

---

# The Health Consequences of SMOKING

A PUBLIC HEALTH SERVICE REVIEW : 1967

---



**U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE**

*U.S.* **Public Health Service**

iii

**Public Health Service Publication No. 1696**

---

**For sale by the Superintendent of Documents, U.S. Government Printing Office  
Washington, D.C. 20402 - Price 60 cents**

## Foreword

The Federal Cigarette Labeling and Advertising Act of 1965 (Public Law 89-92) requires that the Secretary of Health, Education, and Welfare submit regular reports to the Congress on the health consequences of smoking, together with any legislative recommendations he may wish to make.

This 1967 Surgeon General's Report was prepared to provide the Secretary and the public with a review of the research findings which have taken place in smoking and health in the approximately 3½ years which have elapsed since the Surgeon General's Advisory Committee issued its monumental 1964 report. Part I of this document was included as part of the Secretary's 1967 Report which he sent to Congress in July 1967. Part II, which provides detailed discussions of the relationship of smoking to specific diseases, is issued here for the first time.

The 1967 report represents a review of more than 2,000 research studies published since the 1964 report. These additional studies confirm and strengthen the conclusion of the Surgeon General's Advisory Committee that: "Cigarette smoking is a health hazard of sufficient importance in the United States to warrant appropriate remedial action."

In a separate section of this report, acknowledgments have been made for the help of numerous scientists both within and outside the Public Health Service, who participated in the preparation of this report. These include the 10 distinguished scientists who made up the Surgeon General's 1964 Advisory Committee, all of whom were kind enough to review part I of the 1967 report before its publication. A special word of thanks is due Leonard M. Schuman, M.D., one of the 1964 committee members, who advised the staff in the final editing of the entire document.

*William H. Stewart*  
SURGEON GENERAL.

## Table of Contents

	Page
Part I. Current Information on the Health Consequences of Smoking.....	1
Introduction.....	3
Smoking and Overall Mortality.....	7
Some General Considerations.....	11
Smoking and Overall Morbidity.....	19
Smoking and Cardiovascular Diseases.....	25
Smoking and Chronic Bronchopulmonary Diseases (Non-neoplastic).....	29
Smoking and Cancer.....	33
Other Conditions and Areas of Research.....	39
Cited References.....	41
Part II. Technical Reports on the Relationship of Smoking to Specific Disease Categories.....	43
Chapter 1. Smoking and Cardiovascular Diseases.....	45
2. Smoking and Chronic Bronchopulmonary Diseases (Non-neoplastic).....	87
3. Smoking and Cancer.....	125
4. Other Conditions and Areas of Research.....	179

## Acknowledgments

Responsible for the preparation of this report was the National Clearinghouse for Smoking and Health, Daniel Horn, Ph. D., director. Staff director for this report was Albert C. Kolbye, Jr., M.D., M.P.H., LL.B.

The professional staff has had the assistance and advice of a number of experts in the scientific and technical fields in and outside government. The staff gratefully acknowledges their contributions, often made at considerable sacrifice of time from their own professional duties. Although space does not permit a listing of all those who have participated in this project, the staff wishes to express appreciation for their cooperation and help. Special thanks are due the following:

- ABINANTI, FRANCIS R., D.V.M., PH. D.—Chief, Virology and Rickettsiology Branch, Extramural Program, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Bethesda, Md.
- AMES, BRUCE N., M.D.—Laboratory of Molecular Biology, National Institutes of Health, Bethesda, Md.
- AREND, WILLIAM P., M.D.—Medical consultant, Stroke Section, Heart Disease Control Program, National Center for Chronic Disease Control, U.S.P.H.S., Arlington, Va.
- AUERBACH, OSCAR, M.D.—Senior medical investigator, Veterans Administration Hospital, East Orange, N.J.
- AXELROD, DAVID, M.D.—Medical consultant, Laboratory of Biology of Viruses, National Institutes of Health, Bethesda, Md.
- AYRES, STEPHEN M., M.D.—Director, Cardiopulmonary Laboratory, Saint Vincent's Hospital and Medical Center of New York, New York, N.Y.
- AYRES, WILLIAM R., M.D.—Medical officer, Heart Disease Control Program, National Center for Chronic Disease Control, U.S.P.H.S., Arlington, Va.
- BALLENGER, JOHN J., M.D.—Head, Department of Otolaryngology, Evanston Hospital, Evanston, Ill.
- BERENDES, HEINZ, W., M.D.—Chief, National Institute of Neurological Diseases and Blindness, Perinatal Research Branch, National Institutes of Health, Bethesda, Md.
- BERG, GORDON W.—Statistician, Operational Studies Section, Cancer Control Program, National Center for Chronic Disease Control, U.S.P.H.S., Arlington, Va.
- BERLINER, ROBERT, M.D.—Director, Office of Director of Research, National Heart Institute, National Institutes of Health, Bethesda, Md.
- BING, RICHARD J., M.D.—Professor and chairman, Department of Medicine, Wayne State University, Detroit, Mich.
- BLESS, STUART R., M.D.—Medical consultant, Heart Disease Control Program, National Center for Chronic Disease Control, U.S.P.H.S., Arlington, Va.

BOREN, HOLLIS, M.D.—Clinical investigator, Veterans Administration Hospital, Denver, Colo.

CARROL, BENJAMIN E.—Biometric Branch, National Cancer Institute, National Institutes of Health, Bethesda, Md.

CHADWICK, DONALD R., M.D.—Director, National Center for Chronic Disease Control, U.S.P.H.S., Arlington, Va.

DE LA PUENTE, JOSEPH L.—Chief, statistical methods, Cancer Control Program, National Center for Chronic Disease Control, U.S.P.H.S., Arlington, Va.

DEYKIN, DANIEL, M.D.—Assistant professor of medicine, Harvard Medical School, Boston, Mass.

DOBBS, GEORGE, M.D.—Associate chief, Division of Scientific Opinions, Federal Trade Commission, Washington, D.C.

DOYLE, JOSEPH, M.D.—Director, Cardiovascular Health Center, Albany Medical College, Union University, Albany, N.Y.

EASTMAN, NICOLAS J., M.D.—Professor emeritus of obstetrics, Johns Hopkins Hospital, Woman's Clinic, Baltimore, Md.

EPSTEIN, FREDERICK H., M.D.—Professor, University of Michigan School of Public Health, Department of Epidemiology, Ann Arbor, Mich.

ERLICH, S. PAUL, Jr., M.D.—Deputy chief, Heart Disease Control Program, National Center for Chronic Disease Control, U.S.P.H.S., Arlington, Va.

EVANS, ROBERT, Ph. D.—Department of Sociology, University of Wisconsin, Madison, Wis.

FALK, HANS L., Ph. D.—Associate scientific director for carcinogenesis, National Cancer Institute, National Institutes of Health, Bethesda, Md.

FERRIS, BENJAMIN G., Jr., M.D.—Professor, Department of Physiology, Harvard School of Public Health, Harvard University, Boston, Mass.

FOX, BERNARD H., Ph. D.—Acting Chief, Experimental Research Branch, Injury Control Program, National Center for Urban and Industrial Health, U.S.P.H.S., Arlington, Va.

FOX, SAMUEL M., III., M.D.—Chief, Heart Disease Control Program, National Center for Chronic Disease Control, U.S.P.H.S., Arlington, Va.

GITTLESOHN, ALLAN, Ph. D.—Professor, Johns Hopkins School of Public Health and Hygiene, Johns Hopkins University, Baltimore, Md.

GOLD, RONALD J.—Statistician, Operational Studies Section, Cancer Control Program, National Center for Chronic Disease Control, U.S.P.H.S., Arlington, Va.

HAENSZEL, WILLIAM M.—Chief, Biometry Branch, National Cancer Institute, National Institutes of Health, Bethesda, Md.

HALPERIN, MAX, Ph. D.—Assistant chief, Biometrics Research Branch, National Institutes of Health, Bethesda, Md.

HAMMOND, E. CUYLER, Sc. D.—Vice president, epidemiology and statistical research, American Cancer Society, New York, N.Y.

HASKELL, WILLIAM L., Ph. D.—Physical activity consultant, Heart Disease Control Program, National Center for Chronic Disease Control, U.S.P.H.S., Arlington, Va.

HAYES, RICHARD, D.D.S.—Assistant to the chief, cancer detection, Cancer Control Program, National Center for Chronic Disease Control, U.S.P.H.S., Arlington, Va.

HEINZELMAN, FRED, Ph. D.—Research psychologist, Heart Disease Control Program, National Center for Chronic Disease Control, U.S.P.H.S., Arlington, Va.

HESS, CATHERINE B., M.D.—Assistant to the chief, Cancer Control Program, National Center for Chronic Disease Control, U.S.P.H.S., Arlington, Va.

HIGGINS, I. I. T., M.D.—Professor, University of Michigan School of Public Health, Department of Epidemiology, Ann Arbor, Mich.

**HOFFMANN, DIETRICH, M.D.**—Associate member, environmental carcinogenesis, Sloan-Kettering Institute for Cancer Research, New York, N.Y.  
**IMBODEN, C. A., Jr., M.D.**—Chief, Chronic Respiratory Disease Control Program, National Center for Chronic Disease Control, U.S.P.H.S., Arlington, Va.  
**ISKRAANT, ALBERT P.**—Chief, Epidemiology and Surveillance Branch, Injury Control Program, National Center for Urban and Industrial Health, U.S.P.H.S., Arlington, Va.  
**KANNEL, WILLIAM B., M.D.**—Associate medical director, National Heart Institute, Harvard Medical School, Boston, Mass.  
**KENNER, HARRIS, M.D.**—Medical consultant, Heart Disease Control Program, National Center for Chronic Disease Control, U.S.P.H.S., Arlington, Va.  
**KOLBYE, SUSANNAH M.**—Scientist, Chevy Chase, Md.  
**KOTIN, PAUL, M.D.**—Director, National Environmental Health Sciences Center, Research Triangle Park, N.C.  
**KRUEGER, DEAN E.**—Statistician, Biometrics Section, National Heart Institute, National Institutes of Health, Bethesda, Md.  
**LANDAU, EMANUEL, Ph. D.**—Statistical advisor, Office of the Director, National Center for Air Pollution Control, U.S.P.H.S., Washington, D.C.  
**LEGATOR, MARVIN S., M.D.**—Chief, Cell Biology Branch, Division of Nutrition, Food and Drug Administration, Washington, D.C.  
**LEMAISTRE, CHARLES A., M.D.**—Vice chancellor of health affairs, Office of the Chancellor, University of Texas, Austin, Tex.  
**LILLENFELD, ABRAHAM, M.D.**—Professor, Johns Hopkins School of Hygiene and Public Health, Baltimore, Md.  
**LONCIN, HUBERT, M.D.**—Office of associate director for collaborative studies, National Heart Institute, National Institutes of Health, Bethesda, Md.  
**LOUDON, R. G., M.D.**—Professor, Department of Internal Medicine, University of Texas, Dallas, Tex.  
**MARLAND, RICHARD E., Ph. D.**—Injury Control Program, National Center for Urban and Industrial Health, U.S.P.H.S., Arlington, Va.  
**MCLAN, ROSS, M.D.**—Professor of medicine (pulmonary disease), Emory University, School of Medicine, Atlanta, Ga.  
**MORRISON, BAYARD H., Ph. D.**—Office of the Director, National Cancer Institute, National Institutes of Health, Bethesda, Md.  
**MOUNT, FRANK W., M.D.**—Deputy chief, Chronic Respiratory Disease Control Program, U.S.P.H.S., Arlington, Va.  
**MURPHY, EDMOND A., M.D.**—Associate professor, University of Colorado Medical Center, medicine and biostatistics, Denver, Colo.  
**PETERSON, WILLIAM F., M.D.**—Chief, Obstetrics and Gynecology Service, USAF Hospital Andrews, MSHCB, Andrews Air Force Base, Washington, D.C.  
**PETTY, THOMAS L., M.D.**—Assistant professor of medicine, University of Colorado Medical Center, Denver, Colo.  
**ROBINS, MORTON**—Chief, program evaluation and project design, Heart Disease Control Program, National Center for Chronic Disease Control, U.S.P.H.S., Arlington, Va.  
**ROSS, WILLIAM L., M.D.**—Chief, Cancer Control Program, National Center for Chronic Disease Control, U.S.P.H.S., Arlington, Va.  
**SCHUMAN, LEONARD M., M.D.**—Professor of epidemiology, University of Minnesota, School of Public Health, Minneapolis, Minn.  
**SCHWARTZ, J. THEODORE, M.D.**—Section head, Epidemiology Branch, National Institute of Neurological Diseases and Blindness, National Institutes of Health, Bethesda, Md.

**SHEAR, MURRAY J., Ph. D.**—Special advisor, Office of the Director, National Cancer Institute, National Institutes of Health, Bethesda, Md.

**SIDEL, JAMES S., M.D.**—Chief, Field Staff, Coordination and Development Section, Heart Disease Control Program, National Center for Chronic Disease Control, U.S.P.H.S., Arlington, Va.

**STEINKE, WILLIAM, M.D.**—Medical officer, Heart Disease Control Program, National Center for Chronic Disease Control, U.S.P.H.S., Arlington, Va.

**STRONG, JACK, M.D.**—Chairman of Department of Pathology, Louisiana State University, School of Medicine, New Orleans, La.

**THOM, THOMAS J.**—Statistician, Heart Disease Control Program, National Center for Chronic Disease Control, U.S.P.H.S., Arlington, Va.

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

**WESTURA, EDWIN, M.D.**—Chief, Applied Physiology Laboratory, Heart Disease Control Program, National Center for Chronic Disease Control, U.S.P.H.S., Arlington, Va.

**WHITE, ELIJAH L.**—Acting Director, Division of Health Interview Statistics, National Center for Health Statistics, U.S.P.H.S., Washington, D.C.

**WOOLSEY, THEODORE D.**—Deputy director, Office of the Center Director, National Center for Health Statistics, U.S.P.H.S., Washington, D.C.

**WYNDEE, ERNEST L., M.D.**—Associate member, Sloan-Kettering Institute for Technology, New York, N.Y.

**YARMOLINSKY, MICHAEL, M.D.**—Research chemist, Laboratory of Molecular Biology, National Institutes of Health, Bethesda, Md.

**ZUKEL, WILLIAM J., M.D.**—Associate Director for Collaborative Studies, National Heart Institute, National Institutes of Health, Bethesda, Md.

The following professional staff of the National Clearinghouse for Smoking and Health contributed to the preparation of this report: Robert F. Clarke, Ph. D., Emil Corwin, Robert S. Hutchings, Selwyn Waingrow, and David G. Wember, M.D.