

## Prevalence of Low Weight-for-recumbent Length, Recumbent Length-for-age, and Weight-for-age Among Infants and Toddlers From Birth to 24 Months of Age: United States, 1999–2000 Through 2015–2016

by Cheryl D. Fryar, M.S.P.H., Margaret D. Carroll, M.S.P.H., and Cynthia L. Ogden, Ph.D., Division of Health and Nutrition Examination Surveys

Undernutrition in children is defined using weight-for-recumbent length, recumbent length-for-age, and weight-for-age. The Centers for Disease Control and Prevention (CDC) recommends using the World Health Organization (WHO) growth standards to monitor growth in children under age 2 years in the United States. The recommended definition of low values in infants is  $-2 z$  scores (corresponding to less than the 2.3rd percentile) on the WHO sex-specific growth standards. Less than the 5th percentile on the corresponding CDC sex-specific growth charts has also been used as a cut point. Consequently, this report presents estimates using both definitions.

Based on the WHO growth standards, results from the 2015–2016 National Health and Nutrition Examination Survey (NHANES), using measured recumbent lengths and weights, indicate that an estimated 1.4% of infants and children under age 24 months have low weight-for-recumbent length, 3.2% have low recumbent length-for-age, and 1.7% have low weight-for-age. Based on the CDC growth charts, 3.9% of infants and toddlers have low weight-for-recumbent length, 5.6% have low recumbent length-for-age, and 7.3% have low weight-for-age. Differences between the WHO and CDC growth charts are described in the references below.

[Table 1](#) shows the unweighted sample sizes for infants and toddlers with measured recumbent length or weight for each survey cycle from 1999–2000 through 2015–2016. [Table 2](#) shows the prevalence of low weight-for-recumbent length, recumbent length-for-age, and weight-for-age among infants and toddlers from birth to 24 months for each survey cycle from 1999–2000 through 2015–2016. The variability of the 2-year estimates over time is consistent with what might be observed in the smaller sample size of infants and toddlers in NHANES.

NHANES uses a stratified, multistage probability sample of the civilian noninstitutionalized U.S. population. A household interview and a physical examination are conducted for each survey participant. During the physical examination, conducted in a mobile examination center, recumbent length and weight are measured as part of a more comprehensive set of body measurements. These measurements are taken by trained health technicians, using standardized measuring procedures and equipment. Observations for persons missing a valid recumbent length or weight measurement are not included in the data analysis.

For additional information on NHANES methods, visit: <https://www.cdc.gov/nchs/nhanes/analyticguidelines.aspx>.

## References

- Grummer-Strawn LM, Reinold C, Krebs NF, Centers for Disease Control and Prevention (CDC). Use of World Health Organization and CDC growth charts for children aged 0–59 months in the United States. *MMWR Recomm Rep* 59(RR–9):1–15. 2010. Available from: <https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5909a1.htm>.
- Kuczmarski RJ, Ogden CL, Guo SS, Grummer-Strawn LM, Flegal KM, Mei Z, et al. 2000 CDC growth charts for the United States: Methods and development. National Center for Health Statistics. *Vital Health Stat* 11(246). 2002. Available from: [https://www.cdc.gov/nchs/data/series/sr\\_11/sr11\\_246.pdf](https://www.cdc.gov/nchs/data/series/sr_11/sr11_246.pdf).
- World Health Organization. WHO child growth standards. Length/height-for-age, weight-for-age, weight-for-length, weight-for-height and body mass index-for-age: Methods and development. 2006. Available from: [http://www.who.int/childgrowth/standards/Technical\\_report.pdf?ua=1](http://www.who.int/childgrowth/standards/Technical_report.pdf?ua=1).

This *Health E-Stat* supersedes the earlier version, “Prevalence of Low Weight-for-recumbent Length, Recumbent Length-for-age, and Weight-for-age Among Infants and Toddlers From Birth to 24 Months of Age: United States, 1999–2000 Through 2013–2014,” available from: [https://www.cdc.gov/nchs/data/hestat/low\\_weight\\_recumbent\\_2013-14/low\\_weight\\_recumbent\\_2013\\_14.htm](https://www.cdc.gov/nchs/data/hestat/low_weight_recumbent_2013-14/low_weight_recumbent_2013_14.htm).

**Table 1. Unweighted sample size for infants and children from birth to 24 months with measured recumbent length or weight: United States, 1999–2000 through 2015–2016**

Survey period	Measured weight and recumbent length	Measured recumbent length	Measured weight
1999–2000	671	672	679
2001–2002	667	839	671
2003–2004	766	767	774
2005–2006	822	822	831
2007–2008	719	719	723
2009–2010	703	703	704
2011–2012	584	584	587
2013–2014	609	610	613
2015–2016	630	630	633

SOURCE: NCHS, National Health and Nutrition Examination Survey.

**Table 2. Low weight-for-recumbent length, recumbent length-for-age, and weight-for-age among infants and children from birth to 24 months: United States, 1999–2000 through 2015–2016**

Survey period	Low weight-for-recumbent length <sup>1,2</sup>		Low recumbent length-for-age <sup>3,4</sup>		Low weight for-age <sup>5,6</sup>	
	WHO growth charts	CDC growth charts	WHO growth charts	CDC growth charts	WHO growth charts	CDC growth charts
	Percent (standard error)					
1999–2000	0.4 (0.3)	3.5 (0.6)	4.9 (1.1)	6.4 (1.2)	1.6 (0.8)	6.1 (1.5)
2001–2002	0.7 (0.5)	4.4 (0.9)	3.3 (0.7)	4.5 (1.0)	0.8 (0.3)	4.9 (0.9)
2003–2004	1.1 (0.6)	*5.5 (1.6)	3.9 (1.1)	5.0 (1.3)	2.5 (0.8)	9.0 (1.6)
2005–2006	1.7 (0.6)	5.7 (1.2)	2.1 (0.8)	3.8 (0.8)	1.2 (0.5)	7.9 (1.4)
2007–2008	1.2 (0.5)	3.6 (1.0)	3.8 (0.7)	7.1 (1.2)	1.4 (0.5)	9.9 (1.7)
2009–2010	0.3 (0.2)	3.0 (0.8)	3.3 (0.7)	5.0 (0.9)	1.1 (0.3)	7.2 (1.0)
2011–2012	0.9 (0.4)	3.6 (0.6)	*3.2 (1.1)	*3.9 (1.1)	0.4 (0.2)	6.4 (1.6)
2013–2014	0.9 (0.6)	3.5 (0.7)	3.4 (0.7)	5.1 (1.1)	0.8 (0.5)	7.7 (1.3)
2015–2016	1.4 (0.6)	3.9 (1.1)	3.2 (0.9)	5.6 (1.0)	1.7 (0.7)	7.3 (1.1)

\* Estimate has a confidence interval width between 5 and 30 and a relative confidence interval width greater than 130% and does not meet standards of reliability or precision; see "National Center for Health Statistics Data Presentation Standards for Proportions," available from: [https://www.cdc.gov/nchs/data/series/sr\\_02/sr02\\_175.pdf](https://www.cdc.gov/nchs/data/series/sr_02/sr02_175.pdf).

<sup>1</sup>Weight less than 2.3rd percentile of weight-for-recumbent length on the sex-specific WHO growth standards.

<sup>2</sup>Weight less than 5th percentile of weight-for-recumbent length on the sex-specific CDC growth charts.

<sup>3</sup>Recumbent length less than 2.3rd percentile of recumbent length-for-age on the sex-specific WHO growth standards.

<sup>4</sup>Recumbent length less than 5th percentile of recumbent length-for-age on the sex-specific CDC growth charts.

<sup>5</sup>Weight less than 2.3rd percentile of weight-for-age on the sex-specific WHO growth standards.

<sup>6</sup>Weight less than 5th percentile of weight-for-age on the sex-specific CDC growth charts.

NOTE: WHO is World Health Organization; CDC is Centers for Disease Control and Prevention.

SOURCE: NCHS, National Health and Nutrition Examination Survey.