

---

**The  
Health Consequences  
of SMOKING**

**1969 SUPPLEMENT TO THE  
1967 Public Health Service Review**

---



**U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE  
Public Health Service**

**1969 Supplement to**  
**Public Health Service Publication No. 1696-2**

**Library of Congress Catalog No. 68-60025**

## Foreword

This is the third report required by Section 5(d)(1) of the Federal Cigarette Labeling and Advertising Act, which directs the Secretary of Health, Education, and Welfare to submit annual reports to the Congress on the health consequences of smoking. The preceding two reports were *The Health Consequences of Smoking, A Public Health Service Review: 1967* and *The Health Consequences of Smoking, 1968 Supplement to the 1967 Public Health Service Review*.

The present Supplement was submitted to the Congress on July 29, 1969.

## Acknowledgments

The National Clearinghouse for Smoking and Health, Daniel Horn, Ph. D., Director, was responsible for the preparation of this report; Albert C. Kolbye, Jr., M.D., M.P.H., LL.B., was consulting editor. Staff director for the report was Daniel P. Asnes, M.D.

The professional staff has had the assistance and advice of a number of experts in the scientific and technical fields, both in and outside of the Government. Their contributions are gratefully acknowledged.

Special thanks are due the following :

- ANDERSON, WILLIAM H., M.D.—Associate professor of medicine, University of Louisville, School of Medicine, Louisville, Ky.
- AUERBACH, OSCAR, M.D.—Senior medical investigator, Veterans Administration Hospital, East Orange, N.J.
- AVIADO, DOMINGO M., M.D.—Professor of pharmacology, Department of Pharmacology, School of Medicine, University of Pennsylvania, Philadelphia, Pa.
- AYRES, STEPHEN M., M.D.—Director, Cardiopulmonary Laboratory, Saint Vincent's Hospital and Medical Center of New York, New York, N.Y.
- BATES, DAVID V., M.D.—Chairman, Department of Physiology, McGill University, Montreal, Quebec, Canada.
- BELLET, SAMUEL, M.D.—Director, Division of Cardiology, Philadelphia General Hospital, Philadelphia, Pa.
- BING, RICHARD J., M.D.—Professor and chairman, Department of Medicine, Wayne State University, Detroit, Mich.
- BLOMQUIST, EDWARD T., M.D.—Chief, Chronic Respiratory Disease Control Program, Health Services and Mental Health Administration, U.S.P.H.S., Arlington, Va.
- BOCK, FRED G., Ph. D.—Director, Orchard Park Laboratories, Roswell Park Memorial Institute, Orchard Park, N.Y.
- BOREN, HOLLIS, M.D.—Chief of pulmonary disease, Professor of medicine, Marquette School of Medicine, Wood VA Center, Milwaukee, Wis.
- BOUTWELL, ROSWELL K., M.D.—Professor of oncology, McArdle Laboratory for Cancer Research, University of Wisconsin, Madison, Wis.
- COOPER, THEODORE, M.D.—Director, National Heart Institute, National Institutes of Health, Bethesda, Md.
- CORNFIELD, JEROME—Biostatistics Project, Bethesda, Md.
- DE LA PUENTE, JOSEPH—Chief, Program Studies Section, Kidney Disease Control Program, Health Services and Mental Health Administration, U.S.P.H.S., Arlington, Va.
- EASTMAN, NICHOLSON J., M.D.—Professor emeritus of obstetrics, Johns Hopkins Hospital, Baltimore, Md.
- ELIOT, ROBERT S., M.D.—Associate professor of medicine, Division of Cardiology, College of Medicine, University of Florida, Gainesville, Fla.

- ENDICOTT, KENNETH M., M.D.—Director, National Cancer Institute, National Institutes of Health, Bethesda, Md.
- EPSTEIN, FREDERICH H., M.D.—Professor of epidemiology, Department of Epidemiology, University of Michigan, School of Public Health, Ann Arbor, Mich.
- FALK, HANS L., Ph. D.—Associate director for laboratory research, National Institute of Environmental Health Sciences, Research Triangle Park, N.C.
- FERRIS, BENJAMIN G., Jr., M.D.—Professor, Department of Physiology, Harvard School of Public Health, Harvard University, Boston, Mass.
- FOX, SAMUEL M., III, M.D.—Chief, Heart Disease and Stroke Control Program, Health Services and Mental Health Administration, U.S.P.H.S., Arlington, Va.
- FRAZIER, TODD M.—Assistant director, Harvard Center for Community Health and Medical Care, Harvard School of Public Health, Boston, Mass.
- HASS, GEORGE M., M.D.—Chairman, Division of Pathology, Presbyterian-St. Luke's Hospital, Chicago, Ill.
- HIGGINS, IAN T. T., M.D., M.R.C.P.—Professor, Department of Epidemiology, University of Michigan, School of Public Health, Ann Arbor, Mich.
- HOFFMANN, DIETRICH, Ph. D.—Associate member, Environmental Carcinogenesis, Sloan-Kettering Institute for Cancer Research, New York, N.Y.
- KELLER, ANDREW Z., D.M.D., M.P.H.—Chief, Research in Geographic Epidemiology Research Service, Veterans Administration Central Office, Department of Medicine and Surgery, Washington, D.C.
- \*KERSHBAUM, ALFRED, M.D.—Assistant Chief, Division of Cardiology, Philadelphia General Hospital, Philadelphia, Pa. (Dr. Kershbaum, who contributed to this and previous reports, died suddenly in March 1969.)
- KOTIN, PAUL, M.D.—Director, National Institute of Environmental Health Sciences, Research Triangle Park, N.C.
- KRUMHOLZ, RICHARD A., M.D.—Director, Institute of Respiratory Diseases, Kettering Medical Center, Kettering, Ohio.
- LEUCHTENBERGER, CECILE, Ph. D.—Head, Department of Cytochemistry, Swiss Institute for Experimental Cancer Research, Lausanne, Switzerland.
- LEUCHTENBERGER, RUDOLF, M.D.—Professor, Swiss Institute for Experimental Cancer Research, Lausanne, Switzerland.
- LIEBOW, AVERILL A., M.D.—Professor and chairman, Department of Pathology, University of California, San Diego, La Jolla, Calif.
- LILIENFELD, ABRAHAM, M.D.—Professor and chairman, Department of Chronic Diseases, Johns Hopkins School of Hygiene and Public Health, Baltimore, Md.
- LYON, HARVEY W., D.D.S., Ph. D.—Secretary, Council on Dental Research, American Dental Association, Chicago, Ill.
- MACMAHON, BRIAN, M.D.—Professor of epidemiology, Harvard University School of Public Health, Boston, Mass.
- MCLEAN, ROSS, M.D.—Professor of medicine (pulmonary disease), Emory University, School of Medicine, Atlanta, Ga.
- MITCHELL, ROGER S., M.D.—Director, Webb-Waring Institute for Medical Research, University of Colorado Medical Center, Denver, Colo.
- MURPHY, EDMOND A., M.D., Sc. D.—Associate professor of medicine, The Johns Hopkins Hospital, Baltimore, Md.
- PAFFENBARGER, RALPH S., Jr., M.D.—Chief, Bureau of Adult Health and Chronic Diseases, Department of Public Health, Berkeley, Calif.
- PETERSON, WILLIAM F., M.D.—Chief, Obstetrics and Gynecology Service, USAF Hospital Andrews, MSHCB, Andrews Air Force Base, Washington, D.C.

---

\*Deceased.

PETTY, THOMAS L., M.D.—Assistant professor of medicine, University of Colorado Medical Center, Denver, Colo.

ROCHMIS, PAUL G., M.D.—Heart Disease and Stroke Control Program, Health Services and Mental Health Administration, U.S.P.H.S., Arlington, Va.

ROSS, WILLIAM L., M.D.—Chief, Cancer Control Program, Health Services and Mental Health Administration, U.S.P.H.S., Arlington, Va.

SAFFIOTTI, UMBERTO, M.D.—Associate scientific director for carcinogenesis, etiology, National Cancer Institute, National Institutes of Health, Bethesda, Md.

SCHACHTER, JOSEPH—Statistician, Adult Heart Activities, Heart Disease and Stroke Control Program, Health Services and Mental Health Administration, U.S.P.H.S., Arlington, Va.

SCHUMAN, LEONARD M., M.D.—Professor of epidemiology, University of Minnesota, School of Public Health, Minneapolis, Minn.

SHIMKIN, MICHAEL B., M.D.—Director, Regional Medical Programs, University of California at San Diego, La Jolla, Calif.

SILVERMAN, SOLS, JR., D.D.S.—Professor of oral biology, School of Dentistry, University of California, San Francisco, Calif.

SMITH, LOWELL C., D.D.S.—Chief, Preventive Services Section, Community Programs Branch, Division of Dental Health, U.S.P.H.S., Bethesda, Md.

STAMLER, JEREMIAH, M.D.—Executive director, Chicago Health Research Foundation, Chicago, Ill.

STEDMAN, RUSSELL L., D. Sc.—Head, Smoke Investigations, Tobacco Laboratory, U.S. Department of Agriculture, Philadelphia, Pa.

TIECKE, RICHARD W., D.D.S.—Director, Research Institute, American Dental Association, Chicago, Ill.

TOBIN, CHARLES E., Ph. D.—Professor of human biology, University of Colorado School of Dentistry, Denver, Colo.

TYLER, WALTER S., D.V.M., Ph. D.—Professor and chairman, Department of Anatomy, School of Veterinary Medicine, University of California, Davis, Calif.

UNDERWOOD, PAUL, M.D.—Assistant professor of obstetrics and gynecology, Department of Obstetrics and Gynecology, University of South Carolina Medical School, Charleston, S.C.

VAN DUUREN, BENJAMIN L., M.D.—Associate professor, New York University Medical Center, Institute of Environmental Health, New York, N.Y.

WEIR, JOHN M.—Director, Bureau of Dental Health Education, American Dental Association, Chicago, Ill.

WYNDEB, ERNEST L., M.D.—Associate member, Sloan-Kettering Institute for Cancer Research, New York, N.Y.

The following professional staff of the National Clearinghouse for Smoking and Health contributed to the preparation of this report: Louis Nemser, M.D., David V. Sharpe, M.D., Dorothy E. Green, Ph. D., Richard Eisinger, Robert S. Hutchings, Emil Corwin, and Richard W. White. Special thanks are due Jennie M. Jennings, Mildred H. Ritchie, and Donald R. Shopland.

## Table of Contents

	<b>Page</b>
Foreword.....	iii
Acknowledgments.....	v
Part 1. Current Information on the Health Consequences of Smoking: Summary of the Report.....	1
Part 2. Technical Reports on the Relationship of Smoking to Specific Disease Categories.....	7
Chapter 1. Smoking and Cardiovascular Diseases.....	9
Chapter 2. Smoking and Chronic Obstructive Bronchopulmonary Disease.....	35
Chapter 3. Smoking and Cancer.....	53
Chapter 4. Effects of Smoking on Pregnancy.....	75
Chapter 5. Smoking and Noncancerous Oral Disease.....	83