# Sleep-related Injury Deaths among Infants in New York City, 2016-2020

From 2016 to 2020 in New York City (NYC), there were a total of 2,289 deaths among infants less than 1 year of age. Injury was the third leading cause, accounting for 11% of all infant deaths. Among these infant injury deaths, 83% were sleep related.
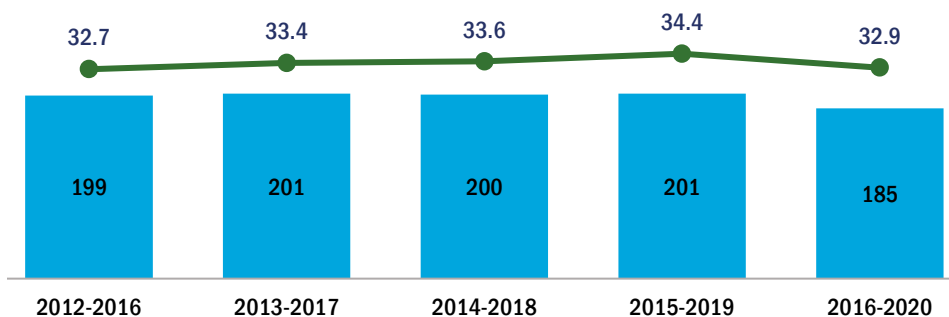
This report reviews trends in the counts and rates of NYC sleep-related infant injury deaths (see definition below). These data include information from medical examiner records regarding unsafe sleep factors; the frequency and prevalence of unsafe sleep practices and risk factors in the infant sleep environment among this subset of injury deaths are presented.

Despite wide-scale safe-sleep education efforts and distribution of cribs and other safe-sleep resources, racial and ethnic inequities in sleep-related infant injury mortality rates remain, often driven by structural racism related to poverty and housing inequality.

Environmental factors such as lack of heat, presence of rodents or pests, and lack of space due to overcrowding influence a caregiver's decision on how and where to place a baby to sleep. These factors must be considered in future intervention efforts.[1]

## Sleep-related infant injury death rate has remained steady since 2012

Sleep-related infant injury death count and rate* (five-year increments), NYC, 2012-2020



| Period | Count | Rate |
|---|---|---|
| 2012-2016 | 199 | 32.7 |
| 2013-2017 | 201 | 33.4 |
| 2014-2018 | 200 | 33.6 |
| 2015-2019 | 201 | 34.4 |
| 2016-2020 | 185 | 32.9 |

*Sleep-related infant injury death rates per 100,000 live births in NYC
Sources: Bureau of Vital Statistics, New York City Department of Health and Mental Hygiene and New York City Office of Chief Medical Examiner, 2016-2020.

- From 2016 to 2020, there were a total of 185 sleep-related injury deaths, an average of 37 infant deaths per year. The rate of sleep-related injury deaths among infants was 32.9 deaths per 100,000 live births in 2016-2020.
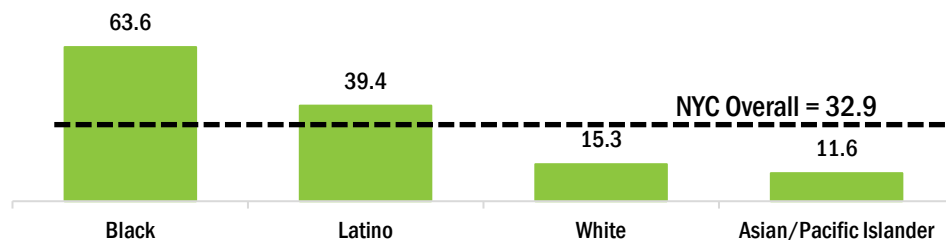
**Definitions: Sleep-related injury death:** Sleep-related injury death among infants are defined as infant deaths (less than 1 year of age) due to select injury causes (accidental suffocation and strangulation in bed – ICD-10 code W75; unspecified threat to breathing – ICD-10 code W84; and undetermined causes – ICD-10 codes Y33 & Y34) when the infant was asleep when last seen alive, with one or more unsafe environmental risk factors present at the time of death. These environmental risk factors are unsafe sleep position, unsafe sleep surface/location, excess bedding, and bed-sharing defined as: **Unsafe sleep position**: any position in which an infant is not placed on the back to sleep (e.g., on their stomach or side). **Unsafe sleep surface/location**: anything other than cribs, bassinettes, or playpen. **Excess bedding**: anything other than a sleep sack and one fitted bed sheet in the infant's sleep environment. **Bed-sharing/co-sleeping**: sleeping with one or more adult or child on the same surface.
**A note on sleep-related death terminology**
In 2022, the American Academy of Pediatrics (AAP) updated its recommendations for reducing infant deaths in a sleep environment. AAP uses the term sleep-related death to encompass both unexplained sudden death in infancy and accidental deaths from suffocation explained by a physical hazard in the sleep environment. This broader group of both unexplained and explained infant deaths is described as Sudden Unexpected Infant Death (SUID). SUID is defined by the National Center for Health Statistics to include deaths with an underlying cause of death of accidental suffocation and strangulation in bed, sudden infant death syndrome, and deaths due to unknown causes. Scientific literature and reporting nationally focus on SUID deaths to explain sleep-related infant deaths. Therefore, our future sleep-related infant mortality review beyond the year 2020 will utilize the SUID data definition in a separate data publication.

## There are racial and ethnic inequities in the rate of sleep-related infant injury death

**Sleep-related infant injury death rate\* by mother's race and ethnicity,\*\* New York City, 2016-2020**



63.6 — Black
39.4 — Latino
15.3 — White
11.6 — Asian/Pacific Islander

NYC Overall = 32.9

\*Sleep-related infant injury death rates per 100,000 live births in the selected population

\*\* Latino includes people of Hispanic origin based on ancestry reported on the birth certificate, regardless of reported race; Latino excludes reported ancestry from non-Spanish speaking Central/South American countries, and non-Spanish speaking Caribbean islands. Black, Asian/Pacific Islander, and white race categories do not include people of Latino origin.

*Sources: Bureau of Vital Statistics, New York City Department of Health and Mental Hygiene and New York City Office of Chief Medical Examiner, 2016-2020.*

- In 2016-2020, the rate of sleep-related injury deaths among infants born to Black mothers (63.6 per 100,000 live births) was more than four times that of white mothers (15.3 per 100,000 live births) and Asian/Pacific Islander mothers (11.6 per 100,000 live births).

- Racial and ethnic inequities in sleep-related infant injury mortality rates are often driven by structural racism related to poverty and housing inequality.

## Infants ages four months or younger are at the highest risk of sleep-related injury death

- In 2016-2020, 81% of sleep-related injury deaths occurred among infants who were four months old or younger.

**Number and percentage of sleep-related injury death among infants by age group, New York City, 2016-2020**



| < 28 days 13% (24) | 28 days to 4 months 68% (125) | 5-12 months 19% (36) |
| --- | --- | --- |

*Sources: Bureau of Vital Statistics, New York City Department of Health and Mental Hygiene and New York City Office of Chief Medical Examiner, 2016-2020.*
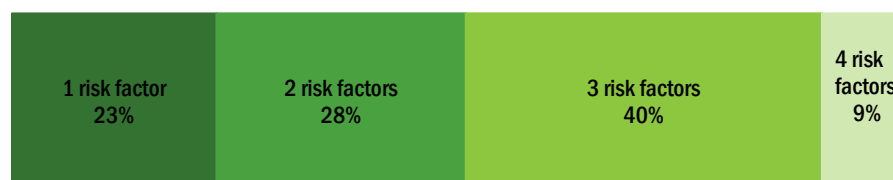
## Three quarters of sleep-related injury deaths involve an unsafe sleep surface and include more than one unsafe environmental risk factor

**Percentage of sleep-related injury death among infants by type of environmental risk factors, NYC, 2016-2020**



Unsafe sleep position — 39%
Bed-sharing/Co-sleeping — 53%
Excess bedding — 74%
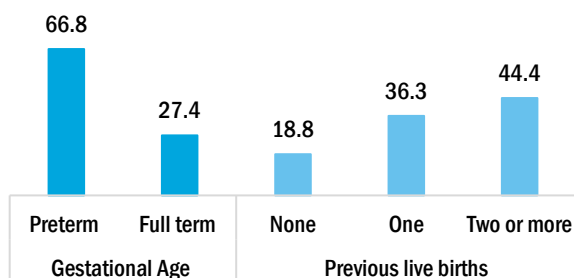Unsafe sleep surface/location — 75%

*Sources: Bureau of Vital Statistics, New York City Department of Health and Mental Hygiene and New York City Office of Chief Medical Examiner, 2016-2020.*

**Percentage of sleep-related injury deaths among infants by number of environmental risk factors, New York City, 2016-2020**



| 1 risk factor 23% | 2 risk factors 28% | 3 risk factors 40% | 4 risk factors 9% |
| --- | --- | --- | --- |

*Sources: Bureau of Vital Statistics, New York City Department of Health and Mental Hygiene and New York City Office of Chief Medical Examiner, 2016-2020.*

- In 2016-2020, the circumstances of 75% of all sleep-related injury deaths among infants involved an unsafe sleep surface or location, 74% included excess bedding, 53% involved bed-sharing, and 39% included an unsafe sleep position.

- Most sleep-related injury deaths among infants involved more than one environmental risk factor: in 2016-2020, 28% of all sleep-related infant injury deaths involved two environmental risk factors, 40% of all sleep-related infant injury deaths involved three environmental risk factors, and 9% of all sleep-related infant injury deaths involved all four environmental risk factors.

# Inequities in sleep-related infant injury death rates are seen across infant and maternal characteristics

**Sleep-related infant injury death rates\* by infant characteristics, New York City, 2016-2020**



**Sleep-related infant injury death rates\* by maternal characteristics, New York City, 2016-2020**
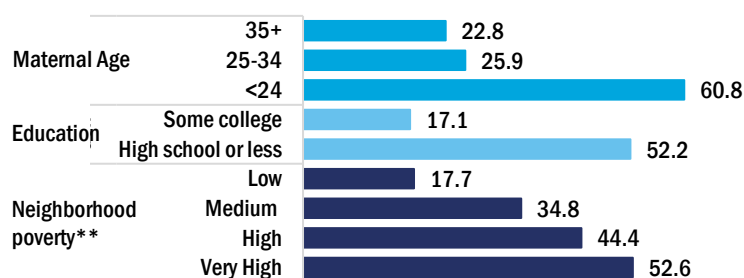


\*Sleep-related infant injury death rates per 100,000 live births in the selected population. Preterm is defined as < 37 weeks gestation.

\*\*Neighborhood poverty is based on census tract, defined as the percentage of residents with incomes below 100% of the federal poverty level (FPL), per American Community Survey 2016-2020. Low poverty: <10% of residents below FPL; medium: 10 to <20%; high: 20 to <30%; very high poverty: ≥30% of residents below FPL.
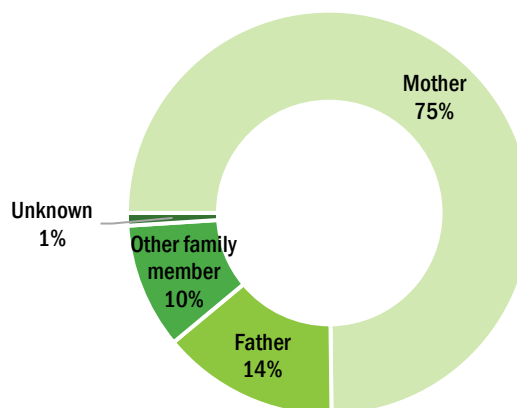
*Sources: Bureau of Vital Statistics, New York City Department of Health and Mental Hygiene and New York City Office of Chief Medical Examiner, 2016-2020.*

- In 2016-2020, the rate of sleep-related injury death in preterm infants (less than 37 weeks gestation) was nearly 2.5 times higher than the rate of sleep-related injury deaths in full-term infants (37 weeks or more gestation).

- The rate of sleep-related injury death among infants was higher among mothers with one or more previous live births compared with those with no previous live births.

- Infants born to mothers who resided in very high-poverty neighborhoods had a rate of sleep-related infant injury death three times higher than those who resided in low-poverty neighborhoods.

- Infants born to mothers who did not have a high school degree or had only a high school degree had a rate of sleep-related infant injury death that was three times higher than those with at least some college education.

- The rate of sleep-related infant injury death among infants born to mothers who were 24 years or younger was more than two times higher than among those born to mothers 25 to 34 years and 35 years or older.

## The focus of safe-sleep education should extend beyond the mother to other caregivers

- In 2016-2020, about a quarter of infant caregivers at the time of sleep-related injury death were not the infant's mother.

- Fathers (14%), other family members including grandparents, siblings, aunts, uncles, cousins (10%); and, caregivers classified as "other" or the relationship was unknown (1%) were the infant caregivers at the time of death.

**Infant caregivers at the time of infant death for sleep-related injury deaths, New York City, 2016-2020**



*Sources: Bureau of Vital Statistics, New York City Department of Health and Mental Hygiene and New York City Office of Chief Medical Examiner, 2016-2020.*

# Recommendations

## Caregivers and parents:

- Follow the American Academy of Pediatrics recommendations for safe sleep:
  - Place infants on their backs for sleep in their own sleep space with no other people.
  - Use a crib, bassinet, or portable play yard with a firm, flat mattress and a fitted sheet. Avoid sleep on a couch or armchair or in a seating device, like a swing or car safety seat (except while riding in the car).
  - Keep loose blankets, pillows, stuffed toys, bumpers, and other soft items out of the sleep space.
  - Breastfeed if possible, and avoid smoking.[2]
- For more safe sleep information and resources, visit nyc.gov/health and search for "safe sleep," or call 311.

## Clinicians:

- Provide safe sleep education as outlined by the American Academy of Pediatrics.[3]
- Discuss barriers to safe sleep practices with pregnant and parenting families. As needed, connect them to social service organizations and government agencies that can provide housing, fix environmental issues in their home (for example, pest infestations, lack of heat), provide breastfeeding support, and other safe sleep resources such as portable cribs and wearable blankets.
- Provide extra support and education to encourage safe sleep practices among families with higher risk of sleep-related injury deaths, including: parents and caregivers of preterm infants and infants less than 4 months old, pregnant and parenting teens less than 24 years old, and parents with more than one child.

## Public health educators, advocates, and policymakers:

- Help reduce racial/ethnic and socioeconomic inequities by combating racism, practicing cultural humility and increasing access to safe, affordable housing, childcare, education, transportation and healthcare.
- Promote peer-to-peer learning and elevate local voices and lived experiences as part of safe sleep education.
- Tailor safe sleep messages and educational materials to their intended audiences as much as possible, ensuring they are culturally and linguistically appropriate.
- Expand safe sleep education beyond the mother and birthing parent to other infant caregivers, especially fathers and extended family (for example, siblings, grandparents, aunts, and uncles).

**REFERENCES**

1. Chu T, Hackett M, Kaur N. Housing influences among sleep-related infant injury deaths in the USA. Health Promotion International. 2015;31(2):396-404.
2. Moon RY, Carlin RF, Hand I. AAP Task Force on Sudden Infant Death; AAP Committee on Fetus and Newborn. Evidence Base for 2022 Updated Recommendations for a Safe Infant Sleeping Environment to Reduce the Risk of Sleep-Related Infant Deaths. Pediatrics. 2022;150(1):e2022057991
3. Moon RY, Carlin RF, Hand I. Sleep-Related Infant Deaths: Updated 2022 Recommendations for Reducing Infant Deaths in the Sleep Environment. Pediatrics. 2022;150(1).

**Health equity** is attainment of the highest level of health and well-being for all people. Not all New Yorkers have the same opportunities to live a healthy life. Achieving health equity requires focused and ongoing societal efforts to address historical and contemporary injustices such as discrimination based on race and ethnicity, and other identities. For more information, visit the World Health Organization's Health Equity webpage.

**Data sources: NYC DOHMH Vital Statistics, 2016-2020:** Data are compiled from death certificates issued in NYC. Cause of death is coded according to the International Statistical Classification of Diseases, 10th Revision (ICD-10) framework. Sleep-related infant injury deaths are determined by the following ICD-10 codes: unintentional/accidental suffocation injury deaths (W75, W84) and injury deaths of undetermined cause and intent (Y33, Y34). For the purpose of this publication, this does not include infant deaths caused by sudden infant death syndrome (R95) or undetermined deaths with natural causes (R97). Infant and maternal demographic data were obtained from infant birth certificates issued in NYC.
**The Office of Chief Medical Examiner (OCME) database, 2016-2020:** Data on all household and sleep environmental risk factors were abstracted from the autopsy report, death certificate, examination report, death investigation report, and scene investigation report.

All Vital Signs are available at NYC.gov/health. To contact NYC Vital Signs, e-mail VitalSigns@health.nyc.gov.