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Gute, David Mueller

OCCUPATIONAL AND INDUSTRIAL MORTALITY IN RHODE ISLAND (1968-1972)

Yale University

PH.D. 1981

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OCCUPATIONAL AND INDUSTRIAL MORTALITY IN RHODE ISLAND (1968-1972)

A Dissertation

Presented to the Faculty of the Graduate School

of

Yale University

in Candidacy for the Degree of

Doctor of Philosophy

by

David Mueller Gute

December, 1981

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ABSTRACT

OCCUPATIONAL AND INDUSTRIAL
MORTALITY IN RHODE ISLAND (1968-1972)

David Mueller Gute
Yale University, 1981

The association between occupation and the development of specific disease entities has long been recognized. Given that the majority of these conditions are theoretically preventable there has been an increasing need to develop methods to identify groups of workers at increased risk. This study has sought to develop such a capacity by utilizing cross-sectional death certificate data.

Data for this study were obtained from 43,311 white Rhode Island resident death certificates for the years 1968-1972. The decedent's occupation and industry were coded directly from death certificates employing the occupational coding system used in the 1970 United States Census.

The completeness of the occupation and industry entry on the death certificates was found to be quite good. For males only 6.2 percent of all occupational statements were to some extent incomplete as compared to 9.2 percent for the industrial statements. The respective incompleteness figures for females was 8.9 and 11.0 percent.

These data were analyzed by the calculation of standardized mortality ratios (SMRs) by occupation, industry, sex, and cause

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of death for the age intervals: 16-34, 35-44, 45-54, and 55-64. Proportionate mortality ratios (PMRs) were calculated for identical age intervals and also for ages 65-74, 75-84, and ≥ 85.

These analyses yielded a set of ratios which were significantly elevated ($p < .05$). Examples of significant findings for males included an increased risk of lung cancer for construction craftsmen, metal craftsmen, and transport operatives, an excess experience of accidental deaths among construction workers and an elevated finding for acute myocardial infarction mortality among managers.

Significantly elevated results for females included an increased breast cancer experience for clerical workers, raised mortality due to acute myocardial infarction and chronic ischemic heart disease among textile product workers, and an increased risk of stomach cancer among female decedents $\geq$ 65 years of age employed as jewelry workers.

An attempt was made to ascertain the relationship of the joint effects of industry and occupation and mortality by cause. The technique of log-linear modeling was employed with limited success. As a final approach at documenting the joint effect of industry and occupation PMRs were calculated for selected occupational groups within industry categories. In analyzing male accidental deaths by occupation within the mining and construction industry it was demonstrated that those occupations most directly

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engaged in actual construction, craftsmen, laborers, and transport operatives, suffered the highest mortality experience due to accidental deaths. In a similar fashion male bladder cancer mortality was seen to be significantly elevated for the occupational group "operatives, not transport" within the textile industry.

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to an "Old Blue" and HSG

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This research benefitted from the active support of the National Institute for Occupational Safety and Health (NIOSH). My personal thanks go particularly to Stanley Kusnetz who served as NIOSH Project officer.

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TABLE OF CONTENTS

		PAGE
ACKNOWLEDGMENTS		iv
LIST OF TABLES		vii
LIST OF ILLUSTRATIONS		xi
CHAPTER:		
I	INTRODUCTION	1
II	REVIEW OF THE LITERATURE	5
	1. Alternative Methodologies	9
	2. English Studies	17
	3. American Studies	26
	4. Methodologic Problems	31
	5. Comparison of Incompleteness of Records to Previous Studies	36
	6. Study Objectives	41
III	STUDY METHODOLOGY	43
	1. Data Management Procedures	44
	2. Occupation and Industry Specific Methods of Analysis	49
	3. Analytical Methods for the Joint Distribution of Occupation and Industry	52
	4. Summary	56
IV	ANALYSIS AND RESULTS	57
	1. General Comparison of the SMR and PMR Findings to Previous Studies	69
	2. Occupation and Industry Specific Findings of the SMR and PMR Analysis	72
	3. Interpretation of the SMR and PMR Findings	99
	4. The Joint Effect of Occupation and Industry on Mortality	105
V	DISCUSSION AND CONCLUSIONS	137
APPENDICES		151
LIST OF REFERENCES		245

PREVIEW

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LIST OF TABLES

TABLE		PAGE
1	SMR CALCULATION, COMPUTATION OF STANDARDIZED RATIOS FOR TUBERCULOSIS, ALL FORMS, FOR WHITE MINERS: UNITED STATES, 1950.	18
2	OCCUPATIONAL MORTALITY STUDIES	20
3	PMR CALCULATION, COMPUTATION OF PROPORTIONATE MORTALITY RATIOS FOR TUBERCULOSIS, ALL FORMS, FOR WHITE MINERS: UNITED STATES, 1950	23
4	DIRECT AND INDIRECT STANDARDIZATION: RESULTS .	24-25
5	PERCENTAGE DISTRIBUTION OF COMPLETENESS OF OCCUPATIONAL AND INDUSTRIAL STATEMENT ON DEATH CERTIFICATES, OCCUPATIONAL MORTALITY STUDY, RHODE ISLAND (1968-1972).	38
6	95% AND 99% SIGNIFICANCE FACTORS FOR THE RATIO OF AN OBSERVED VALUE OF A POISSON VARIABLE TO ITS EXPECTATION.	53
7	1968-1972 RHODE ISLAND WHITE RESIDENT DEATHS IN STUDY POPULATION AGES 16-64 BY SEX . . .	55
8	MORTALITY BY OCCUPATION FOR WHICH THE SMRs WERE SIGNIFICANTLY RAISED ($p<.05$): MEN AGED 16-64	58
9	MORTALITY BY INDUSTRY FOR WHICH THE SMRs WERE SIGNIFICANTLY RAISED ($p<.05$): MEN AGED 16-64	59
10	MORTALITY BY OCCUPATION FOR WHICH THE SMRs WERE SIGNIFICANTLY RAISED ($p<.05$): WOMEN AGED 16-64	60
11	MORTALITY BY INDUSTRY FOR WHICH THE SMRs WERE SIGNIFICANTLY RAISED ($p<.05$): WOMEN AGED 16-64	61
12	MORTALITY BY OCCUPATION FOR WHICH THE PMRs WERE SIGNIFICANTLY RAISED ($p<.05$): MEN AGED ≥ 16	62-63

PREVIEW

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TABLE		PAGE
13	MORTALITY BY INDUSTRY FOR WHICH THE PMRs WERE SIGNIFICANTLY RAISED ($p<.05$): MEN AGED $\geq$ 16.	64
14	MORTALITY BY OCCUPATION FOR WHICH THE PMRs WERE SIGNIFICANTLY RAISED ($p<.05$): WOMEN AGED $\geq$ 16.	65
15	MORTALITY BY INDUSTRY FOR WHICH THE PMRs WERE SIGNIFICANTLY RAISED ($p<.05$): WOMEN AGED $\geq$ 16.	66
16	MORTALITY BY OCCUPATION FOR CAUSES OF DEATH FOR WHICH THE SMRs WERE SIGNIFICANTLY RAISED ($p<.05$): MEN AGED 16-64	74-75
17	MORTALITY BY OCCUPATION FOR CAUSES OF DEATH FOR WHICH THE PMRs WERE SIGNIFICANTLY RAISED ($p<.05$): MEN AGED $\geq$ 16.	76-77
18	MORTALITY BY INDUSTRY FOR CAUSES OF DEATH FOR WHICH THE SMRs WERE SIGNIFICANTLY RAISED ($p<.05$): MEN AGED 16-64	78
19	MORTALITY BY INDUSTRY FOR CAUSES OF DEATH FOR WHICH THE PMRs WERE SIGNIFICANTLY RAISED ($p<.05$): MEN AGED $\geq$ 16.	79
20	MORTALITY BY OCCUPATION FOR CAUSES OF DEATH FOR WHICH THE SMRs WERE SIGNIFICANTLY RAISED ($p<.05$): WOMEN AGED 16-64	80
21	MORTALITY BY OCCUPATION FOR CAUSES OF DEATH FOR WHICH THE PMRs WERE SIGNIFICANTLY RAISED ($p<.05$): WOMEN AGED $\geq$ 16.	81
22	MORTALITY BY INDUSTRY FOR CAUSES OF DEATH FOR WHICH THE SMRs WERE SIGNIFICANTLY RAISED ($p<.05$): WOMEN AGED 16-64	82
23	MORTALITY BY INDUSTRY FOR CAUSES OF DEATH FOR WHICH THE PMRs WERE SIGNIFICANTLY RAISED ($p<.05$): WOMEN AGED $\geq$ 16.	83

PREVIEW

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TABLE		PAGE
24	SIGNIFICANT SMRs (p<.05) FOR LUNG CANCER: MEN AGED 16-64 OCCUPATIONAL MORTALITY STUDY, 1968-1973.	102
25	LEVELS OF OCCUPATION AND INDUSTRY VARIABLES USED IN THE FITTING OF PRELIMINARY LOG-LINEAR MODELS FOR MALES AND FEMALES	106
26	PRELIMINARY LOG-LINEAR MODEL SCREENING RESULTS FOR CANCER, ACCIDENTS, HEART DISEASE IN MALES (THREE-WAY INTERACTIONS ONLY). . .	109
27	UNIVARIATE DISTRIBUTIONS OF OCCUPATIONAL MORTALITY STUDY VARIABLES, 1968-1972, MALES AGED 16-64 ONLY (N=8261).	111
28	UNIVARIATE DISTRIBUTIONS OF OCCUPATIONAL MORTALITY STUDY VARIABLE 1968-1972, FEMALES AGED 16-64 ONLY (N=4617).	112
29	LOG-LINEAR MODEL SCREENING RESULTS, OCCUPATIONAL MORTALITY STUDY, 1968-1972, MALES AGED 16-64 ONLY	114
30	COMPARISON OF FITTED MODELS, MALES, 16-64, OCCUPATIONAL MORTALITY STUDY, 1968-1972 . .	115
31	FINAL LOG-LINEAR MODEL SCREENING RESULTS, OCCUPATIONAL MORTALITY STUDY, 1968-1972, FEMALES AGED 16-64 ONLY	118
32	COMPARISON OF FITTED MODELS, FEMALES 16-64, OCCUPATIONAL MORTALITY STUDY, 1968-1972 . .	119
33	INDUSTRY BY OCCUPATION FITTED VALUES AND ODDS RATIOS FOR CANCER, MALES AGED 16-64, EMPLOYING BCOLLAR AS THE REFERENCE VALUE. .	122
34	INDUSTRY BY OCCUPATION FITTED VALUES AND ODDS RATIOS FOR HEART DISEASE, MALES AGED 16-64, EMPLOYING BCOLLAR AS THE REFERENCE VALUE. .	123
35	INDUSTRY BY OCCUPATION FITTED VALUES AND ODDS RATIOS FOR ACCIDENTS, MALES AGED 16-64, EMPLOYING BCOLLAR AS THE REFERENCE VALUE. .	124

PREVIEW

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TABLE		PAGE
36	CATEGORIES OF INDUSTRY, OCCUPATION AND CAUSE OF DEATH USED IN THE FITTING OF DISAGGREGATED LOG-LINEAR MODELS FOR MALES AND FEMALES AGED 16-64.	128
37	ALL ACCIDENT PMRs FOR OCCUPATION AND INDUSTRY FOR MALES AGED 16-64	130
38	ALL ACCIDENT PMRs FOR THE MINING AND INDUSTRY CATEGORY BY OCCUPATION FOR MALES AGED 16-64.	132
39	ALL ACCIDENT PMRs FOR THE CRAFTSMEN AND KINDRED WORKER OCCUPATION CATEGORY BY INDUSTRY FOR MALES AGED 16-64	134
40	REQUIRED SIZE OF TWO UNEQUAL SAMPLES FOR A STUDY OF STOMACH CANCER MORTALITY	141

PREVIEW

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LIST OF ILLUSTRATIONS

FIGURE		PAGE
1	RHODE ISLAND DEATH CERTIFICATE.	33
2	OCCUPATIONAL AND INDUSTRIAL CODING PROCEDURES	46

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CHAPTER I

INTRODUCTION

The observation that certain disease entities are associated with specific occupations is as old as recorded history. Hunter (1975), in his classic work, The Diseases of Occupations, relates that such records can be traced back to as far as Pharoah's Egypt with the description of the diseases suffered by miners. It is plausible to assume that the nature of tasks performed for seven to eight hours each working day might be expected to exert some influence on a given worker's health.

A continuing problem surrounding inquiry into the relationship between occupation and health is the characterization of the discrete impact of employment on health above and beyond the cumulative effects on the host of extrinsic factors which have a known influence on the expression of disease such as, age, race, sex, personal characteristics, social class, etc. Accompanying this problem of measuring the discrete impact of occupation is the concomitant problem of obtaining accurate and reliable information regarding occupational status and the health outcomes of a working population; namely, morbidity and mortality.

The linkage of occupational information with health outcome data for specific and broad population groups continues to be a goal in occupational health research. Analyses based

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on such linkages have been conducted with varying levels of vigor by numerous investigators. The earliest link uncovered between an occupation and a specific association with cancer was first reported by Pott (1775) when he identified soot as the cause of scrotal cancer among chimney sweeps. Such associations have proliferated in the 20th century with the growing interest in the causes of chronic diseases.

The majority of studies evaluating the relationship between work and health usually involve the analysis of specific occupational groups which already manifest adverse morbidity or mortality. Such research contributes greatly to our knowledge of known hazards in selected populations. This work is also of critical importance in the development of control technologies to hopefully lessen the observed risks.

The object of this present research will be to devise a method by which occupational data and health status outcome can be analyzed for large populations of workers across occupational and industrial categories. Because of the difficulty in obtaining reliable morbidity information on free living populations, such research is usually restricted to mortality data as represented by the death certificate.

As will be discussed in the body of this report, there are many inherent problems involved with analyses of death certificates. These difficulties are largely offset by the accessibility and availability of the death certificate and

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the many possibilities the death certificate affords in terms of research regarding work and health.

The British have most fully realized the potential of deriving estimates of death rates from routine mortality data for different subpopulations. For each ten year period since 1861, an examination of mortality rates by occupation has been conducted by the Registrar General.

The importance of such routine analysis is basic and compelling. Results from such analysis may reinforce findings of other studies. Periodic analysis allows for a consideration of the effect of technologic changes in the workplace and the subsequent influence on health. Such analyses are also useful in drawing attention to specific groups at higher than normal risk for specific disease entities.

These groups may be studied more intensely to gain a better understanding of the potential effect of occupation on the natural history of the disease under observation. The development of hypotheses speaks to one of the basic reasons for the comparison of mortality rates. Such a mechanism has been fruitfully employed by the British investigators for many years and also forms a data base through which research workers may test potential models expressing work and the possible development of disease.

The principal thesis behind the design of the Occupational Mortality Study (OMS) conducted in Rhode Island is parallel

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to that of the British investigators. There did not exist in Rhode Island, prior to the conducting of the OMS, any meaningful estimates of risk borne specifically by Rhode Island's workforce. What is sought by this exercise is the elucidation of specific associations involving work and health which are measurable through an analysis of death certificates. Such analysis, based on state specific data, is a vast improvement over the calculation of synthetic estimates of disease incidence rates within the Rhode Island workforce as obtained from national data. This is because of the characteristic differences which exist when comparing the mixture of industries in Rhode Island to that found in the United States as a whole.

The description of the mortality experience of Rhode Island's workforce will prove most valuable in the targeting of preventive programs aimed at specific subpopulations for which excess risk has been observed. This is especially useful in that a large proportion of work related illness and injury is potentially preventable. The present study was not only designed to investigate the relationship between work and health but also to serve as a data base which can provide guidance for the prevention of further morbidity and mortality arising from occupational exposures.

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