

# Contents

Preface

Prologue: Public Health in the News

## Part I: What Is Public Health?

### 1 Public Health: Science, Politics, and Prevention

What Is Public Health?

Public Health Versus Medical Care

The Sciences of Public Health

Prevention and Intervention

Public Health and Terrorism

Conclusion

References

### 2 Why Is Public Health Controversial?

Economic Impact

Individual Liberty

Moral and Religious Opposition

Political Interference with Science

Conclusion

References

### 3 Powers and Responsibilities of Government

Federal Versus State Authority

How the Law Works

How Public Health Is Organized and Paid for in the United States

Nongovernmental Role in Public Health

Conclusion

References

## Part II: Analytical Methods of Public Health

### 4 Epidemiology: The Basic Science of Public Health

How Epidemiology Works

A Typical Epidemiologic Investigation—Outbreak of Hepatitis

Legionnaires' Disease

Eosinophilia-Myalgia Syndrome

Epidemiology and the Causes of Chronic Disease

Heart Disease 121

Lung Cancer 521

Conclusion 621

References 921

Epidemiologic Principles and Methods 131

References 231

Kind of Epidemiologic Studies 231

Conclusion xiii

References xv

Problems and Limits of Epidemiology 241

References 441

Problems with Studying Humans 641

Sources of Error 641

Proving Cause and Effect 641

Epidemiologic Studies of Hormone Replacement Therapy 641

Therapy—Confusing Results 641

Ethics in Epidemiology 641

Conflicts of Interest in Drug Trials 641

Conclusion 11

References 13

Statistics: Making Sense of Uncertainty 13

The Uncertainty of Science 15

Probability 16

The Statistics of Screening Tests 18

Rates and Other Calculated Statistics 20

Risk Assessment and Risk Perception 22

Cost-Benefit Analysis and Other Evaluation Methods 23

Conclusion 23

References 23

The Role of Data in Public Health 25

Vital Statistics 26

The Census 28

NCHS Surveys and Other Sources 29

Is So Much Data Really Necessary? 36

Accuracy and Availability of Data 37

Confidentiality of Data 38

Conclusion 39

References 39

Part III: Biomedical Basis of Public Health 41

How Epidemiology Works 42

A Typical Epidemiologic Investigation—Outbreak of Hepatitis 43

Legionnaires' Disease 44

Eosinophilia-Myalgia Syndrome 47

Means of Transmission 49

|   |            |
|---|------------|
| Heart Disease   | 49         |
| Lung Cancer   | 51         |
| Conclusion  | 53         |
| References  | 54         |
| <b>5 Epidemiologic Principles and Methods</b>                             | <b>57</b>  |
| Kinds of Epidemiologic Studies  | 62         |
| Conclusion  | 67         |
| References  | 68         |
| <b>6 Problems and Limits of Epidemiology</b>                              | <b>69</b>  |
| Problems with Studying Humans   | 69         |
| Sources of Error  | 71         |
| Proving Cause and Effect  | 73         |
| Epidemiologic Studies of Hormone Replacement<br>Therapy—Confusing Results | 74         |
| Ethics in Epidemiology  | 75         |
| Conflicts of Interest in Drug Trials                                      | 78         |
| Conclusion  | 80         |
| References  | 81         |
| <b>7 Statistics: Making Sense of Uncertainty</b>                          | <b>83</b>  |
| The Uncertainty of Science  | 84         |
| Probability   | 86         |
| The Statistics of Screening Tests   | 88         |
| Rates and Other Calculated Statistics                                     | 90         |
| Risk Assessment and Risk Perception                                       | 94         |
| Cost–Benefit Analysis and Other Evaluation Methods                        | 98         |
| Conclusion  | 99         |
| References  | 100        |
| <b>8 The Role of Data in Public Health</b>                                | <b>103</b> |
| Vital Statistics  | 104        |
| The Census  | 104        |
| NCHS Surveys and Other Sources of Health Data                             | 107        |
| Is So Much Data Really Necessary?   | 108        |
| Accuracy and Availability of Data   | 109        |
| Confidentiality of Data   | 111        |
| Conclusion  | 111        |
| References  | 112        |
| <b>Part III: Biomedical Basis of Public Health</b>                        | <b>115</b> |
| <b>9 The “Conquest” of Infectious Diseases</b>                            | <b>117</b> |
| Infectious Agents   | 118        |
| Means of Transmission   | 120        |

|   |            |
|---|------------|
| Chain of Infection                                      | 121        |
| Rabies  | 125        |
| Smallpox, Measles, and Polio                            | 126        |
| Fear of Vaccines  | 129        |
| Conclusion  | 131        |
| References  | 132        |
| <b>10 The Resurgence of Infectious Diseases</b>         | <b>135</b> |
| The Biomedical Basis of AIDS                            | 135        |
| Ebola   | 140        |
| Other Emerging Viruses                                  | 144        |
| Influenza   | 146        |
| New Bacterial Threats                                   | 148        |
| Multidrug-Resistant Tuberculosis (MDR TB)               | 150        |
| Prions  | 154        |
| Public Health Response to Emerging Infections           | 155        |
| Public Health and the Threat of Bioterrorism            | 156        |
| Conclusion  | 157        |
| References  | 157        |
| <b>11 The Biomedical Basis of Chronic Diseases</b>      | <b>163</b> |
| Cardiovascular Disease                                  | 165        |
| Cancer  | 169        |
| Diabetes  | 171        |
| Other Chronic Diseases                                  | 172        |
| Conclusion  | 172        |
| References  | 173        |
| <b>12 Genetic Diseases and Other Inborn Errors</b>      | <b>175</b> |
| Environmental Teratogens                                | 176        |
| Genetic Diseases  | 177        |
| Genetic and Newborn Screening Programs                  | 180        |
| Genomic Medicine  | 184        |
| Ethical Issues and Genetic Diseases                     | 185        |
| Conclusion  | 187        |
| References  | 188        |
| <b>Part IV: Social and Behavioral Factors in Health</b> | <b>191</b> |
| <b>13 Do People Choose Their Own Health?</b>            | <b>193</b> |
| Education   | 197        |
| Regulation  | 200        |
| Does Prohibition Work?                                  | 201        |
| Conclusion  | 203        |
| References  | 203        |

|           |  |            |
|-----------|--|------------|
| <b>14</b> | <b>How Psychosocial Factors Affect Health Behavior</b>                                   | <b>205</b> |
|           | Health of Minority Populations   | 207        |
|           | Stress and Social Support  | 208        |
|           | Psychological Models of Health Behavior  | 209        |
|           | Ecological Model of Health Behavior  | 211        |
|           | Health Promotion Programs  | 213        |
|           | Changing the Environment   | 215        |
|           | Conclusion   | 216        |
|           | References   | 217        |
| <b>15</b> | <b>Public Health Enemy Number One: Tobacco</b>   | <b>219</b> |
|           | Biomedical Basis of Smoking's Harmful Effects  | 221        |
|           | Historical Trends in Smoking and Health  | 221        |
|           | Regulatory Restrictions on Smoking—New Focus<br>on Environmental Tobacco Smoke           | 225        |
|           | Advertising—Emphasis on Youth  | 226        |
|           | Taxes as a Public Health Measure   | 227        |
|           | California's Tobacco Control Program   | 228        |
|           | The Master Settlement Agreement (MSA)  | 230        |
|           | FDA Regulation   | 232        |
|           | Electronic Cigarettes  | 233        |
|           | Conclusion   | 233        |
|           | References   | 234        |
| <b>16</b> | <b>Public Health Enemy Number Two and Growing:<br/>Poor Diet and Physical Inactivity</b> | <b>237</b> |
|           | Epidemiology of Obesity  | 238        |
|           | Diet and Nutrition   | 242        |
|           | Promoting Healthy Eating   | 243        |
|           | Physical Activity and Health   | 247        |
|           | How Much Exercise Is Enough, and How Much Do People Get?                                 | 249        |
|           | Promoting Physical Activity  | 250        |
|           | Confronting the Obesity Epidemic   | 252        |
|           | Conclusion   | 254        |
|           | References   | 254        |
| <b>17</b> | <b>Injuries Are Not Accidents</b>  | <b>259</b> |
|           | Epidemiology of Injuries   | 260        |
|           | Analyzing Injuries   | 263        |
|           | Motor Vehicle Injuries   | 264        |
|           | Pedestrians, Motorcyclists, and Bicyclists   | 267        |
|           | Poisoning  | 268        |
|           | Firearms Injuries  | 269        |
|           | Occupational Injuries  | 271        |
|           | Injury from Domestic Violence  | 272        |

|   |            |
|---|------------|
| Nonfatal Traumatic Brain Injuries                             | 272        |
| Tertiary Prevention   | 274        |
| Conclusion  | 275        |
| References  | 276        |
| <b>18 Maternal and Child Health as a Social Problem</b>       | <b>281</b> |
| Maternal and Infant Mortality                                 | 282        |
| Infant Mortality—Health Problem or Social Problem?            | 283        |
| Preventing Infant Mortality                                   | 285        |
| Family Planning and Prevention of Adolescent Pregnancy        | 290        |
| Nutrition of Women and Children                               | 292        |
| Children's Health and Safety                                  | 293        |
| Conclusion  | 296        |
| References  | 297        |
| <b>19 Mental Health: Public Health Includes Healthy Minds</b> | <b>301</b> |
| Major Categories of Mental Disorders                          | 301        |
| Anxiety   | 302        |
| Psychosis   | 302        |
| Disturbances of Mood  | 302        |
| Disturbances of Cognition                                     | 302        |
| Epidemiology  | 302        |
| Causes and Prevention   | 303        |
| Children  | 306        |
| Eating Disorders  | 307        |
| Mental Health in Adulthood                                    | 308        |
| Mental Health in Older Adults                                 | 310        |
| Treatment   | 310        |
| Conclusion  | 311        |
| References  | 311        |
| <b>Part V: Environmental Issues in Public Health</b>          | <b>313</b> |
| <b>20 A Clean Environment: The Basis of Public Health</b>     | <b>315</b> |
| Role of Government in Environmental Health                    | 316        |
| Identification of Hazards                                     | 317        |
| Pesticides and Industrial Chemicals                           | 321        |
| Occupational Exposures—Workers as Guinea Pigs                 | 324        |
| New Source of Pollution—Factory Farms                         | 325        |
| Setting Standards—How Safe Is Safe?                           | 326        |
| Risk–Benefit Analysis   | 327        |
| Conclusion  | 327        |
| References  | 328        |

|  |            |
|--|------------|
| <b>21 Clean Air: Is It Safe to Breathe?</b>                            | <b>333</b> |
| Criteria Air Pollutants  | 334        |
| Strategies for Meeting Standards                                       | 336        |
| Indoor Air Quality   | 341        |
| Global Effects of Air Pollution  | 342        |
| Conclusion   | 344        |
| References   | 345        |
| <b>22 Clean Water: A Limited Resource</b>                              | <b>349</b> |
| Clean Water Act  | 350        |
| Safe Drinking Water  | 352        |
| Dilemmas in Compliance   | 364        |
| Is the Water Supply Running Out?                                       | 366        |
| Conclusion   | 366        |
| References   | 367        |
| <b>23 Solid and Hazardous Wastes:<br/>What to Do with the Garbage?</b> | <b>369</b> |
| Sanitary Landfills   | 370        |
| Alternatives to Landfills  | 372        |
| Hazardous Wastes   | 373        |
| Coal Ash   | 377        |
| Conclusion   | 377        |
| References   | 378        |
| <b>24 Safe Food and Drugs: An Ongoing<br/>Regulatory Battle</b>        | <b>381</b> |
| Causes of Foodborne Illness  | 382        |
| Government Action to Prevent Foodborne Disease                         | 383        |
| Additives and Contaminants   | 388        |
| Drugs and Cosmetics  | 389        |
| Food and Drug Labeling and Advertising                                 | 390        |
| Politics of the FDA  | 392        |
| Conclusion   | 394        |
| References   | 395        |
| <b>25 Population: The Ultimate Environmental<br/>Health Issue</b>      | <b>399</b> |
| Public Health and Population Growth                                    | 401        |
| Global Impact of Population Growth—Depletion of Resources              | 403        |
| Global Impact of Population Growth—Climate Change                      | 406        |
| Dire Predictions and Fragile Hope                                      | 409        |
| Conclusion   | 411        |
| References   | 412        |

## Part VI: Medical Care and Public Health 415

### 26 Is the Medical Care System a Public Health Issue? 417

|  |     |
|--|-----|
| When Medical Care Is a Public Health Responsibility              | 418 |
| The Conflict Between Public Health and the<br>Medical Profession | 419 |
| Licensing and Regulation   | 422 |
| Ethical and Legal Issues in Medical Care                         | 423 |
| Ethical Issues in Medical Resource Allocation                    | 426 |
| Conclusion   | 427 |
| References   | 428 |

### 27 Why the U.S. Medical System Needs Reform 431

|  |     |
|--|-----|
| Problems with Access                           | 432 |
| Why Do Costs Keep Rising?                      | 435 |
| Approaches to Controlling Medical Costs        | 436 |
| Managed Care and Beyond                        | 437 |
| The Patient Protection and Affordable Care Act | 439 |
| Rationing                                      | 440 |
| Conclusion                                     | 442 |
| References                                     | 443 |

### 28 Health Services Research: Finding What Works 447

|  |     |
|--|-----|
| Reasons for Practice Variations                              | 448 |
| The Field of Dreams Effect                                   | 450 |
| Outcomes Research  | 451 |
| Quality  | 454 |
| Medical Care Report Cards                                    | 456 |
| Inequities in Medical Care                                   | 458 |
| The Relative Importance of Medical Care for<br>Public Health | 461 |
| Conclusion   | 463 |
| References   | 464 |

### 29 Public Health and the Aging Population 469

|   |     |
|---|-----|
| The Aging of the Population—Trends                    | 470 |
| Health Status of the Older Population                 | 472 |
| General Approaches to Maximizing Health<br>in Old Age | 473 |
| Preventing Disease and Disability in Old Age          | 476 |
| Medical Costs of the Elderly                          | 482 |
| Proposals for Rationing                               | 485 |
| Conclusion  | 487 |
| References  | 487 |

|  |            |
|--|------------|
| <b>Part VII: The Future of Public Health</b>                                     | <b>491</b> |
| <b>30 Emergency Preparedness, Post-9/11</b>                                      | <b>493</b> |
| Types of Disasters and Public Health Responses                                   | 494        |
| New York's Response to the World Trade Center Attacks                            | 495        |
| Response to Hurricane Katrina  | 496        |
| Principles of Emergency Planning and Preparedness                                | 500        |
| Bioterrorism Preparedness  | 502        |
| Pandemic Flu   | 506        |
| Conclusion   | 507        |
| References   | 509        |
| <b>31 Public Health in the Twenty-First Century: Achievements and Challenges</b> | <b>513</b> |
| Challenges for the 21st Century  | 515        |
| Strategic Planning for Public Health   | 516        |
| Dashed Hopes for the Integration of Public Health and Medical Practice           | 520        |
| Information Technology   | 521        |
| The Challenge of Biotechnology   | 523        |
| The Ultimate Challenge to Public Health in the Twenty-First Century              | 523        |
| Conclusion   | 524        |
| References   | 525        |
| Glossary   | 529        |
| Index  | 547        |
| Causes of Foodborne Illness  | 382        |
| Government Action to Prevent Foodborne Illness                                   | 383        |
| Additives and Contaminants   | 383        |
| Drugs and Cosmetics  | 383        |
| Food and Drug Labeling and Advertising   | 383        |
| Politics of the FDA  | 383        |
| Conclusion   | 383        |
| References   | 383        |
| Population, The Ultimate Environmental Health Issue                              | 393        |
| Public Health and Population Growth  | 393        |
| Global Impact of Population Growth   | 393        |
| Global Impact of Population Growth   | 393        |
| Disease Predictions and Fragile Hope   | 393        |
| Conclusion   | 393        |
| References   | 393        |