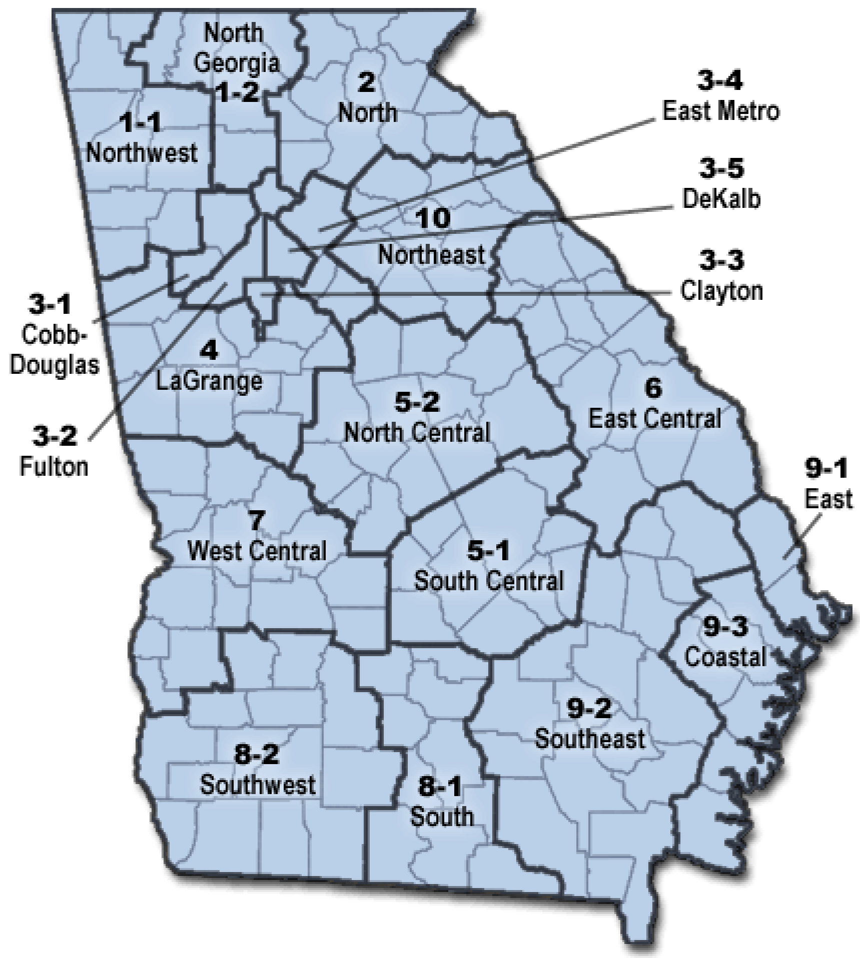
DISTRICT HEALTH PLANNING TRAINING MANUAL



2nd Edition

Originally Prepared by:

Health Planning and Evaluation Unit
Administrative Services Section
1985

Revised by:

Office of Health Information & Policy
Division of Public Health
Georgia Department of Human Resources
2000

Publication # DPH02-91

Contributors to the 2nd Edition:
Terry Lofton, Ph.D., M.P.H., Chief, Office of Health Information & Policy
Gordon Freymann, M.P.H., Director, Data Policy/Analysis Unit
Rajni Samavedam, M.P.H., Strategic Health Planner

"If you can't measure it, you can't manage it."

P. Drucker

"There are three kinds of lies: lies, damned lies and statistics."

Disraeli

"Life is the art of drawing sufficient conclusions from insufficient premises."

S. Butler

CONTENTS

F I G U R E S

I. BACKGROUND

BACKGROUND

All the forces in the world are not so powerful as ***an idea whose time has come.*** *So the decisions we face today are not hopeless, endless problems. The question is, who can make the eradication of lifestyle diseases an idea whose time has come?*

From ***Passages: Predictable Mortality Through the Life Stages,*** *p.4.*

The Division of Public Health formulated two ideas "whose time had come." The first idea, from **Georgia's New Health Outlook** (evolved from a study of the top ten killers and disablers of Georgians), recognizes changing disease patterns and produces a broader concept of health with emphasis on prevention rather than cure of illness.

The second idea is presented in **Passages: Predictable Mortality Through the Life Stages.** It focuses on the concept that poor health habits in early life stages contribute to poor health in later life stages. Thus, mortality is predictable as a result, and many killers and disablers can be forestalled through preventive measures and health maintenance.

Both ideas encompass prevention and health maintenance. Health problems change as life stages change, as shown in Figure 1.

Figure 1: Life Stages and Relevant Health Problems

Age	Life Stages	Relevant Health Problems
< 1	Infants	Low birth weight, congenital anomalies, pneumonia, accidents, SIDS
1-9	Children	Accidents, infectious diseases, child abuse, lead poisoning, Leukemia, influenza, pneumonia
10-19	Adolescents	Pregnancy, alcohol, drug abuse, accidents, homicide, suicide, motor vehicle accidents
20-44	Young adults	Homicide, suicide, anxiety, ischemic heart disease, motor vehicle accidents, cancer, HIV
45-64	Middle adults	Heart disease, accidents, cancer, ulcer, hypertension (high blood pressure)
65+	Older adults	Ulcer, hypertension, hernia, dependency, heart disease, cancer

Epidemiology (the study of the distribution, determinants, and frequency of disease in population) and geography (accounting for spatial variation in the human and physical environment) are the basis for health planning. It is important that departments of health: 1) acquire skills in the use of epidemiological methods; 2) learn about the epidemiology of major health problems; 3) study health services and their management; and 4) focus on outcome evaluation while still maintaining process evaluation to encourage productivity, efficiency, sustainability, and accountability.

This **training manual** pertains to programmatic activities of the district and county health departments in their delivery of health services. The intention of this manual is to guide health program planning and activities related to the betterment of health status in individual communities. The manual is not exhaustive, and it is hoped that the material will motivate health departments to develop innovative health planning processes.

II. P L A N N I N G

PLANNING

The planning process can be divided into three main levels: strategy, operation, and policy.

Strategic planning is the most conceptual and is concerned with the community's value structure, or what the community considers to be most important. At this level, epidemiological principles are most important to the planning process. Such principles aid in describing the dimensions of disease, disability, and death; in providing data for planning, implementation, and evaluation; and in identifying etiological factors. In addition, the information collected should include resources, financing, and management.

Operational planning consists of developing detailed plans for carrying out the developed **strategies**. At this level, long-range goals and objectives are established, along with possible methods of achieving these goals. The final outcome is the **operation** (implementation) of plans carried out within the organization's framework.

This training manual primarily deals with the development of strategic and operational planning, which both lead to the development of policy.

Planning Process: Step-By-Step

Step 1. Review all planning data relevant to your district. Then determine:

a. Top ten causes of death, by number, rate, year and aggregate (e.g. 5-year) totals;

b. Infant mortality and neonatal mortality totals;

c. Live births, low birth weights, induced and spontaneous abortions;

d. Aggregated (e.g. 5-year) total population, by age groups; and

e. Standardized mortality ratios.

Step 2. Determine the diseases that are significantly higher in your district, as compared to the rest of the state.

Step 3. Conduct a needs assessment to determine the issues facing your district.

Step 4. Identify the target population(s) to serve.

Step 5. Determine the geographical areas in which the problems are located.

Step 6. Risk assessment: Assess the risk according to Biology, Environment, Lifestyle, and Health Services.

Step 7. For each risk assessment, determine the resources available for addressing the problems, including facilities utilized, services offered, and services shared.

Step 8. For each issue identified, determine the goal that is ultimately desired.

Step 9. Identify the major objectives for accomplishing the goal, in quantitative terms, by indicating number, rate, direction, magnitude, and time.

Step 10. Determine intervention strategies you will utilize to accomplish objectives, who will accomplish them, and where they will be performed.

Step 11. Select indicators, such as outcome, workload, and efficiency that will measure accomplishment of objectives.

The eleven steps described previously are essential to district planning. It is very important, however, that the objectives formulated are achievable, measurable, and exist to guide policy and decision-making.

Outcome and Process Objectives

The most important part of any planning process is to be able to identify and develop objectives that are measurable and quantifiable. There are two types of objectives that should be dealt with:

A **process objective** is related to a specific goal pertaining to a program activity. It may detail the target group to receive benefits; number of services to be received; program organization, funding, staffing; or program location and timing. The process objective is set to measure efforts and activities rather than results (outcomes) of those activities. Like all good objectives, the process objective is measurable, specific, attainable, and time-framed.

An **outcome objective** deals with the desired results of the program activity. An outcome objective should be operational, quantifiable, and attainable, and directly related to the overall program goals. The data to formulate outcome objectives should be derived from the most currently available data so that long-term projections can be made as accurately as possible. However, it is also important to use an aggregate of past data for the comparison of trends and for predictability. See Figure 2 for the components that go into the development of an outcome.

Figure 2: Identifying Outcome Objectives

Outcome Objective Components

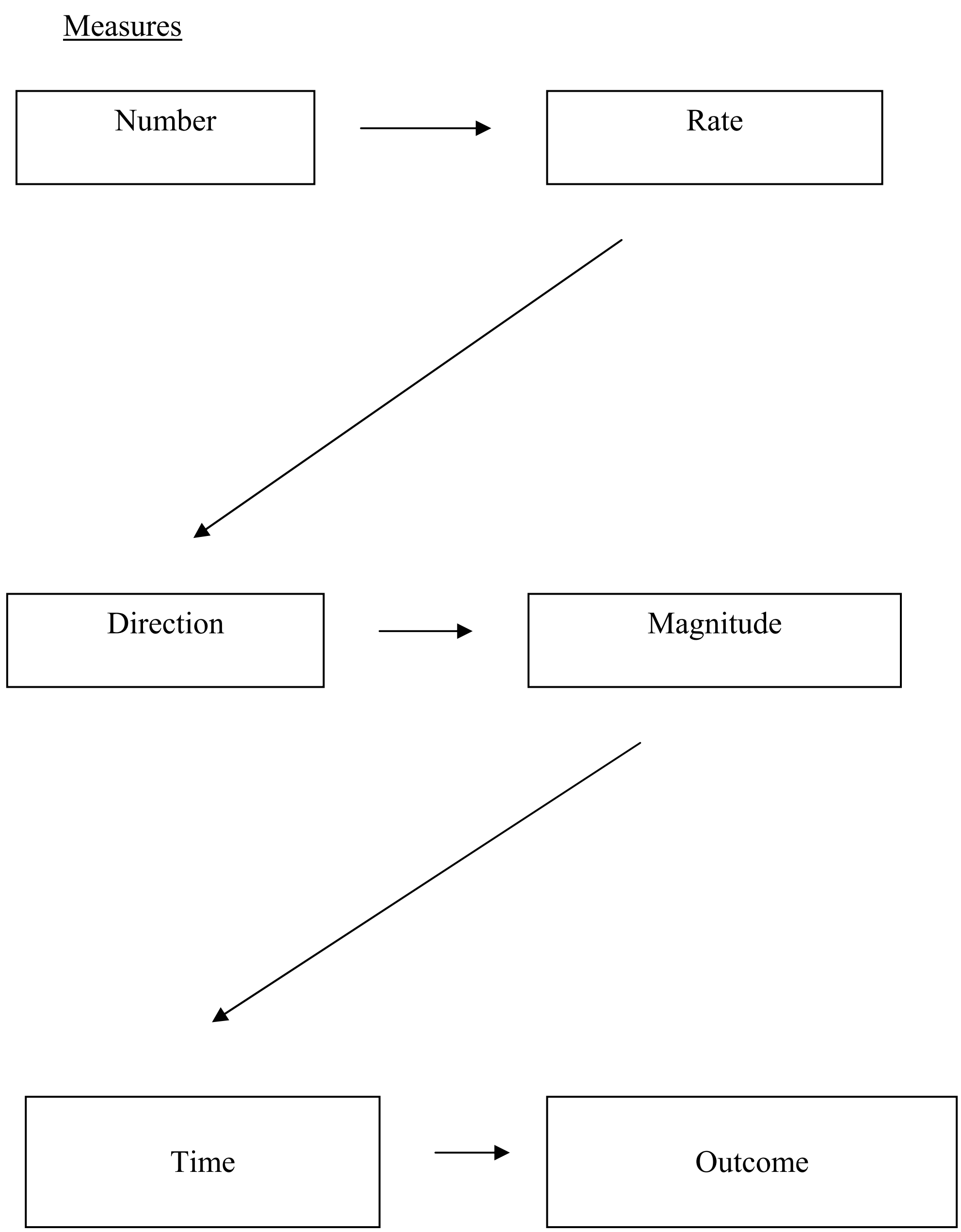
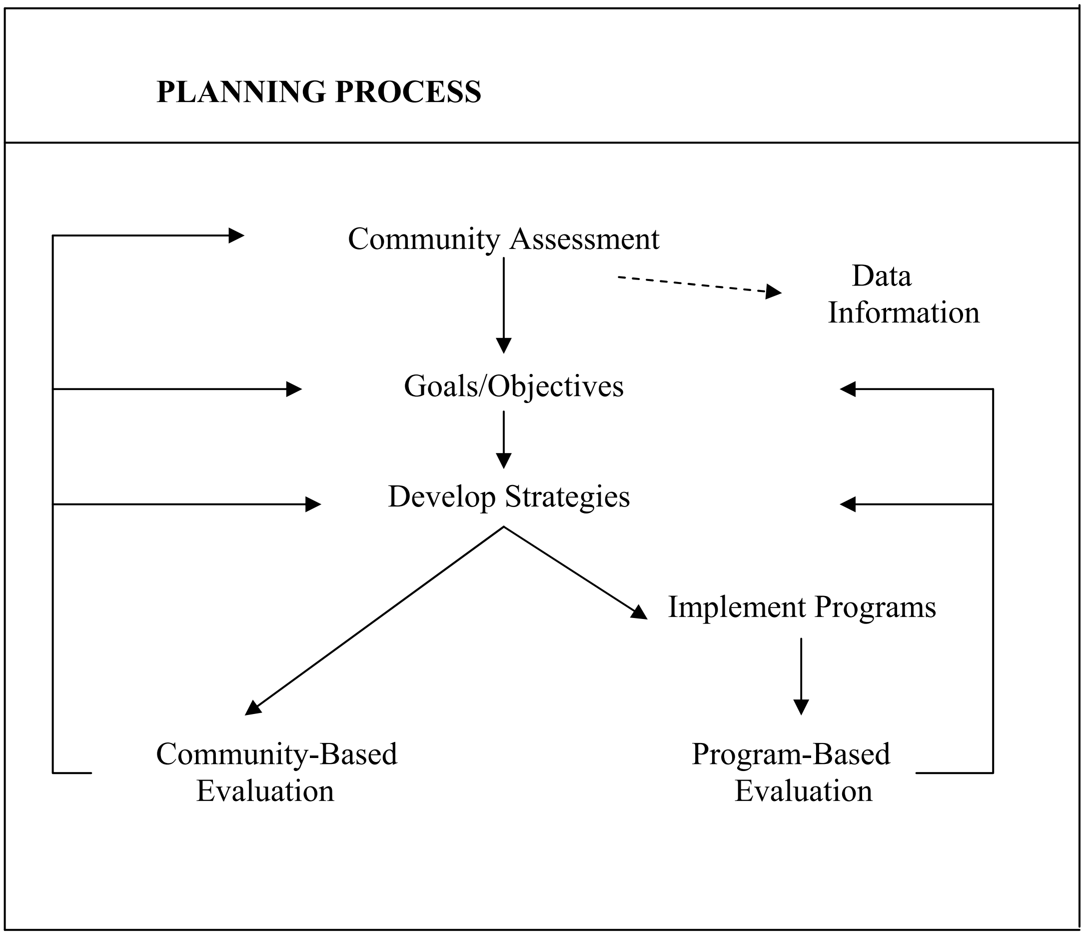


Figure 3: Model for Health Planning and Evaluation for Local Health Department



By carrying out effective assessments of the communities, health departments can tailor interventions specific to the health status of individuals. In developing program plans at the district level, the district should identify target populations in the disease categories that are prevalent within the district (Figure 3).

To devise program plans, health departments should be aware of and utilize the epidemiological approach to planning. The epidemiological approach simply refers to **person, place, and time** (who, where, and when). It is specific in identifying the **persons** affected by a disease, the **place** where the disease occurs, and an estimate of the

time of disease occurrence. Thus, information of public health importance must have five dimensions: age, race, sex, place and time.

1. **Person** (Who?)
   - Basic demographic and life-style characteristics; e.g., age, sex, race, socioeconomics, habits.
2. **Place** (Where?)
   - Basic geographic reference; e.g., place of residence, place of occurrence, census tract, county, urban, rural.
3. **Time** (When?)
   - Basic trend reference; e.g., seasonal, weekly, monthly, yearly.

Accounting for the spatial variation across space by Person, or within the same space over Time provides a geographical perspective and leads us to:

4. **Time-Place Patterns**
   - Random
   - Clustered

Fundamentally Important:

1. Determine:

- Persons affected by disease.
- Where the health-related problem occurred.
- When the health-related problem occurred.

2. Assist in planning the location of health facilities.
3. Provide clues, questions, or hypotheses as to disease etiology for further study.
4. Determine the health status of a population in a geographical area.

Thus, by determining the health status of a population in a specific geographical location, priorities and objectives may be more easily determined. Figure 5 on the following page is an example of a planning form used to identify and operationalize a public health problem.

Figure 4: Planning Form Example

Example

District X Program SHAPP FY 1998

Prepared by Jane Doe Title Head Nurse Date *Current Date*

(Please type responses. Attach additional pages if needed.)

<table>
<tr><td>NEEDS ASSESSMENT</td><td colspan="4">RISK ASSESSMENT</td></tr>
<tr><td rowspan="4">PROBLEM (Identify in quantitative terms.)

Data for 1998 can be found in the District Data Set, by district and state

Heart Attack (AMI) number and rate are examples of quantitative terms.

TARGET POPULATION (Population that should be served)

Identify.

GEOGRAPHICAL AREA

District (X) and County (A)</td><td>Biology</td><td>Environment</td><td>Lifestyle</td><td>Health Services</td></tr>
<tr><td>Includes characteristics such as aging, genetic and hereditary factors.</td><td>Physical
Social
Psychological</td><td>Leisure activities
Consumption patterns
Economic status
Employment
Religious beliefs
Occupational risks
Substance abuse
Exercise
Violence
Education</td><td>Physicians
Hospitals
Midwives
Health department clinics</td></tr>
<tr><td colspan="4">RESOURCES (Include facilities utilized, services offered, and services shared.)</td></tr>
<tr><td>Genetic screening and Counseling
Sickle Cell Foundation
Private and non-profit Agencies
Medical facilities</td><td>Health education
Community block grants
Foundations
Dept. of Family and Children Svcs.</td><td>Churches
Dept. of Family and Children Services
Community groups
WIC Program
Hot lines</td><td>All health departments (Public and Private)</td></tr>
</table>

PLANNING FORM EXAMPLE (continued)

District X Program SHAPP FY 1998

(Please type responses. Attach additional pages if needed.)

GOAL *(Briefly state the desired ultimate results.)*

To reduce mortality from heart attack in District X.

OBJECTIVES *(Briefly state, in quantitative terms, the major objectives for accomplishing the goal. Indicate time, magnitude, direction, number, rate, and define the measures.)*

1. By FY '01, reduce AMI in District X from the 1998 rate of 147.3 per 100, 000 population (339 adults) to 144.7 (333 deaths)

2. By FY '01, reduce AMI in District X from the 1998 rate of 147.3 (339) to 143.0 (329 deaths).

3. By FY '01, reduce AMI in District X from the 1998 rate of 147.3 (339) to 139.0 (320 deaths).

INTERVENTION STRATEGIES *(Briefly state how the staff will accomplish the above objectives, who will accomplish them, and where they will be performed.)*

Note: Each strategy should relate to specific objectives (above).

1. a) SHAPP staff will follow-up with mail and phone calls within 2 weeks of patients' referrals.
   b) Increase the caseload of diagnosed hypertensives from 250 to 275 per (*insert time period*).

2. Initiate 2 clinics in the county health departments (A, B, C) where no clinics exist at present by (*insert time period*).

3. Conduct 30 blood pressure screening programs in industry, church groups, and volunteer programs by (*insert time period*).

EVALUATION *(List indicators that will measure the accomplishment of the objectives. Use OUTCOME, WORKLOAD, and EFFICIENCY measures and relate to specific objectives.)*

May be defined as a comparison between what has actually happened and the desired results. Determines if the objectives and strategies are appropriate in accomplishing program plans.

1. Efficiency: Cost/Visit = $\frac{\text{Total expenditures}}{\text{Total visits}}$

2. Outcome: Number of diagnosed HP screens and mortality rates.

3. Workload: $\frac{\text{Number of staff}}{\text{Number of patients (monitored and treated)}}$

III. IDENTIFYING THE TARGET POPULATION

IDENTIFYING THE TARGET POPULATION

The outcome of any program plan relies on the proper identification of the population to be served. Specifically, the target population is comprised of individuals who are at high risk. Associated with health status are certain socio-economic characteristics that can contribute to identification of the target population: Race, age, sex, environment, and lifestyle.

One method , for example, in identifying the target population is by computing standardized mortality ratios (SMR, discussed in section IV).

Objectives should be set for providing services to as much of the target population as is feasible.

COMPUTING AND INTERPRETING STATISTICS

The following provides a beginning towards computing the appropriate statistics for setting objectives and establishing priorities.

Population-At-Risk

The population-at-risk is a term applied to all those to whom an event could have happened, whether it did or did not. It includes all the cases of "disease" as well as all others who were exposed but did not become cases (or *could* have been exposed, e.g. females 15-44 could be 'exposed to pregnancy' but the total male and female population of all ages could not).

Numerator and Denominator

The **numerator** of a rate is the number of people or things something happened to, e.g. the number of cases, deaths, or physician visits. The **denominator** of a rate is the entire population at risk.

Numbers are needed to estimate the magnitude of a problem and to project resource need. Rates are used to develop comparable indices. Rates are a critical component to determining the health status of an area; they can show trends occurring over time, or can be compared to other standards.

Interpretation of Rates

Depending on interpretation, rates can either be useful to guide programmatic action or be misleading. For example, if a county's infant mortality rate was 12 per 1,000 live births, and this year, because of an intensive effort, the rate reduced to 11 per 1,000 live births. Would you be impressed?

(Choose one: ______Yes ______No)

To generate comparable indices, we may look at the number of deaths for two different groups of people, or at the same group at two different times. The number of deaths may differ only because the size of the population-at-risk differs. By converting to a rate, such as deaths per 100,000 persons, the population size effect is removed and the rates become comparable indices. It is important to note changes in the population-at-risk; for example, it is possible for a death rate to increase but the number of deaths decrease at the same time within the same group under study.

Examples of Rates

A **rate** can be calculated as follows:

$$\frac{\textbf{Events}}{\textbf{Population-at-risk}} \quad \textbf{X 100,000 (or other “base”) = events per 100,000}$$

Crude death rate (CDR): A crude death rate is a summary rate, based on the total number of deaths reported during a given time interval **(numerator)**, divided by the population-at-risk **(denominator)** (usually the entire population), and then multiplied by a constant number. For example, a crude death rate is calculated as follows:

$$\frac{\textbf{Total Deaths}}{\textbf{Total Population-at-risk}} \quad \textbf{X 100,000 = CDR}$$

Thus, for Georgia, 1998:

$$\textbf{CDR} = \frac{\textbf{46, 800 deaths}}{\textbf{5,857,805 total state population}} \quad \textbf{X 100,000 = 798.9 per 100,000}$$

In Georgia in 1998, then, total deaths can be said to occur at the rate of 798.9 per 100,000 population.

Cause-specific rate: To make statistically valid comparisons, death rates should be specific. Crude rates can be used if it is assured that the age and sex structures of the studied population are similar (which is often not the case). A cause-specific death rate is based on the number of deaths due to a specific cause during a given time interval **(numerator)**, divided by the total population **(denominator)**, and multiplied by a constant number. A cause specific death rate is calculated a follows:

$$\frac{\textbf{Total Deaths by Cause}}{\textbf{Total Population}} \times 100{,}000$$

Thus, in Georgia, 1998, the cause-specific death rate of acute myocardial infarction (AMI) can be determined as follows:

$$\frac{\textbf{6,762 AMI deaths}}{\textbf{5,857,805 total state population}} \times 100{,}000 = \textbf{115.4 AMI deaths per 100,000 population}$$

In 1998, in Georgia, deaths from acute myocardial infarction occurred at the rate of 115.4 per 100, 000 people.

Both crude and cause-specific death rates may also be calculated for specific age, race, sex, and socioeconomic groups. The type of rate depends upon the desired statistical inferences to be made. To assess **risk** of succumbing to a disease, such inferences or comparisons must be based on similar or standardized population characteristics, especially age. Other characteristics that can vary within a population and influence health status outcomes are race, sex, and socioeconomic status. The general format for these indicators is similar: Numerator over denominator, multiplied by a constant. To assess allocation of resources based on volume of disease in an area, attention to adjusting for differences in age structure become less important. See Appendix A for a more detailed example.

IV. UTILIZING STANDARDIZED MORTALITY RATIOS

UTILIZING STANDARDIZED MORTALITY RATIOS

As previously illustrated, numbers can be converted into rates to generate comparable indices. Some reasons for calculating standardized mortality ratios (SMRs) are: 1) to identify a problem, 2) to determine the significance of the problem; and 3) to set priorities for program and resource planning. SMR results are in turn used to:

- Determine geographical areas where deaths are fewer or are in excess of those *expected*. Consequently, **observed deaths** in your area of study (e.g. county) may be compared to the number of **expected deaths** based on a standard population (e.g. the state of Georgia).
- Determine if a perceived mortality or morbidity problem is supported by data in an area.
- Select geographical areas with an unusual number of (observed) deaths, and then use the age-specific SMR to determine if the number of deaths are excessive in a specific age group or if excessive deaths are common among all age groups.
- Determine problem areas to be selected for health education, promotion, and awareness programs, with attention to Economics, Education, Enforcement, Engineering (the 4 E's), and Separation/Substitution, Services, Social Support, and Supplies (the 4 S's).

What do these statistics mean?

Calculating an SMR is done in three steps:

Step 1: $$\text{Population Ratio} = \frac{\text{local population}}{\text{state population}}$$

Step 2: Expected Deaths = Population Ratio x Actual Deaths in State

Step 3: **SMR =** $$\frac{\text{observed deaths}}{\text{expected deaths}} \times 100$$

The result can be interpreted as:

a. An SMR of 91.2 implies that the community had nine fewer deaths than expected based on the experience of the standard population.

b. An SMR of 127.4 implies that the community had 27% more deaths than expected, based on the experience of the standard population.

Calculating the SMR is only the first step. After calculating an SMR, we must know whether it is a reliable account of differences between population rates. A "high" SMR (e.g. 127) may or may not reflect actual differences between populations. Small numbers in the numerator increase the likelihood that differences between the area of study and the standard population are unreliable. Thus we calculate the following statistics to determine if our SMR is statistically significant.

A standard error (SE) is the standard deviation of the sampling (or theoretical) distribution of a rate. The SE is calculated as follows:

SE = standard error

R = rate (or SMR)

D = observed number of deaths

$$\mathbf{SE\ (R)} = \frac{R}{\sqrt{D}}$$

Thus:

a. The resulting value of 1 SE will fall within the true value 68.3% of the time;

b. Or if the SE is multiplied by 1.96 = 95% of the time;

c. 3 SE's = 99.7% of the time.

Recall what you may have heard about the Normal (Bell-shaped) data distribution. Thus if our observed value falls within the expected 1.96 SE's, the vernacular is to say that our finding is "95% significant".

The next step is to calculate the Confidence Limits. **Confidence Limits (CL)** are the upper and lower ranges within which a true rate lies. The range defines the **confidence interval (CI)**.

To estimate validity of findings:

a. If the upper confidence limit is less than 100 (e.g. for an SMR of 86), then the number of deaths observed is significantly lower than expected.

b. If the lower confidence limit is above 100 (e.g. for an SMR of 111), then the number of deaths observed is significantly higher than expected.

c. If either the upper or lower limits of a CI include the 100 mark, then there is no significant difference in the observed number of deaths as compared to the expected number of deaths (e.g. an SMR of 111, but confidence limits of 95-123).

Note: If a confidence limit is "wide" (for example greater than 100 wide), then ideally more years of data or a wider geographic scope are required to make more reliable conclusions concerning the magnitude of the excess or deficit of deaths.

V. BLANK SMR TEMPLATES

Determining SMRs

The five blank templates on the following pages are to be used for calculating SMRs in your particular area. The forms are titled:

Template #1. Standard Mortality Ratios (SMRs) for Leading Causes of Death by Race, Sex, and Life Stage

Template #2. Calculation of Standard Error and Confidence Limits by County and District

Template #3. Cause Specific Mortality Rates by Life Stage (District/County)

Template #3b. Cause Specific Mortality Rates by Life Stage (Cause of Death)

Template #4. District Standard Mortality Ratios for Leading Causes of Death by County

Formula:

SMR= $\frac{\text{Observed Deaths}}{\text{Expected Deaths}}$ x 100

Template #1

Standard Mortality Ratios (SMRs) for Leading Causes of Death
by Race, Sex and Life Stage
1994-1998

District ________ County ________ Life Stage ________

Race ______ Sex ______

Pr = $\frac{\text{Specific Local Population}}{\text{Specific State Population}}$

Cause of Death	Calculation of Expected Deaths			Observed Deaths	SMR	
	Column A	Column B	Column C	Column D	Column E	
	Pr (from above)	Actual Deaths in State	Expected Deaths = Col A x Col B	Number of Observed Deaths in Area	$\frac{\text{Col D}}{\text{Col C}}$ x 100	√ if SMR is greater than 100
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
All Other Causes						
Total Deaths						

Formula:

$$S.E. = \frac{smr}{\sqrt{d}}$$

Template #2

Calculation of Standard Error and Confidence Limits by County and District
1994-1998

District __________, County ______________, Race _______, Sex ____, Life Stage ________

	Standard Error				Confidence Limits			
Cause of Death	Column A	Column B	Column C	Column D	Column E	Column F		Significance
	SMR (from worksheet # 1)	Number of Deaths	Square Root of Number of Deaths	S.E. = Col A / Col C	S.E. x 1.96	Col A – Col E Lower Limit	Col A + Col E Upper Limit	+ = Lower Limit > 100 - = Upper Limit < 100 0 = Upper > 100, and lower < 100
1.								
2.								
3.								
4.								
5.								
6.								
7.								
8.								
9.								
10.								
All Other Causes								
Total Deaths								

Template #3

Cause Specific Mortality Rates by Life Stage

1994-1998

District__________ County____________

Life Stage	Infant	Childhood	Adolescence	Adulthood			
Cause of Death				Young	Middle	Older	Total
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							
11.							
12.							
13.							
14.							
15.							
16.							
Total District							
Total State							

Note: Infancy = under 1 Adolescence = 10-19 Middle Adulthood = 45-64

Childhood = 1-9 Young Adulthood = 20-44 Older Adulthood = 65+

Template #3b

Cause Specific Mortality Rates by Life Stage

1994-1998

District__________ County____________

Life Stage	Infant	Childhood	Adolescence	Adulthood			
Cause of Death				Young	Middle	Older	Total
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							
11.							
12.							
13.							
14.							
15.							
16.							
Total District							
Total State							

Note: Infancy = under 1 | Adolescence = 10-19 | Middle Adulthood = 45-64

Childhood = 1-9 | Young Adulthood = 20-44 | Older Adulthood = 65+

Summary Template #4
District Standard Mortality Ratios and Significance for Leading Causes of Death by County
1994-1998

Cause of Death:										
District/County:	SMR	SIG. + o -	SMR	SIG. + o -	SMR	SIG. + o -	SMR	SIG. + o -	SMR	SIG. + o -
1.										
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										
12.										
13.										
14.										
15.										
16.										
17.										
18.										
19.										

SMR = Standard Mortality Ratio

SIG. = Statistically Significant

+ = significantly high
o = no significant difference
- = significantly low

VI. EXAMPLES OF SMR RESULTS

Formula:

SMR= Observed Deaths x 100 / Expected Deaths

EXAMPLE
#1

Standard Mortality Ratios (SMRs) for Leading Causes of Death
by Race, Sex and Life Stage
1994-1998

District ______X___ County _____All__ Life Stage _____All___

Race ____X__ Sex ___X___

Pr= Specific Local Population / Specific State Population

Cause of Death	Calculation of Expected Deaths			Observed Deaths	SMR	
	Column A	Column B	Column C	Column D	Column E	
	Pr (from above)	Actual Deaths in State	Expected Deaths = Col A x Col B	Number of Observed Deaths in Area	Col D / Col C x 100	√ if SMR is greater than 100
1. AMI	.03929	6,762	266	339	127.4	√
2. Homicide	.03929	676	27	51	188.9	√
3. CVD	.03929	4,350	171	128	74.9	
4. MVA	.03929	1,446	57	52	91.2	
5.						
6.						
7.						
8.						
9.						
10.						
All Other Causes						
Total Deaths						

Formula:

$$S.E. = \frac{smr}{\sqrt{d}}$$

EXAMPLE
#2

Calculation of Standard Error and Confidence Limits by County and District
1994-1998

District ___X_____, County ___X_____, Race __X__, Sex _X___, Life Stage ___All_____

	Standard Error				Confidence Limits			
Cause of Death	Column A	Column B	Column C	Column D	Column E	Column F		Significance
	SMR (from worksheet # 1)	Number of Deaths	Square Root of Number of Deaths	S.E. = Col A / Col C	S.E. x 1.96	Col A – Col E Lower Limit	Col A + Col E Upper Limit	+ = Lower Limit > 100 - = Upper Limit < 100 0 = Upper > 100, and lower < 100
1. AMI	127.4	339	18.41	6.92	13.56	113.8	- 141.0	+
2. HOMICIDE	188.9	51	7.14	26.46	51.86	137.0	- 240.8	+
3. CVD	74.9	128	11.31	6.62	13.00	61.9	- 87.9	-
4. MVA	91.2	52	7.21	12.65	24.79	66.4	- 116.0	0
5.								
6.								
7.								
8.								
9.								
10.								
All Other Causes								
Total Deaths								

VII. APPENDICES

APPENDIX A: Example of Benefits of Age-Adjusting

Suppose rates (such as morbidity or mortality rates) are to be compared for two study populations but there is a dissimilarity between the populations for some factor such as age, sex, race, vaccination status or some other factor. In this circumstance, rates may be **adjusted** so the populations can be compared. The most frequent type of adjustment is for age (age-adjusted rates).

In comparing two populations consider the questions:

1) Do rates within the populations vary appreciably with age?

2) Do the populations differ appreciably in age composition?

If the answer to both questions is yes, comparison of overall rates must be interpreted with caution. Preferably, pair-wise comparisons of age-specific rates should be made (as was done for the mortality data in the Health Status Baseline). Comparison of Aadjusted≅ rates between the populations is a technique for summarizing several age-specific rate comparisons by a single (age-adjusted) overall rate comparison.

Definition: Age-adjusted rates are those rates which would have been observed if the age distribution of the community being studied were the same as that of the standard population. Again, an age-adjusted rate is an estimated overall rate that would have occurred in a selected standard population (we choose the standard population, e.g. the age distribution of the population of Georgia) had the age-specific rates, which did occur in the study population, prevailed.

Consider as an example the death rates per 1,000 persons for Pinellas County, Florida vs. Tiller County, Maryland.

Rate in Pinellas County = 15.3
Rate in Tiller County = 6.7

Does this imply that it is more dangerous to live in Pinellas County than in Tiller County?

It is not sufficient to take these figures at face value. The characteristics of the population must be taken into account. After doing so (by examining the distribution of the two populations by age groups), we find the probable reason for the high crude death rate for Pinellas as compared with Tiller County. Pinellas County has a generally older population than Tiller County, particularly in age group 65 years and older where more deaths are expected to occur.

If, however, the age group distributions between the two populations were similar, would the crude death rates for the counties be more similar? Is the risk of dying (crude death rate) really twice as great in Pinellas County?

These questions can be answered by adjusting the rates by comparing them to a standard population.

The **expected** deaths are those which would be expected to occur if the age distribution of the study population were the same as that of the standard population.

Different methods of age adjusted are used, which can depend on the characteristics of the mortality data in your study population.

When the age distribution of the population is considered, the age-adjusted rates show higher death rates in Tiller County. Thus, the risk of dying is not nearly twice as great in Pinellas County. The crude death rate in Pinellas is significantly biased by the high proportion of persons in older age groups where death is more likely to occur. In fact, when compared to a standard population, the risk of dying in Pinellas County is a little less than in Tiller County (Boring, 1985).

APPENDIX B: DEFINITIONS

AGE-ADJUSTED RATES: One problem when comparing crude rates between populations is that groups may differ with regard to certain characteristics. One such characteristic is age, which may affect the overall rate of disease (Hennekens and Buring, 1987). When comparing the mortality rates between two populations, two questions that must be asked are: Do the rates vary with age, and; Do the populations vary in age composition. Age adjusting refers to methods that take these differences into account, creating synthetic rates for comparison.

AGE-SPECIFIC DEATH RATES: Death rates for sub-groups of people in certain age ranges. For example, the number of deaths to people aged 20 through 44, and the total population of people aged 20 through 44 are needed to create an age-specific death rate. Such a rate from a county can be used to compare with a state's rate. This is one of several methods of adjusting for age distribution differences between a county and a state when comparing rates.

CONFIDENCE INTERVAL: The range within which the true magnitude of effect lies with a certain degree of assurance (Hennekens & Buring, 1987).

CONFIDENCE LIMIT: The upper and lower range within which a true rate lies.

CRUDE RATE: Represents the actual experience of the population, providing data for the allocation of health resources and public health planning (Hennekens and Buring, 1987).

DISEASE: A deviation from the normal health status; associated with a characteristic sequence of signs and symptoms.

EPIDEMIOLOGY: The study of the distribution, determinants and frequency of disease in populations.

ETIOLOGY: The study or theory of the causation of diseases; the sum of knowledge regarding causes.

EXPECTED: Refers to findings from a standard mortality ratio analysis. For example, "the second leading cause of death occurred as expected". The number of deaths in a county was neither significantly greater or less than the population-size-adjusted number of deaths in Georgia.

INTERVENTION: Any program or other plan to produce intended changes in a target population.

MORBIDITY: Refers to illness or other morbid condition. It does not refer to death. Ways to measure morbidity can include specific symptoms, reported cases, days lost from work.

MORTALITY: Refers to death. Usually measured through death certificates.

NEEDS ASSESSMENT: Systematic appraisal of type, depth, and scope of problems studied in a geographic area for a specific time period.

OBJECTIVE: Precise program objectives are clarified in terms of time, direction, magnitude, definition of measure, and the measure of the characteristic to be changed. Objectives should reflect what anticipated outcomes or behavioral changes are sought among the target group.

POPULATION-AT-RISK: A term applied to all those to whom an event could have happened, whether it did or not. It becomes the denominator for a rate and includes all actual cases plus potential cases of all those who were exposed but did not become cases.

PREVALENCE: The proportion of individuals in a population who have the disease (or condition) at a specific instant and provides an estimate of the probability (risk) that an individual will be ill (exhibit the condition) at a point in time (Hennekens and Buring, 1987).

RATE: A fraction made by dividing the number of events that happened (the numerator) by the population that the event could have happened to (denominator), and then multiplying the result by a "base" constant, such as 1,000 or 100,000.

RELIABILITY: Regarding statistical validity and reliability concerns: Less than 20 deaths in the numerator produce rates that are statistically unreliable, and have standard errors greater than 23%. The denominator is not a factor; that is, the rates are considered unreliable regardless of population size (CDC, 1995 and Daniel, 1974). One could aggregate over time or over space to achieve a greater number of events. Regarding confidence intervals that are greater than 100 wide in the *standard mortality ratio* method: One can say a significant difference exists, but the ability to interpret the degree to which a difference in rates is significant is severely limited (Gopal Singh, personal communication, April 1994). The reader may wish to see *Appendix D: Data Issues* in Healthy Communities 2000: Model Standards for further discussion of technical considerations, statistical instability, crude rates, validity, and reliability. This should be available at any Public Health District office.

STANDARD ERROR: Standard deviation of the sampling (or theoretical) distribution of a rate.

STANDARDIZED MORTALITY RATIO (SMR): Ratio of observed number of deaths to the expected number of deaths, based on a standard (Georgia can be used as a standard). This helps answer the question of whether the observed number of deaths in a study population is unusual, or if the observed number of deaths is what would be expected.

TARGET POPULATION: A group of individuals who possess certain characteristics that are associated with poor health status, as indicated by selected health measures or indicators. It is referred to as the "in need" or high-risk population.

Reference List

Boring, John R. (1985). ABC's of Epidemiology. Unpublished manuscript, Emory University School of Public Health

Centers for Disease Control and Prevention, National Center for Health Statistics (1995, August). Monthly vital statistics report, 44 (3).

Daniel, W. W. (1974). Biostatistics: A foundation for analysis in the health sciences. New York: John Wiley & Sons, Inc.

Hennekens, C. H., and Buring, J. E. (1987). Epidemiology in medicine. Boston/Toronto: Little, Brown and Company.