and of appraising the quality of the existing staff are also of interest. A good school interviews many persons for a position; it looks outside the borders of its district and even outside its State for personnel. Thus, an important indicator would be the average number of outside-the-area candidates interviewed for each teacher hired, or the percent of outsiders on the staff. In addition, the better school systems have an organized program of teacher appraisal on which merit increases are based.

Teaching load is another indicator. In many schools 20 hours of teaching a week and dealing with about 175 students is considered normal. It might be helpful to relate the average teaching load of a given school to the national average.

Finally, the quality of the teaching staff depends to no small extent on the number and the variety of specialists among it. Is there a full-time librarian, or more than one, and what is the number of

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[19] See James B. Conant, "The American High School Today" (New York: McGraw-Hill, 1959), 140 pages.

students per librarian? Likewise, how many counselors are there, and how many students per counselor? Similar figures should be collected for other specialists.

(4) Quality of school administration: The leadership offered and ability of the school superintendent and his principals cannot be neglected; yet it is most difficult to appraise their contributions. Usually, principals who are not relieved from all teaching cannot do a superior job.

(5) Teaching program: Schools with a good college preparatory program insist that college-bound students carry four courses a year in English, mathematics, science, history, or foreign languages. What percent of the students have such a program? How far does the mathematics program go? What percent of the students take mathematics courses beyond a second year of algebra and 1 year of plane geometry? Are they taught calculus? In the foreign language field, what percent of the students take 3 or 4 years of foreign languages? How much writing is done in the English classes?

While it is possible to develop an ideal hypotheis about the quality of education, the task of implementation is enormous. It was attempted in a study of the public schools in the St. Louis city-county area.[20] This quality index was composed of six subindexes:

A=number of teachers per 100 pupils in average daily attendance.[21]

B=number of college hours of average teacher.

C=average teacher salary.

D=percent of teachers with more than 10 years of experience.

E=number of high school credit units.

F=percent of high school seniors entering college.

In this index, A is supposed to reflect class size, B, C, and D quality of teaching staff, and E quality of teaching program. It is true that F is not an ingredient of good education. Instead it is a way of crudely approximating an achievement-native ability comparison. It may, however, be a better measure than appears at first glance. It is widely assumed that whether a high school senior enters college depends mainly upon the financial situation of his parents. Yet the rank correlation coefficient measuring the relation between percent of high school seniors entering college in 1955 and average assessed valuation of the 27 school districts, which were considered in this case study, is $+0.34$, and is statistically barely significant at an α of 0.05. This low correlation may have a number of causes. College education has become more and more universal and is no longer available primarily to the sons of the well to do. Also, school districts are not entirely homogeneous in regard to property values. And finally, assessed valuation is not only the product of residential property values, it is also affected by the relative importance of commercial and industrial property located within the district.

Another subindex tried was one reflecting average capital expenditure per pupil in average daily attendance for the past 4 years. As

[20] For detailed discussion, see Werner Z. Hirsch "Measuring Factors Affecting Expenditure Levels of Local Government Services" (St. Louis: Metropolitan St. Louis survey, 1957), 94 pages.

[21] Teachers per 100 pupils in average daily attendance and average teacher salary are usually expected to be highly correlated with the general level of expenditures. An analysis revealed that the correlation, while high, is far from perfect. It is $+0.71$ in the first case and $+0.68$ in the second case. Both are not very high. Thus, the inclusion of factors A and C in the scope and quality index appears warranted.

was to be expected, a simple scatter diagram revealed a very high correlation between this factor and school population increases. This factor appears to measure primarily growth and not quality; and it was therefore discarded.

The weighting problem is truly difficult. Who can confidently assess the relative importance of the number of teachers per 100 pupils, as compared to the number of high school credits offered by the school? Since no useful basis could be found to give each of the six factors specific differential weights, equal weights were used. Fortunately, with six components to the index, the weighting system is no longer so very crucial. Doubling the weights of any one or two of the components will not greatly affect the magnitude of the index numbers.

This simplified index was subjected to a test which sheds some light on its reliability. A number of educators who are well acquainted with public schools of the St. Louis city-county area were interviewed separately and asked to rate the various school distficts in terms of excellent, good, medium, poor, and very poor. These ratings, when compared with the scope and quality index data, showed very close consistency. In no case was the school district with an index number above 1, i.e., average, given a subjective rating of poor or very poor, and vice versa. In the few cases with difference in the rating, the index number was equivalent to excellent and the subjective rating was good. Although this is a very simple validation procedure, it might well be that if there are inaccuracies in the index numbers, they are not in excess of from 5 to 10 percent either way. To the extent that discrepancies exist, they are likely to be randomly distributed and no bias appears to have crept into the index.

On the national level, the paucity of appropriate and consistent data, useful for such an analysis, is very great. Virtually all the data that are available, and that at first glance appear pertinent, are expressed in dollars. They pose serious problems of circularity. It is a simple tautology to state that high salaries, designed to reflect variety, scope, and quality of education, affect expenditures.

However, one measure, expressed in physical units and most likely an ingredient of good education, is the number of principals, superintendents, and consultants per 1,000 pupils in average daily attendance. These are the educational experts who evaluate the curriculum and introduce changes, provide guidance, supervise teachers, etc., and their number is considered to be as reliable an indication of the quality of education as can be obtained at present; superior to any other simple measure, as, for instance, teacher-pupil ratio. About the latter, Ralph Cordiner, of the General Electric Co., is reported to have made the controversial statement—

There are some educators who are actually proud of the declining ratio of students to faculty. * * * To my knowledge, there is no other field in human endeavor which actually prides itself on declining productivity.[22]

Returning to the number of principals, superintendents, and consultants per 1,000 pupils in average daily attendance as a sole measure of the quality of education, in the narrow sense, the following assumptions should be kept in mind. Quality of output is highly

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[22] Quoted by J. A. Livingston in "Get With It, Professor, Your Show's Slipping," the Washington Post and Times Herald. Nov. 27, 1957.

correlated with the quality of certain crucial inputs, one of which is the number of principals, superintendents, and consultants per 1,000 pupils in average daily attendance. Also, superior school districts not only hire more specialists than do inferior ones, but they also hire better ones and, in general, they are rational and approximate a marginal calculus by using high-quality ingredients all around, i.e., the quality of none of the ingredients making for good education is far out of line.[23]

As can be seen from table 14, the number of principals, superintendents, and consultants per 1,000 pupils in average daily attendance has about doubled since the turn of the century.

TABLE 14.—*Total number of principals, superintendents, and consultants per 1,000 pupils in average daily attendance in public primary and secondary schools, selected years, 1900–1958*

Year:	Number of principals, superintendents, and consultants per 1,000 pupils in average daily attendance	Year—Con.	Number of principals, superintendents, and consultants per 1,000 pupils in average daily attendance	Year—Con.	Number of principals, superintendents, and consultants per 1,000 pupils in average daily attendance
1900	[1] 1. 31	1930	1. 78	1950	2. 18
1902	[1] 1. 31	1932	[1] 1. 33	1952	[1] 2. 13
1910	[1] 1. 33	1940	1. 65	1954	2. 18
1913	[1] 1. 32	1942	[1] 1. 86	1956	2. 32
1920	1. 25	1946	[1] 1. 82	1958	2. 70
1922	[1] 1. 44	1948	[1] 2. 22		

[1] Estimate.

NOTE.—The estimates were made by extending the biennial survey data backward based on Stigler's study.   Estimates for certain years was based on simple linear extrapolation.   The number of consultants, superintendents, and principals was derived as a "residual" where data on total instruction staff and the number of teachers, librarians, and other nonsupervisory instruction staff were available.

Sources: U.S. Department of Health, Education, and Welfare, "Biennial Survey of Education in the U.S., 1954–56," ch. 2, table 1; George J. Stigler, "Employment and Compensation in Education," Occasional Paper 33, NBER, Inc. (1950).

At least in theory, there is a much superior approach to measuring scope and quality changes of public education.   It involves comparing the students' achievement with their native ability.   Specifically, a pupil's achievement test results obtained in high school could be compared with results of his IQ test taken early in his primary grade school days.   One complicating element in this approach is that school districts do not have identical educational objectives.   Furthermore, some schools consider it their task to prepare youngsters for college, while other schools, particularly those in rural America and to some extent in the core cities, have as their main objective the provision of vocational training.   There can be no doubt that students will score differently on an achievement test depending upon the school's objective.

Implementation of this approach would require that all schools in the United States use the very same achievement and IQ tests and that they have done so for a long period of time.   Since these requirements are not met, this method does not lend itself to practical application at the moment.

[23] The author is obliged to Prof. William Fellner, who pointed out these explicit assumptions.

TEST OF HYPOTHESIS

The working hypothesis which was enunciated in the preceding pages will now be tested in the light of available national data. In many respects, availability more than appropriateness of data determines their application. Time series data for selected years during 1900–1958 will be used and subjected to multiple correlation and regression analyses.

By insisting on intervals of at least 2, and in many instances 7 or 8 years, it is hoped that much otherwise existing serial intercorrelation is eliminated.[24] But with only data for 17 years at hand, one is somewhat handicapped in including all the independent variables that appear appropriate. Care must be exercised that no unduly large number of degrees of freedom is lost. Because of this consideration, it was decided to use as dependent variable, daily total current expenditures plus debt-service per pupil in average daily attendance. In a sense, the dependent variable is already adjusted for possibly two independent variables—number of pupils in average daily attendance and length of school year. While there are some risks in taking such a step, they were considered outweighed by the advantages of retaining more degrees of freedom.

In order to shed light on such questions as, "Why has the public education sector had such large expenditure increases?" and "What are the underlying relationships for the near term?" two working hypotheses have been enunciated and empirically tested. The first hypothesis is as follows:

X_{1a}—daily total current expenditure plus debt service for public primary and secondary education per pupil in average daily attendance is a function of—

X_2—percent of public high school enrollment relative to total public school enrollment;

X_3—percent of pupils (5 to 19 years old) in average daily attendance living in urban areas;

X_4—average annual salary for member of instruction staff; and

X_6—number of principals, superintendents, and consultants per 1,000 pupils in average daily attendance.

In brief,
$$X_{1a} = f(X_2, X_3, X_4, X_6).$$

The following multiple regression equation was obtained for 17 selected years during 1900–1958:

$$X'_{1a} - 0.164999 + \frac{0.002067\ X_2}{(0.0257)} - \frac{0.005288\ X_3}{(0.1069)} + \frac{0.000441\ X_4}{(0.9895)} + \frac{0.022391\ X_6}{(0.0271)}.^{25} \quad (1.1)$$

The coefficient of multiple determination, adjusted for degrees of freedom lost—$R^{*2}_{1.2346}$—is 0.998 and is statistically highly significant. Thus, about 99.8 percent of the variation of daily total current ex-

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[24] Although no detailed checks were made, it appears that also the other two important assumptions underlying the method are met. Thus, the values of the dependent variable of the population appear to be normally distributed around the least square line, and also the standard deviations of these normal population distributions appear about equal.

[25] The figures in brackets are partial correlation coefficients. Since there are 17–5 or 12 degrees of freedom, coefficients are statistically significant at an α of 0.05, when they are larger than 0.532.

penditure plus debt service per pupil in average daily attendance is explainable in terms of these four variables of which salary level, X_4, is statistically significant. All relationships but one are positive   The significant net regression coefficient 0.000441 can be interpreted in the following manner—during 1900–1958, a $1,000 increase in average annual teacher salaries was on the average associated with a 44.1-cent increase in daily total current expenditures per pupil in average daily attendance, holding the effect of changes in the other three factors constant.   Also, about 98 percent of the variation of the cost of the standardized education unit can be explained in terms of teacher salary level increases, holding the effect of changes in the other three factors constant.

It is somewhat surprising that neither the percentage of high school enrollment, nor urbanization, nor the number of specialists per 1,000 pupils in average daily attendance, which was designed to measure quality of education, had a statistically significant effect on expenditures.

The beta coefficients, i.e., net regression coefficients divided by their respective standard deviations, are, in order of magnitude:

$$\beta_{14.236} = 0.9944,$$
$$\beta_{13.246} = -0.0504,$$
$$\beta_{12.346} = 0.0273, \text{ and}$$
$$\beta_{16.234} = 0.0161.$$

The simple correlation coefficient matrix, which follows, is of some interest:

	X_{1a}	X_2	X_3	X_4
X_2	0.6892			
X_3	0.5707	0.9659		
X_4	0.9992	0.7027	0.5881	
X_6	0.9484	0.7307	0.6150	0.9487

This matrix reveals exceptionally high intercorrrelations; for example, $r_{23} = 0.9659$ and $r_{46} = 0.9487$.   All simple correlation coefficients are high and statistically significant at an $\propto$ of 0.05.

The second hypothesis, a slight modification of the first one, takes explicit recognition of the fact that expenditures for auxiliary services and the number of principals, superintendents, and consultants per 1,000 pupils in average daily attendance are unlikely to be related. Thus, instead of relating X_2, X_3, X_4, and X_6 to daily total current expenditures, it relies upon a new dependent variable, i.e., X_{1b}—daily total current expenditures plus debt service minus expenditures for auxiliary services for public primary and secondary education per pupil in average daily attendance.

On this basis, the following new multiple regression equation was obtained for 1900–1958:

$$X^1{}_{1b} = 0.006929 - \frac{0.000603X_2}{(0.0030)} - \frac{0.000336X_3}{(0.00058)} + \frac{0.000372X_4}{(0.9889)} \qquad (1.2)$$
$$+ \frac{0.013847X_6}{(0.01110)}.$$

The statistically significant net regression coefficient is $b_{14 \cdot 236}$. The beta coefficients are, in order of magnitude:

$\beta_{14 \cdot 236} = 0.9970$,
$\beta_{16 \cdot 234} = 0.0118$,
$\beta_{12 \cdot 346} = 0.0094$, and
$\beta_{13 \cdot 246} = 0.0036$.

The coefficient of multiple determination adjusted for degrees of freedom lost is highly significant at an α of 0.05. It is 0.998. The following is the simple correlation coefficient matrix:

	X_{1b}	X_2	X_3	X_4
X_2	0.6963			
X_3	0.5808	0.9659		
X_4	0.9994	0.7027	0.5881	
X_6	0.9484	0.7307	0.6150	0.9487

The foregoing multiple correlation and regression analysis clearly points to the overwhelming importance of the salary level variable and perhaps the prices of all goods and services bought by schools. However, they, in turn, are determined by the general demand and supply situation and price level of the rest of the economy, as well as the particular demand for and supply of teachers.[26]

EDUCATION COST IN CONSTANT TERMS

A truly serious shortcoming of the deflating efforts of the U.S. Department of Commerce is its admitted inability to adjust for anything but price level changes. It expresses State and local government purchases in constant dollar terms, but neglects changes in the variety, scope, and quality of services.

Thus, an effort will be made to develop first a series which in concept resembles that of the U.S. Department of Commerce, i.e., cost of public primary and secondary education in constant dollars. Thereafter, more terms than merely price level will be held constant, leading to an education cost index in real terms.

By deflating the actual expenditure series by an average annual salary index—with, for instance, 1954 = 100—a new series results which testifies to the expenditures that would have been incurred if 1954 salary conditions had prevailed throughout the period.

[26] According to some calculations made by Roger A. Freeman, for instance, during 1929-57 teachers' salaries advanced more rapidly than the earnings of all workers—94 versus 82 percent. This indicates that the demand for and supply of teachers cannot be neglected. See Roger A. Freeman, "School Needs in the Decade Ahead" (Washington, D.C.: Institute for Social Science Research, 1958), p. 131.

TABLE 15.—*Total current expenditures plus debt service for public, primary, and secondary education, selected years, 1900–1958*

[In thousands of dollars]

Year	Unadjusted	Adjusted for pupils in ADA (1954=100)	Adjusted for salary level (1954=100)	Year	Unadjusted	Adjusted for pupils in ADA (1954=100)	Adjusted for salary level (1954=100)
	(1)	(2)	(3)		(1)	(2)	(3)
1900	193. 9	467. 2	2, 281. 2	1942	2, 378. 6	2, 900. 7	6, 037. 1
1902	214. 2	497. 0	2, 353. 8	1946	2, 995. 1	3, 869. 6	5, 737. 7
1910	384. 8	769. 6	3, 029. 9	1948	4, 092. 4	5, 021. 3	5, 931. 0
1913	473. 0	890. 8	3, 529. 9	1950	5, 090. 7	5, 858. 1	6, 468. 5
1920	938. 5	1, 489. 7	4, 116. 2	1952	6, 219. 8	6, 857. 6	6, 895. 6
1922	1, 332. 0	1, 852. 6	4, 367. 2	1954	7, 458. 3	7, 458. 3	7, 458. 3
1930	2, 095. 0	2, 527. 1	5, 646. 9	1956	9, 054. 6	8, 368. 4	8, 368. 4
1932	2, 147. 9	2, 477. 4	5, 805. 1	1958	1 11, 020. 0	1 9, 467. 4	1 8, 973. 9
1940	2, 192. 0	2, 548. 8	5, 814. 3				

1 Estimate.

Sources: Worksheets made available by the U.S. Department of Health, Education, and Welfare, and tables 7 and 10.

Such a deflated series is presented in column 3 of table 15 and can be compared with the actual expenditure series in column 1. While between 1900 and 1958 actual expenditures had increased 56-fold, the increase of the salary adjusted series extends merely from about $2.3 billion to $9 billion—less than threefold—and only 5 percent of that actually incurred.

The U.S. Department of Commerce's constant dollar series of State and local government purchases extends back to 1929. During 1930–57 it advanced by 88 percent, while during the same period the education cost series in constant dollars advanced distinctly less, i.e., 56 percent.

By the way, in the same manner adjustments have been made for the number of pupils in [average daily attendance. (See col. 2 of table 15.) In terms of 1954 average daily attendance, expenditure increases from 1900 to 1958 would have been twentyfold, i.e., slightly more than one-third of the actual increase.

What can be said about expenditures for public, primary, and secondary education in constant terms? To answer this question an attempt will be made to measure the cost of an education unit, so standardized that its variety and scope are held reasonably constant, and expressed in per pupil in average daily attendance terms.

At an earlier stage it was pointed out that since the turn of the century an increasingly large number of auxiliary services—schoolbus transportation, cafeteria, health services, etc.—have been introduced. Their cost has progressed from near zero in 1900 to almost $1.5 billion in 1958 (see table 12). But these auxiliary services have not necessarily improved the quality of education itself.

If expenditures for auxiliary services are subtracted from the other current expenditures plus debt service, the 1900–1958 increase is only 48-fold (col. 1 of table 16). By adjusting this series for changes in salary level, the increase is further reduced to less than 2½-fold (col. 2 of table 16).

TABLE 16.—*Total current expenditure plus debt service for public, primary, and secondary education minus auxiliary services, selected years, 1900–1958*

Year	Unadjusted annual, thousands of dollars (1)	Adjusted for salary level (1954=100), thousands of dollars (2)	Per pupil expenditures, dollars (3)	Daily per pupil expenditures, dollars (4)	Daily per pupil expenditures in 1954 dollars (5)
1900	193.9	2,281.2	18.233	0.126	1.482
1902	214.2	2,353.8	19.357	.134	1.473
1910	379.8	2,990.6	29.607	.188	1.480
1913	463.0	3,455.2	34.007	.215	1.604
1920	892.8	3,915.8	55.281	.341	1.496
1922	1,262.7	4,140.0	68.506	.418	1.370
1930	1,942.8	5,236.6	91.359	.529	1.426
1932	2,003.6	5,415.1	90.069	.526	1.422
1940	2,012.7	5,338.7	91.311	.522	1.385
1942	2,158.9	5,479.4	102.655	.588	1.492
1946	2,646.0	5,069.0	133.308	.754	1.444
1948	3,565.4	5,167.2	170.511	.960	1.391
1950	4,377.5	5,562.3	196.443	1.104	1.403
1952	5,302.4	5,878.5	227.991	1.279	1.418
1954	6,438.2	6,438.2	251.062	1.406	1.406
1956	7,750.3	7,162.9	279.392	1.570	1.451
1958	¹ 9,530.0	7,760.6	319.167	1.786	1.454

¹ Estimate.

Sources: Tables 7, 10, 12, 13, and 15.

In addition to excluding auxiliary services, it appears proper to use an education unit which is neither affected by the number of pupils in average daily attendance nor the length of the school term. Thus, the education unit which will be used is daily public primary and secondary education per pupil in average daily attendance, leaving aside auxiliary services. In column 3 of table 16, per-pupil annual expenditures are given, and in column 4 they are reduced to a daily basis. Finally, in column 5, daily per-pupil expenditures (minus auxiliary services) in 1954 dollars are given. This series might be quite appropriate to indicate the cost of a given bundle of public primary and secondary education in constant terms. This series together with the current and constant dollar series is presented in chart 2.

Costs in real terms exhibit amazing stability during 1900–1958. For the years for which data are available, 1922 was the low year with $1.37 daily expenditure per pupil, and 1913 was the high year with $1.60. Over the 58 years, an overall decline of about 3 percent was registered. To the extent that the standardization of the educational unit has been successful and appropriate data in general were used, the analysis can reflect on the productivity variable as a residual. Apparently, productivity in the public schools has changed very little, if at all. This finding appears to bear out the claim made by Burck and Parker some 4 years ago.[27]

[27] Gilbert Burck and Sam Ford Parker, op. cit., pp. 249, 250.

Chart 2
Current Expenditures (plus Debt Service) for Public
Primary and Secondary Education Minus Expenditures for
Auxiliary Services

Selected Years, 1900-58
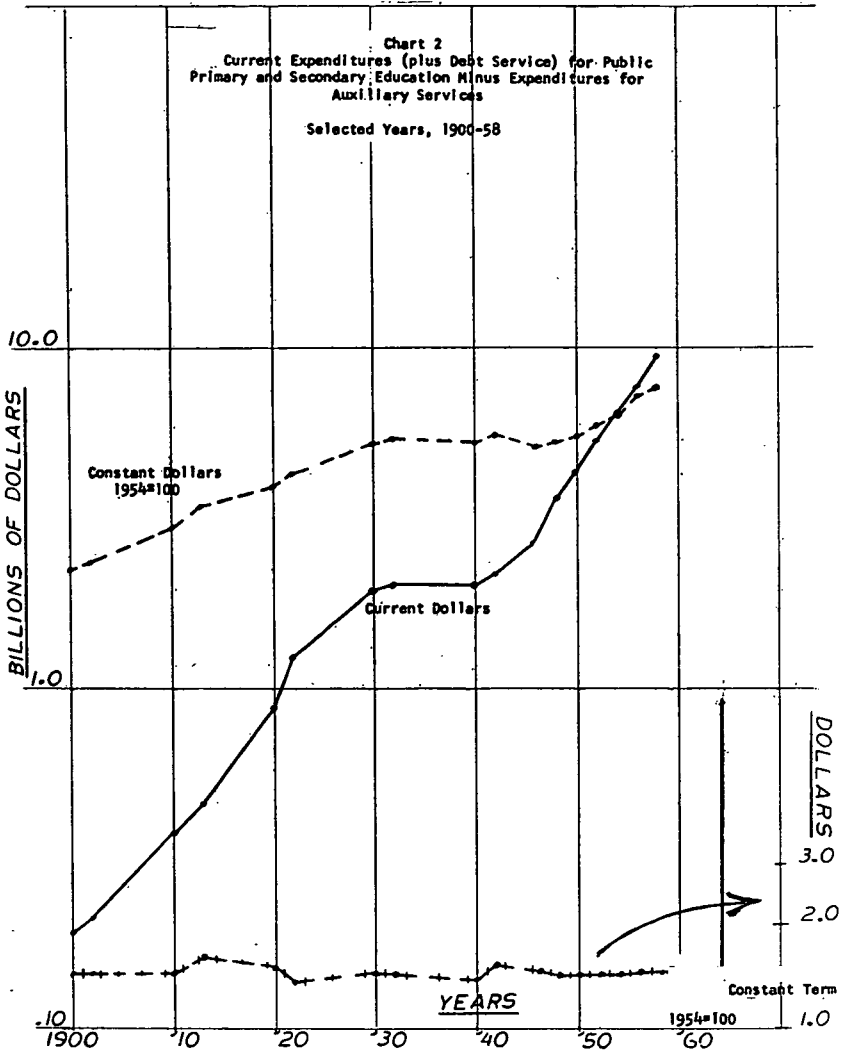
INCOME ELASTICITY OF PUBLIC EDUCATION

For policy as well as projective purposes, there is much interest in measuring the income elasticity of public primary and secondary education, a concept which was briefly discussed above. Measuring income elasticity requires that a net regression coefficient relating expenditures to personal income be computed and then multiplied by the mean personal income of the period divided by the corresponding mean expenditures figure. It assumes that expenditures are representatives of the "amount" of education. To the extent that X_6—number of principals, superintendents, and consultants per 1,000 pupils in average daily attendance—is a measure of the quality of education, it should not be included in an equation designed to esti-

mate income elasticity. Income changes must be permitted to find their expression in quality changes, which, in turn, can then lead to expenditure changes.

With these considerations in mind, the following hypothesis was enunciated and tested:

X_1—daily total currently expenditures plus debt service for public, primary, and secondary education per pupil in average daily attendance is a function of,

X_2—percent of public high school enrollment relative to total public school enrollment,

X_3—percent of pupils (5 to 19 years old) in average daily attendance living in urban areas, and

X_5—per capita personal income.

In brief,

$$X_{1a}=f(X_2, {}^{\circ}X_3, X_5).$$

The multiple regression equation was found to have the following values for selected years during 1900–1958:

$$X'_{1a}=.112568+\frac{0.004274}{(.0024)}\,X_2-\frac{0.005200}{(.0022)}\,X_3+\frac{0.000924}{(.8715)}\,X_5. \quad (1.3)$$

The statistically significant coefficient is $\beta_{15.23}$.[27]

The coefficient of multiple determination adjusted for degrees of freedom lost—$R^{*2}_{1.235}$—is 0.969. It is statistically highly significant at an $\propto$ of 0.05. About 76 percent of the 1900–1958 variation in the cost of daily per pupil current expenditure plus debt service can be explained on the average in terms of per capita personal income change, holding the effect of changes in the public high school—all public school enrollment ratio and urbanization constant.

The following beta coefficients were found:

$\beta_{15.23}=.9625$,
$\beta_{13.25}=-.0565$, and
$\beta_{12.35}=-.0474$.

The following is the simple correlation coefficient matrix:

	X'_a	X_2	X_3
X_2	0.6892		
X_3	.5707	0.9659	
X_5	.9746	.7049	0.5854

Income elasticity of education is defined as,

$$\frac{\partial X_1}{\partial X_5}\cdot\frac{\overline{X_5}}{\overline{X_1}},$$

and for 1900–1958 it is $+1.09$, just a little above unit elastic. Thus, it can be concluded that during 1900–1958, a 1 percent increase in per capita personal income was on the average associated with a

[27] With 17–4 or 13 degrees of freedom lost, coefficients are statistically significant at an $\propto$ of 0.05 if they are larger than 0.514.

1.09 percent increase in daily total current expenditures for public primary and secondary education per pupil in average daily attendance. It assumes that the effect of the other variables of the equation is held constant.

This figure can be compared with income elasticities obtained from cross section data. For example, Solomon Fabricant, using 1942 data of the 48 States, found the income elasticity coefficient of education to be +0.78.[29] Fabricant's analysis included two additional independent variables—urbanization and density. Income elasticity of all State and local government services was +0.90; but if education was excluded, it was somewhat higher, i.e., +0.96. Such services as come under the heading of general control, health and hospital, highways and police, were income elastic, while in addition to education, fire, public welfare, and sanitation were income inelastic.

Harvey E. Brazer estimated the income elasticity of education for 40 large cities using 1949 median family income and 1953 per capita operating expenditure data. He computed the income elasticity to be +0.73.[30] Other variables included in the analysis were:

Ratio of city population to metropolitan areas' population in 1950,

Students in average daily attendance per 1,000 of 1950 population, and intergovernmental revenue per capita, for education, 1953.

The present author used 1951–52 and 1954–55 cross-section data to estimate income elasticity of education for the St. Louis City-County area. It was found to be +0.58. In the analysis the following additional variables had been included—

Pupils in average daily attendance,

High school pupils in average daily attendance as percent of all pupils in average daily attendance,

Pupils in average daily attendance per square mile, and

Percent increase in pupils in average daily attendance, 1951–56.

The coefficient of +0.58 is distinctly below the +10.1 for fire protection and +0.98 for police protection found in the St. Louis study. (See table 17.) This study also estimated the elasticity with respect to per capita income of major education expenditure categories, which are also reproduced in table 17. It is interesting to note that, with but one exception, the income elasticity for instruction is lowest. Fixed charges are the exception, where a low income elasticity is not surprising. By definition these charges vary little with income. The fact that the income elasticity of instruction is so low gives cause for concern, as long as the quality of instruction requires great improvement.

[29] Solomon Fabricant, op. cit., p. 125.
[30] Harvey E. Brazer, "City Expenditures in the United States," Occasional Paper 66, (New York: National Bureau of Economic Research, Inc., 1959), p. 58.

TABLE 17.—*Income* [1] *elasticities of select local public services, St. Louis City-County area, 1951–52 and 1954–55*

Education:	Services	Income elasticity
Total current plus debt service		+0. 56
Total current without debt service		+. 52
General control		+. 50
Instruction		+. 42
Auxiliary services		+1. 15
Plant operation and maintenance		+. 55
Fixed charges		+. 29
Fire protection		+10. 1
Police protection		+. 98

[1] Since assessed valuation of real property is highly correlated with income and information about it is much more readily available, the former is used for measurement. The rank correlation coefficient, relating 1949 median income with 1954–55 per pupil assessed valuation of 10 of the districts about coterminous with municipal or census tract boundaries, is +0.905, which is highly significant at an x of 0.05.

As was to be expected, income elasticities computed with the aid of cross section data are lower than those based on time series data.[31] Actually, depending on the type of data used, the coefficient answered slightly different questions. Income elasticities of education based on cross section data reflect the average percentage change in per pupil education expenditures that is brought about as average per capita personal income changes from one school district to the next by 1 percent within a given year or sets of years. If based on time series data, the coefficient testifies to the average percentage change in per pupil education expenditures that results as average per capita personal income changes over time by 1 percent. The first provides a static picture, while the second reflects dynamic changes in our society.

But no matter which of the two concepts is used, there can be little doubt that the income elasticity of public education is quite low. (Especially low appears to be the income elasticity of instruction.) It is low in comparison to income elasticities of other public services and in particular such consumer amenities as air conditioning, automobiles, golf, speedboats, etc. It is also low compared to what it must be if public education in the United States is to be improved. No doubt, people's attitudes toward education and the existing tax system, which relies so heavily on proportional property and sales taxes, are mainly responsible for the low income elasticity of education.

The United States can readily afford the expenditures needed to raise the level of education as required by our status as a leading world power; but the necessary funds will only become available if an increasing portion of people's income is channeled into public education. This will require the combined leadership of all branches of government and educators. Further shifts will be needed in the responsibility of financing education from local to State and possibly Federal Government. Matching Federal funds combined with specific performance criteria for eligibility for aid appear to offer a useful approach.

Among the States' performance criteria two will be mentioned— tax effort and partial statewide equalization of educational opportunity. Only States that raise a given percent of personal income for education should be eligible. In addition, a certain minimum education budget needs to be underwritten by the State for each and every child in the State.

[31] Marguerite C. Burk, "Some Analysis of Income-Food Relationships," Journal of the American Statistical Association, 53 (December 1958), pp. 905–927.

THE 1960 AND 1965 OUTLOOK

In spite of serious misgivings, 1960 and 1965 projections have been made with the aid of two of the equations given above. The fact that predictive equations have been derived offers flexibility and makes possible later projections by others who might want to change the assumptions.

By and large the following projections are based on the same general assumptions that were made by Otto Eckstein in his "Trends in Public Expenditures in the Next Decade."

1. The degree of international tension is not expected to change much.

2. The political attitudes toward expenditures will not undergo a revolution.

3. Prices are assumed constant at 1958 levels.

4. The economy is to grow at a 3 percent annual rate.

5. The division of functions between Federal and State, and local governments is assumed to persist unchanged.[32]

Three basic sets of projections will be developed. The first or "low" projection assumes that by and large 1958 conditions will persist, except that the number of pupils in average daily attendance will in all three cases increase as projected by the National Education Association.[33]

The "medium" projections assume a cumulative annual increase of 3 percent in the magnitude of per capita personal income, teachers' salaries and length of school term. The other independent variables are assumed to increase very little.[34]

Finally, the third projections are "high," in that they make rather optimistic assumptions about the future, i.e., cumulative annual increases of 6 percent in per capita personal income, teachers' salaries and length of school term.

On the basis of these assumptions daily per pupil expenditures can be projected with the aid of equations 1.1 and 1.3. They will be converted into annual total current expenditures plus debt service estimates by assuming that the number of pupils in average daily attendance will advance from 29,859,000 in 1958 to 32 million in 1960, and 37,200,000 in 1965.

Under these assumptions the following sets of projections were derived, which can be compared with 1958 expenditures:

[In billions]

	(1958)	1960	1965
Low projection	$11	$11.8	$13.8
Medium projection		12.7	17.4
High projection		13.8	22.8

[32] Otto Eckstein, "Trends in Public Expenditures in the Next Decade" (New York: Committee for Economic Development, 1959), p. 4.

[33] Enrollment projections were taken from "Status and Trends: Vital Statistics, Education, and Finance," (Washington, D.C., National Education Association, 1959), p. 9, and with the aid of an enrollment-pupils in average daily attendance regression, pupils in average daily attendance figures were estimated.

[34] X_7—percent of public high school enrollment relative to total public enrollment—is assumed to be 23 in 1960 and 1965, compared to 22.4 in 1958, and

X_3—percent of pupils in average daily attendance living in urban areas—is assumed to be 52 in 1960 and 1965, compared to 51.5 in 1958.

Equation 1.1 emphasizes teachers' salary level and, in certain respects, it mainly reflects expenditure conditions. Using equation 1.3, which emphasizes the income side, projections are produced which more nearly reflect the revenue situation. As is to be expected, projections by these two equations show differences. Thus, with the aid of equation 1.3 the following three sets of projections are derived and can be compared with 1958 expenditures:

[In billions]

	(1958)	1960	1965
Low projection	--------	$10. 4	$12. 1
Medium projection	$11	11. 1	15. 3
High projection	--------	12. 1	20. 3

It is interesting to compare these sets of projections with 1958 expenditures, which amounted to $11 billion; 1960 and 1965 medium projections (in terms of 1958 dollars) emphasizing the expenditure side are 16 and 58 percent, respectively, above the 1958 figure. The corresponding projections emphasizing the income revenue side are 1 and 39 percent, respectively, above 1958.

APPENDIX

ECONOMIES OF SCALE

To shed light on the question whether economies of scale are likely in the public schools, a working hypothesis will be established in the light of detailed deductive reasoning. It then will be subjected to empirical tests by using the St. Louis City-County area as a case study.

An examination of the operational characteristics of school districts suggests that, within limits, growth need not lead to economies of scale. Here are some of the reasons. A school district can be looked upon as a horizontally integrated government which controls a number of units all furnishing a single service, i.e., education; a unified policy is pursued with regard to all its units. For the sake of efficiency, a school is usually built in a location which minimizes the average distance of its pupils. Growth and even consolidation, except in the case of one-teacher schools, usually take the form of more horizontally integrated units. With the advent of consolidation, some local schools will tend to be closed and their functions performed by consolidated schools, particularly high schools. However, with minor exceptions, the consolidated government will use the existing plant. The consolidated school district, like any government that adds facilities to already existing ones, will seldom operate under genuine longrun conditions. Thus, growth and consolidation, in the strict sense at least, takes place under quasi-longrun conditions which, depending upon the relative importance of fixed factors, and their degree of fixity, can approach longrun conditions.

A school district in a small community faces a shortrun expenditure function until it reaches a size where an additional school is needed. While very little is known about the shape of the shortrun per pupil expenditure function of a of a school, deductive reasoning suggests that it should have a flat-bottomed shape. The declining phase on the lefthand side is due to the spreading of overhead. The flat bottom can be traced back to a certain amount of flexibility in most schools. The end of the flat bottom will curve up; from that point on there are more students than can be readily accommodated in the existing facilities. But schools will seldom operate in the rising expenditures phase. Location considerations, i.e., the distance a child has to travel to school, lead to diseconomies of scale, and in turn will tend to result in the opening of a new school. Schools have indivisible but highly adaptable fixed plants. The law of diminishing returns applies and leads to a U-shaped shortrun expenditure function. Since schools are basically flexible, the average expenditure function will tend to be reasonably flat.

What about the per pupil expenditure function of horizontally integrated schools? If we assume that services of equal quality are rendered regardless of the scale of operations and that the various plants are all of about equal size, have about equal service functions, and tend to be operated at about optimum capacity, schools can be readily added and closed and that factor prices are fixed, the longrun per pupil expenditure function will tend to be horizontal.[1]

To what extent are these longrun assumptions met? It has been argued above that location considerations result in schools of about equal size; upon inspection it appears that each school has quite similar service functions. There should be a tendency to operate near optimum capacity. But whether the schools are of exactly equal size and operate at optimum capacity is not too important a factor affecting the shape of the longrun per capita expenditure function, as long as the shortrun expenditure function is flatbottomed. Except for financing problems faced by local school districts, adding schools poses few problems. These new schools are additions to existing plants, making for quasi longrun conditions. This is not of major importance, since overhead of horizontally integrated school districts is relatively small compared to operating

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[1] Don Patinkin, "Multiple-Plant Firms, Cartels, and Imperfect Competition," Quarterly Journal of Economics, 61 (February 1947), pp. 173–205.

expenditures. Closing of schools is not much of a problem in most areas, because of rapid population growth.

Next, the relative importance of economies and diseconomies which can be associated with different degrees of integration and scales of operation deserves consideration. On the whole, it appears that conditions which help horizontally integrated manufacturers and marketers benefit from net economies—lower factor costs, larger and more efficient plants, and induced circular and vertical integration—do not exist when local government grows and consolidates. Since schools purchase a highly diversified array of factors, but virtually none in quantity, few large-scale factor purchases and even fewer significant price concessions are likely to result. While pecuniary economies are likely to be minor, the only factor purchased in large quantities, i.e., manpower, tends to unionize and produce pecuniary diseconomies.[2] Also, the nature of public education, particularly the importance of location, tends to keep schools relatively small. This aspect together with legal restrictions on salary levels and permissible debt will tend to allow only small technological economies. At the same time, serious technological diseconomies can accompany large school districts, which tend to lose efficiency because of political patronage and general administrative top heaviness.

On a priori grounds, growing or consolidating school districts can approximate the conditions under which the longrun expenditure function will tend to be horizontal. Since plant and caliber of the school superintendent are virtually fixed, the quasi-longrun function will resemble a U with a flat bottom over a very wide range. To the extent that relatively little overhead exists, the shortrun and longrun functions tend to approximate one another. They coincide in their flat-bottomed portion. Net economies are responsible for a negative slope to the left of this area and net diseconomies for a positive slope to the right of it. The more units are horizontally integrated, the flatter the shortrun function.

The conclusions of this deductive reasoning have been subjected to some empirical verification. With the aid of multiple regression and correlation techniques a working hypothesis was tested in relation to the school districts of the St. Louis area.

First, a few words might be said about the St. Louis City-County area and its 27 school districts which offer both primary and secondary education. The area has a total population of about 1½ million. St. Louis City with a population of about 850,000 has a single school district, while St. Louis County has 29 districts, 26 of which operate both primary and secondary schools, while the other 3 have merely primary schools. The 1954–55 enrollment of the St. Louis City district was 84,000 while the smallest of the 26 county districts with both primary and secondary schools had an enrollment of 600, and the largest had one of 7,000. Total expenditures per pupil in average daily attendance in St. Louis City was $261 and in the county districts it ranged from $121 to $728. Some school districts, including that of the St. Louis City, had hardly grown between 1951 and 1956, while in one school district a 225 percent growth had taken place. There existed great differences in assessed valuation of real property per pupil in average daily attendance; the low was $1,500 and the high $24,000. Finally, much variation in the tax rate levied upon property within these school districts existed. The school district of the city of St. Louis had the lowest rate. In the county school districts it ranged from $1.68 to $3.58 on $100 of assessed valuation.

The State of Missouri has a school aid program, under which relatively small subsidies are paid to a district per pupil in average daily attendance. In addition, the equalization phase of the program is designed to assure each district $110 per pupil in average daily attendance. During the period under discussion, the State of Missouri contributed virtually nothing under its equalization program, i.e., less than $60,000 in 1954–55. The virtual absence of State equalization payments made the St. Louis City-County area useful for the purpose of this case study. It excluded many knotty problems connected with identifying determinants of the progress of State subsidy.

The following working hypothesis was established in order to learn about the presence or absence of economies of scale in the St. Louis schools:

Total current expenditures plus debt service for public primary and secondary education per pupil in average daily attendance is a function of—

   X_2—number of pupils in average daily attendance in public primary and secondary schools,

   X_3—high school pupils in average daily attendance as a percent of all pupils in average daily attendance,

X_4—number of public school pupils in average daily attendance per square mile,

X_5—percent increase in public school pupils in average daily attendance, 1951–56,

X_6—average assessed valuation of real property per pupil in average daily attendance, and

X_7—quality index of public education in primary and secondary schools. As was mentioned above, the quality index is composed of six subindexes—

A is equal to number of teachers per 100 pupils in average daily attendance,

B is equal to number of college hours of average teacher,

C is equal to average teacher's salary,

D is equal to percent of teachers with more than 10 years of experience,

E is equal to number of high school credit units, and

F is equal to percent of high school seniors entering college.

Since testing this hypothesis involves the loss of 8 degrees of freedom, a large loss when merely 27 observations are available, it was thought desirable to work with as large a sample as possible. For this reason, data for two different periods—that is, 1951–52 and 1954–55, with a 2-year interval between, were used. Since expenditures and their determinants increased overtime at somewhat different rates in the different school districts, the cross-section data pertaining to the 2 staggered years are devoid of major serial intercorrelation.

In order that a test as to the presence of economies of scale can be made, the following functional relationship was assumed:

$$X_1 = f(X_2, X_2^2, X_3, X_4, X_5, X_6, X_7).$$

The following results were obtained for total current expenditures plus debt service (X_{1a}) and total current expenditures without debt service (X_{1b}), respectively, per pupil in average daily attendance.

$$X'_{1a} = -240.966 - \frac{0.00347\ X_2}{(0.0916)} + \frac{0.000000317\ X_2^2}{(0.0696)} + \frac{4.090\ X_3}{(0.363)}$$

$$- \frac{0.0293\ X_4}{(0.0253)} - \frac{0.335\ X_5}{(0.0253)} + \frac{0.0135 X_6}{(0.679)} + \frac{213.888\ X_7^3}{(0.414)}.$$

The coefficient of multiple determination—R^2—is 0.85 and this coefficient adjusted for degrees of freedom lost—R^{*2}—is 0.82. It is highly significant at an $\propto$ of 0.05. Thus, about 82 percent of the variation in total current expenditures plus debt service per pupil in average daily attendance is explainable in terms of these six stated independent variables, of which financial ability, service level, and percentage of high school pupils are statistically significant.

$$X'_{1b} = -26.956 - \frac{0.00181\ X_2}{(0.0584)} + \frac{0.0000000154\ X_2^2}{(0.0412)} + \frac{2.999\ X_3}{(0.329)}$$

$$- \frac{0.0198\ X_4}{(0.148)} - \frac{0.143 X_5}{(0.131)} + \frac{0.0116\ X_6}{(0.697)} + \frac{156.40\ X_7^4}{(0.375)}.$$

$R^2 = 0.84$ and $R^{*2} = 0.82$. They are highly significant at an $\propto$ of 0.05.

Thus, the empirical correlation and regression analysis did not reveal significant economies of scale in the school districts of the St. Louis city-county area.

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[3] The figures in brackets are partial correlation coefficients. Since there are 54–8 or 46 degrees of freedom, the coefficient is statistically significant at an $\propto$ of 0.05 in case it is larger than 0.28. Statistically significant regression coefficients are associated with X_3, X_5, and X_7.

[4] See footnote 3 above.

STUDY PAPER NO. 5

TRENDS IN THE SUPPLY AND DEMAND

OF MEDICAL CARE

(BY MARKLEY ROBERTS)

TRENDS IN THE SUPPLY AND DEMAND OF MEDICAL CARE

(By Markley Roberts)

INTRODUCTION AND SUMMARY

Medical care is becoming wonderfully effective and appallingly expensive. Rising demand for medical care and shortages of medical personnel and medical facilities require sound public policy decisions to bring about a balance which is fair to those who need care and successful in providing a rising standard of medical services.

This study, suggestive rather than comprehensive in scope, is an effort to outline some of the problems which require attention and action. These are public policy problems because the adequacy of medical care vitally affects the general welfare. Improving health has been an important factor in the advance of American productivity, and continuing improvement of health standards will contribute to further economic growth. Also, public policy must recognize the primary public interest in an adequate supply of medical care and must assure that those needs that private agencies and individuals do not meet, and perhaps cannot be expected to meet, will be fulfilled.

The American people are increasingly conscious of health problems and eager to share in the advances of medical science. Total spending on health and medical care is approaching $25 billion a year, or about 5 percent of gross national product. The price of this portion of the GNP has been rising rapidly, and thus has served to raise consumer prices, and no study of inflation would be complete without examination of this sector.

Private spending on medical care is rising, with the biggest increases in spending for hospitalization and for prepaid health insurance programs. The average family spends 5 percent of its income on medical care, but medical costs are not spread evenly. Spending on medical care rises with rising family income, but declines as a proportion of rising family income. Voluntary health insurance covers more than 70 percent of the population, and pays about 25 percent of the Nation's private medical care bill.

Federal, State, and local community spending make up about a quarter of total spending for health and medical care. A substantial part of this public spending comes from Federal funds to care for veterans and military personnel and their families. Federal support for medical research is growing and pays an increasing proportion of medical school operating expenses.

Hospitals are increasingly utilized in medical care because medical progress and medical services are hospital oriented, because of the prevalence of hospitalization insurance and because of long-term hospital care needs of older people with chronic and degenerative diseases. New drugs have made treatment possible for mental patients in general hospitals and outside hospitals.

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Organization of medical services is separated from the market price system by a combination of public and voluntary nonprofit supply factors. To achieve greater efficiency, certain aspects of the organization of supply may need revision, and a trend toward greater efficiency in supplying medical services appears in the growth of group medical practice. Although medical science is raising the quality of medical care, there has been a decline in the ratio of active physicians and dentists to the rising population. Expansion in the number of professional, technical, and auxiliary health workers matches advances in medical science, but lengthy training, low wages, and low salaries contribute to shortages of personnel and high turnover in these occupations.

The number of hospitals and hospital beds increased between 1948 and 1959. However, the number of beds per 1,000 population dropped from 9.7 in 1948 to 9.1 in 1958 and hospital utilization rose from 115 to 137 hospital admissions per 1,000 population. Almost half of existing hospital beds are occupied by mental and tuberculosis patients in State and Federal hospitals, but most hospital care for the general public is provided by short-term nonprofit hospitals. These general hospitals are community-owned or under religious or other voluntary associations which depend on hospital fees and on philanthropy for their operation. Expenses increased from $10.04 per patient-day in 1946 to $29.24 in 1958 in the voluntary short-term hospitals, primarily because of rising payroll costs.

Demand for higher levels of quantity and quality of medical care can be expected to continue. This demand will generate increasing public support for medical research, medical education, and health facilities. Rising costs of hospital care will continue to increase demand for insurance protection against hospitalization. Demands for protection against other medical care expenses will increase the comprehensivenesss and cost of health insurance.

In spite of progress in medical science, the supply of available medical care, in terms of medical personnel and medical facilities, is declining in relation to population growth and rising health consciousness. Shortages of supply exist already and will grow more serious in the future, unless there is a broad national effort of public and private support.

Such a national effort will require increased Federal assistance for medical research, medical education, and construction of medical facilities. It will require Federal aid to encourage recruitment, training, and more effective use of auxiliary health workers such as physical therapists, rehabilitation specialists, practical nurses and home aides.

Voluntary health insurance, already widespread, will become increasingly comprehensive in financing the Nation's private medical care needs. Nevertheless, the greater health care needs and lower income of the aged population will preclude private insurance plans from solving the financial side of the medical problems of this group. There will continue to be a need for some form of public participation, probably in the form of social insurance. Other health needs include development of community services to provide home care for the chronically ill and aged, and public assistance for the special problems of disabled children.

CHAPTER 1. DEMAND FOR MEDICAL CARE

TOTAL DEMAND

Health consciousness

Personal and social ethics combine to put reverence for life and health high on the current American scale of values. Higher standards of living, rising levels of education, and widespread public information about progress in medical science contribute to increasing general public awareness of health and medical care needs, thus stimulating a large and growing desire for health and medical care for individuals and for communities. There is a new awareness of interaction between health of the community at large and the health of its individual members. There is growing realization of benefits achieved for individuals and for society by maintaining a high, rising level of health through effective medical care and preventive health measures.

Disease, pain, and disability are increasingly regarded as avoidable and death as postponable. These attitudes are reflected in the concept that a society can buy the level of health it wants for its members if it is willing to pay the price. Such expectations raise the problem of distinguishing between needs for health and medical care and the demand for such care. Needs may be large, or even infinite, but demand is a measure of financial ability and willingness to meet the needs.

A revolution of rising expectations is in progress in the field of health and medical care. New expectations and new attitudes are raising demand for medical care, increasing utilization of medical services, and generating support for public health activities and medical research. Widespread concern about cancer, heart disease, mental illness, alcoholism, accidents, and other health hazards reflect public awareness of social costs as well as personal and family costs. Widespread concern about the chronic and degenerative health problems of the aging reflects an awareness of the human and social costs imposed by increases in the older age groups of the American population. Rising expectations stimulate support for medical progress through research. These expectations also support private and public action to raise availability of health and medical care toward higher levels of adequacy.

Good health and adequate medical care are regarded as part of a high standard of living. Naturally, individuals want to gain the advantages of progress in medical science for themselves and their families, but the American people increasingly appear to believe that their fellow citizens have a right to adequate medical care, although the concept of adequacy may be subject to wide variations. This belief rests primarily on humanitarian welfare considerations,[1] but there is growing awareness of the economic costs of illness as well.[2][3]

[1] Herman M. Somers and Anne R. Somers, "Private Health Insurance, Part I, Changing Patterns of Medical Care Demand and Supply in Relation to Health Insurance." Reprinted from California Law Review, August 1958, vol. 46, No. 3, p. 382.

[2] Selma Mushkin, "Toward a Definition of Health Economics." Public Health reports, vol. 73, No. 9, September 1958.

[3] But see the views of Eli Ginzberg, "What Every Economist Should Know About Health and Medicine." American Economic Review, March 1954. pp. 104–119; also see his testimony in hearings before the Joint Economic Committee, Oct. 1, 1959. "But we are coming to the nonproductive areas of medicine. * * * We are moving up against the old age, and what we are really trading is a kind of easing of life in the terminal years, and really trading one kind of illness for another."

Total spending

Total public and private spending on health and medical care indicates aggregate effective demand for medical care. Such spending is currently about 5 percent of the gross national product, or close to $25 billion annually in recent years. (See table 1.)

Combined private and public health care spending rose from 3.6 percent of gross national product in fiscal 1929 to 4.7 percent in fiscal 1950 and to 5.2 percent in fiscal 1958. Total spending rose from $3.6 billion in 1929 to $9 billion in 1950 and to $22.7 billion in 1958.[4] It is clear that health and medical care is taking vastly increased amounts of the Nation's output in absolute and relative terms.

A rising proportion of total spending on health care comes from public funds. In 1929, public spending, excluding funds for medical facilities, amounted to $414 million. In 1958, public spending was more than $4.9 billion, or about 13 times the 1929 level. On the other hand, private spending on health care in 1958 was more than five times the 1929 level, increasing from $3.1 billion to $17.2 billion.

In fiscal 1929, public expenditures by Federal, State, and local government units were about 15 percent of the total. Since 1946, public expenditures have been about 25 percent of the total, amounting to $5.4 billion in fiscal 1958. (See chart 1.)

The rising amount of spending for health and medical care indicates that the American people want to raise their health standards. Even after allowance for changes in the purchasing power of the dollar, a substantial increase in total demand is indicated by the amount and proportion of medical care spending. Spending on medical care increases as national income rises, but the increase in the proportion of income devoted to medical care also reflects changes in distribution of income as well as new sophistication about the need for health care and about its social and economic value.

[4] Ida C. Merriam, "Expenditures for Health and Medical Care, 1928-29—1957-58." Department of Health, Education, and Welfare, Social Security/Administration, Division of Program Research, Research and Statistics Note No. 26, Sept. 17, 1959.

CHART 1. Spending for health and medical care.
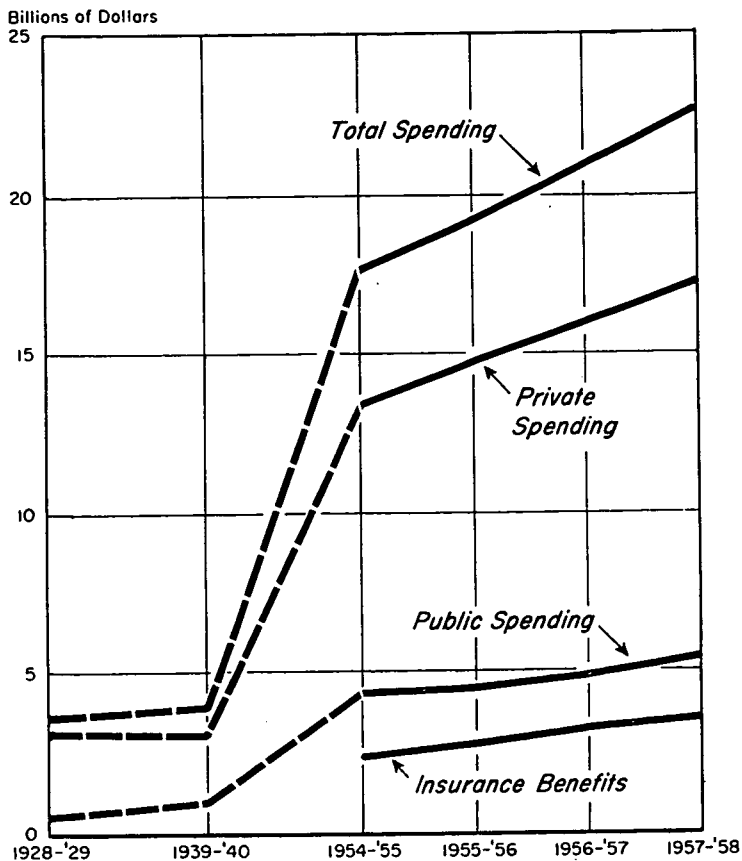
Billions of Dollars

TABLE 1.—*Private and public spending for health and medical care, selected fiscal years 1929–58*

[Dollars in millions]

	1929	1940	1950	1955	1956	1957	1958
Total spending	$3,625.0	$3,914.7	$12,407.1	$17,764.7	$19,220.6	$21,057.3	$22,737.7
Private expenditures	3,112.0	3,023.0	9,042.0	13,455.0	14,711.0	16,082.0	17,294.0
Health and medical services	3,010.0	2,992.0	8,827.0	13,130.0	14,399.0	15,693.0	16,785.0
Direct payments	2,900.0	2,900.0	7,125.0	9,388.0	10,176.0	10,937.0	11,555.0
Insurance benefits			878.0	2,357.0	2,776.0	3,245.0	3,675.0
Expenses for prepayment			274.0	595.0	611.0	639.0	645.0
Industrial in-plant services	30.0	40.0	150.0	210.0	221.0	232.0	245.0
Philanthropy	80.0	52.0	400.0	580.0	615.0	640.0	665.0
Medical facilities construction	102.0	31.0	215.0	325.0	312.0	389.0	509.0
Public expenditures	513.0	891.7	3,365.1	4,309.7	4,509.6	4,975.3	5,443.7
Health and medical services	414.0	836.6	2,780.1	3,923.4	4,148.3	4,497.3	4,918.5
Medical facilities construction	99.0	55.1	585.0	386.3	361.3	478.0	525.2
Total expenditures as percent of gross national product	3.6	4.1	4.7	4.7	4.7	4.9	5.2
Public expenditures as percent of the total	14.2	22.8	27.1	24.3	23.5	23.6	23.9
Percent of personal health care spending from—							
Private spending	90.5	82.0	78.2	78.0	78.9	79.4	78.8
Insurance benefits			8.1	14.8	16.1	17.3	18.1
Public spending	9.5	18.0	21.8	22.0	21.1	20.6	21.2

Source: Social Security Administration, Research and Statistics Note No. 26–1959.

PRIVATE DEMAND

Total personal consumption spending

Total personal consumption spending for medical care gives a general view of effective private demand for health and medical care, although certainly not an accurate picture of needs or costs. Personal consumption spending for medical care rose 140 percent between 1947 and 1958, from $6.8 billion to $16.4 billion.[5]   During this same period, gross national product rose 88 percent, from $234 billion to $441 billion.

Private medical care spending rose from 2.9 percent of GNP in 1947 to 3.7 percent in 1958.   In terms of total personal consumption spending, private medical care spending rose from 4.1 percent in 1947 to 5.5 percent in 1958, but remained about 15 percent of consumer spending on all services.

The greatest increases in private medical care spending were for hospital costs and health insurance payments.   Spending for hospitalization rose about 280 percent, from $1.1 billion in 1946 to $4.3 billion in 1958.   Insurance payments rose 205 percent, from $444 million to $1,359 million.   Payments for drugs and prescriptions rose more than 150 percent, from $1.2 billion to $3.2 billion.   Payments to doctors rose about 130 percent, from $1.7 billion in 1947 to $3.9 billion in 1958 and payments to dentists rose about 115 percent, from $772 million to $1,674 million.   (See chart 2 and table 2.)

[5] U.S. Commerce Department, "U.S. Income and Output, Supplement to Survey of Current Business, 1958." Also "Survey of Current Business, July 1959," tables II–4.

Rising national income and new health consciousness provide partial explanations for increases in private demand for medical care. However, increases in private spending for hospitalization and health insurance indicate the nature of this demand. The increase in spending for hospitalization reflects the central role of hospitals in supplying medical care. The growth of prepayment and health insurance spending represents a new approach to the problem of financing medical care, a new approach to adjust supply and demand. This new approach has created a new component in total private demand for medical care since the end of World War II. Some aspects of this component will be discussed below.

CHART 2. Personal consumption spending (for medical care).

Millions of Dollars

Hospitalization

Doctor Fees

Drugs and Prescriptions

Dental Fees

Health Insurance
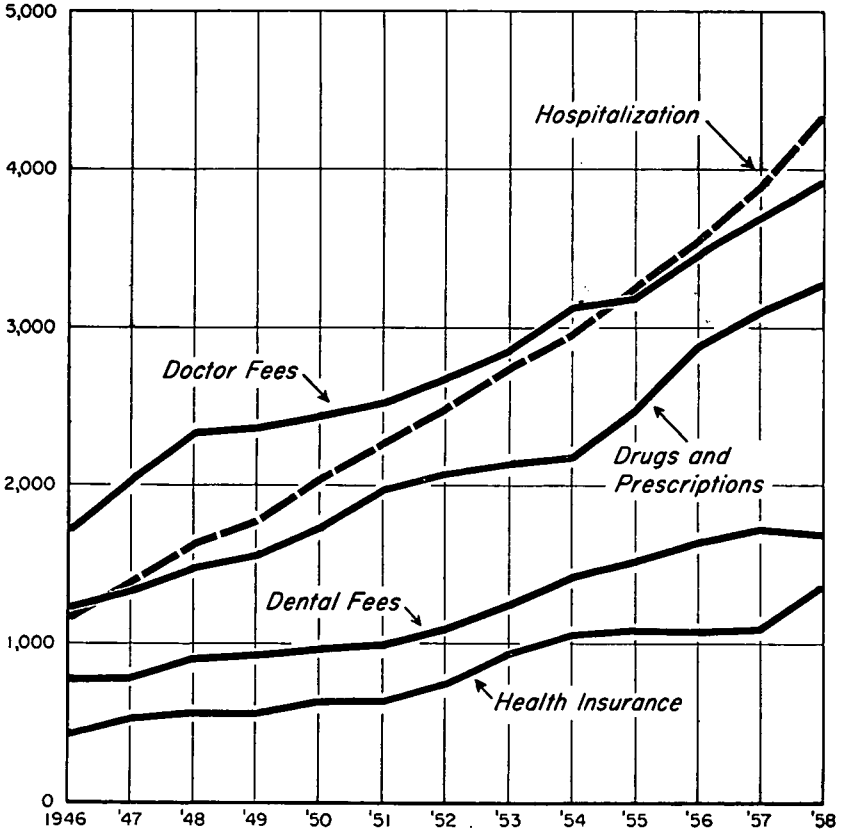
Source: Commerce Department

TABLE 2.—*Personal consumption spending for medical care*

[Millions of dollars]

	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958
Total	6,104	6,817	7,749	8,051	8,741	9,440	10,172	11,072	11,925	12,827	14,048	15,051	16,384
Physicians	1,720	2,020	2,327	2,338	2,427	2,519	2,657	2,840	3,109	3,189	3,470	3,693	3,901
Dentists	772	784	900	920	961	997	1,098	1,234	1,406	1,508	1,625	1,705	1,674
Other professional services	338	390	445	455	482	510	544	586	634	653	697	734	769
Privately controlled hospitals, nursing homes, and sanitariums	1,163	1,397	1,621	1,772	2,037	2,248	2,486	2,729	2,962	3,229	3,518	3,884	4,319
Medical care and hospitalization insurance	444	513	559	557	629	641	749	942	1,056	1,090	1,055	1,064	1,359
Drug preparations and sundries	1,271	1,313	1,466	1,555	1,719	1,979	2,058	2,137	2,163	2,473	2,869	3,098	3,261
Ophthalmic products and orthopedic appliances	396	400	431	454	486	546	580	604	595	685	814	873	1,101

Source: Commerce Department, U.S. Income and Output.

Family medical care spending

The family is the typical consumer unit in private demand for general health and medical care. The "average" family spends about 5 percent of its income on such care. However, the real impact of medical care needs on the family budget appears not in average family spending but in the uneven incidence of sickness and disability, in the uneven distribution of medical charges and in the uneven ability of families to pay the costs incurred.

A nationwide survey, sponsored by the Health Information Foundation,[6] indicated that 53 percent of all families spent less than 5 percent of their income and 8 percent had no health or medical expenses. On the other hand, 2 percent of all families incurred expenses exceeding 50 percent of their income. More than 40 percent of the total medical costs of all families were incurred by 11 percent of the families, which had medical expenses greater than $495 a year.

The 1950 Bureau of Labor Statistics study of consumer spending[7] found an average medical care expenditure by all families of $197 a year, of which $163 was paid directly for medical service and $34 was paid for group health plans and insurance. Average medical care spending ranged from $91 for families with income less than $1,000 to $446 for families with income of $10,000 and over.

The more recent 1953 survey of the Health Information Foundation reported an average cost incurred for all personal health services of $207 per family, although the median charge was $110. The average charge incurred by families with some kind of health insurance was $237 and the average charge incurred by uninsured families was $154. The proportion of income paid out for personal health services ranged from a median of 6.1 percent for families with income under $2,000 to a median of 3.2 percent for families with income greater than $7,500.[8] However, average medical care outlays ranged from 11.8 percent for families with income under $2,000 to 3 percent for families with incomes of $7,500 and over. For families with incomes under $2,000 and without health insurance, medical care took an average of 13.4 percent of family income.[9] (See tables 3 and 4.)

Medical care needs clearly impose a major financial burden on low-income families. Large, unexpected, medical care expenses can have a catastrophic impact on family budgets. Some indication of unmet medical care needs can be found in the pattern of rising family spending on medical care as family income rises. This increase in spending would indicate the high order of importance placed on medical care for the family. However, spending on medical care as a proportion of family income declines as family income increases. This proportional decline would appear to indicate that families achieve some degree of satisfaction of their medical care needs as family income goes up.

[6] Odin :W. Anderson, "Family Medical Costs and Voluntary Insurance: A Nationwide Survey." McGraw-Hill, 1956. p. xiii.
[7] U.S. Bureau of Labor Statistics, "Study of Consumer Expenditures Incomes and Savings," vol. XVIII. University of Pennsylvania, 1957, p. 9.
[8] Anderson, op. cit., p. xii.
[9] Ibid., p. 114.

TABLE 3.—*Charges incurred by families for health services, by income and health insurance status*

Family income	Mean gross charges			Median gross charges		
	All families	Insured	Un-insured	All families	Insured	Un-insured
Total, all income groups	$207	$237	$154	$110	$145	$63
Under $2,000	130	164	115	54	82	43
$2,000 to $3,499	152	168	132	82	103	54
$3,500 to $4,999	207	220	167	119	134	83
$5,000 to $7,499	259	262	247	176	187	105
$7,500 and over	353	362	312	238	255	185

Source: 1953 survey by Health Information Foundation and National Opinion Research Center, table A-15 in Odin W. Anderson, "Family Medical Costs and Voluntary Health Insurance," p. 113. Footnote omitted.

TABLE 4.—*Family outlays for medical care as a percentage of family income by income and health insurance status*

Family income	Aggregate family outlay as percent of aggregate family income			Median of family total outlay as percent of aggregate family income		
	All families	Insured	Un-sured	All families	Insured	Un-sured
Total, all income groups	4.8	4.8	4.8	4.1	4.4	3.0
Under $2,000	11.8	13.4	11.0	6.2	10.2	4.8
$2,000 to $3,499	6.1	6.6	5.3	4.0	5.1	2.6
$3,500 to $4,999	5.4	5.8	4.2	3.9	4.4	2.2
$5,000 to $7,499	4.7	4.9	4.2	3.6	3.9	2.2
$7,500 and over	3.0	3.1	2.8	3.3	3.3	3.0

Source: Table A-16 in Anderson, "Family Medical Costs and Voluntary Health Insurance," p. 114. Footnotes omitted.

Growth of prepayment

Prepaid health insurance programs cover an increasing proportion of the Nation's private medical care bills. The heavy burden of hospital and medical charges on low- and middle-income families, the unpredictability of individual family medical expenses, and the relative predictability of aggregate family medical care costs have contributed to the tremendous expansion during the past 12 years of voluntary health insurance coverage and prepayment programs which now cover more than 70 percent of the American people. (See chart 3.)

The growth of these prepayment plans, enabling families to finance the greater part of their medical care expenses on a regular budget basis, is a major feature of the new pattern of private demand for medical care. These programs reflect rising demand for medical care, but they also contribute to rising demand by financing medical care needs, converting need and health consciousness into effective demand.

CHART 3. Growth of health insurance coverage.

Millions of People Covered
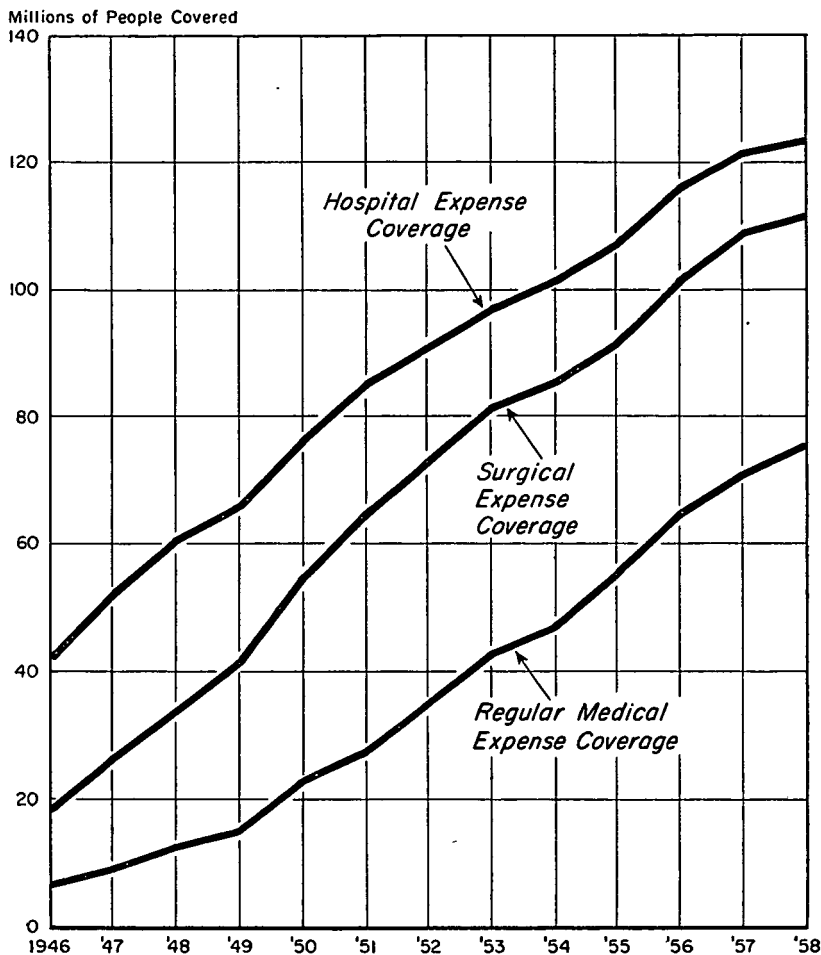
Source: Health Insurance Council

In 1948, only 60 million Americans were protected by insurance for hospitalization, the most expensive part of modern medical care.   By the end of 1958, more than 123 million people were insured against hospital expenses, 111 million were insured against surgical expenses, and 75 million were insured against regular medical costs of nonsurgical physician care.[10]   (See table 5.)

[10] Health Insurance Council, "Greater Security for the American People."   Preliminary report on 13th annual survey, voluntary health insurance in the United States as of Dec. 31, 1958.

TABLE 5.—*Growth of health insurance coverage, number of people protected against hospital expenses, surgical expenses, and regular medical expenses*

[In thousands]

End of year	Hospital expense	Surgical expense	Regular expense medical	End of year	Hospital expense	Surgical expense	Regular medical expense
1940	12. 312	5. 350	3. 000	1950	76. 639	54. 156	21, 589
1941	16. 349	6, 775	3. 100	1951	85. 348	64. 892	27, 723
1942	19. 695	8. 140	3. 200	1952	90. 965	72, 459	35, 670
1943	24. 160	10. 069	3. 411	1953	97. 303	80. 982	42, 684
1944	29. 232	11, 713	3. 840	1954	101. 493	85. 890	47. 248
1945	32. 068	12. 890	4. 713	1955	107. 662	91. 927	55. 506
1946	42. 112	18. 609	6, 421	1956	115. 949	101. 325	64, 891
1947	52. 584	26. 247	8. 898	1957	121, 432	108. 931	71. 813
1948	60. 995	34. 060	12. 895	1958	123. 038	111, 435	75, 395
1949	66, 044	41, 143	16, 892				

Source: Health Insurance Council.

Insurance benefits now pay almost a quarter of all private medical care bills. Direct "out of pocket" private spending for medical care dropped from 88.7 percent in 1948 to 72.5 percent of total private medical care spending in 1957. Insurance benefits for hospital services rose from 6 to 15.3 percent of private medical care spending, and insurance benefits for physicians' services rose from 2 to 7.8 percent.[11]

Private medical care spending rose from 4 percent in 1948 to 4.9 percent of per capita disposable income in 1957. During this period, direct "out of pocket" per capita payments for medical care remained fairly stable, but insurance benefit payments for medical care rose more than 250 percent, from 0.3 percent in 1948 to 1.1 percent of per capita disposable income in 1957.[12]

Direct "out of pocket" payments for doctors' services as a percentage of per capita disposable income dropped 26 percent from 1948 to 1957, but insurance payments to doctors rose 375 percent. In 1948 insurance benefits were only 6.4 percent of private spending for doctors' services; by 1957 insurance benefits were paying 30 percent.[13]

Voluntary health insurance, which accounted for about one-quarter of private hospital service spending in 1948, covered more than half of private spending for hospital care in 1957. Insurance benefits paid for more than 40 percent of private spending for hospital and doctor services in 1957 compared to 15 percent in 1948.

One dramatic indication of the growth of prepayment programs appears in the 470-percent increase in benefit payments made by voluntary health insurance, from $606 million in 1948 to $3,474 million in 1957. Payments into voluntary health insurance programs rose 380 percent, from $862 million in 1948 to $4,144 million in 1957.[14] The declining rate of overhead expenses, which represents the cost of getting the insurance protection, reflects in part the savings achieved by enrollment of large groups in health insurance programs but pressures of rising utilization and opposition to increases in health insurance premiums have also forced insurance carriers to reduce the gap between earned income from prepayments and outgoing benefit payments.

[11] Agnes W. Brewster, "Voluntary Health Insurance and Medical Care Expenditures: A 10-Year Review," Social Security Bulletin, December 1958, p. 9.
[12] Ibid., table 2, p. 10.
[13] Ibid., table 6, p. 13.
[14] Ibid., table 3, p. 11.

Collective bargaining is one of the major factors contributing to the growth of health insurance coverage and medical care prepayments. In 1945 an estimated 500,000 workers were covered by prepaid health programs under collective-bargaining agreements. By 1957 more than 12 million workers were covered.[15] Nonwage fringe benefits negotiated during World War II and exemption of health benefits from Korean War wage freezing encouraged growth of these industrial health prepayment programs and expansion of their coverage. As the proportion of workers covered by these programs has increased, more attention is centered on broadening the coverage of existing plans to workers' families and to retired workers. Also, more attention is given to problems of adding new benefits and raising the level of benefits.

The growth of industrial health prepayment programs and other voluntary group enrollment for health insurance reflects the new awareness of the value of medical care and awareness of the need to budget unpredictable medical costs. The demand for health insurance is part of the total demand for medical care, and they rise together as family income rises. These are underlying factors behind the rising proportions of total and individual medical care spending channeled into prepayment insurance programs, which pay an increasing part of the Nation's private medical care bill.

Health needs of older people

Older people need more health and medical care at the stage in life when they can least afford to pay for this care. Longer life spans, brought about by progress in preventive and therapeutic medicine, have changed the Nation's demand for health services, with emphasis shifting from control and treatment of communicable, infectious diseases to the chronic and degenerative diseases. The three leading causes of death at present are heart diseases, cancer, and vascular lesions of the brain—all characteristic health problems of older age groups.

Nearly 16 million Americans, or about 9 percent of the population, are now over 65 years of age. By 1970 there will be an estimated 20 million persons over 65, and, if research in disease and health problems of the aged progresses at a rapid rate, the estimate for 1970 may be raised closer to 30 million.[16] People over 65 are particularly affected by the cost of medical care, since the chronic and degenerative health problems cause more long-term disability, greater need for medical services, and longer hospital stays at a time when income is sharply reduced by retirement. (See table 6.) Three-fifths of the men and women past 65 received less than $1,000 in cash income last year.

Five major points on health needs of the elderly are listed in the summary of discussions this year before the Senate Subcommittee on Problems of the Aged and Aging: [17]

1. Most older people in this country do not have hospital and surgical insurance enabling them to get health services readily and at reasonable cost, although in recent years voluntary health insurance has increased among persons over 65.

[15] U.S. Bureau of Labor Statistics, "Analysis of Health and Insurance Plans Under Collective Bargaining, Late 1955." Bulletin No. 1221, November 1957, p. iii.
[16] U.S. Senate, Committee on Labor and Public Welfare, "The Aged and Aging in the United States, Summary of Expert Views Before the Subcommittee on Problems of the Aged and Aging," 86th Cong. 1st sess., 1959, p. 6.
[17] Ibid.

2. Public and private efforts are needed to preserve health and functional ability in old age.

3. Older people spend more on health care and are less able to afford it than younger age groups.

4. Three basic principles in organization of medical care are (*a*) high quality of medical care, (*b*) a satisfactory payment system to support professional, hospital, and supplementary services, and (*c*) administration guaranteeing proper standards and economy of service.

5. Most older people in the future could readily acquire paid-up health insurance if it were provided through the social security mechanism.

These general considerations lead to the conclusion that the present health care needs of our older citizens are not being met adequately. Furthermore, their health care needs are a growing national problem.

Although about 40 percent of the population aged 65 and over has some kind of health insurance, there is less opportunity for the "over 65" group to get private health insurance for a number of reasons. Elderly people are poor risks for private insurers because their health needs are greater than the needs of younger age groups. Higher premiums charged for greater risk are more difficult to pay when income is reduced by retirement. However, even when elderly people are willing and able to pay the premiums, they frequently are unable to get private health insurance coverage. Further consideration of these greater health care needs and reduced ability to get insurance protection appear below in the discussion of hospital utilization by older people.

TABLE 6.—*Health problems of people aged 65 and over, 1957–58*

Experience	Rate per 100 persons per year		
	Persons aged 65 and over	Persons under age 65	Persons of all ages
Restricted activity days	4,730	1,743	2,000
Bed disability days including hospital days	1,630	697	780
Days in short-stay hospitals	178	76	85
Incidence of acute conditions	163	269	260
Persons with 1 or more chronic conditions	76	38	41
Persons with activity limited by chronic conditions	42	7	10
Persons injured	25	28	28
Physician visits	680	514	530
Dental visits	80	164	160

Source: Tabulation from U.S. National Health Survey in "Hospitalization Insurance for Old-Age, Survivors, and Disability Insurance Beneficiaries," report submitted to the Committee on Ways and Means by the Secretary of Health, Education, and Welfare, Apr. 3, 1959, p. 13.

PUBLIC SPENDING

Public support for health and medical care

A major component of total demand for health and medical care is public spending, which is about a quarter of total spending for this purpose. Public funds from Federal, State, and community sources, almost $5.5 billion in fiscal 1958, are spent for veterans, military personnel, hospital construction, medical research, maternal and child health services, medical vocational rehabilitation, public assistance medical payments, school health programs, and various other public

programs providing health care for such groups as Indians, merchant seamen, civilian residents in the Panama Canal Zone, narcotics addicts, and the residents in prisons and penitentiaries.[18]

The largest public outlays are for State and local public hospitals and medical care, about $1.8 billion, and the next major outlay is Federal spending for veterans and military personnel and their families, about $1.5 billion in fiscal 1958. Veterans' hospitals and medical care accounted for about $800 million, hospital and medical care administered by the Department of Defense accounted for about $580 million and Medicare assistance for medical services in community hospitals to eligible military dependents accounted for about $85 million. (See table 7.)

TABLE 7.—*Public spending for health and medical care, selected fiscal years, 1929–58*

[In millions of dollars]

	1929	1940	1950	1955	1956	1957	1958
Total	513.0	891.7	3,365.1	4,309.7	4,509.6	4,975.3	5,443.7
Health and medical services	414.0	836.6	2,780.1	3,923.4	4,148.3	4,497.3	4,918.5
General hospital and medical care	215.0	415.0	1,174.0	1,449.5	1,577.8	1,707.0	1,881.5
Defense Department facilities	30.0	45.0	332.0	602.6	548.0	529.3	584.7
Medicare						24.7	86.6
Veterans' hospital and medical care	30.0	72.0	582.2	722.0	723.5	732.9	794.1
Public assistance (vendor medical payments)				211.9	252.6	287.6	320.2
Workmen's compensation medical benefits	25.0	90.0	193.0	315.0	335.0	355.0	370.0
Temporary disability insurance medical benefits			2.5	20.6	22.7	25.8	31.9
Medical vocational rehabilitation		.4	7.4	9.2	11.0	12.7	14.9
Maternal and child health services	5.0	13.7	29.7	93.4	104.8	113.8	122.7
School health programs	9.0	17.9	30.6	66.3	74.2	81.0	87.8
Medical research		3.1	55.0	105.9	115.9	183.0	237.5
Other public health activities	100.0	179.5	373.7	327.0	382.8	444.5	386.6
Medical facilities construction	99.0	55.1	585.0	386.3	361.3	478.0	525.2

Source: Social Security Administration, Research and Statistics Note No. 26—1959.

Federal support for research

Federal support for medical research is growing in amount and importance. Total medical research spending rose from $88 million in 1947 to $479 million in 1958. The Federal share rose from 32 percent in 1947 to 56 percent in 1957, but dropped to 48 percent in 1958, although the Federal funds for medical research increased from $186 million in 1957 to $230 million in 1958.[19] Medical research in universities is particularly dependent on Federal funds. Two-thirds of university medical research funds came from the Federal Government in 1957.[20]

The 1958 report to the Secretary of Health, Education, and Welfare by a panel of consultants, headed by Dr. Stanhope Bayne-Jones, indicated that Federal support for research and specialized training provides a rising proportion of total budgets of medical schools.

[18] Merriam, op. cit. Also, Federal Hospital and Medical Care Programs, Special Analysis J, reprint of pp. 1004–1010 from the Budget of the U.S. Government for the fiscal year 1960.
[19] U.S. Department of Health, Education, and Welfare, "The Advancement of Medical Research and Education." Final Report of the Secretary's Consultants on Medical Research and Education, June 27, 1958, p. 22. Hereafter cited as Bayne-Jones report.
[20] Ibid., p. 22.

A more recent study of 20 medical schools for the National Institutes of Health indicates that Federal funds made up 9 percent of medical school budgets in 1948, about 29 percent in 1958, and that by 1970 an estimated 44 percent of medical school budgets will come from Federal grants.[21] These figures do not include construction grants, which would raise the proportion of Federal support for medical education.

Assuming an annual growth in gross national product of only 3 percent, the Bayne-Jones report projects a desirable rise in national spending for medical research from $330 million in 1957 to $900 million or $1 billion a year by 1970. Attainment of this level of spending for medical research will require private industry and private philanthropy to triple private spending for medical research, the report states, and Federal spending for medical research should rise to about $500 million a year in 1970. Although the report stresses the need for increasing Federal support, it also states clearly that non-Federal spending must continue to support about half of the total medical research effort.[22]

Widespread awareness of the value of research has created strong public support for medical research. Discovery of an effective poliomyelitis vaccine has raised hopes for other major medical breakthroughs. It is significant that in 1959 Congress raised appropriations for National Institutes of Health research activities by $106 million above the Administration budget request to $400 million. This action reflects public support for medical research. This demand for progress in medical research can be expected to continue to grow.

DEMAND FOR HOSPITAL SERVICES

Trend to hospitals for health care

Hospitals are focal points for advances in medical science, and the American people increasingly demand hospital services for diagnosis and treatment of disease, as well as for preventive medicine and community health education. Increased utilization of hospitals stems in part from the social and technological role of hospitals in providing medical services, but rising income and prepaid health insurance programs provide additional incentives toward utilization.

Hospital utilization is also determined by age, sex, marital status, education, and a variety of less measurable socio-economic factors, including existing alternatives to hospital care such as family or home care or care by nonhospital institutions such as nursing homes and halfway homes for mental patients. Among the most significant factors, however, are the prevalence of hospitalization insurance, the increase in older age groups, and the incidence of long-term diseases and mental illness.

Hospitalization insurance

The most widespread benefit of health insurance is protection against costs of hospitalization. Evidence of higher hospital utilization by insured persons raises the question of abuse of this protection. It is difficult to establish abuse, which implies doctor-patient collusion,

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[21] U.S. Department of Health, Education, and Welfare, "A Study of 20 Medical Schools," a report to the Director, National Institutes of Health, from the staff committee on support for research and training, April 1959, p. 6.
[22] Bayne-Jones report, pp. 29-30.

but it is possible to indicate some factors involved in utilization of hospital care by the insured and the uninsured.

The 1953 Health Information Foundation survey [23] revealed that hospital admission rates vary little between different income groups, but that insured persons, regardless of income, had higher admission rates—14 admissions per 100 insured persons per year, compared with 9 admissions per 100 uninsured persons per year. The survey also indicated utilization of 100 hospital days per 100 insured persons pear year and 70 hospital days per 100 uninsured persons per year but with an average length of stay in hospitals of 7 days per insured person and 8.3 days per uninsured person.

Among the uninsured, there was little variation in hospital utilization, regardless of family income. Among insured persons, however, individuals from low-income families (less than $2,000 a year) had a much higher hospital admission rate than any other income group—21 hospital admissions per 100 persons. This rate is far above the general average admission rate of 14 per 100 insured persons per year and 9 per 100 uninsured persons per year,[24] but this high utilization by low income individuals may reflect the large number of older retired people in this income group.

In all income groups, hospital utilization by insured persons exceeded utilization by the uninsured, even at very high income levels. Apparently, families with health insurance go to hospitals more often and stay a shorter time than do those without such insurance. This higher utilization by the insured does not imply excessive use of hospitalization insurance protection, although it does indicate that insured persons (or their doctors) use hospitals for less serious conditions. If at least some of these less serious conditions are presumed to require hospital care, it would appear that there are unmet hospitalization needs and lack of health consciousness among uninsured people. The lack of health consciousness is indicated by the failure of uninsured persons to demand more hospital care as family income rises.

Whether insured persons get more hospital care because they have hospitalization insurance or whether they get hospitalization insurance because they want hospital care, it is clear that insured persons are more health conscious. The significance of health consciousness in hospital utilization is confirmed by the observation that insured persons, regardless of income or insurance benefits, spend more for "out of pocket" medical expenses than do the uninsured.

As health insurance benefits become more comprehensive, covering "out of hospital" medical care, it is possible that the high rate of hospital utilization by insured persons will be reduced. If a patient must be hospitalized to get the benefit of health insurance, both patient and doctor may have some incentive to use hospital care to ease financial burdens on the patient. On the other hand, comprehensive health insurance, which covers outpatient hospital visits and doctor visits to the patient's home or patient's visits to the doctor's office, may reduce hospital utilization, but will also raise questions concerning overutilization of nonhospital medical services. There exists already a growing trend toward greater comprehensiveness of

[23] Anderson, op. cit., pp. xiv–xv, 55.
[24] Ibid., p. 58.

benefits in health insurance coverage, including home calls, visits to doctors' offices, and diagnostic X-ray and laboratory fees. However, the effect of comprehensive health benefits on hospital utilization has not yet been clearly established.

Utilization by older people

Older people need more hospital care than younger age groups. Those past 65 use more than twice as many days of hospital care as those under 65. But the surge in demand for hospital care begins before 65, affecting those in the final years of their active working lives. People in the 55-to-64 age bracket use hospitals at a rate three times as great as those in the 35-to-44 age group.[25]

About 60 percent of the over-65 population do not have any hospital insurance. Insurance coverage for the aged increases with income, but the low incomes characteristic of this age group indicate that these people who need hospital insurance coverage the most have the lowest proportion of protection. According to Prof. Wilbur Cohen, an authority on welfare and problems of the aging:

These are the people who, as they need hospital care, even though they are receiving social security, must ultimately apply for public assistance to supplement their social security to pay for their hospital care; or not receive hospital care; or borrow money; or receive it from relatives or friends; or get free care in some way from the communities.[26]

About half of the uninsured persons in the over-65 age group reported that they could not afford or were refused health insurance, and half indicated that they had not considered or did not want such protection.[27] It would appear, therefore, that even apart from lack of financial ability, older people are less aware of their health care needs and potential benefits from modern medical science. There may also exist a reluctance to get medical care for what older people may regard as inevitable illneses of old age.[28]

Since hospital and nursing home care imposes heavy medical expenses on older citizens, the lack of tax-supported health insurance and the failure of private health insurance programs to meet their needs for protection leaves this portion of the population in a particularly weak, vulnerable position in financing their hospitalization needs.

Mental illness and chronic diseases

Mental illness and chronic diseases are raising the demand for long-term hospital care. To a large extent, this trend in demand for hospital care reflects the conquest of communicable, infectious diseases, with consequently longer life expectancy and resulting increases in health problems of the older age groups. Mental and tuberculosis patients occupy almost half of all available hospital beds, but the demand for long-term-care facilities appears even more strikingly in the 94 percent average occupancy reported in 1958 by the long-term, non-Federal psychiatric hospitals, many of which have waiting lists. In contrast to this high occupancy, voluntary, short-term, general,

[25] Ray E. Brown, "Forces Affecting the Community's Hospital Bill." Reprinted from "Hospitals," Journal of the American Hospital Association, Sept. 16, 1958, vol. 32, p. 3.
[26] U.S. Senate, "Hearings Before the Subcommittee on Problems of the Aged and Aging of the Committee on Labor and Public Welfare." 86th Cong., 1st sess., June 1959, p. 26.
[27] "Progress in Health Services," Bulletin of the Health Information Foundation, January 1959.
[28] "Progress in Health Services," April 1959.

and special hospitals reported an average occupancy of only 76 percent.[29]

Mental illness is a heavy financial burden on the Nation with minimum annual costs estimated at more than $2.4 billion a year.[30]   The average length of stay for a patient in a mental hospital is about 1 year and 10 months.   More than 80 percent of all mental patients are in State mental hospitals and about 10 percent are in veterans' hospitals.

Mental and tuberculosis hospitals have traditionally been operated at taxpayer expense, in part because of the high cost of the necessary long-term care and in part because of a public interest in protecting the community from mental and tuberculosis patients.   However, medical progress is reducing the need for tuberculosis facilities and tranquilizing drugs are changing the pattern of long-term care for mental patients and are easing the need for facilities for confinement of mental patients.

Nevertheless, long-term care will remain beyond the financial capacity of most families.   The cost per patient-day in non-Federal psychiatric hospitals in 1958 was only $4.40 compared to $29.24 in voluntary short-term general hospitals, but despite this lower cost per day, a patient's length of stay would impose staggering burdens on most families.

General hospital care for patients with long-term diseases is costly and clearly not an economic use of limited hospital resources.   The increasing burden of chronic and degenerative diseases accentuates the need for alternative facilities, nursing homes, and long-term-care institutions which can furnish skilled care for patients who need medical attention but who do not require the intensive care and treatment and expensive services included in the overhead costs of general short-term hospitals.

CHAPTER 2. SUPPLY OF MEDICAL CARE

ORGANIZATION OF MEDICAL SERVICES

The visiting family doctor with his little black bag no longer holds the center of the stage in supplying medical services.   The drama of medical care has shifted to the hospital operating room, where teams of specialized physicians, assisted by an ever-increasing number of highly trained assistants, technicians, and laboratory experts, cooperate in complex techniques of surgery, radiology, pathology, and many other specialized medical skills.   In order to utilize the new techniques and new skills achieved by medical science, the supply of medical services must be organized.   Changes in organization of these services is taking place not only in hospitals, but also in the private practice of physicians, particularly through the growth of group practice.

The complexities of organization reflect the pluralistic nature of supply in the medical care field.   Private physicians' services for fees are supplemented by free services to the indigent as charity, by industrial inplant services, by hospital outpatient clinics, by public

[29] "Hospitals: Guide Issue," J.A.H.A., Aug. 1, 1959, p. 384.
[30] Rashi Fein, "Economics of Mental Illness."   Joint Commission on Mental Illness and Health, 1958, p. xii.

health services, and by a variety of combinations of private, public, and semipublic voluntary, nonprofit medical services and health facilities. Direct payment for medical services is supplemented by third-party payments through health insurance, public assistance, Government programs such as Medicare and by philanthropy. Similarly, the supply of hospitals, medical schools, and other health facilities are determined by a wide range of private, public and semipublic agencies. These agencies make decisions and perform functions vitally affecting the general welfare, at times without recognition of the public interest or without enlisting public support.

Group medical practice and specialization affect the general problems of supply and efficiency of physicians. As a means of coordinating specialized physicians' services, economizing on laboratory facilities and administrative expenses, group practice of medicine may well be a partial solution to the shortage of medical doctors. The trend to group practice brings another intervening step in the financial relations between doctors and patients, since partners in group practice are likely to get a fixed income plus "profit sharing" from the group's income, rather than direct fees from patient to doctor.

In the field of hospital organization, requirements for expensive equipment and additional skilled personnel have diminished the role of small, proprietary hospitals and have augmented the central role of the large public and voluntary general hospitals. Hospitals are developing progressive patient care with patients moving from intensive care units to less costly intermediate care units and home care programs as rapidly as possible. Hospital organization requires coordination in supplying services to patients, as well as coordination in supplying educational opportunities for medical students, interns, and auxiliary medical personnel and coordination of research activities. This coordination has become a specialized field with graduate training for hospital administrators.

The new trends in organization of medical services undoubtedly affect the supply of these services but there is great difficulty in measuring the effect. The pressure of rising costs in supplying medical services encourages any trend to greater efficiency, and further developments in organization of medical services can be expected as a result of this pressure, in spite of resistance from traditionally conservative professional organizations.

QUALITY CHANGES IN MEDICAL CARE

The quality of medical care improves as medical research provides new, more effective techniques for prevention, diagnosis, and treatment of disease. However, there is no simple, single index of quality changes in medical care.[31]

The trained, competent physician has a primary role in providing high quality medical care. Quality reflects the caliber of medical education and research, specialization in medical practice, and progress in hospital administration. It also reflects health education of the public, consumer financing practices, community social and economic patterns, and many other factors. The quality of medical service a physician is able to provide depends also on the drugs, equipment, and supplementary personnel available to him and to the community he serves.

[31] U.S. Veterans' Administration, "Report of the Committee on Measurement of the Quality of Medical Care," Department of Medicine and Surgery, April 1959, p. 27.

Rising life expectancy, reduced mortality rates, and control of many communicable diseases are indications of rising quality of medical care, but they are difficult to disentangle from questions about the quantity or the availability of health and medical service or from improved diet and improved living conditions. Although judgments on quality of medical care are generally subjective and elusive, nevertheless, they are pertinent in considering the more measurable factors of supply, the supply of trained medical personnel, and the supply of hospital facilities.

SUPPLY OF MEDICAL PERSONNEL

Physicians (M.D.)

Present trends indicate that population growth is outstripping the supply of medical doctors, the most important group supplying medical care to the American people. Since 1949, the ratio of M.D. physicians has declined from 135 to 132 per 100,000 population, although their total number has risen from 201,000 to more than 227,000. In 1930, the ratio was 125. (See chart 4 and table 8.)

The national totals fail to reflect the number of physicians who are retired or partially retired, and thus understate the physician-population ratio. Furthermore, the national average covers wide geographic differences. In New England and the Middle Atlantic States, there are about 160 physicians per 100,000 population, but there are less than 100 physicians per 100,000 population in the South Central States.

In 1959, about 6,900 medical students were graduated from the Nation's medical schools. The output of physicians will have to expand to 9,100 a year from medical schools in the United States, plus another 750 from foreign medical schools, if the 1957 ratio of 132 physicians per 100,000 population is to be maintained in 1970.[32]

There are currently eighty-one 4-year medical schools and four 2-year medical schools. The graduating class of each 4-year school averages about 90 students. Medical schools must increase in number and capacity to provide adequate personnel for medical research, education, and maintenance of current physician-population ratios.

More physicians can be produced by existing medical schools. Since the attrition rate in these schools results in under-utilization of existing clinical facilities during the final 2 years of medical education, 2-year preclinical medical schools can provide students to fill the existing clinical facilities. Also, experiments are underway to shorten the time required to produce physicians by strengthening premedical training and by speeding the process of medical training.

However, the Bayne-Jones report points out that even with such trends underway, from 14 to 20 new medical schools will have to be built to maintain a ratio of 132 physicians per 100,000 population and to meet research and educational needs. Such a program, requiring $500 million to $1 billion for construction of new medical schools, may well require substantial Federal aid. The report states:

Unless there is a marked change in social philosophy leading to private gifts or State appropriations on an unprecedented scale, large Federal appropriations will be required.[33]

Without the large number of foreign-trained physicians serving the American people, the physician-population ratio would have de-

[32] Bayne-Jones report, p. 34.
[33] Ibid., p. 36.

clined much more seriously in the postwar years. More than 10 percent of new physicians added to the total supply in this country since 1950 were educated outside the United States. About 400 of the 1,300 foreign medical school graduates added to the supply in this country were American citizens studying abroad, but the rest were aliens. Thus the output of medical schools in the United States was supplemented by the equivalent of 10 to 15 medical school graduating classes from abroad. Such dependence on foreign-trained medical doctors clearly indicates inadequate output of physicians by American medical schools.

Dentists

The number of dentists in the United States increased from 81,000 in 1947 to about 100,000 in 1958, thus maintaining the ratio of 57 to 59 dentists per 100,000 population which has existed since 1949. However, the national average fails to exclude an estimated 12,000 dentists who are retired or active outside the dental profession.[34] Also, the national average includes dentists in Federal service, almost 7,000 in 1958.

As in the case of physicians, there is a wide range in distribution of dentists. New York had a 1958 ratio of 85 dentists per 100,000 population and South Carolina a ratio of 20 dentists per 100,000 population.[35] Increased use of auxiliary dental personnel such as technicians and dental hygienists has resulted in a better supply of dental services, but needs for dental research and adequate dental services in the future will require a greatly increased number of dentists.

The Nation could use 13,500 more dentists now, and unless more dentists per year are produced, the dentist-population ratio will continue to decline. While four new dental schools have been established during the past 2 years, more new schools are needed. Indeed, two new schools, each with a graduating class of 50, would be required each year between 1957 and 1970 to reestablish the 1955 ratio of 1 dentist for each 1,900 persons.[36]

The American Dental Association has made a similar estimate. Public Health Service estimates, based on projected current levels of dental schools output, indicate a decline in the supply of dentists to 52.8 per 100,000 population in 1970 and 50.2 per 100,000 population in 1975.[37] Dental schools in the United States have graduated about 3,000 students a year since 1952. Nearly all of the 45 dental schools reported that they are operating at full capacity and would apply for Federal matching construction grants to expand teaching facilities, if such funds were available.[38] (See table 8.)

Nurses

In contrast to continuing declines in the physician- and dentist-population ratios, the supply of active professional nurses has been rising and is expected to continue rising to provide higher nurse-population ratios in the future. (See table 8.)

Nurses are the largest single group of health workers and nursing service is fundamental in supplying adequate hospital care. About 60

[34] U.S. House of Representatives. "Medical School Inquiry," staff report to the Committee on Interstate and Foreign Commerce, 85th Cong., 1st sess., 1957, p. 435.
[35] Ibid., p. 436.
[36] Bayne-Jones report, p. 37.
[37] U.S. Department of Health, Education, and Welfare, Health Manpower Source Book, sec. 9, Physicians, Dentists, Nurses. Public Health Service Publication No. 263, 1959, p. 58
[38] "Medical School Inquiry," p. 71.

CHART 4. Supply of physicians, dentists and nurses, in relation to population, with projections on the basis of currently predicted output of medical, dental, and nursing schools.

Rates per 100,000 population
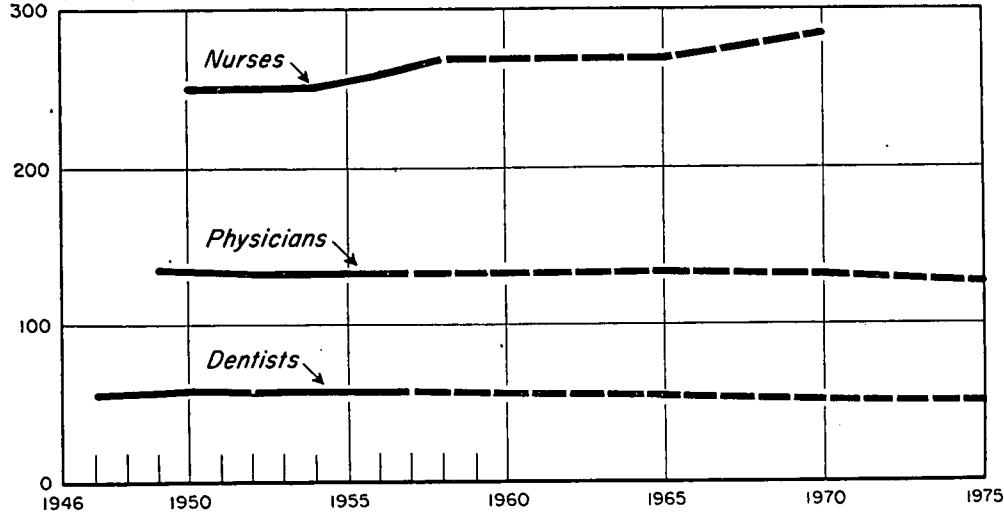
Sources: Health, Education and Welfare Indicators.
        Projections from Health Manpower Source Book, Section 9.

percent of active professional nurses are employed in hospitals. Hospitals also supplement the relatively expensive services of graduate professional nurses, who have 3 or 4 years of professional training, with the less expensive and less highly trained services of practical nurses, nursing aids, and other auxiliary nursing personnel.

Estimates of the number of graduate professional nurses range above 800,000, but many are retired permanently or temporarily from active employment. Active professional nurses totaled 460,000 in 1958, a ratio of 268 per 100,000 population. On the basis of currently predicted output of nursing schools, the supply of active professional nurses will rise to 525,810 for a projected ratio of 269 per 100,000 population in 1965, and to 608,050 for a projected 1970 ratio of 284 per 100,000.[39]

In 1958, about 1,100 professional nursing schools graduated 30,000 students. Increasingly, nursing education includes a 4-year collegiate degree program, although the present pattern is still predominantly a 3-year diploma program. Hospitals bear the major burden of financing nursing education, a burden estimated at two-thirds to three-fourths of the total cost of nursing education. Therefore, tuition fees must be supplemented by general university funds in collegiate nursing schools and by the institutions which operate nursing schools as part of a general hospital program.

The 2-year 30,000 increase in the number of active professional graduate nurses from 1956 to 1958 tends to confirm the observation that almost half of nursing school graduates drop out of professional life within a few years after graduation. In spite of the preference for matrimony to employment, large increases in the number of 17-year-old girls, who comprise most of the students admitted to nursing schools, will maintain a rising supply of active professional nurses, according to Public Health Service projections.

TABLE 8.—*Physicians, dentists, and nurses: Trends and projections of supply*

	Number of persons			Rate per 100,000 population		
	Physicians	Dentists	Active professional graduate nurses	Physicians	Dentists	Active professional graduate nurses
1910	135,000	37,684	50,500	146.0	41.0	55
1920	144,977	56,152	103,900	137.0	53.0	98
1930	153,803	71,055	214,300	125.0	58.0	174
1940	175,163	69,921	284,200	133.0	54.0	216
1947		82,990			58.0	
1948						
1949	201,277			135.0		
1950	203,400	89,441	375,000	134.0	59.0	251
1951	205,500			133.0		
1952	207,900	91,638		132.0	58.0	
1953	210,900	93,726	401,600	132.0	59.0	249
1954	214,200	95,883		132.0	59.0	
1955	218,061	97,529	430,000	132.0	59.0	258
1956	221,700	99,227		132.0	59.0	
1957	226,625	100,534		132.0	59.0	
1958		101,623	460,000		57.0	268
1960 ¹	239,350	100,266	475,190	132.9	55.6	264
1965 ¹	259,950	106,735	525,810	132.8	54.5	269
1970 ¹	279,000	112,881	608,050	130.5	52.8	284
1975 ¹	296,100	118,142		125.9	50.2	

¹ Projections based on currently predicted output of U.S. medical, dental, and nursing schools plus graduates from foreign medical schools.

Source: Health, Education, and Welfare Indicators, August 1958; Health Manpower Source Book, Section 9—Physicians, Dentists, Nurses, Public Health Service Publication No. 263.

[39] Health Manpower Source Book, sec. 9, p. 73.

Other health workers

As the functions of medical care become increasingly specialized and expensive, there has been great expansion of the professional and technical occupations in the health field to supplement and often to take over functions previously performed by physicians, dentists, and nurses. To some extent, this trend reflects the substitution of less expensive medical care for the more expensive services of physicians, dentists, and nurses. However, the growing complexity of medical care and equipment requires more workers with specialized professional and technical training.

More than 1.8 million workers were employed in health-related occupations in 1955. Of this total, about 750,000 were medical doctors, dentists, and professional nurses. The remaining auxiliary medical workers providing health services included: [40]

Student nurses	113,000
Practical nurses	175,000
Hospital attendants	146,000
Nursing aids	138,000
Pharmacists	111,000
Medical laboratory technicians	50,000
Dental technicians	21,000
X-ray technicians	50,000
Dietitians, nutritionists	22,000
Chiropractors	25,000
Osteopathic physicians	12,000
Veterinarians	17,000
Medical record librarians	7,000
Medical social workers	5,000
Psychiatric social workers	5,000
Physical therapists	7,000
Occupational therapists	6,000
Speech, hearing therapists	4,000
Rehabilitation counselors	2,000
Hospital and medical program directors	9,000

In addition to the occupations listed above, office assistants to physicians and dentists totaled about 130,000. Nonprofessional attendants, orderlies and ward maids in hospitals and other health institutions numbered about 200,000.

New paramedical occupations, requiring additional training and new skills, tend to appear with advances in medical science. The major training field is necessarily the hospital, which is a focus for all health training, but increasing emphasis by professional organizations on maintenance of high standards within their specialty has resulted in longer training and greater reliance on university graduate degree programs for training. Lengthening of the training period tends to discourage people from entering these occupations and also raises the income requirements of those completing the training. Thus, at the same time that rising professional standards push up the cost of paramedical services, relatively low salaries in paramedical occupations continue to deter recruitment of enough trained workers to overcome persistent shortages in these occupations.

Apart from doctors and dentists, about 9 out of 10 professional health workers are women.[41] Thus, a characteristic employment prob-

lem in the nursing profession, early retirement from professional activity, is a significant factor in the supply of other professional health personnel. The high proportion of women in these professions helps to explain the persistent personnel turnover imposed by marriage, child raising, and female attitudes toward employment. The predominant number of women may also help to account for the relatively low pay scales in hospitals and health service employment. However, low wages and salaries are also determined by the institutional arrangements and organization in the health industry, where public institutions depend on tax funds and nonprofit agencies depend on philanthrophy and voluntary donation of services. The voluntary nonprofit hospitals and the general public community hospitals are usually unable to pay fully competitive salaries, even for the professionally trained auxiliary medical personnel. Therefore, these occupations are filled with women whose salary expectations are less optimistic than the expectations of men with similar professional training.

Although the supply of personal health services could be increased by greater use of family services for patients in hospitals and by greater utilization of volunteer workers, there is no clear trend toward increased charitable or volunteer service to ease the foreseeable demand for professional and auxiliary health workers. The supply of such workers is inadequate in almost all fields, and shortages of professional auxiliary health workers appear likely to continue for the foreseeable future.

<div align="center">SUPPLY OF HOSPITAL FACILITIES</div>

Increases and shortages

The supply of hospital facilities has grown by more than 10 percent in the last decade, but rising population and rising hospital utilization continue to put severe pressures on the available supply of hospital facilities.

The American Hospital Association reported 6,786 hospitals in the continental United States with a total of 1,572,000 hospital beds in 1958. In 1948, there were 6,160 hospitals with 1,411,000 beds. In spite of these increases, however, the number of hospital beds per 1,000 population dropped from 9.7 in 1948 to 9.1 in 1958, and hospital utilization rose from 115 to 137 hospital admissions annually per 1,000 population.[42]

The decline in the average length of patient stay in general and other special hospitals tends to counteract pressures on the supply of hospital facilities. These pressures result in earlier discharge of patients and occasionally in refusal to admit patients. However, the average length of stay in general short-term hospitals fell from 15.4 days in 1932 to 11.1 days in 1948 and to 9.6 days in 1957. This would indicate that hospital care is changing so as to enable existing facilities to serve more people more quickly. Among the factors involved in declining length of patient stay are the concentration of expensive and effective diagnosis and treatment in the first few days of a hospital stay, the trend to early ambulation of maternity and surgical patients, and the development of "progressive patient care" which moves patients from intensive care units to intermediate, less intensive and less expensive hospital care units and early transfer to home care status. Increasing reliance on tranquilizing drugs for mental patients enables

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[42] Hospitals: Guide Issue, J.A.H.A., Aug. 1, 1959, p. 384.

hospitals to give "out patient" analysis and treatment to cases which formerly had to be institutionalized.

However, apart from these trends which reflect progress in medical science and reduce pressures on the supply of hospital facilities, considerations of supply also involve problems of distribution of facilities, as well as the nature and cost of hospital services.

Types of hospitals

The predominant type of hospital supplying medical care to the general public is the non-Federal, short-term general hospital. In 1958, there were 5,290 hospitals in this category with 610,000 beds. Voluntary, proprietary and State and local public hospitals are included in this category. Long-term hospitals include mental institutions, tuberculosis hospitals, and hospitals intended primarily for care of aged or chronic disease patients.

However, in terms of all hospital beds, about two-thirds are owned by Federal, State, or local governments. The rest are under voluntary or proprietary ownership, although proprietary ownership is declining. Three-fourths of the governmentally owned beds are in mental, tuberculosis, and veterans' hospitals.[43] Thus, Federal and State hospitals tend to be large, long-term care institutions, whereas general, short-term hospital care is provided by the private, nonprofit or community hospitals. Of the 5,290 non-Federal short-term general hospitals in 1958, 3,203 were voluntary, 896 were proprietary, and 1,191 were owned by State and local governments. (See chart 5 and table 9.)

[43] Health Education and Welfare Indicators, August 1958, p. 19.

CHART 5. Ownership of hospital beds.
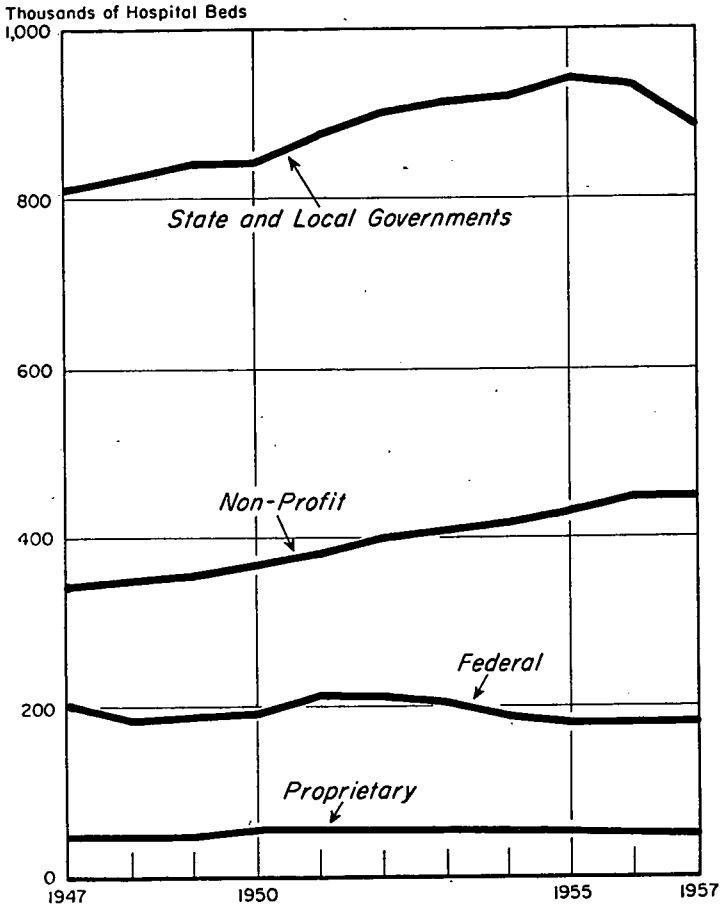
Source: Health, Education and Welfare Indicators

TABLE 9.—*Ownership of hospital beds*

[In thousands]

	Total	Governmental			Nonprofit	Proprietary
		Federal	State	Local		
1930	956	64	405	151	336	(¹)
1940	1,226	109	572	193	298	54
1946	1,436	236	812	(²)	335	53
1947	1,400	200	808	(²)	342	51
1948	1,411	186	826	(²)	349	50
1949	1,435	187	842	(²)	355	51
1950	1,456	189	844	(²)	368	55
1951	1,522	215	871	(²)	383	54
1952	1,562	213	897	(²)	399	54
1953	1,581	203	711	204	409	54
1954	1,578	189	718	202	417	52
1955	1,604	183	739	203	427	52
1956	1,608	184	728	202	443	50
1957	1,559	183	686	195	448	47

¹ Included with nonprofit hospital beds.
² Included with State governmental beds.

Source: Health, Education, and Welfare Indicators, August 1958.

When function rather than ownership is considered, the impact of mental illness appears startling in relation to the total supply of hospital beds.

Almost half of existing hospital beds are occupied by mental patients. In 1957, there were 4.6 beds in general and other special hospitals per 1,000 population and 4.2 mental hospital beds per 1,000 population. The 4.6 rate of general hospital beds per 1,000 has remained about the same since 1947, but the 4.2 rate of mental hospital beds per 1,000 in 1957 represents a drop from 4.7 beds per 1,000 in 1947. Non-Federal psychiatric hospitals contained 646,000 beds for mental patients and Federal psychiatric hospitals another 67,000 beds for mental patients. On the basis of the Public Health Service standard of 5 beds for the mentally ill per 1,000 population, there is clearly a shortage of mental beds, and the shortage would appear even greater if "nonacceptable" mental beds were excluded from the existing total. However, new emphasis on community and home treatment, outpatient mental health clinics and centers are easing the pressures on existing mental hospitals, although shortages and overcrowding of mental facilities continue. According to estimates reported to the Public Health Service, only 55 percent of total needs are met by existing acceptable mental beds.[44]

The need for long-term care facilities to supply medical services for the rising aged population has brought new emphasis on the role of nursing homes. The best of these nursing homes provide skilled nursing care and related medical services to patients who do not require the expensive, intensive care provided in general hospitals. The worst are venal and dangerous, extracting profit from the small pensions of elderly people crowded together in obsolete firetraps.

A 1954 survey of nursing homes and related facilities by the Public Health Service indicated a total of about 25,000 nursing homes with about 450,000 beds.[45] Only 180,000 beds, however, were provided with skilled nursing care. On the basis of needs reported to the Public Health Service, existing acceptable skilled nursing home beds are meeting only one-fourth of the needs.

Thus, existing needs and future needs of the expanding aged population indicate an inadequate supply of long-term care facilities, but a national effort to increase the supply of nursing home facilities can alleviate the need for general short- and long-term hospital care.

Distribution of hospitals

Wide regional differences are included in the national average of 4.6 general hospital beds per 1,000 population. New England and Northwest States have about 6 beds per 1,000 in their central cities; Southeast States, 5.7; Central States, 5.2; and Middle East, Southwest and Far West central cities have about 4.5 beds per 1,000 population.[46] In the 375 hospital service regions reported in Hill-Burton State plans, general hospital bed availability varies from 1.6 beds per 1,000 population for 31 regions to 6.2 acceptable beds per 1,000 population for 20 regions. In rural States, where population density is low, more small hospitals with relatively low occupancy are needed,

[44] U.S. Department of Health, Education, and Welfare, "The Nation's Health Facilities: 10 Years of the Hill-Burton Hospital and Medical Facilities Program, 1946–56." Public Health Service Publication No. 616, 1958, p. 77.
[45] Ibid., pp. 83–85.
[46] Ibid., pp. 33–34.

and adequate hospital care would require 5.1 to 5.5 beds per 1,000 population.[47]   Acceptable beds in areas outside central cities vary from 0.51 general beds per 1,000 in the Southwest to 1.86 in New England, with a national average of 1.42 beds per 1,000 population outside central cities.[48]

Hospital services and costs

A vast range of services are provided by hospitals. Primarily, these are personal services, but they also require an array of expensive equipment.

Payroll expenses are the major hospital operating expense, taking about two-thirds of total costs and about two-thirds of the average cost per patient day. In the psychiatric hospitals, payroll expenses account for $3.08 of the $4.40 expenses per patient day. In the voluntary, short-term hospitals, payroll expenses account for $17.71 of the $29.24 expenses per patient day. The American Hospital Association survey for 1958 listed 1.5 million full-time hospital workers with an overall average of 111 hospital workers per 100 patients and a range from 224 workers per 100 patients in voluntary short-term general hospitals to 34 workers per 100 patients in non-Federal psychiatric hospitals. (See table 10.)

More than 90 percent of short-term non-Federal hospitals have emergency rooms and operating rooms, clinical laboratories, basal metabolism apparatus, diagnostic X-ray equipment and electrocardiographs, the hospital survey indicated. Other expensive equipment such as electroencephalographs, radioactive isotope therapy, X-ray therapy, intensive care units, postoperative recovery rooms, and premature nursery facilities are increasingly prevalent, as are such hospital services as physical and occupational therapy as well as various skilled services, including medical and psychiatric social service.

The addition of new, expensive equipment does not result in savings on hospital payrolls. Instead, this equipment creates new payroll expenses.

As newly developed diagnostic and treatment equipment is added to hospitals, more—not fewer—people are required to operate it. Hospital equipment is expensive, its cost is impressive, but the enduring element of cost for these new services is the new trained personnel who must accompany it.[49]

In addition to the rising expense of professional and other highly trained workers, hospitals are faced with payroll pressures from the general wage level on costs of lower paid, unskilled workers. Although there have been significant increases in hospital wage scales and reduction of hours worked, there is still a considerable lag behind the general wage level of industry. Wages averaging $1,330 a year in 1946 for a 48-hour week rose to $2,873 in 1957 for a 42-hour week, an increase of 116 percent in pay and a decrease of about 14 percent in hours.[50]

But continuing requirements for hospitals to match general wage and salary levels will put a long-run pressure on hospitals costs.

[47] U.S. Department of Health, Education, and Welfare. "How Many General Hospital Beds Are Needed?" Public Health Service Publication No. 309, 1953, p. 62.
[48] "The Nation's Health Facilities," p. 49.
[49] Russell A. Nelson, Maryland-District of Columbia-Delaware Hospital Association. Statement before Maryland Insurance Commissioner, May 26, 1958, (mimeo) p. 16.
[50] Frank Groner, American Hospital Association. Statement prepared for U.S. House of Representatives, Ways and Means Committee, hearings on Federal Unemployment Tax Act, Apr. 10, 1959, (mimeo) p. 4.

This pressure, reinforced by the difficulty of introducing machinery and automation to replace personal services, will increase costs of hospital care by an estimated 5 percent annually for many years in the future.[51]

TABLE 10.—*Hospital personnel and payroll costs*

	Number [1]	Number [1] per 100 patients	Hospital payroll per patient-day	Hospital expense per patient-day
All hospitals, total:				
1946	829, 000	73	$2. 93	$5. 21
1948	938, 000	76	3. 60	6. 35
1950	1, 057, 000	84	4. 79	7. 98
1952	1, 118, 000	84	5. 63	9. 14
1954	1, 245, 000	93	6. 83	10. 67
1956	1, 374, 000	101	7. 98	12. 16
1957	1, 401, 000	107	8. 72	12. 96
1958	1, 465, 000	111	9. 63	14. 74
Voluntary, short term general hospitals:				
1946	361, 000	156	$5. 11	$10. 04
1948	427, 000	173	7. 57	14. 06
1950	473, 000	191	9. 40	16. 89
1952	485, 000	184	11. 22	19. 55
1954	567, 000	207	13. 67	22. 78
1956	638, 000	213	15. 23	24. 99
1957	680, 000	218	16. 14	26. 81
1958	720, 000	224	17. 71	29. 24

[1] Full-time personnel plus full-time equivalents of part-time personnel. Excludes resident physicians, interns and students.

Source: "Hospitals: Guide Issue," JAHA, Aug. 1, 1959, vol. 33, pt. 2, hospital statistics table 1.

Hospital construction

The Hill-Burton Federal aid program to stimulate construction of hospitals and other medical facilities was approved by Congress in 1946. Since that time, spending for hospital construction has ranged from about $650 million to $950 million a year. Hill-Burton funds helped to finance about 25 percent of all non-Federal construction of health facilities, particularly in rural Southern States previously having serious shortages of hospital facilities. (See table 11.)

Hospital construction, slowed by the depression of the 1930's and by World War II, has been tremendously expanded by the Hill-Burton program, which aided construction of 135,000 new hospital and nursing home beds plus 750 units for outpatient care such as public health centers, clinics, and diagnostic centers during the first 10 years of the program.[52]   It is worth noting that this program, relying on State plans, provides Federal aid without regard to the public or private nature of the ownership of the projects to be aided, but requires that the operation of facilities be nonprofit.

This is believed to be the first major example of Federal assistance to non-public groups, for public ends. Such action was found essential to a comprehensive program, because of the dual nature of the existing hospital system, which has evolved to a large degree under private auspices.[53]

Such an approach is a frank recognition of the semipublic nature of privately owned medical facilities.

Some indication of future hospital construction needs can be found in the estimates of State agencies concerning specific projects to be

[51] Ray E. Brown, "The Nature of Hospital Costs." Reprinted from Hospitals, J.A.H.A., Apr. 1, 1956, p. 1.
[53] "The Nation's Health Facilities," p. 19.
[53] Ibid., p. 15.

undertaken if funds become available.   These estimates forecast hospital construction amounting to $700 million a year and an additional $300 million a year for long-term care, including chronic care hospitals, nursing homes, rehabilitation facilities and outpatient diagnostic or treatment centers.[54]   These estimates indicate unmet needs, and public support appears to be strong for further Federal assistance in this program.   In 1959 Congress, in the same appropriation bill which increased funds for medical research, also increased funds for Federal grants for hospital construction to $186 million, $85 million more than requested by the administration.

TABLE 11.—*Hospital construction, value put in place and value by source of funds*

[Millions of current dollars]

	Value of new hospital construction put in place [1]			Value of hospital construction by source of funds			
						Non-Federal	
	Total	Public [2]	Private	Federal	Without Federal aid	Federally aided	Federal share as percent of federally aided [3]
1940	87	54	33	5	82		
1949	679	477	202	169	386	124	31.8
1950	840	496	344	146	466	228	39.7
1951	947	528	419	132	569	246	35.4
1952	867	473	394	113	532	222	33.0
1953	682	365	317	66	434	182	27.1
1954	697	360	337	35	529	133	28.2
1955	673	322	351	22	553	98	25.8
1956	626	298	328	37	467	122	25.0
1957	858	333	525	45	560	253	29.7

[1] Includes construction of health-related institutions, such as nursing homes.
[2] Includes construction of federally owned hospitals.
[3] For projects approved and construction begun under the Hill-Burton hospital and medical facilities construction program.

Source: Health, Education, and Welfare Indicators, August 1958.

## CHAPTER 3. THE PRICE INDEX OF MEDICAL CARE

TRENDS

The medical care component of the Bureau of Labor Statistics-Consumer Price Index, currently weighted at 5.3 percent of the total CPI (see table 12), gives an indication of price reactions to demand and supply relations.   During the period 1947–58, only two items in the medical care "market basket" increased more than the "all services" index: hospital room rates and group hospitalization insurance premiums.   All other services in the "market basket" of medical services increased less than the average for all services.   (See chart 6 and table 13.)

Medical care services generally rose about 58 percent from 1947 to 1958, but hospital room rates rose more than 125 percent and group hospitalization premiums rose almost 80 percent from 1951 to 1959. When hospital rates and hospitalization insurance prepayments are removed from the medical care price index (see table 13), the rise in

[54] Ibid., p. 32.

the medical care price index from 1947 to 1958 is 35 percent, only slightly above the all items CPI increase of 29 percent during the same period.

CHART 6.—Medical care price index and selected components.

1947-'49=100
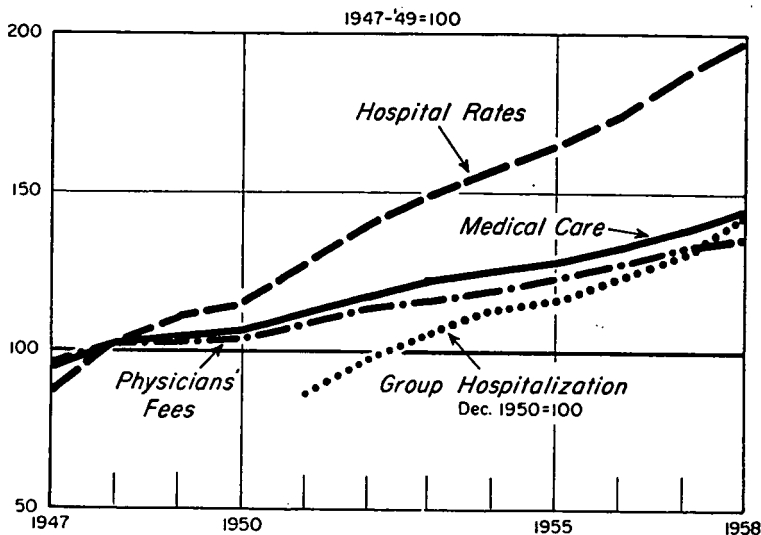
Source: Bureau of Labor Statistics

The index of fees for general physician fees rose by only 44 percent, dentist fees by 38 percent, specialist fees by 35 percent and surgeon's fees by 27 percent.

Expressing the increases as average annual rates without compounding, the rise in the price of hospital rooms was 7 percent from 1947 to 1958; for group hospitalization insurance premiums it was 6.5 percent. No other component of the medical care price index rose as fast. General physician and specialist fees rose by only 3 percent a year during this period.

Thus, hospital expenses and hospitalization prepayments are clearly a major factor in the rapid increase in the price index of medical care. Introduction of payments for group hospitalization among the items priced for the medical care price index in December 1950 was a justified recognition of the rapid growth of voluntary health insurance, which in turn reflected a rechanneling of demand for increasingly expensive hospital care. However, as noted below, the rise in costs of prepayment is based not alone on hospital costs, but also on increased hospital utilization.

The trend in group hospitalization premiums since December 1950, when first included in the CPI, has closely paralleled the trend in the room rate—the major cost item covered in such plans. However the average annual increase in group hospitalization premiums during these 6 years (1950-56) was 7.5 percent com-pared with 6.4 percent for hospital room rates, reflecting not only higher hospital costs but also greater utilization.[55]

[55] Elizabeth Langford. "Medical Care in the Consumer Price Index, 1936-56." Reprint from Monthly Labor Review, September 1957, p. 2.

Drugs and prescriptions, the nonservice component of the price index of medical care, account for about one-sixth of the total medical care weight in the CPI "market basket." The price experience for this component has been quite different from that of medical services. The drug price index went up about 26 percent, 2 percent a year, compared to the all-items rise of 30 percent, or 2.3 percent a year, and the medical services price rise of 58 percent, or 4.1 percent a year, from 1947 to 1958. Therefore, it would appear that increasing prices of drugs and prescriptions, the commodity portion of the price index of medical care, are relatively less significant in comparison to the increases in the prices of medical services.

TABLE 12.—*Relative importance of medical care price index components as percent of consumer price index all-items total*

	1947–49 average	January 1950	December 1952	December 1957
All items	100.0	100.0	100.0	100.0
Medical care	3.3	5.2	5.1	5.3
Medical care (excluding drugs)	2.9	4.4	4.2	4.4
General practitioner	1.1	1.3	1.6	1.6
Office visit	.6	.6	.7	.7
Home visit	.4	.5	.7	.7
Obstetrical care	.1	.2	.2	.2
Surgeon: Appendectomy	.1	.1	.2	.2
Tonsillectomy	.1	.1	.1	.1
Dentist	.7	1.2	.8	.8
Filling	.5	.9	.6	.6
Extraction	.2	.3	.2	.2
Optometric examination and eyeglasses	.1	.2	.3	.3
Hospital services	.6	.5	.2	.3
Men's pay ward	.2	.2	.1	.1
Semiprivate room Private room	} .4	.3	.1	{ .1 .1
Group hospitalization		1.0	1.0	1.1
Accident and health insurance	.2			
Prescriptions and drugs	.4	.8	.9	.9
Prescriptions, narcotic and nonnarcotic	.2	.4	.3	.3
Penicillin tablets			.1	.1
Multiple vitamin concentrates			.2	.2
Aspirin		.1	.2	.2
Milk of magnesia	.1	.2	.1	.1
Tincture of iodine	.1	.1		

Source: "Relative importance of CPI components, 1957," Monthly Labor Review, July 1958, reprint No. 2287.

LIMITATIONS

The price index of medical care is useful for describing price trends and comparing medical care price trends with changes in prices of other goods and services. This index also can serve as a price deflator or an approximate indicator of the changing purchasing power of the medical care dollar. However, the index does not show changes in the quality and quantity of medical care purchased. Consumer spending surveys may give an indication of quantity, but the index-making process precludes measurement of quality changes, even if these quality changes were not extremely elusive.

Higher hospital rates reflected in the price index, for example, may indicate greater concentration of expensive hospital services during the first few days of a patient's hospital stay. Since 1946, the average length of stay in general hospitals has dropped from 13.5 to 9.5 days, a decline which might be considered a 30 percent increase in hospital efficiency or in the quality of hospital services. The index of hospital room rates must cover a variety of demand and supply factors, therefore, which have a resultant upward pressure on the index.

Some of the limitations of the medical care price index stem from the sampling techniques used. The CPI is determined by the prices of goods purchased by urban wage earners and clerical salaried workers and thus fails to indicate rural medical care spending costs. There is a presumption that urban medical care prices give an accurate picture of total medical care cost trends, but such assumptions need further confirmation.

A recent Health Information Foundation study lists four limitations of the medical care price index.[56] First, the quality of priced services are not uniform. However, since the index measures price trends rather than specific prices, this limitation does not vitiate validity of the index. A second limitation is that relative weights of items in the medical care index may not reflect changing patterns of medical care purchases. Thus, the items priced for the CPI may not be representative of the medical goods and services actually purchased by consumers. Third, the index does not measure changes in the product. Finally, the weight of the medical care component in the CPI may not reflect the overall importance of medical care within the CPI, since consumer purchasing patterns change over time. The Bureau of Labor Statistics makes surveys of consumer spending to revise and update the sources of the index, but the process is unending since consumer purchasing patterns are continuously changing.

Subject to its limitations, however, the price index of medical care does indicate price trends for the major components of medical care and shows the relation of these price trends to other consumer price trends. These trends may indicate changing demand and supply relations and thus suggest the problem areas for public and private action.

[56] Harry J. Greenfield and Odin W. Anderson, "The Medical Care Price Index." Health Information Foundation Research Series No. 7, 1959, pp. 7-8.

TABLE 13.—*Medical care price index, selected items and groups, 1947–June 1959*

[1947–49=100 unless otherwise specified]

	Other index base	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	June 1959
All items		95.5	102.8	101.8	102.8	111.0	113.5	114.4	114.8	114.5	116.2	120.2	123.5	124.5
Services		94.5	100.4	105.1	108.5	114.1	119.3	124.2	127.5	129.8	132.6	137.7	142.4	145.4
Medical care		94.9	100.9	104.1	106.0	111.1	117.2	121.3	125.2	128.0	132.6	138.0	144.6	150.6
Medical care less hospital rates and group hospitalization.		96.3	100.7	103.2	104.9	108.6	111.7	114.1	116.2	118.5	121.9	125.8	129.7	-------
Physicians' fees		96.8	100.7	102.5	104.1	108.0	112.8	115.8	119.2	123.3	127.0	132.5	137.0	142.3
General practitioners' fees		96.9	100.6	102.5	104.0	108.0	113.0	116.1	119.9	124.3	128.4	134.5	139.3	145.0
Office visit		96.8	100.8	102.4	103.8	107.5	111.9	115.8	120.4	123.7	127.1	131.4	136.3	141.2
House visit		97.6	100.1	102.3	104.3	107.7	111.0	115.9	120.7	125.3		133.1	138.2	144.7
Obstetrical care		95.2	101.7	103.1	104.2	110.9	122.7	125.4	131.2	139.8	144.5	149.8	153.8	158.5
Surgeons' fees		96.2	101.0	102.9	104.5	107.3	111.5	113.9	115.2	116.4	118.2	120.9	122.7	126.2
Appendectomy		97.3	101.0	101.8	104.2	107.4	112.0	114.0	114.9	115.2	117.6	119.6	120.1	122.8
Tonsillectomy		95.1	100.9	103.9	104.8	107.1	111.1	114.1	116.4	119.2	120.0	124.1	128.4	133.5
Dentists' fees		95.2	100.3	104.4	106.9	110.9	113.3	117.0	120.9	122.0	124.4	127.4	131.4	134.6
Fillings		95.2	100.3	104.4	106.8	110.3	113.2	116.9	120.4	121.2	123.6	126.6	130.8	134.2
Extractions		95.1	100.4	104.6	107.3	112.5	113.8	118.1	124.0	126.1	128.4	131.6	135.0	137.0
Optometric examination and eyeglasses		96.2	100.2	103.5	104.5	109.2	110.5	109.4	108.0	109.5	111.2	115.5	116.7	118.2
Hospital rates		87.4	102.1	110.4	114.1	126.9	139.5	148.2	156.8	164.4	173.3	187.3	208.0	209.6
Men's pay ward		85.8	102.3	111.9	117.2	131.2	145.3	155.1	164.4	173.9	183.8	202.3	215.6	229.9
Semiprivate room		87.4	101.9	110.7	114.6	126.6	138.3	145.9	153.5	160.0	170.0	183.0	193.5	203.0
Private room		89.0	102.1	108.9	112.1	122.5	134.0	142.1	150.9	157.7	164.4	174.2	182.4	193.6
Group hospitalization	December 1952					85.6	97.0	104.8	112.5	115.5	122.7	129.9	143.3	156.6
Prescriptions and drugs		96.1	101.2	102.7	103.9	106.9	107.9	108.9	110.1	111.2	113.7	116.7	120.7	122.7
Prescriptions		94.0	101.7	104.2	106.9	112.2	113.6	113.6	115.8	117.3	121.0	125.0	130.7	134.2
Aspirin tablets		99.5	100.3	100.3	99.9	99.4	99.5	99.8	98.6	100.0	100.7	102.3	108.0	109.1
Milk of magnesia		99.7	100.0	100.2	100.5	100.7	101.4	108.2	112.3	114.1	123.0	132.8	136.3	141.9
Multiple vitamin concentrate	December 1952							100.1	100.8	101.1	101.4	101.6	101.2	100.4

Source: Bureau of Labor Statistics.

CHAPTER 4. A LOOK AHEAD

EXPANDING DEMAND FOR MEDICAL CARE

1. The increase of the population of the United States to an estimated 196 million in 1965 and 214 million in 1970 will raise demand for a greater quantity of medical care. Rising national income and rising per capita income, bringing rising standards of living, will also raise the demand for a greater quantity of medical care.

2. Increasing awareness of health and medical care needs will stimulate demand for a greater quantity of medical care and a higher quality of medical care. Rising expectations for improved medical care generate support for medical research and public action to increase the availability of medical care.

3. Rising demand for medical care generates private and public action to finance medical care. Private action appears in the growth of voluntary health insurance, which now pays about 25 percent of the private medical care bill and will pay an increasing proportion in the future. Public action appears in tax-supported programs to provide medical care for special segments of the population and in tax-supported medical research programs.

INADEQUACIES OF SUPPLY

1. The supply of medical doctors in relation to the population has been falling. Since 1949, the ratio of M.D. physicians declined from 135 per 100,000 to an estimated 132.7 per 100,000 population in 1959. The Public Health Service has estimated [57] that the ratio will fall to 130.5 per 100,000 population in 1970 and to 125.9 medical doctors per 100,000 population in 1975, if the number of graduates of U.S. medical schools does not increase above the level currently predicted.

2. The supply of dentists in relation to population has been stable, but the Public Health Service estimates the ratio will drop from 57 dentists per 100,000 population currently to 54.5 dentists per 100,000 population in 1965, to 52.8 in 1970, and to 50.2 in 1975, on the basis of currently predicted output of dental school graduates.[58]

3. The supply of health facilities and the supply of hospital beds judged acceptable by Public Health Service standards are inadequate in terms of rising population and increased demand. To meet the needs of the prospective population, 265,000 hospital beds will be required within the next 10 years [59] in addition to the existing 1.5 million hospital beds. The supply of nonhospital health facilities offering alternative services for health and medical care, such as public health centers, nursing homes, mental health clinics, and physical therapy and diagnostic centers, can alleviate the shortage of hospital beds; at the present time, the backlog of demand for these alternative health facilities far exceeds their supply.

CONTINUING PRICE INFLATION

1. Expanding demand for medical care and continuing inadequacies in supply of personnel and facilities providing medical care have contributed to rising prices of medical care services. This price inflation.

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[57] "Health Manpower Source Book," sec. 9, p. 31.
[58] Ibid., p. 58.
[59] "The Nation's Health Facilities," p. 31.

will continue even if supply expands simply to maintain current levels of availability of medical services.

2. Price inflation in the field of medical care is made more acute by longer training and increased specialization for medical personnel and by increasing utilization of expensive hospital equipment and procedures requiring additional personnel. Medical care is little susceptible to economies of mechanization and automation. Therefore, the rising quantity and quality of medical care will tend to create additional inflationary pressures on the price of medical care.

PROVIDING AN ADEQUATE SUPPLY OF MEDICAL CARE

Decisions of public policy on problems of medical care must recognize the primarily public service nature of medical services. These decisions must encourage and insure an adequate supply of resources available for medical care. The following observations stem from the paramount public interest in maintaining an adequate, rising level of medical care for the Nation in the future.

1. To maintain current physician-population ratios, the output of U.S. medical schools must be increased.

This increase will require expansion of medical school facilities, construction of new medical schools, and greater educational opportunities.

A recent report to the Surgeon General [60] includes the following recommendations to increase the output of medical schools:

(*a*) Private support for low-cost loans and scholarships and Federal grants-in-aid for needy medical students.

(*b*) Establishment of new medical schools and expansion of existing medical schools.

(*c*) Reconsideration of unreasonably restrictive medical school admissions policies.

(*d*) Continuing appraisal of the length and content of medical training, including evaluation of experiments to shorten the training period.

(*e*) Increased public and private support for basic operations of medical schools.

(*f*) Federal matching grants for construction and expansion of medical schools and teaching hospitals.

(*g*) Public and private efforts to recruit candidates for careers in medicine and related health services.

2. The supply of health facilities must be increased.

Shortages of health facilities and uneven geographic distribution of hospitals hinder optimum organization and maximum efficiency in the supply of medical services. The existing Hill-Burton program of Federal aid for construction of these facilities has been very successful in stimulating States and communities to increase the supply of hospital beds, public health centers, nursing homes, and other health facilities. In view of the rising needs for health care for older people, there is particular need for greater availability of nursing homes with skilled nursing care. Existing skilled nursing home beds are meeting less than half of the need for such care. The Hill-Burton program

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[60] Department of Health, Education, and Welfare, "Physicians for a Growing America," Report of the Surgeon General's Consultant Group on Medical Education (Bane Committee), Public Health Service Publication No. 709, October 1959.

should be expanded, with greater support for construction of nursing homes and other health facilities to supplement hospital care.

3. Organization of supply in the field of medical care must be improved.

This can be achieved by public and private assistance and encouragement for innovations in hospital administration, in the use of alternative health facilities such as nursing homes, and in more efficient use of available facilities and personnel through such programs as "progressive patient care," group medical practice, and increased utilization of voluntary workers in health care.

4. Public action is needed to protect particularly vulnerable groups against the burden of heavy medical expenses.

A Federal program of social health insurance for elderly citizens is justified by their larger health needs and smaller effective demand than other segments of the population. These elderly citizens are poor risks from the point of view of private insurers, but their health needs are important from a social and humanitarian perspective. Other possibilities are direct assistance or federally aided private insurance.

Crippled and handicapped children create tremendous financial burdens for low- and middle-income families. Private voluntary and philanthropic assistance to ease the burden of such disabilities must be supplemented with greater public support.

Low-income families have great difficulty in financing their medical care needs adequately. Continued private and public efforts to meet the needs of this group are necessary. The inability of low-income families to finance their medical care needs adequately imposes a heavy financial burden on private philanthropic sources of funds. To enable these families to get the medical care they need, public efforts by State and local governments must be supplemented with greater Federal support.

To summarize—Federal support and leadership is essential for cooperative action by States, communities, and private groups to insure adequacy in the supply of medical care.

O