

OVERVIEW OF HEALTH INSURANCE STUDY PUBLICATIONS

Joseph P. Newhouse
and
Rae W. Archibald

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I. INTRODUCTION

The Health Insurance Study began in July 1971 under a one-year grant from the Office of Economic Opportunity. The purposes of that grant were to analyze demand for medical care using existing data and to assess the desirability and feasibility of a social experiment in medical care financing. A preliminary design for an experiment was submitted in December 1971. The Office of Economic Opportunity decided to go ahead with an experiment in February 1972 and selected Rand to conduct the experiment in May 1972. In 1973 the Office of the Assistant Secretary for Planning and Evaluation, DHEW, took over supervision of the project. In November 1973 a pilot sample was enrolled at the first site, Dayton, Ohio.

The pilot sample showed that individuals would enroll in the experiment and that the experiment could administer the necessary insurance services; as a result, in November 1974 enrollment of the regular sample began at Dayton. In 1975 other sites--Seattle, Washington; Fitchburg and Franklin County, Massachusetts; and Charleston and Georgetown County, South Carolina--were selected. Enrollment at these sites took place during 1976. The experiment is now in progress; field work is scheduled to end in January 1982.

The experiment is designed to answer the following issues:

1. How do alternative cost sharing arrangements (e.g., different deductibles and coinsurance rates) affect the demand for medical care services? How much does it cost to cover specific medical services, such as dental services, mental health services, and prescription drugs? Does cost sharing affect the poor more than the middle class? Children more than adults? If so, how much more?

2. Suppose that more medical services are used when these services are fully paid for by insurance; what are the consequences of the additional services for health status, quality of medical care, and patient satisfaction?

3. Does a prepaid group practice tend to attract a less (or more)

sickly population than the fee-for-service system? When a random sample of the community not initially receiving care at a prepaid group practice begins to receive care at the prepaid group, how does its utilization compare to a similar group which continues to receive care in the fee-for-service system?

4. How do patterns of ambulatory care delivery differ across regions with varying degrees of stress on the primary care delivery system? When demand for physician services is high relative to supply, are adjustments made in type of problem seen, time spent with patients, hours physicians work, or paramedical personnel employed?

5. What administrative problems arise if health insurance benefits are income related? How can such problems best be treated?

Experimental data to address these questions will not be available until the 1980s. As a result, we have attempted to learn what we can from existing data; this research is termed nonexperimental, although as a by-product, it has improved the design of the experiment.

The nonexperimental research that has been completed to date is described in Section II of this paper; papers related directly to the experiment are abstracted in Section III. Each section includes a short, nontechnical summary, followed by abstracts of each publication. To date, of course, the preponderance of papers have been nonexperimental. The nonexperimental research includes: Health Insurance and the Demand for Care; Financing Health Insurance; Health Insurance and the Medical Marketplace; Quality of Medical Care; and Health Planning. The experimental work includes: The Design of the Experiment; Measurement of Medical Care Utilization; Ethics of Experimentation; Data Processing; Measurement of Health Status; and Statistical Methods.

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II. NONEXPERIMENTAL RESEARCH

HEALTH INSURANCE AND THE DEMAND FOR MEDICAL CARE

Most of our nonexperimental research has attempted to quantify the relationship between insurance coverage and the demand for medical care. When this work began in 1971, there were few estimates in the literature about how deductibles and coinsurance affect the demand for care. A number of persons argued that deductibles and coinsurance have no effect at all; others argued that demand is quite responsive. Work undertaken as part of the Health Insurance Study has established with some confidence the overall magnitude of response to variation in coinsurance. Although there are exceptions and gaps in knowledge, demand for many services appears to increase by 50 to 100 percent as one moves from no coverage at all to full coverage. Whether the response varies across the population (e.g., whether the poor are more responsive) is less certain.

General Overview of Insurance and Demand

Two of these publications are particularly recommended. P-6134 is a recent nontechnical review of the literature; R-1528 includes estimates of how much particular national health insurance plans are likely to change demand. We conclude that full coverage of hospital services is likely to cause little change in demand, but that full coverage of ambulatory services will increase demand markedly. Demand for ambulatory services will increase only slightly if the nonpoor face a moderate deductible.

Insurance Benefits, Out-of-Pocket Payments, and the Demand for Medical Care: A Review of the Literature. J. P. Newhouse. P-6134. May 1978. Also published in *Health and Medical Care Services Review*, July/August 1978.

Numerous studies are reviewed that relate the demand for medical care services to variation in out-of-pocket payments. Medical care services include physician, hospital, dentist, and drugs. Demand increases as out-of-pocket payments fall for all these services, but the exact magnitude of the response is somewhat uncertain. Although some believe that eliminating out-of-pocket payments for ambulatory services decreases hospitalization and decreases overall costs, the preponderance of evidence suggests the contrary. Evidence from the Medicare and Medicaid programs and Canada supports the hypothesis that demand responds to variation in out-of-pocket payments. 56 pp.

Policy Options and the Impact of National Health Insurance.

J. P. Newhouse, C. E. Phelps, W. B. Schwartz. R-1528.

June 1974. Also published in *New England Journal of Medicine*, June 13, 1974.

The effects of various prototypical health insurance options on demand for medical services are estimated. Data indicate that under full coverage or a maximum of 25 percent coinsurance, demand for hospital services would rise modestly. However, either program would greatly increase demand for ambulatory services and would stress the delivery system, with resulting increased price of physicians' services, queueing, or less physician time per patient--all without increasing total delivery of ambulatory services. Ambulatory services would be redistributed from the affluent to the poor. A catastrophic health insurance program would not stress the ambulatory system. Reorganization of the delivery of ambulatory services into prepaid groups probably will not increase productivity, nor will emphasis on preventive medicine reduce overall demand for health services. National insurance

providing more health services would not appreciably affect objective indexes of health (life expectancy), but should improve subjective but unquantifiable elements such as quality of life. 68 pp.

Coinsurance and the Demand for Medical Services. C. E. Phelps, J. P. Newhouse. R-964-1. October 1974. Abridged version published in *Review of Economics and Statistics*, August 1974.

Between 8 to 17 percent more services would be demanded at zero coinsurance rate than at a 25 percent rate. A theoretical model is developed of demand for medical services when insurance is present, and when time costs are involved in purchasing medical care. Responsiveness to changes in insurance coverage is shown to diminish as the cost of time becomes a relatively more important (and money price a relatively less important) proportion of total costs for medical services. Under plausible (and weak) conditions, the observed responsiveness of demand for medical services to either money price changes or insurance coverage changes approaches zero as insurance coverage becomes complete. 63 pp.

Health Care Cost Sharing and Cost Containment. J. P. Newhouse. P-5615. February 1976. Also published in *National Health Insurance: Major Issues*, Volume III, Hearings Before the Subcommittee on Health and the Environment of the Committee on Interstate and Foreign Commerce, House of Representatives, Ninety-fourth Congress, Second Session (Serial 94-91), February 24, 1976.

If cost sharing is eliminated in a national health insurance plan, substantial demand will be generated for services such as physician office visits. This demand increase will probably be spread across all income classes. In the short run, large demand increases will cause services to be rationed. Therefore, if it is desired to eliminate cost

sharing, a planned gradual phasing out of an initial deductible for the nonpoor is suggested. In the long run, the elimination of cost sharing in a decentralized, fee-for-service system is likely to generate unacceptably high total expenditures for national health care. There are two approaches to dealing with the problem: (1) restore the link between consumer and producer that exists in the usual market, and (2) establish rate regulation or budget determination in the public sector. The choice between the market approach and the public sector approach is fundamental and must be made through the political process. 27 pp.

National Health Insurance. J. P. Newhouse. P-5920. July 1977.

Also published in *The Report of the National Commission on the Cost of Medical Care*, Vol. 2, AMA, 1978, and *Textbook for Employee Benefit Plan Trustees, Administrators, and Advisors*, Vol. 19, Proceedings of the 1977 Annual Educational Conference of the International Foundation of Employee Benefit Plans.

This paper includes an outline of the objectives of national health insurance, a discussion of the critical issues involved in assessing various plans that have been proposed, and an appraisal of the three main types of plans. Plan types include (1) the "catastrophic" approach, coverage requiring a high deductible and intended only to prevent financial devastation due to the cost of medical care, (2) an "intermediate" approach, covering more than disastrous illnesses and requiring less out-of-pocket payment, and (3) full coverage of all medical-care expenses. None of the approaches is likely to substantially improve the nation's health. All provide financial protection against catastrophic illnesses; all redistribute income from the healthy to the sick, in different degrees; all can make the medical care system more efficient. A fundamental choice must be made about whether efficiency is best promoted by market incentives--leaving the administration of national insurance in private hands--or by centralizing administration in the public sector. 13 pp.

Insurance Benefits and Their Impact on Health Care Costs.

C. E. Phelps. P-5844. April 1977.

Increased health insurance coverage and extended benefits have reduced the financial risk faced by consumers of medical care, but have increased the total amount of care consumed. This has led to increases in demands for health services, incentives to choose more costly forms of care, possibly reduced incentives for patients to seek optimal preventive care, and obliterated normal market forces that constrain the price of care. Health insurance policies could be structured in ways to provide incentives to patients and doctors to counteract these side effects of health insurance. Deductibles and coinsurance in the ambulatory sector and insurance premiums that vary with the costliness of the hospital used are devices that seem to hold promise. 19 pp.

Variation in Coinsurance or Copayment and the Demand for Medical Care

Situations in which a coinsurance rate or copayment rate varies are addressed in these publications. These are the simplest situations to study; therefore, the results are considered more reliable than those for deductibles. Physician and laboratory services are treated in R-976, dental services in R-2157, and the effect of copayment for ambulatory services on the use of hospital services in R-2167. R-1281 improves understanding of the theory of coinsurance.

The Effects of Coinsurance on Demand for Physician Services.

C. E. Phelps, J. P. Newhouse. R-976. June 1972. Abridged
version published in *Social Security Bulletin*, June 1972.

In a natural experiment, the coverage of 2567 persons varied from full coverage in one year to 25 percent another year. Physician visits and expenditures declined by roughly 25 percent. Decline in ancillary services, while statistically significant, was only about half as great. Utilization of different groups of individuals varied inversely with their assumed prices of time. The hypothesis that there was an equal absolute decline in visits and expenditures among all individuals cannot be rejected. It is possible, however, that utilization is a function of both a money price and a time price, and that the time price is lower for female dependents. 30 pp.

*Dental Care Demand: Point Estimates and Implications for
National Health Insurance.* W. G. Manning, C. E. Phelps.
R-2157. March 1978.

Demand curves for various dental services and the aggregate number of dental visits are estimated, using a national probability sample of households drawn in 1970. A 10 percent decrease in the price of dental visits would cause an increase in demand of 7 percent for white males, 8 percent for white females, and 14 percent for white children. Too few nonwhites were sampled to permit reliable estimation for nonwhites. A 10 percent increase in income was associated with a 6 to 9 percent increase in visits. Surprisingly, the responsiveness to price appeared largest in the higher income groups, so that large price reductions in a national health insurance program could disproportionately increase the demands of higher income groups. Experimental data will provide an opportunity for confirming this result. Using the estimated demand curves and several assumptions about distributions of medical and dental expenses, it is estimated that aggregate dental demand would increase by 11 percent if children alone were provided dental insurance coverage

with a 25 percent coinsurance rate and a \$150 per person deductible applying to both medical and dental expenses. 57 pp.

Copayments and Demand for Medical Care: The California Medicaid Experience. L. J. Helms, J. P. Newhouse, C. E. Phelps. R-2167. February 1978. Also published in *The Bell Journal of Economics*, Spring 1978.

In this study, the authors assess the impact of a copayment requirement on utilization of health care resources by the poor. They use data from the 1972 California Medi-Cal Copayment Experiment. Three questions are addressed regarding the effects of an increase in out-of-pocket cost of physician office visits: (1) will such an increase inhibit demand for office visits, (2) will it increase or decrease demand for hospitalization, (3) how will it affect total resource cost of health care services, both in and out of hospitals? The results indicate that a \$1 copayment requirement apparently decreases demand for physician visits by 8 percent and increases demand for hospital inpatient services by 17 percent. The copayment increases overall program costs by a statistically insignificant 3 to 8 percent. Thus copayments could be self-defeating as a method of controlling medical costs in a welfare population. These results, however, differ from those elsewhere in the literature and could represent a statistical artifact attributable to the nonrandomized design of the California Medi-Cal "experiment." 29 pp.

Price and Income Elasticities for Medical Care Services.

J. P. Newhouse, C. E. Phelps. R-1197. June 1974. Earlier version published in *The Economics of Health and Medical Care*, Proceedings of an International Economics Association Conference, ed. Mark Perlman; updated and expanded version published in *The Role of Health Insurance on the Health Services Sector*, ed. Richard Rosett.

A theory of the demand for medical care services is presented that generalizes earlier theoretical work of Michael Grossman in three ways: (1) medical care is not treated as a homogeneous commodity but disaggregated to hospital and physician services, (2) the price of the provider selected and medical insurance are treated as subject to the consumer's choice, and (3) variation in price per unit of services among providers is allowed for and explained. Preliminary estimates are presented of the responsiveness of demand to variation in price and income using data on heads of families in the labor force from the 1963 Center for Health Administration Studies survey. These data show that a 10 percent decrease in price is associated with approximately a 2 percent increase in hospital length of stay. 41 pp.

Welfare Analysis of Changes in Health Coinsurance Rates.

K. J. Arrow. R-1281. November 1973. Also published in
The Role of Insurance on the Health Services Sector, ed.
Richard Rosett, 1976.

A general equilibrium theory of demand for and supply of medical care when medical care purchases are insured by a plan with a coinsurance rate is developed in this report. The welfare effects of a change in the coinsurance rate are then outlined. Random levels of health care are considered, and utility is allowed to vary with the state of health. If supply is fixed, decreases in coinsurance only transfer income to suppliers of medical care with no changes in welfare or efficiency. If supply responds to price, welfare depends upon how supply and demand respond to price and upon how health status and the utility of additional income covary. It is also shown that welfare unambiguously increases with the introduction of some insurance coverage, but the optimal level of coverage cannot be determined theoretically. 39 pp.

Variation in Deductibles

The relationship between demand and deductibles is much harder to study than between demand and coinsurance. Work as part of the Health Insurance Study has led to the first theory of behavior with respect to a deductible (R-1514) and the first empirical estimate of how demand changes as a deductible varies (R-1661). The policy relevant results include:

- (1) Above a certain point, further increases in a deductible impose risk without any real change in demand. It should be possible to obtain near unanimity that deductibles should not be above that point. Exactly where this point is cannot be established, but preliminary evidence suggests that it is above \$500 per person per year (1975 dollars). Of course, an optimal deductible could be much less, even zero.
- (2) Demand is quite responsive through an intermediate range of deductibles. This range of responsiveness may be in the \$50 to \$200 per person per year range.
- (3) Family rather than individual deductibles are preferable if administrative considerations are ignored, but family deductibles are considerably more difficult to administer.

Deductibles and the Demand for Medical Services: The Theory of the Consumer Facing a Variable Price Schedule Under Uncertainty.

E. B. Keeler, J. P. Newhouse, C. E. Phelps. R-1514. December 1974. Abridged version published in *Econometrica*, April 1977.

A theoretical model of a consumer who faces a deductible in a health insurance policy is presented. The model utilizes dynamic programming techniques to show that the perceived price of care falls (following a nonlinear path) as the consumer approaches the deductible. The model suggests: (1) Because demand and administrative costs are likely to be insensitive to the size of the deductible above a certain range, deductibles above that range will not be optimal; they add risk with no return. (2) Demand estimates that use the average or marginal coinsurance rate to represent price (as have virtually all studies in the literature) will yield biased estimates if insurance policies in the sample contain deductibles, and if the dependent variable is annual medical demand. (3) Demand analysis by episode of illness is the appropriate framework if insurance policies have a deductible. 57 pp.

An Estimate of the Impact of Deductibles on the Demand for Medical Care Services. J. P. Newhouse, J. E. Rolph, B. Mori, M. Murphy. R-1661. October 1978.

Using data on insurance premiums for policies with varying deductibles, together with a distribution of medical expenses, the authors estimate the relationship between deductibles and the demand for medical care. Estimates are limited to deductibles ranging from \$50 to \$1000 (1975 dollars). Results indicate that demand is quite sensitive to variation in a deductible in the region of \$50 and becomes steadily less sensitive as the deductible rises above \$75. This finding is consistent with a theoretical model of demand for medical care given a deductible, and with what is presently known about the responsiveness of demand to variation in coinsurance. The size of the deductible will affect importantly the amount of public funds used in a national health

insurance program and thus the distribution of payments among the population in a tax-financed program. No evidence was found that increasing the deductible increases expenditures by deterring efficacious preventive care, but the data are not well suited to test this hypothesis. 67 pp.

Optimal Insurance and Generalized Deductibles. K. J. Arrow.
R-1108. February 1973. Also published in *Scandinavian Actuarial Journal*, 1974.

The theory of demand for insurance is developed where the utility of additional income varies with an individual's health. The author relaxes the assumption in his earlier work that the utility function is independent of health. If the utility function is independent of health, an optimal insurance policy makes income after insurance benefits equal or exceed a critical level. Relaxing this assumption leads to a policy in which the utility of additional income is no greater than a certain level. The following result is derived: for an optimal insurance policy, the ratio of the expected to the maximum marginal utility of postinsurance income is equal to the (exogenously given) benefit-premium ratio. If the insurance is fair, so that the benefit-premium ratio equals one, all possible outcomes are insured. The amount of insurance purchased is shown to be sensitive to loading charges. 74 pp.

The Choice Between Family and Individual Deductibles in Health Insurance. E. B. Keeler, D. A. Relles, J. E. Rolph. R-1393.
October 1975. Theoretical portion published in *The Journal of Economic Theory*, December 1977; empirical portion in *Inquiry*, September 1977.

This is a study of how the choice of family or individual deductibles affects the variability in family expenditure. The authors

prove that if the coinsurance rate above the deductible is zero, the variance of payments by the insured is higher with individual deductibles than with equivalent (expected value) family deductibles. This result is tested for deductibles with nonzero coinsurance rates using data from the CHAS-NORC 1970 Medical Expenditures Survey. The variance of payments by insured families remains higher with individual than with family deductibles in simulations based on these data and representative health insurance plans. However, family deductible plans have administrative disadvantages that must be balanced against these reductions in variance. 33 pp.

Demand for Health Insurance

The amount of insurance a person has is related to the extent of the markup of premium over payout by the insurance company (R-1054). The size of existing markups suggests that most individuals would not buy supplementary insurance to cover a moderate size deductible (say \$50 to \$200 per person per year) (R-1958). Almost certainly this will be true if the premiums for such insurance must be paid for with after-tax dollars (see also Section on financing, page 23).

Demand for Health Insurance: A Theoretical and Empirical Investigation. C. E. Phelps. R-1054. July 1973. Abridged version published in *The Role of Insurance in the Health Services Sector*, ed. Richard Rosett, 1976.

A theory of demand for health insurance is developed that incorporates the effects of the insurance on demand for medical care. Household interview data from the 1963 Center for Health Administration Studies' survey are used to study actual insurance choices of families. Demand for insurance is also estimated from aggregated (annual) time series data, where the variable studied is the average coverage level of the population. Key results are that the demand for insurance rises with income and is quite responsive to the markup in the policy. 210 pp.

The Demand for Supplementary Health Insurance, Or Do Deductibles Matter? E. B. Keeler, D. T. Morrow, J. P. Newhouse. R-1958. July 1976. Also published as "What Will the Market Be For Supplementary Insurance Under National Health Insurance?" in *Journal of Political Economy*, August 1977.

Will consumers purchase private insurance policies to supplement a deductible that might be part of a national health insurance plan? "If such supplementation does occur," say the authors, "demand for ambulatory health services may stress existing supply, leading to extensive nonprice rationing of services." Based on an economic model of the decision to purchase supplementary insurance, study results show that, if the current tax subsidy of health insurance is ended, administrative costs, and hence policy premiums covering all medical expenses that supplement a moderate (up to \$200 per person) deductible, will be so high that almost no one will buy them. Even if the subsidy is continued, there probably will not be much demand for supplementary insurance. Supplementary insurance covering only hospital expenditures is more attractive because administrative costs are much lower. Only

about 1 in 10 persons eligible for Medicare has chosen to supplement the \$60 deductible for physician services, whereas more than half have purchased hospital supplementary policies. 30 pp.

Criticism of Existing Literature on Demand for Medical Care

Because of the poor quality of existing data, studies in the economics literature that estimate the effects of insurance on demand use methods that produce misleading estimates. One of the major advances of the Health Insurance Study experimental data will be the improvement in the quality of data available to analyze issues pertaining to the demand for medical care.

On Having Your Cake and Eating It Too: Econometric Problems in Estimating the Demand for Health Services. J.P. Newhouse, C.E. Phelps. R-1149. April 1974. Accepted for publication in *Journal of Econometrics*.

Certain methodological problems in the economics literature related to the demand for medical care are discussed. Two principal problems are examined: misspecification of how insurance affects demand, and aggregation across services or across individuals. It is shown that in both cases estimates contained in the literature are inconsistent. Where possible, the direction of the inconsistency is obtained a priori. Estimates also are made of the magnitude of the inconsistency; estimates in the economics literature of how utilization varies with price may be overstated by a factor of three or more. 65 pp.

The Role of Time

Some of our work has measured the effect of travel and waiting time on the demand for care. Demand falls as travel time and waiting time rise. For example, a ten percent increase in travel time yields a three percent decrease in demand for individuals using private physicians and about a six to ten percent decrease for persons using clinics (see R-1151). (This difference is consistent with theory, which predicts greater responsiveness when lower priced providers are used.)

Demand for Health Care Among the Urban Poor, With Special Emphasis on the Role of Time. J.P. Acton, R-1151. April 1973. Also published in *The Role of Health Insurance In the Health Services Sector*, ed. Richard Rosett, 1976.

The demand for health care is estimated using household survey data from poor neighborhoods in New York City. A theoretical model is developed in which people pay for alternative types of medical care with money and time. The times needed to consume alternative types of care are explanatory variables, as are earned and nonearned income and selected socio-demographic variables. Time plays a significant role in determining demand in these populations. The effects of changes in clinic locations, waiting room policies, and substituting income maintenance for direct provision of care are examined as means for increasing access of the poor to health care. 61 pp.

Demand for Health Care When Time Prices Vary More Than Money Prices . J.P. Acton. R-1189. May 1973. Also published in *Journal of Political Economy*, June 1975.

A survey of users of New York Municipal Hospital Outpatient Departments was employed to examine factors that determine demand for medical services. Particular emphasis is given to nonmonetary factors, especially travel times, that become more important as money prices fall. 47 pp.

FINANCING HEALTH INSURANCE

We have undertaken work on several different aspects of financing health insurance. R-1711 contains estimates of the amount of redistribution that would be caused by the financing methods that were part of four 1974 National Health Insurance bills -- Kennedy-Corman, Long-Ribicoff, the Ford Administration, and Kennedy-Mills. By using the estimates for any particular revenue generating mechanism (e.g., general revenues, payroll tax), the amount of redistribution that would be caused by any financing method may be computed.

The effect of the medical deduction on income distribution is estimated in R-1222. It is shown that higher income classes benefit more from the medical deduction despite the higher absolute amount of the deductible. The employment effects and the possible tax losses from a plan that mandates employers to provide a certain level of insurance (as did the Ford Administration's bill) are described in R-1509.

Health and Taxes: An Assessment of the Medical Deduction. B.M. Mitchell, R.J. Vogel. R-1222. August 1973. Also published in *Southern Economic Journal*, Spring 1975.

Indirect tax subsidies to health insurance and medical expenses totaled \$3.8 billion in 1970 and were estimated to reach \$7.6 billion in 1976. These subsidies create incentives to purchase health care through insurance rather than directly. Most families with an annual income exceeding \$6000 can obtain a subsidy that exceeds the administrative costs of group insurance policies. Increased health insurance coverage, by reducing the net price of health care, increases the demand for health care and, with limited medical resources, leads to higher hospital and physician prices. The medical deduction under the personal income tax is a last-resort health insurance plan. Despite its income-related deductible and coinsurance parameters, the deduction provides limited catastrophic protection and larger benefits to high income taxpayers. Tax subsidies are distributed in near proportion to income. Several alternative tax policies that would provide greater health benefits to lower income families and increase protection against the expense of catastrophic illness are considered. 52 pp.

Employer-Paid Group Health Insurance and the Costs of Mandated National Coverage. B.M. Mitchell, C.E. Phelps. R-1509. September 1975. Also published in *Journal of Political Economy*, June 1976.

This is a study of the costs and economic effects of financing a national health insurance program by mandating that all employers provide insurance for their employees and dependents. Using data from a 1970 national health care survey to simulate the level of new premiums needed for the various amounts of mandated coverage, the authors examine the effects of these new employer costs on the U.S. economy. Conclusions are: (1) Employer premiums will increase between \$5 and \$21

billion. (2) Without offsetting subsidies, premium increases will cause a transitory decrease in employment. (3) Premium payments will eventually be reflected in lower taxable income for employees. Thus, potential tax revenues foregone (in 1975 dollars) could range from \$1.3 to \$5.9 billion. Combining this expenditure with existing uncollected taxes on employer insurance payments and the tax expenditures arising from itemized deductions of family-paid premiums, could result in a total tax expenditure for mandated coverage of \$8 to \$12 billion, or about four to six percent of federal revenues from personal income and social security taxes. 53 pp.

The Financing of National Health Insurance. B.M. Mitchell, W.B. Schwartz. R-1711. May 1976. Also published in *Science*, May 14, 1976.

To what degree should a national health insurance bill be used to redistribute income? This pioneering study of the way in which the costs of a national health insurance (NHI) program are to be distributed among income groups begins with a quantitative analysis of four prototypical NHI bills in terms of the tax burden and income redistribution they would produce: the Ford Administration bill, the Kennedy-Mills bill, the Corman-Kennedy bill, and the Long-Ribicoff bill. The authors then examine the value judgments that are reflected in the financing provisions of the four bills and identify both areas of agreement and of unresolved controversy among the sponsors of health insurance legislation. Finally, they consider the philosophical disagreement between proponents of a payroll tax and of a premium, and suggest possible areas for compromise between opposing factions. 47 pp.

Basic Elements of Financing National Health Insurance. B.M. Mitchell. P-5610. March 1976. Also published as "Strategies for Financing National Health Insurance: Who Wins and Who Loses," in *New England Journal of Medicine*, October 14, 1976.

In the debate over the establishment of a comprehensive program of national health insurance, the provisions for financing have emerged as a key obstacle blocking agreement on new legislation. The authors outline the different combinations of premiums, payroll and income taxes, and out-of-pocket payments that would allow a program to be designed to achieve nearly any distribution of costs--ranging from a plan that has approximately equal costs and benefits at every level of income to a program that creates a substantial degree of income redistribution. Economic analysis is needed to define the cost implications of specific proposals and to suggest alternative means by which national health insurance could be financed. (Testimony to Subcommittee on Health and the Environment of the Committee on Interstate and Foreign Commerce, February 1976.) 21pp.

HEALTH INSURANCE AND THE MEDICAL MARKETPLACE

Both theory and empirical analysis suggest that a nearly fully insured market will not behave like a competitive market, but rather will show a faster rate of price increase (e.g., the more rapid rate of price increase for hospital services than other medical services). It is likely that if a medical service is nearly fully insured (say around 90 percent or more insured) its price will rise faster than the economy average with nothing else changing. If this is undesirable, either regulatory or market oriented solutions can be pursued; both, however, have potential disadvantages.

The Erosion of the Medical Marketplace. J.P. Newhouse. R-2141-1.
October 1978.

Possible sources of market failure in medical care due to the structure of current health insurance policies that make reimbursement a function of total expenditure are described and tested. When widespread, such policies are hypothesized to raise the rate at which prices and expenditures increase relative to the competitive model. A principal reason is that current insurance policies leave the consumer little or no incentive to find efficient suppliers. Although this hypothesis is difficult to test, the evidence presented is consistent with it. Specifically, variation in prices over time is consistent with the competitive model for drug, dental, and physician services where insurance is less prevalent, and not consistent with it for hospital services where insurance is widespread. Possible course of action for hospital services include doing nothing, regulating, or altering the structure of insurance policies to enhance price competition. 34 pp.

The Structure of Health Insurance and the Erosion of Competition in the Medical Marketplace. P-5906. J.P. Newhouse. July 1977.
Also published in *Competition in the Health Services Sector: Past, Present, and Future*, ed. Warren Greenberg, March 1978.

Nearly 100 percent insurance coverage weakens the concept of a competitive health care market. The author argues that such high levels of insurance permit prices and expenditures to increase at above average rates independent of a change in demand that a change in insurance induces. Results indicate that hospital prices could continue to increase at above average rates for a long time if present institutions are not changed, and that increased insurance coverage for other services (dental, drugs, physician services) could cause prices and expenditures for those services to increase dramatically. Possible solutions: (1) Do nothing--some propose that the cure is worse than the disease. (2) Regulate--proponents of this idea argue that a

market solution is inappropriate or infeasible. (3) Market strategy--a substantial deductible for outpatient services in insurance policies would cause insured consumers to seek lower cost care; premiums related to choice of provider would cause inefficient providers to lose business. 19 pp.

Inflation and Health Insurance. J.P. Newhouse. P-5331. July 1975. Also published in *Health: A Victim or Cause of Inflation?*, ed. Michael Zubkoff, 1976.

The interrelationships between inflation in medical care and health insurance are reviewed. An increase in medical care prices does not cause less insurance to be purchased, but increased medical insurance does cause prices to rise through two mechanisms: (1) Increased demand pressing against supply that does not immediately adjust, raises the price of medical services as a one-time occurrence. (2) As insurance approaches completeness, the medical care sector may continuously turn the terms of trade between it and the rest of society to its advantage. Thus the present trend toward full insurance coverage in an essentially unregulated fee-for-service system does not appear to be viable in the long run. Three approaches that promise to moderate inflation are discussed: (1) a plan with a deductible equal to 10 percent of family income, together with repeal of the tax incentives to supplement this plan; (2) encouragement of Health Maintenance Organizations; (3) direct control of resource allocation by the public sector, together with full or nearly full coverage. 19 pp.

QUALITY OF MEDICAL CARE

Part of the experimental portion of the Health Insurance Study (HIS) involves assessing the quality of medical care as a function of insurance plan, provider characteristics (e.g., specialist versus general practitioner), and patient characteristics (e.g., poor versus nonpoor). When designing this aspect of the Study, we reviewed the quality of care literature and made a number of contributions to it. Quality is defined to include not only the technical process of care, but also the art of care as measured by patient satisfaction. Selected findings include: 1) Quality of care in general has demonstrable shortcomings, but is not strikingly worse for the poor (R-1658); 2) Foreign medical graduates do not necessarily deliver poorer quality care than domestic medical graduates (R-1698); 3) The most important element in patient satisfaction with medical care services is the conduct of the physician; this is more important than access or availability and continuity of care (P-5670); 4) If items in a patient satisfaction scale are favorably (unfavorably) worded, the scale will show greater (less) satisfaction than actually exists (P-5676). Balanced scales are therefore recommended; 5) Malpractice claims appear concentrated among a small number of physicians (even allowing for high risk specialties); thus there appear to be a few physicians delivering markedly poorer care (P-5877-1).

Evaluating Quality of Health Care for the Disadvantaged: A Literature Review. R. H. Brook, K. N. Williams. R-1658. November 1975. Abridged version published as "Quality of Health Care for the Disadvantaged" in *Journal of Community Health*, Winter 1975.

The current literature on the assessment of quality of health care is reviewed in terms of health care for the American public in general and for the disadvantaged populations in particular. Four principal conclusions are drawn: (1) differentials in health status between the disadvantaged and others persist; (2) differences in the overall amount of health care received are less dramatic than in the past, but standardization by need demonstrates discrepancies in health services provided to the disadvantaged compared with others; (3) quality of health care in general has demonstrable shortcomings, but the technical quality of care for the disadvantaged is not strikingly worse than care for others; and (4) efforts to improve the quality of care for the disadvantaged (through traditional or innovative means) have not had the hoped-for impact. Four new avenues for policy-related research and evaluation are discussed: greater patient responsibility, increased consumer knowledge, financial accountability, and quality assurance activities. 28 pp.

Foreign Medical Graduates and Their Effects on the Quality of Medical Care in the United States. K. N. Williams, R. H. Brook. R-1698. January 1976. Also published in *Health and Society*, Fall 1975.

The literature on quality of care delivered by foreign medical graduates (FMGs) substantiates the existence of differences between U.S. medical graduates (USMGs) and FMGs, especially in terms of structural (proxy) characteristics--e.g., achievement of standard professional credentials or the quality of undergraduate and graduate training. Data from two studies using process criteria to evaluate quality of care, however, do not consistently support the notion that FMGs

deliver lower level medical care than USMGs. Four policy-related recommendations are advanced. (1) The heterogeneity of the FMG physician pool must be taken into account in policy formulation; (2) peer review activities must be administered impartially for fully qualified FMGs and USMGs; (3) higher priority should be given to improvement of the medical care capabilities of the less able provider; and (4) quality of care studies (in both hospital and office practice settings) should be implemented to compare FMGs with USMGs, rather than with ideal standards. 26 pp.

Mechanisms for Assuring Quality of U.S. Medical Care Services:

Past, Present, and Future. R.H. Brook, A. Davies-Avery.

R-1939. August 1977. Earlier version published in *A Question of Quality*, ed. Gordon McLachlan, 1976.

Public- and private-sector programs for assessing and assuring the quality of medical care services are reviewed and their potential effectiveness analyzed. Included are Professional Standards Review Organizations, the Performance Evaluation Procedures (PEP) used by the Joint Commission on Accreditation of Hospitals, the programs devised by prepaid group practice systems established under the aegis of the Health Maintenance Organization Act of 1973, and the legislative initiatives prompted by the malpractice crisis. Although there are numerous deficiencies in current programs and several areas needing further research, present-day assessment methods are able to detect deficiencies and should not be delayed for further improvements. 42 pp.

Policy Issues in Quality Assurance. R.H. Brook. P-5517.

October 1975.

This is a discussion of fundamental issues pertinent to investigations of the assessment or assurance of the quality of medical care,

with the goal of fostering interdisciplinary work in this area. A fundamental issue is the relative efficacy and/or effectiveness of the personal medical care system versus other social systems or variables which produce changes in health status. When choosing measures to assess the quality of care, the analyst must be sure they are valid measures. Failure to do so will result in the expenditure of a substantial amount of money to satisfy invalid criteria, and produce no change in health status. Although most of the paper is concerned with quality assessment methodology, the author points out that it is also important to raise and attempt to answer basic questions of quality assurance, a field in which there has been virtually no methodological research.

38 pp.

The Relationship Between Medical Malpractice and Quality of Care.

R.H. Brook, R.L. Brutoco, K.N. Williams. P-5526. October 1975.

Also published in *Duke Law Journal*, January 1975.

The impact of present and future malpractice systems on the quality of medical care are examined. The paper is divided into four parts: (1) Consideration of quality-of-care constructs; (2) an overview of those issues of medical malpractice which are pertinent to quality-of-care considerations; (3) examination of the relationship, both theoretical and empirical, between malpractice and quality-of-care; and (4) development of policy and research suggestions for understanding and altering the current malpractice system. Sanctions on providers for malpractice might be separated from mechanisms for reimbursement of patients for malpractice-related injuries. The current Professional Standards Review Organization (PSRO) program should be strengthened by including both the public and health providers other than physicians, by covering both ambulatory and hospital care, and by extending its authority to sanction providers. 39 pp.

The Reliability and Validity of General Health Ratings.

J. E. Ware, Jr. P-5720. November 1976. Also published in *Health Services Research*, Winter 1976.

This article is a much abridged summary of a lengthy technical report regarding studies of general health perceptions. Eight scales pertaining to perceptions of Prior Health, Current Health, Health Outlook, Resistance-Susceptibility to Illness, Health Worry/Concern, Sickness Orientation, Rejection of Sick Role, and Attitude Toward Going to the Doctor were constructed from 32 items in a standardized survey instrument that can be self-administered. Tests of the reliability, validity, and stability of rating scores are described. It is recommended that the scales be used in studies requiring general health measures, i.e., those measuring both objective and subjective health constructs and negative and positive well-being. Suggestions for future research are offered. 37 pp.

Effects of Acquiescent Response Set on Patient Satisfaction

Ratings. J. E. Ware, Jr. P-5676. February 1977. Also published in *Medical Care*, April 1978.

This paper summarizes the results of three studies of bias in patient satisfaction questionnaires due to acquiescent response set (ARS), a tendency to agree with statements of opinion regardless of content. Three independent surveys (N=1280) were fielded using the Patient Satisfaction Questionnaire developed by the author. Across the three field tests, 40 to 60 percent of respondents manifested some degree of ARS and from 2 to 10 percent demonstrated noteworthy ARS tendencies. Occurrence of ARS accounts for significant upward bias in satisfaction ratings computed from favorably worded questionnaire items and significant downward bias in satisfaction ratings computed from unfavorably worded items. These biases are greatest for groups reporting lower educational attainment or less income. An example is presented to show that average satisfaction scores for groups differing in

education are biased by ARS to such an extent that group differences in satisfaction are overestimated by favorably worded items and missed entirely by unfavorably worded items. Balanced satisfaction scales, i.e., those containing both favorably and unfavorably worded items, are not correlated or correlate only slightly with ARS; therefore, group averages for balanced scales are not biased by ARS or are biased only slightly. 21 pp.

Physician Conduct and Other Factors that Affect Consumer Satisfaction with Medical Care. J. E. Ware, Jr., B. J. Boyle.
P-5670. October 1977. Also published in *Journal of Medical Education*, October 1977.

Major dimensions of consumer perceptions regarding physicians and medical care services are identified (using factor analysis of survey data). The dimensions are accessibility, availability of family doctors, availability of hospitals/specialists, completeness of facilities, continuity of care, and physician conduct (perceived quality and art of care). Scores for these dimensions are used to predict general satisfaction ratings for a cross-section of adults for groups differing in age, education, health status, and sex. Perceptions regarding physician conduct are clearly the best predictors of general satisfaction with care for all groups studied. Other factors are important also, suggesting that more than one interpretation of general satisfaction scores should be considered when consumer satisfaction surveys are interpreted. Improvements in physician's conduct toward their patients, even without altering the structure or organization of medical care, are likely to increase consumer satisfaction. 20 pp.

The Measurement and Meaning of Patient Satisfaction: A Review of the Literature. J.E. Ware, Jr., A. Davies-Avery, A.L. Stewart. P-6036. December 1977. Also published in *Health and Medical Care Services Review*, January/February 1978.

This is a review of articles published between 1951 and 1976 reporting on patient satisfaction with health care. The review had the following goals: (1) to define the concept of patient satisfaction and identify its major dimensions; (2) to evaluate the state of the art of measuring patient satisfactions, focusing particularly on reliability and validity of reported measures; (3) to assess the usefulness of the patient satisfaction concept as an independent and dependent variable. The authors develop a taxonomy of patient satisfaction that defines the major characteristics of providers and services that influence patient satisfaction. This serves as a basis for grouping results and as a standard to judge the comprehensiveness of a given questionnaire. The resulting taxonomy includes eight dimensions that constitute the major sources of satisfaction and dissatisfaction with care: art of care, technical quality of care, accessibility/convenience, finances, physical environment, availability, continuity, and outcomes of care. 39 pp.

Quality Assurance in the 20th Century: Will It Lead to Improved Health in the 21st? R. H. Brook, K. N. Williams, A. Davies-Avery. P-5530. October 1975. Also published in *Quality Assurance in Health Care*, eds. R. H. Egdahl and P. M. Gertman, 1976.

Continuing developments in the measurement of the quality of medical care and efforts to assure the quality of medical care services in the United States are reviewed. Several topics are recommended for continued research to solve problems in measurement of the quality of care. An outline of a quality assurance system for the 1980s and beyond is presented. 43 pp.

Quality Assessment: Issues of Definition and Measurement.

R.H. Brook, A.D. Avery. P-5618. March 1976. Also in *Medical Peer Review: Theory and Practice*, eds. P.Y. Ertel and M.G. Aldridge, 1977.

Six major problems in the conceptualization and measurement of the quality of medical care are discussed. These include: (1) how quality should be defined, (2) how medical care problems should be selected for quality assessment activities, (3) what type of data should be used to measure quality, (4) what data source should be used to measure quality, (5) how criteria to determine whether quality is good or bad should be set, and (6) what values should be applied to these criteria. The state-of-the-art of research thinking on each of these problems is reviewed and suggestions are made for use of current knowledge, while further conceptual and measurement research proceeds. 53 pp.

Quality Assurance and Cost Control in Ambulatory Care.

R.H. Brook, A. Davies-Avery. P-5817. July 1977.

The authors highlight the policy questions that must be addressed in deciding how to improve health and what levels of resource commitment are needed. Issues discussed: (1) the marginal benefit to health produced by additional investments in ambulatory care; (2) changes in the structural characteristics of the medical care system to improve quality; (3) the need for improved physician performance; (4) the cost of quality assurance activities and how it can be kept in bounds by physicians who know the major problems in the delivery of care in the environments in which they practice. Physicians are urged to participate in these policy debates so that the direction taken by quality assurance and cost control activities will benefit from their expertise. (Presented at Health Care Management Systems Conference, San Francisco, March 1977.) 32 pp.

Experience Rating in Medical Malpractice Insurance. C. E. Phelps.
P-5877-1. June 1978.

The author argues that experience-rate pricing of medical malpractice insurance could be a useful quality-control device by forcing bad doctors to pay insurance rates reflecting the true costs of malpractice. Available data show that, for four years, 8000 physicians in Los Angeles sustained 575 suits annually. There were 46 physicians sued four or more times. If all 8000 doctors had identical probabilities of being sued, 0.21 doctors, not 46, would have four consecutive years of suits. If 2000 of the 8000 are in high risk specialties then of the 2000 only four are expected to sustain four suits, not 46. The data demonstrate dramatically that the doctors with multiple suits were indeed drawn from a different distribution than their colleagues. The author concludes with some conjectures on why doctors continue to choose malpractice insurance that does not reflect actual claim histories.

7 pp.

HEALTH PLANNING

Our work has explored in part the relationship between health planning and health insurance. We have shown that common demographic variables, the kind readily available from Census data, are not helpful in predicting changes in demand for medical care between 1963 and 1970 (see R-1635). Measures of changes in insurance, which unfortunately are expensive to obtain, are necessary for accurate estimates. Thus, it is potentially difficult for local Health Systems Agencies to forecast demand for medical care in their areas.

Two studies were also undertaken which found no strong links between additional medical care resources in a local area and health status. In one study (R-2066) individual data on physiological measures of health from the Health Examination Survey of the National Center for Health Statistics were examined as a function of the characteristics of the individual and the quantity of medical resources in an area. In general, individuals in areas with more resources did not exhibit better measures of health, although individual characteristics (such as age, income, and education) did explain variation across the population.

In another study (P-5608-1), expenditures on medical care for several developed countries were examined as a function of each country's Gross National Product (GNP). The level of GNP explains nearly all the variance in spending; moreover, as GNP rises, the share of it devoted to medical care rises. If the additional amount of medical care bought in wealthier countries consisted of simple, cheap cures, medical care spending would be much less responsive to GNP (almost everyone would want such medical care). That spending on medical care rises disproportionately with GNP suggests that additional medical care dollars buy "caring" rather than "curing"; e.g., they may buy reduced anxiety, symptomatic relief, and heroic measures near the end of life.

Forecasting Demand for Medical Care for the Purpose of Planning Health Services. J. P. Newhouse. R-1635. December 1974.

Also published in *Systems Aspects of Health Planning*, ed. M. Thompson and N. T. J. Bailey, 1974.

How complex a model is needed to predict the demand for health services in the U.S.? To overcome the high cost of obtaining information for sophisticated models, the author estimates a simplified version of a model for predicting the demand for hospital and physician services to ascertain the model's properties. "Simplification" involves making demand a function only of demographic variables, which can readily be obtained, and omitting measures of health status, price, and insurance coverage, which generally are unavailable. Unfortunately, this simplification is impractical for today's health planning because changes in insurance influence demand too greatly to be omitted from predictive equations, even if data on labor force participation, income, and education are available as explanatory variables. These variables are not satisfactory proxies. Over time, as coverage approaches completeness, insurance may cease to be as critical in predicting demand, but for the next several years it is likely to remain important.

24 pp.

The Relationship Between Medical Resources and Measures of Health: Some Additional Evidence. J. P. Newhouse, L. J. Friedlander. R-2066. May 1977.

The relationship between medical resources of an area and physiological measures of individual health status is examined. To assess the effect of the area's medical resources on the individual's health, variables such as age, sex, race, education, and household income were controlled for. The physiological variables include diastolic blood pressure, serum cholesterol concentration, abnormal electrocardiogram, abnormal chest X-ray, varicose veins, and periodontal disease. While

additional education and income were found to reduce the prevalence of abnormal chest X-rays and periodontal disease, the physiological measures were affected little by additional medical resources. The results thus support the view that what an individual does (or does not) do for himself has greater impact on his health than additional medical services. The data come from the early 1960s; thus, these results may no longer hold. This study should be repeated when more recent data become available. 30 pp.

Allocation of Resources in Medical Care from an Economic Viewpoint: Remarks to the XXIX World Assembly of the World Medical Association and Commentary. J. P. Newhouse, G. A. Goldberg. P-5590. February 1976. Also published in *Asian Medical Journal*, May 1976.

This paper is an analysis of the allocation of medical care resources in developed countries, based on data compiled by the United Nations and other sources. Three central questions of economic organization of medical care are posed: What determines the fraction of resources that a society devotes to medical care? What determines how the fraction is divided among various medical care facilities and providers? What determines who receives benefits of the medical care resources and how much providers and facilities are paid? The authors suggest that wealth of the society, prices at which the society can obtain various resources, and preferences of the individuals within the society all interact to determine the answers.

Income and Medical Care Expenditure Across Countries. J. P.

Newhouse. P-5608-1. August 1976. Also published in *Journal of Human Resources*, Winter 1977.

Cross-national studies are subject to a great many well-known difficulties. Yet both cross-nation and within-nation data support the conclusion that the proportion of Gross National Product spent on medical care rises with income. This suggests that medical care services at the margin have less to do with curing and more to do with caring. That per capita income can explain much of the cross-national variation in expenditure also suggests that a country will find methods by which to ration services consistent with its income despite variation in out-of-pocket prices paid by the consumer in various countries or alternative methods of reimbursing the physician. 19 pp.

Health Status Age: An Age Predictive Health Status Index.

A. F. Abrahamse, A. I. Kisch. R-1626. June 1975.

A new health status index, HSAGE, is defined to be that linear combination of six health-related parameters that best predicts a person's chronological age: The parameters are diastolic blood pressure, serum cholesterol concentration, observable electrocardiogram abnormalities, observable chest X-ray abnormalities, presence of varicose veins in the legs, and a periodontal index. Data used in the model were derived from the 1960-1962 Health Examination Survey (5313 observations). HSAGE yields statements of the type: Such a person is young (old) for his age. As a result, it can be used as an individual health status index and, when aggregated, as a community health status index. 29 pp.

III. EXPERIMENTAL RESEARCH

Publications regarding the experimental work to date have concerned design and methods rather than substantive conclusions. Preliminary results are expected to be published in 1980.

THE DESIGN OF THE EXPERIMENT

R-965-1, although its details are now somewhat out of date, is a description of the objectives and overall experimental design of the Health Insurance Study. The remaining papers in this section are focused on specific aspects of the experiment's design.

The Health Insurance Study--A Summary. J. P. Newhouse. R-965-1.
March 1974. Also published in *Inquiry*, March 1974.

The experimental portion of the Health Insurance Study has been designed to test the effects of varying the extensiveness of health insurance benefits. Two thousand families from four sites have been selected at random and assigned to one of fourteen types of insurance plans. The plans vary the fraction of the bill the family must pay from zero to 100 percent. In all plans that require some out-of-pocket payments, such payments are limited to 5, 10, or 15 percent of the family's income. An additional group of participants chosen at random have been enrolled in a Health Maintenance Organization. 55 pp.

Mental Health, Dental Services, and Other Coverage in the Health Insurance Study. L. A. Clasquin. R-1216. November 1973.

Cost, transitory demand under experimental conditions, and likelihood of inclusion in a national plan are discussed as criteria for determining the scope of coverage in the Health Insurance Study. Discussion focuses particularly on mental health and dental insurance benefits. 38 pp.

Issues in the Analysis and Design of the Experimental Portion of the Health Insurance Study. J. P. Newhouse. R-1484. June 1974.
Also published in *Proceedings of the American Statistical Association Meetings, Social Statistics Section*, 1973.

Analytical problems discussed are measurement of how demand responds to price when there is an upper limit on out-of-pocket cost and measurement of the purchase of supplemental insurance. Design problems discussed are the number of individuals to be assigned to any one plan, method of assignment, choice of individuals from given communities, and choice of communities. A brief description is

provided of the Finite Selection Model, developed for this experiment to choose the optimal subset of observations (families) from a finite set of possible observations (families) in order to estimate a specified equation or equations. 29 pp.

Rules of Operation for the Rand Health Insurance Study

L. A. Clasquin, M. E. Brown. R-1602. May 1977.

As part of the Health Insurance Study a selected group of families has been enrolled in health insurance plans operated by the Study. Definitions of family unit, income, accounting period, and other administrative rules as they relate to these insurance plans are provided in this report. 51 pp.

The Health Insurance Study Screening Examination Procedures

Manual. L. Hahn Smith, G. A. Goldberg, R. H. Brook, L. Tosi, R. W. Archibald. R-2101. September 1978.

As part of the measurement of health status, participants in the Health Insurance Study complete a medical screening examination designed to gather information about the functioning of certain body organ systems. Data are collected from a random sample of participants at the time of enrollment and from all participants at exit from the HIS. Medical tests are administered to collect data about some thirty disease conditions. This technical report is a description of the procedures used at all enrollment examinations and the first exit examination at Dayton. The rationale for choice of procedures and detailed technical descriptions of each procedure are provided. 380 pp.

*Measurement Issues in the Second Generation of Social Experiments:
The Health Insurance Study.* J. P. Newhouse, K. H. Marquis,
C. N. Morris, C. E. Phelps, W. H. Rogers. P-5701. August 1976.
To be published in *Annals of Econometrics*, 1979.

This paper is a discussion of the Hawthorne Effect in social experiments and how this effect is estimated in the Health Insurance Study. A Hawthorne Effect will exist if those involved in the experiment behave differently simply because they are enrolled in the experiment. It is difficult to measure such an effect, so the experiment is designed to measure effects of certain experimental methods (as opposed to enrollment in the experiment) by splitting the observed sample on the relevant methods. Methods effects that we can measure include (1) the incentive to file claims and the possible stimulus to utilization from frequent questioning; (2) the effect on utilization of a medical screening examination; (3) the effect on utilization of the Study's participation incentive payments; and (4) the consequences of the limited duration of the experiment. 17 pp.

MEASUREMENT OF MEDICAL CARE UTILIZATION

A major concern in the experiment is the accurate measurement of utilization. Most of the papers in this section are discussions of methods to assess accuracy or the actual reliability of the experiment's measurements (R-1883, R-2088, R-2126, R-2319). R-2107 is an assessment of the accuracy of the HIS screening interview.

The Measurement of Expenditures for Outpatient Physician and Dental Services: Methodological Findings from the Health Insurance Study. K. H. Marquis, M. S. Marquis, J. P. Newhouse. R-1883. April 1976. Also published in *Medical Care*, November 1976.

This report is an examination of the extent to which one-time household surveys can obtain precise unbiased estimates of expenditures for outpatient medical care. Survey data are evaluated for missing data, bias, and random error. Missing data are frequent for persons whose health care is financed through the public sector, but otherwise are infrequent. A comparison of nonsurvey estimates of average total and out-of-pocket physician and dental expenditure to estimates from two household surveys (including the Health Insurance Study) reveals that out-of-pocket physician expenditures are overestimated in surveys, but that estimates of total expenditures are not. Estimates using cheaper, self-administered methods appear to be biased upward. A procedure developed in the HIS for estimating random error in household responses shows substantial error in the measurement of dental expenditure: 44 percent of the total variance of expenditures in survey data is response error. Errors also occur when abstracting data from provider records (due in part to not finding all the relevant data and in part to recording errors); 39 percent of the variance in expenditure as measured from records is random error. 33 pp.

Survey Measurement Design and Evaluation Using Reliability Theory. M. S. Marquis, K. H. Marquis. R-2088. June 1977.

To what degree do household responses to surveys contain error? The authors consider the general classes of response error recognized by contemporary reliability theory, the consequences of these errors for some descriptive and inferential statistics, and the traditional methodologies used to measure the amount of error in survey data.

Traditional methodologies rest on stringent assumptions. Extensions of these methodologies are presented to test and correct for violations of these assumptions. 72 pp.

Measurement Evaluation of the Health Insurance Study Screening

Interview. M. S. Marquis, K. H. Marquis. R-2107. November 1977.

The authors compare the Health Insurance Study sample's characteristics to government census and survey data. They conclude that the Study's sample adequately represents the intended population. The levels of response error in the HIS data compare favorably to those obtained in other personal interview surveys and are low enough not to seriously distort estimated relationships based on the data. Rules for who should answer and the level of question detail have a small effect on estimates of average income and no effect on the amount of random error in the answers. The random error in the answers is least for the most recent year and greater for questions about prior year incomes. Averages and the amount of random error for individual characteristics such as educational attainment are not affected if obtained from someone else in the household, rather than from the person himself. Re-interviews, conducted by telephone within a short time of the original interview, are best for establishing the amount of random error in answers. 134 pp.

The Methodology Used to Measure Health Care Consumption During

the First Year of the Health Insurance Experiment. K. H. Marquis.

R-2126. August 1977.

This report is a description of the objectives, theory, and pre-test results that were used to design a system to measure the use of health services in the Health Insurance Study. It gives an overview of the questionnaires, incentives, and procedures used by the Health Insurance Survey in its first year in the field, and presents a

preliminary evaluation. Attention is focused on the possibility that respondents with higher coinsurance rates might have filed claims less frequently. Pretest data suggested such behaviors could occur, so steps were taken to minimize it. Preliminary evaluation of year-one data suggests the magnitude of the problem was reduced to minimal levels and possibly eliminated entirely. Evaluation of the data contributed to decisions to drop the control group from the study, to introduce additional reporting incentives for some groups, and to expand the study design to provide estimates of any remaining reporting biases. 77 pp.

Record Check Validity of Survey Responses: A Reassessment of Bias in Reports of Hospitalizations. K. H. Marquis. R-2319. May 1978.

What is the magnitude and direction of the bias in survey reports of hospital admissions or discharges? How valid are published conclusions that more recent hospital admissions are better remembered and that one adult in a household cannot answer accurately about the other adult's hospitalization experience? This study of record check designs (comparison of household responses with hospital records) suggests that such conclusions may not be valid. A model is developed that describes survey and hospital record observations, and defines the net bias in household response. Three types of record check designs are described--pure prospective, retrospective, and full--and the effects of each design on the validity of inferences about measurement bias are derived. 89 pp.

ETHICS OF EXPERIMENTATION

The paper described below was prepared for a conference on social experiment ethics sponsored by the Brookings Institution. It responds to a longer paper given at the conference which used the Health Insurance Study to illustrate some of its points.

Informed Consent and Social Experimentation. J. P. Newhouse.
P-5088. December 1974. Also in *Ethical and Legal Issues of Social Experimentation*, eds. Alice Rivlin and Michael Timpane, 1975.

This paper is a comment on a paper by Peter Brown, "Informed Consent in Social Experimentation," given at a Conference on Moral, Ethical, and Legal Issues of Social Experimentation. In Brown's analysis of the role of informed consent in social experiments, he argues first that a certain type of person exists for whom the consent doctrine is inappropriate; these people are either not sufficiently perceptive or too poor to make wise decisions. Brown's second point is that nonparticipants in the experiment who are affected by it ought to have the right to disapprove of it, and if the experiment proceeds, ought to be compensated. The author disputes these arguments. 11 pp.

DATA PROCESSING

Management of large machine-readable data bases to be used for many different research purposes requires considerable resources and special attention to the design of the system for data storage and efficient access. The rationales for various aspects of the design of the Health Insurance Study data processing system are outlined in the papers in this section (P-5229, P-5324, P-5926, and P-5605). Also included are reviews of statistical packages and commercially available data management systems (P-5491, P-5181), and documentation of a key element of the Health Insurance Study data processing system (RCC-1550/11, RCC-1550/12, RCC-1550/13).

A Data Management System Evaluation for the Health Insurance Study.

B. Yormark, D.H. Stewart. P-5181. November 1973.

In this paper, the authors encapsulate and formalize the thinking and processes involved in selecting a data management system for the Health Insurance Study. The types of information processed, its sources and quantities are discussed, together with a number of key decisions affecting the decision to employ general-purpose commercially available software. The HIS design philosophy is described relative to several general categories of systems on the market. Other areas covered are: the problems of reviewing software packages; the development of data management analysis; the actual process of collecting information on data management systems; and the analysis performed to determine a classification and a functional usefulness score for each system. Candidate systems that the evaluation process showed to be of interest were subjected to a final evaluation that resulted in a recommended software acquisition. The configurations and purpose of the proposed software are presented. 60 pp.

A Design for Information Processing in the Health Insurance Study.

D.H. Stewart. P-5229. September 1974.

The Health Insurance Study is a complex multi-year longitudinal study of the role of health insurance in the utilization of health care services. The information system being developed to facilitate this research is reviewed. A number of key design considerations are discussed and outstanding information science problems are outlined. (Presented at the Annual Conference of the American Society for Information Processing, October 1974.) 24 pp.

Use and Maintenance of a Data Dictionary. W. C. Dunn, B. Yormark,
P-5324. November 1974.

As part of the Health Insurance Study, a large data base is being constructed using information gathered from numerous data collection documents. Because of the nature and size of the data base, it is important that a systematic archive be maintained that presents an overview of the data contained in the data files. Central to this archive is the Data Element Dictionary. It provides a formal reference point for the proper use, meaning, and manipulation of the data elements. This paper is a discussion of the role of the dictionary in the HIS information system. 14 pp.

*Experiences in Conducting a Review of Statistical Program
Packages.* K. Van Riesen. P-5491. August 1975.

As part of the Health Insurance Study, a large experimental data base is being constructed and will be analyzed by researchers from several disciplines using various statistical tools. Rand has acquired and supports several general-purpose statistical program packages, in addition to packages that perform more specific statistical analyses. To better understand the use of these packages on this large data base and to enhance the information available to the HIS staff members who use statistical software, a review of package features was conducted in light of HIS project and data base characteristics. The considerations and criteria employed in the review are presented. 16 pp.

Application of Data Base Concepts in Operationalizing the Archiving and Retrieval of Panel Study Data. J. Hurley. P-5605.

December 1975.

Efficient data processing of a large collection of social survey data is a difficult task. A generalized data base approach has advantages over the traditional survey approach for large volumes of data. The Health Insurance Study is used to illustrate the dimensions of the data processing task and the benefits of applying data base techniques in managing them. 18 pp.

Data Processing in the National Health Insurance Study.

D. H. Stewart, M. Seda. P-5926. February 1978.

The important factors inherent in the data collection and processing of large surveys are discussed, with particular attention paid to how they apply to the Health Insurance Study (HIS). These factors significantly influenced the design of the HIS data processing systems and the data base. The design of the HIS data base is presented and the principal data sources are identified. Additionally, architecture of the HIS data processing system is described. 31 pp.

Rand Master Input Tape (RMIT): Description, RCC-1550/11, February 1978, 20 pp.; *Rand Master Input Tape Generator System (RMITGEN): System Description*, RCC-1550/12, February 1978, 177 pp.; *Rand Master Input Tape Generator System (RMITGEN): User's Manual*, RCC-1550/13, February 1978, 96 pp. All by Helene R. Mills.

These three reports are documentation of an important data processing system designed and used by the Health Insurance Study. The Rand Master Input Tape (RMIT) is the study's principal means of organizing, transferring, and storing machine-readable survey data. The structure

of an RMIT, the files included in it, and the generalized record structure that is the data storage format upon which the RMIT design is based are documented in RCC-1550/11. The RMIT Generator System (RMITGEN) was designed and implemented to convert survey data processed in fixed-card format to the RMIT Generalized Record Structure. RMITGEN is documented in RCC-1550/12. Use of RMITGEN in a production environment is documented in RCC-1550/13.

MEASUREMENT OF HEALTH STATUS

Many of the resources devoted to experimental design on the Health Insurance Study have supported development of comprehensive measures of health status, including physical health, mental health, social health, physiological health, general health perceptions, and patient satisfaction. Several papers describing this work are now in process and should be completed by the latter part of 1979. The four papers listed below present some of our preliminary thinking on the subject. P-5716 is especially noteworthy, given the common tendency of organizations such as Health Systems Agencies to use disability days as an indicator of health. This paper shows that disability days can have different causes in poor- and middle-class populations.

The Conceptualization and Measurement of Health for Policy Relevant Research in Medical Care Delivery. J. E. Ware. P-5599.

February 1976.

Several issues regarding health status assessment for purposes of evaluating medical care delivery are discussed, including: (1) reasons for health status assessment, (2) the nature and number of health concepts that can be measured, and (3) some of the implications of various measurement strategies. The Health Insurance Study (HIS) is an example of a social experiment in which the measurement of health will aid in policy decisions. Solutions to the problems of health status assessment for purposes of the HIS are offered as examples that may have general applicability. It is argued that: (1) more use of health care services does not imply better care; (2) an omnibus approach to measurement of health status is required; (3) differences between disadvantaged and other groups with respect to the reliability and validity of scores computed from survey measures of health must be kept in mind when comparing their survey responses; and (4) self-ratings of health should be given greater emphasis in evaluating medical care. 24 pp.

A Study of the Reliability, Validity, and Precision of Scales to Measure Chronic Functional Limitations Due to Poor Health.

A. L. Stewart, J. E. Ware, Jr., R. H. Brook. P-5660. March 1977. Also published as "The Meaning of Health: Understanding Functional Limitations," in *Medical Care*, November 1977.

Results of psychometric studies of 14 questionnaire items used to define limitations due to poor health are reported. Self-administered questionnaire data were gathered from 1209 persons. These data were used to study the reliability and validity of alternative scales for detecting differences in functional limitations. Three scales pertaining to chronic limitations in mobility, physical activity, and social role activity functions satisfied psychometric criteria. Reliability estimates were very high. Strong associations (some curvilinear) were

observed among functional limitations scales and survey measures of physical abilities, general health perceptions, health worry/concern, chronic disease conditions, and age. Measures of physical abilities and functional limitations appeared to define opposite ends of a function-dysfunction continuum. 40 pp.

Studies of the Value Placed on Health. J. E. Ware, Jr., J. Young. P-5987. December 1977. Also published in *Health Status: How to Measure It*, ed. S. Mushkin, 1978.

Survey instruments were administered to respondents in five populations (N=2058) to study the value placed on health. One could distinguish values placed on physical, mental, and social health, as well as a separate dimension, the value of health behavior. Studies yielded a method for estimating the value of health in relation to other personal values (e.g., accomplishment, exciting life). Noteworthy differences in the values placed on health were observed among the five populations and between sociodemographic groups. Health tended to be valued more by women, and by older, less educated, and poorer respondents. 47 pp.

Income Group Differences in Relationships Among Survey Measures of Physical and Mental Health. S. A. Johnston, J. E. Ware, Jr. P-5716. December 1976. Also published in *Health Services Research*, Winter 1976.

This research is an exploration of the determinants of disability days among disadvantaged and middle class populations. Disability days are related to both mental and physical illness in middle class populations. These results are related to existing findings in medical sociology and suggestions for the direction of future research are made. 34 pp.

STATISTICAL METHODS

Analysis of experimental data can profit from recently developed methods in statistics. The two papers below describe these advances.

Data Analysis Using Stein's Estimator and Its Generalizations.

B. Efron, C. N. Morris. R-1394. March 1974. Also published in *Journal of American Statistical Association*, June 1975. See also the authors' article "Stein's Paradox in Statistics," in *Scientific American*, May 1977.

Stein's estimator for the mean of a multivariate normal distribution has a uniformly lower mean squared error than the sample mean. Several of its generalizations are presented briefly in an empirical Bayes context and applied to three examples with real data. These estimators perform much better than the classical estimators. The first application predicts final 1970 batting averages for 14 major league players from their early season performance. The predictions resulting from Stein's estimator are more accurate than the maximum likelihood estimator for every batter. Then toxoplasmosis prevalence rates for 36 El Salvador cities are estimated. The generalization of Stein's estimator used for this situation is substantially better than the usual estimator. Finally, in 51 situations a computer simulation is used to estimate the size of Pearson's chi-square test for comparing binomial means. Stein's estimator and its multivariate generalizations are approximately twice as efficient as the maximum likelihood estimator; they will be used in the Health Insurance Study. 67 pp.

Choosing Shrinkage Estimators for Regression Problems.

J. E. Rolph. R-1640. February 1975.

A Bayesian formulation of the canonical form of the standard regression model is used to compare various Stein-type estimators and the ridge estimator of regression coefficients. A particular ("constant prior") Stein-type estimator having the same pattern of shrinkage as the ridge estimator is recommended for use and will be used in the Health Insurance Study. 14 pp.

RAND/P-6221

OVERVIEW OF HEALTH INSURANCE STUDY PUBLICATIONS

Newhouse & Archibald