Class 2 – Major Health Challenges from a Public Health Perspective

- Morbidity and mortality worldwide
- Epidemiologic transition
- Diverse perspectives on public health

Life Expectancy

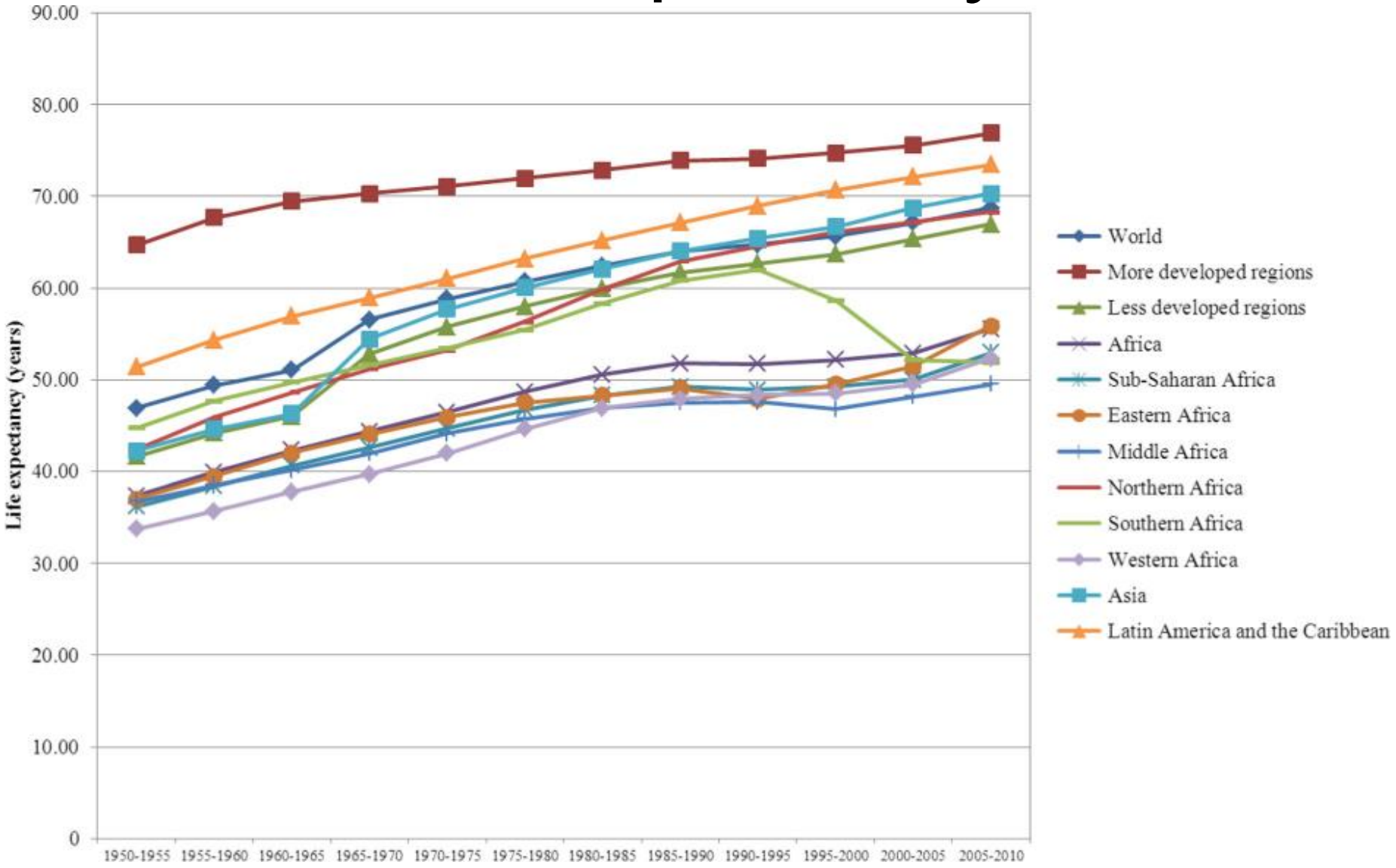


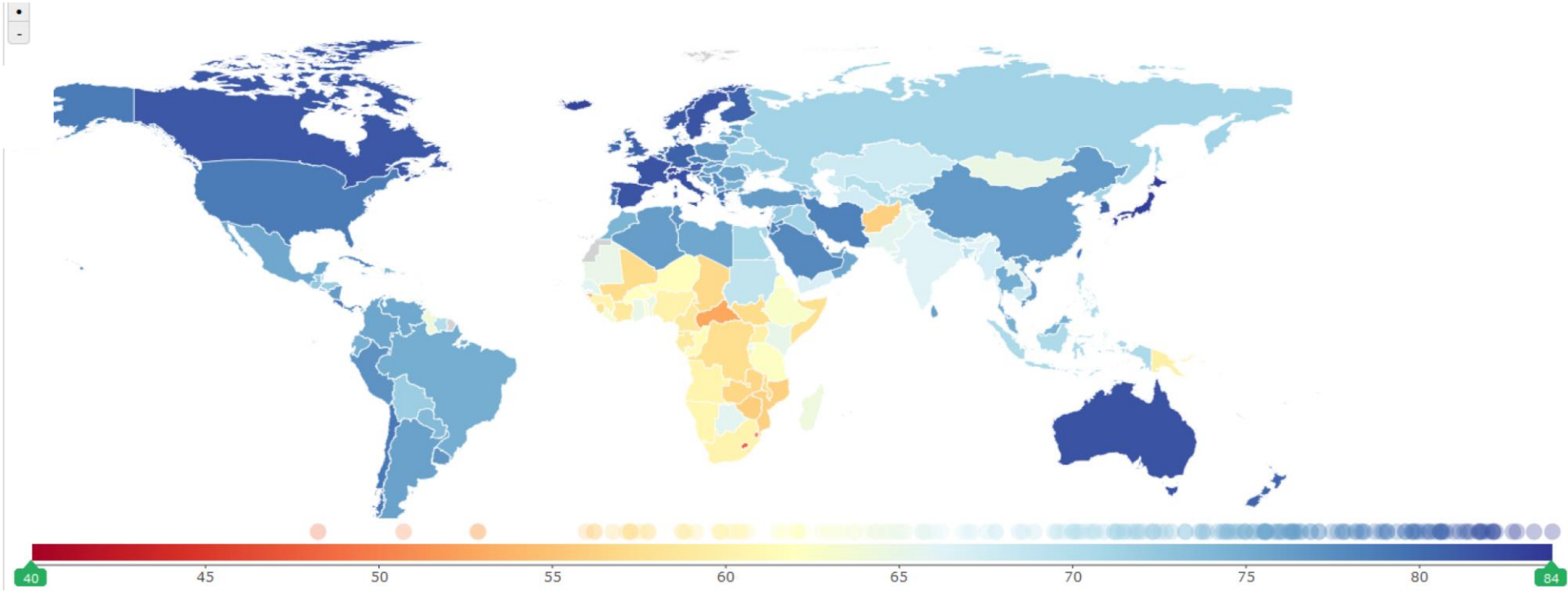
Image courtesy of Global Health Action. CC BY.

Defo, B. K. (2014). Demographic, epidemiological, and health transitions: are they relevant to population health patterns in Africa?. *Global health action*, *7*.

Life expectancy

- Global life expectancy increased by 6.2 years, 1990-2013
- Healthy life expectancy increased by 5.4 years

Life Expectancy, 2013



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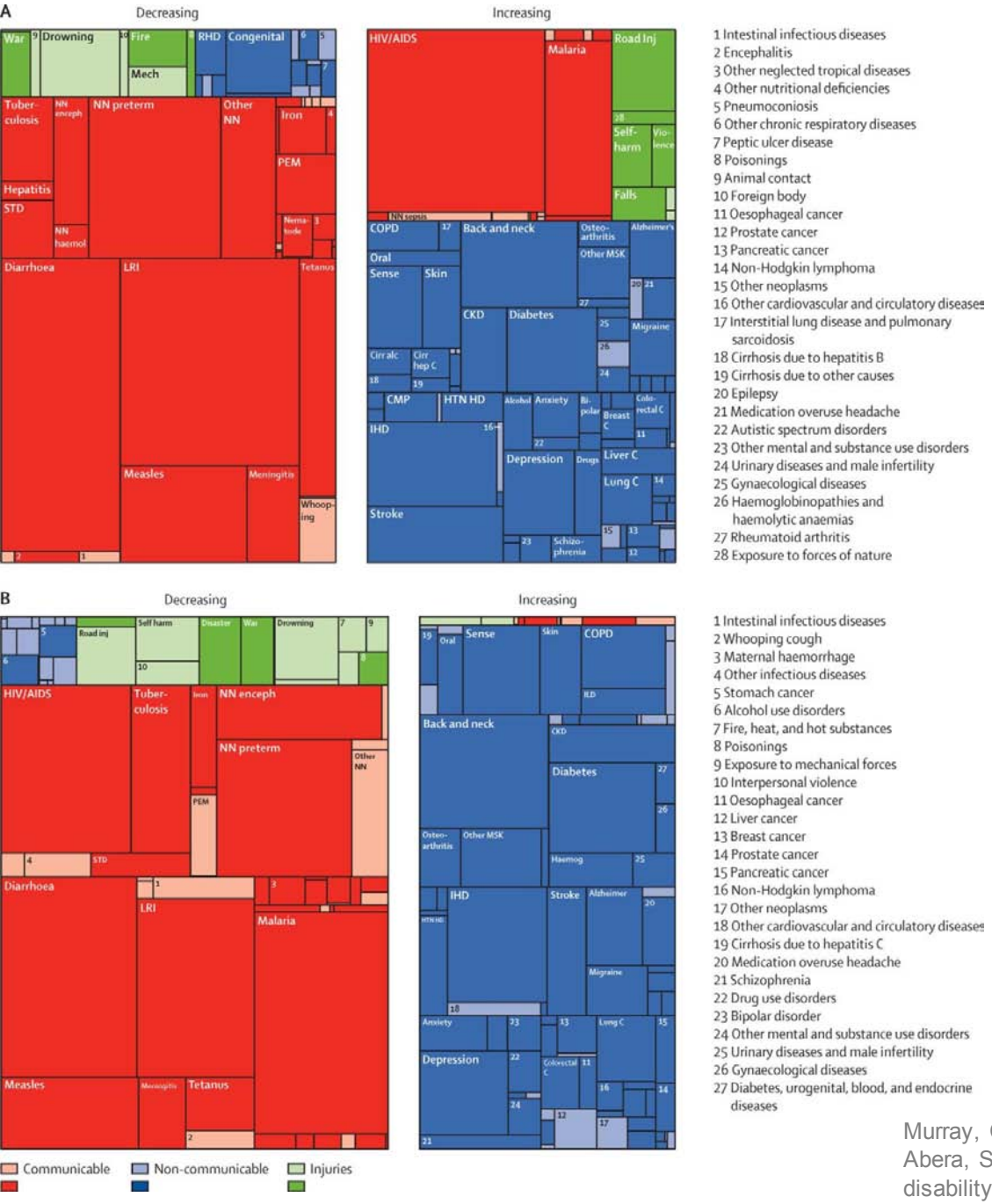
Institute for Health Metrics and Evaluation (IHME). **Life Expectancy & Probability of Death**. Seattle, WA: IHME, University of Washington, 2014. Available from http://vizhub.healthdata.org/le/.

Global Burden of Disease

- A loss of welfare/subjective well-being/quality of life

Figure 1 from Murray, C. J., Barber, R. M., Foreman, K. J., Ozgoren, A. A., Abd-Allah, F., Abera, S. F., ... & Abu-Rmeileh, N. M. (2015). "Global, regional, and national disability-adjusted life years (DALYs) for 306 diseases and injuries and healthy life expectancy (HALE) for 188 countries, 1990–2013: quantifying the epidemiological transition." *The Lancet*, *386*(10009), 2145-2191 removed. Please visit the journal to view the image.



Increasing and decreasing global DALYs for causes from 1990 to 2005 (A) and 2005 to 2013 (B). Within each tree map, the size of the rectangle for each cause is proportional to the magnitude of the decrease or increase in DALYs for each cause. Dark shading show statistically significant changes and light shading shows changes that are not significant.

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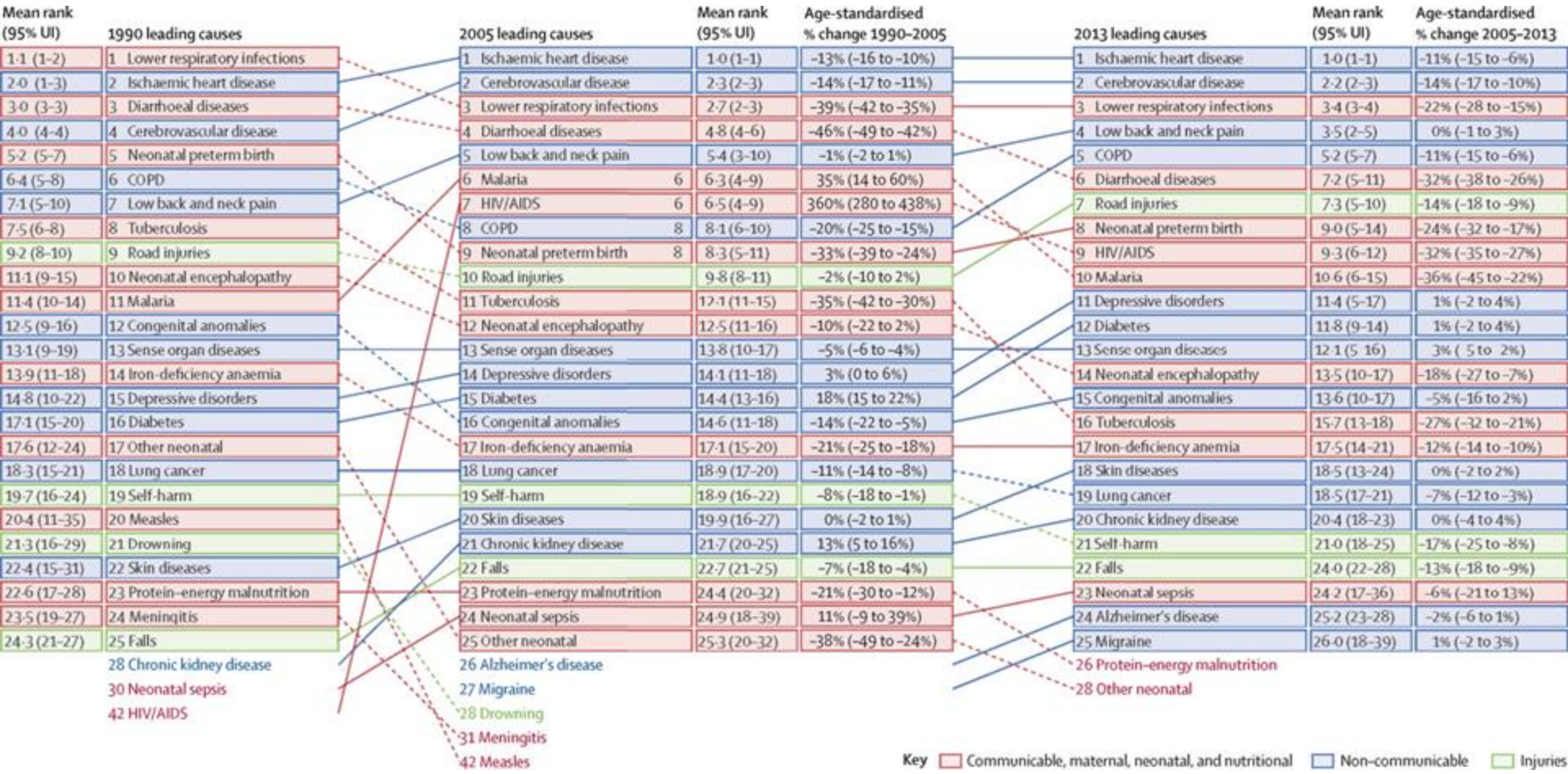
Murray, C. J., Barber, R. M., Foreman, K. J., Ozgoren, A. A., Abd-Allah, F., Abera, S. F., ... & Abu-Rmeileh, N. M. (2015). Global, regional, and national disability-adjusted life years (DALYs) for 306 diseases and injuries and healt life expectancy (HALE) for 188 countries, 1990–2013: quantifying the epidemiological transition. *The Lancet*, *386*(10009), 2145-2191.

25 most common causes of global DALYs for both sexes combined, 1990, 2005, and 2013, with age-standardized median percentage change



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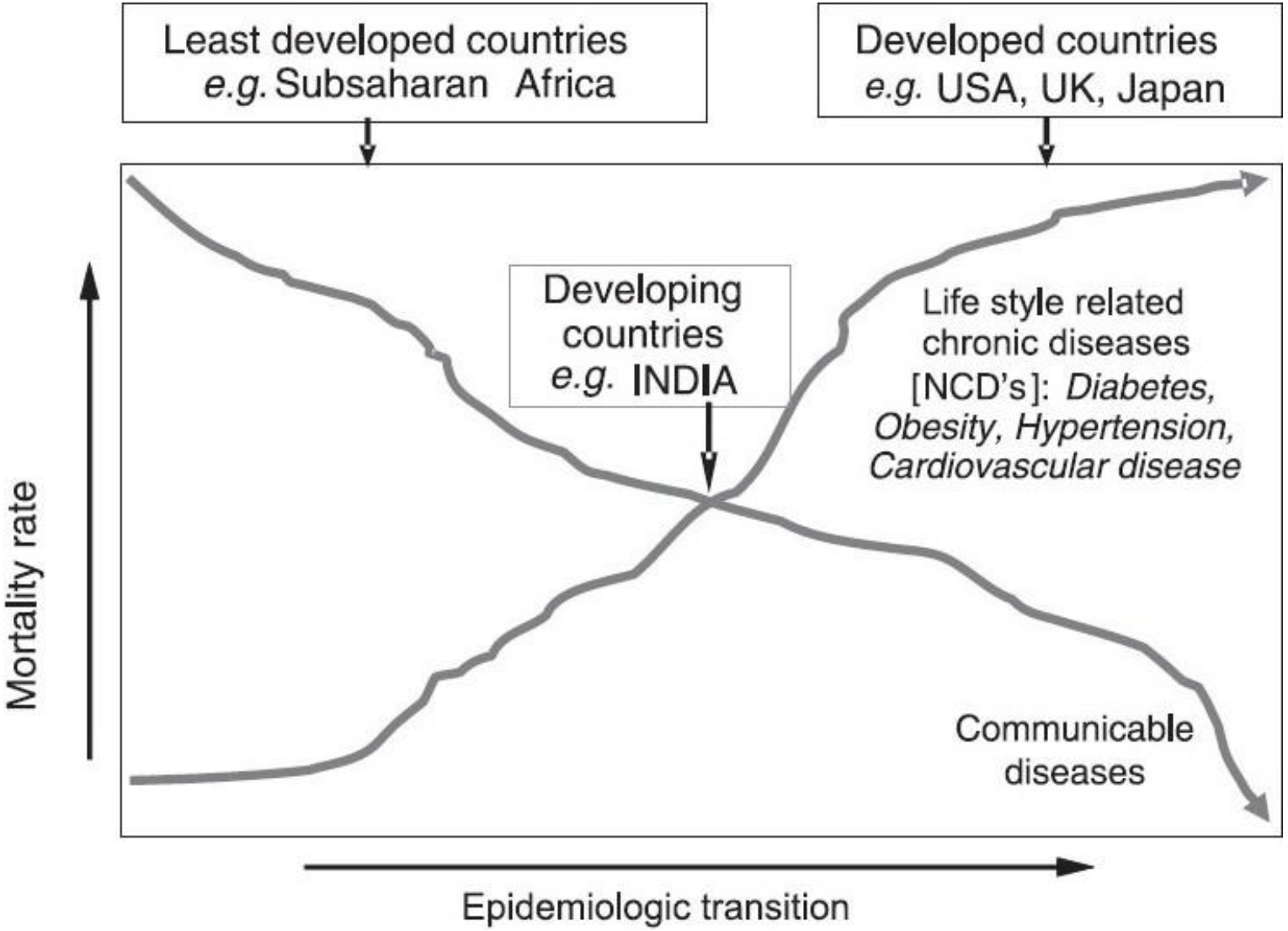
Murray, C. J., Barber, R. M., Foreman, K. J., Ozgoren, A. A., Abd-Allah, F., Abera, S. F., ... & Abu-Rmeileh, N. M. (2015). Global, regional, and national disability-adjusted life years (DALYs) for 306 diseases and injuries and healthy life expectancy (HALE) for 188 countries, 1990–2013: quantifying the epidemiological transition. *The Lancet*, *386*(10009), 2145-2191.

Figure 2 from Murray, C. J., Barber, R. M., Foreman, K. J., Ozgoren, A. A., Abd-Allah, F., Abera, S. F., ... & Abu-Rmeileh, N. M. (2015). "Global, regional, and national disability-adjusted life years (DALYs) for 306 diseases and injuries and healthy life expectancy (HALE) for 188 countries, 1990–2013: quantifying the epidemiological transition." *The Lancet*, *386*(10009), 2145-2191 removed. Please visit the journal to view the image.

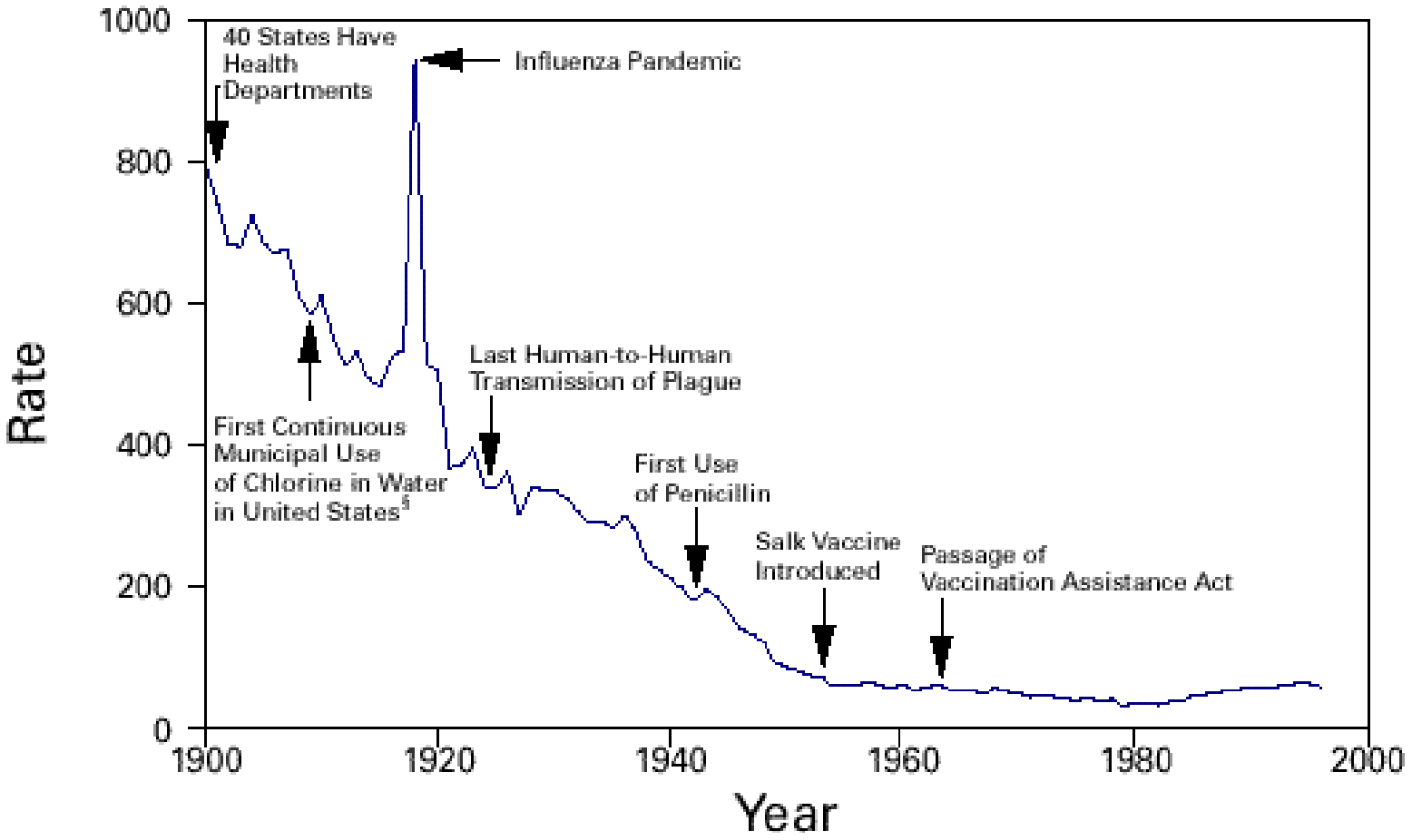
Total DALYs, crude DALY rates, and age-standardised DALY rates from 1990 to 2013
Changes in global DALYs caused by communicable, maternal, neonatal, and nutritional disorders, non- communicable diseases, and injuries shown in terms of numbers of DALYs (A), DALY rates per 100 000 people (B), and age-standardised DALY rates per 100 000 people (C). The difference in trends between A and B is caused by population growth and the difference between B and C because of changes in the percentage distribution of the population by age. Shaded areas show 95% uncertainty intervals. DALY=disability-adjusted life-years.



Courtesy of the CDC. This image is in the public domain.

Anjana, R. M., Ali, M. K., Pradeepa, R., Deepa, M., Datta, M., Unnikrishnan, R., ... & Mohan, V. (2011). The need for obtaining accurate nationwide estimates of diabetes prevalence in India-rationale for a national study on diabetes. *The Indian journal of medical research*, *133*(4), 369.

FIGURE 1. Crude death rate* for infectious diseases — United States, 1900–1996†



*Per 100,000 population per year.

†Adapted from Armstrong GL, Conn LA, Pinner RW. Trends in infectious disease mortality in the United States during the 20th century. JAMA 1999:281;61–6.

§American Water Works Association. Water chlorination principles and practices: AWWA manual M20. Denver, Colorado: American Water Works Association, 1973.

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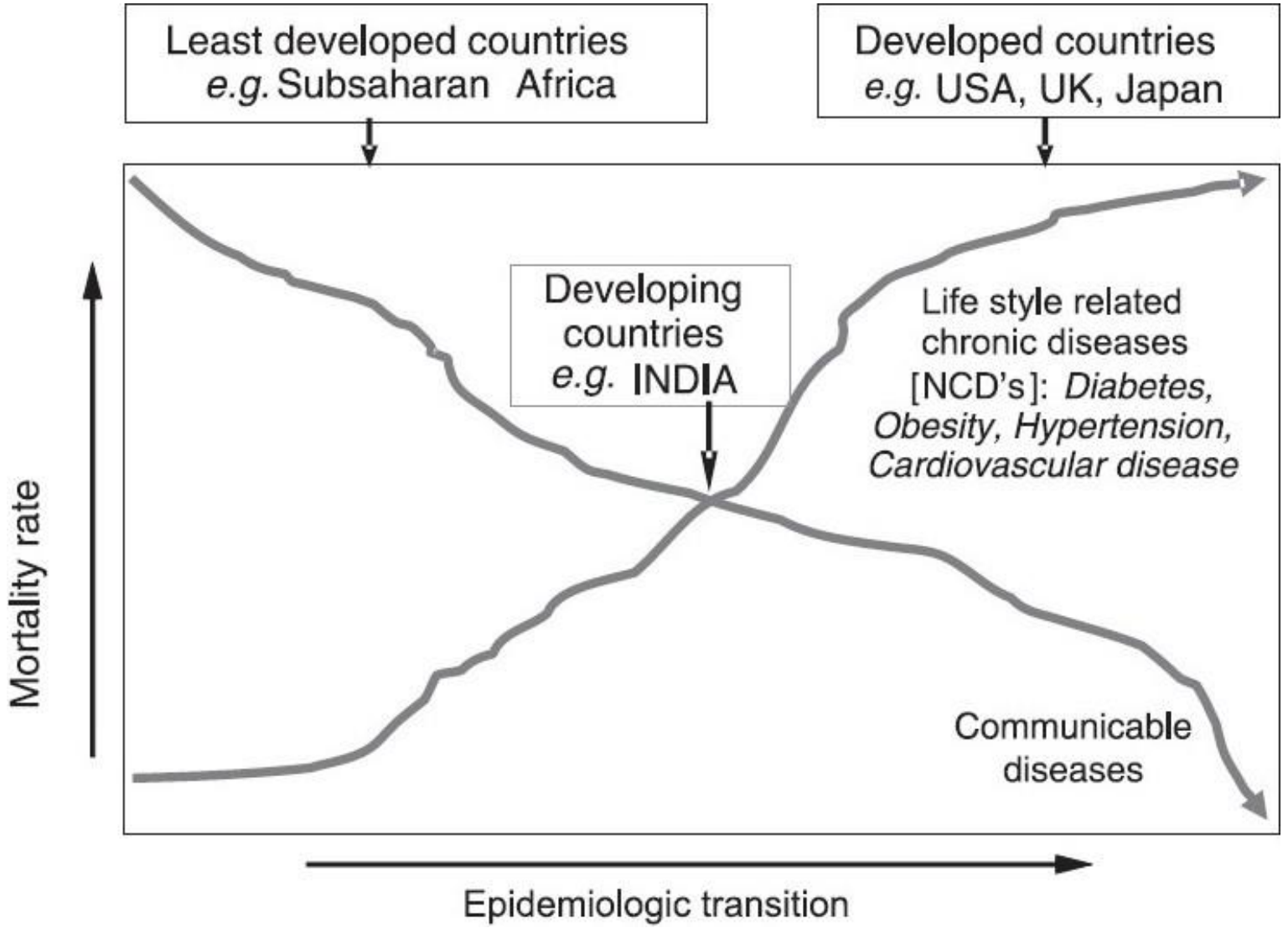

Image courtesy of Global Health Action. CC BY.

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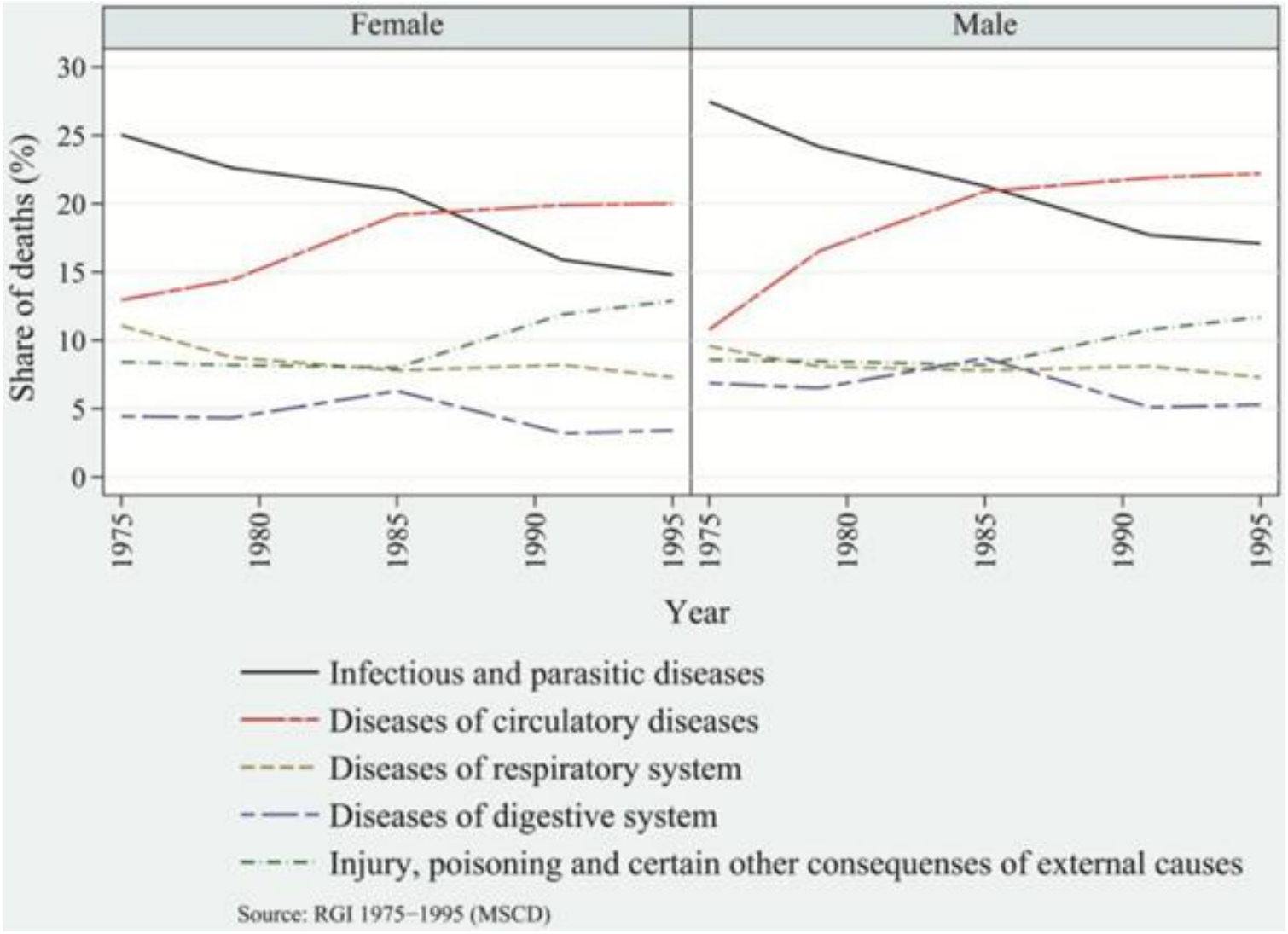
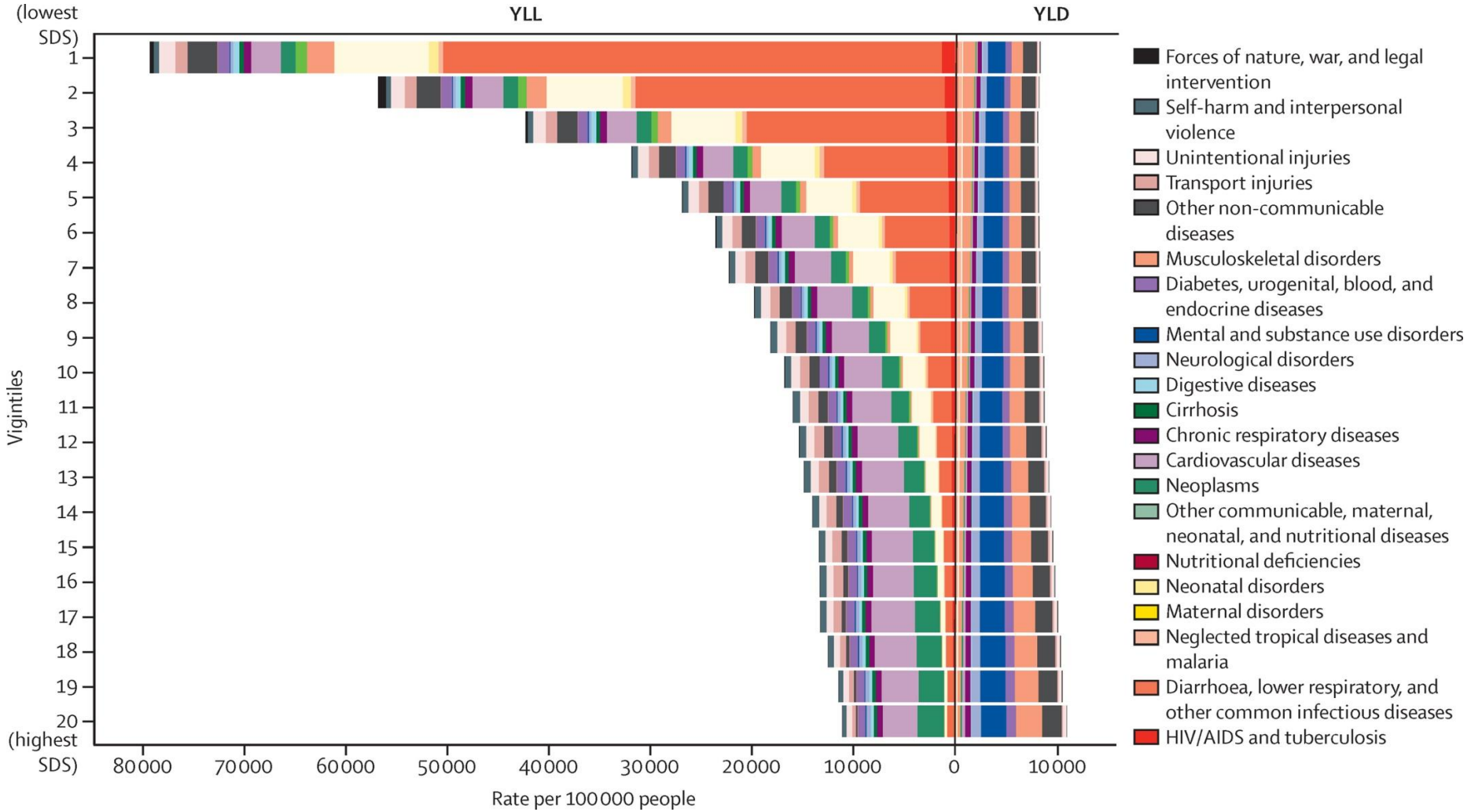
Epidemiological Transition – Urban India



Yadav, S., & Arokiasamy, P. (2014). Understanding epidemiological transition in India.*Global health action*, *7*.



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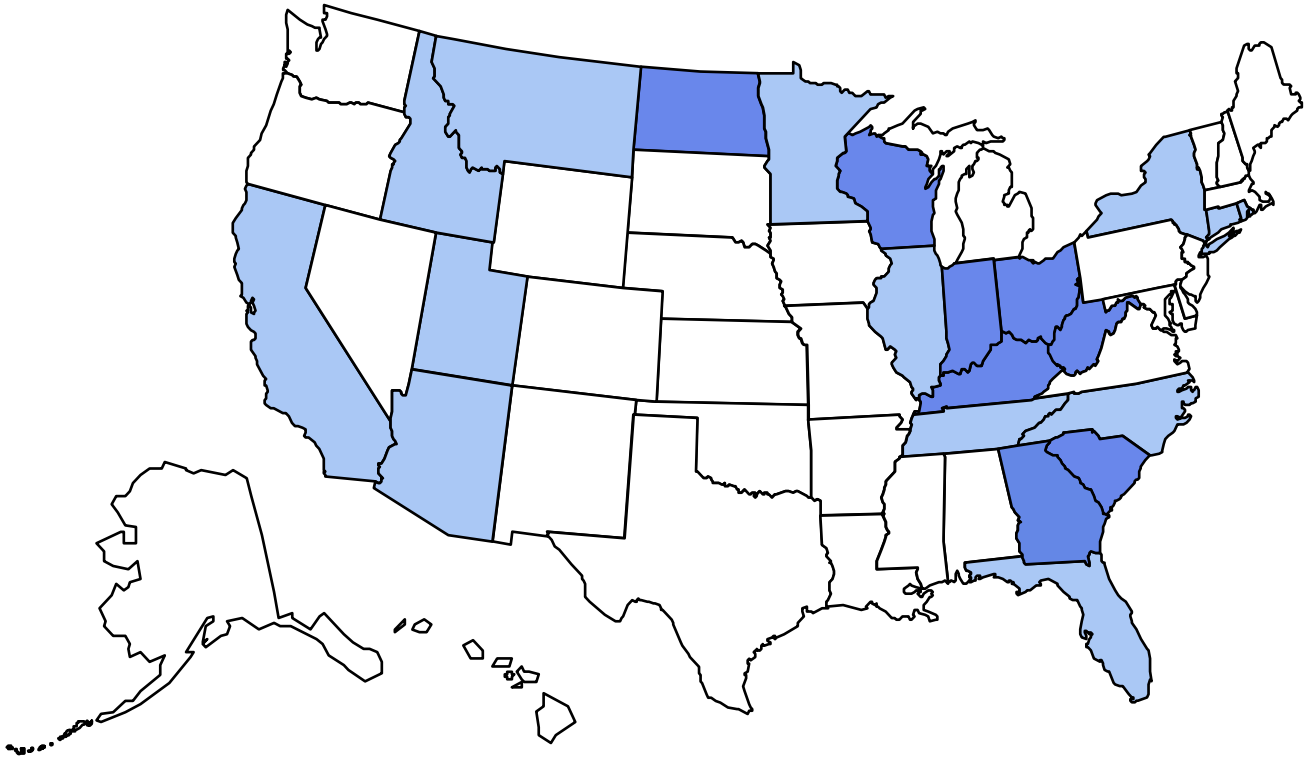
Murray, C. J., Barber, R. M., Foreman, K. J., Ozgoren, A. A., Abd-Allah, F., Abera, S. F., ... & Abu-Rmeileh, N. M. (2015). Global, regional, and national disability-adjusted life years (DALYs) for 306 diseases and injuries and healthy life expectancy (HALE) for 188 countries, 1990–2013: quantifying the epidemiological transition. *The Lancet*, *386*(10009), 2145-2191.

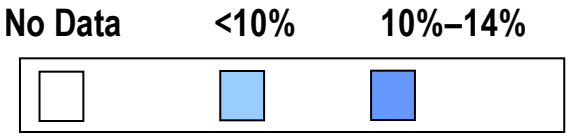
YLL and YLD cause composition of DALY rates by sociodemographic status vigintile. The epidemiological transition based on predicted YLL and YLD rates per 100 000 people as a function of the level of sociodemographic status by vigintile and broken down into GBD level 2 causes. These predicted levels control for variation explained by year and country. YLL= years of life lost. YLD=years lived with disability. GBD=Global Burden of Disease.

Obesity Trends* Among U.S. Adults

*BM ≥30, or ~ 30 lbs overweight for 5’4" person

BRFSS, 1985



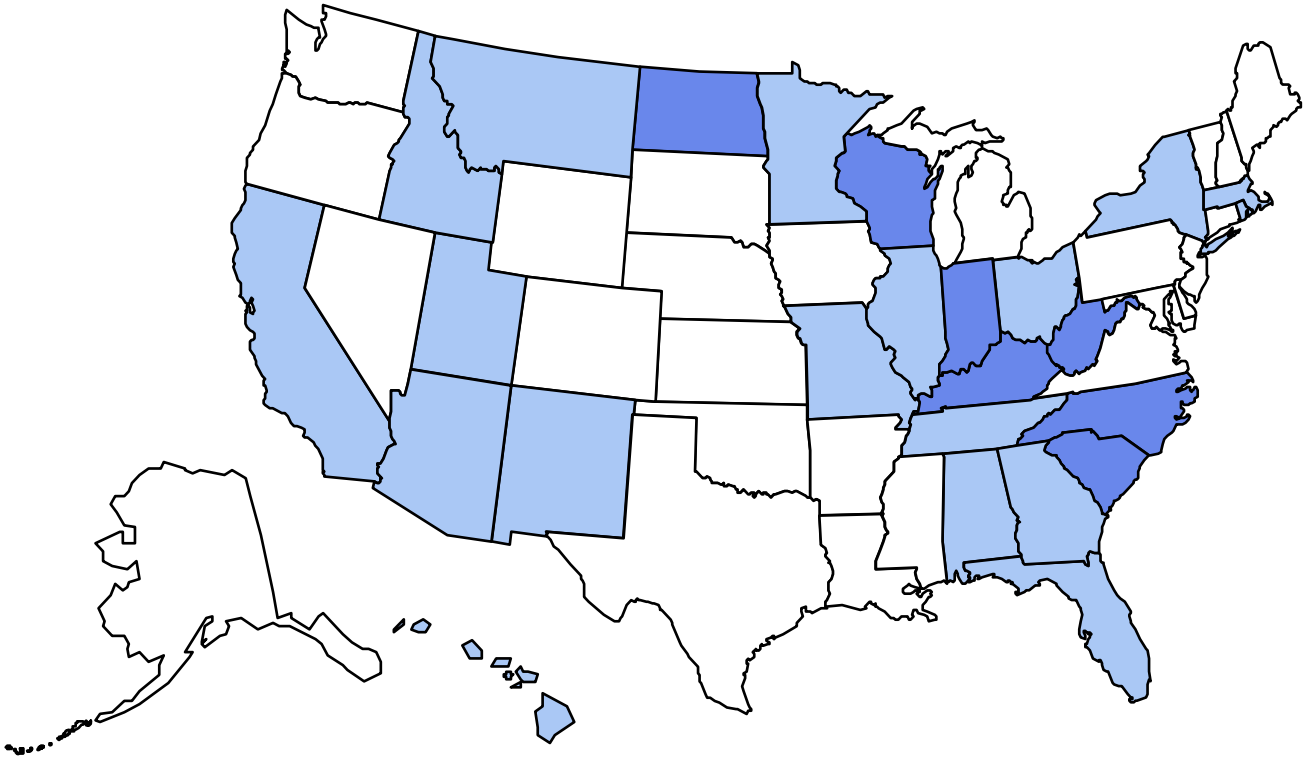


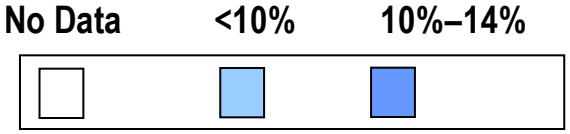
Source: Behavioral Risk Factor Surveillance System, CDC

Map and data via the Centers for Disease Control. This image is in the public domain.

Obesity Trends* Among U.S. Adults

BRFSS, 1986





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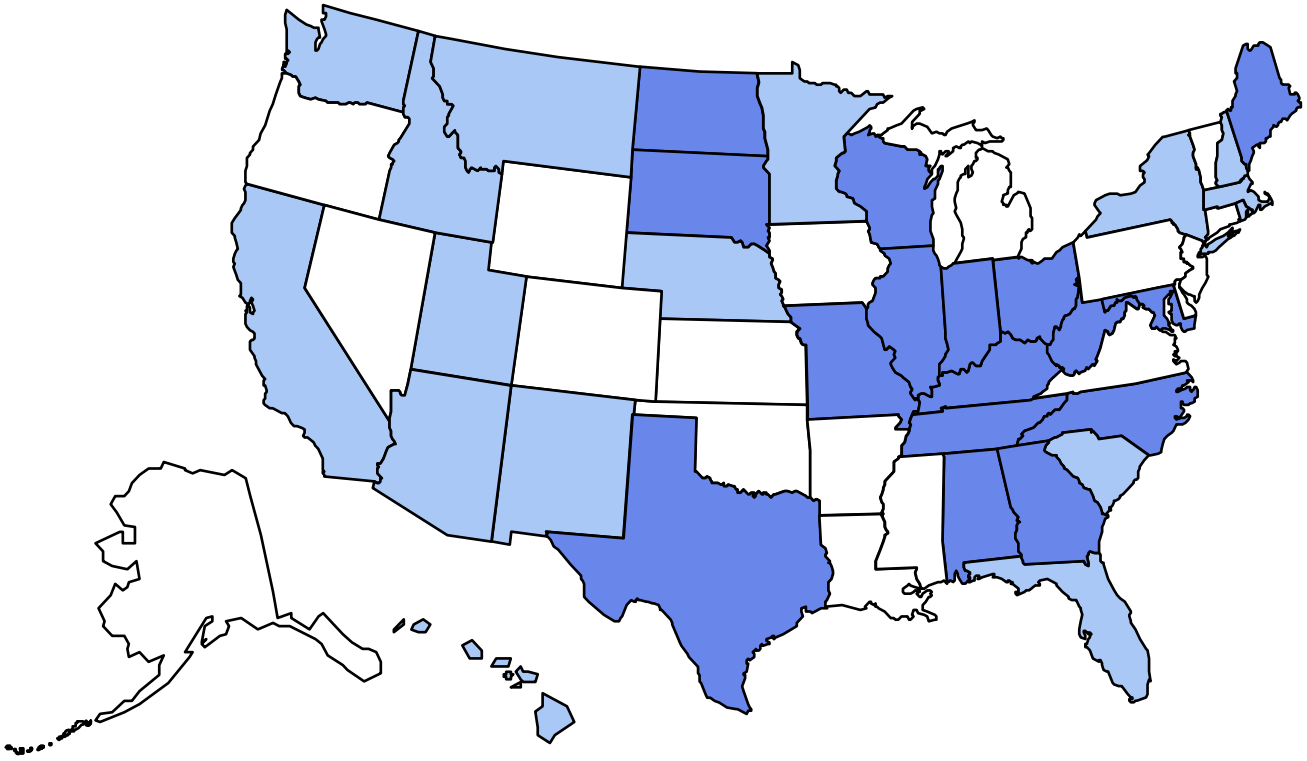
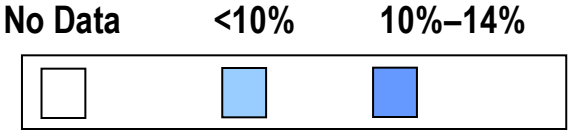
Map and data via the Centers for Disease Control. This image is in the public domain.

Obesity Trends* Among U.S. Adults

BRFSS, 1987



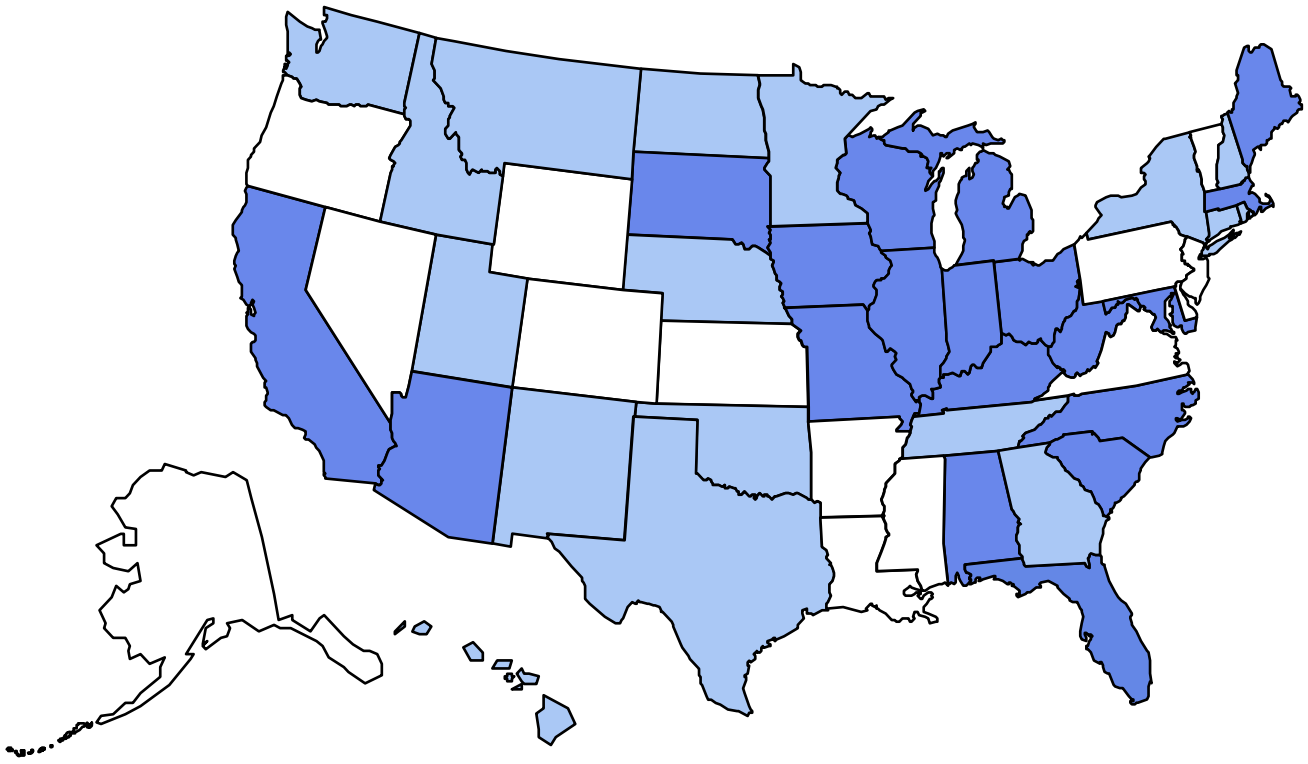


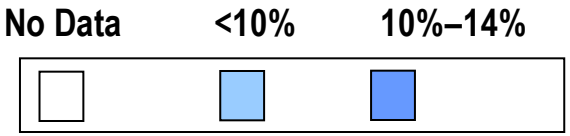
Source: Behavioral Risk Factor Surveillance System, CDC

Map and data via the Centers for Disease Control. This image is in the public domain.

Obesity Trends* Among U.S. Adults

BRFSS, 1988



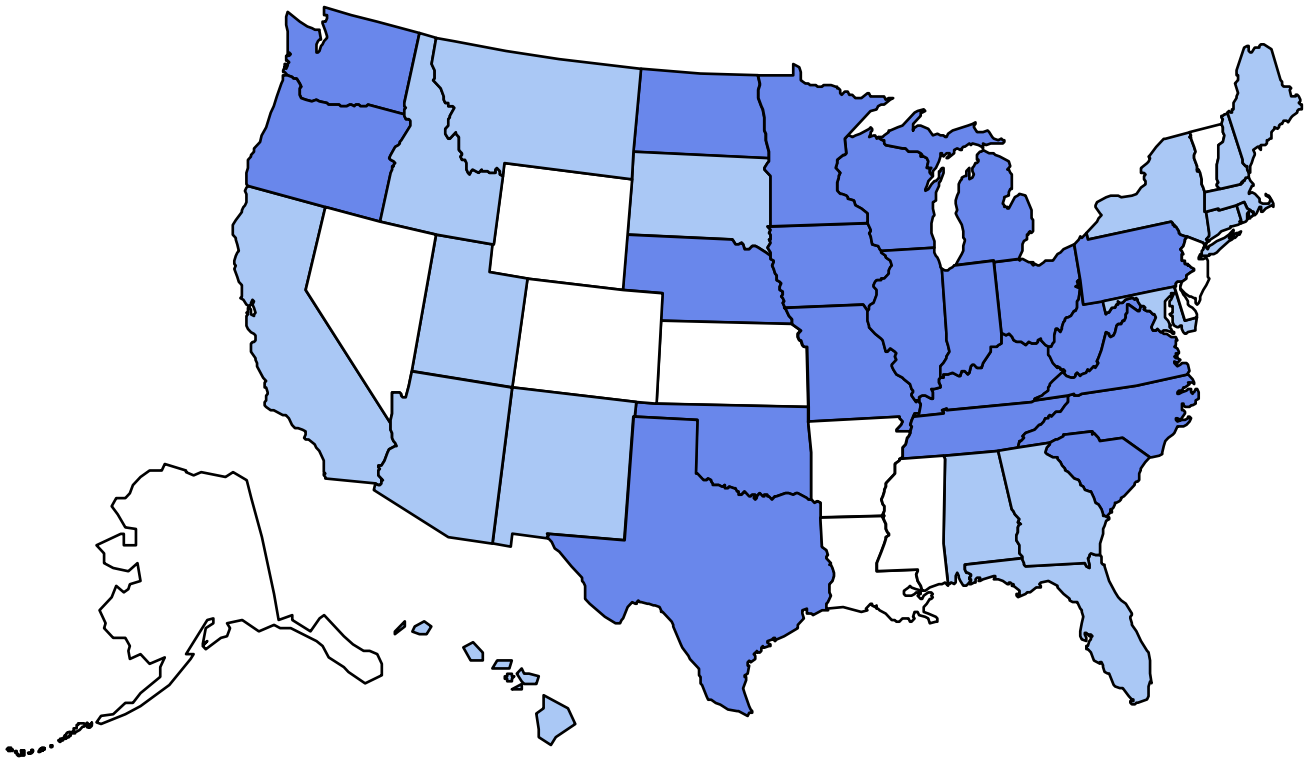


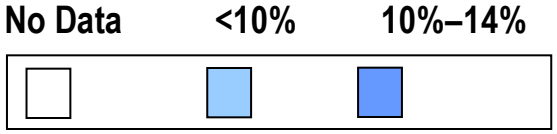
Source: Behavioral Risk Factor Surveillance System, CDC

Map and data via the Centers for Disease Control. This image is in the public domain.

Obesity Trends* Among U.S. Adults

BRFSS, 1989





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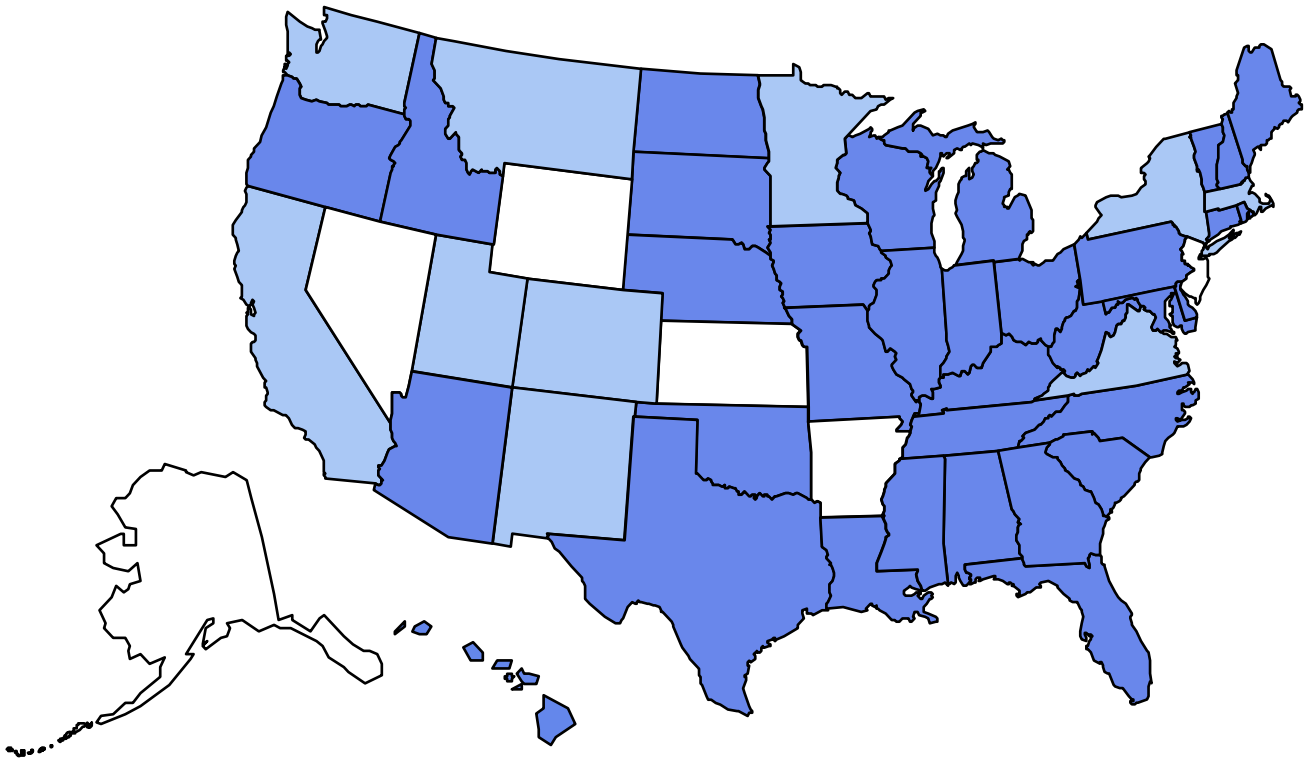
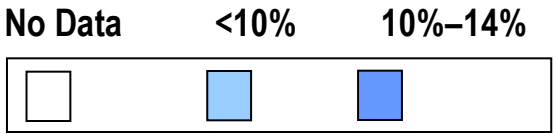
Obesity Trends* Among U.S. Adults

BRFSS, 1990





Source: Behavioral Risk Factor Surveillance System, CDC

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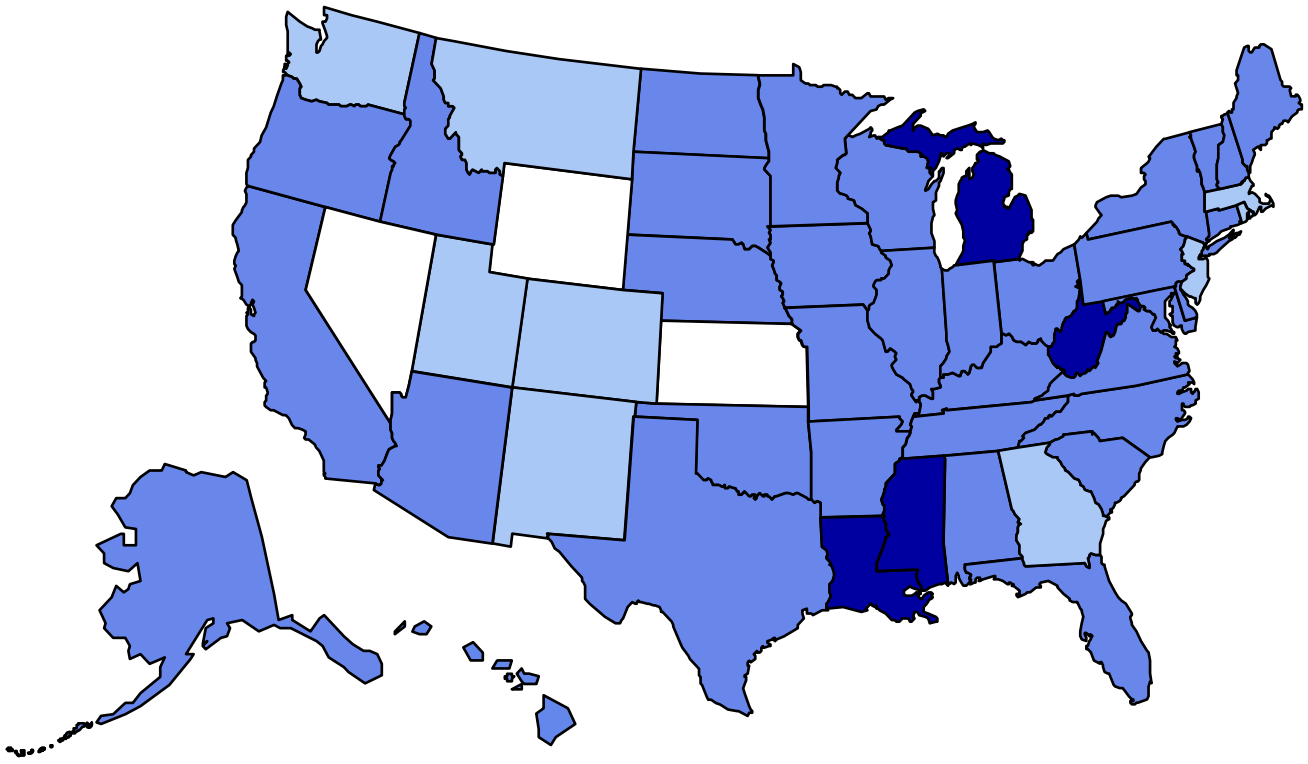
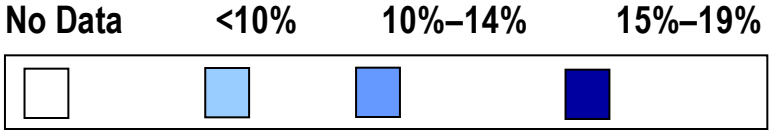
Obesity Trends* Among U.S. Adults

BRFSS, 1991





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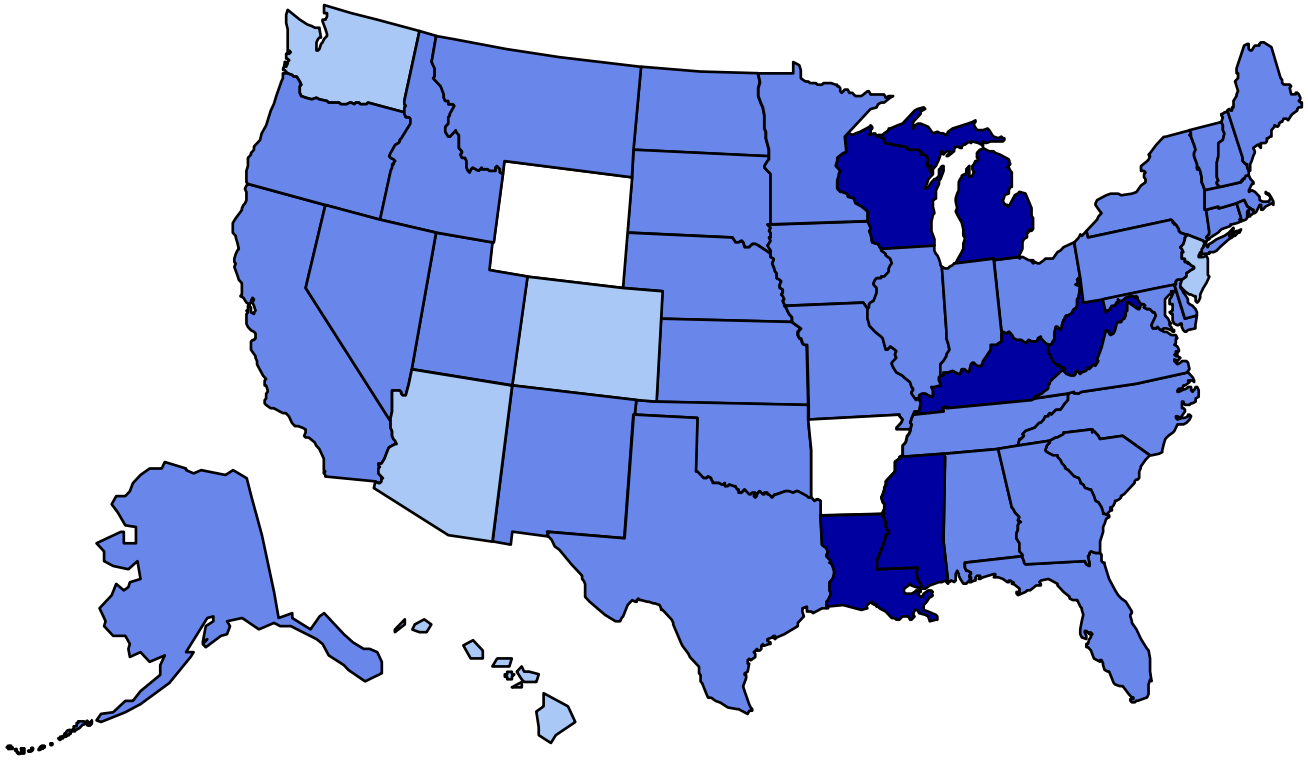
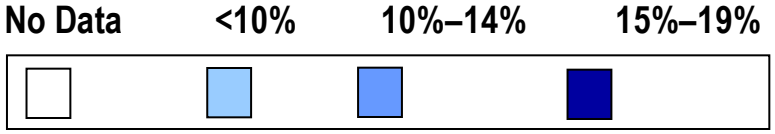
Obesity Trends* Among U.S. Adults

BRFSS, 1992





Source: Behavioral Risk Factor Surveillance System, CDC

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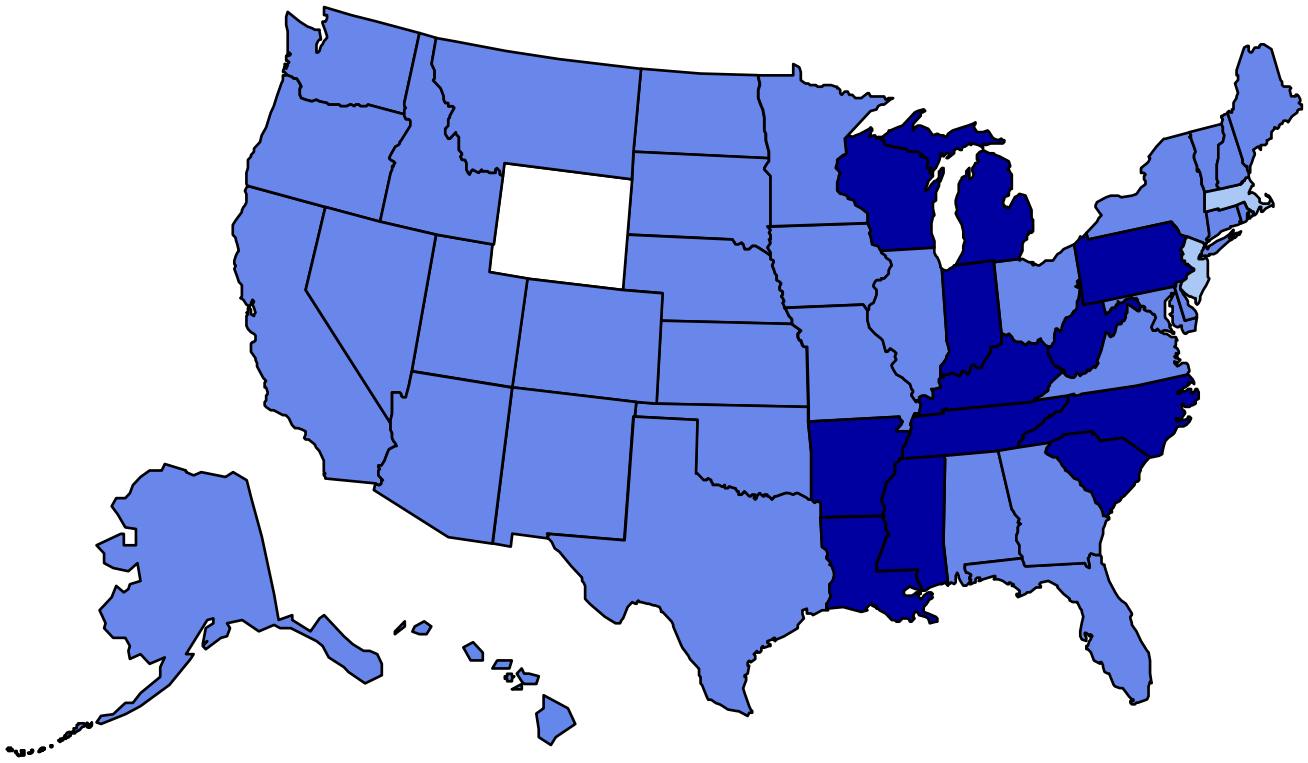
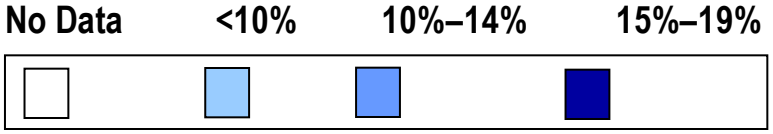
Obesity Trends* Among U.S. Adults

BRFSS, 1993





Source: Behavioral Risk Factor Surveillance System, CDC

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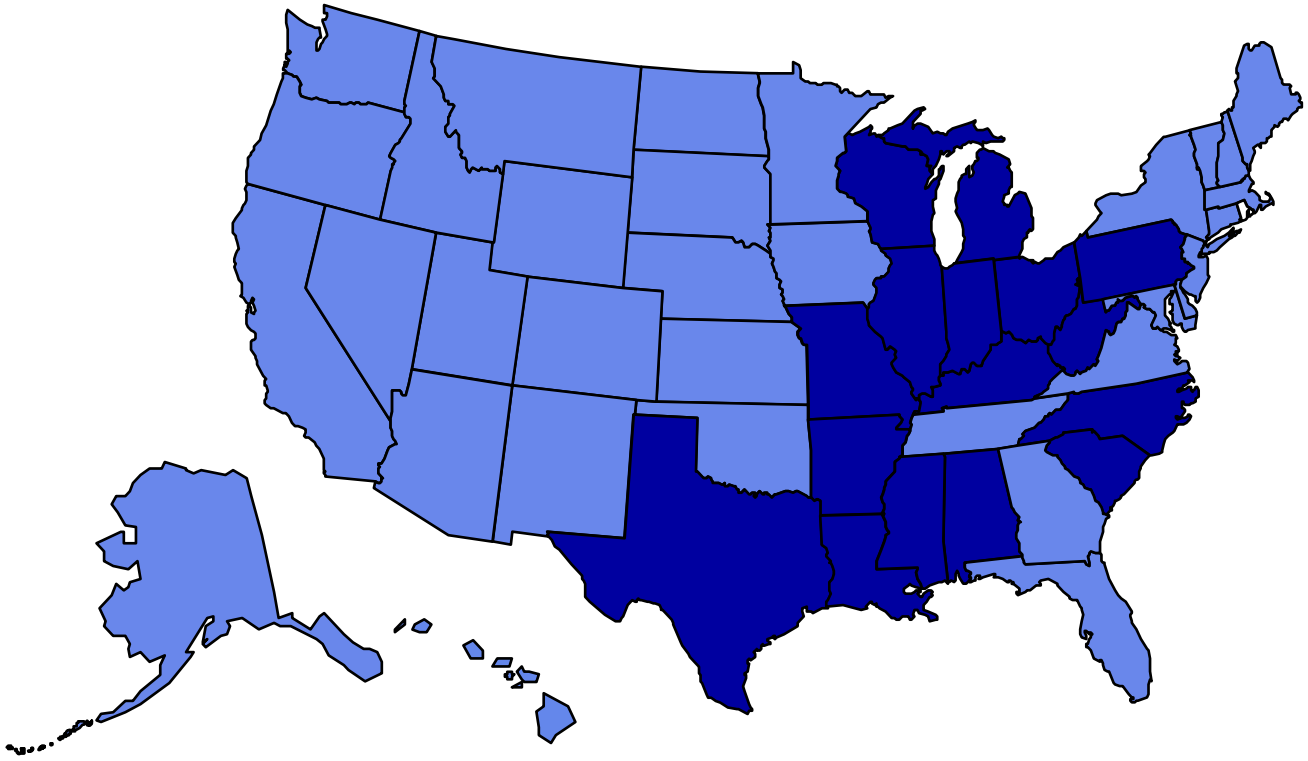
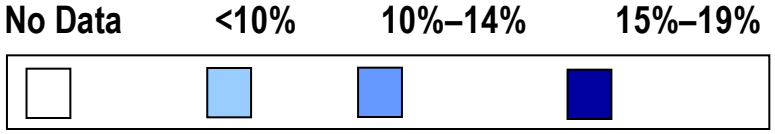
Obesity Trends* Among U.S. Adults

BRFSS, 1994





Source: Behavioral Risk Factor Surveillance System, CDC

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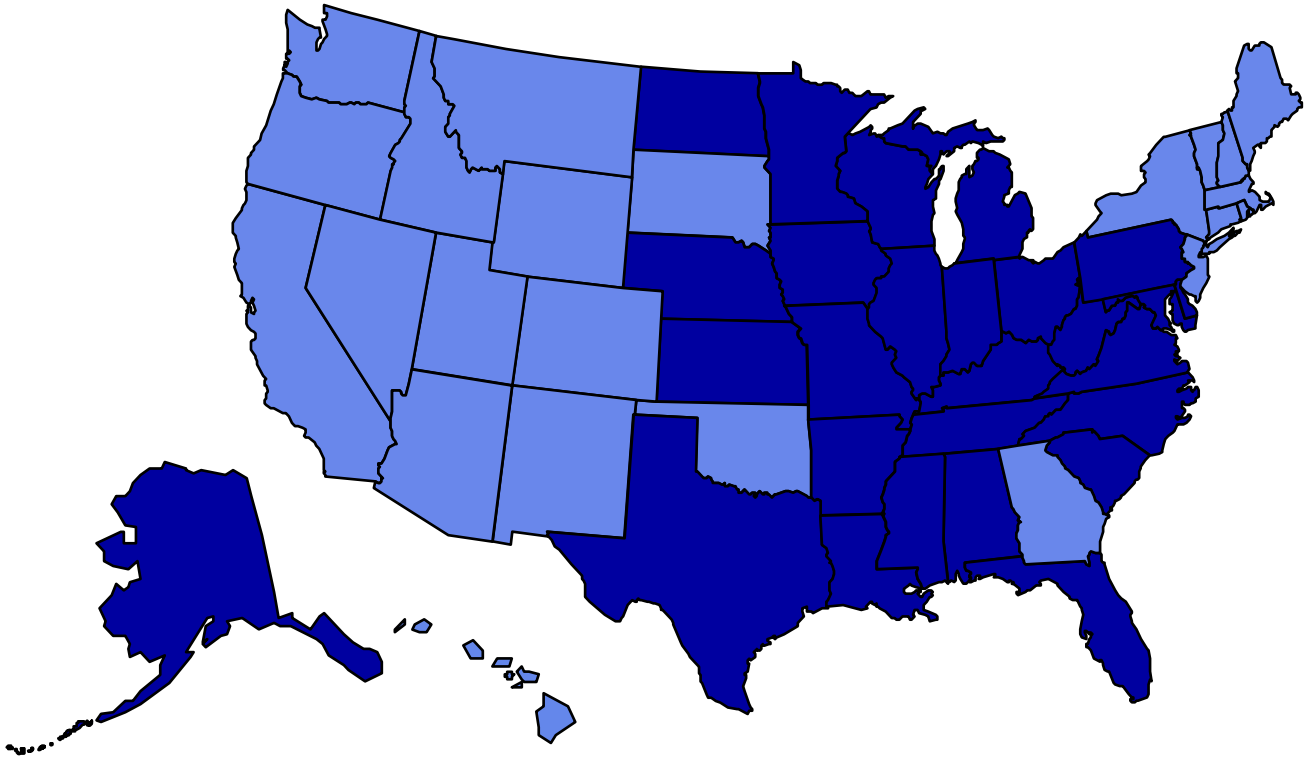
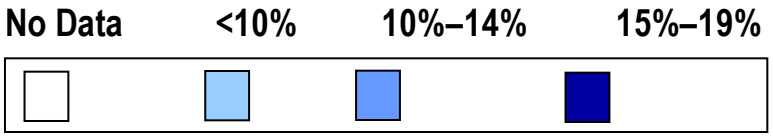
Obesity Trends* Among U.S. Adults

BRFSS, 1995





Source: Behavioral Risk Factor Surveillance System, CDC

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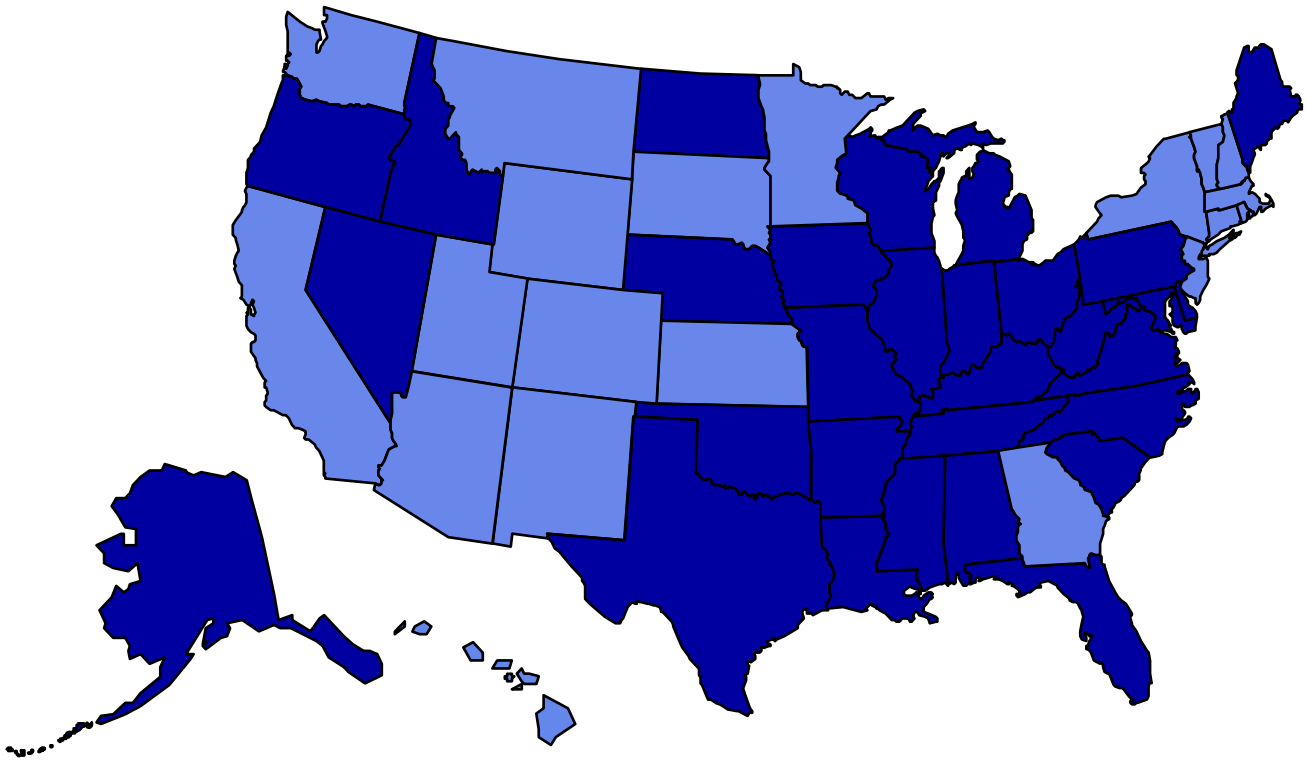
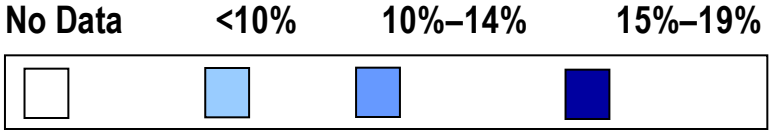
Obesity Trends* Among U.S. Adults

BRFSS, 1996



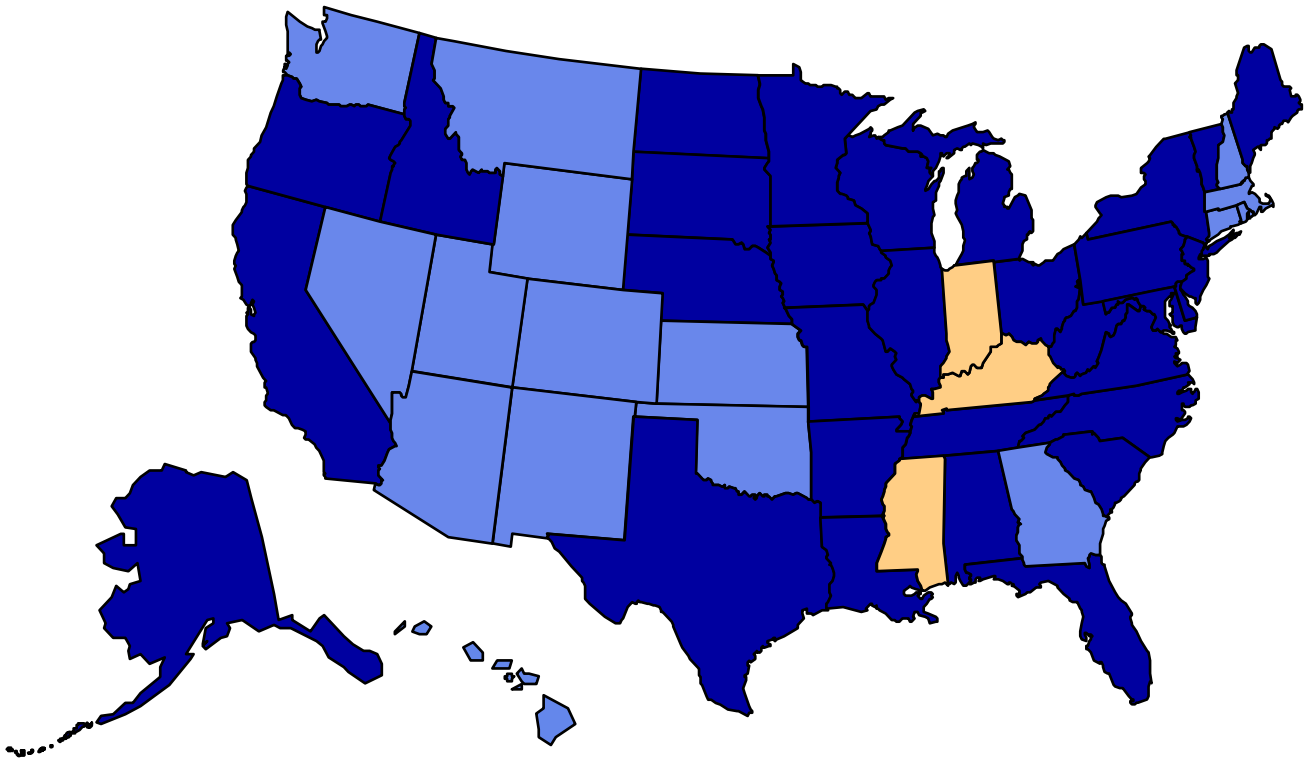


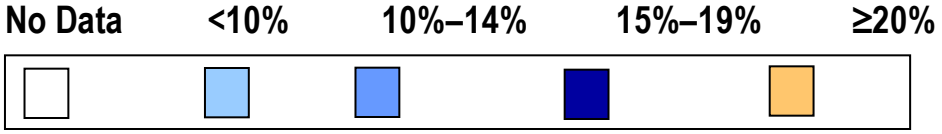
Source: Behavioral Risk Factor Surveillance System, CDC

Map and data via the Centers for Disease Control. This image is in the public domain.

Obesity Trends* Among U.S. Adults

BRFSS, 1997





Source: Behavioral Risk Factor Surveillance System, CDC

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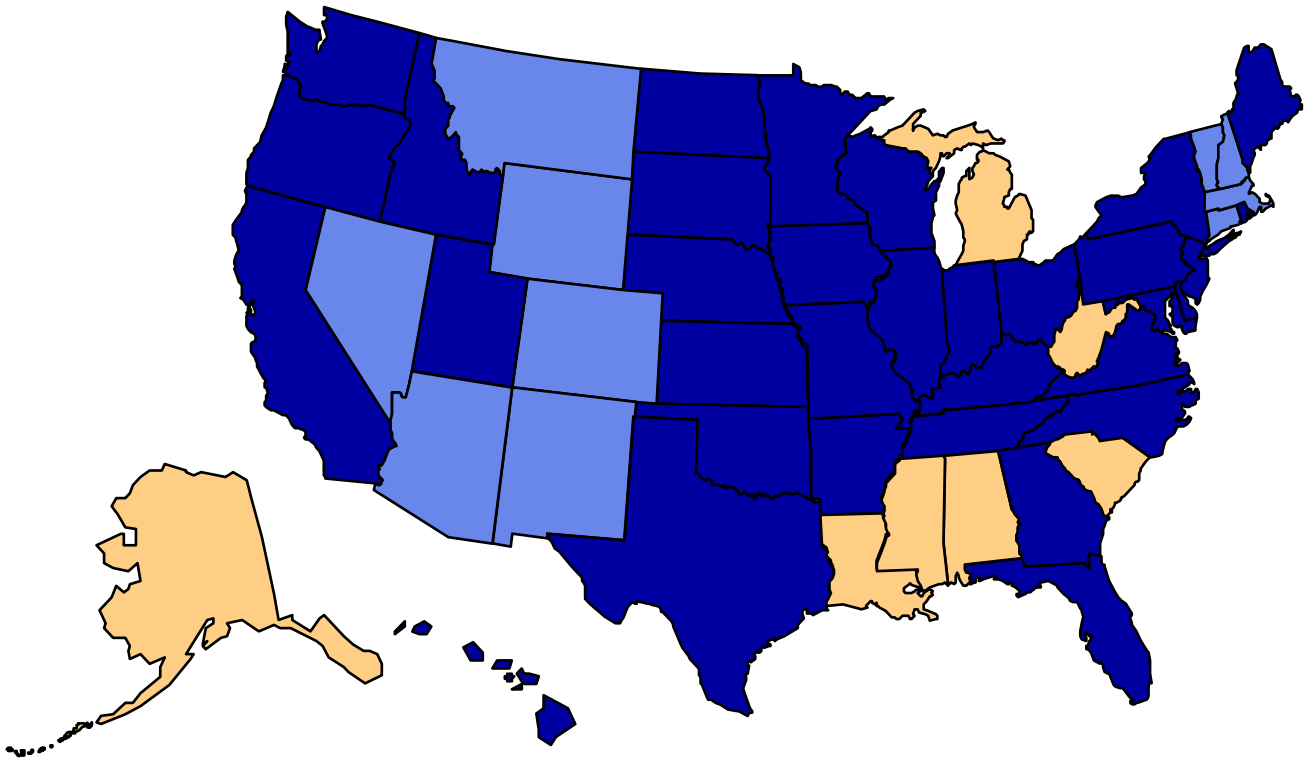
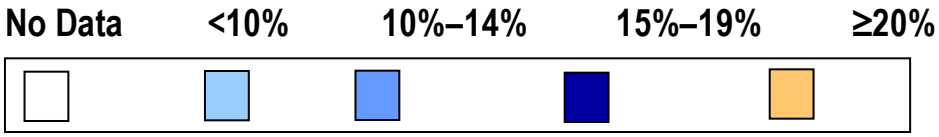
Obesity Trends* Among U.S. Adults

BRFSS, 1998



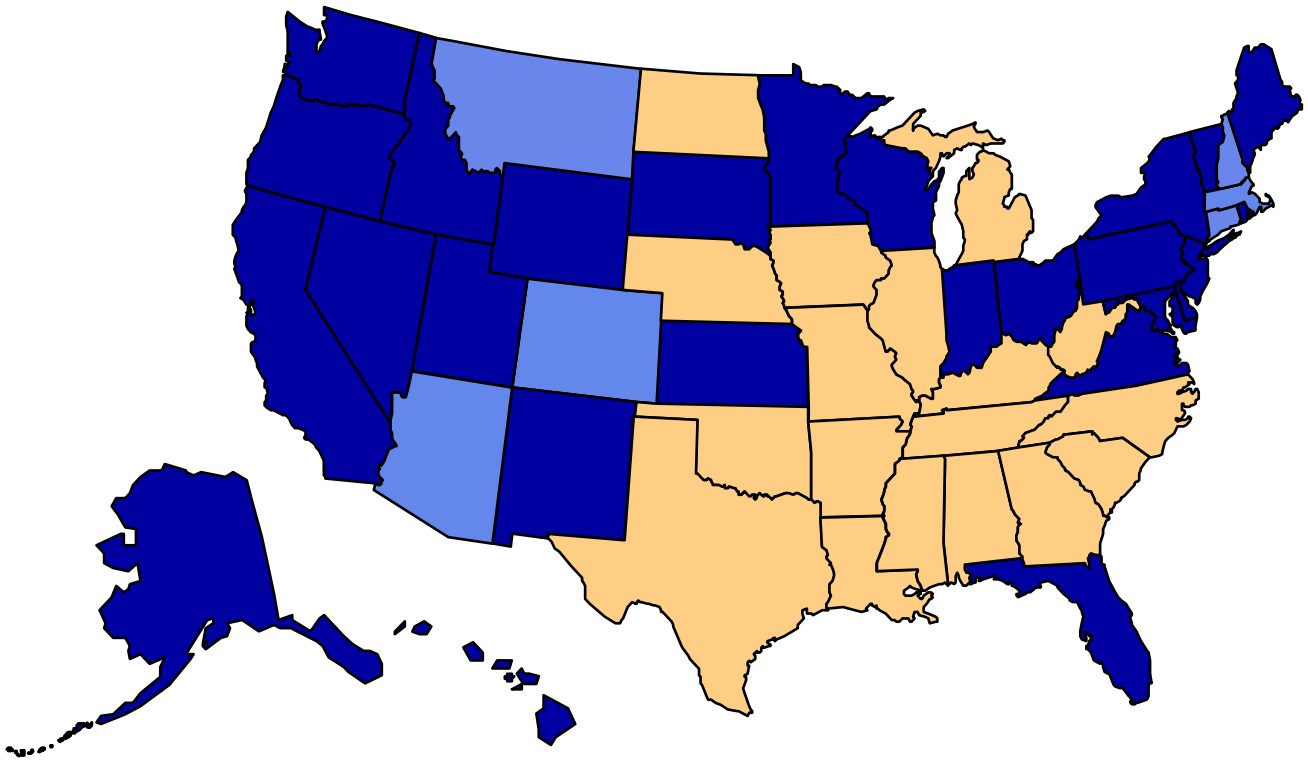


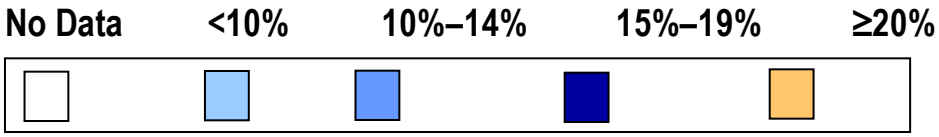
Source: Behavioral Risk Factor Surveillance System, CDC

Map and data via the Centers for Disease Control. This image is in the public domain.

Obesity Trends* Among U.S. Adults

BRFSS, 1999



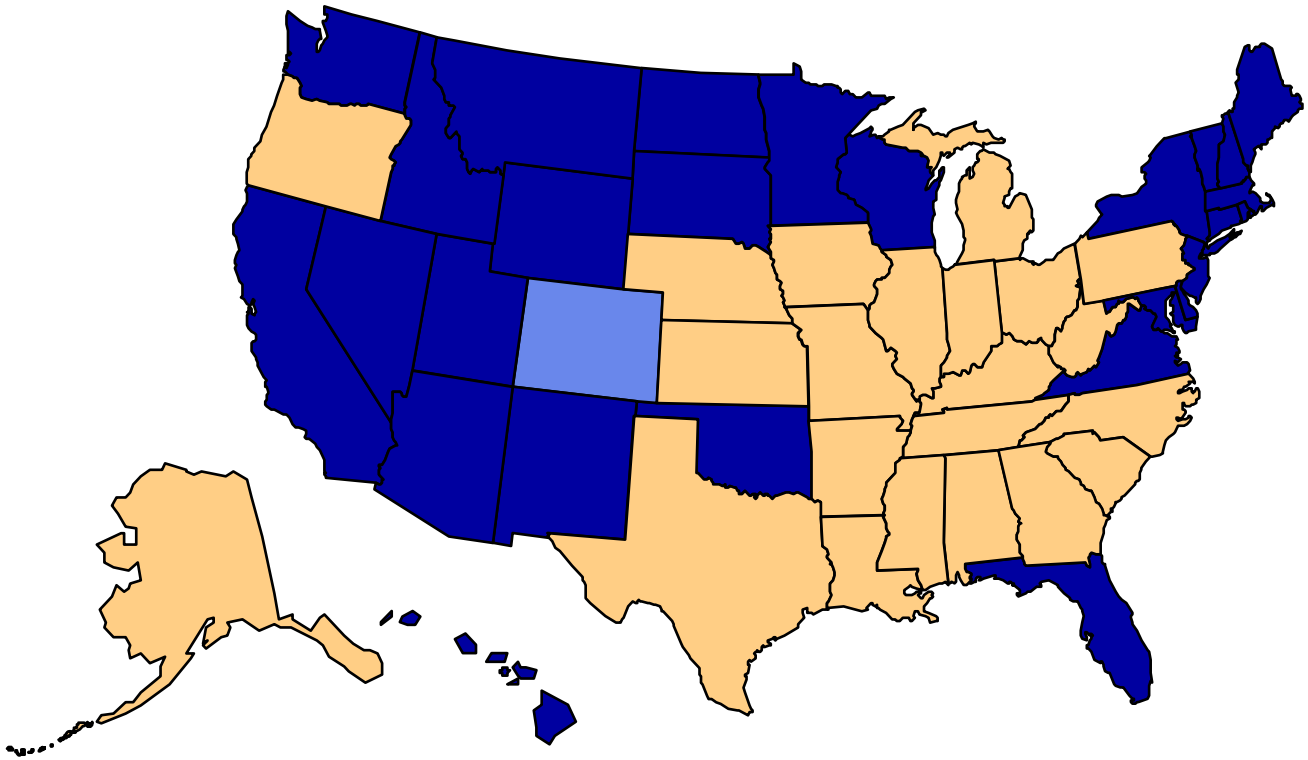


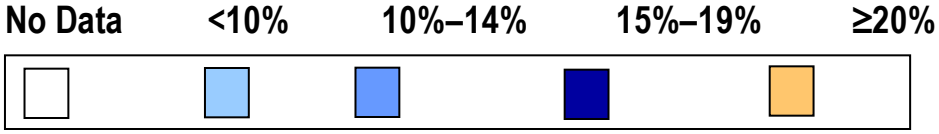
Source: Behavioral Risk Factor Surveillance System, CDC

Map and data via the Centers for Disease Control. This image is in the public domain.

Obesity Trends* Among U.S. Adults

BRFSS, 2000



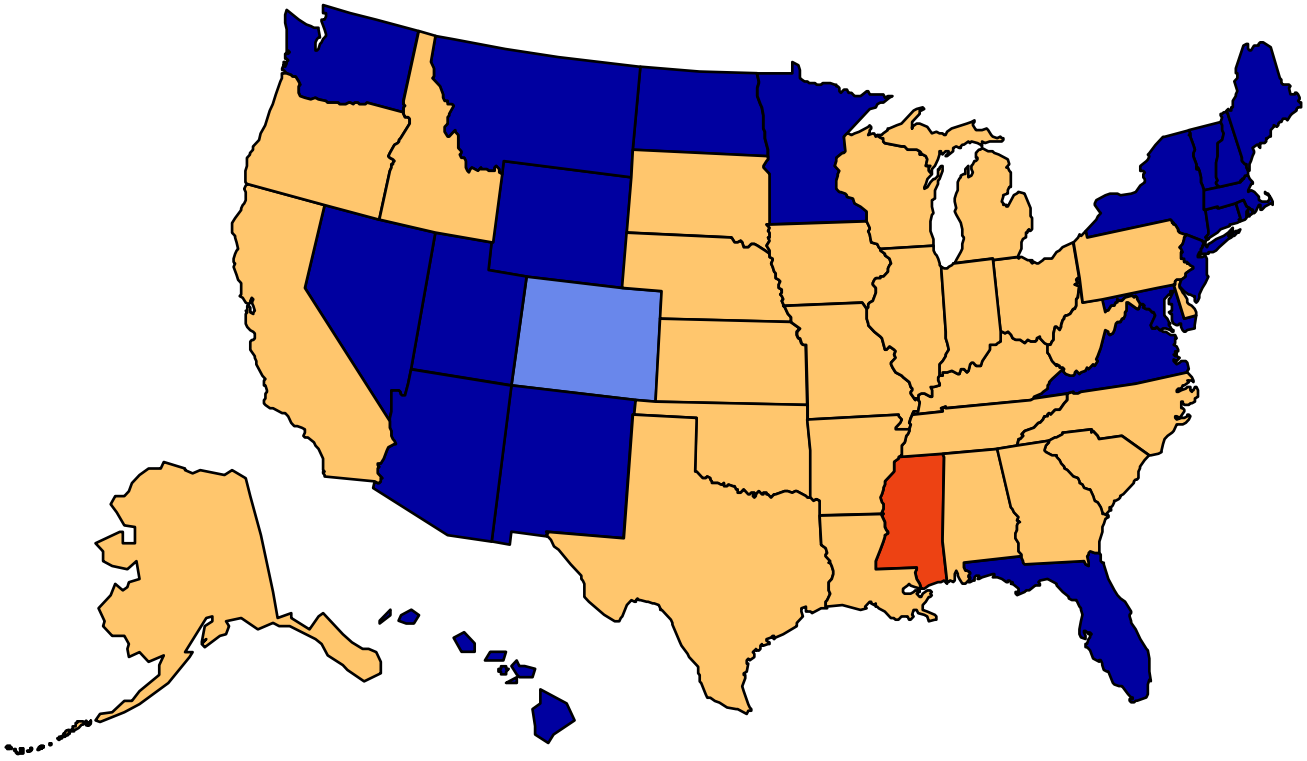


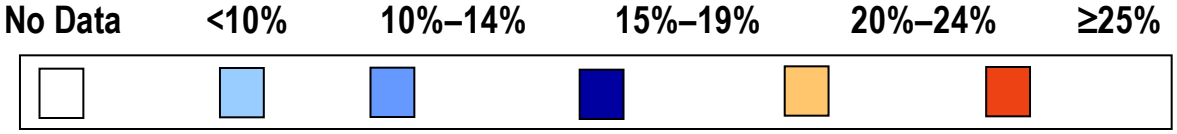
Source: Behavioral Risk Factor Surveillance System, CDC

Map and data via the Centers for Disease Control. This image is in the public domain.

Obesity Trends* Among U.S. Adults

BRFSS, 2001

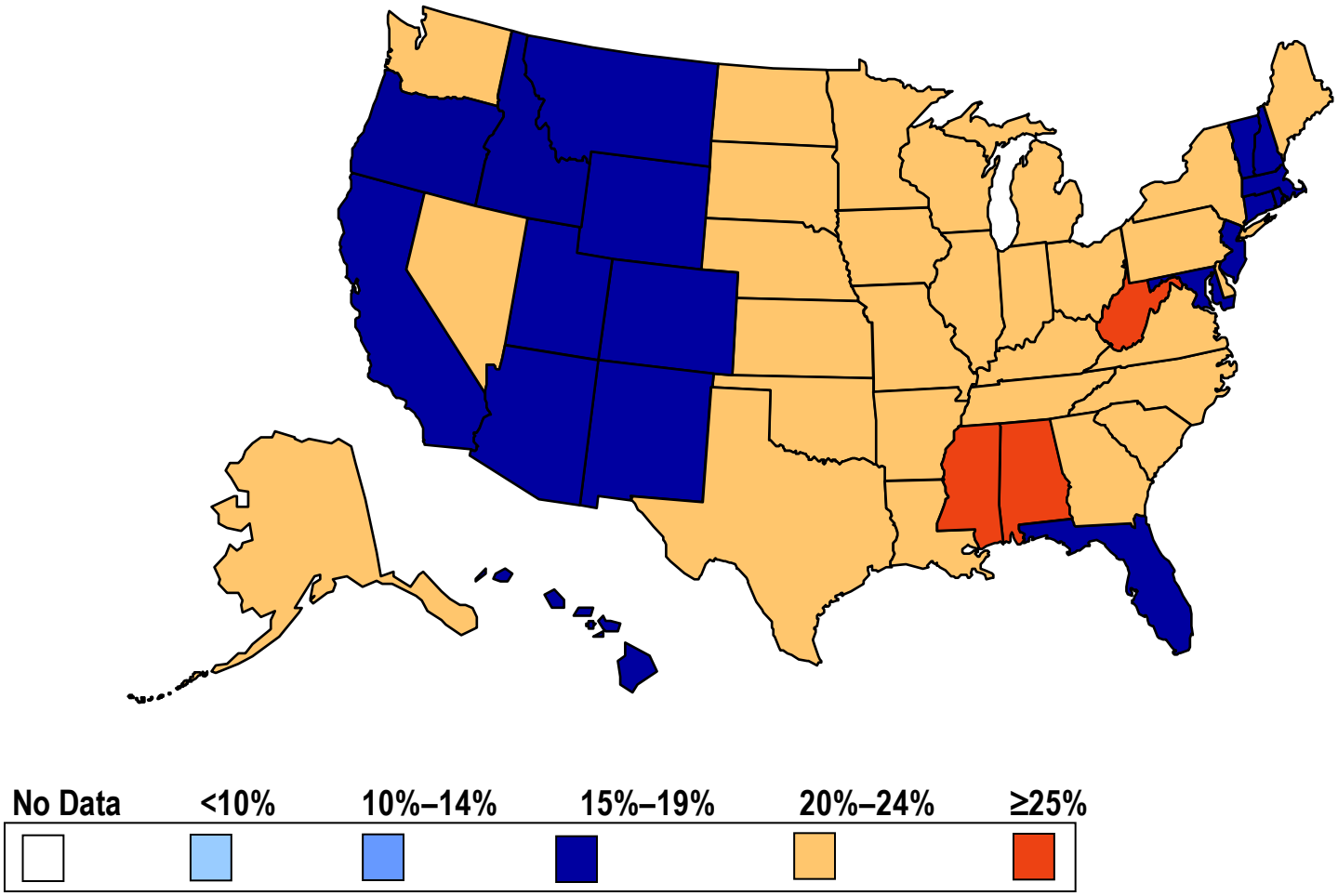




Source: Behavioral Risk Factor Surveillance System, CDC

Map and data via the Centers for Disease Control. This image is in the public domain.

Obesity Trends* Among U.S. Adults
BRFSS, 2002

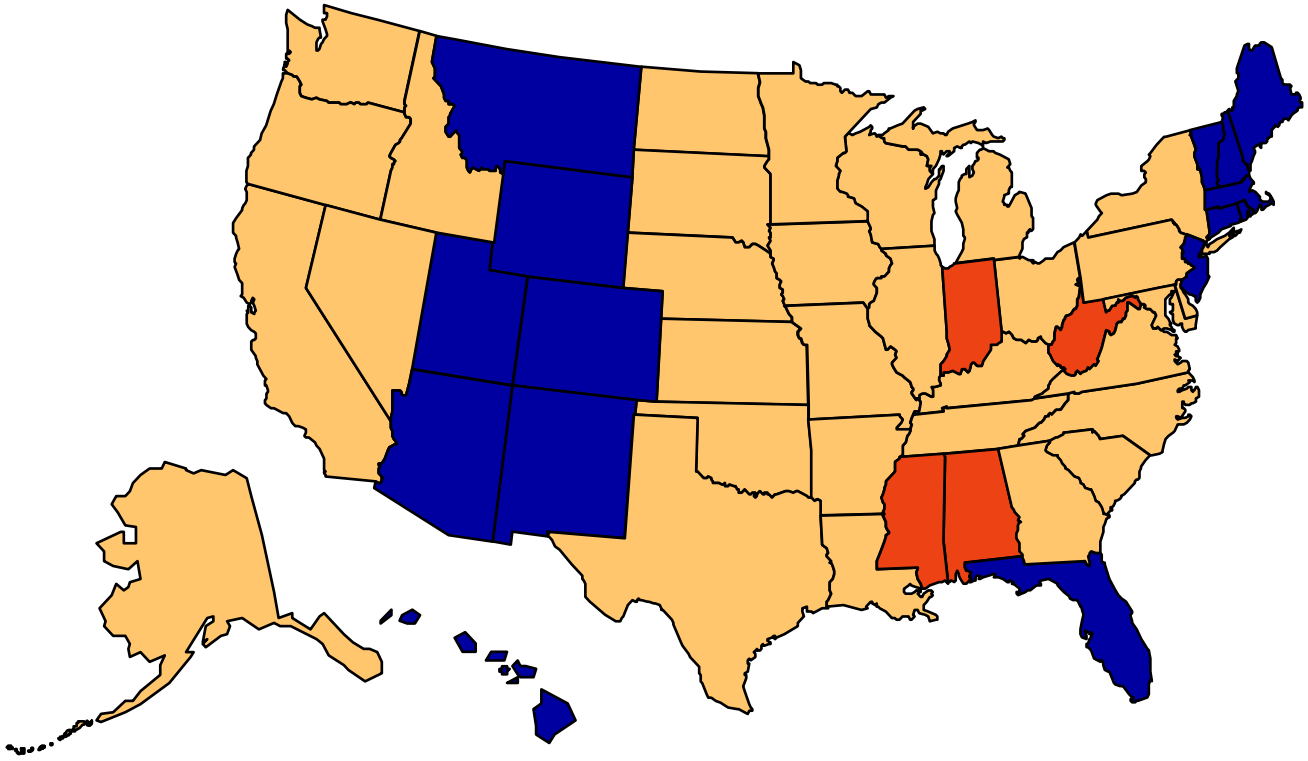


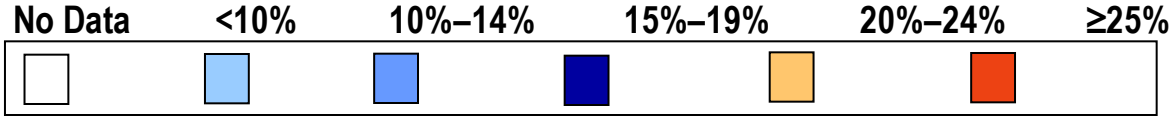
Source: Behavioral Risk Factor Surveillance System, CDC

Map and data via the Centers for Disease Control. This image is in the public domain.

Obesity Trends* Among U.S. Adults

BRFSS, 2003



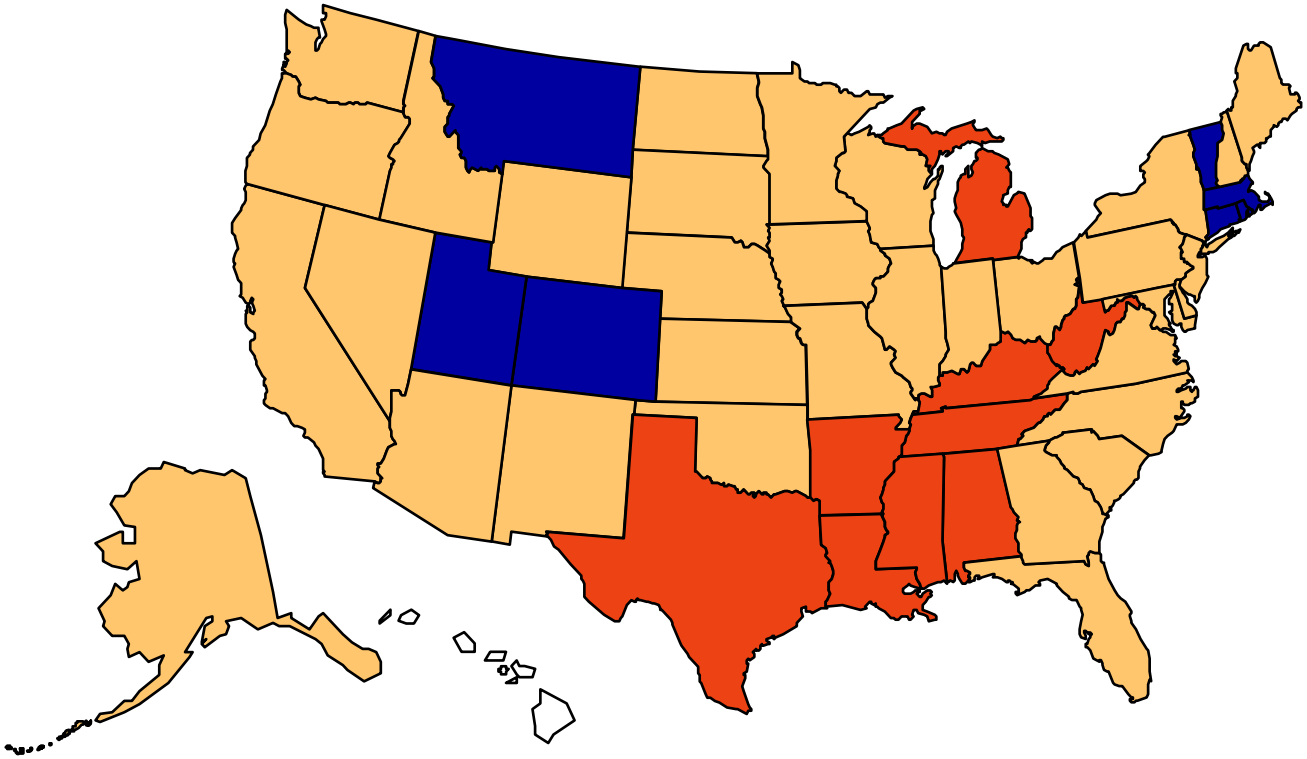


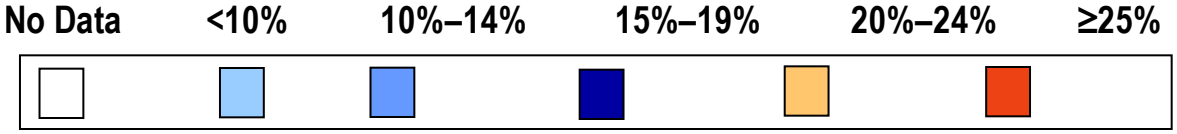
Source: Behavioral Risk Factor Surveillance System, CDC

Map and data via the Centers for Disease Control. This image is in the public domain.

Obesity Trends* Among U.S. Adults

BRFSS, 2004



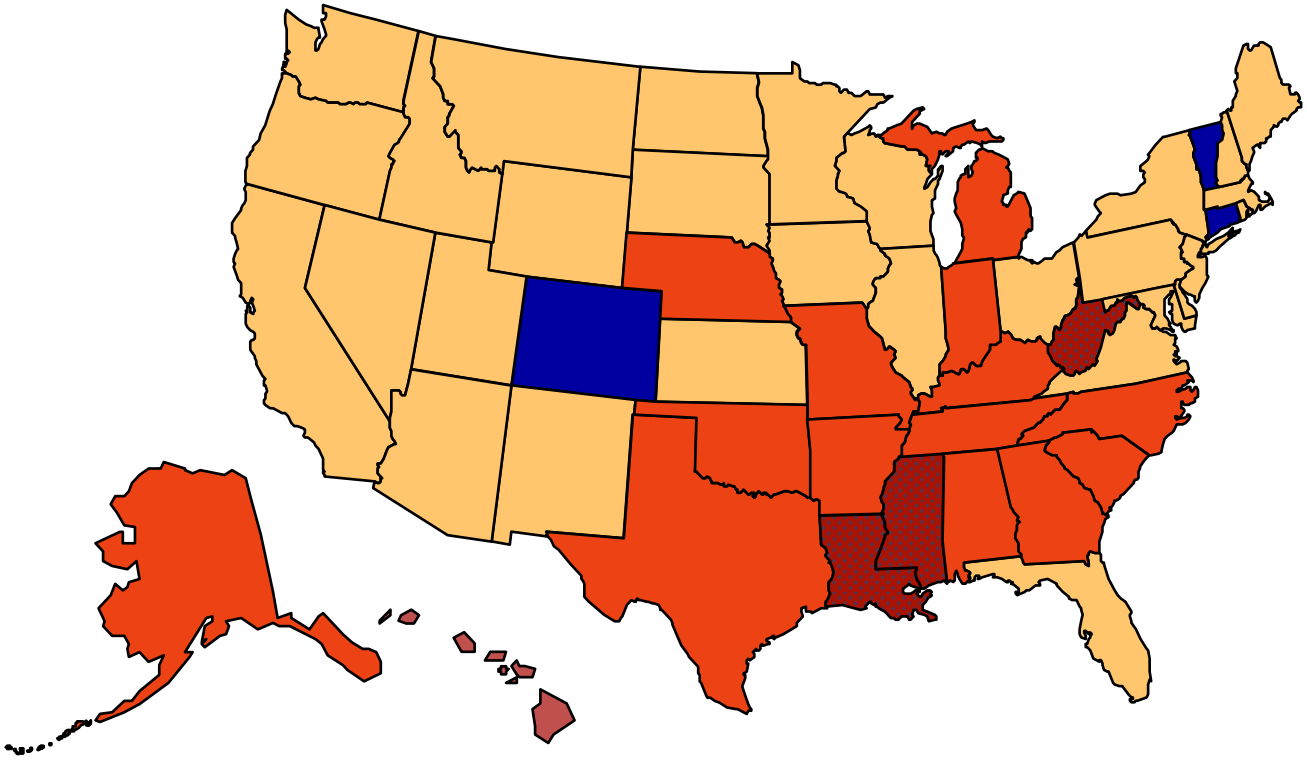


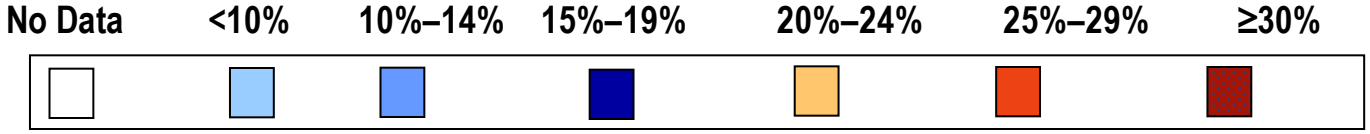
Source: Behavioral Risk Factor Surveillance System, CDC

Map and data via the Centers for Disease Control. This image is in the public domain.

Obesity Trends* Among U.S. Adults

BRFSS, 2005



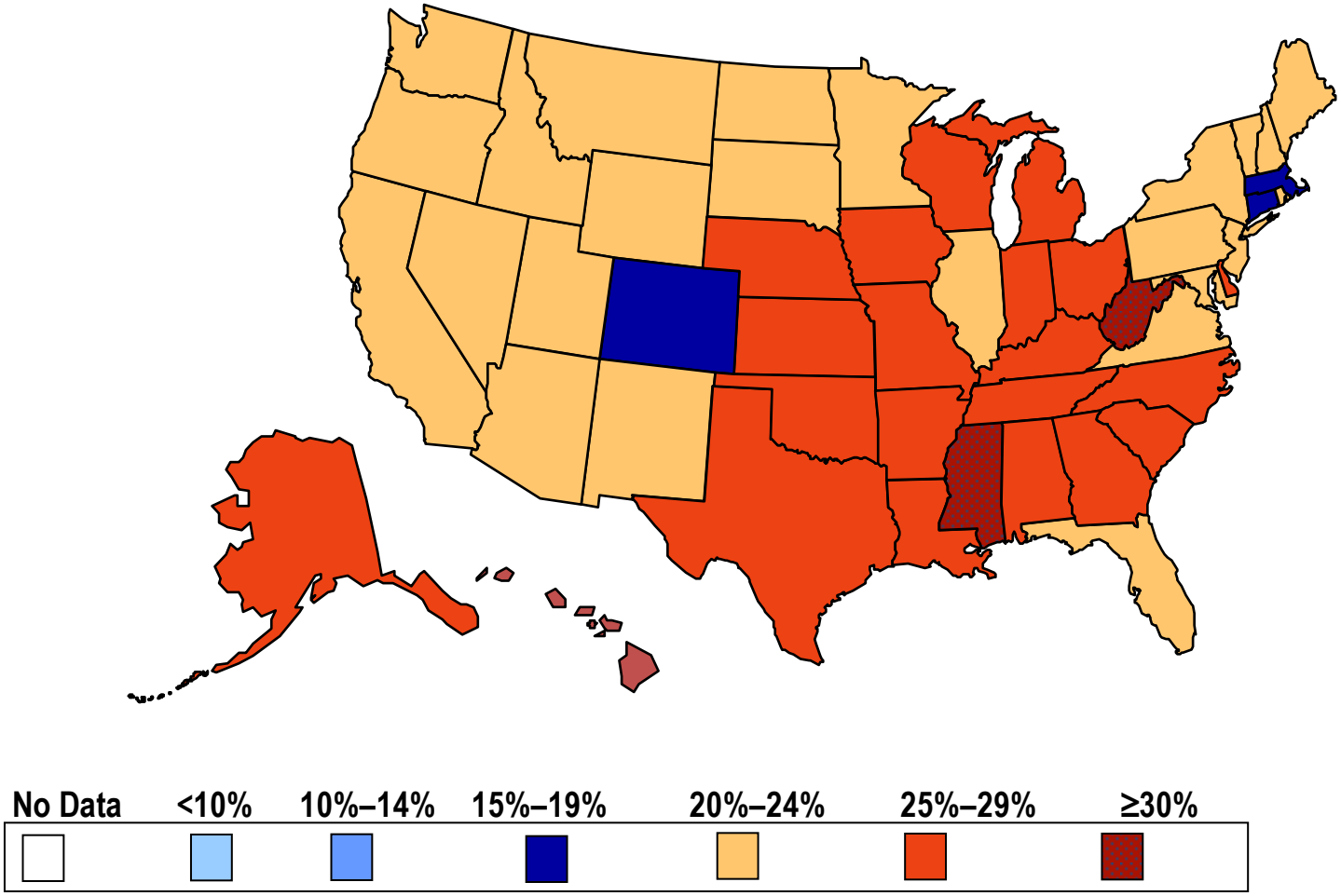


Source: Behavioral Risk Factor Surveillance System, CDC

Map and data via the Centers for Disease Control. This image is in the public domain.

Obesity Trends* Among U.S. Adults

BRFSS, 2006

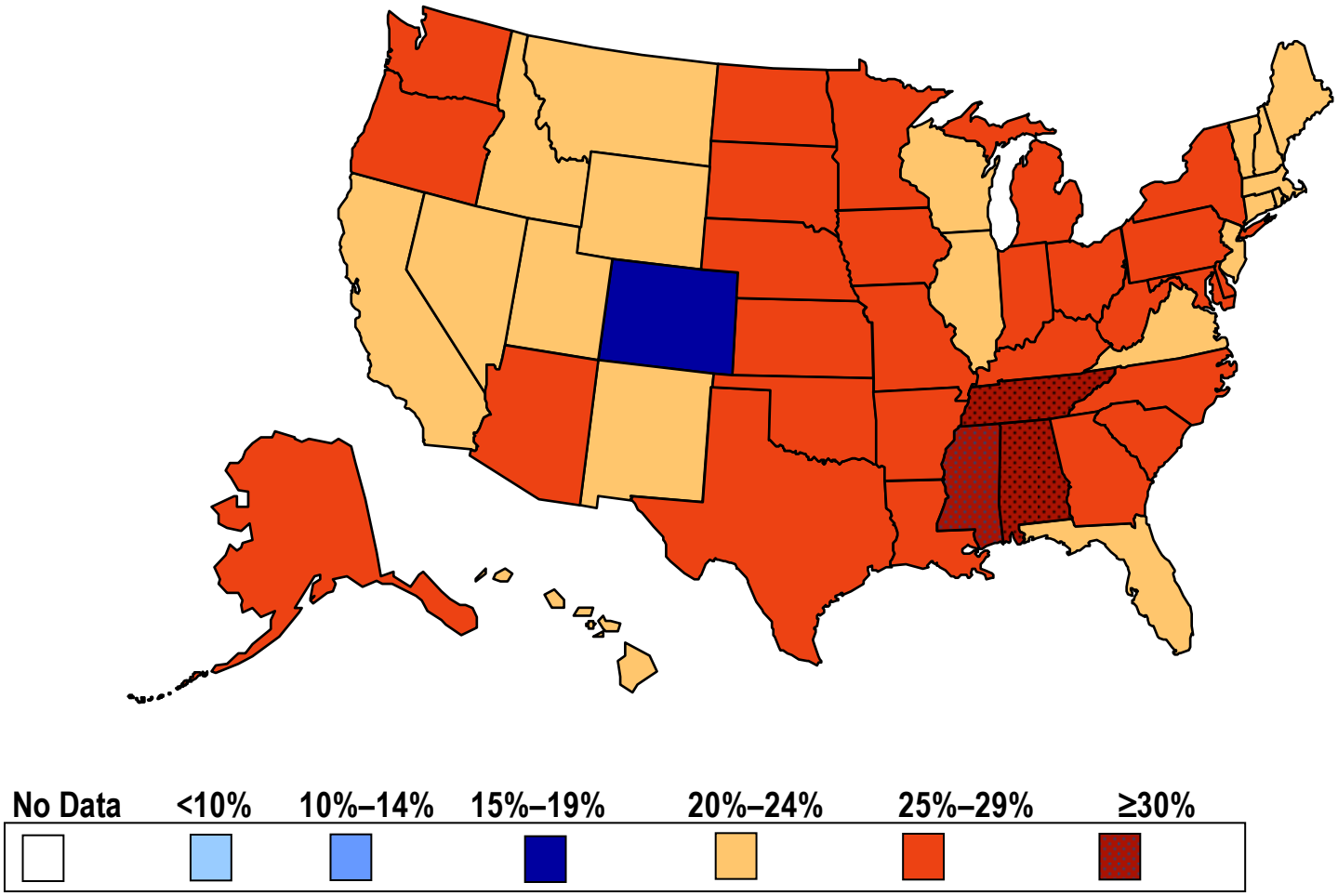


Source: Behavioral Risk Factor Surveillance System, CDC

Map and data via the Centers for Disease Control. This image is in the public domain.

Obesity Trends* Among U.S. Adults

BRFSS, 2007

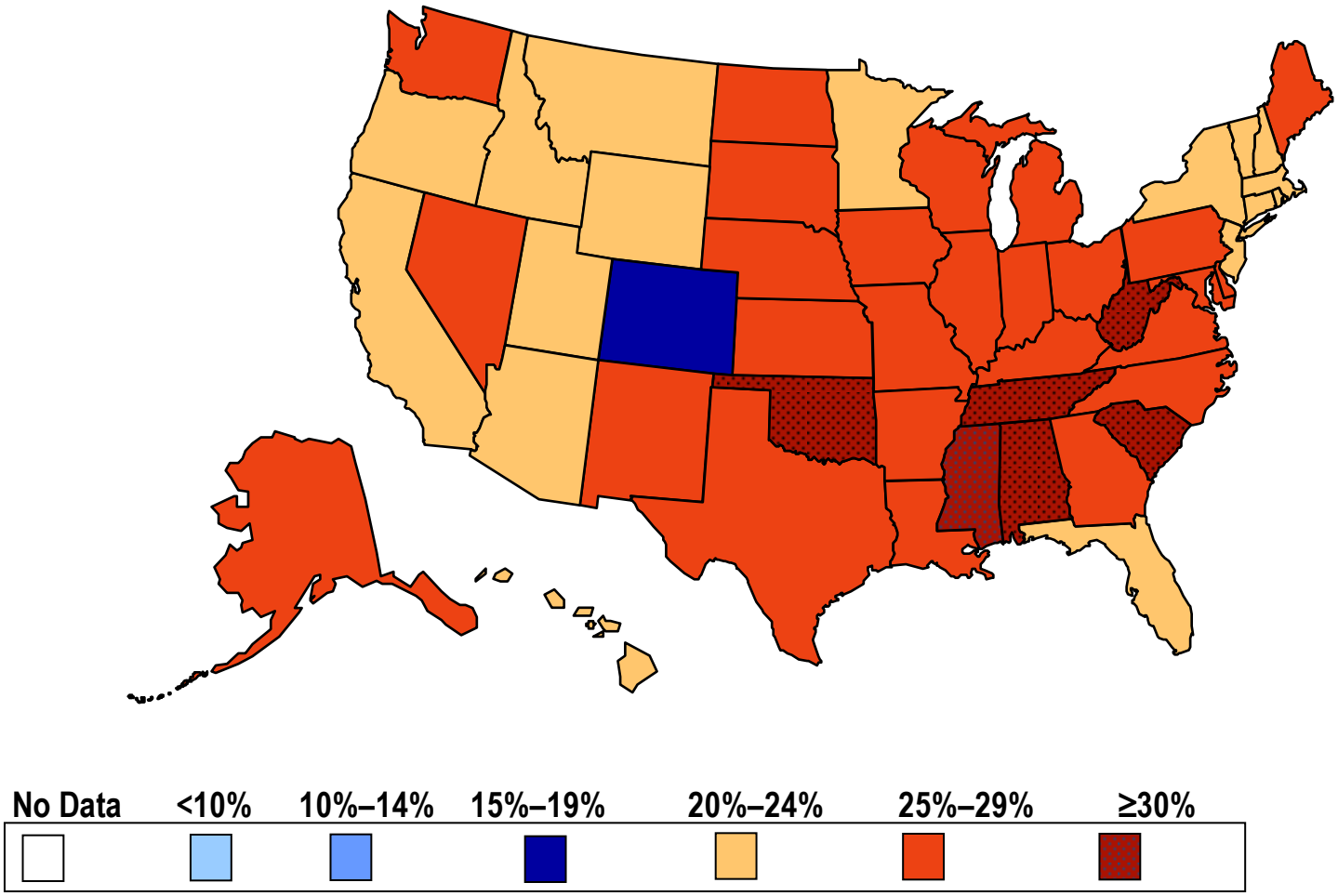


Source: Behavioral Risk Factor Surveillance System, CDC

Map and data via the Centers for Disease Control. This image is in the public domain.

Obesity Trends* Among U.S. Adults

BRFSS, 2008

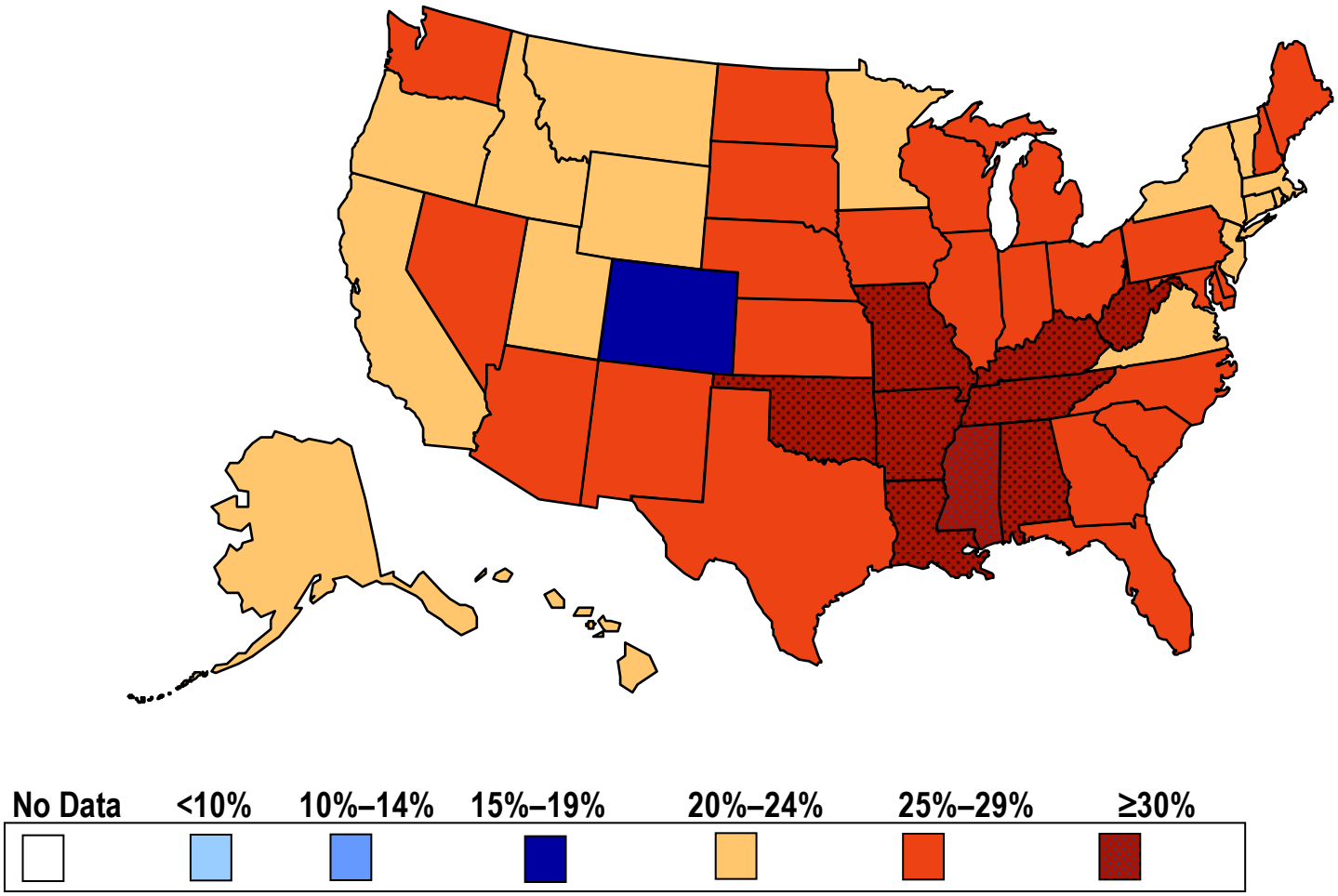


Source: Behavioral Risk Factor Surveillance System, CDC

Map and data via the Centers for Disease Control. This image is in the public domain.

Obesity Trends* Among U.S. Adults

BRFSS, 2009

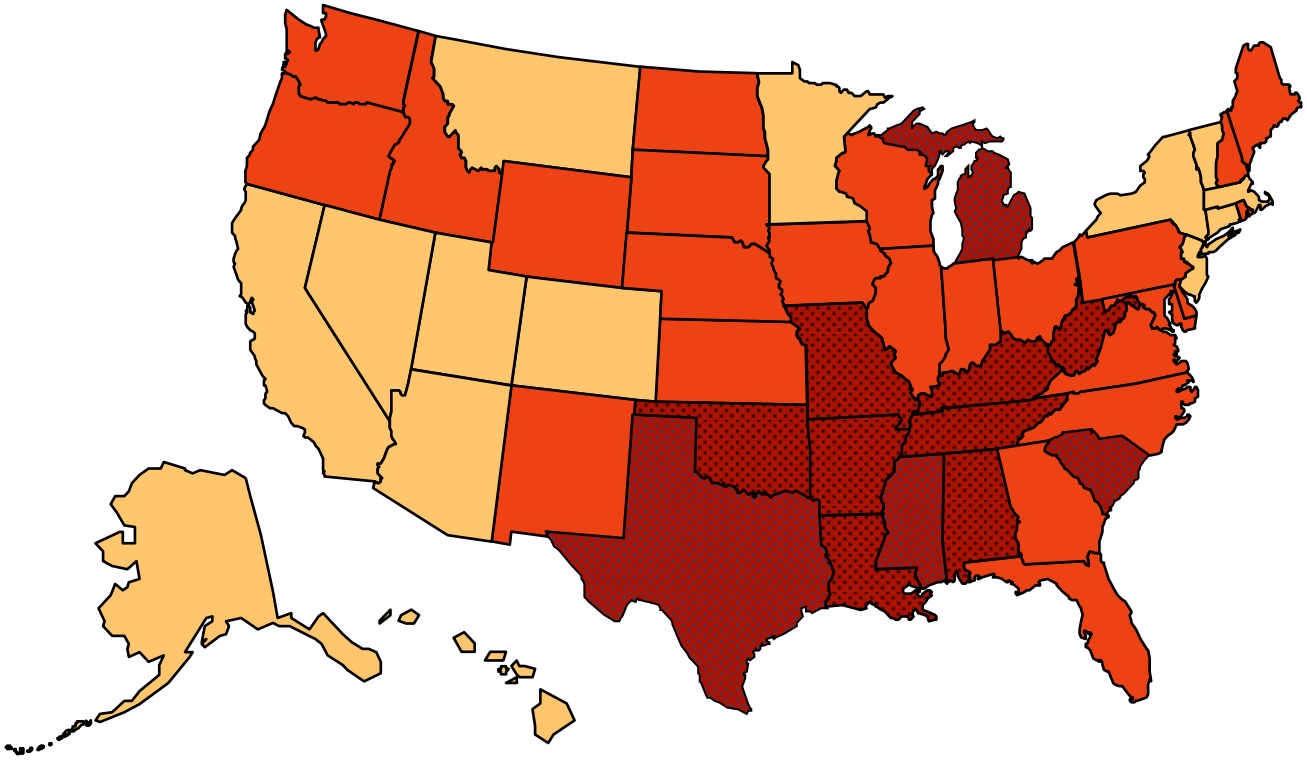


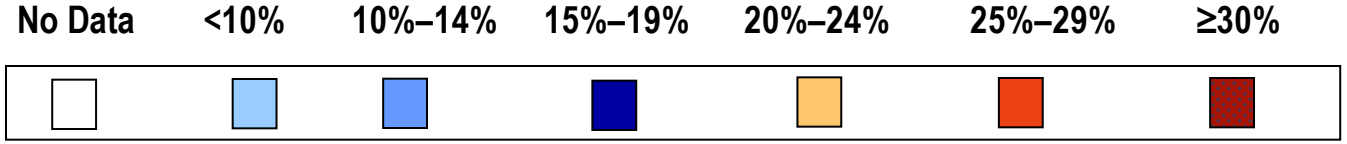
Source: Behavioral Risk Factor Surveillance System, CDC

Map and data via the Centers for Disease Control. This image is in the public domain.

Obesity Trends* Among U.S. Adults

BRFSS, 2010



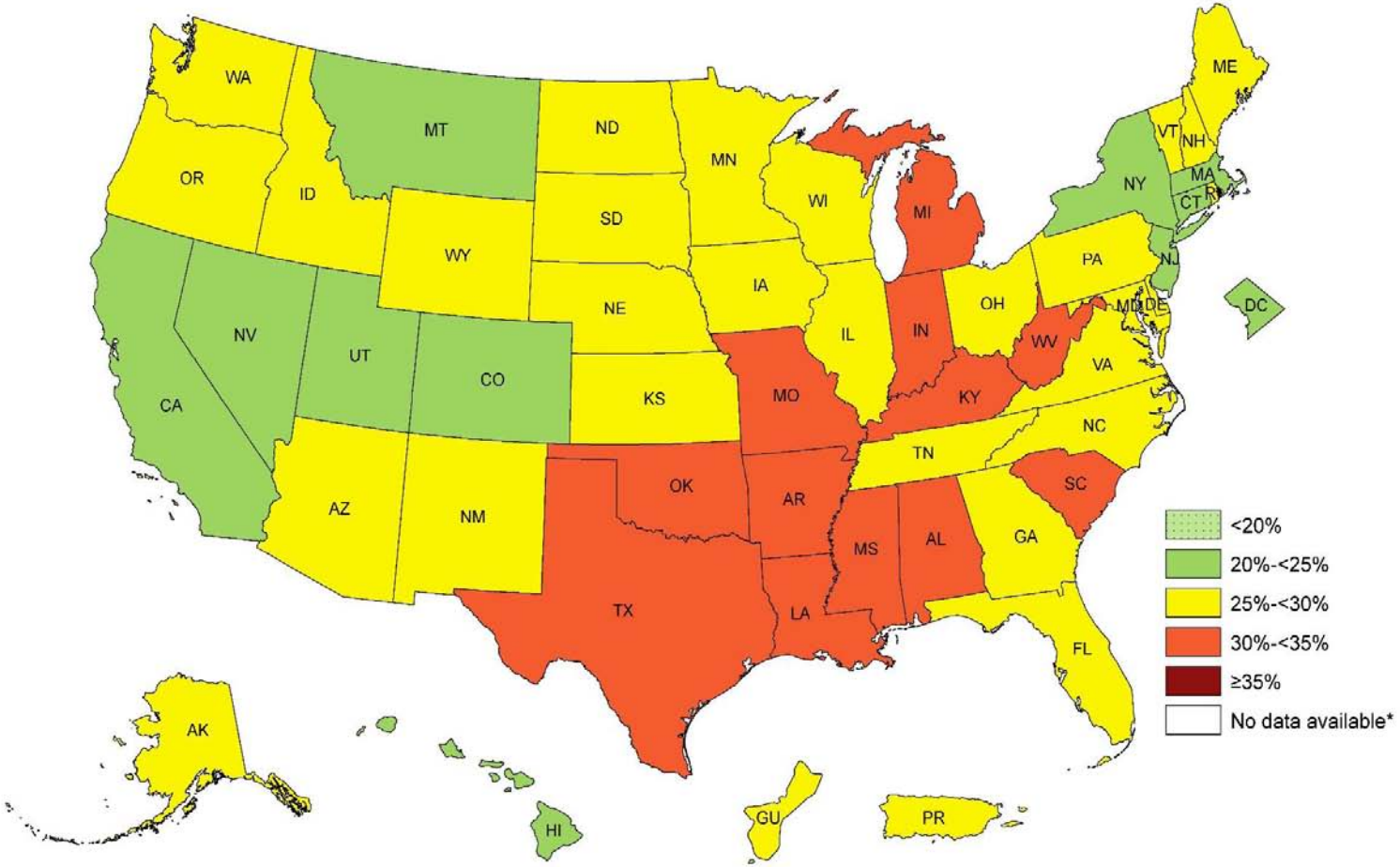


Source: Behavioral Risk Factor Surveillance System, CDC

Map and data via the Centers for Disease Control. This image is in the public domain.

Prevalence¶ of Self-Reported Obesity Among U.S. Adults by State and Territory, BRFSS, 2011

¶ Prevalence estimates reflect BRFSS methodological changes started in 2011. These estimates should not be compared to prevalence estimates before 2011.



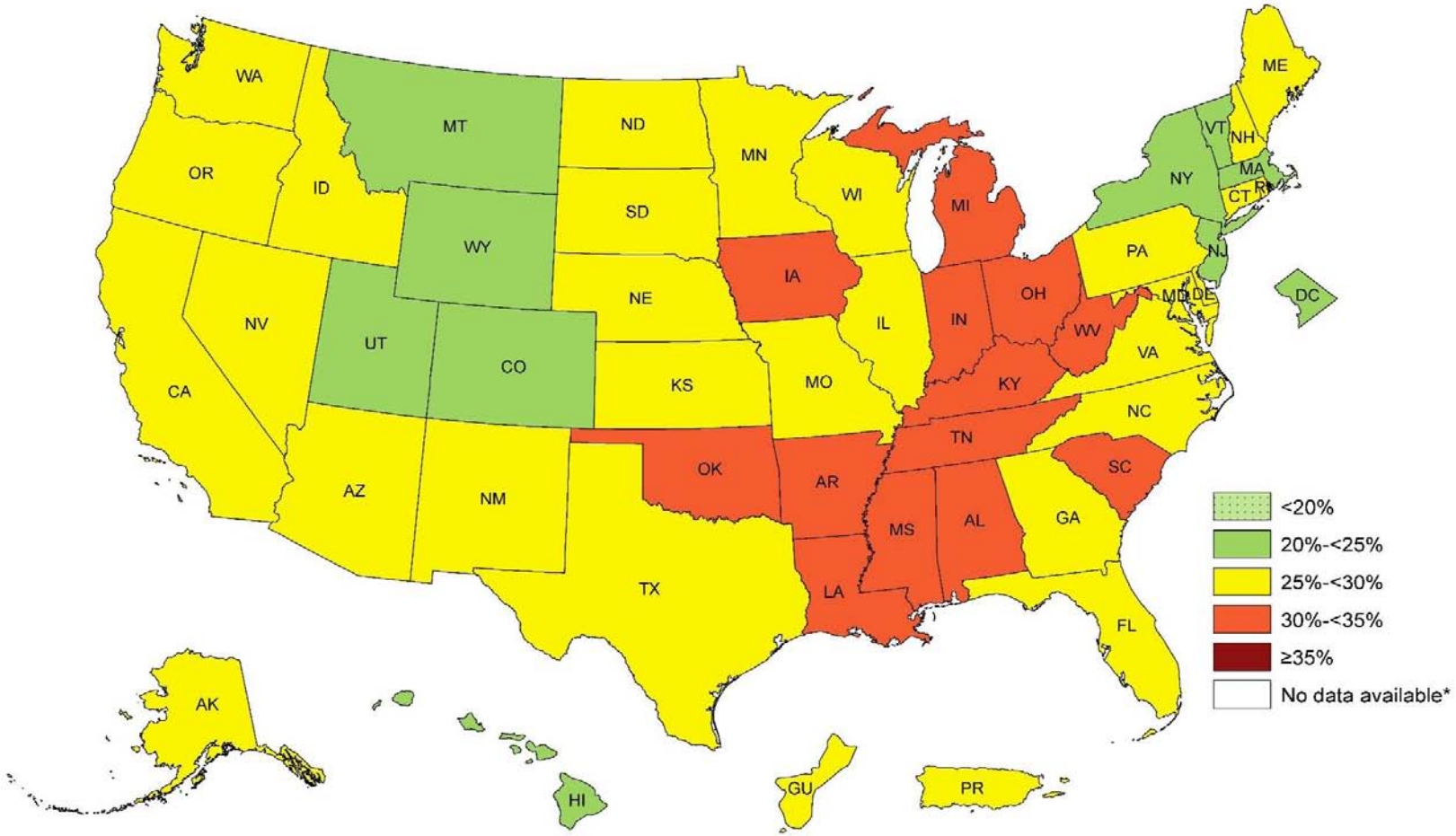
Source: Behavioral Risk Factor Surveillance System, CDC

***Sample size <50 or the relative standard error (dividing the standard error by the prevalence) ≥ 30%.**

Map and data via the Centers for Disease Control. This image is in the public domain.

Prevalence¶ of Self-Reported Obesity Among U.S. Adults by State and Territory, BRFSS, 2012

¶ Prevalence estimates reflect BRFSS methodological changes started in 2011. These estimates should not be compared to prevalence estimates before 2011.



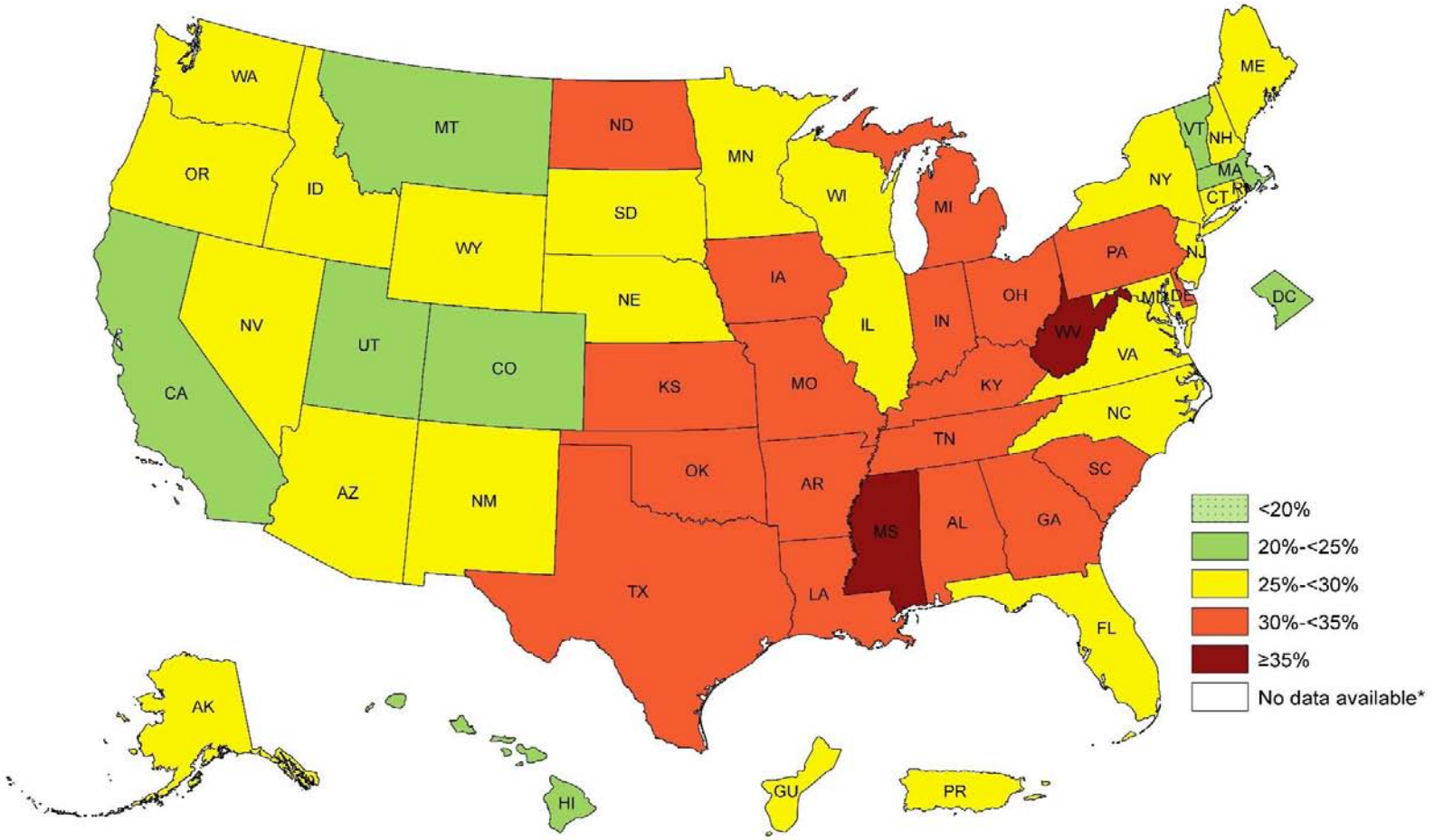
Source: Behavioral Risk Factor Surveillance System, CDC

***Sample size <50 or the relative standard error (dividing the standard error by the prevalence) ≥ 30%.**

Map and data via the Centers for Disease Control. This image is in the public domain.

Prevalence¶ of Self-Reported Obesity Among U.S. Adults by State and Territory, BRFSS, 2013

¶ Prevalence estimates reflect BRFSS methodological changes started in 2011. These estimates should not be compared to prevalence estimates before 2011.



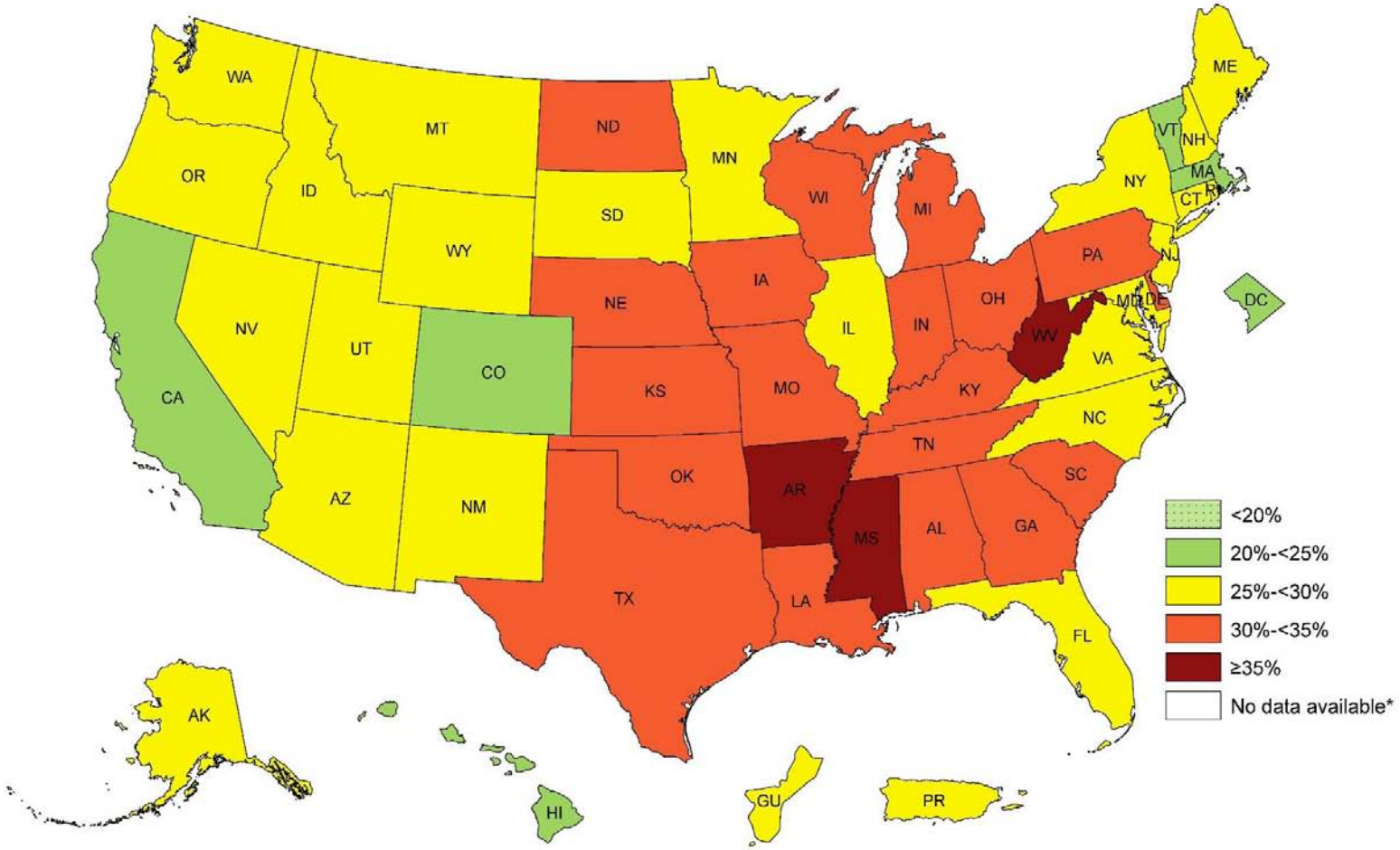
Source: Behavioral Risk Factor Surveillance System, CDC

***Sample size <50 or the relative standard error (dividing the standard error by the prevalence) ≥ 30%.**

Map and data via the Centers for Disease Control. This image is in the public domain.

Prevalence¶ of Self-Reported Obesity Among U.S. Adults by State and Territory, BRFSS, 2014

¶ Prevalence estimates reflect BRFSS methodological changes started in 2011. These estimates should not be compared to prevalence estimates before 2011.



Source: Behavioral Risk Factor Surveillance System, CDC

***Sample size <50 or the relative standard error (dividing the standard error by the prevalence) ≥ 30%.**

Map and data via the Centers for Disease Control. This image is in the public domain.

Poor Health by Income and Race/Ethnicity

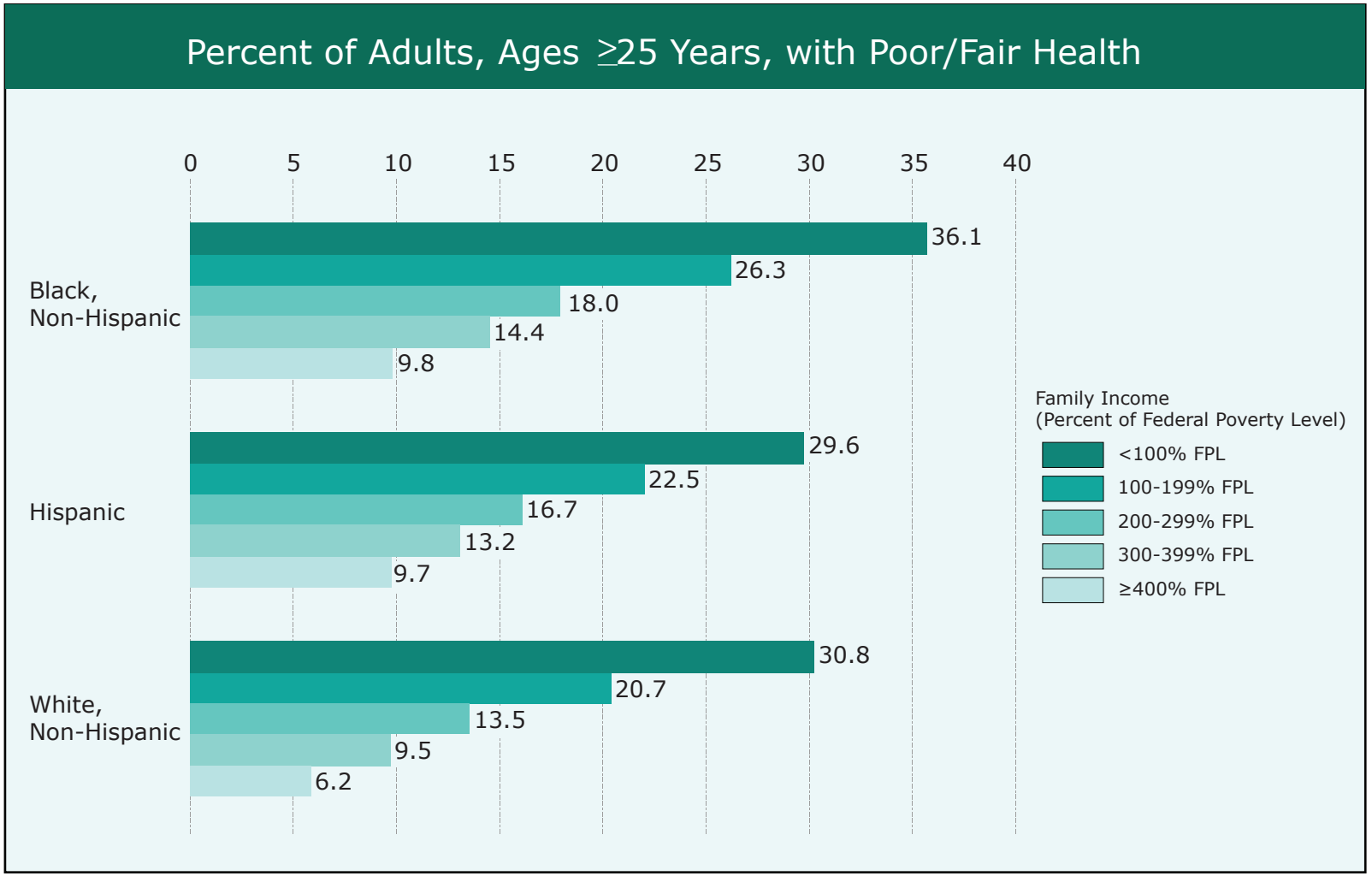
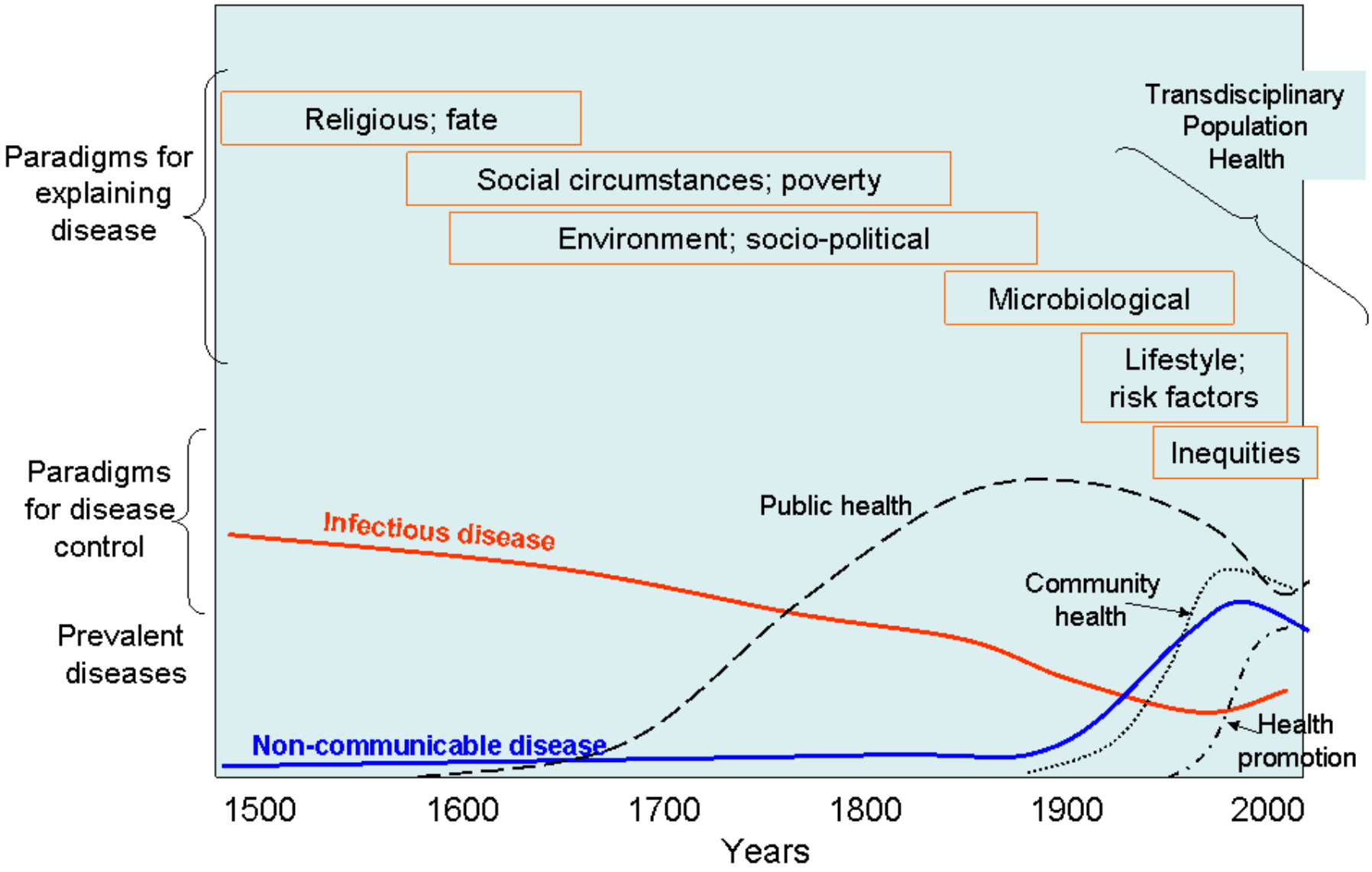


Image by MIT OpenCourseWare.

Evolution of Public Health Models



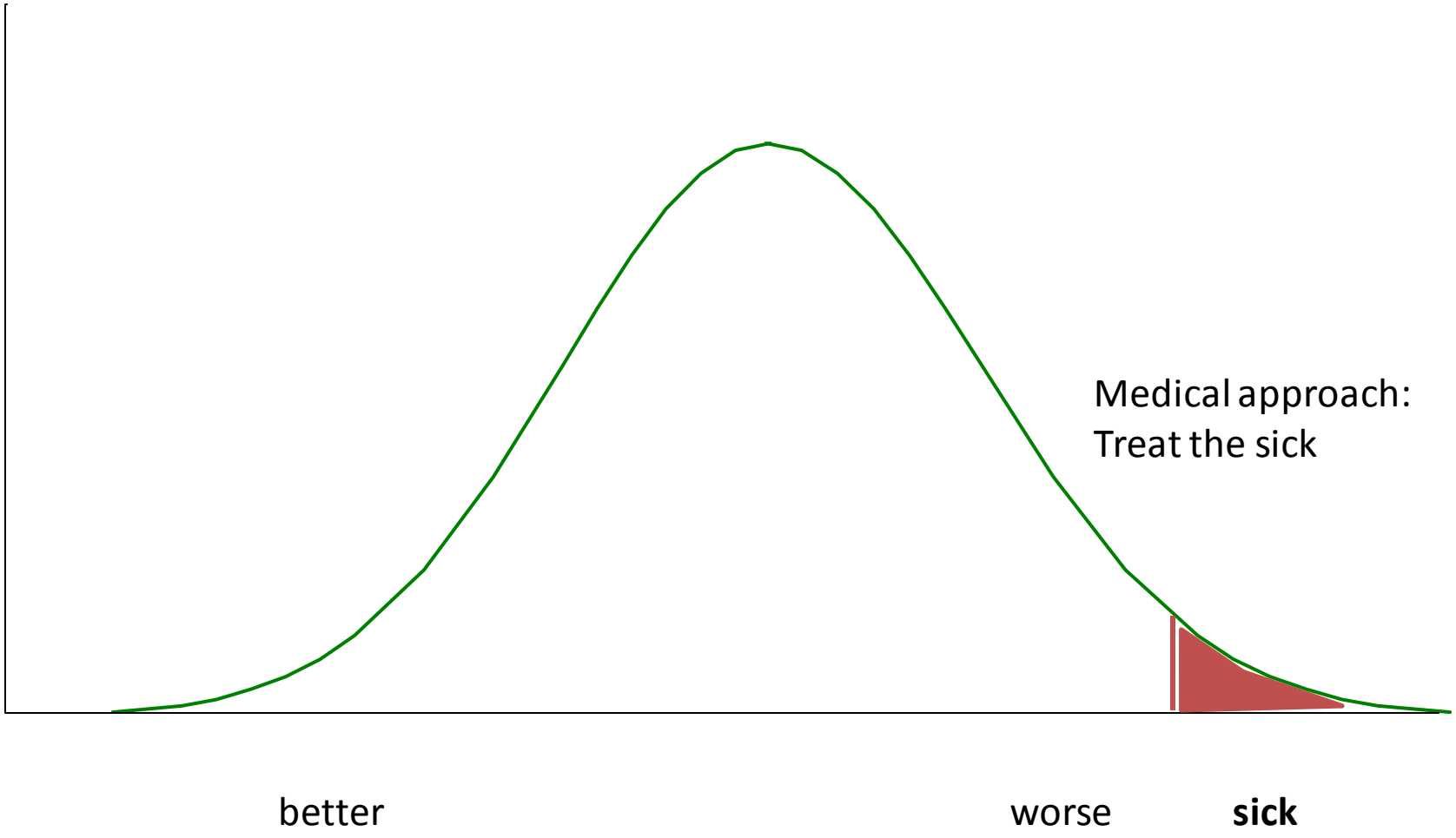
Courtesy of University of Ottowa. Used with permission.

Index of Conceptual Models of Population Health; Society, the Individual and Medicine. The University of Ottowa.
http://www.med.uottawa.ca/sim/data/Models/Default_models_e.htm

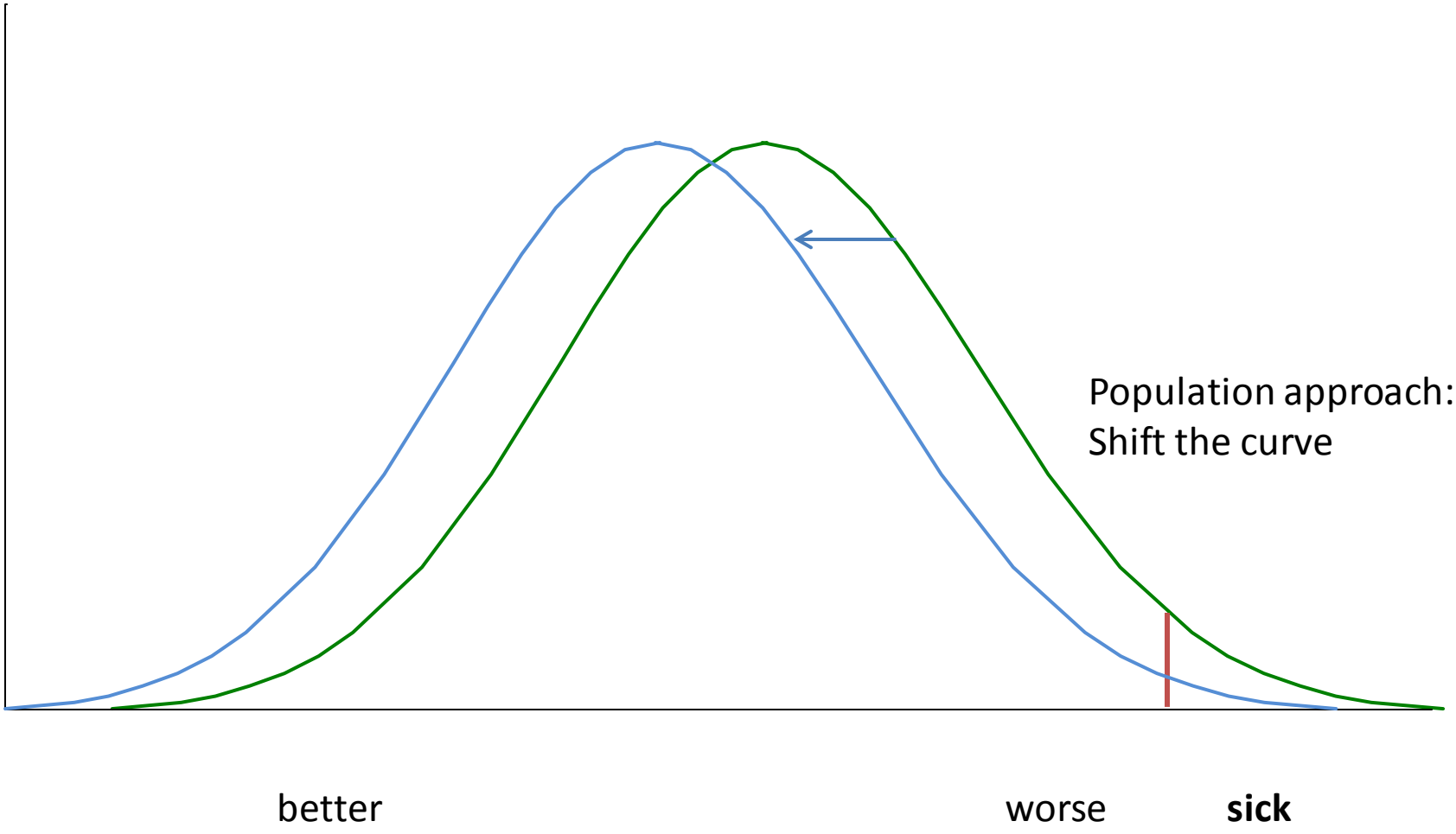
Theories of disease distribution

- Germ theory
- Lifestyle
- Psychosocial
- Social production of disease/political economy of health
- Risk factor epidemiology
- Ecosocial theory

Health + Planning



Health: a population perspective



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11.S941 Healthy Cities: Assessing Health Impacts of Policies and Plans
Spring 2016

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