

APPENDIX A

Technical Notes

Contents

| | |
|---|------|
| Introduction | A-2 |
| Key Concepts | A-2 |
| Objective Types | A-2 |
| Healthy People 2020 Targets | A-2 |
| Sex | A-3 |
| Race and Ethnicity | A-3 |
| Education | A-3 |
| Income | A-4 |
| Disability | A-4 |
| Geographic Location | A-5 |
| Health Insurance | A-5 |
| Children with Special Health Care Needs | A-5 |
| Statistical Methods | A-5 |
| Age Adjustment | A-5 |
| Progress Toward Healthy People 2020 Targets | A-6 |
| Disparities for Population-based Objectives | A-7 |
| Quality and Years of Life | A-8 |
| Measuring Life Expectancy | A-8 |
| Measuring Years of Healthy Life | A-8 |
| Computing Healthy Life Measures | A-8 |
| Data Items Used for Healthy Life Measures | A-8 |
| Maps | A-9 |
| Footnotes | A-9 |
| Suggested Citation | A-10 |

Introduction

This appendix provides technical information on key concepts and statistical methods and issues in the *Healthy People 2020 Midcourse Review*. The data used in Healthy People 2020 (HP2020) come from nearly 200 data sources, sponsored by numerous entities including the federal government and private and global agencies and organizations. In each case, the sponsoring agency or organization collected data using its own methods and procedures. Therefore, data in this report vary with respect to source, method of collection, definitions, and reference period.

The term “midcourse” is used to refer to the approximate half-way point of the decade spanning 2010 to 2020. The exact year or years of both the baseline and midcourse data vary by data source and by specific objective. For example, many objectives with the National Health Interview Survey (NHIS) as their data source have 2008 as the baseline year and 2014 as the midcourse year. For many mortality objectives with data from the National Vital Statistics System (NVSS), 2008 is the baseline year and 2013 is the midcourse year.

Readers are invited to visit the following online resources for further information:

1. Technical details about data and methods for individual HP2020 objectives, including information on each HP2020 objective’s baseline, target, target-setting method, data source, and revision history can be located via the “Data Search” page on HealthyPeople.gov: <https://www.healthypeople.gov/2020/data-search/>

After finding a specific objective of interest, click on the  icon to open the Data Details page.

2. A complete list of data sources for HP2020 is available from: <https://www.healthypeople.gov/2020/data-search/Data-Sources>

Each data source listed contains further technical details, including questionnaires, data collection instruments, and sampling methods.

Key Concepts

This section provides explanations of key concepts used in the Healthy People 2020 Midcourse Review.

Objective Types

■ Measurable Objectives

Measurable objectives have a national baseline value. The baselines use valid and reliable data derived from currently established and, where possible, nationally representative data systems. In most cases, baseline data provide the point from which a HP2020 target is set.

» Trackable Objectives

Trackable objectives are a subset of measurable objectives that have more than one data point (i.e., data for the baseline year(s) and data for at least one additional time point). Progress toward the 2020 target can be assessed for trackable objectives.

» Baseline-only Objectives

Baseline-only objectives are a subset of measurable objectives for which progress toward target attainment cannot be assessed, because there is only a single data point.

» Informational Objectives

Informational objectives are a subset of measurable objectives with baselines for which targets have not been established. These objectives are tracked for informational purposes. Targets may not be set for an objective if little change is anticipated over the course of the decade or if the objective is not actionable by the Department of Health and Human Services (HHS).

■ Developmental Objectives

Developmental objectives lack national baseline data and, therefore, do not have targets and cannot be tracked for progress. However, all developmental objectives included in HP2020 have an identified potential nationally representative data source.

■ Archived Objectives

Archived objectives are no longer being monitored due to lack of data source, changes in science, or replacement with other objectives.

Healthy People 2020 Targets

The preferred method of setting targets for HP2020, sometimes referred to in this publication simply as 2020 targets, is through the application of science- and

evidence-based methods, such as modeling, projection, or trend analysis. When circumstances do not permit the use of science- and evidence-based methods, targets generally are set using a 10% improvement relative to the baseline value. The other methods used for setting HP2020 targets include:

- Maintaining baseline level
- Maintaining consistency with national programs, regulations, policies, or laws
- Minimum statistical significance
- Retention of HP2010 targets
- Fixed percentage point improvement
- Total elimination or total coverage

Sex

Data for males and females are reported separately in HP2020 when available and applicable. Sex is self-reported by respondents in surveys and other interview-based data collection systems. In many surveillance systems (e.g., NVSS), sex is often recorded by health care professionals based on observation or written records. Sex may also be reported by proxies, for example, the adult head of family or household may report sex of children.

In HP2020, there are a small number of objectives that are sex-specific, meaning they apply only to males or females. Examples include objective C-7, *Reduce the prostate cancer death rate (males only)*, and STD-6.1, *Reduce gonorrhea rates among females aged 15–44*.

Race and Ethnicity

In 1997, the Office of Management and Budget introduced new standards for record keeping, data collection, and data presentation for race and ethnicity in federal programs. Federal agencies that collect information on race and ethnicity are required to offer respondents the option of selecting one or more of the following five racial categories:

- **American Indian or Alaska Native:** A person having origins in any of the original peoples of North America and South America (including Central America), and who maintains tribal affiliation or community attachment.
- **Asian:** A person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam.

■ **Black or African American:** A person having origins in any of the black racial groups of Africa.

■ **Native Hawaiian or Other Pacific Islander:** A person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.

■ **White:** A person having origins in any of the original peoples of Europe, the Middle East, or North Africa.

These five categories are the minimum set for data on race for federal statistics, program administrative reporting, and civil rights compliance reporting. The 1997 standards were implemented by the U.S. Census Bureau starting with the 2000 decennial census. Other federal programs that collect information on race and ethnicity were required to incorporate the new standards into household surveys, administrative forms and records, and other data collections by January 1, 2003.

The standards regarding Hispanic origin provide for the collection of data on whether or not a person is of Hispanic or Latino culture or origin. This category is defined as follows:

■ **Hispanic or Latino:** A person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin, regardless of race. The term “Spanish origin” can be used in addition to Hispanic or Latino. Persons of Hispanic origin may be of any race, and persons in the various race groups may be of any origin.

Education

Educational attainment is typically measured either by the number of years of education an individual has completed or by the highest credential received. The categories for educational attainment that are generally used in HP2020 are:

- **Less than high school:** Persons with less than 12 years of schooling or no high school diploma.
- **High school graduate:** Persons with either 12 years or schooling, a high school diploma, or Certificate of General Educational Development (GED).
- **At least some college:** Persons with a high school diploma or GED and 13 years or more of schooling, but without a college degree.
- **Associate's degree:** A.A., A.S., or other 2-year degree.
- **4-year college degree:** B.A., B.S., or other 4-year degree.
- **Advanced degree:** Master's degree, Ph.D., M.D., or other doctoral or advanced degree.

In general, data on educational attainment are presented beginning with age 25, the age at which education has been completed for most people. This practice is consistent with guidance given by the U.S. Census Bureau.¹ However, some objectives have different age groups for the education variable.

Income

Family income

In most data systems, income is defined as money income before taxes and does not include the value of noncash benefits such as food stamps, Medicare, Medicaid, public housing, and employer-provided fringe benefits. Personal income includes wages, salaries, pensions, rental income, interest, dividends, and monetary help from relatives. Personal income also includes profits and fees from a person's own businesses.

Family income is the sum of the personal incomes for all persons in the family. The operational definition of "family" varies across data systems. For example, for the purpose of assessing family income, NHIS and the National Health and Nutrition Examination Survey (NHANES) consider that all persons within a household who are related to each other by blood, marriage, or adoption constitute a family. Thus, each member of a family is classified according to the total income of the family. Unrelated individuals are classified according to their own personal incomes.

Family income data are used in the computation of the poverty threshold.

Poverty status

Poverty status is assigned to individuals based on their family incomes, adjusted for family size, family composition, and inflation. These adjustments facilitate comparisons between groups and over time. Poverty status thresholds were developed by the U.S. Census Bureau, based on definitions originally developed by the Social Security Administration. These thresholds vary by family size and composition and are updated annually to reflect changes in the Consumer Price Index for all urban consumers. Multi- or single-person families with incomes below their applicable thresholds are classified as below poverty.

For example, for a family of four, the average poverty threshold weighted for family composition was \$22,025 in 2008 (the baseline year for many HP2020 objectives). In 2014, the weighted average threshold income for a family of four was \$24,230. Detailed poverty thresholds by year, size of family, and number of children are available on the U.S. Census Bureau website.²

In HP2020, five categories of poverty status based on family income are generally analyzed:

- **Poor:** Below the poverty threshold.
- **Near-poor:** At 100%–199% of the poverty threshold.
- **Middle:** At 200%–399% of the poverty threshold.
- **Near-high:** At 400%–599% of the poverty threshold.
- **High:** At or above 600% of the poverty threshold.

The use of five categories of family income, rather than the simple dichotomy of "above" versus "below" poverty, permits examination of a broader range of family income categories on progress toward meeting HP2020 objective targets.

Note that these categories and thresholds do vary somewhat by data system. For example, some data systems only collect family income data relative to specific income ranges, while others use different poverty thresholds for income categories. Specific family income definitions are footnoted or labeled appropriately in Healthy People data tables.

Disability

In HP2020, many data sources use the American Community Survey (ACS) disability questions to determine a person's disability status. During the development of HP2020, the ACS questions were adopted as the standard definition of disability.

The six questions used to define disability in ACS are:

- *Is this person deaf or does he/she have serious difficulty hearing? [Yes/No]*
- *Is this person blind or does he/she have serious difficulty seeing even when wearing glasses? [Yes/No]*
- *[For persons aged 5 years and over] Because of a physical, mental, or emotional condition, does this person have serious difficulty concentrating, remembering, or making decisions? [Yes/No]*
- *Does this person have serious difficulty walking or climbing stairs? [Yes/No]*
- *Does this person have difficulty dressing or bathing? [Yes/No]*
- *[For persons aged 15 and over] Because of a physical, mental, or emotional condition does this person have difficulty doing errands alone, such as visiting a doctor's office or shopping? [Yes/No]*

Respondents who answer "yes" to one or more of the questions are classified as having a disability. The ACS disability questions were endorsed in 2011 by HHS as the

standard set of disability questions to be included on all HHS national surveys.³

However, some data systems still use other definitions of disability, including basic actions difficulty (a composite measure of disability designed to capture limitations or difficulties in movement, emotional, sensory, or cognitive functioning associated with a health problem) and activity limitation (a composite measure of disability that measures inability to function successfully in certain social roles, also described below). Data systems that use other definitions of disability in Healthy People, such as those noted above, are footnoted or labeled appropriately in Healthy People data tables.

Geographic Location

In HP2020 data tables, geographic location is classified as either metropolitan or nonmetropolitan. For many data sources, these categories are based on standards for metropolitan statistical areas (MSAs). MSAs are defined by the Office of Management and Budget and revised before each decennial census. When census data become available, the standards are applied to define the actual MSAs. An MSA is a county or group of contiguous counties that contains at least one urbanized area of 50,000 or more population. In addition to the county or counties that contain all or part of the urbanized area, an MSA may contain other counties that are metropolitan in character and that are economically and socially integrated with the main city. In New England, cities and towns, rather than counties, are used to define MSAs. Counties that are not within an MSA are considered to be nonmetropolitan.⁴

For some Healthy People data sources, metropolitan refers to urban areas and nonmetropolitan refers to rural areas. Urban areas are within or outside a metropolitan statistical area or within or outside an urbanized area or urban place as designated by the U.S. Census Bureau. Urban areas are urbanized areas and the urban portion of places outside an urbanized area that have a decennial census population of 2,500 or more. An urbanized area is an area consisting of a central place(s) and adjacent urban fringe that together have a minimum residential population of at least 50,000 people and generally an overall population density of at least 1,000 people per square mile of land area. The U.S. Census Bureau uses published criteria to determine the qualification and boundaries of urbanized areas.⁵

Note that for either definition (MSA or urban area), geographic location in HP2020 may refer to the location of an individual's residence, a family's residence, a health

care provider, or a school, depending on the focus of the specific objective.

Health Insurance

The health insurance status population category applies only to persons under age 65, because most persons aged 65 and over are eligible for Medicare. In NHIS, respondents are identified as having health insurance if they are covered by either private or public health plans. Private insurance includes fee-for-service plans, single service hospital plans, and coverage by health maintenance organizations. Public insurance includes Medicare, Medicaid, Children's Health Insurance Program (CHIP), state-sponsored and other government-sponsored health plans, and military plans. Respondents are defined as being uninsured if they had only Indian Health Service coverage or had only a private plan that paid for one type of service, such as accidents or dental care.⁶ Most HP2020 data systems report categories of health insurance status similar to NHIS.

Children with Special Health Care Needs

Children with special health care needs are those who have a chronic physical, developmental, behavioral, or emotional condition and who also require health and related services of a type or amount beyond that required by children generally.⁷

Statistical Methods

Age Adjustment

Age adjustment is a statistical technique used to compare risks for two or more populations with different age structures. Population age structures can vary over time, by geographic area, and by sociodemographic characteristics. In HP2020, age-adjusted rates are computed by the direct method, which consists of applying the age-specific rates in a population of interest to a standardized age distribution in order to eliminate differences in observed rates that result from age differences in the population composition.⁸ Unless specifically denoted as age-adjusted, data in Healthy People should be considered crude (unadjusted). Further information on age adjustment, including detailed information on methods, is available in various National Center for Health Statistics publications.^{9,10}

Progress Toward Healthy People 2020 Targets

This section provides some technical details about the statistics and calculations behind the progress measures displayed in the topic area chapters. For help with understanding and interpreting the progress tables, please consult the [Reader's Guide](#). For a more advanced and comprehensive explanation of methods related to the measurement of progress and disparities in HP2020, see Talih and Huang.¹¹

Progress toward 2020 targets is displayed using icons for every trackable objective in the topic area progress tables in this publication. Assessment of an objective's midcourse progress depended on several factors, including the availability of a baseline or midcourse data point, a target, the direction of movement, the percentage of change from the baseline or toward the target, the availability of standard errors, and statistical significance.

The “percent of targeted change achieved” quantifies progress for HP2020 objectives that are moving toward their targets. The percent of targeted change achieved expresses the difference between the baseline and the midcourse value as a percent of the targeted change between the baseline and the HP2020 target. The percent of targeted change achieved is used to compare how much of the targeted change is achieved for an objective relative to other HP2020 objectives.

For objectives moving away from their baselines and targets, the “magnitude of the percent change from baseline” is used to measure movement. An objective that moves away from the baseline and target would need to make up the deficit from baseline in addition to the desired targeted change once the baseline value is regained.

Objectives that met or exceeded their targets

- When the desired direction is increase, an objective *has met or exceeded* the target at the midcourse data point if $midcourse\ value \geq HP2020\ target$.
- When the desired direction is decrease, an objective *has met or exceeded* the target at the midcourse data point if $midcourse\ value \leq HP2020\ target$.

HP2020 objectives that met or exceeded their targets at the midcourse data point are designated by a target met or exceeded progress status indicator (). Even though statistical significance, when measures of variability are available, is not factored into the determination of the target met or exceeded status, the movement is still evaluated for statistical significance unless normality could not be assumed.

Objectives moving toward their targets

- When the desired direction is increase, an objective is *moving toward* its target at the midcourse data point if $baseline\ value < midcourse\ value < HP2020\ target$.
- When the desired direction is decrease, an objective is *moving toward* its target at the midcourse data point if $baseline\ value > midcourse\ value > HP2020\ target$.

For HP2020 objectives that had not already met or exceeded their targets at baseline, the percent of targeted change achieved measures the extent of movement toward the target. It is given by:

$$\text{Percentage of targeted change achieved} = \frac{\text{Midcourse value} - \text{Baseline value}}{\text{HP2020 target} - \text{Baseline value}} \times 100$$

Statistical significance of the percent of targeted change achieved is evaluated using Taylor linearization when measures of variability are available and normality can be assumed. A one-sided 0.05-level test is used. When measures of variability are available, the improving status indicator () is designated for a statistically significant percent of targeted change achieved, regardless of the amount of the change, whereas the little or no detectable change status indicator () is designated for a percent of targeted change achieved that is not statistically significant, regardless of the amount of the change. Several steps are required to evaluate statistical significance, which are described in further detail in Talih and Huang.¹¹

When measures of variability are unavailable, the improving status indicator () is designated for objectives that are moving toward their targets, and for which the percent of targeted change achieved is $\geq 10\%$ but less than 100%.

Objectives moving away from their baselines and targets

- When the desired direction is increase, an objective is *moving away* from the baseline and target at the midcourse data point if $midcourse\ value < HP2020\ target$ and $midcourse\ value < baseline\ value$.
- When the desired direction is decrease, an objective is *moving away* from the baseline and target at the midcourse data point if $midcourse\ value > HP2020\ target$ and $midcourse\ value > baseline\ value$.

Movement away from baseline is quantified using:

$$\text{Magnitude of percentage} = \frac{| \text{Midcourse value} - \text{Baseline value} |}{\text{Baseline value}} \times 100$$

A percent change from baseline of 10% or more in magnitude means that the objective is at least 10% in deficit relative to its baseline. Such an objective would

need to make up the deficit from baseline in addition to the desired targeted change once the baseline value is regained.

When measures of variability are available, the getting worse status indicator () is designated for a statistically significant “magnitude of percentage change from baseline,” regardless of the value, whereas the little or no detectable change status indicator () is designated for a percent change from baseline that is not statistically significant, regardless of the value.

When measures of variability are available and normality can be assumed, statistical significance of the magnitude of the percent change from baseline is evaluated using Taylor linearization. A one-sided 0.05-level test is used. Several steps are required to evaluate statistical significance, which are described in further detail in Talih and Huang.¹¹

When measures of variability are unavailable, the getting worse status indicator () is designated for HP2020 objectives that are moving away from their baselines and targets, and for which the magnitude of the percent change from baseline is 10% or more.

Objectives for which progress toward target attainment cannot be assessed

Progress toward target attainment cannot be assessed or quantified when only baseline data () are available, the target was met at baseline, or the objective’s desired direction is to “maintain the baseline.” In addition, progress toward target attainment is not assessed when an objective is informational () and does not have a target.

Disparities for Population-based Objectives

This section provides technical details about the statistics and calculations behind the summary disparity ratio displayed in the topic area chapters. For help with understanding and interpreting the disparities tables, please consult the *Reader’s Guide*. For a more advanced and comprehensive explanation of methods related to the measurement of progress and disparities in HP2020, please see Talih and Huang.¹¹

Midcourse disparities for specific population groups are displayed for every population-based objective in the topic area disparities tables in this publication. The most commonly reported population groups in the *Healthy People 2020 Midcourse Review* are defined by the following characteristics: sex, race and ethnicity, educational attainment, family income, disability status, and geographic location. In some cases, it was not

appropriate to include certain characteristics for analysis for individual objectives because of potential collinearity (two variables that are highly correlated). For example, rates by disability status would not be compared for objectives strongly related to disability.

HP2020 summary rate ratio (RR_{ave})

■ Definition

Given that there are $K - 1$ groups other than the one identified as having the “best” group rate, compute their average rate R_a by using the following formula:

$$R_a = \frac{R_1 + R_2 + \dots + R_{K-1}}{K-1}.$$

Let R_b denote the “best” group rate, that is, the highest rate for objectives expressed in terms of favorable outcomes, or the lowest rate for objectives expressed in terms of adverse outcomes. The HP2020 summary rate ratio is defined as:

$$RR_{ave} = \max \left\{ \frac{R_b}{R_a}, \frac{R_a}{R_b} \right\}.$$

Irrespective of the objective’s directionality, the HP2020 summary rate ratio RR_{ave} is such that $RR_{ave} \geq 1$.

When there are only two groups, that is, $K = 2$, the rates R_b and R_a denote the better and worse group rates, respectively. Thus, when $K = 2$, the summary rate ratio equals the ratio between the highest and lowest rates.

■ Statistical significance

When measures of variability are available and normality on the log scale can be assumed, the evaluation of statistical significance and confidence intervals for the HP2020 summary rate ratio RR_{ave} proceeds according to the analytic steps noted in Talih and Huang.¹¹ Note that, because the distribution of the rate ratio is typically skewed to the right, the natural logarithm transformation is applied first.

■ Construction

The HP2020 summary rate ratio RR_{ave} is constructed in such a way that its numerical value remains greater than or equal to one regardless of whether an objective is expressed in terms of a favorable outcome or its complementary adverse outcome. Nonetheless, the substantive interpretation of the HP2020 summary rate ratio changes with the directionality of the objective. For objectives expressed in terms of adverse outcomes, the HP2020 rate ratio RR_{ave} expresses the factor by which the average rate R_a for the other $K - 1$ groups would need to be divided to achieve parity with

the best group rate. For objectives expressed in terms of favorable outcomes, the HP2020 summary rate ratio RR_{ave} expresses the factor by which the average rate R_a for the other $K - 1$ groups would need to be multiplied to achieve parity with the best group rate.

Quality and Years of Life

Measuring Life Expectancy

Life expectancy is the average number of years a group of persons are expected to survive from a given starting age. Life expectancy is calculated based on the mortality data contained in a life table. There are two types of life tables: the cohort (or generation) life table and the period (or current) life table. The cohort life table presents the actual mortality experience of a particular birth cohort (for example, all persons born in the year 1900) from birth throughout their lives. The cohort life table is based on age-specific death rates observed throughout the lifetimes of the cohort members, and thus reflects the mortality experiences of an actual population from birth until the final group member has died.¹²

Unlike the cohort table, the period table does not represent the mortality experience of an actual birth cohort. Rather, the period table presents what would happen to a hypothetical cohort if they experienced, throughout their entire lives, the mortality conditions of a particular period in time. For example, a period life table for 2014 assumes a hypothetical cohort subject throughout their lifetimes to the age-specific death rates that occurred in 2014.¹² The period table is used to construct the life expectancies tracked in HP2020. The methodology for constructing period life tables for the United States has been published elsewhere.¹³

Measuring Years of Healthy Life

Due to the multidimensional nature of health, assessing years of healthy life is more complex than measuring life expectancy, and the field is still evolving. Various measures are used nationally and internationally to measure the health component of healthy life. These fall into two general categories:¹⁴

- Self-assessments of overall health status by individuals or their proxies.
- Composite measures that include multiple dimensions of health. Scores on the various dimensions are combined into a single measure using a predetermined algorithm.

Measures that combine mortality and morbidity (where the morbidity measure can be either of the types described above or a measure of a single dimension of health); these measures use years as the metric to quantify healthy life.

The three healthy life measures used in HP2020 are defined as follows:

- **Expected years of life in good or better health** is the average number of years a person can expect to live in good or better health. This measure assesses healthy life using a single global assessment question that asks a person to rate his or her health as “excellent,” “very good,” “good,” “fair,” or “poor.”
- **Expected years of life free of activity limitation** is the average number of years a person can expect to live free from a limitation in activities, a need for assistance in personal or routine care needs, or a need to use special equipment.
- **Expected years of life free of disability** is the average number of years a person can expect to live without having a difficulty in any of the six domains of functioning: hearing; seeing; concentrating, remembering, or making decisions; walking or climbing stairs; dressing or bathing; and doing errands alone.

Computing Healthy Life Measures

Healthy life expectancies are calculated using a period life table methodology as described above.¹⁵ Age-specific mortality rates are combined with age-specific prevalence rates to produce an estimate of overall healthy life expectancy. The methodology has been published elsewhere.¹⁵ Healthy life expectancies can be compared across populations, as well as over time, as long as the age-specific prevalence rates are reliable across all age categories.

Data Items Used for Healthy Life Measures

- **Self-rated health status** is measured by the single question in which the respondent, or proxy respondent, is asked to rate his or her health as “excellent,” “very good,” “good,” “fair,” or “poor.” This self-assessed health rating has been validated to be a useful indicator of a person’s actual health for a variety of populations, and thus permits broad comparisons across different conditions and populations.¹⁶ In addition to NHIS, NHANES, the Behavioral Risk Factor Surveillance System (BRFSS), and other surveys include the measure.

- **Activity limitation** is measured using questions about personal care needs, limitations of activities, and use of special equipment. Adults are asked whether they need assistance with personal care needs, such as eating, bathing, dressing, or getting around inside the home; if they need assistance with routine care needs, such as household chores; if they have mental or physical problems that prevent them from working at a job or going to school; or if they have health problems that require the use of special equipment, such as a cane, wheelchair, or special telephone. Respondents (or their proxies) responding “yes” to any of these questions are classified as having an activity limitation.
- **Disability status** is measured using a set of six standardized questions developed for ACS and mentioned earlier in this document. These questions ask if a person has difficulty in six domains of functioning: hearing; seeing; concentrating, remembering, or making decisions; walking or climbing stairs; dressing or bathing; and doing errands alone. The hearing and seeing questions are asked of persons aged 1 year and over. Questions on concentrating, remembering, or making decisions, questions on walking or climbing stairs, and questions on dressing or bathing are asked of persons aged 5 years and over. The questions on doing errands alone are asked of persons aged 18 and over. Respondents (or their proxies) who answer “yes” to one or more of the questions are classified as having a disability.

Maps

In the *Healthy People 2020 Midcourse Review*, state- and county-level maps are presented as simple choropleths (areas are shaded according to a legend) and use either a Jenks or modified Jenks classification.¹⁷ A Jenks classification is a method to group ordered data in such a way that within-group variance is minimized and between-group variance is maximized.

When geographic units (states or counties) have values that meet the HP2020 target, and the national data source is the same as the state or county data source, the classification is modified by manually setting the best (lowest for objectives that seek to reduce events and highest for objectives that seek to increase events) cut point to the HP2020 target. In some instances where the number of geographic units meeting the target is large, a cut point in the middle of the distribution is set to the target.

However, when the national data source is different from the state or county data source, geographic units are not compared with the HP2020 target. For state data that are based on self-reported responses, data are not directly compared with the national target, which is based on national data using actual measurements (objectives HDS-5.1 and NWS-9). Some state data come from data systems that pose survey questions differently and use a different mode of survey administration from the national data system (telephone compared with in-person interviews), so again, those data are not directly compared with the national target (objectives C-16, PA-1, PA-2.4, and SH-4).

The Jenks classification is an iterative process whereby an arbitrary number of classes are created from an ordered set of data. For most maps presented here, the default number of classes is five. The process proceeds by calculating the sum of the squared deviations between classes (SDBC), calculating the sum of squared deviations from the array mean (SDAM), and subtracting the SDBC from SDAM giving the squared deviation from class means (SDCM). Observations are iteratively moved from classes with larger SDBCs to those with smaller SDBCs until all SDBCs are minimized.

Mapping was done using ArcGIS ArcMap.¹⁸ Maps are presented using a North American conic equidistant projection based on the 1983 North America geographic coordinate system. The states of Alaska and Hawaii retain these attributes but are not shown to scale or correct location, and were placed independently for greater ease of interpretation.

Footnotes

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