

STATISTICAL ASPECTS OF A COMMUNITY HEALTH AND ENVIRONMENTAL SURVEILLANCE SYSTEM

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1. Introduction

The Community Health and Environmental Surveillance System (CHESS), a program conducted by the Division of Health Effects Research, Office of Research and Monitoring, Environmental Protection Agency, has been described in some detail by Riggan and co-workers [4] and Shy and co-workers [5]. Briefly, CHESS is a continuing series of epidemiologic studies carried out in selected communities representing an exposure gradient for the most common air pollutants. The basic purpose is to relate community health to changing environmental quality. The program involves monitoring of various pollutants and simultaneous surveillance of health indicators known to be sensitive to variations in environmental quality. The CHESS program will be useful in quantitating pollutant burdens, evaluating environmental standards, and documenting the health benefits of pollution control.

Area sets, sensitive health indicators, and environmental monitoring are the three key elements of CHESS. An area set consists of a group of communities selected as representative of a pollution gradient and similar to each other with respect to climate and socioeconomic traits. Each community in an area set is a middle class residential neighborhood.

The health indicators used reflect a broad spectrum of human responses, including no demonstrable effect, increase in body burden, physiologic changes of uncertain significance, physiologic sentinels of disease, acute and chronic morbidity, and death. Indicators used currently include symptoms of chronic respiratory disease in adults, incidence of acute respiratory disease in families, pulmonary function testing and lower respiratory illness of elementary school children, daily symptom reporting of asthmatics and elderly patients with chronic heart or lung disease, and tissue concentrations of selected trace elements.

A pollution monitoring station is established within each study neighborhood. Such factors as topography, emission sources, and land use are considered in monitoring site selection to ensure that the measurements are representative of